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Vacuum Components and Vacuum Technology

2015/16

Contents

| | |
|---|---------------------------------|
| Oerlikon Leybold Vacuum – Worldwide | Oerlikon Leybold Vacuum |
| Oil Sealed Vacuum Pumps | Oil Sealed Vacuum Pumps |
| Rotary Vane Vacuum Pumps S 1,5, TRIVAC B, TRIVAC E, SOGEVAC | |
| Dry Compressing Vacuum Pumps | Dry Compressing Vacuum Pumps |
| Diaphragm Vacuum Pumps DIVAC | |
| Scroll Vacuum Pumps SCROLLVAC, LEYVAC | |
| Screw Vacuum Pumps SCREWLINE, DRYVAC | |
| Roots Vacuum Pumps | Roots Vacuum Pumps |
| Roots Vacuum Pumps RUVAC | |
| High Vacuum Pumps | High Vacuum Pumps |
| Turbomolecular Pumps TURBOVAC / TURBOVAC MAG | |
| Oil Diffusion Pumps DIP, LEYBOJET, OB | |
| Cryo Pumps, Cold Heads and Compressors COOLVAC / COOLPOWER / COOLPAK | |
| Vacuum Pump Systems | Vacuum Pump Systems |
| Oil sealed and dry compressing Fore Vacuum Pump Systems RUTA | |
| Central Vacuum Supply Systems with SOGEVAC , High Vacuum Pump Systems TMP | |
| High Vacuum Experimentation Systems UNIVEX , Calibration Systems | |
| Vacuum - measuring, controlling | Measuring, controlling |
| Vacuum Gauges with Mechanical Display, Handheld Measurement Instruments, Sensors | |
| Operating Units, Controller, Pressure Switches and Control Instruments | |
| Calibration Service | |
| Leak Detecting Instruments | Leak Detecting Instruments |
| PHOENIX | |
| Flanges and Fittings | Flanges and Fittings |
| ISO-KF-, ISO-K-, ISO-F-, CF- Flange Fittings and Components | |
| Feedthroughs | Feedthroughs |
| ISO-KF-, ISO-K-, CF- Feedthroughs | |
| Valves | Valves |
| Micro Valves; ISO-KF-, ISO-K-, CF- Valves; Special Valves | |
| HV/UHV Gate Valves | |
| Turboradial Blowers | Turboradial Blowers |
| TURBOSTREAM | |
| Oils / Greases / Lubricants | Oils / Greases / Lubricants |
| LEYBONOL Oils, Special Oils, Pump Fluids, Greases | |
| Services | Services |
| Advanced Vacuum Service | |
| Product Index / Inquiry Forms | |

Oerlikon Leybold Vacuum – Worldwide

Oerlikon Leybold Vacuum – Pioneers of Vacuum Technology

In the mid of the 19th century, the company founders Ernst Leybold in Cologne, and Wilhelm Karl Heraeus in Hanau laid the basic building blocks for a high-tech global corporation. With competence and know-how, Oerlikon Leybold Vacuum today continues the life work of those pioneers of vacuum technology.

Oerlikon Leybold Vacuum is part of the Oerlikon Group and focuses on the development, manufacture and sales of vacuum equipment and system solutions for the generation, control and measurement of vacuum, employing more than 1600 employees worldwide. This field of business includes pumps, components and measuring instruments, which find use in a variety of applications ranging from space simulation, basic research, furnaces, to

industrial coating and solar panel manufacture.

This wide range of products is complemented by extensive expertise in designing customer-specific vacuum solutions. Functional, effective products and systems for customer-specific applications are our goal.

Oerlikon Leybold Vacuum acts as a partner for manufacturing industries. Qualified, motivated employees and a high level of innovation guarantee the steady expansion of global market leadership in our areas. This leading position ensures financial soundness and ensures the stability for an optimal support in solving our customers' vacuum technology requirements.

A worldwide service network, comprehensive after-sales services and training

offered by our Leybold Vacuum Academy complement our technical know-how.

The quality of our products and services is paramount. A quality program tailored to our company's structures which also includes the complete supply chain, contributes to a consistent improvement of all our business processes. The benchmark for all quality efforts is the satisfaction of our customers:

- short delivery times,
 - high on-time delivery,
 - highest quality standards
- define our goals and our actions.

An important prerequisite is the certification according to DIN EN ISO 9001 : 2008.

Global Responsibility and Compliance

The Oerlikon Group has established a unique position of leadership throughout the world in providing state-of-the-art technology, products and services. Our products and solutions not only

add value for our customers, they also are at the forefront of efforts to tackle global challenges. Compliance means acting in accordance with the laws, rules, regulations and internal directives

and conducting corporate business such that Oerlikon will deserve and receive recognition as an organisation that fulfils its ethical and legal responsibilities.



Quality Management System
DIN EN ISO 9001 : 2008



Authorized Economic Operator AEO



Customs-Trade Partnership Against
Terrorism C-TPAT

The Sales and Service Network

Think Global – Act Local

Creative innovative industrial solutions for a better life is our vision. Therefore, we aspire to become the world-wide leading vendor of premium high-tech products and services in our branch.

As a reliable business partner we increase value through high-quality innovative industrial solutions. Customer satisfaction through market proximity, speed and reliability requires, apart from our production locations in Europe and China, a world-wide network of sales and service organizations – matching the regionally differing market requirements.

With our own sales subsidiaries, an internationally organized service network, and representative offices in more than 70 countries, Oerlikon Leybold Vacuum has one of the largest sales and after-sales network in the vacuum industry.

With more than 40%, Asia represents the major part of the relevant market. In the Far East, China in particular is gaining importance in the area of semiconductor and display technology, for

example, and the thereby created over proportional market growth.

The Oerlikon Leybold Vacuum sales organizations in Japan, Korea, Taiwan, China and Singapore with the respective further branch offices have attained a competitive edge through their on-location presence, competent consulting, comprehensive training and the rapid service they provide to this region. This is impressively confirmed through the positive business development over recent years.

The increasing importance of the Indian market is recognized through a sales organization located at Pune and Bangalore.

In the USA, Oerlikon Leybold Vacuum maintains a subsidiary consisting of over 20 sales and service locations. Our subsidiary in Brazil maintains our presence in South America.

In Western Europe, Oerlikon Leybold Vacuum is represented by its own companies and field offices in all countries of importance for the vacuum related markets.



Oerlikon Leybold Vacuum Dresden GmbH



Oerlikon Leybold Vacuum USA Inc., Export, Pa., USA



Oerlikon Leybold Vacuum GmbH, Cologne



Oerlikon Leybold Vacuum (Tianjin), P.R. China



Oerlikon Leybold Vacuum France S.A., Valence, France

The ideal connection

Your current source of information
www.oerlikon.com/leyboldvacuum

Vacuum Components

Vacuum Systems

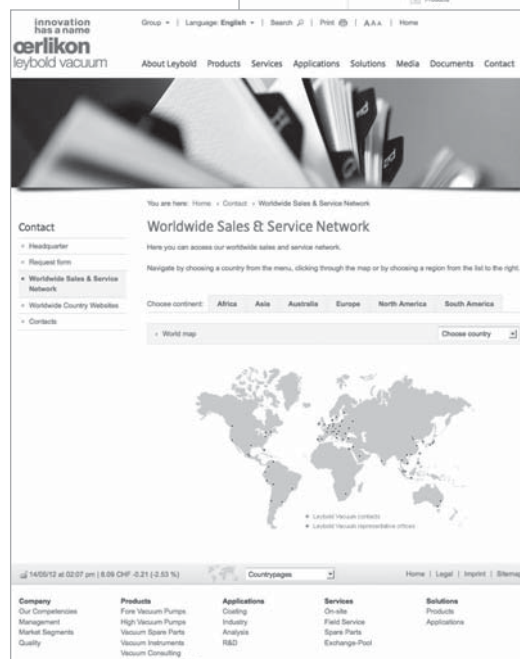
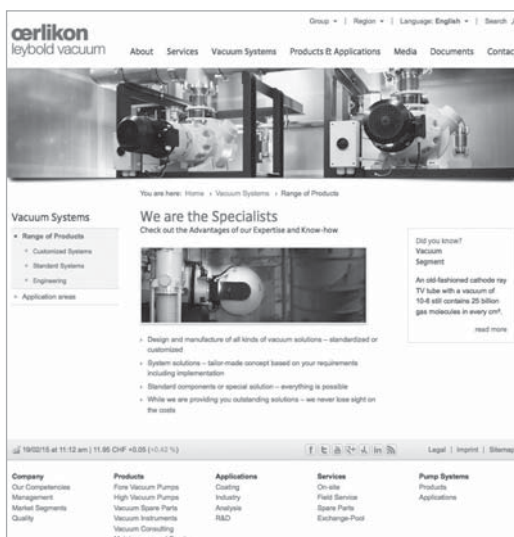
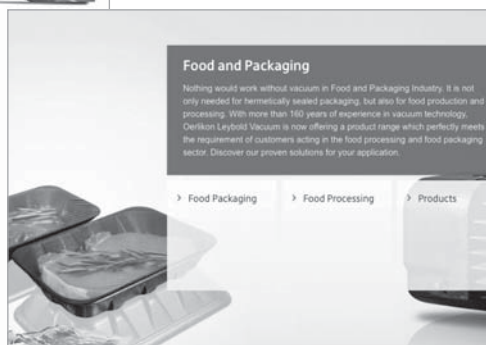
Vacuum Service

Online Catalog

Documentation

Contact Data

Microsites



Oerlikon Leybold Vacuum Academy

For further information on a wide range of courses in vacuum technology please contact the Oerlikon Leybold Vacuum Training Center in Cologne:

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We would like to point out that also courses are given in the Oerlikon Leybold Vacuum Training Center in Great Britain:

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The latest information about our seminars including content and time schedule is available on the Internet:
“www.oerlikon.com/leyboldvacuum”.

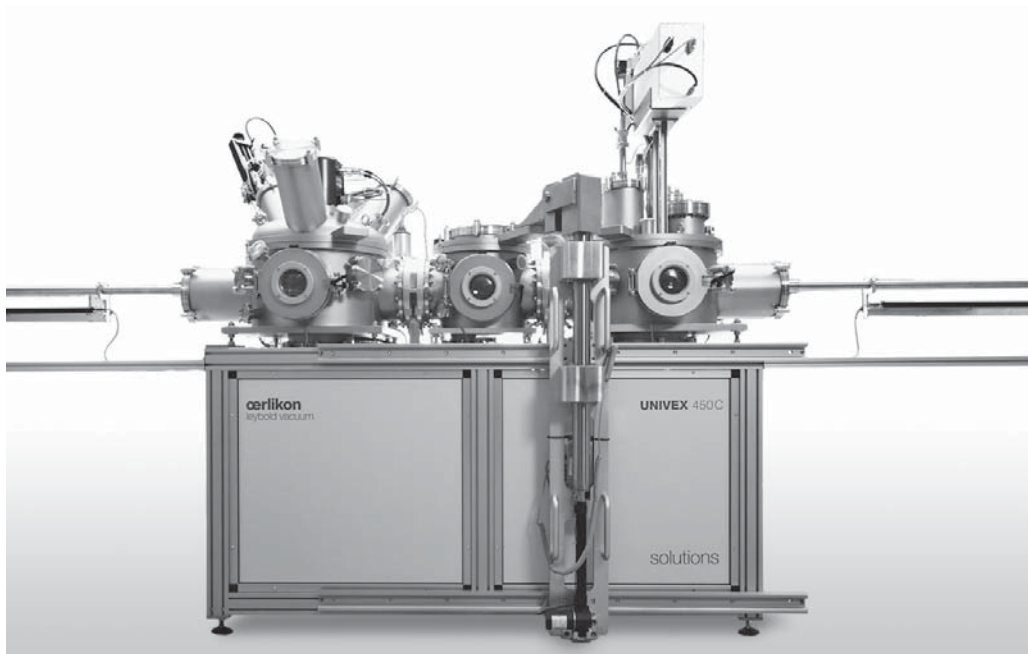
Oerlikon Leybold Vacuum – Solutions

Tailor-made vacuum solutions start with a good customer dialogue ...

Together with our customers, we develop worldwide individual products and services around the implementation of vacuum pumps aimed at providing a full solution.

The scope of our solutions here spans from custom bundling of products and services to handling of complete value-added processes.

We deliver to you solutions for your vacuum engineering tasks whereby we cover every aspect – from engineering to after sales service.



We deliver custom solutions for your specific requirements.

Frequently the requirements are so exceptional that smooth operation is fully dependent on the vacuum technology.

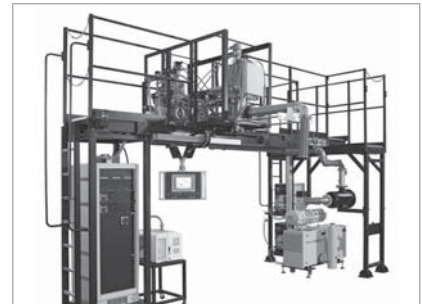
Space simulation chambers for the engineering assessment of materials for space shuttle flights or for the largest

mass spectrometer of the world are only two examples, which require consulting, design and technology on the highest level.

Wherever you are – we are at your side.

Thanks to our worldwide centres of competence we have available solution experts who thus are also close by you at all times. Through this network, we not only ensure a direct and close contact with our customers but also maintain through this network uniform global quality standards.

For Solutions, the aspirations of high quality imply a comprehensive customer service as well as consulting and engineering services. In connection with highly complex systems, which are chiefly deployed in production facilities, the engineering service plays a central role.

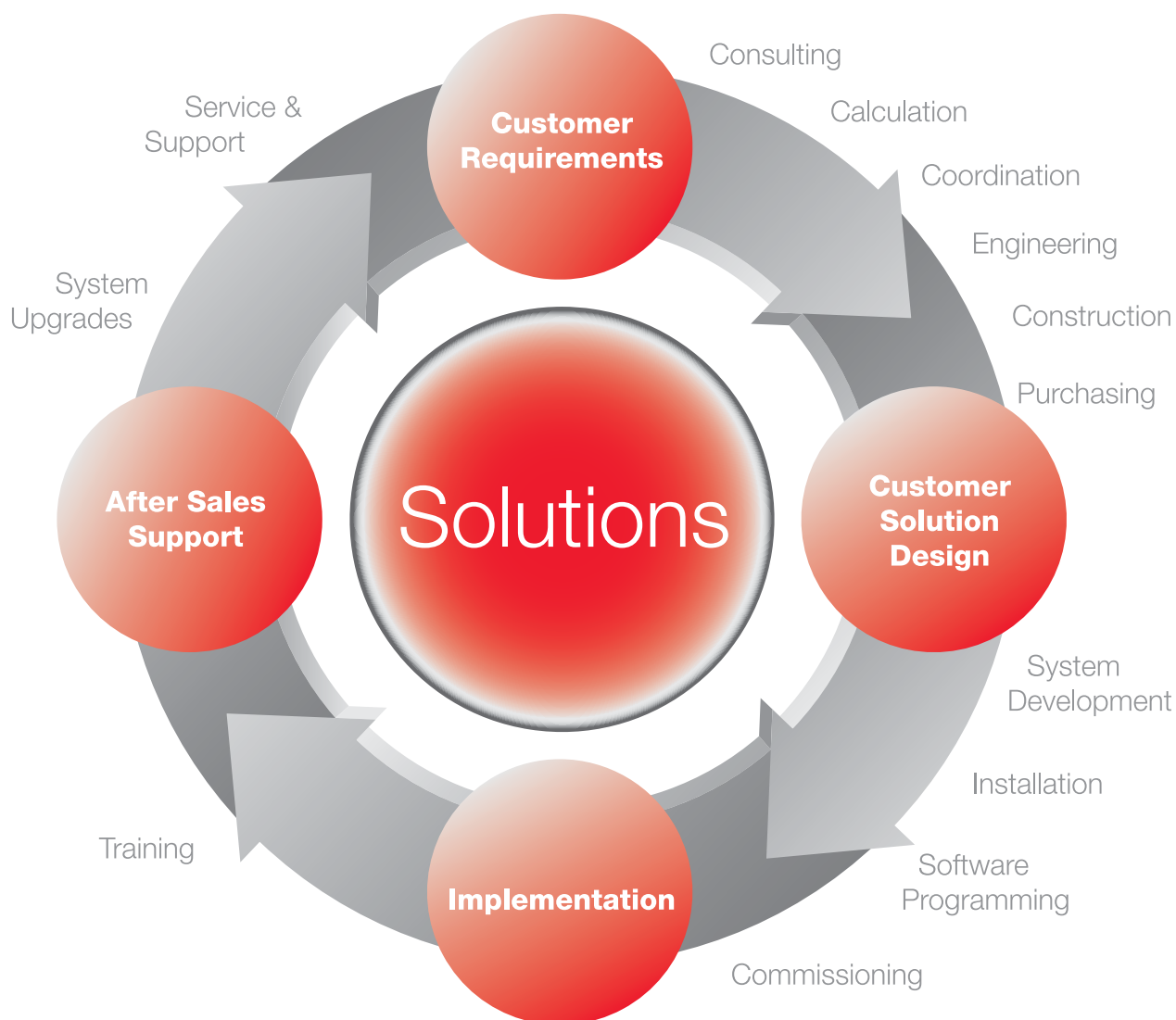
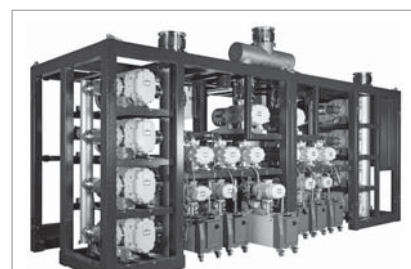
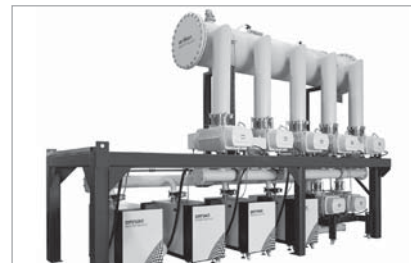


... and that is by far not all.

**The complete solution –
perfection from simple to
complex.**

Many industrial processes are based on prolonged, engineering-wise complex scientific trials, which need to be run as efficiently as possible. Also for experimentation systems, Oerlikon Leybold Vacuum – Solutions is in a position to provide interesting solutions:

- Universal systems for the production of functional coatings
- Modular system concepts, comprehensive range of accessories
- Custom system solutions based on customer specifications
- Variable chamber sizes
- Manual or fully automatic process control and system control



Areas of Application

Many things are possible with vacuum

The pleasure of beholding a thing of beauty, the enjoyment of listening to a clear sound, the need for ultra-high strength materials, the demand for ever-higher performance products – these are just some things made possible by vacuum technology. In practical terms, this may involve the coating of surfaces, the enhancing of CDs, the fabrication of high-strength components, and the manufacture of compact yet powerful computers.

With Oerlikon Leybold's vacuum technology life's necessities and what makes life more pleasant can be produced with greater precision, more economically and, above all, in a manner friendlier to the environment. The titanium coating on your watch, for example, or the anti-reflective coating on your eyeglasses, the high-capacity hard disk in your computer, your high quality videotapes, the long-lasting

reliable packaging of your food, the high-strength turbine blades that make an aircraft more dependable, the flat-panel displays in small and light-weight notebooks and much, much more.

The applications and demands placed upon our products are numerous and, depending on the application, amazingly varied.





Members of the Oerlikon Leybold Vacuum staff from sales, marketing, applications consulting and product development are in continuous contact with technology specialists. This guarantees that any application-specific requirements are considered in advance and can be incorporated at an early stage during product development.

Our customers are not buying just vacuum components – they are buying functional, application oriented products for individual solutions.

Products

| | Applications | | | | | | | | | | | | | | | | | |
|--|--------------------------|----------------|--------------------------|--------------------------------|--------------------------|---------------------|-----------------------------|---------------------|------------------|-----------|------------------|------------------------|--------------------------|------------------------------|------------------------|------------------------|------------------|--------------|
| | Semiconductor production | Vacuum coating | Research and development | Loadlock and transfer chambers | Chemistry/Pharmaceutical | Metallurgy/Furnaces | Lamps and tubes manufacture | Automotive industry | Laser technology | Packaging | Space simulation | Analytical engineering | Environment technologies | Cooling and air-conditioning | Electrical engineering | Mechanical engineering | Paper / Printing | Solar energy |
| TRIVAC B and E rotary vane vacuum pumps | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| SOGEVAC rotary vane vacuum pumps | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| DIVAC diaphragm vacuum pumps | | | ■ | | ■ | ■ | ■ | | | ■ | | | | ■ | ■ | | | |
| SCROLLVAC oil-free scroll vacuum pumps | | ■ | ■ | ■ | | ■ | | ■ | | | ■ | | ■ | ■ | | | | |
| LEYVAC dry compressing vacuum pumps | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | | ■ | | ■ | ■ | | | ■ |
| SCREWLINE dry compressing vacuum pumps | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | | ■ | | ■ | ■ | | | ■ |
| DRYVAC dry compressing vacuum pumps | | ■ | ■ | ■ | | ■ | | ■ | ■ | | | ■ | ■ | | | | | |
| CHEMROVAC dry compressing vacuum pumps | | | | ■ | | | | | | | ■ | | | | | | | |
| RUUVAC Roots vacuum pumps | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | | ■ | ■ | ■ | ■ | ■ |
| Magnetically suspended turbomolecular pumps | ■ | ■ | ■ | ■ | | | | | | ■ | | | | | | | | ■ |
| Mechanically suspended turbomolecular pumps | ■ | ■ | ■ | ■ | | ■ | ■ | | | ■ | | | | | | | | ■ |
| DIP, LEYBOJET and OB oil diffusion pumps | | ■ | ■ | | | ■ | ■ | ■ | | ■ | ■ | | | ■ | | | | |
| Refrigerator cryopumps | ■ | ■ | ■ | ■ | | ■ | | | | ■ | ■ | | | | | | | ■ |
| Refrigerator cryostats | | | ■ | | | | | | | | | | | | | | | |
| RUTA vacuum pump systems | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ |
| PT turbomolecular pump systems | | ■ | ■ | | | ■ | ■ | | | ■ | ■ | | | ■ | ■ | | | |
| UNIVEX high vacuum experimentation systems | | ■ | ■ | | | | | | | | ■ | | | ■ | | | | |
| Total pressure gauges | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
| Leak detecting instruments | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
| Valves and flange components (ISO-KF, ISO-K, ISO-F, CF) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TURBOSTREAM turboradial blowers | | | | | | | ■ | | | | | | | | | | | |

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The latest information is available on
the internet
"www.oerlikon.com/leyboldvacuum".

Symbols used in Vacuum Technology





















Vacuum Symbols

All symbols, except those marked ¹⁾ may be used in any orientation.

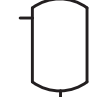

The symbols for vacuum pumps should always be so positioned that the narrowing lines point to the side of higher pressure.

¹⁾ These symbols must only be used in the indicated position (tip of the triangle pointing downwards)




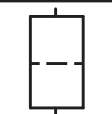





Vacuum Pumps

| | | | | | |
|---|-----------------------------------|---|---------------------------|---|---------------------------------|
|  | Vacuum pump, general |  | Piston vacuum pump |  | Diaphragm vacuum pump |
|  | Rotary positive displacement pump |  | Rotary piston vacuum pump |  | Sliding vane rotary vacuum pump |
|  | Rotary plunger vacuum pump |  | Liquid ring vacuum pump |  | Roots vacuum pump |
|  | Turbine vacuum pump, general |  | Turboradial vacuum pump |  | Turboaxial vacuum pump |
|  | Turbomolecular pump |  | Ejector vacuum pump |  | Diffusion pump |
|  | Adsorption pump |  | Getter pump |  | Sputter-ion pump |
|  | Cryopump |  | Scroll vacuum pump | | |


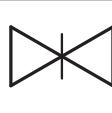

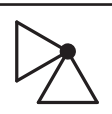
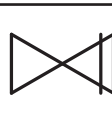

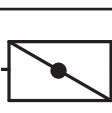


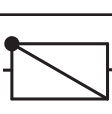
Container

| | | | |
|---|-----------------------------------|---|-----------------|
|  | Vessel with crowned ends, general |  | Vacuum bell jar |
|---|-----------------------------------|---|-----------------|







Accessories

| | | | | | |
|---|--|---|--|---|--|
|  | Seperator, general |  | Seperator with heat exchange, (e. g. cooled) |  | Gas filter, air filter, general |
|  | Filter or filter device, general |  | Vapour baffle, general |  | Vapour baffle, cooled (with heat exchange) |
|  | Cold trap, general |  | Cold trap with supply reservoir |  | Cold trap |










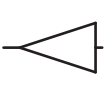









Isolating Devices

| | | | | | |
|---|------------------------------|---|---|---|--|
|  | Shut-off fitting, general |  | Gate valve |  | Shut-off valve, Straight-line valve |
|  | Right-angle valve |  | Shut-off device with safety function |  | Stopcock |
|  | Butterfly valve |  | Right-angle stopcock |  | Three-way stopcock |
|  | Check valve | | | | |








Valve Actuation

| | | | | | |
|---|--------------------|---|----------------------|---|--|
|  | Manual operation |  | Metering valve |  | Fluid drive (hydraulic or magnetic) |
|  | Solenoid operation |  | Electric motor drive |  | Weight-actuated |

Connections and Piping

| | | | | | |
|---|--|---|---|---|---|
|  | Flange connector, general |  | Flange connector, bolted |  | Small flange connector |
|  | Clamped flange connector |  | Threaded pipe connector |  | Ball-and-socket joint |
|  | Spigot-and-socket joint |  | Connection by taper ground joint |  | Flange connector, general |
|  | Change in pipe cross section (e.g. reducer nipple) |  | Junction of two pipes with communication |  | Cross-over of two pipes without communication |
|  | Branch point |  | Bundle pipes |  | Port allowing sliding motion, with flange |
|  | Linear motion feedthrough |  | Rotary and linear motion feedthrough |  | Rotary motion feedthrough |
|  | Electric current feedthrough | | | | |

Vacuum Measurement and Gauges

| | | | | | |
|---|--|---|--|---|---|
|  | ¹⁾ Vacuum (to indicate the presence of a vacuum) |  | ¹⁾ Vacuum measurement, Vacuum measurement point |  | ¹⁾ Vacuum gauge |
|  | ¹⁾ Recording vacuum gauge (writing) |  | ¹⁾ Vacuum gauge with analogue display |  | ¹⁾ Vacuum gauge with digital display |
|  | Flow measurement | | | | |

¹⁾ These symbols must only be used in the indicated position (tip of the triangle pointing downwards)

Pressure Units

| | bar | mbar | Pa | atm | Torr | mTorr |
|---|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|
| 1 bar | 1 | 10 ³ | 10 ⁵ | 0.987 | 0.750 x 10 ³ | 0.750 x 10 ⁶ |
| 1 mbar | 10 ⁻³ | 1 | 10 ² | 0.987 x 10 ⁻³ | 0.750 | 0.750 x 10 ³ |
| 1 Pa ¹⁾ (N · m ⁻²) | 10 ⁻⁵ | 10 ⁻² | 1 | 0.987 x 10 ⁻⁵ | 0.750 x 10 ⁻² | 0.750 x 10 ¹ |
| 1 atm = 760 Torr | 1.01 | 1.01 x 10 ³ | 1.01 x 10 ⁵ | 1 | 0.760 x 10 ³ | 0.760 x 10 ⁶ |
| 1 Torr | 1.33 x 10 ⁻³ | 1.33 | 1.33 x 10 ² | 1.32 x 10 ⁻³ | 1 | 10 ³ |
| 1 mTorr | 1.33 x 10 ⁻⁶ | 1.33 x 10 ⁻³ | 1.33 x 10 ⁻¹ | 1.32 x 10 ⁻⁶ | 10 ⁻³ | 1 |

¹⁾ Pa = Pascal

All dimensions given in the technical drawings are stated in mm.
Dimensions in () are stated in inch.

The products of Oerlikon Leybold Vacuum are subject to continual further development; thus the technical data or the dimensional drawings are subject to change without prior notice.

On the basis of international agreements (ISO/R 1000) and the regulations which apply in the Federal Republic of Germany based on these (laws on the units used in metrology) as well as the Vacuum Engineering Standards (DIN 28 400 and subsequent numbers) we have adapted the characteristic quantities stated in this catalog to the current regulations.

The table gives the conversion factors between commonly used pressure units.

$$1 \text{ mbar} \times l \times s^{-1} \equiv 60 \text{ sccm}$$

Pressure Units

Conversion Factors

| | |
|--------------|------------------------------|
| 1 inch | 2.54 cm |
| 1 ft | 30.48 cm |
| 1 sq inch | 6.45 cm ² |
| 1 sqft | 0.0929 m ² |
| 1 cu inch | 923.03 cm ³ |
| 1 cu ft | 28.32 liter |
| 1 US gallon | 3.78 liter |
| 1 Imp gallon | 4.54 liter |
| 1 micron | 1.33 x 10 ⁻³ mbar |
| 1 US qt | 0.946 liter |
| 1 Imp qt | 1.137 liter |
| 1 lb | 0.453 kg |
| 1 hp | 735 W |
| 1 r.p.m. | 1 min ⁻¹ |

Temperature

| °C | °F |
|-----|-----|
| 0 | 32 |
| 10 | 50 |
| 20 | 68 |
| 30 | 86 |
| 40 | 104 |
| 50 | 122 |
| 60 | 140 |
| 70 | 158 |
| 80 | 176 |
| 90 | 194 |
| 100 | 212 |

$$^{\circ}\text{F} = 1.8 \times ^{\circ}\text{C} + 32$$

Pressure

| psi | bar |
|------|------|
| 1.0 | 0.07 |
| 10 | 0.70 |
| 14.5 | 1.00 |
| 20 | 1.38 |
| 30 | 2.07 |
| 40 | 2.76 |
| 50 | 3.45 |
| 60 | 4.14 |
| 70 | 4.83 |
| 80 | 5.51 |
| 90 | 6.20 |
| 100 | 6.90 |

Various pressure units

| mbar (millibar) | Torr | inches Hg vacuum |
|--------------------|------|---------------------|
| 1013 | 760 | 0 |
| 400 | 300 | 18.12 |
| 133 | 100 | 25.98 |
| 4 | 3 | 29.80 |
| 1 | 0.75 | 29.89 |
| 0 | 0 | 29.92 |

Various pumping speed units

| | m ³ x h ⁻¹ | l x s ⁻¹ | cfm |
|--|----------------------------------|---------------------|-------|
| m ³ x h ⁻¹ = m ³ /h | 1.0 | 0.278 | 0.589 |
| l x s ⁻¹ = l/s | 3.60 | 1.0 | 2.12 |
| cfm (cubic feet per minute) | 1.699 | 0.472 | 1.0 |

Example: 1 m³ x h⁻¹ = 0.589 cfm

Please note: The nominal pumping speed of a pump at 60 Hz is 20% higher than at 50 Hz

Dimensions

| Inches | Inches | mm |
|--------|--------|---------|
| 1/8 | 0.1250 | 3.1750 |
| 1/4 | 0.2500 | 6.3500 |
| 3/8 | 0.3750 | 9.5250 |
| 1/2 | 0.5000 | 12.7000 |
| 3/4 | 0.7500 | 19.0500 |
| 1/1 | 1.0000 | 25.4000 |

Various flow rate units

| | mbar x l x s ⁻¹ | kg x h ⁻¹ | cm ³ x s ⁻¹ | slm |
|---|----------------------------|--------------------------|-----------------------------------|-------------------------|
| mbar x l x s ⁻¹ | 1.0 | 4.28 x 10 ⁻³ | 0.987 | 59.2 x 10 ⁻³ |
| kg x h ⁻¹ (0 °C) | 218 | 1.0 | 215 | 12.91 |
| cm ³ x s ⁻¹ (NTP) | 2.81 x 10 ⁻⁴ | 1.2 x 10 ⁻⁶ | 1.0 | 1.66 x 10 ⁻⁵ |
| slm (standard liter per minute) | 16.88 | 72.15 x 10 ⁻³ | 16.67 | 1.0 |

The booklet “Fundamentals of Vacuum Technology” covers on 234 pages in an easily comprehensible and clear manner all relevant aspects of vacuum technology.

Through 16 chapters the reader learns about all important aspects of handling “vacuum”.

Besides the fundamentals of vacuum physics, the field of vacuum technology beginning with vacuum generation, vacuum measurement and ending with leak detection and vacuum coating processes is described in detail.

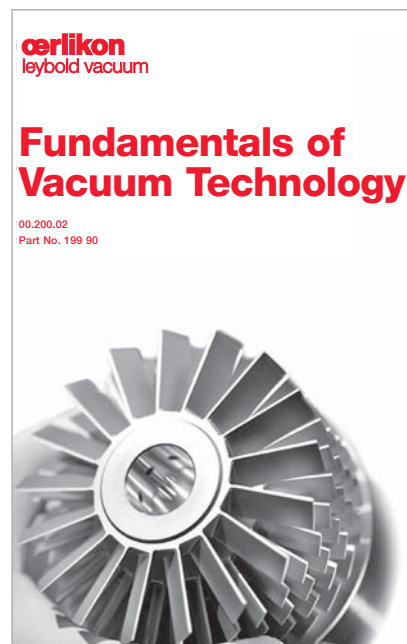
The compilation explains the different pumping principles employed for generating a vacuum, assists in the selection of a suitable pumping process, dimensioning of the necessary pump size as well as designing a vacuum system.

A separate chapter deals with the measurement of low pressures, pressure monitoring, pressure regulation and control.

Further fields of vacuum technology like mass spectrometric gas analysis at low pressures, leak detection or vacuum engineering applications like coating processes and film thickness measurements are described too. Also recommended and indispensable are the numerous practice related operating hints for vacuum systems.

This booklet is of interest to beginners and vacuum experts alike.

Numerous tables, formulae and diagrams, as well as the explanation of vacuum engineering standards, supplement the material for a deeper understanding of all vacuum technology aspects.



Ordering Information

Fundamentals of Vacuum Technology

| | Part No. |
|-----------------------------------|----------|
| Fundamentals of Vacuum Technology | 199 90 |

Contents

Oil Sealed Vacuum Pumps

Rotary Vane Vacuum Pumps **TRIVAC** 24

General

| | |
|---|----|
| Applications for TRIVAC pumps | 24 |
| Accessories for TRIVAC pumps | 25 |
| Oil for TRIVAC pumps, for different fields of application | 26 |
| Oil for TRIVAC pumps, for different pump types | 27 |

Products

| | |
|---|----|
| Small Compact Pump S 1,5 | 28 |
| TRIVAC E, Two-Stage Rotary Vane Vacuum Pump | 30 |
| TRIVAC B, Two-Stage Rotary Vane Vacuum Pumps | 34 |
| TRIVAC D 4 B and D 8 B | 38 |
| TRIVAC D 16 B and D 25 B | 42 |
| TRIVAC D 40 B and D 65 B | 46 |
| TRIVAC D 16 B-DOT to D 40 B-DOT | 50 |
| TRIVAC D 65 B ³ He | 54 |
| TRIVAC D 16 B-Ex (Explosion Protected and Pressure Burst Resistant) | 56 |
| TRIVAC BCS, Two-Stage Rotary Vane Vacuum Pumps | 58 |
| TRIVAC D 16 BCS to D 65 BCS | 60 |
| TRIVAC D 16 BCS-PFPE to D 65 BCS-PFPE | 64 |
| Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE | 68 |

Accessories for TRIVAC E, B and BCS

Global Versions

| | |
|--|----|
| Exhaust Filters AF 8 to AF 25 | 76 |
| Condensate Traps AK 8 to AK 25 | 76 |
| Exhaust Filters AF 4-8 to AF 40-65 | 78 |
| Exhaust Filters AF 16-25 DOT and AF 40-65 DOT | 78 |
| Exhaust Filters with Lubricant Return | |
| ARP 4-8 and AR 4-8 to AR 40-65 | 80 |
| ARS 16-25 and ARS 40-65 | 81 |
| Exhaust Filter Drain Tap | 82 |
| Oil Drain Tap | 82 |
| Oil Drain Kit | 82 |
| Oil Suction Facility AR-V Controlled by Solenoid Valve | 83 |
| Manually Operated Oil Suction Facility AR-M | 83 |
| Condensate Separators AK 4-8 to AK 40-65 | 84 |
| Dust Filters FH/DF, DN 16 KF to DN 40 KF | 85 |
| Adsorption Traps FH/RF, DN 16 KF to DN 40 KF | 86 |
| Cold Trap TK 4-8 | 87 |
| Dust Separators AS 8-16 and AS 30-60 | 88 |
| Molecular Filters MF 8-16 and MF 30-60 | 88 |
| Mechanical Oil Filters OF 4-25 and OF 40-65 | 90 |
| Chemical Oil Filters CF 4-25 and CF 40-65 | 90 |
| Chemical Filters with Safety Isolation Valve CFS 16-25 and CFS 40-65 | 92 |

| | |
|---|----|
| Inert Gas System IGS 16-25 and IGS 40-65 | 93 |
| Limit Switch System LSS 16-25 and LSS 40-65 | 94 |
| Roots Pump Adaptor | 95 |

Versions for the North and South American Continents

| | |
|----------------------------------|----|
| RST Refillable Traps | 96 |
| SE Smoke Eliminator | 97 |
| Compact Oil Mist Exhaust Filters | 98 |

General Accessories

| | |
|---------------------------|----|
| Flange Components, Valves | 99 |
|---------------------------|----|

Miscellaneous

| | |
|--------------|-----|
| Services | 100 |
| 60 Hz Curves | 103 |

Rotary Vane Vacuum Pumps SOGEVAC 105

General

| | |
|--|-----|
| Applications for SOGEVAC pumps | 105 |
| Oil for SOGEVAC pumps, for different fields of application | 106 |
| Oil for SOGEVAC pumps, for different pump types | 107 |
| Product Range, Features and Design | 108 |

Products

| | |
|---|-----|
| SOGEVAC .. B | |
| SV 10 B / SV 16 B | 110 |
| SV 25 B | 112 |
| SV 40 B / SV 65 B | 114 |
| SV 100 B | 118 |
| SV 120 B | 122 |
| SV 300 B | 126 |
| SV 470 B(F) / SV 570 B(F) | 130 |
| SV 500 B | 134 |
| SV 630 B / SV 630 BF / SV 750 B(F) | 138 |
| SOGEVAC .. BI | |
| SV 28 BI | 142 |
| SV 40 BI | 146 |
| SOGEVAC | |
| SV 200 | 148 |
| SV 1200 | 152 |
| SOGEVAC .. D | |
| SV 16 D and SV 25 D | 156 |
| Pumps Prepared with PFPE for Use with Oxygen | 160 |
| SOGEVAC .. ATEX | |
| SV 40 ATEX (Explosion Protected and Pressure Burst Resistant) | 162 |
| ATEX Category 2 Pumps | 166 |
| ATEX Category 3 Pumps | 168 |

Accessories

Global Versions

| | |
|--|-----|
| Double Inlet Filter and Roots Adapter TwinFilter 500 | 170 |
| Dust Filters (Suction Side) | 174 |
| Dust Filters F (Suction Side) (Version for the North and South American Continents) | 176 |
| SL Liquid Traps | 178 |
| SEP Separators | 180 |
| SEPC Condensers | 180 |
| Gas Ballast Valve | 182 |
| Thermal Switch | 182 |
| Mobile Base Frame | 184 |
| Noise Enclosure | 185 |
| Mounting Accessories | 186 |
| Exhaust Filter Gauge | 187 |
| Ball Valves and Valves | 188 |
| Bourdon Vacuum Gauges | 190 |
| DIAVAC DV 1000 | 190 |

Versions for the North and South American Continents

| | |
|--------------------------------------|-----|
| External Carbon Exhaust Filter | 191 |
|--------------------------------------|-----|

Global Versions

| | |
|---|-----|
| Connection Fittings | |
| for SOGEVAC SV 10 B, SV 16, SV 16 B, SV 16 D, SV 25, SV 25 B, SV 25 D | 192 |
| for SOGEVAC SV 40 B, SV 65 B, SV 100 B | 194 |
| for SOGEVAC SV 200, SV 300 B | 196 |
| for SOGEVAC SV 470 B(F) / SV 570 B(F) | 198 |
| for SOGEVAC SV 500 B, SV 630 B(F), SV 750 B(F) | 200 |
| for SOGEVAC SV 1200 | 202 |
| 60 Hz Curves | 204 |

Special Accessories for Rotary Vane Vacuum Pumps **TRIVAC** and **SOGEVAC**

Versions for the North and South American Continents

| | |
|--|-----|
| Combination Filter, Vacuum Pump Inlet Filter | 212 |
|--|-----|

Applications for TRIVAC pumps

| Pumps | S 1.5 | TRIVAC D 2.5 E | TRIVAC D 4 B | TRIVAC D 8 B | TRIVAC D 16 B | TRIVAC D 25 B | TRIVAC D 40 B | TRIVAC D 65 B | TRIVAC D 16 B-DOT and D 25 B-DOT | TRIVAC 40 B-DOT | TRIVAC D 65 B ³ He | TRIVAC D 16 B-Ex | TRIVAC D 16 BCS, D 25 BCS | TRIVAC D 40 BCS | TRIVAC D 65 BCS | TRIVAC D 16 + D 25 BCS-PFPE | TRIVAC D 40 BCS-PFPE | TRIVAC D 65 BCS-PFPE |
|---|-------|----------------|--------------|--------------|---------------|---------------|---------------|---------------|----------------------------------|-----------------|-------------------------------|------------------|---------------------------|-----------------|-----------------|-----------------------------|----------------------|----------------------|
| Applications | | | | | | | | | | | | | | | | | | |
| Production of semiconductors | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Vacuum coating | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | |
| Research and development | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | | | ■ | ■ | | | | | |
| Chemistry/pharmaceuticals | | ■ | | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Metallurgy/furnaces | | | | | | ■ | ■ | | | | | | | | | | | |
| Lamps and tubes manufacture | | ■ | ■ | ■ | ■ | | ■ | ■ | | | | | | | | | | |
| Automotive industry | | ■ | | ■ | ■ | | | ■ | ■ | | | | | | | | | |
| Laser engineering | ■ | | | | | | | | | | | | | | | | | |
| Space simulation | | | | | | ■ | ■ | | | | | | | | | | | |
| Analytical engineering | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | |
| Environment engineering | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | |
| Cooling and air-conditioning | ■ | | ■ | ■ | ■ | ■ | ■ | | | ■ | | | | | | | | |
| Electrical engineering | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | |
| Mechanical engineering | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | |
| Medicine technology | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | |
| Vacuum drying cabinets | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | |
| Chemistry and research labs | | ■ | ■ | ■ | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| Freeze drying systems | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | |
| Backing pump for high vacuum pump systems | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Leak detectors | | ■ | | | ■ | ■ | ■ | ■ | | | | | | | | | | |

Accessories for TRIVAC pumps

| Pumps | | | | | | | | | | | | | | | | | | | |
|--|----------|----------------|--------------|--------------|---------------|---------------|---------------|---------------|--------------------------------|-----------------|-------------------------------|------------------|----------------------------|-----------------|-----------------|-----------------------------|----------------------|----------------------|--|
| | S 1,5 | TRIVAC D 2,5 E | TRIVAC D 4 B | TRIVAC D 8 B | TRIVAC D 16 B | TRIVAC D 25 B | TRIVAC D 40 B | TRIVAC D 65 B | TRIVAC D 16 B-DOT + D 25 B-DOT | TRIVAC 40 B-DOT | TRIVAC D 65 B ³ He | TRIVAC D 16 B-Ex | TRIVAC D 16 BCS + D 25 BCS | TRIVAC D 40 BCS | TRIVAC D 65 BCS | TRIVAC D 16 + D 25 BCS-PFPE | TRIVAC D 40 BCS-PFPE | TRIVAC D 65 BCS-PFPE | |
| Accessories | Page | | | | | | | | | | | | | | | | | | |
| Exhaust filters AF(-DOT) | 76/78 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | | | |
| Condensate traps / separators AK | 76/84 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Exhaust filters with lubricant return ARP / AR | 80 | | | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | | |
| Exhaust filters with lubricant return ARS | 81 | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Exhaust filter drain tap | 82 | | ■ | | | | | | | | | | | | | | | | |
| Oil drain tap | 82 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Oil drain kit | 82 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Oil suction facility AR-V ¹⁾ , magnetic AR-M ¹⁾ , manual | 83 83 | | ■ ■ | | | | | | | | | | | | | | | | |
| Dust filters FH/DF, DN 16 to 40 KF | 85 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Adsorption trap FH/RF, DN 16 to 40 KF | 86 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Cold trap TK | 87 | | ■ | ■ | ■ | | | | | | | | | | | | | | |
| Dust separators AS | 88 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Molecular filters MF | 88 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Mechanical oil filters OF | 90 | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | |
| Chemical oil filters CF | 90 | | | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Chemical filters with safety isolation valve CFS | 92 | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Inert gas system IGS | 93 | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Limit switch system LSS | 94 | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Roots pump adaptor | 95 | | | | | | | ■ | ■ | | | | ■ | ■ | | ■ | ■ | | |
| Flange components, valves | 99 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |

¹⁾ For pumps with gas ballast only

Oil for TRIVAC pumps for different fields of application

| Applications | Semiconductor production | Vacuum coating | Research and development | Chemistry/Pharmaceutical | Metallurgy/Furnaces | Lamps and tubes manufactures | Automotive industry | Laser technology | Space simulation | Analytical engineering | Environment technologies | Oxygen applications | Cooling and air-conditioning | Electrical engineering | Medicine engineering | Vacuum drying cabinets | Chemistry and research labs | Freeze drying | Backing pump for HV pump systems | Food industry |
|---------------|--------------------------|----------------|--------------------------|--------------------------|---------------------|------------------------------|---------------------|------------------|------------------|------------------------|--------------------------|---------------------|------------------------------|------------------------|----------------------|------------------------|-----------------------------|---------------|----------------------------------|---------------|
| LEYBONOL Oils | | | | | | | | | | | | | | | | | | | | |
| LVO 100 | ▲ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ● | ■ | ■ | | | |
| LVO 210 | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | ● | ■ | ● | ● | | |
| LVO 240 | | | ■ | ■ | | | | | | | | | | | | | | | | |
| LVO 300 | | | | | | | | | | | | | | | | | | | ■ | |
| LVO 310 | | | ■ | | ■ | ■ | ■ | | | ■ | | ■ | | | | | | | ▲ | |
| LVO 400 | ■ | ● | ■ | ■ | | | | | | ■ | | | | | ▲ | ● | | ● | | |
| LVO 600 | | | ■ | ■ | | | | | | | | | ■ | | | | | | | |
| DOT 4 | | | ● | | | ■ | | | | | | | | | | | | | | |

■ = Standard

● = Possible

▲ = Please contact Oerlikon Leybold Vacuum

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
"Oils / Greases / Lubricants "LEYBONOL®".**

Oil for TRIVAC pumps for different pump types

| Pumps | S 1.5 | TRIVAC D 2.5 E | TRIVAC D 4 B | TRIVAC D 8 B | TRIVAC D 16 B | TRIVAC D 25 B | TRIVAC D 40 B | TRIVAC D 65 B | TRIVAC D 16 B-DOT + D 25 B-DOT | TRIVAC 40 B-DOT | TRIVAC D 65 B ³ He | TRIVAC D 16 B Ex | TRIVAC D 16 BCS + D 25 BCS | TRIVAC D 40 BCS | TRIVAC D 65 BCS | TRIVAC D 16 + D 25 BCS-PFPE | TRIVAC D 40 BCS-PFPE | TRIVAC D 65 BCS-PFPE |
|----------------------|-------|----------------|--------------|--------------|---------------|---------------|---------------|---------------|--------------------------------|-----------------|-------------------------------|------------------|----------------------------|-----------------|-----------------|-----------------------------|----------------------|----------------------|
| LEYBONOL Oils | | | | | | | | | | | | | | | | | | |
| LVO 100 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | | | |
| LVO 210 | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | ● | | | | |
| LVO 240 | ● | ● | ● | ● | ● | ● | ● | ● | | ▲ | | | ● | | | | | |
| LVO 300 | | | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| LVO 310 | ● | ● | ● | ● | ● | ● | | | | ▲ | | | | | | | | |
| LVO 400 | | ▲ | ▲ | | | | | | | | | | | ■ | ■ | ■ | | |
| LVO 600 | ● | ● | ● | ● | ● | ● | ● | ● | | ▲ | ● | ● | ● | | | | | |
| DOT 4 | | | | | | | | ■ | ■ | | | | | | | | | |

■ = Standard

● = Possible

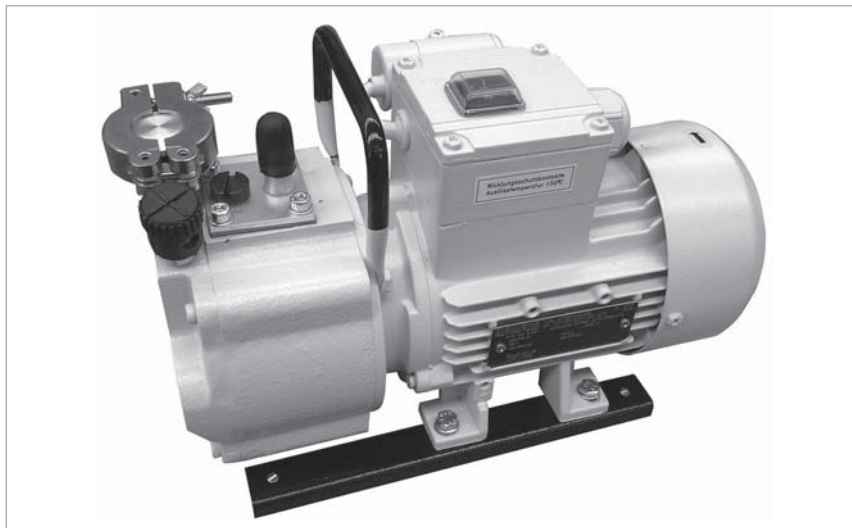
▲ = Please contact Oerlikon Leybold Vacuum

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
"Oils / Greases / Lubricants LEYBONOL®".**

Products

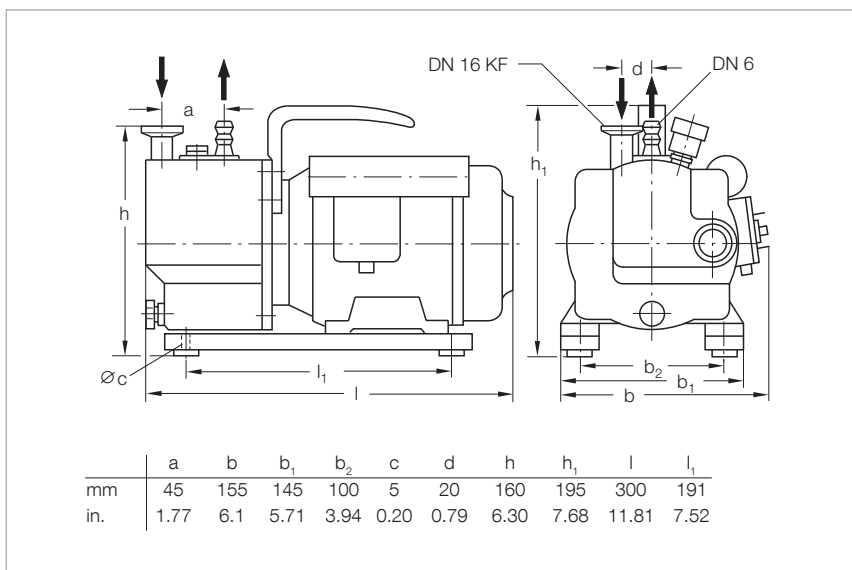
Small Compact Pump S 1,5



The S 1,5 is a single-stage, oil sealed rotary vane pump with a gas ballast valve. It is driven by a flange mounted AC motor. The shaft of the pump and the shaft of the motor are linked by means of a pinned coupling.

Advantages to the User

- Very small and light-weight
- Low ultimate pressure
- High water vapor tolerance
- Low noise operation
- Simple to connect
- Easy to maintain and use



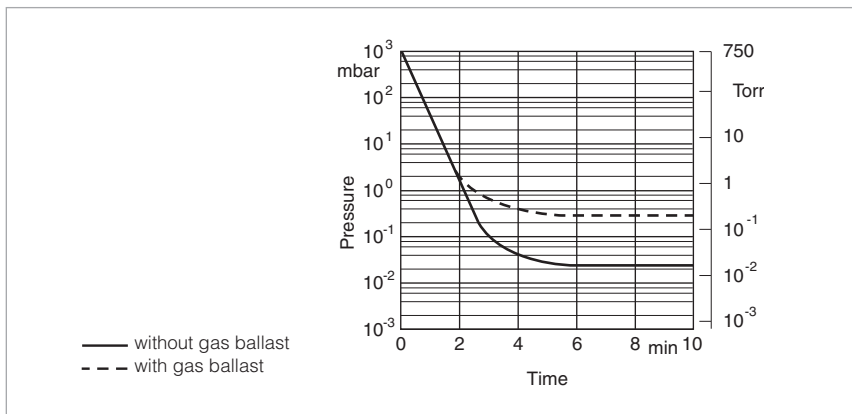
Dimensional drawing for the S 1,5

Typical Applications

- In all areas of vacuum engineering where a low intake pressure is required
- Evacuation of refrigerant circuits
- For suction, lifting, emptying, filling and tensioning
- For installation in mobile instruments

Supplied Equipment

- DN 16 small flange connection on the intake side
- Centering ring and clamping ring
- Exhaust port designed as a DN 6 hose nozzle
- Carrying handle
- Built-in ON/OFF switch and overcurrent circuit breaker
- Oil filling



Pump-down characteristics of a 10 l vessel at 50 Hz

Technical Data

S 1,5

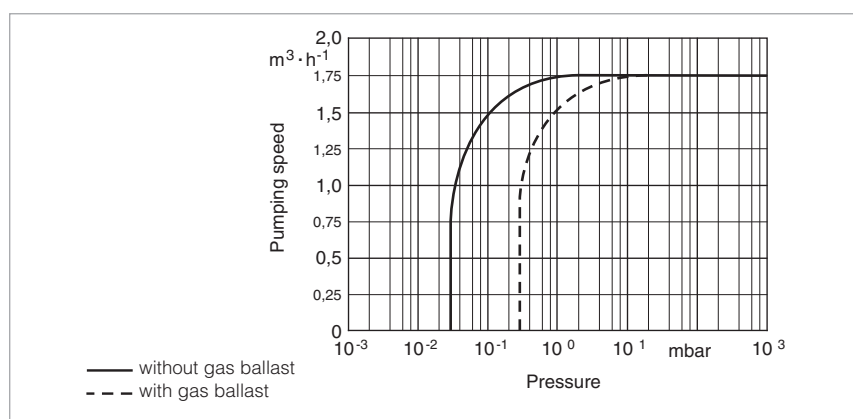
| | | 50 Hz | 60 Hz |
|---|-------------------------|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 1.9 (1.1) | 2.3 (1.3) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 1.75 (1) | 2.1 (1.2) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 3 x 10 ⁻² (2.3 x 10 ⁻²) | 3 x 10 ⁻² (2.3 x 10 ⁻²) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | 5 x 10 ⁻¹ (3.8 x 10 ⁻¹) | 5 x 10 ⁻¹ (3.8 x 10 ⁻¹) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | > 15 (> 11.3) | > 15 (> 11.3) |
| Water vapor capacity | g/h (lbs/h) | 19 (42) | 23 (50) |
| Oil filling, min. / max. | l (qt) | 0.11/0.14 (0.12/0.15) | 0.11/0.14 (0.12/0.15) |
| Noise level to DIN 45 635 | dB(A) | 50 | 50 |
| Admissible ambient temperature | °C (°F) | 12 - 40 (53.6 - 104) | 40 (53.6 - 104) |
| Max. permanent inlet pressure | mbar (Torr) | 30 (22.5) | 30 (22.5) |
| Motor rating | W (hp) | 80 (0.11) | 80 (0.11) |
| Nominal speed | rpm | 1500 | 1800 |
| Weight | kg (lbs) | 8.8 (19.4) | 8.8 (19.4) |
| Connections | | | |
| Intake | DN | 16 KF | 16 KF |
| Exhaust | | 6 mm hose nipple | 6 mm hose nipple |

Ordering Information

S 1,5

| | Part No. |
|---|--------------------|
| S 1,5 with AC motor, 230 V (208 - 252 V ± 5%), 50/60 Hz, with 2 m long mains cord and EURO plug | 101 01 |
| Transition connector (250 V AC, 10 A, L+N+PE) only necessary in Switzerland for 1~ pumps | 800 001 274 |
| AK 8 condensate trap | 190 60 |
| Exhaust filter drain tap (G 1/4") | 190 95 |
| Connection components | |
| Elbow (1x) DN 16 KF | 184 36 |
| Centering ring with O-ring (2x) DN 16 KF | 183 26 |
| Clamping ring (2x) DN 16 KF | 183 41 |

¹⁾ To DIN 28 400 and following numbers



Pumping speed characteristics at 50 Hz

TRIVAC E, Two-Stage, Oil Sealed Rotary Vane Vacuum Pump



TRIVAC D 2,5 E

The TRIVAC E pump is an oil sealed vacuum pump operating according to the rotary vane principle. Oil which is injected into the pump chamber is used for sealing, lubrication and cooling purposes.

The result is the TRIVAC E rotary vane vacuum pump.

Beyond the usual quality and reliability of the B series pumps, the TRIVAC E pump offers improvements in the area of quieter operation, smaller size and improved service-friendliness.

The intake and exhaust ports are equipped with small flanges. Besides standard voltages and frequencies, Oerlikon Leybold Vacuum offers world motors, which are specially required by OEMs.

Advantages to the User

- Highly reliable
- Small and compact
- Quiet operation
- Environmentally compatible (low oil consumption, EMI compatible; IP 54 protection)
- Process quality (low backstreaming of oil)
- Motor for all standard supply voltages and frequencies
- Safe and intelligent vacuum protection (hermetically sealed)
- Free of yellow metals
- Compliance with international standards (CE)
- Suitable for continuous operation at 1000 mbar (750 Torr)
- Low power consumption
- Better individual performance given by 3 stage gas ballast device
- High water vapor tolerance
- Simplified customizing ability

Typical Applications

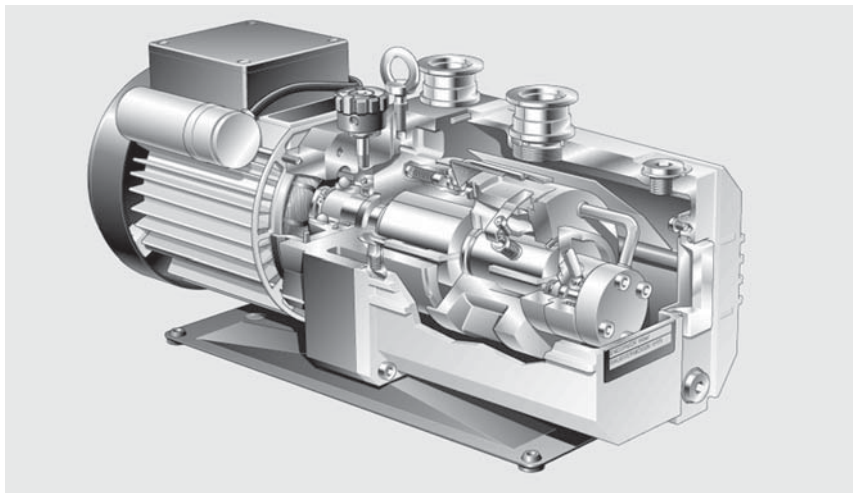
- Mass and X-ray spectrometers
- Electron beam microscopes
- Leak detectors
- Sterilizers
- Freeze-drying systems
- Chemical and research labs
- General vacuum engineering
- Backing pump for high vacuum pump systems

Supplied Equipment

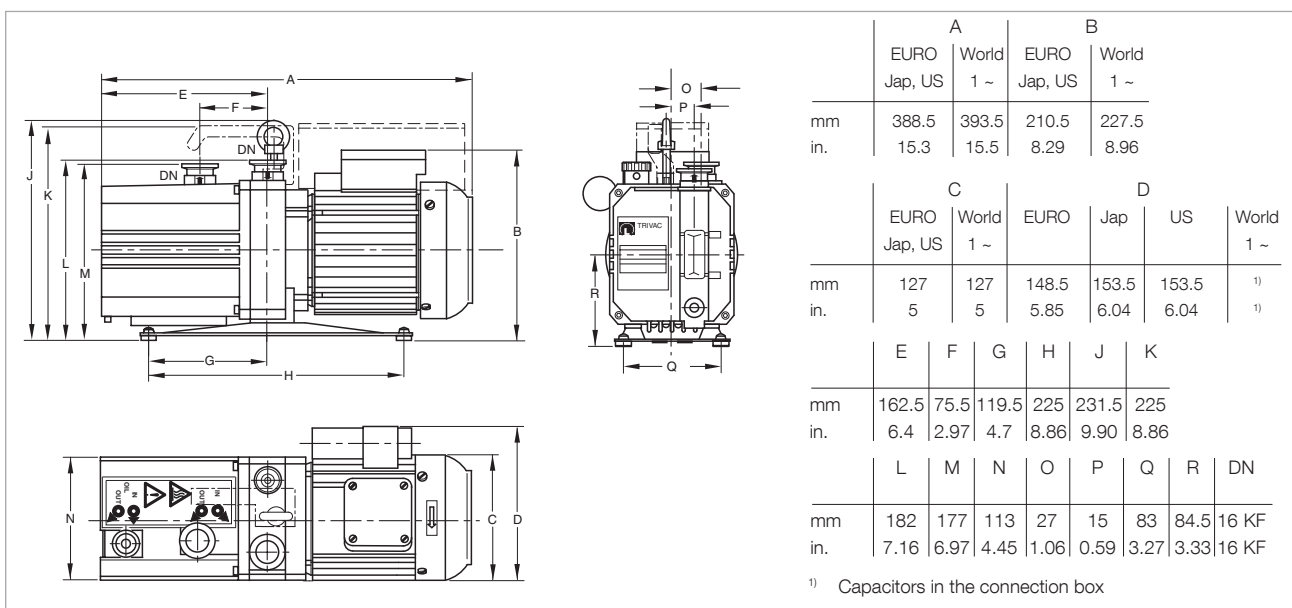
- Dirt trap
- Oil filling included separately (standard LVO 100)
- Gas ballast device
- Mains cord with the specific plug for EURO, US and Japan motors
- Optional: Mains cord with country specific plug for the world motor
- With handle

All pumps are 100% subjected to a vacuum test before delivery!

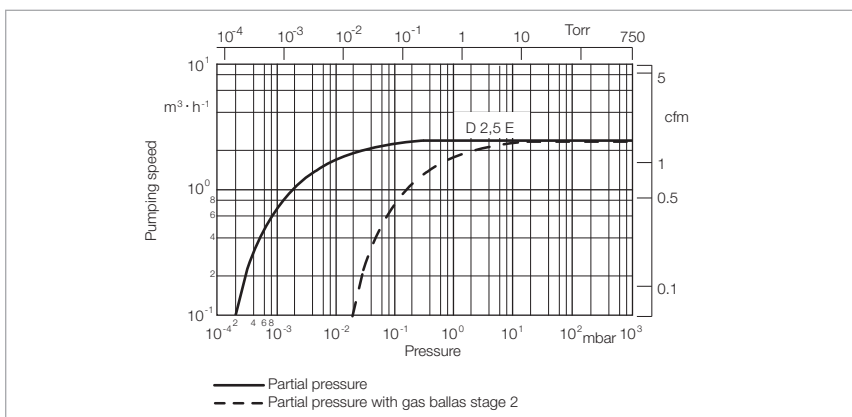
TRIVAC D 2,5 E



TRIVAC E



Dimensional drawing for the TRIVAC D 2,5 E



Pumping speed of the TRIVAC D 2,5 E at 50 Hz (60 Hz curves at the end of the chapter)

Technical Data

TRIVAC D 2,5 E

| | | 50 Hz | 60 Hz |
|--|-------------------------|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 3.2 (1.9) | 3.6 (2.1) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 2.7 (1.6) | 3.3 (1.9) |
| Ultimate partial pressure without gas ballast | mbar (Torr) | $\leq 5 \times 10^{-4}$ ($\leq 3.8 \times 10^{-4}$) | $\leq 5 \times 10^{-4}$ ($\leq 3.8 \times 10^{-4}$) |
| Ultimate total pressure without gas ballast ²⁾ | mbar (Torr) | $\leq 2 \times 10^{-3}$ ($\leq 1.5 \times 10^{-3}$) | $\leq 2 \times 10^{-3}$ ($\leq 1.5 \times 10^{-3}$) |
| Ultimate total pressure with gas ballast Stage 2 ²⁾ | mbar (Torr) | $\leq 3 \times 10^{-2}$ ($\leq 2.3 \times 10^{-2}$) | $\leq 3 \times 10^{-2}$ ($\leq 2.3 \times 10^{-2}$) |
| Water vapor tolerance | | | |
| Stage 1 | mbar (Torr) | 10 (7.5) | 10 (7.5) |
| Stage 2 | mbar (Torr) | 20 (15) | 20 (15) |
| Stage 3 | mbar (Torr) | 30 (22.5) | 30 (22.5) |
| Water vapor capacity | | | |
| Stage 1 | g/h (lbs/h) | 20 (0.044) | 25 (0.055) |
| Stage 2 | g/h (lbs/h) | 40 (0.088) | 50 (0.110) |
| Stage 3 | g/h (lbs/h) | 60 (0.132) | 75 (0.165) |
| Oil filling, min. / max. | l (qt) | 0.4 / 0.7 (0.42 / 0.74) | 0.4 / 0.7 (0.42 / 0.74) |
| Noise level | dB(A) | ≤ 47 | ≤ 49 |
| Admissible ambient temperature | °C (°F) | +10 to +50 (+50 to +122) (EURO motor) / +10 to +40 (+50 to +104) (US/Japan motor) | +10 to +50 (+50 to +122) (EURO motor) / +10 to +40 (+50 to +104) (US/Japan motor) |
| Motor rating | W (HP) | 250 (0.34) | 300 (0.41) |
| Nominal speed | rpm | 1400 | 1600 |
| Type of protection | IP | 54 | 54 |
| Weight (with oil filling) | kg (lbs) | 16.1 (35.4) | 16.1 (35.4) |
| Connections (Intake and Exhaust) | DN | 16 KF | 16 KF |

¹⁾ To DIN 28 426 T1

²⁾ To DIN 28 400 and following numbers

Motor Dependent Data

| Motors for D 2,5 E | Voltage (V) | Frequency (Hz) | Voltage tolerance | Power consumption (W (HP)) | Nominal current (A) | Protection | Nominal speed (rpm) |
|--------------------|--------------------|----------------|-------------------|----------------------------|---------------------|------------|---------------------|
| EURO 1 ~ | 220-240/230 | 50/60 | ± 5% | 250/300 (0.34/0.41) | 1.8/1.4 | IP 54 | 1400/1600 |
| Japan 1 ~ | 100 | 50/60 | ± 5% | 250/300 (0.34/0.41) | 5.5/4.0 | IP 54 | 1400/1600 |
| US 1 ~ | 110-120 | 60 | ± 5% | 300 (0.41) | 3.3 | IP 54 | 1600 |
| World 1 ~ | 100-120 200-240 | 50/60 | ± 5% | 250/300 (0.34/0.41) | 4.4/3.0 2.2/1.5 | IP 54 | 1400/1600 |

Ordering Information

TRIVAC D 2,5 E

| | Part No. |
|---|---------------|
| TRIVAC E with 1.8 m (6 ft.) long mains cord EURO version, 1-ph., 220-240 V, 50 Hz; 230 V, 60 Hz | |
| Schuko plug | 140 000 |
| UK plug | 140 004 |
| CH plug | 140 005 |
| US version, 1-ph., 110-120 V, 60 Hz, NEMA plug | 140 002 |
| Japan version, 1-ph., 100 V, 50/60 Hz, NEMA plug | 140 003 |
| Single phase world motor, 100-120 V, 200-240 V 50/60 Hz (without mains cord) | 140 001 |
| Further variants upon request | |
| Accessories | |
| Connection cable for single phase world motor | |
| 230 V Schuko plug | 200 81 091 |
| 230 V UK plug | 200 81 097 |
| 230 V CH plug | 200 81 099 |
| 230 V NEMA plug (200-240 V) | 200 81 141 |
| 115 V NEMA plug (100-120 V) | 200 81 090 |
| Exhaust filter AF 8 | 190 50 |
| Replacement filter elements FE 8 for AF 8 (pack of 5) | 190 80 |
| Exhaust filter drain tap (G 1/4") | 190 95 |
| Manual oil return AR-M via gas ballast inlet (kit for AF 8-16) | 190 93 |
| Oil suction AR-V controlled by a solenoid valve via the gas ballast inlet (kit for AF 8-16) | 190 92 |
| Condensate trap AK 8 | 190 60 |
| Oil drain tap (M 16 x 1.5) | 190 90 |
| Oil drain kit (M 16 x 1.5) | 190 94 |
| Connection components | |
| Elbow (1x) DN 16 KF | 184 36 |
| Centering ring with O-ring (2x) DN 16 KF | 183 26 |
| Clamping ring (2x) DN 16 KF | 183 41 |
| Spare Parts | |
| Maintenance kit 1 (oil demister, oil box seal) | 200 40 022 |
| Repair kit 1 (motor side sealing, shaft sealing ring, coupling sleeves, compression spring) | E 100 000 351 |
| Repair kit 2 (valves, oil demister, oil box seal) | 200 40 024 |
| Repair kit 3 (oil demister, sealing, wearing parts) | E 100 000 347 |
| For further accessories see Chapter "Accessories for TRIVAC E, B and BCS" | |

TRIVAC B, Two-Stage Rotary Vane Vacuum Pumps TRIVAC D 4 B to D 65 B



The TRIVAC B is part of the well-proven TRIVAC concept.

The TRIVAC B pumps with their comprehensive range of accessories have proven themselves time and again as rugged pumps in many and varied applications.

The inner body is assembled from individual parts without sealing components. The parts are pinned in order to ensure easy disassembly and reassembly of the parts.

All pumps from the D 4 B to the D 25 B model are equipped either with single-phase or three-phase motors. D 40 - 65 B models are equipped with three-phase motors. In the TRIVAC B, the pump unit and the motor are linked by an elastic coupling.

The TRIVAC B range is a modular system which divides into three groups:

TRIVAC 4/8 Series
TRIVAC 16/25 Series
TRIVAC 40/65 Series

Advantages to the User

- All basic models (single-phase and three-phase motor) are certified in accordance with 94/9/EG (ATEX) (Category 3 inside)
- High water vapor tolerance
- Continuous operation even at 1000 mbar
- Built-in oil pump; pressure-lubricated sliding bearings
- All controls as well as the oil sight glass are located on the front face
- Either vertical or horizontal intake and exhaust ports
- Exchangeable inner body
- Anti-suckback valve controlled via the oil pressure
- Free of yellow metals
- Service-friendly
- Ideal as backing pump for medium and high vacuum applications, because of low oil backstreaming
- Highly leaktight (⁴He-capable)

Typical Applications

See chapter "General, Applications and Accessories".

Supplied Equipment

Small flanges, centering and clamping rings. The intake flange contains a dirt trap.

A carrying handle is standard for all pumps up to the D 25 B. TRIVAC B pumps with single-phase motors are delivered with ON/OFF switch, mains cord and main plug, ready for immediate operation.

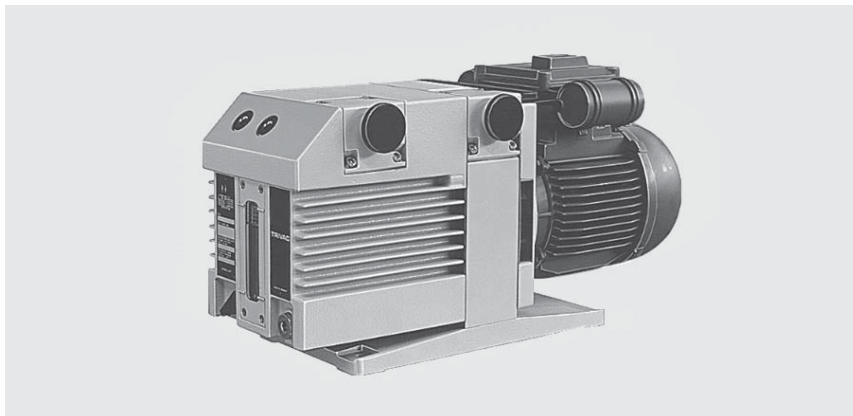
Standard TRIVAC B pumps come with a filling of oil LEYBONOL LVO 100, others with special oil fillings can be specified.

All pumps are 100% subjected to a vacuum test before delivery!

Custom Models

- ATEX (Category 3 inside and 3 outside)
- Brake fluid
- Oils for refrigerating machines, e.g. ester oils for refrigerant circuits with R 134 a
- Pressure burst resistant (for the new refrigerants propane and isobutane)
- ³He-tight (for cryostats)
- Special motors

TRIVAC D 16 B-DOT to D 40 B-DOT



The TRIVAC B-DOT pumps operate with brake fluid (DOT 4) as the sealing and lubricating agent. Therefore these pumps are equipped with EPDM seals. EPDM is highly compatible with brake fluid.

Oil Sealed
Vacuum Pumps

Advantages to the User

- Matching exhaust filters with EPDM gaskets (AF-DOT)
- Except for the seals and the fluid the TRIVAC B-DOT pumps are identical to the oil sealed TRIVAC B pumps

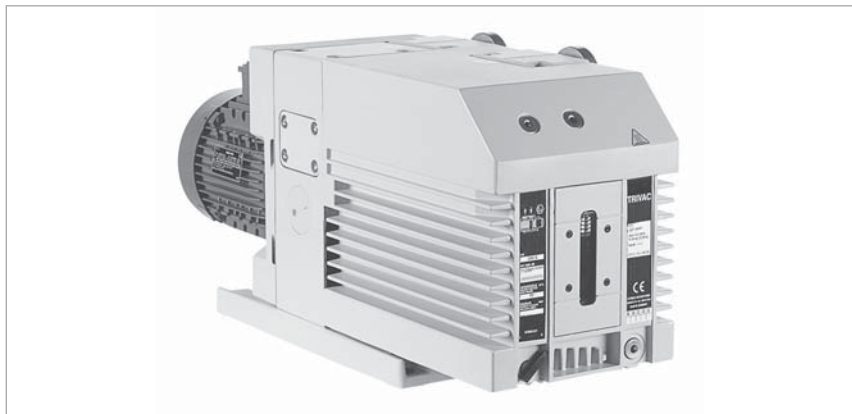
Typical Applications

- For filling of brake fluid circuits in the automotive industry

Supplied Equipment

- The brake fluid is inside the pump when shipped

TRIVAC D 65 B ^3He



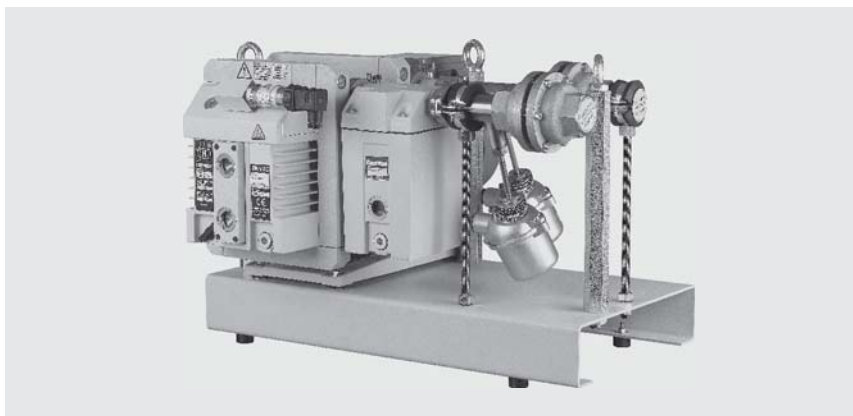
Advantages to the User

- Leak rates below $1 \times 10^{-7} \text{ mbar} \times \text{l} \times \text{s}^{-1}$, also while the pump is running
- Low pressures of 100 mbar in the oil box are permitted during operation
- No gas ballast facility
- Pump is FPM (FKM)-sealed

Typical Applications

- Pumping of continuously or discontinuously ^3He operated cryostats, also on ^3He and ^4He mixed cryostats
- In these cryostats the very expensive helium isotope ^3He , respectively mixtures consisting of ^3He and ^4He are pumped and this is generally done continuously in cycles running over weeks. The gas must neither be lost nor contaminated. For this reason exhaust lines are frequently operated at low pressures of 100 mbar (absolute)

TRIVAC D 16 B-Ex, Explosion Protected and Pressure Burst Resistant



ATEX

**Category 1 inside and
2 outside**

Typical Applications

- Pumping of gases belonging to Group IIB3 and IIC ¹⁾ from Zone 0

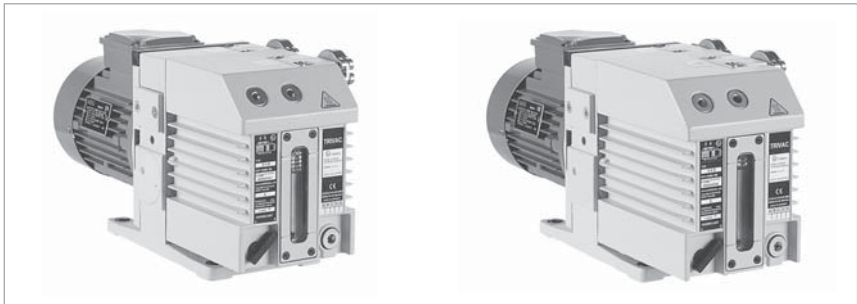
Vacuum pumps TRIVAC D 16 B-Ex meet the requirements of the European Directive 94/9/EG (ATEX Directive). TRIVAC D 16 B-Ex pumps are classified inside as Category 1, outside as Category 2. Thus these pumps are suited for pumping explosive gases from Zone 0, the pump itself may be located in Zone 1.

The vacuum pumps TRIVAC D 16 B-Ex are qualified for gases of Explosion Groups IIC ¹⁾ and IIB3. The temperature class is T4. TRIVAC D 16 B-Ex pumps are explosion resistant and correspond to the state-of-the-art. They are equipped as standard with one each temperature sensor on the intake and delivery side.

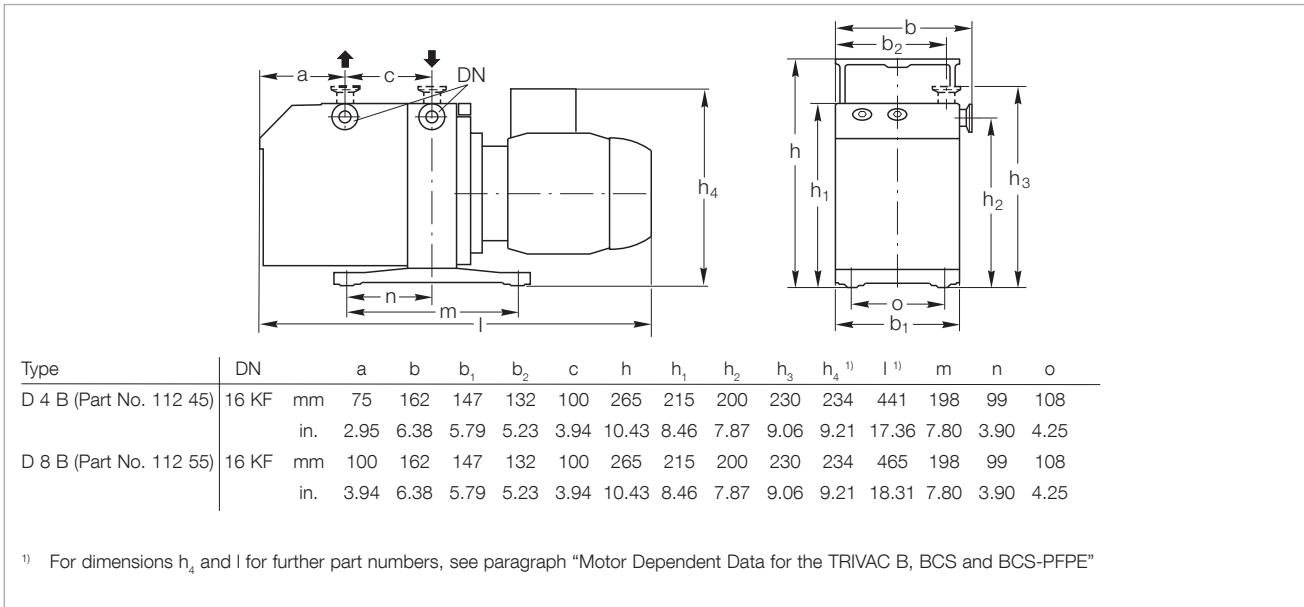
Moreover, the pressure inside the pump is monitored. Flame arresters on the intake and delivery side protect the upstream and downstream system sections. Also provided as standard is an exhaust filter for every pump.

¹⁾ With the exception of acetylene and carbon bisulphide

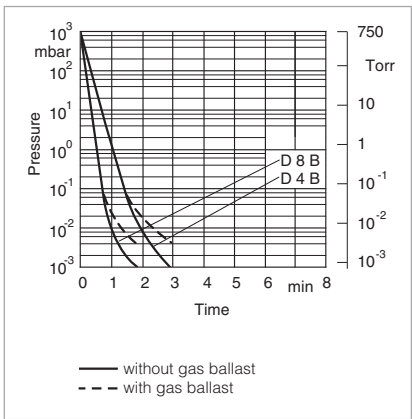
TRIVAC D 4 B and D 8 B



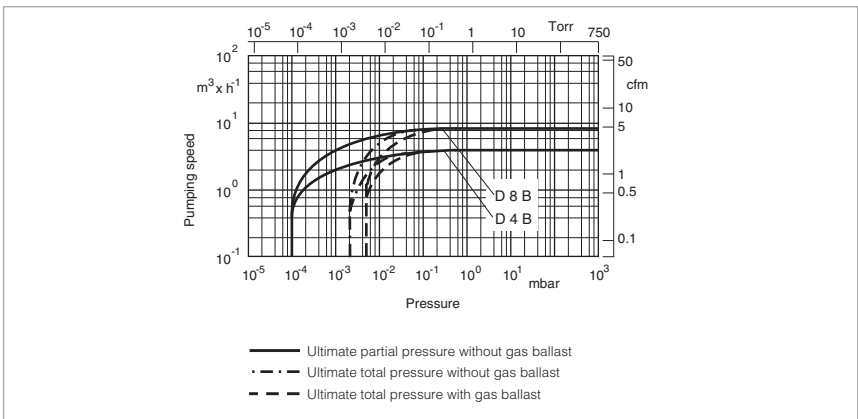
TRIVAC D 4 B (left) and TRIVAC D 8 B (right)



Dimensional drawing for the TRIVAC D 4 B and D 8 B



Pump-down characteristics of a 10 l vessel at 50 Hz



Pumping speed characteristics at 50 Hz (60 Hz curves at the end of the chapter)

Technical Data**TRIVAC D 4 B****two-stage****50 Hz****60 Hz****TRIVAC D 8 B****two-stage****50 Hz****60 Hz**

| | | | | | |
|---|-------------------------|--|--|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 4.8 (2.8) | 5.8 (3.4) | 9.7 (5.7) | 11.6 (6.9) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 4.2 (2.5) | 5.0 (3.0) | 8.5 (5) | 10.2 (6) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 30.0 (22.5) | 30.0 (22.5) | 25.0 (18.8) | 25.0 (18.8) |
| Water vapor capacity | g/h (lbs/h) | 95 (0.209) | 110 (0.243) | 160 (0.353) | 190 (0.419) |
| Oil filling, min. / max. | l (qt) | 0.3 / 0.8 (0.3 / 0.85) | 0.3 / 0.8 (0.3 / 0.85) | 0.3 / 0.9 (0.3 / 0.95) | 0.3 / 0.9 (0.3 / 0.95) |
| Noise level ²⁾ to DIN 45 635, without / with gas ballast | dB(A) | 50 / 52 | 50 / 52 | 50 / 52 | 50 / 52 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating ²⁾ | W (HP) | 370 (0.50) | 370 (0.50) | 370 (0.50) | 370 (0.50) |
| Nominal speed | rpm | 1500 | 1800 | 1500 | 1800 |
| Type of protection | IP | 3) | 3) | 3) | 3) |
| Weight ²⁾ | kg (lbs) | 17.9 (39.4) | 17.9 (39.4) | 18.9 (41.6) | 18.9 (46.7) |
| Connections, Intake and Exhaust | DN | 16 KF | 16 KF | 16 KF | 16 KF |

¹⁾ To DIN 28 400 and following numbers

²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

Ordering Information

TRIVAC D 4 B two-stage

TRIVAC D 8 B two-stage

| | Part No. | Part No. |
|--|------------------------------|------------------------------|
| TRIVAC B | | |
| with 1-phase motor 230 V, 50 Hz ¹⁾ | 112 45 | 112 55 |
| with dual voltage motor ²⁾ 110-115/210-230 V, 50/60 Hz | 140 081 ²⁾ | 140 082 ²⁾ |
| with 3-phase motor 200-240/380-400 V, 50 Hz / 200-240/380-480 V, 60 Hz ¹⁾ | 112 46 | 112 56 |
| 230/400 V, 50 Hz, ATEX Category 3 inside and 3 outside inside: II (I) 3G IIC T4 (50 Hz) outside: II (o) 3G IIC T3 (50 Hz) | 140 140 | 140 150 |
| Mains cord for dual voltage motor ²⁾ | | |
| 230 V Schuko plug | 200 81 091 | 200 81 091 |
| 230 V UK plug | 200 81 097 | 200 81 097 |
| 230 V CH plug | 200 81 099 | 200 81 099 |
| 230 V NEMA plug (200-240 V) | 200 81 141 | 200 81 141 |
| 115 V NEMA plug (100-120 V) | 200 81 090 | 200 81 090 |
| Transition connector (250 V AC, 10 A, L+N+PE) only necessary in Switzerland for 1~ pumps | 800 001 274 | 800 001 274 |
| Accessories | | |
| Dust filter | | |
| Filter pot FH 16 | 140 116 T | 140 116 T |
| Dust filter insert DF 16-25 | 140 117 S | 140 117 S |
| Adsorption trap | | |
| Filter pot FH 16 | 140 116 T | 140 116 T |
| Adsorption filter insert RF 16-25 | 140 118 A | 140 118 A |
| Accessories for dust filter and adsorption trap | | |
| Active charcoal | 178 10 | 178 10 |
| Zeolite | 854 20 | 854 20 |
| Activated aluminium oxide, 1.3 kg (2 l approx.) | 854 10 | 854 10 |
| TK 4-8 cold trap | 188 20 | 188 20 |
| AF 4-8 exhaust filter | 189 06 | 189 06 |
| AR 4-8 exhaust filter with lubricant return | 189 20 | 189 20 |
| AK 4-8 condensate trap | 188 06 | 188 06 |
| OF 4-25 mechanical oil filter | 101 91 | 101 91 |
| CF 4-25 chemical oil filter | 101 96 | 101 96 |
| Connector for gas ballast inlet M 16 x 1.5 – DN 16 KF | 168 40V01 | 168 40V01 |
| Oil drain tap M 16 x 1.5 | 190 90 | 190 90 |
| Spare Parts | | |
| Inner body | E 200 10 989 | E 200 10 991 |
| Major maintenance kit (without oil) | EK 110 002 622 | EK 110 002 620 |
| Minor maintenance kit (without oil) | EK 110 002 628 | EK 110 002 627 |
| Shaft sealing replacement kit | EK 110 002 631 | EK 110 002 631 |
| Small parts kit | EK 110 002 634 | EK 110 002 634 |
| Seal kit | 197 20 | 197 20 |
| For further accessories see section "Accessories for TRIVAC E, B and BCS" | | |

¹⁾ Certification after 94/9/EG (ATEX), Category 3 inside. Inside: II (I) 3G IIC T4 (50 Hz), T3 (60 Hz)

²⁾ A mains cord needs to be ordered additionally

Only available for purchase in North and South America

Ordering Information

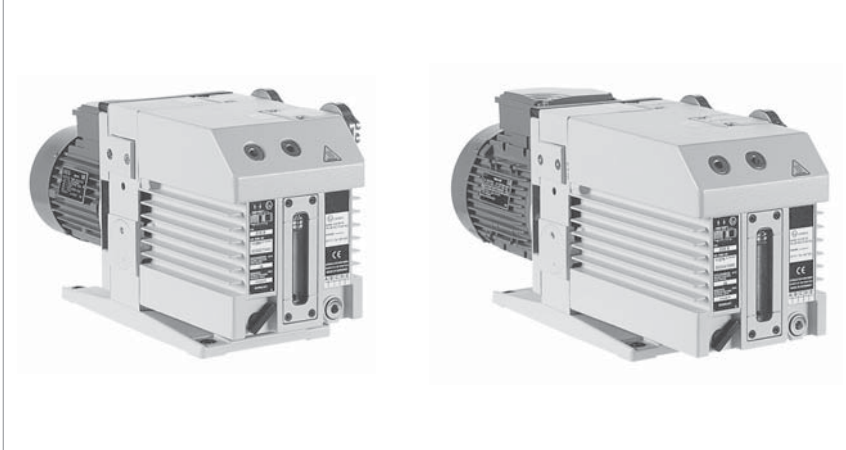
TRIVAC D 4 B two-stage

TRIVAC D 8 B two-stage

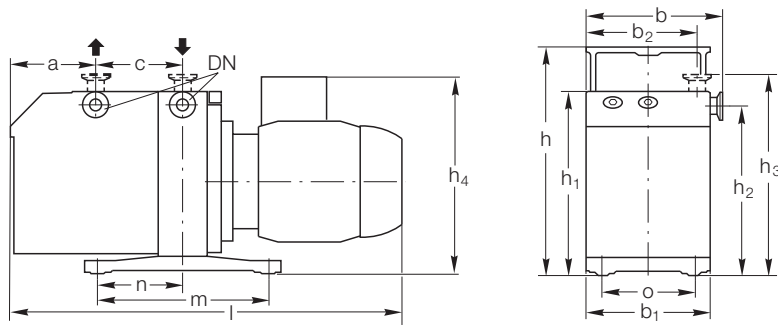
| | Part No. | Part No. |
|--------------------------------|----------|----------|
| TRIVAC B | | |
| with 1-phase motor | | |
| 115 V, 50/60 Hz, NEMA plug | 912 45-1 | 912 55-1 |
| 208-230 V, 50/60 Hz, NEMA plug | 912 45-2 | 912 55-2 |

Oil Sealed
Vacuum Pumps

TRIVAC D 16 B and D 25 B



TRIVAC D 16 B (left) and TRIVAC D 25 B (right)



| Type | | | DN | a | b | b ₁ | b ₂ | c | h | h ₁ | h ₂ | h ₃ | h ₄ ¹⁾ | l ¹⁾ | m | n | o |
|--------------------------|-------|-----|------|------|------|----------------|----------------|-------|------|----------------|----------------|----------------|------------------------------|-----------------|------|------|---|
| D 16 B (Part No. 112 66) | 25 KF | mm | 82 | 186 | 172 | 151 | 135 | 298 | 248 | 227 | 262 | 250 | 508 | 280 | 140 | 132 | |
| | | in. | 3.23 | 7.32 | 6.77 | 5.94 | 5.32 | 11.73 | 9.76 | 8.94 | 10.31 | 9.84 | 20.00 | 11.02 | 5.51 | 5.20 | |
| D 25 B (Part No. 112 76) | 25 KF | mm | 144 | 186 | 172 | 151 | 135 | 298 | 248 | 227 | 262 | 250 | 570 | 280 | 140 | 132 | |
| | | in. | 5.67 | 7.32 | 6.77 | 5.94 | 5.32 | 11.73 | 9.76 | 8.94 | 10.31 | 9.84 | 22.44 | 11.02 | 5.51 | 5.20 | |

¹⁾ For dimensions h₄ and l for further part numbers, see paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

Dimensional drawing for the TRIVAC D 16 and D 25 B

Technical Data

TRIVAC D 16 B

two-stage

50 Hz

60 Hz

TRIVAC D 25 B

two-stage

50 Hz

60 Hz

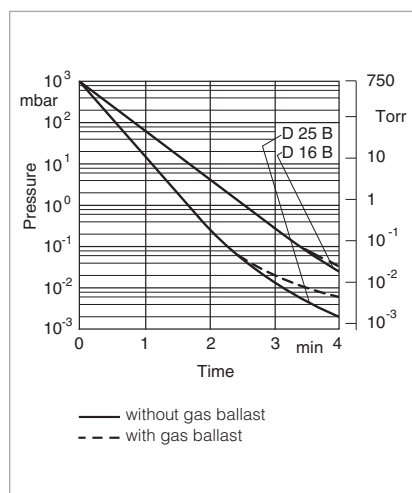
| | | | | | |
|---|-------------------------|--|--|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 18.9 (11.1) | 22.7 (13.4) | 29.5 (17.4) | 35.4 (20.9) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 16.5 (9.7) | 19.8 (11.7) | 25.7 (15.1) | 30.8 (18.2) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 2 x 10 ⁻³ (1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (1.5 x 10 ⁻³) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (3.8 x 10 ⁻³) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 25.0 (18.8) | 25.0 (18.8) | 25.0 (18.8) | 25.0 (18.8) |
| Water vapor capacity | g/h (lbs/h) | 305 (0.672) | 370 (0.816) | 480 (1.058) | 570 (1.257) |
| Oil filling, min. / max. | l (qt) | 0.5 / 1.0 (0.5 / 1.1) | 0.5 / 1.0 (0.5 / 1.1) | 0.6 / 1.4 (0.6 / 1.5) | 0.6 / 1.4 (0.6 / 1.5) |
| Noise level ²⁾ to DIN 45 635, without / with gas ballast | dB(A) | 54 / 56 | 54 / 56 | 54 / 56 | 54 / 56 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating ²⁾ | W (HP) | 550 - 750 (0.75 - 1.0) | 550 - 750 (0.75 - 1.0) | 750 (1) | 750 (1) |
| Nominal speed | rpm | 1500 | 1800 | 1500 | 1800 |
| Type of protection | IP | 3) | 3) | 3) | 3) |
| Weight ²⁾ | kg (lbs) | 31.5 (69.3) | 31.5 (69.3) | 35.8 (78.8) | 35.8 (78.8) |
| Connections, Intake and Exhaust | DN | 25 KF | 25 KF | 25 KF | 25 KF |

¹⁾ To DIN 28 400 and following numbers

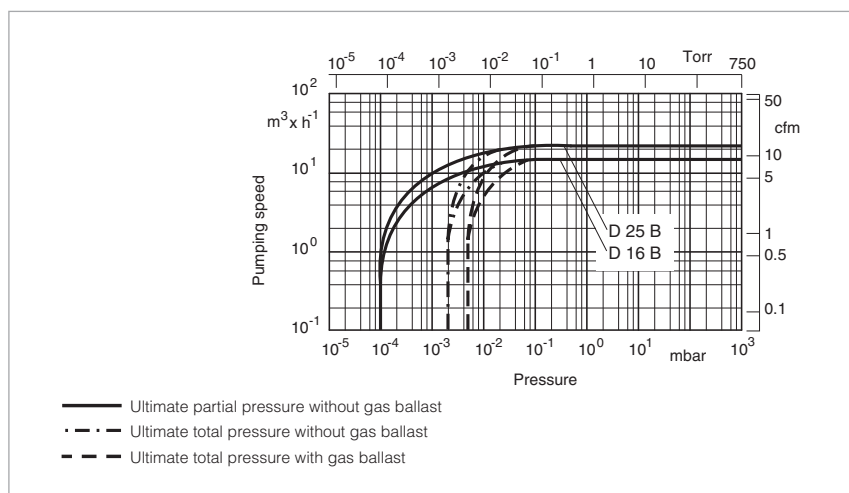
²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"



Pump-down characteristics of a 100 l vessel at 50 Hz



Pumping speed characteristics at 50 Hz (60 Hz curves at the end of the chapter)

Ordering Information

TRIVAC D 16 B two-stage

TRIVAC D 25 B two-stage

| | Part No. | Part No. |
|---|--|-----------------------------|
| TRIVAC B | | |
| with 1-phase motor | | |
| 230 V, 50/60 Hz ¹⁾ | 112 65 | 112 75 |
| 218-242 V, 50/60 Hz ¹⁾ | 113 25 ²⁾ | 113 35 ²⁾ |
| 110/220 V, 50 Hz / 115/208-230 V, 60 Hz ³⁾ | 898 698 | - |
| with 3-phase motor | | |
| 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz ¹⁾ | 112 66 113 33 (LVO 210) | 112 76 |
| 230/400 V, 50 Hz, ATEX Category 3 inside and 3 outside inside: II (i) 3G IIC T4 (50 Hz) outside: II (o) 3G IIC T3 (50 Hz) | 140 160 | 140 170 |
| Accessories | | |
| Mains cord for Part No. 898 698 | | |
| 115 V | E 721 27 877 | - |
| 230 V | E 721 27 878 | - |
| Dust filter | | |
| Filter pot FH 16 | 140 125 T | 140 125 T |
| Dust filter insert DF 16-25 | 140 117 S | 140 117 S |
| Adsorption trap | | |
| Filter pot FH 25 | 140 125 T | 140 125 T |
| Adsorption filter insert RF 16-25 | 140 118 A | 140 118 A |
| Accessories for dust filter and adsorption trap | | |
| Active charcoal | 178 10 | 178 10 |
| Zeolite | 854 20 | 854 20 |
| Activated aluminium oxide, 1.3 kg (2 l approx.) | 854 10 | 854 10 |
| AF 16-25 exhaust filter | 189 11 | 189 11 |
| AR 16-25 exhaust filter with lubricant return | 189 21 | 189 21 |
| AK 16-25 condensate trap | 188 11 | 188 11 |
| OF 4-25 mechanical oil filter | 101 91 | 101 91 |
| CF 4-25 chemical oil filter | 101 96 | 101 96 |
| Connector for gas ballast inlet M 16 x 1.5 – DN 16 KF | 168 40V01 | 168 40V01 |
| Oil drain tap M 16 x 1.5 | 190 90 | 190 90 |
| Spare Parts | | |
| Inner body | E 200 10 956 | E 200 10 960 |
| Major maintenance kit (without oil) | EK 110 002 618 | EK 110 002 616 |
| Minor maintenance kit (without oil) | EK 110 002 626 | EK 110 002 625 |
| Shaft sealing ring replacement kit | EK 110 002 630 | EK 110 002 630 |
| Small parts kit | EK 110 002 635 | EK 110 002 635 |
| Seal kit | 197 21 | 197 21 |
| For further accessories see section "Accessories for TRIVAC E, B and BCS" | | |

¹⁾ Certification after 94/9/EG (ATEX), Category 3 inside. Inside: II (i) 3G IIC T4 (50 Hz), T3 (60 Hz)

²⁾ With cable EURO Schuko. Other cables for wide range motor upon request

³⁾ Mains cord for dual voltage motor see paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"; TRIVAC D 16 B / D 25 B

Only available for purchase in North and South America

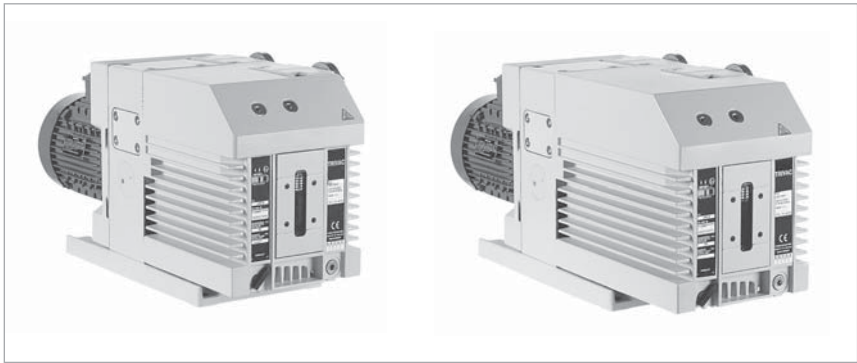
Ordering Information

TRIVAC D 16 B two-stage

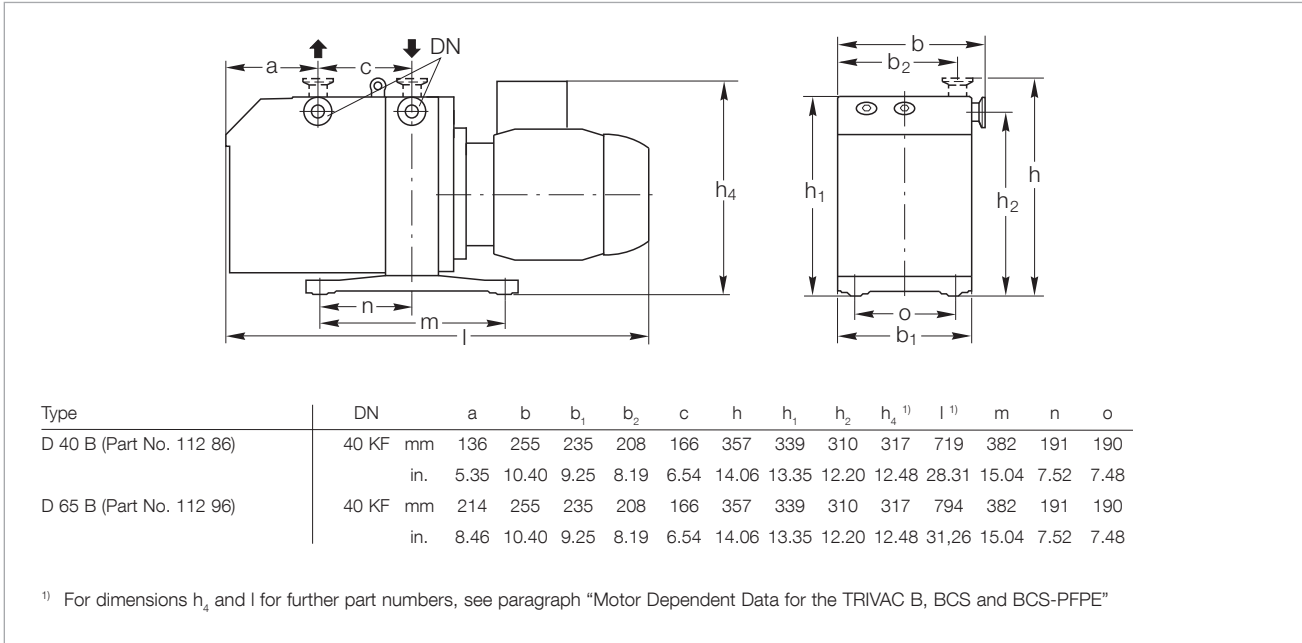
TRIVAC D 25 B two-stage

| | Part No. | Part No. |
|--------------------------------|----------|----------|
| TRIVAC B | | |
| with 1-phase motor | | |
| 110 V, 50 Hz, NEMA plug / | | |
| 115 V, 60 Hz, NEMA plug | 912 65-1 | - |
| 208-230 V, 60/50 Hz, NEMA plug | 912 65-2 | - |
| 208-230 V, 60/50 Hz, NEMA plug | - | 912 75-2 |

TRIVAC D 40 B and D 65 B



TRIVAC D 40 B (left) and TRIVAC D 65 B (right)



Dimensional drawing for the TRIVAC D 40 and D 65 B

Technical Data

TRIVAC D 40 B

two-stage

TRIVAC D 65 B

two-stage

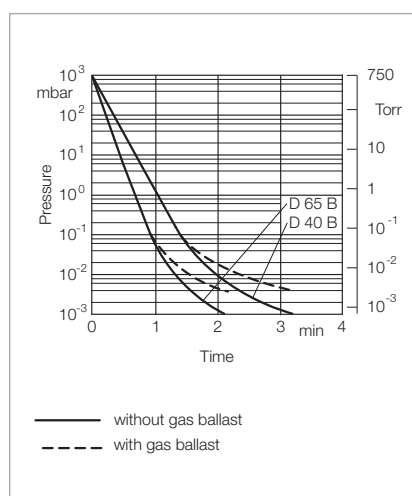
| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|---|-------------------------|--|--|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 46 (27) | 55 (32.5) | 75 (44) | 90 (53) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 40 (24) | 48 (28) | 65 (38) | 78 (46) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 40 (30) | 40 (30) | 40 (30) | 40 (30) |
| Water vapor capacity | g/h (lbs/h) | 1185 (2.612) | 1420 (3.131) | 1925 (4.244) | 2310 (5.093) |
| Oil filling, min. / max. | l (qt) | 1.7 / 2.6 (1.8 / 2.7) | 1.7 / 2.6 (1.8 / 2.7) | 2.0 / 3.3 (2.1 / 3.5) | 2.0 / 3.3 (2.1 / 3.5) |
| Noise level ²⁾ to DIN 45 635, without / with gas ballast | dB(A) | 57 / 59 | 57 / 59 | 57 / 59 | 57 / 59 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating 50/60 Hz ²⁾ | W (HP) | 2200 (3.0) | 1500 (2.0) | 2200 (3.0) | 1500 (2.0) |
| Nominal speed ²⁾ | rpm | 1420 | 1710 | 1420 | 1710 |
| Type of protection | IP | 3) | 3) | 3) | 3) |
| Weight ²⁾ | kg (lbs) | 72.5 (160) | 72.5 (160) | 81.7 (180) | 81.7 (180) |
| Connections, Intake and Exhaust | DN | 40 KF | 40 KF | 40 KF | 40 KF |

¹⁾ To DIN 28 400 and following numbers

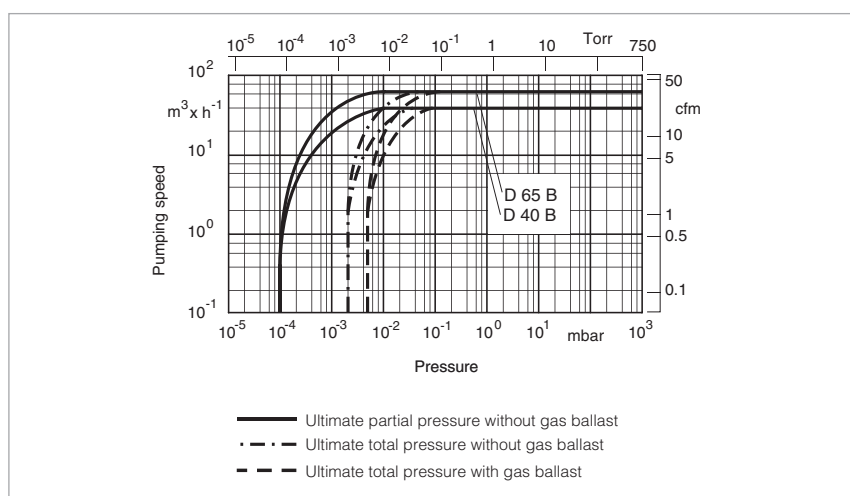
²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"



Pump-down characteristics of a 100 l vessel at 50 Hz



Pumping speed characteristics at 50 Hz (60 Hz curves at the end of the chapter)

Ordering Information

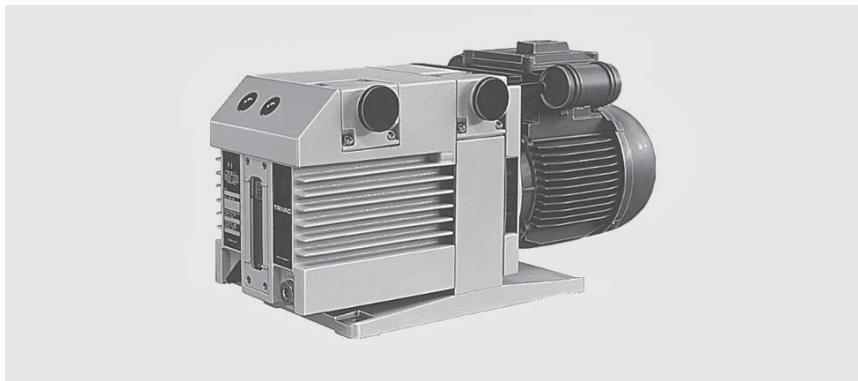
TRIVAC D 40 B two-stage

TRIVAC D 65 B two-stage

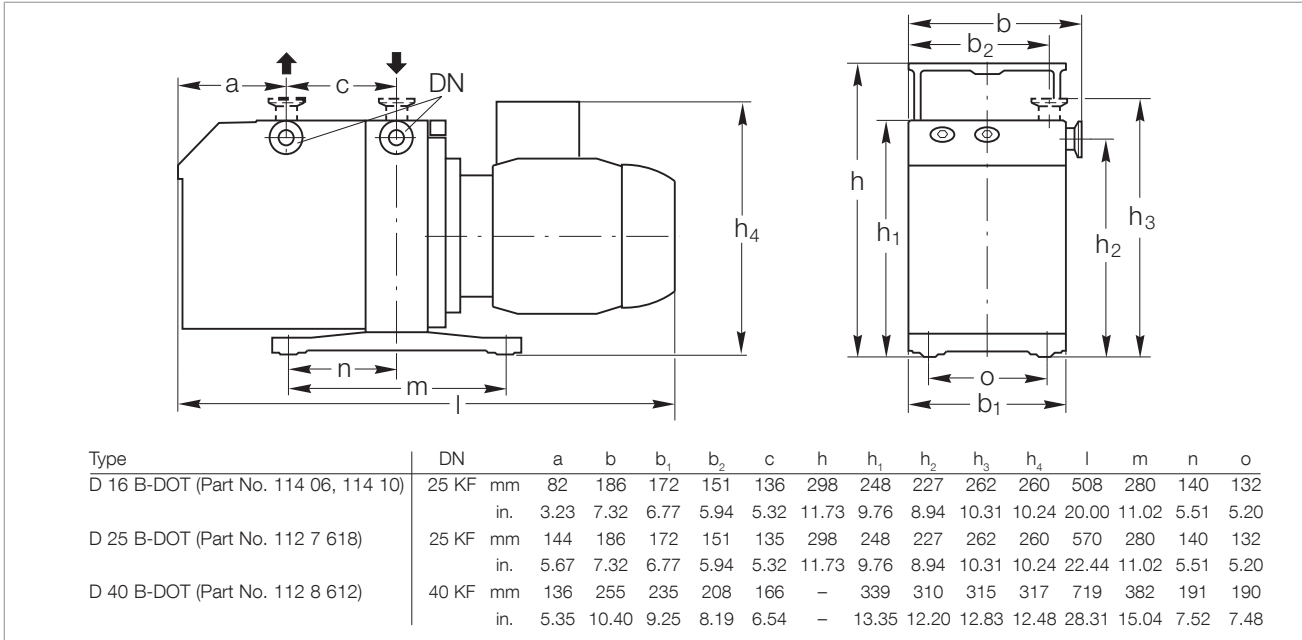
| | Part No. | Part No. |
|---|-----------------------|-----------------------|
| TRIVAC B | | |
| with 3-phase motor 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 V (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz ¹⁾ | 112 86 | 112 96 |
| 219-242/380-420 V, 50 Hz ATEX Category 3 inside and 3 outside inside: II (i) 3G IIC T4 (50 Hz) outside: II (o) 3G IIC T3 (50 Hz) | 140 180 | 140 190 |
| Accessories | | |
| Roots pump adaptor | 168 30 | 168 30 |
| AS 30-60 dust separator | 186 16 | 186 16 |
| MF 30-60 molecular filter | 186 17 | 186 17 |
| Dust filter | | |
| Filter pot FH 40-65 | 140 140 T | 140 140 T |
| Dust filter insert DF 40-65 | 140 141 S | 140 141 S |
| Adsorption trap | | |
| Filter pot FH 40-65 | 140 140 T | 140 140 T |
| Adsorption filter insert RF 40-65 | 140 142 A | 140 142 A |
| Accessories for dust filter and adsorption trap | | |
| Active charcoal | 178 10 | 178 10 |
| Zeolite | 854 20 | 854 20 |
| Activated aluminium oxide, 1.3 kg (2 l approx.) | 854 10 | 854 10 |
| AF 40-65 exhaust filter | 189 16 | 189 16 |
| AR 40-65 exhaust filter with lubricant return | 189 22 | 189 22 |
| AK 40-65 condensate trap | 188 16 | 188 16 |
| OF 40-65 mechanical oil filter | 101 92 | 101 92 |
| CF 40-65 chemical oil filter | 101 97 | 101 97 |
| Connector for gas ballast inlet M 16 x 1.5 – DN 16 KF | 168 40V01 | 168 40V01 |
| Oil drain tap M 16 x 1.5 | 190 90 | 190 90 |
| Spare Parts | | |
| Inner body | E 200 10 933 | E 200 10 944 |
| Major maintenance kit (without oil) | EK 110 002 613 | EK 110 002 612 |
| Minor maintenance kit (without oil) | EK 110 002 624 | EK 110 002 624 |
| Shaft sealing ring replacement kit | EK 110 002 629 | EK 110 002 629 |
| Small parts kit | EK 110 002 636 | EK 110 002 636 |
| Seal kit | 197 22 | 197 22 |
| For further accessories see section “Accessories for TRIVAC E, B and BCS” | | |

¹⁾ Certification after 94/9/EG (ATEX), Category 3 inside. Inside: II (i) 3G IIC T4 (50 Hz), T3 (60 Hz)

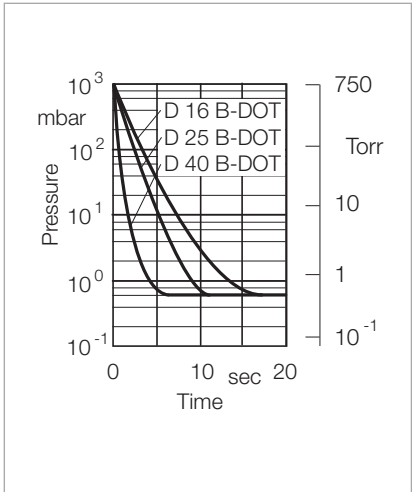
TRIVAC D 16 B-DOT to D 40 B-DOT



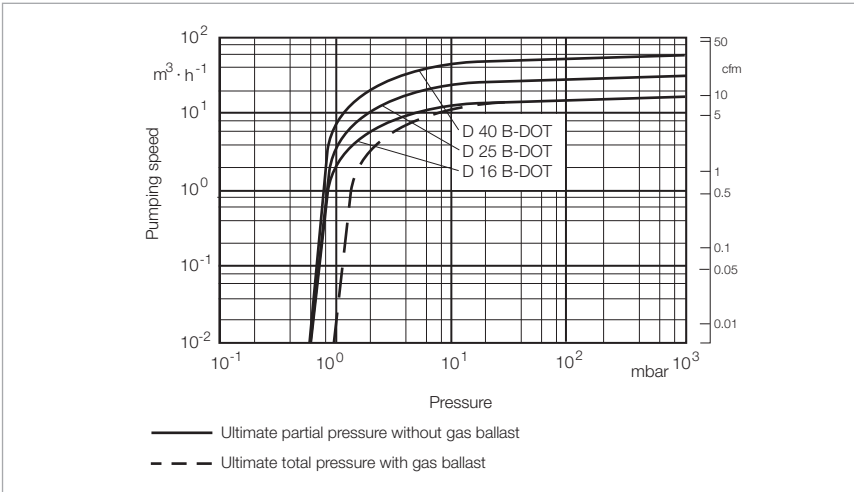
TRIVAC D 16 B-DOT



Dimensional drawing for the TRIVAC D B-DOT pumps



Pump-down characteristics of a 10 l vessel at 50 Hz



Pumping speed characteristics at 50 Hz (60 Hz curves at the end of the chapter)

Technical Data**TRIVAC D 16 B-DOT****two-stage****50 Hz****60 Hz**

| | | | |
|---|-------------------------|---|---|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 18.9 (11.1) | 22.7 (13.4) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 16.5 (9.7) | 19.8 (11.7) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 6 x 10 ⁻¹ (< 4.5 x 10 ⁻¹) | < 6 x 10 ⁻¹ (< 4.5 x 10 ⁻¹) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 9 x 10 ⁻¹ (< 6.75 x 10 ⁻¹) | < 9 x 10 ⁻¹ (< 6.75 x 10 ⁻¹) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 25 (18.75) | 25 (18.75) |
| Water vapor capacity | g/h (lbs/h) | 305 (0.672) | 370 (0.815) |
| Brake fluid filling, min. / max. | l (qt) | 0.45 / 1.0 (0.5 / 1.1) | 0.45 / 1.0 (0.5 / 1.1) |
| Noise level to DIN 45 635, without / with gas ballast | dB(A) | 54 / 56 | 54 / 56 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating | W (HP) | 550 (0.75) | 550 (0.75) |
| Nominal speed | rpm | 1500 | 1800 |
| Type of protection | IP | 2) | 2) |
| Weight | kg (lbs) | 31.7 (69.7) | 31.7 (69.7) |
| Connections, Intake and Exhaust | DN | 25 KF | 25 KF |

¹⁾ To DIN 28 400 and following numbers²⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"**Ordering Information****TRIVAC D 16 B-DOT****two-stage**

| | Part No. |
|---|---|
| TRIVAC B-DOT with 3-phase motor 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz | 114 06 114 10 (with limit switch system LSS 16-25) |
| AF 16-25 DOT exhaust filter | 124 16 |
| AK DOT condensate trap | 110 78 |
| Seal kit DOT | 200 39 059 |

Technical Data

TRIVAC D 25 B-DOT

two-stage

| | | 50 Hz | 60 Hz |
|---|-------------------------|---|---|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 29.5 (17.4) | 35.4 (20.9) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 25.7 (17.4) | 30.8 (18.2) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 6 x 10 ⁻¹ (< 4.5 x 10 ⁻¹) | < 6 x 10 ⁻¹ (< 4.5 x 10 ⁻¹) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 9 x 10 ⁻¹ (< 6.75 x 10 ⁻¹) | < 9 x 10 ⁻¹ (< 6.75 x 10 ⁻¹) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 25 (18.75) | 25 (18.75) |
| Water vapor capacity | g/h (lbs/h) | 480 (1.058) | 570 (1.257) |
| Brake fluid filling, min. / max. | l (qt) | 0.6 / 1.4 (6.3 / 1.5) | 0.6 / 1.4 (6.3 / 1.5) |
| Noise level to DIN 45 635, without / with gas ballast | dB(A) | 54 / 56 | 54 / 56 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating | W (HP) | 550 (0.75) | 550 (0.75) |
| Nominal speed | rpm | 1500 | 1800 |
| Type of protection | IP | 2) | 2) |
| Weight | kg (lbs) | 36.0 (79.2) | 36.0 (79.2) |
| Connections, Intake and Exhaust | DN | 25 KF | 25 KF |

¹⁾ To DIN 28 400 and following numbers

²⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

Ordering Information

TRIVAC D 25 B-DOT

two-stage

| | Part No. |
|---|-------------------|
| TRIVAC B-DOT with 3-phase motor 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz | 112 76 18 |
| AF 16-25 DOT exhaust filter | 124 16 |
| AK DOT condensate trap | 110 78 |
| Seal kit DOT | 200 39 059 |

Technical Data**TRIVAC D 40 B-DOT****two-stage**

| | | 50 Hz | 60 Hz |
|---|-------------------------|---|---|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 46.0 (27.0) | 55.0 (32.5) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 40.0 (24.0) | 48.0 (28.0) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 6 x 10 ⁻¹ (< 4.5 x 10 ⁻¹) | < 6 x 10 ⁻¹ (< 4.5 x 10 ⁻¹) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 9 x 10 ⁻¹ (< 6.75 x 10 ⁻¹) | < 9 x 10 ⁻¹ (< 6.75 x 10 ⁻¹) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 40 (30) | 40 (30) |
| Water vapor capacity | g/h (lbs/h) | 1185 (2.612) | 1420 (3.130) |
| Brake fluid filling, min. / max. | l (qt) | 1.7 / 2.6 (1.8 / 2.7) | 1.7 / 2.6 (1.8 / 2.7) |
| Noise level to DIN 45 635, without / with gas ballast | dB(A) | 57 / 59 | 57 / 59 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating | W (HP) | 2200 (3.0) | 2200 (3.0) |
| Nominal speed | rpm | 1500 | 1800 |
| Type of protection | IP | 2) | 2) |
| Weight | kg (lbs) | 73 (161) | 73 (161) |
| Connections, Intake and Exhaust | DN | 40 KF | 40 KF |

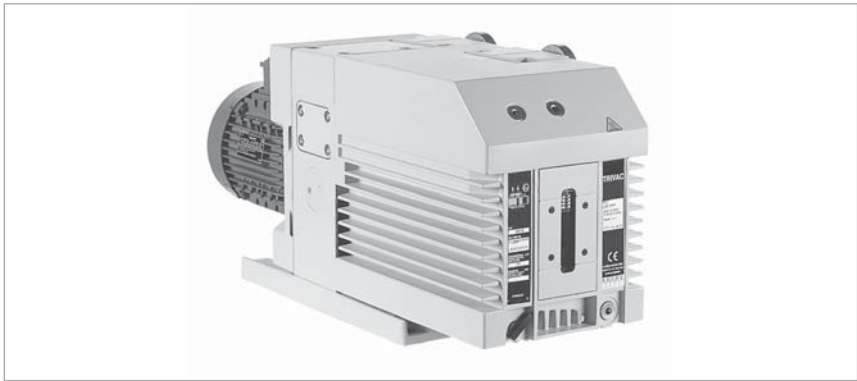
¹⁾ To DIN 28 400 and following numbers

²⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

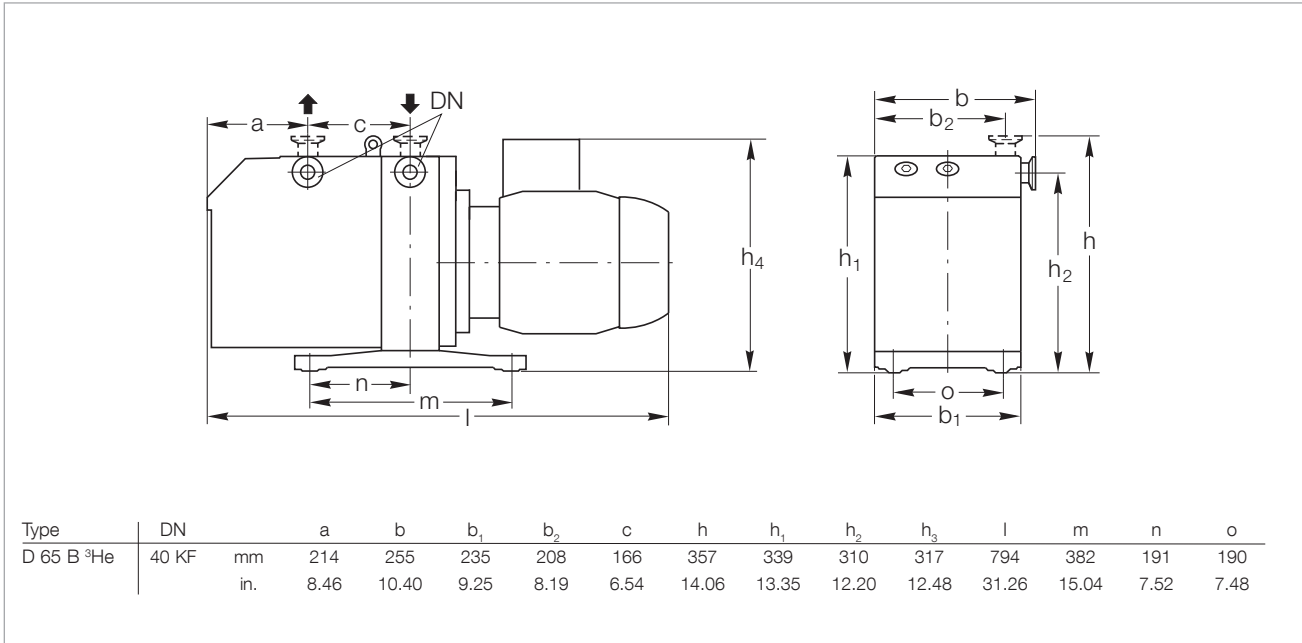
Ordering Information**TRIVAC D 40 B-DOT****two-stage**

| | Part No. |
|---|---------------------|
| TRIVAC B-DOT with 3-phase motor 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 V (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz | 112 86 12 |
| AF 40-65 DOT exhaust filter | 101 15 |
| AK DOT condensate trap | upon request |
| Seal kit DOT | 200 39 707 |

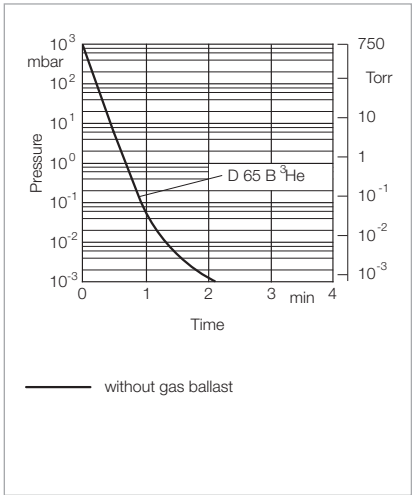
TRIVAC D 65 B ³He



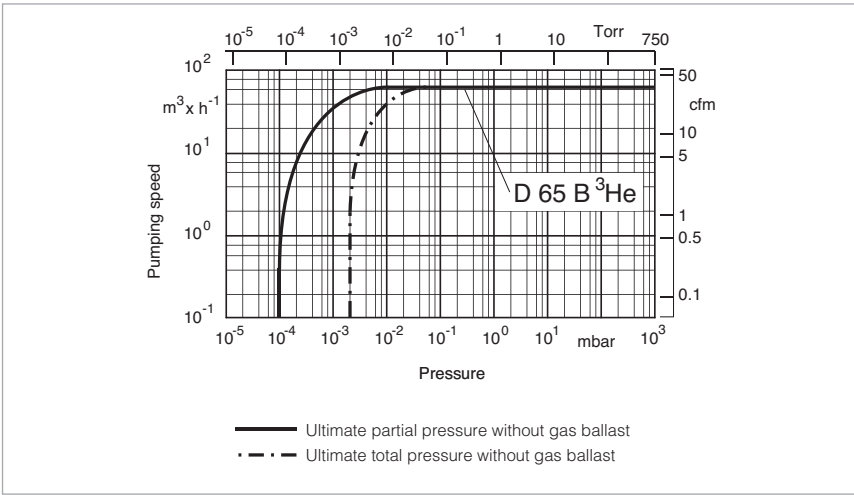
TRIVAC D 65 B ³He



Dimensional drawing for the TRIVAC D 65 B ³He



Pump-down characteristics of a 100 l vessel at 50 Hz



Pumping speed characteristics at 50 Hz (60 Hz curves at the end of the chapter)

Technical Data**TRIVAC D 65 B ³He**

| | | 50 Hz | 60 Hz |
|---|------------------------------|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 75 (44) | 90 (53) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 65 (38) | 78 (46) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 2.0 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2.0 x 10 ⁻³ (< 1.5 x 10 ⁻³) |
| Oil filling with LEYBONOL LVO 100, min. / max. | l (qt) | 2.0 / 3.3 (2.1 / 3.5) | 2.0 / 3.3 (2.1 / 3.5) |
| Leak rate | mbar x l x sec ⁻¹ | < 1.0 x 10 ⁻⁷ | < 1.0 x 10 ⁻⁷ |
| Noise level to DIN 45 635, without / with gas ballast | dB(A) | 57 / 59 | 57 / 59 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating ²⁾ | W (HP) | 2200 (3) | 2200 (3) |
| Nominal speed ²⁾ | rpm | 1500 | 1800 |
| Type of protection | IP | ³⁾ | ³⁾ |
| Weight | kg (lbs) | 81.7 (180) | 81.7 (180) |
| Connections, Intake and Exhaust | DN | 40 KF | 40 KF |

Ordering Information**TRIVAC D 65 B ³He**

| | Part No. |
|---|------------------|
| TRIVAC B ³ He with 3-phase motor 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 V (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz ¹⁾ | 112 96 46 |

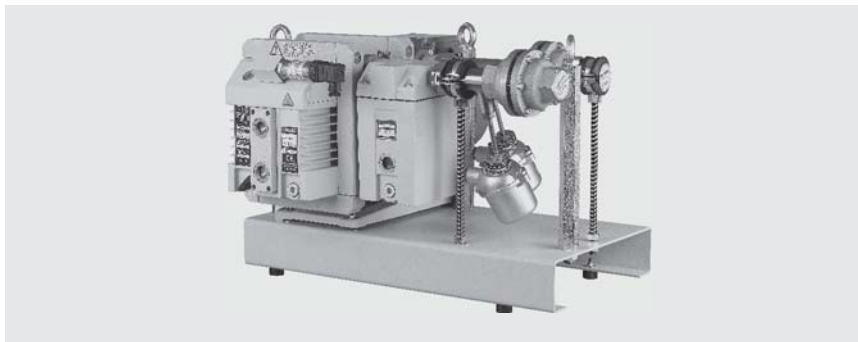
¹⁾ To DIN 28 400 and following numbers

²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

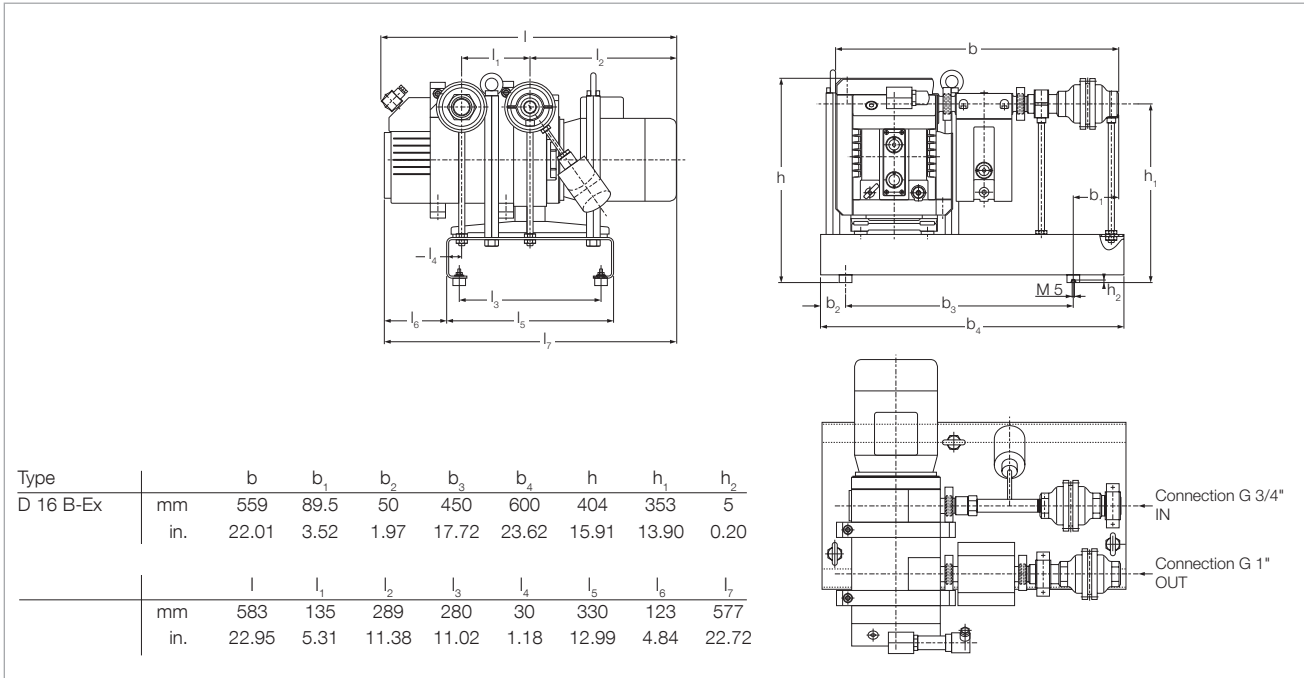
³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

TRIVAC D 16 B-Ex (Explosion Protected and Pressure Burst Resistant)

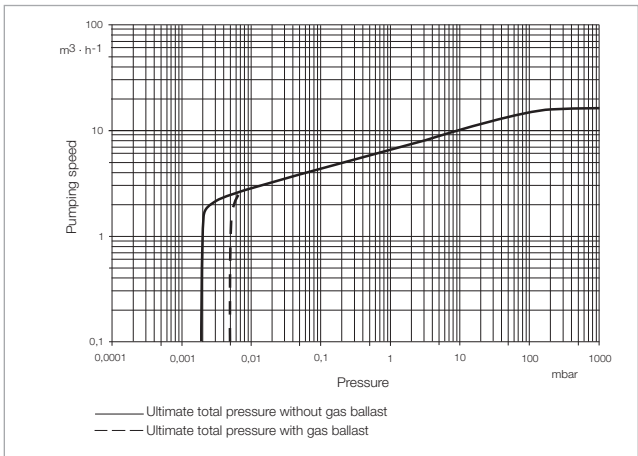


ATEX
Category 1 inside and 2 outside

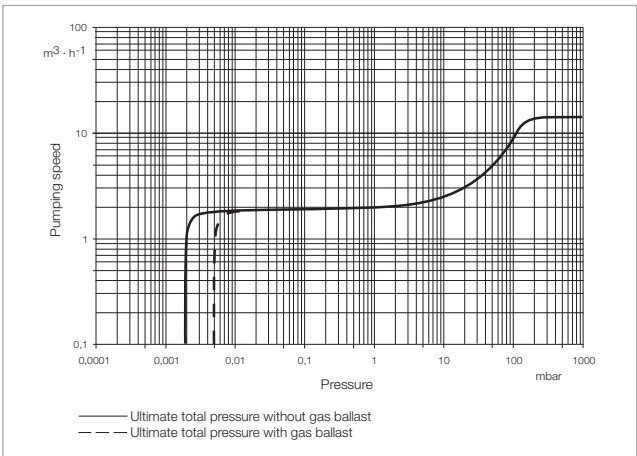
TRIVAC D 16 B-Ex



Dimensional drawing for the TRIVAC D 16 B-Ex (explosion protected and pressure burst resistant)



Pumping speed characteristics of TRIVAC D 16 B-Ex [IIB3 T4]
 (Part No. 140 091)





Pumping speed characteristics of TRIVAC D 16 B-Ex [IIC T4]
 (Part No. 140 092)

Technical Data**TRIVAC D 16 B-Ex****(Explosion Protected and Pressure Burst Resistant) Two-Stage**

| | | |
|---|-------------------------|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 18.9 (11.1) |
| Pumping speed (for Part No. 140 091 / 140 092) ¹⁾ | m ³ /h (cfm) | 16 / 15 (9.4/8.8) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 1 x 10 ⁻⁴ (< 0.75 x 10 ⁻³) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 25 (18.75) |
| Water vapor capacity | g/h (lbs/h) | 305 (0.672) |
| Oil filling, min. / max. | l (qt) | 0.55 / 1.3 (0.58 / 1.4) |
| Motor | | 3~, 230 V / 400 V, 50 Hz, Ex e II T4 |
| Type of protection | IP | 54 |
| Maximum gas inlet temperature | °C (°F) | 60 (140) |
| Highest permissible pressure in the oil box | mbar (Torr) | 1500 (1125) |
| Ambient temperature (t _a) | °C (°F) | +12 to +40 (+46 to +104) |
| Maximum surface temperature | °C (°F) | 135 (275) |
| Max. Inlet pressure | mbar (Torr) | Atmospheric pressure |
| Weight (complete system) | kg (lbs) | 72 (159) |
| Materials (materials in contact with the gas) | | Steel, hardened steel, spring steel, stainless steel, zinc, aluminium and aluminium alloys, grey cast iron 25, FKM, felt, glass, silicone, polyamide |
| Connections | | |
| Intake side | Inside thread | G 3/4" |
| Pressure side | Inside thread | G 1" |

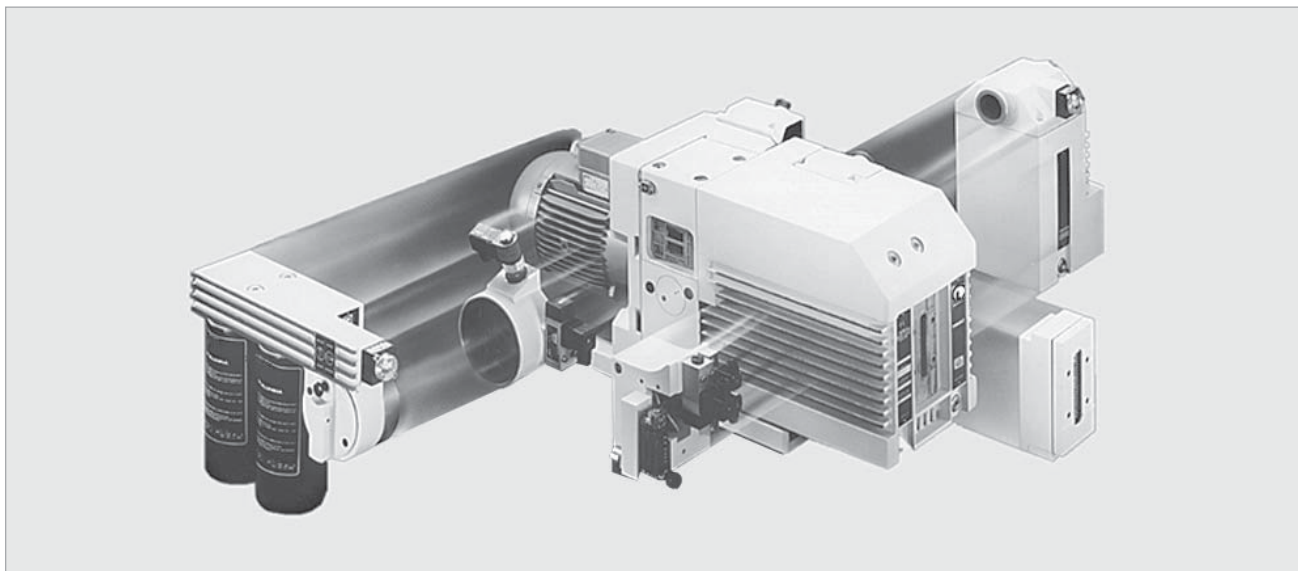
Ordering Information**TRIVAC D 16 B-Ex****(Explosion Protected and Pressure Burst Resistant) Two-Stage**

| | Part No. |
|---|------------------------------|
| TRIVAC D 16 B-Ex IIB3 T4 in accordance with 94/9/EC [ II inside: 1G IIB3 T4 outside: 2G IIB T4 (12 °C < t _a < 40 °C) X EC Type Examination Certificate: IBExU03ATEX1017 X] | 140 091 |
| TRIVAC D 16 B-Ex IIC T4 ²⁾ in accordance with 94/9/EC [ II inside: 1G IIC (no C ₂ H ₂ , CS ₂) T4 outside: 2G IIC T4 (12 °C < t _a < 40 °C) X EC Type Examination Certificate: IBExU03ATEX1016 X] | 140 092 ²⁾ |

¹⁾ To DIN 28 400 and following numbers²⁾ with the exception of acetylene and carbon bisulphide

For all enquiries and orders relating to category 1 and 2 ATEX products please exclusively use our ATEX questionnaire. You can find this questionnaire at the end of the full-line catalog together with the fax forms or on the Internet under "www.oerlikon.com/leyboldvacuum" under Download Documents in the area Documentation.

TRIVAC BCS, Two-Stage Rotary Vane Vacuum Pumps



TRIVAC System

The TRIVAC BCS pumps are oil sealed vacuum pumps operating according to the rotary vane principle. Oil which is injected into the pump chamber is used for sealing, lubrication and cooling purposes.

The pump body is assembled from individual parts without sealing components. The parts are pinned in order to ensure easy disassembly and reassembly of the parts.

The motor is connected to the pumping section via an elastic coupling.

In addition, the TRIVAC BCS is ready for system integration (adaptable to different applications).

Advantages to the User

- Compact design
- Low noise operation with hardly any vibrations
- Built-in oil pump
- Continuous operation even at 1000 mbar (750 Torr)
- Pressure-lubricated sliding bearings
- Anti-suckback valve controlled via the oil pressure, no backstreaming of oil, independent of the operating mode, with or without gas ballast
- Low backstreaming of oil within the pump
- High pumping speed down to ultimate pressure
- Either vertical or horizontal intake and exhaust ports
- All controls as well as the oil sight glass are located on the face side
- Low power consumption
- Produces very little heat
- Exchangeable inner section
- Main flow oil filters may be fitted
- Very long service life
- Modular system
- Service-friendly
- Built-in temperature switch for temperature monitoring
- Corrosion protected – the use of yellow metals has been avoided; only grey cast iron, surface treated aluminium, steel and stainless steel is used
- Double shaft seal

Typical Applications

- In all areas of vacuum engineering
- Pumping of corrosive or aggressive media
- Production of semiconductors and in the area of chemistry
- Research and production
- Generation of rough and medium vacuum
- Backing pump in pump sets, i.e. in connection with Roots, diffusion, turbo or cryopumps

Supplied Equipment

- Small flanges
- Centering, sealing and clamping rings
- The intake port includes a dirt trap

BCS pumps are supplied with a filling of standard oil LEYBONOL LVO 100.

All pumps are subjected to a vacuum test before delivery!

TRIVAC SYSTEM

The TRIVAC BCS and its accessories

- CFS, chemical filter with safety isolation valve
- ARS, exhaust filter with lubricant return
- IGS, inert gas system
- LSS, limit switch system

make up the TRIVAC SYSTEM.

TRIVAC BCS-PFPE

In many applications the use of synthetic lubricants like perfluoropolyether (PFPE) offers superior characteristics compared to mineral oils.

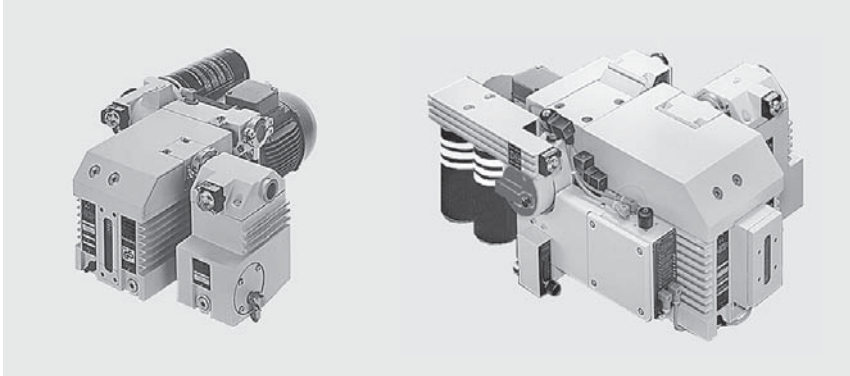
Advantages of perfluoropolyether (PFPE) LEYBONOL LVO 400:

- Practically inert against all chemical and oxidizing influences
- No polymerization under the influence of high energy radiation
- In part significantly increased oil change intervals
- Thermally highly stable. Thermal decomposition will only occur at temperatures over 290 °C (554 °F)

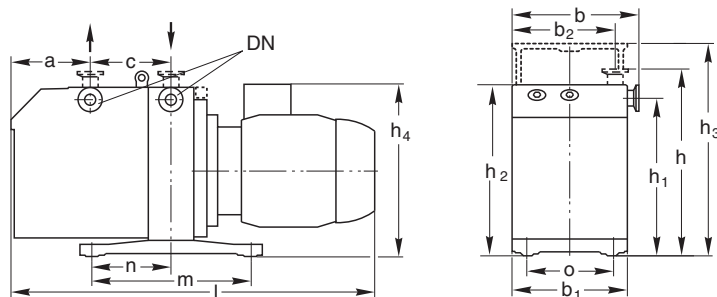
BCS-PFPE pumps have been especially prepared for operation with LEYBONOL LVO 400 and are supplied **without** the oil filling.

We recommend using our operating fluid LEYBONOL LVO 400 and always to install a chemical oil filter CF or CFS.

TRIVAC D 16 BCS to D 65 BCS



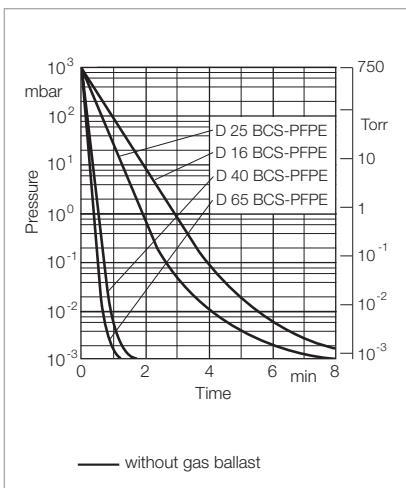
TRIVAC D 25 BCS with ARS and CFS (left)
and TRIVAC D 65 BCS with CFS, ARS, IGS, LSS, EIS – TRIVAC SYSTEM (right)



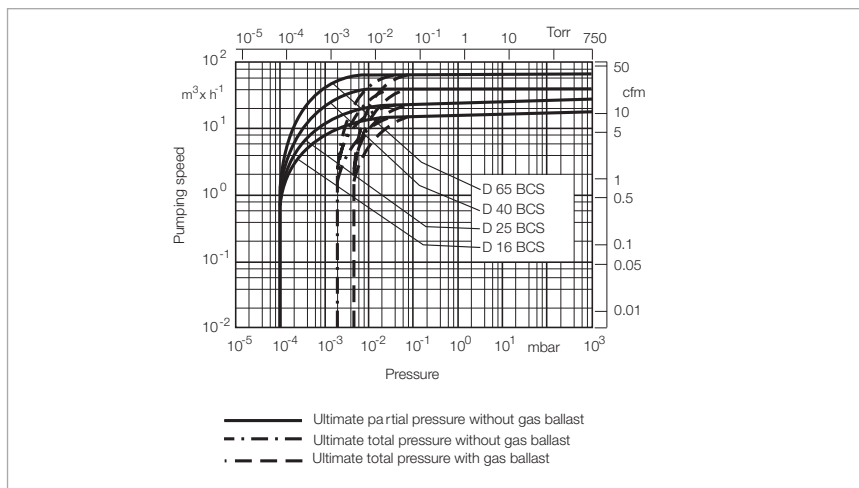
| Type | | | DN | a | b | b ₁ | b ₂ | c | h | h ₁ | h ₂ | h ₃ | h ₄ ¹⁾ | l ¹⁾ | m | n | o |
|----------------------------|-------|-----|------|-------|------|----------------|----------------|-------|-------|----------------|----------------|----------------|------------------------------|-----------------|------|------|---|
| D 16 BCS (Part No. 113 68) | 25 KF | mm | 82 | 186 | 172 | 151 | 135 | 262 | 227 | 248 | 298 | 260 | 508 | 280 | 140 | 132 | |
| | | in. | 3.23 | 7.32 | 6.77 | 5.94 | 5.32 | 10.31 | 8.94 | 9.76 | 11.73 | 10.24 | 20.00 | 11.02 | 5.51 | 5.20 | |
| D 25 BCS (Part No. 113 78) | 25 KF | mm | 144 | 186 | 172 | 151 | 135 | 262 | 227 | 248 | 298 | 260 | 570 | 280 | 140 | 132 | |
| | | in. | 5.67 | 7.32 | 6.77 | 5.94 | 5.32 | 10.31 | 8.94 | 9.76 | 11.73 | 10.24 | 22.44 | 11.02 | 5.51 | 5.20 | |
| D 40 BCS (Part No. 113 88) | 40 KF | mm | 135 | 264 | 234 | 206 | 166 | 355 | 308 | 336 | – | 317 | 719 | 382 | 191 | 190 | |
| | | in. | 5.32 | 10.39 | 9.21 | 8.11 | 6.54 | 13.98 | 12.13 | 13.23 | – | 12.48 | 28.31 | 15.04 | 7.52 | 7.48 | |
| D 65 BCS (Part No. 113 98) | 40 KF | mm | 213 | 264 | 234 | 206 | 166 | 355 | 308 | 336 | – | 317 | 794 | 382 | 191 | 190 | |
| | | in. | 8.39 | 10.39 | 9.21 | 8.11 | 6.54 | 13.98 | 12.13 | 13.23 | – | 12.48 | 31.26 | 15.04 | 7.52 | 7.48 | |

¹⁾ For dimensions h₄ and l for further part numbers, see paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

Dimensional drawing for the TRIVAC D 16 to D 65 BCS



Pump-down characteristics of a 100 l vessel at 50 Hz



Pumping speed characteristics at 50 Hz (60 Hz curves at the end of the chapter)

Technical Data

TRIVAC
D 16 BCS
two-stageD 25 BCS
two-stage

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|--|-------------------------|---|---|---|---|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 18.9 (11.1) | 22.7 (13.4) | 29.5 (17.4) | 35.4 (20.9) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 16.5 (9.7) | 19.8 (11.7) | 25.7 (15.1) | 30.8 (18.2) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 2.5 x 10 ⁻³ (< 1.9 x 10 ⁻³) | < 2.5 x 10 ⁻³ (< 1.9 x 10 ⁻³) | < 2.5 x 10 ⁻³ (< 1.9 x 10 ⁻³) | < 2.5 x 10 ⁻³ (< 1.9 x 10 ⁻³) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 25 (18.8) | 25 (18.8) | 25 (18.8) | 25 (18.8) |
| Water vapor capacity | g/h (lbs/h) | 305 (0.672) | 370 (0.816) | 480 (1.058) | 570 (1.257) |
| Oil filling, min. / max. | l (qt) | 0.45 / 1.0 (0.5/1.1) | 0.45 / 1.0 (0.5/1.1) | 0.6 / 1.4 (0.6/1.5) | 0.6 / 1.4 (0.6/1.5) |
| Noise level ²⁾ to DIN 45 635, without / with gas ballast | dB(A) | 54 / 56 | 54 / 56 | 54 / 56 | 54 / 56 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating ²⁾ | W (HP) | 750 (1) | 750 (1) | 750 (1) | 750 (1) |
| Nominal speed ²⁾ | rpm | 1500 | 1800 | 1500 | 1800 |
| Type of protection | IP | 3) | 3) | 3) | 3) |
| Weight ²⁾ | kg (lbs) | 31.5 (69.3) | 31.5 (69.3) | 35.8 (78.8) | 35.8 (78.8) |
| Connections, Intake and Exhaust | DN | 25 KF | 25 KF | 25 KF | 25 KF |

¹⁾ To DIN 28 400 and following numbers

²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

Technical Data

TRIVAC

D 40 BCS two-stage

D 65 BCS two-stage

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|--|-------------------------|---|---|---|---|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 46 (27) | 55 (32.5) | 75 (44) | 90 (53) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 40 (24) | 48 (28) | 65 (38) | 78 (46) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) | 10 ⁻⁴ (0.75 x 10 ⁻⁴) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 40 (30) | 40 (30) | 40 (30) | 40 (30) |
| Water vapor capacity | g/h (lbs/h) | 1185 (2.612) | 1420 (3.131) | 1925 (4.244) | 2310 (5.093) |
| Oil filling, min. / max. | l (qt) | 1.7 / 2.6 (1.8/2.7) | 1.7 / 2.6 (1.8/2.7) | 2.0 / 3.3 (2.1/3.5) | 2.0 / 3.3 (2.1/3.5) |
| Noise level ²⁾ to DIN 45 635, without / with gas ballast | dB(A) | 57 / 59 | 57 / 59 | 57 / 59 | 57 / 59 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating ²⁾ | W (HP) | 2200 (3) | 2200 (3) | 2200 (3) | 2200 (3) |
| Nominal speed ²⁾ | rpm | 1500 | 1800 | 1500 | 1800 |
| Type of protection | IP | 3) | 3) | 3) | 3) |
| Weight ²⁾ | kg (lbs) | 72.5 (160) | 72.5 (160) | 81.7 (180) | 81.7 (180) |
| Connections, Intake and Exhaust | DN | 40 KF | 40 KF | 40 KF | 40 KF |

¹⁾ To DIN 28 400 and following numbers

²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

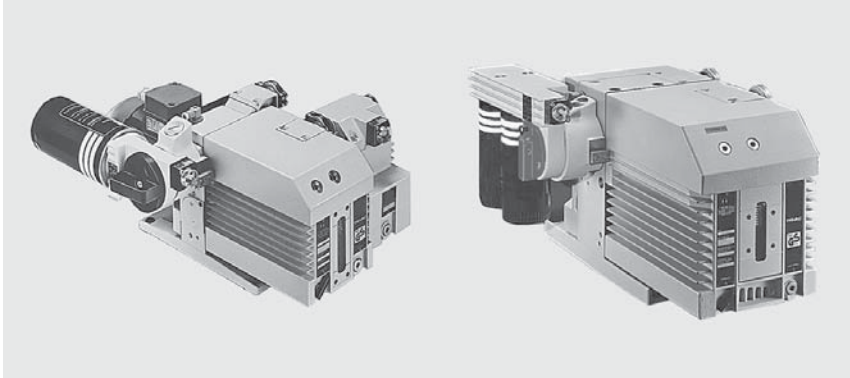
³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

Ordering Information

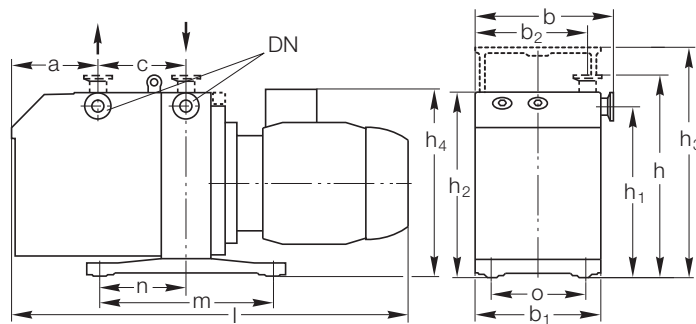
TRIVAC

| | D 16 BCS two-stage | D 25 BCS two-stage | D 40 BCS two-stage | D 65 BCS two-stage |
|---|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | Part No. | Part No. | Part No. | Part No. |
| TRIVAC BCS with 3-phase motor 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz | 113 68 | 113 78 | 113 88 | 113 98 |
| Accessories | | | | |
| Roots pump adaptor | – | – | 168 30 | 168 30 |
| Exhaust filter with lubricant return | | | | |
| ARS 16-25 | 189 56 | 189 56 | – | – |
| ARS 40-65 | – | – | 189 57 | 189 57 |
| Condensate separator | | | | |
| AK 16-25 | 188 11 | 188 11 | – | – |
| AK 40-65 | – | – | 188 16 | 188 16 |
| Chemical filter with safety blocking valve | | | | |
| CFS 16-25 | 101 76 | 101 76 | – | – |
| CFS 40-65 | – | – | 101 77 | 101 77 |
| Inert gas system | | | | |
| IGS 16-25 | 161 76 | 161 76 | – | – |
| IGS 40-65 | – | – | 161 68V | 161 68V |
| Limit switch system | | | | |
| LSS 16-25 | 161 06 | 161 06 | – | – |
| LSS 40-65 | – | – | 161 07 | 161 07 |
| Spare Parts | | | | |
| Inner body | 200 39 762 | 200 39 764 | 200 39 758 | 200 39 760 |
| Major maintenance kit for LVO 100 (without oil) | EK110002646 | EK110002647 | EK110002641 | EK110002642 |
| Minor maintenance kit for LVO 100 (without oil) | EK110002649 | EK 110002648 | – | – |
| Shaft sealing replacement kit | EK110002650 | EK110002650 | EK110002643 | EK110002643 |
| Small parts kit | – | – | EK110002651 | EK110002651 |
| Seal kit | 197 31 | 197 31 | 197 32 | 197 32 |
| For further accessories see section “Accessories for TRIVAC E, B and BCS” | | | | |

TRIVAC D 16 BCS-PFPE to D 65 BCS-PFPE



TRIVAC D 25 BCS-PFPE with CFS 16-25 and ARS 16-25 (left) and
TRIVAC D 65 BCS-PFPE with CFS 40-65 (right)



| Type | DN | | a | b | b ₁ | b ₂ | c | h | h ₁ | h ₂ | h ₃ | h ₄ | l | m | n | o |
|---------------------------------|-------|-----|------|-------|----------------|----------------|------|-------|----------------|----------------|----------------|----------------|-------|-------|------|------|
| D 16 BCS-PFPE (Part No. 113 69) | 25 KF | mm | 82 | 190 | 175 | 150 | 135 | 263 | 226 | 250 | 298 | 260 | 508 | 280 | 140 | 132 |
| | | in. | 3.23 | 7.48 | 6.89 | 5.91 | 5.32 | 10.35 | 8.90 | 9.84 | 11.73 | 10.24 | 20.00 | 11.02 | 5.51 | 5.20 |
| D 25 BCS-PFPE (Part No. 113 79) | 25 KF | mm | 142 | 190 | 175 | 150 | 135 | 263 | 226 | 250 | 298 | 260 | 570 | 280 | 140 | 132 |
| | | in. | 5.59 | 7.48 | 6.89 | 5.91 | 5.32 | 10.35 | 8.90 | 9.84 | 11.73 | 10.24 | 22.44 | 11.02 | 5.51 | 5.20 |
| D 40 BCS-PFPE (Part No. 113 89) | 40 KF | mm | 135 | 264 | 234 | 206 | 166 | 355 | 308 | 336 | – | 317 | 719 | 382 | 191 | 190 |
| | | in. | 5.32 | 10.39 | 9.21 | 8.11 | 6.54 | 13.98 | 12.13 | 13.23 | – | 12.48 | 28.31 | 15.04 | 7.52 | 7.48 |
| D 65 BCS-PFPE (Part No. 113 99) | 40 KF | mm | 213 | 264 | 234 | 206 | 166 | 355 | 308 | 336 | – | 317 | 794 | 382 | 191 | 190 |
| | | in. | 8.39 | 10.39 | 9.21 | 8.11 | 6.54 | 13.98 | 12.13 | 13.23 | – | 12.28 | 31.26 | 15.04 | 7.52 | 7.48 |

¹⁾ For dimensions h₄ and l for further part numbers, see paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

Dimensional drawing for the TRIVAC D 16 to D 65 BCS-PFPE

Technical Data

TRIVAC

D 16 BCS-PFPE two-stage

D 25 BCS-PFPE two-stage

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|---|-------------------------|--|--|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 18.9 (11.1) | 22.7 (13.4) | 29.5 (17.4) | 35.4 (20.9) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 16.5 (9.7) | 19.8 (11.7) | 25.7 (15.1) | 30.8 (18.2) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) |
| Ultimate total pressure with reduced gas ballast, 200 l x h ⁻¹ ¹⁾ | mbar (Torr) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) | < 2 x 10 ⁻³ (< 1.5 x 10 ⁻³) |
| Lubricant filling | | | | | |
| min. / max. | l (qt) | 0.45 / 1.0 (0.5 / 1.1) | 0.45 / 1.0 (0.5 / 1.1) | 0.6 / 1.4 (0.6 / 1.5) | 0.6 / 1.4 (0.6 / 1.5) |
| upon delivery | l (qt) | 0.2 (0.2) | 0.2 (0.2) | 0.4 (0.4) | 0.4 (0.4) |
| Noise level ²⁾ to DIN 45 635, without / with gas ballast | dB(A) | 54 / 56 | 54 / 56 | 54 / 56 | 54 / 56 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating ²⁾ | W (HP) | 750 (1) | 750 (1) | 750 (1) | 750 (1) |
| Nominal speed ²⁾ | rpm | 1500 | 1800 | 1500 | 1800 |
| Type of protection | IP | 3) | 3) | 3) | 3) |
| Weight ²⁾ | kg (lbs) | 30.8 (67.8) ⁴⁾ | 30.8 (67.8) ⁴⁾ | 35.3 (77.7) ⁴⁾ | 35.3 (77.7) ⁴⁾ |
| Connections, Intake and Exhaust | DN | 25 KF | 25 KF | 25 KF | 25 KF |

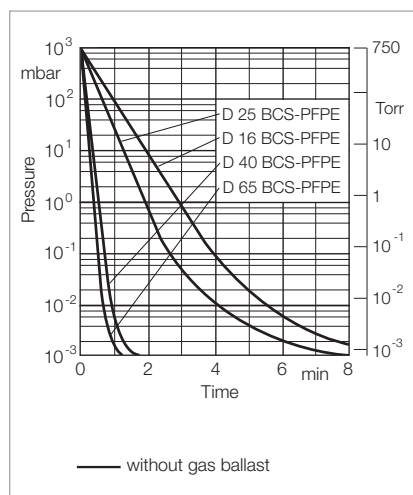
¹⁾ To DIN 28 400 and following numbers

²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

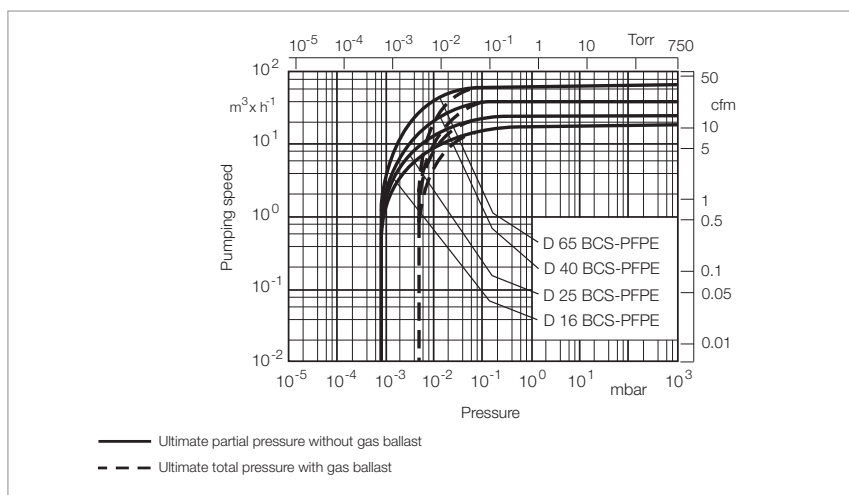
Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

⁴⁾ Upon delivery



Pump-down characteristics of a 100 l vessel at 50 Hz



Pumping speed characteristics at 50 Hz (60 Hz curves at the end of the chapter)

Technical Data

TRIVAC

D 40 BCS-PFPE two-stage

D 65 BCS-PFPE two-stage

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|--|-------------------------|--|--|--|--|
| Nominal pumping speed ¹⁾ | m ³ /h (cfm) | 46 (27) | 55 (32.5) | 75 (44) | 90 (53) |
| Pumping speed ¹⁾ | m ³ /h (cfm) | 40 (24) | 48 (28) | 65 (38) | 78 (46) |
| Ultimate partial pressure without gas ballast ¹⁾ | mbar (Torr) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.8 x 10 ⁻³) |
| Lubricant filling | | | | | |
| min. / max. | l (qt) | 1.7 / 2.6 (1.8 / 2.7) | 1.7 / 2.6 (1.8 / 2.7) | 2.0 / 3.3 (2.1 / 3.5) | 2.0 / 3.3 (2.1 / 3.5) |
| upon delivery | l (qt) | 0.6 (0.6) | 0.6 (0.6) | 0.75 (0.8) | 0.75 (0.8) |
| Noise level ²⁾ to DIN 45 635, without / with gas ballast | dB(A) | 57 / 59 | 57 / 59 | 57 / 59 | 57 / 59 |
| Admissible ambient temperature | °C (°F) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) | +12 to +40 (+54 to +104) |
| Motor rating ²⁾ | W (HP) | 2200 (3) | 2200 (3) | 2200 (3) | 2200 (3) |
| Nominal speed ²⁾ | rpm | 1500 | 1800 | 1500 | 1800 |
| Type of protection | IP | 3) | 3) | 3) | 3) |
| Weight ²⁾ | kg (lbs) | 71.3 (157) ⁴⁾ | 71.3 (157) ⁴⁾ | 80.2 (176) ⁴⁾ | 80.2 (176) ⁴⁾ |
| Connections, Intake and Exhaust | DN | 40 KF | 40 KF | 40 KF | 40 KF |

¹⁾ To DIN 28 400 and following numbers

²⁾ Motor rating and noise levels for the pumps with AC motor 50 Hz.

Any data that deviate from the above for pumps with other motors, and other motor-dependent data are given in chapter "Products", paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

³⁾ See paragraph "Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE"

⁴⁾ Upon delivery

Ordering Information

TRIVAC

| | D 16 BCS-PFPE two-stage | D 25 BCS-PFPE two-stage | D 40 BCS-PFPE two-stage | D 65 BCS-PFPE two-stage |
|--|----------------------------|----------------------------|----------------------------|----------------------------|
| | Part No. | Part No. | Part No. | Part No. |
| TRIVAC BCS-PFPE with 3-phase motor 200-240 V (200 V IE2) / 380-400 V (380-400 V IE 2), 50 Hz / 200-240 (208-240 V EPact) / 380-480 V (416-480 V EPact), 60 Hz | 113 69 | 113 79 | 113 89 | 113 99 |
| Accessories | | | | |
| Roots pump adaptor | - | - | 168 30 | 168 30 |
| Exhaust filter with lubricant return ARS 16-25 | 189 56 | 189 56 | - | - |
| ARS 40-65 | - | - | 189 57 | 189 57 |
| Condensate trap AK 16-25 | 188 11 | 188 11 | - | - |
| AK 40-65 | - | - | 188 16 | 188 16 |
| Chemical filter with safety isolation valve CFS 16-25 | 101 76 | 101 76 | - | - |
| CFS 40-65 | - | - | 101 77 | 101 77 |
| Inert gas system IGS 16-25 | 161 76 | 161 76 | - | - |
| IGS 40-65 | - | - | 161 68V | 161 68V |
| Limit switch system LSS 16-25 | 161 06 | 161 06 | - | - |
| LSS 40-65 | - | - | 161 07 | 161 07 |
| Spare Parts | | | | |
| Major maintenance kit, LVO 400 (without oil) | EK110002644 | EK110002645 | EK110002637 | EK110002638 |
| Shaft sealing replacement kit | EK110002650 | EK110002650 | EK110002643 | EK110002643 |
| Small parts kit | - | - | EK110002651 | EK110002651 |
| Seal kit | 197 41 | 197 41 | 197 42 | 197 42 |
| For further accessories see section "Accessories for TRIVAC E, B and BCS" | | | | |








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Ordering Information




TRIVAC







| | D 16 BCS-PFPE two-stage | D 25 BCS-PFPE two-stage |
|---|----------------------------|----------------------------|
| | Part No. | Part No. |
| TRIVAC BCS-PFPE with 1-phase motor 220-230 V, 50/60 Hz, NEMA plug | - | 913 79-2 |






Motor Dependent Data for the TRIVAC B, BCS and BCS-PFPE

| Pump type | | D 4 / 8 B | D 4 / 8 B | D 4 / 8 B | D 4 / 8 B |
|---|------------|---|---|---|---|
| Part No. of the pump | | 140 081, 140 082 | 112 45, 112 55 | 112 46, 112 56 112 5631, 140 246 | 140 140, 140 150 |
| Motor part number | | 100002292 | 6507733 | 6508538 | 20010406 |
| Size | | 80 | 71 | 71 | 71L |
| Protection class | | IP 54 | IP 55 | IP 55 | IP 55 |
| Operating mode in acc. w. IEC 34 / NEMA | | S1 | S1 | S1 | S1 |
| Insulation class | | F | F | F | F |
| Phases | | 1~ | 1~ | 3~ | 3~ |
| Efficiency class | | – | – | – | – |
| Number of poles | | 4 | 4 | 4 | 4 |
| Nominal output power at 50 Hz at 60 Hz | | 570 W 660 W | 370 W – | 370 W 440 W | 370 W – |
| Nominal input frequency | | 50 Hz / 60 Hz | 50 Hz | 50 Hz / 60 Hz | 50 Hz |
| Nominal voltage range and nominal current (Mains voltage tolerance $\pm 10\%$) at 50 Hz | | 100-115 V / 7.7 A – 210-230 V / 4.0 A – | 230 V / 3.0 A – – – | 200-240 V / 2.15 A – 380-400 V / 1.07 A – | 230 V / 1.84 A – 400 V / 1.06 A – |
| at 60 Hz | | 100-115 V / 5.6 A – 210-230 V / 2.8 A – | – – – – | 200-240 V / 2.15 A – 380-480 V / 1.07 A – | – – – – |
| Nominal speed 50 Hz 60 Hz | rpm rpm | 1420 1690 | 1410 – | 1430 1735 | 1390 – |
| Maximum operating altitude above sea level | | 1000 m above sea level | 1000 m above sea level | 1000 m above sea level | 1000 m above sea level |
| Max. ambient temperature during operation | °C (°F) | 40 (104) | 40 (104) | 40 (104) | 40 (104) |
| Terminal board / plug | | Multi-pin plug at junction box, mains cord 20081091 (1.8 m) with Schuko plug CEE 7/7 (Included in delivery), mains cord 20081097 (1.8 m) with UK plug BS 1363 (optional), mains cord 20081099 (1.8 m) with CH plug SEV 1011 (optional), mains cord 20081141 (1.8 m) with US plug NEMA 6-15P (optional), mains cord 20081090 (1.8 m) with US plug NEMA 5-15P (100-120 V) (optional) | mains cord (2 m) with Schuko plug CEE | 9 pins | 6 pins |
| Certifications | |   |  |  RoHS  |   II 2 G Ex e II T3 |
| Shaft dimension $\varnothing d / l$ | mm (in.) | 14 / 30 (0.55 / 1.18) | 14 / 30 (0.55 / 1.18) | 14 / 30 (0.55 / 1.18) | 14 / 30 (0.55 / 1.18) |
| Size of flange A/B | mm (in.) | 140 / 95 (5.51 / 3.74) | 140 / 95 (5.51 / 3.74) | 140 / 95 (5.51 / 3.74) | 140 / 95 (5.51 / 3.74) |
| Length of the pump | mm (in.) | 480 (18.90) (D 4 B) 504 (19.84) (D 8 B) | 442 (18.11) (D 4 B) 467 (19.06) (D 8 B) | 458 (18.62) (D 4 B) 483 (19.57) (D 8 B) | 467 (18.39) (D 4 B) 491 (19.33) (D 8 B) |
| Height up to top edge of junction box h_4 | mm (in.) | 254 (10.0) | 258 (10.16) | 247 (9.72) | 241 (9.49) |




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| Pump type | | D 4 B | D 8 B | D 8 B |
|---|------------|---|---|--|
| Part No. of the pump | | 898 973 | 170 028, 898 852 912 55-1, 912 55-2 | 898 974 |
| Motor part number | | 72260195 | 72260117 | 72260196 |
| Size | | 56C | 56C | 56C |
| Protection class | | TEFC | P 43 | TEFC |
| Operating mode in acc. w. IEC 34 / NEMA | | continuous | continuous | continuous |
| Insulation class | | B | B | B |
| Phases | | 1~ | 1~ | 1~ |
| Efficiency class | | – | – | – |
| Number of poles | | 4 | 4 | 4 |
| Nominal output power at 50 Hz at 60 Hz | | 180 W 240 W | 550 W 550 W | 240 W 370 W |
| Nominal input frequency | | 50 Hz / 60 Hz | 50 Hz / 60 Hz | 50 Hz / 60 Hz |
| Nominal voltage range and nominal current (Mains voltage tolerance $\pm 10\%$) at 50 Hz | | 110 V / 6.8 A – 220 V / 3.4 A – | 115 V / 13.0 A – 208-230 V / 5.5-6.5 A – | 110 V / 9.6 A – 220 V / 4.8 A – |
| at 60 Hz | | 115 V / 6.0 A – 208-230 V / 3.1 A – | 115 V / 9.4 A – 208-230 V / 4.8-4.7 A – | 115 V / 8.8 A – 208-230 V / 4.5 A – |
| Nominal speed 50 Hz 60 Hz | rpm rpm | 1425 1725 | 1425 1725 | 1425 1725 |
| Maximum operating altitude above sea level | | 1000 m above sea level | 1000 m above sea level | 1000 m above sea level |
| Max. ambient temperature during operation | °C (°F) | 40 (104) | 40 (104) | 40 (104) |
| Terminal board / plug | | 12 pin plug at the motor, mains cord (1.8 m) 721 27 874 with US plug NEMA 5-15P (115 V) (optional) | mains cord (1.8 m) with US plug NEMA 5-15P (115 V), 898 853 and 912 55-2 with mains cord (1.8 m) and US plug NEMA 6-15P (230 V) | 12 pin plug at the motor, mains cord (1.8 m) 721 27 874 with US plug NEMA 5-15P (115 V) (optional) |
| Certifications | | |  |  RoHS  |
| Shaft dimension $\varnothing d / l$ | mm (in.) | 15.87 / 52.32 (0.625 / 2.06) | 15.87 / 52.32 (0.625 / 2.06) | 15.87 / 52.32 (0.625 / 2.06) |
| Size of flange A/B | mm (in.) | 114.3 (4.5) | 114.3 (4.5) | 114.3 (4.5) |
| Length of the pump | mm (in.) | 464 (18.27) (D 4 B) | 502 (19.78) (D 8 B) | 488 (19.21) (D 8 B) |
| Height up to top edge of junction box h_4 | mm (in.) | 252 (9.92) | 252 (9.92) | 287 (11.30) |


| | | | |
|--|--|---|---|
| Pump type | D 16 / 25 B D 16 / 25 BCS D 16 / 25 BCS-PFPE D 16 / 25 B-DOT | D 16 / 25 B (3i/3o) | D 16 B-Ex |
| Part No. of the pump | 112 66, 112 76, 113 33 914 63-1 112 68, 112 78 112 69, 112 79 114 06, 114 10, 112 76 18 | 140 160, 140 170 | 140 091, 140 092 |
| Motor part number | E6506939 | 20010409 | 100002330 |
| Size | 80 | 80L | 80L |
| Protection class | IP 55 | IP 55 | IP 55 |
| Operating mode in acc. w. IEC 34 / NEMA | S1 | S1 | S1 |
| Insulation class | F | F | F |
| Phases | 3~ | 3~ | 3~ |
| Efficiency class | IE2 EPAct | – – | – – |
| Number of poles | 4 | 4 | 4 |
| Nominal output power at 50 Hz at 60 Hz | 750 W 750 W | 750 W – | 750 W – |
| Nominal input frequency | 50 Hz / 60 Hz | – | – |
| Nominal voltage range and nominal current (Mains voltage tolerance ±10 %) at 50 Hz | 200-240 V / 3.6 A 200 V / 3.6 A (IE2) 380-400 V / 1.8 A 380-400 V / 1.8 A (IE2) | 230 V / 3.35 A – 400 V / 1.94 A – | 230 V / 3.4 A – 400 V / 1.95 A – |
| at 60 Hz | 200-240 V / 3.4 A 208-240 V / 3.2 A (EPAct) 380-480 V / 1.7 A 416-480 V / 1.6 A (EPAct) | – – – – | – – – – |
| Nominal speed 50 Hz 60 Hz | rpm rpm 1430 1740 | 1380 – | 1405 – |
| Maximum operating altitude above sea level | 1000 m above sea level | 1000 m above sea level | 1000 m above sea level |
| Maximum ambient temperature during operation | °C (°F) 40 (104) | 40 (104) | 40 (104) |
| Terminal board | 9 pins | 6 pins | 6 pins |
| Certifications |  RoHS  |   II 2 G Ex e II T3 |   II 2 G Ex e II T4 |
| Shaft dimension $\varnothing d / l$ | mm (in.) 19 / 40 (0.75 / 1.58) | 19 / 40 (0.75 / 1.58) | 19 / 40 (0.75 / 1.58) |
| Size of flange A/B | mm (in.) 160 / 110 (6.30 / 4.33) | 160 / 110 (6.30 / 4.33) | 160 / 110 (6.30 / 4.33) |
| Length of the pump | mm (in.) 508 (20.00) (D 16 B) 570 (22.44) (D 25 B) | 510 (20.08) (D 16 B) 572 (22.52) (D 25 B) | 510 (20.08) (D 16 B) – |
| Height up to top edge of junction box h_4 | mm (in.) 260 (10.24) | 268 (10.55) | 268 (10.55) |





| | | | | |
|--|------------|---|---|---|
| Pump type | | D 16 / 25 B | D 16 / 25 B | D 16 B |
| Part No. of the pump | | 112 65, 112 75 | 113 25, 113 35 | 898 698 |
| Motor part number | | E38066003 | E110001212 | 72260187 |
| Size | | 90 | 90 | 56C |
| Protection class | | IP 44 | IP 54 | IP44 |
| Operating mode in acc. w. IEC 34 / NEMA | | S1 | H | continuous |
| Insulation class | | F | F | F |
| Phases | | 1~ | 1~ | 1~ |
| Efficiency class | | – | – | – |
| Number of poles | | 4 | 4 | 4 |
| Nominal output power at 50 Hz at 60 Hz | | 750 W 750 W | 750 W 750 W | 750 W 750 W |
| Nominal input frequency | | 50 Hz / 60 Hz | 50 Hz / 60 Hz | 50 Hz / 60 Hz |
| Nominal voltage range and nominal current (Mains voltage tolerance $\pm 10\%$) at 50 Hz ¹⁾ | | 230 V / 5.6 A – – – | 230 V / 5.7 A – – – | 110 V / 15.0 A – 220 V / 7.5 A – |
| at 60 Hz ¹⁾ | | 230 V / 5.7 A – – – | 230 V / 4.9 A – – – | 115 V / 12.4 A – 208-230 V / 6.3-6.2 A – |
| Nominal speed 50 Hz 60 Hz | rpm rpm | 1460 1750 | 1420 1680 | 1500 1800 |
| Maximum operating altitude above sea level | | 1000 m above sea level | 1000 m above sea level | 1000 m above sea level |
| Maximum ambient temperature during operation | °C (°F) | 40 (104) | 40 (104) | 40 (104) |
| Terminal board | | mains cord (2 m) with Schuko plug CEE | Multi-pin plug at junction box, mains cord 20081091 (1.8 m) with Schuko plug CEE 7/7 (Included in delivery), mains cord 20081097 (1.8 m) with UK plug BS 1363 (optional), mains cord 20081099 (1.8 m) with CH plug SEV 1011 (optional), mains cord 20081141 (1.8 m) with US plug NEMA 6-15P (230 V) (optional) | Multi-pin plug at junction box, mains cord (1.8 m) E72127877 with US plug NEMA 5-15P (115 V), mains cord (1.8 m) E72127878 with US plug NEMA 6-15P (230 V) |
| Certifications | |  |  |    |
| Shaft dimension $\varnothing d / l$ | mm (in.) | 19 / 40 (0.75 / 1.58) | 19 / 40 (0.75 / 1.58) | 15.87 / 53.32 (0.625 / 2.06) |
| Size of flange A/B | mm (in.) | 160 / 110 (6.30 / 4.33) | 160 / 110 (6.30 / 4.33) | 114.3 (4.5) |
| Length of the pump | mm (in.) | 521 (20.51) (D 16 B) 583 (22.95) (D 25 B) | 505 (19.88) (D 16 B) 567 (22.32) (D 25 B) | 582 (22.91) (D 16 B) – |
| Height up to top edge of junction box h_4 | mm (in.) | 278 (10.95) | 279 (10.98) | 263 (10.35) |

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| | | | |
|--|----------|---|---|
| Pump type | | D 16 B | D 16 B |
| Part No. of the pump | | 898 208, 912 65-1 | 912 65-2 |
| Motor part number | | 72260117 | 72260005 |
| Size | | 56C | 56C |
| Protection class | | IP 43 | TEFC |
| Operating mode in acc. w. IEC 34 / NEMA | | continuous | continuous |
| Insulation class | | F | B3 |
| Phases | | 1~ | 1~ |
| Efficiency class | | – | – |
| Number of poles | | 4 | 4 |
| Nominal output power | | | |
| at 50 Hz | | 560 | 550 W |
| at 60 Hz | | 560 | 550 W |
| Nominal input frequency | | 50 Hz / 60 Hz | 50 Hz / 60 Hz |
| Nominal voltage range and nominal current (Mains voltage tolerance $\pm 10\%$) | | | |
| at 50 Hz ¹⁾ | | 115 V / 13.0 A – 208-230 V / 5.5-6.5 A – | 208-230 V / 5.5-6.5 A – – – |
| at 60 Hz ¹⁾ | | 115 V / 9.4 A – 208-230 V / 4.8-7.4 A – | 208-230 V / 4.8-4.7 A – – – |
| Nominal speed | | | |
| 50 Hz | rpm | 1425 | 1500 |
| 60 Hz | rpm | 1725 | 1800 |
| Maximum operating altitude above sea level | | 1000 m above sea level | 1000 m above sea leve |
| Maximum ambient temperature during operation | °C (°F) | 40 (104) | 40 (104) |
| Terminal board | | mains cord (1.8 m) with US plug NEMA 5-15P (115 V) | mains cord (1.8 m) with plug NEMA 6-15P (230 V) |
| Certifications | |   |  |
| Shaft dimension $\varnothing d / l$ | mm (in.) | 15.87 / 53.32 (0.625 / 2.06) | 15.87 / 53.32 (0.625 / 2.06) |
| Size of flange A/B | mm (in.) | 114.3 (4.5) | 114.3 (4.5) |
| Length of the pump | mm (in.) | 624 (24.57) (D 16 B) | 538 (21.18) (D 16 B) |
| Height up to top edge of junction box h_4 | mm (in.) | 265 (10.43) | 247 (9.72) |

Only available for purchase in North and South America

| Pump type | | D 25 B | D 25 B - PFPE |
|--|----------|---|------------------------------|
| Part No. of the pump | | 912 75-2, 913 79-2 | 170 119 |
| Motor part number | | 72260022 | 190260213 |
| Size | | – | 56C |
| Protection class | | IP 44 | TEFC |
| Operating mode in acc. w. IEC 34 / NEMA | | continuous | continuous |
| Insulation class | | F | F |
| Phases | | 1~ | 1~ |
| Efficiency class | | – | – |
| Number of poles | | 4 | 4 |
| Nominal output power | | | |
| at 50 Hz | | 1100 | – |
| at 60 Hz | | 1100 | 1100 |
| Nominal input frequency | | 50 Hz / 60 Hz | 60 Hz |
| Nominal voltage range and nominal current (Mains voltage tolerance $\pm 10\%$) | | | |
| at 50 Hz | | 220-230 V / 9.6-9.2 A | – |
| | | – | – |
| | | – | – |
| | | – | – |
| at 60 Hz | | 220-230 V / 9.6-8.0 A | 115 V / 18.0 A |
| | | – | – |
| | | – | 208-230 V / 8.4-8.0 A |
| | | – | – |
| Nominal speed | | | |
| 50 Hz | rpm | 1425 | – |
| 60 Hz | rpm | 1725 | 1725 |
| Maximum operating altitude above sea level | | 1000 m above sea level | 1000 m above sea level |
| Maximum ambient temperature during operation | °C (°F) | 40 (104) | 40 (104) |
| Terminal board | | mains cord (1.8 m) with plug NEMA 6-15P (230 V) | 9 wires |
| Certifications | |  | |
| Shaft dimension $\varnothing d / l$ | mm (in.) | 15.87 / 53.32 (0.625 / 2.06) | 15.87 / 53.32 (0.625 / 2.06) |
| Size of flange A/B | mm (in.) | 114.3 (4.5) | 114.3 (4.5) |
| Length of the pump | mm (in.) | 639 (25.16) (D 25 B) | 644 (25.35) (D 25 B) |
| Height up to top edge of junction box h_4 | mm (in.) | 265 (10.43) | 263 (10.35) |

| | | | |
|--|------------|--|--|
| Pump type | | D 40 / 65 B D 40 / 65 BCS D 40 / 65 BCS-PFPE D 40 B-DOT + D 65 B ³He | D 40 / 65 B-Ex |
| Part No. of the pump | | 112 86, 112 96 113 88, 113 98 113 89, 113 99 112 86 12 / 112 96 46 | 140 180, 140 190 |
| Motor part number | | E6506961 | 20010411 |
| Size | | 100L | 100L |
| Protection class | | IP 55 | IP 55 |
| Operating mode in acc. w. IEC 34 / NEMA | | S1 | S1 |
| Insulation class | | F | F |
| Phases | | 3~ | 3~ |
| Efficiency class | | IE2 EPAct | – – |
| Number of poles | | 4 | 4 |
| Nominal output power at 50 Hz at 60 Hz | | 2200 W 2200 W | 2600 W – |
| Nominal input frequency | | 50 Hz / 60 Hz | 50 Hz |
| Nominal voltage range and nominal current (Mains voltage tolerance ±10 %) at 50 Hz | | 200-240 V / 15.0 A 200 V / 10.4 A (IE2) 380-400 V / 5.2 A 380-400 V / 5.2 A (IE2) | 219-242 V / 10.1 A – 380-420 V / 5.8 A – |
| at 60 Hz | | 200-240 V / 12.0 A 208-240 V / 9.2 A (EPAct) 380-480 V / 5.2 A 416-480 V / 4.6 A (EPAct) | – – – – |
| Nominal speed 50 Hz 60 Hz | rpm rpm | 1430 1735 | 1420 – |
| Maximum operating altitude above sea level | | 1000 m above sea level | 1000 m above sea level |
| Maximum ambient temperature during operation | °C (°F) | 40 (104) | 40 (104) |
| Terminal board | | 9 pins | 6 pins |
| Certifications | |  RoHS  |   II 2 G Ex e II T3 |
| Shaft dimension $\varnothing d / l$ | mm (in.) | 28 / 60 (1.10 / 2.36) | 28 / 60 (1.10 / 2.36) |
| Size of flange A/B | mm (in.) | 160 / 110 (6.30 / 4.33) | 160 / 110 (6.30 / 4.33) |
| Length of the pump | mm (in.) | 719 (28.31) (D 40 B) 794 (31.26) (D 65 B) | 719 (28.31) (D 40 B) 794 (31.26) (D 65 B) |
| Height up to top edge of junction box h_4 | mm (in.) | 317 (12.48) | 328 (12.91) |

Accessories

For TRIVAC E, B and BCS

Exhaust Filters AF 8 to AF 25 Condensate Traps AK 8 to AK 25



Exhaust filter (left) and condensate trap (right)

Exhaust-Filter

Oil mists and aerosols are retained in the exhaust filter.

Advantages to the User

- Filtering of the exhaust gas by removal of entrained lubricant particles
- Emptying via drain screw or exhaust filter drain tap
- Separation efficiency > 99%
- Filter elements (made of glass fiber) are exchangeable

Condensate Trap

Condensate traps prevent the formation of condensate in the pump as well as the backstreaming of fluids.

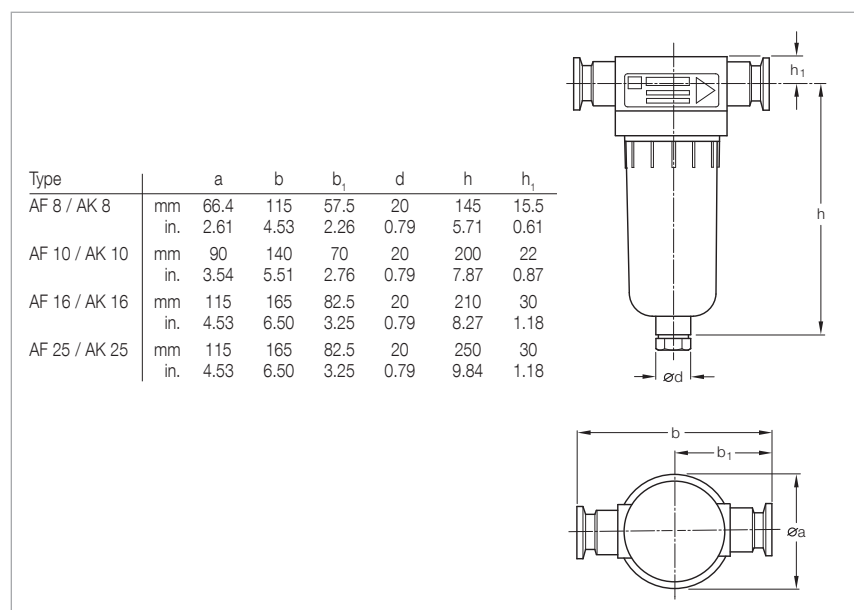
Advantages to the User

- Can be connected to either the intake or the exhaust side
- Protects against condensate forming from sucked in vapors or gases (intake line)
- Protects against backstreaming liquids (exhaust line)
- Emptying via drain screw/drain tap

Technical Information

The exhaust filter is not capable of retaining toxic and/or aggressive gases. For such applications we recommend the use of an exhaust gas line (e.g. a gas washer).

Since the material is not resistant to all gases and solvents, a materials compatibility chart is available upon request.



Dimensional drawing for the AF exhaust filter and AK condensate trap

Technical Data**AF 8 AK 8 AF 10 AK 10 AF 16 AK 16 AF 25 AK 25**

| | | | | | | | | | |
|---|----------------------------|---------------------------|---------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Connection to pump (required accessories for TRIVAC E: elbow) | TRIVAC | D 2,5 E D 4 B D 8 B | D 2,5 E D 4 B D 8 B | D 16 B | D 16 B | D 16 B | D 16 B | D 16 B D 25 B | D 16 B D 25 B |
| Connection flanges | DN | 16 KF | 16 KF | 25 KF | 25 KF | 25 KF | 25 KF | 25 KF | 25 KF |
| Max. filling level (for vertical installation) | ml | 60 | 60 | 145 | 145 | 285 | 285 | 285 | 285 |
| Permissible leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ |
| Max. continuous temperature | °C (°F) | 90 (194) | 90 (194) | 90 (194) | 90 (194) | 90 (194) | 90 (194) | 90 (194) | 90 (194) |
| Material | | Polyamide 6 | Polyamide 6 | Polyamide 6 | Polyamide 6 | Polyamide 6 | Polyamide 6 | Polyamide 6 | Polyamide 6 |

Ordering Information**AF 8 AK 8 AF 10 AK 10 AF 16 AK 16 AF 25 AK 25**

| | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
|---|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
| Exhaust filter | 190 50 | – | 190 51 | – | 190 52 | – | 190 53 | – |
| Exhaust filter drain tap | 190 95 | 190 95 | 190 95 | 190 95 | 190 95 | 190 95 | 190 95 | 190 95 |
| Condensate trap | – | 190 60 | – | 190 61 | – | 190 62 | – | 190 63 |
| Replacement filter element (pack of 5) | | | | | | | | |
| FE 8 | ES 190 80 | – | – | – | – | – | – | – |
| FE 10 | – | – | ES 190 81 | – | – | – | – | – |
| FE 16 | – | – | – | – | ES 190 82 | – | – | – |
| FE 25 | – | – | – | – | – | – | ES 190 83 | – |
| Reducer DN 25/16 KF ¹⁾ Aluminium (if necessary) | 183 86 | 183 86 | 183 86 | 183 86 | 183 86 | 183 86 | 183 86 | 183 86 |
| Elbow (1x) Aluminium | 184 36 | 184 36 | 184 37 | 184 37 | 184 37 | 184 37 | 184 37 | 184 37 |
| Centering ring with O-ring (2x) aluminium / NBR | 183 26 | 183 26 | 183 27 | 183 27 | 183 27 | 183 27 | 183 27 | 183 27 |
| stainless steel / FPM (FKM) | 883 46 | 883 46 | 883 47 | 883 47 | 883 47 | 883 47 | 883 47 | 883 47 |
| Clamping ring (2x) | 183 41 | 183 41 | 183 42 | 183 42 | 183 42 | 183 42 | 183 42 | 183 42 |

¹⁾ When using the reducer, an elbow is required

Exhaust Filters

AF 4-8 to AF 40-65

AF 16-25 DOT and AF 40-65 DOT

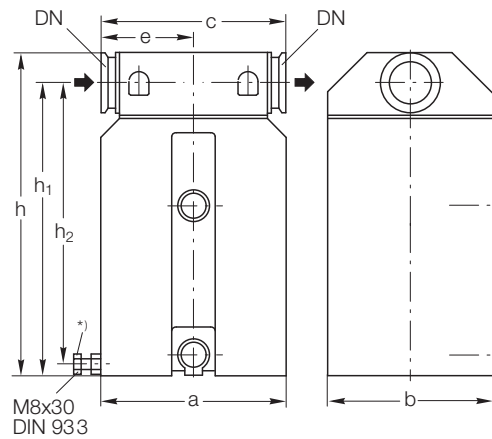


AF 4-8 exhaust filter

Exhaust filters retain oil mists and aerosols.

Advantages to the User

- Can be fitted without additional accessories
- Separation efficiency over 99 %
- Exchangeable filter inserts
- Built-in over-pressure relief valve (threshold at about 1.5 bar (7.2 psi, differential))
- Sight glass for checking of the quantity of collected oil
- Resistant against solvents
- Seals for
 - AF made of FPM (FKM)
 - AF-DOT made of EPDM
- Easy to clean and use
- Retains dirt and cracked products



| Type | DN | | a | b | c | e | h | h ₁ | h ₂ |
|----------------|-------|-----|------|------|------|------|-------|----------------|----------------|
| AF 4-8 | 16 KF | mm | 90 | 90 | 120 | 60 | 194 | 178 | — |
| | | in. | 3.54 | 3.54 | 4.72 | 2.36 | 7.64 | 7.01 | — |
| AF 16-25 (DOT) | 25 KF | mm | 110 | 125 | 142 | 71 | 214 | 193 | — |
| | | in. | 4.33 | 4.92 | 5.59 | 2.80 | 8.43 | 7.60 | — |
| AF 40-65 (DOT) | 40 KF | mm | 170 | 157 | 170 | 85 | 300 | 272 | 261 |
| | | in. | 6.69 | 6.18 | 6.69 | 3.35 | 11.81 | 10.71 | 10.28 |

^{*)} Supporting screw only for AF 40-65

Dimensional drawing for the AF exhaust filters

Typical Application

- Improvement of oil separating capacity

Technical Information

An exhaust line must be connected in case of hazardous exhaust gases.

Technical Data**AF 4-8****AF 16-25****AF 40-65**

| | | | | |
|---------------------------------------|----------|------------|---------------|---------------|
| Connection to pump | TRIVAC | D 4/8 B | D 16/25 B/BCS | D 40/65 B/BCS |
| Max. capacity for condensate, approx. | l (qt) | 0.4 (0.45) | 0.5 (0.57) | 1.0 (1.14) |
| Weight | kg (lbs) | 1.9 (4.1) | 3.2 (7.1) | 6.5 (14.3) |

Ordering Information**AF 4-8****AF 16-25****AF 40-65**

| | Part No. | Part No. | Part No. |
|---|---------------|---------------|---------------|
| Exhaust filter | 189 06 | 189 11 | 189 16 |
| Replacement filter element | | | |
| FE 4-8 | 189 71 | – | – |
| FE 16-25 | – | 189 72 | – |
| FE 40-65 | – | – | 189 73 |
| Oil drain tap M 16 x 1.5 (vacuum-tight) | 190 90 | 190 90 | 190 90 |

Technical Data**AF 16-25 DOT****AF 40-65 DOT**

| | | | | |
|--------------------|--------|---|---------------|------------|
| Connection to pump | TRIVAC | – | D 16/25 B-DOT | D 40 B-DOT |
|--------------------|--------|---|---------------|------------|

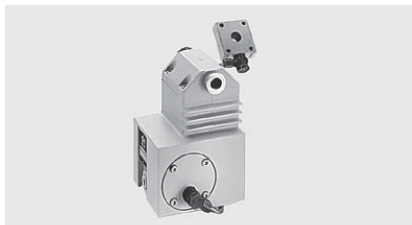
Ordering Information**AF 16-25 DOT****AF 40-65 DOT**

| | Part No. | Part No. | Part No. |
|----------------------------|----------|-------------------|---------------------------------|
| Exhaust filter DOT | – | 124 16 | 101 15 |
| Replacement filter element | – | 200 10 304 | – |
| FE 16-25 DOT | – | – | 200 39 840 ¹⁾ |
| FE 40-65 DOT | | | |

¹⁾ 2 pieces are required

Exhaust Filters with Lubricant Return

ARP 4-8 and AR 4-8 to AR 40-65



AR 4-8 exhaust filter with lubricant return



ARP 4-8 exhaust filter with lubricant return

This combination of an exhaust filter with a float-controlled valve considerably extends the maintenance intervals for the TRIVAC pumps.

Advantages to the User

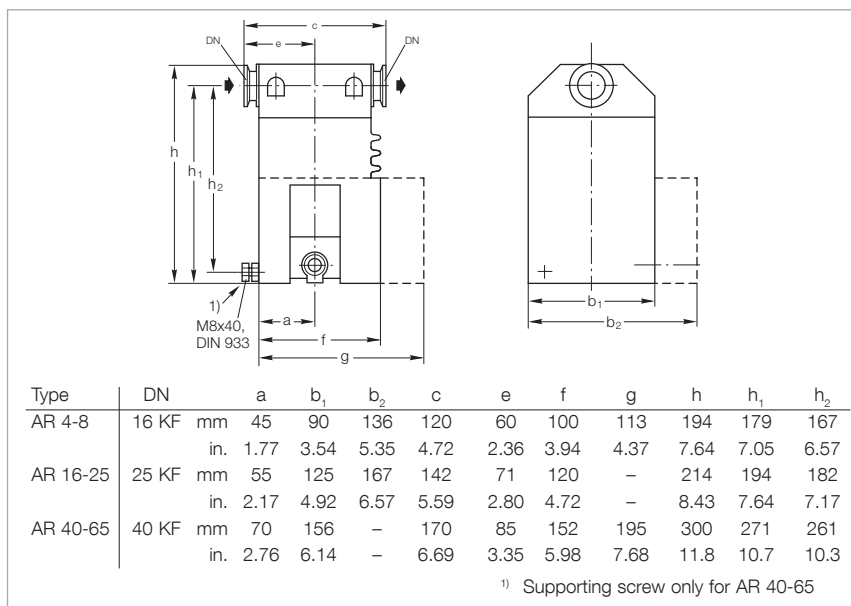
- Filtering the exhaust air of entrained lubricant particles
- Lubricant return with the aid of a float-controlled valve back into the intake port
- No operating costs caused by lost lubricant
- Hardly any oil consumption
- Standard filter element
- Built-in over-pressure relief valve
- Resists solvents
- All seals made of FPM (FKM)
- Easy change of the return port for horizontal or vertical connection

Typical Application

- Extending the maintenance intervals

Supplied Equipment

Intermediate flange, connecting lines with hollow screws, required gaskets as well as mounting screws for the intake flange.



Dimensional drawing for the AR exhaust filters with lubricant return
(dimensions for the ARP exhaust filter with lubricant return upon request)

Technical Data

ARP 4-8 AR 4-8 AR 16-25 AR 40-65

| Connection to pump | TRIVAC | D 4/8 B | D 4/8 B | D 16/25 B/BCS | D 40/65 B/BCS |
|---|----------------------|-----------|------------|---------------|---------------|
| For opening the float-controlled valve required amount of oil | | | | | |
| LEYBONOL LVO 100 | cm ³ (qt) | – | 430 (0.45) | 510 (0.54) | 760 (0.80) |
| LEYBONOL LVO 400 | cm ³ (qt) | – | 350 (0.37) | 430 (0.45) | 700 (0.74) |
| Remaining amount of oil | | | | | |
| LEYBONOL LVO 100 | cm ³ (qt) | – | 290 (0.31) | 340 (0.36) | 420 (0.44) |
| LEYBONOL LVO 400 | cm ³ (qt) | – | 250 (0.26) | 300 (0.32) | 390 (0.41) |
| Weight | kg (lbs) | 1.7 (3.8) | 3.1 (6.89) | 4.7 (10.4) | 8.5 (18.7) |

Ordering Information

ARP 4-8 AR 4-8 AR 16-25 AR 40-65

| | Part No. | Part No. | Part No. | Part No. |
|--------------------------------------|----------------|---------------|---------------|---------------|
| Exhaust filter with lubricant return | 140 065 | 189 20 | 189 21 | 189 22 |
| Replacement filter element | | | | |
| FE 8 | 190 80 | – | – | – |
| FE 4-8 | – | 189 71 | – | – |
| FE 16-25 | – | – | 189 72 | – |
| FE 40-65 | – | – | – | 189 73 |

Technical Information

The AR is connected to the exhaust port of the TRIVAC B, the return line is connected at the intermediate flange under the intake port. An exhaust line must be connected in case of hazardous exhaust gases.

The ARP and AR filters are factory cleaned to such an extent, that they may be operated either with mineral oil (e.g. LEYBONOL LVO 100) or per-fluoropolyether (PFPE) (e.g. LEYBONOL LVO 400).

Exhaust Filters with Lubricant Return ARS 16-25 and ARS 40-65



ARS 40-65

This combination of an exhaust filter with a float-controlled valve considerably extends the maintenance intervals of the TRIVAC BCS.

The ARS is part of the TRIVAC SYSTEM.

Advantages to the User

- Lubricant return with the aid of a float-controlled valve back into the intake port
- The intake port may be easily exchanged (either vertical or horizontal orientation)
- No operating costs caused by lost lubricant
- Hardly any oil consumption
- Visual indication of the differential pressure
- Standard filter element
- All aluminium parts are surface protected
- Built-in over-pressure relief valve
- Resists solvents
- All seals made of FPM (FKM)

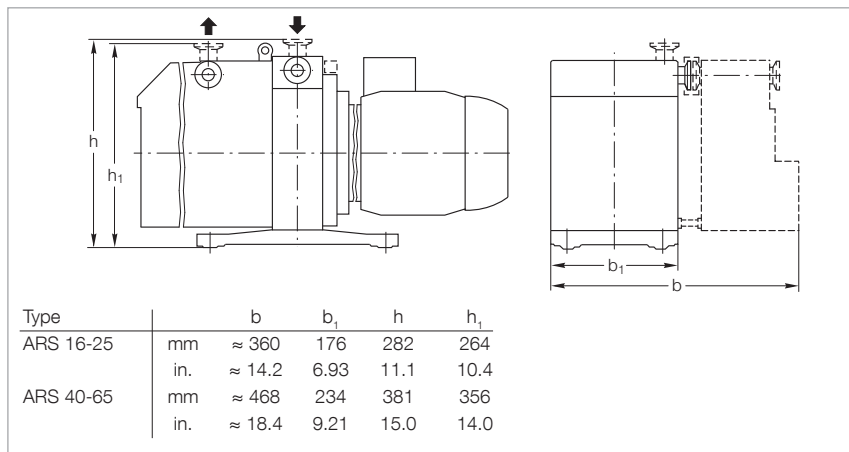
Typical Application

- Filtering the exhaust air of entrained lubricant particles

Supplied Equipment

Intermediate flange, connecting lines with hollow screws, required gaskets as well as mounting screws for the intake flange.

Wrapped in foil for shipping.



Dimensional drawing for the ARS mounted on a TRIVAC BCS

Technical Information

An exhaust line must be connected in case of hazardous exhaust gases. The ARS is connected to the exhaust port of the TRIVAC BCS, the return line is connected at the intermediate flange under the intake port.

The ARS is factory cleaned to such an extent, that it may be operated either with mineral oil (e.g. LEYBONOL LVO 100) or perfluoropolyether (PFPE) (e.g. LEYBONOL LVO 400).

Technical Data

ARS 16-25

ARS 40-65

| Connection to pump | | TRIVAC | D 16/25 B D 16/25 BCS (-PFPE) | D 40/65 B D 40/65 BCS (-PFPE) |
|---|----------------------|----------|----------------------------------|----------------------------------|
| Connection flanges | | DN | 25 KF | 40 KF |
| Amount of oil required for opening the float-controlled valve | | | | |
| LEYBONOL LVO 100 | cm ³ (qt) | | 510 (0.54) | 760 (0.80) |
| LEYBONOL LVO 400 | cm ³ (qt) | | 340 (0.36) | 420 (0.44) |
| Remaining amount of oil | | | | |
| LEYBONOL LVO 100 | cm ³ (qt) | | 430 (0.45) | 700 (0.74) |
| LEYBONOL LVO 400 | cm ³ (qt) | | 300 (0.31) | 390 (0.41) |
| Weight with intermediate flange, tubing and filter, without lubricant | | kg (lbs) | 4.7 (10.4) | 8.5 (16.7) |

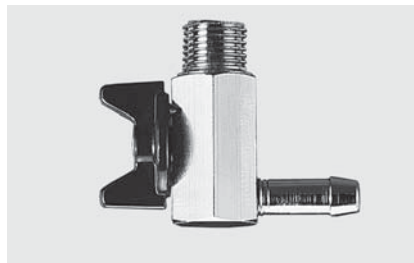
Ordering Information

ARS 16-25

ARS 40-65

| | Part No. | Part No. |
|--------------------------------------|---------------|---------------|
| Exhaust filter with lubricant return | 189 56 | 189 57 |
| Replacement filter element | | |
| FE 16-25 | 189 72 | — |
| FE 40-65 | — | 189 73 |

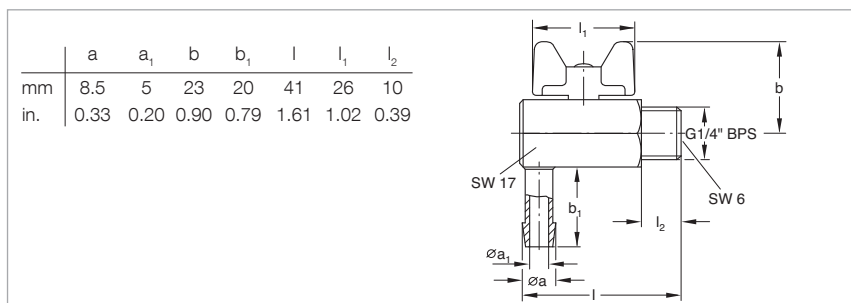
Exhaust Filter Drain Tap



The exhaust filter drain tap simplifies draining of the oil from the exhaust filter.

Technical Note

May also be used in connection with the condensate separator AK.



Dimensional drawing for the exhaust filter drain tap

Technical Data

| | | |
|-----------|----------------------------|--------------------|
| Leak rate | mbar x l x s ⁻¹ | ≤ 10 ⁻⁵ |
|-----------|----------------------------|--------------------|

Exhaust Filter Drain Tap

Ordering Information

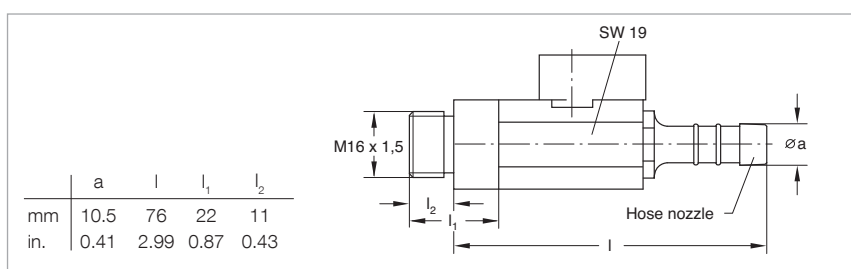
Exhaust Filter Drain Tap

| | Part No. |
|--------------------------|----------|
| Exhaust filter drain tap | 190 95 |

Oil Drain Tap



This oil drain tap may be screwed into the oil drain when wanting to change the oil in the rotary vane pumps. It is also suited for the condensate separators and exhaust filters of the TRIVAC B series.



Dimensional drawing for the oil drain tap

Technical Data

| | | |
|-----------|----------------------------|--------------------|
| Leak rate | mbar x l x s ⁻¹ | ≤ 10 ⁻⁵ |
|-----------|----------------------------|--------------------|

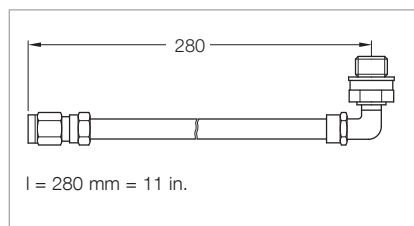
Oil Drain Tap

Ordering Information

Oil Drain Tap

| | Part No. |
|---------------|----------|
| Oil drain tap | 190 90 |

Oil Drain Kit



Dimensional drawing for the oil drain kit

Technical Data

| | | |
|-----------|----------------------------|--------------------|
| Length | mm (in.) | 280 (11) |
| Leak rate | mbar x l x s ⁻¹ | ≤ 10 ⁻⁵ |

Oil Drain Kit

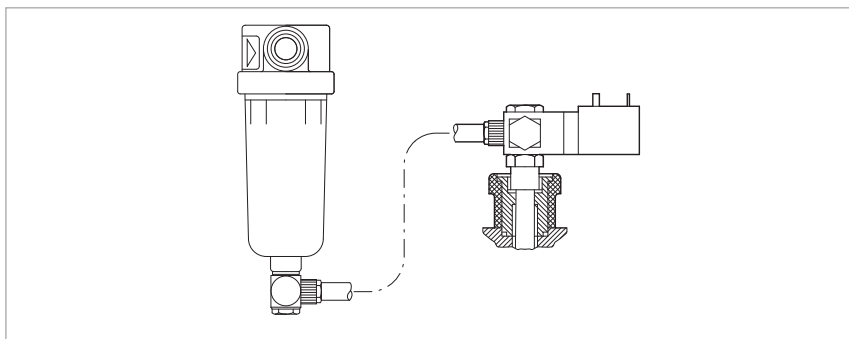
Ordering Information

Oil Drain Kit

| | Part No. |
|---------------|----------|
| Oil drain kit | 190 94 |

Oil Suction Facility AR-V Controlled by Solenoid Valve

Suited for the AF 8 or AK 8 when connected to the D 2.5 E the oil suction facility AR-V with its solenoid valve allows the removal of oil via the gas ballast which has collected in the exhaust filter. When the valve is closed the gas ballast remains fully operational. For this, a hose link is provided between the exhaust filter and the gas ballast.



AR-V oil suction facility controlled by solenoid valve (kit without exhaust filter)

Technical Note

If oil which has collected in the exhaust filter is to be removed, the solenoid valve is opened briefly.

Technical Data

| | | |
|-----------|----------------------------|----------------|
| Leak rate | mbar x l x s ⁻¹ | $\leq 10^{-5}$ |
|-----------|----------------------------|----------------|

AR-V Oil Suction Facility Controlled by Solenoid Valve

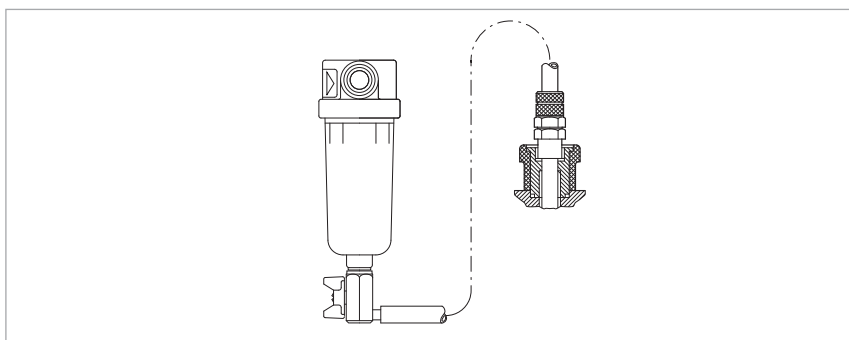
Ordering Information

| | Part No. |
|--|----------|
| AR-V oil suction facility controlled by solenoid valve 24 V DC, 4 W, normally closed | 190 92 |

AR-V Oil Suction Facility Controlled by Solenoid Valve

Manually Operated Oil Suction Facility AR-M

Suited for the AF 8 or AK 8 when connected to the D 2,5 E the oil suction facility AR-M allows the removal of oil via the gas ballast which has collected in the exhaust filter, whereby the gas ballast remains fully operational as long as the angled ball valve remains closed. For this, a hose link is provided between the exhaust filter and the gas ballast.



AR-M manually operated oil suction facility (kit without exhaust filter)

Technical Note

If oil which has collected in the exhaust filter is to be removed, the angled ball valve is manually opened briefly.

Technical Data

| | | |
|-----------|----------------------------|----------------|
| Leak rate | mbar x l x s ⁻¹ | $\leq 10^{-5}$ |
|-----------|----------------------------|----------------|

AR-M Manually Operated Oil Suction Facility

Ordering Information

| | Part No. |
|---|----------|
| AR-M manually operated oil suction facility | 190 93 |

AR-M Manually Operated Oil Suction Facility

Condensate Separators

AK 4-8 to AK 40-65

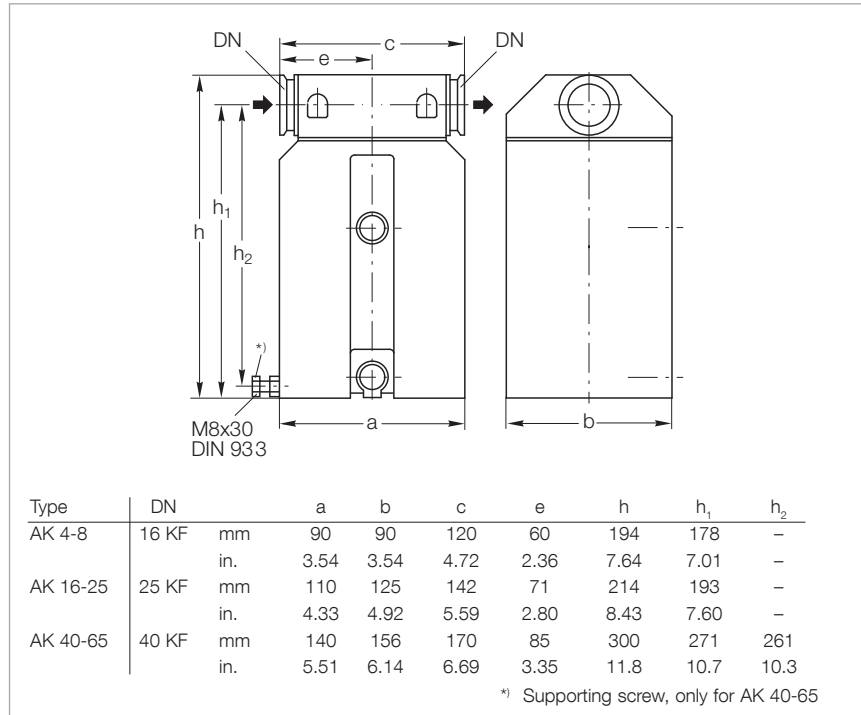


AK 4-8 condensate separator

Separators protect the pump against condensate.

Advantages to the User

- May be installed without accessories
- May be used either on the intake or the exhaust side
- Independent of the direction of flow
- Condensate level check via inspection glass
- Resists solvents
- All seals made of FPM (FKM)
- Simple to clean
- Easy to use
- Drained via drain screw or drain tap



Dimensional drawing for the AK condensate separators

Typical Application

- Prevention of the collection of liquids in the intake line

Technical Information

Depending upon the layout and pipe run of an exhaust line, it may be necessary to install a separator to prevent condensate draining back to the pump.

Technical Data

AK 4-8

AK 16-25

AK 40-65

| | | | | |
|-------------------------|----------|------------|----------------------------------|----------------------------------|
| Connection to pump | TRIVAC | D 4/8 B | D 16/25 B D 16/25 BCS (-PFPE) | D 40/65 B D 40/65 BCS (-PFPE) |
| Capacity for condensate | l (qt) | 0.66 (0.7) | 1.2 (1.3) | 3.0 (3.2) |
| Weight | kg (lbs) | 1.7 (3.7) | 2.4 (5.3) | 5.5 (12.1) |

Ordering Information

AK 4-8

AK 16-25

AK 40-65

| | Part No. | Part No. | Part No. |
|---|---------------|---------------|---------------|
| Condensate separator | 188 06 | 188 11 | 188 16 |
| Oil drain tap M 16 x 1.5 (vacuum-tight) | 190 90 | 190 90 | 190 90 |
| Adaptor DN 16 KF – hose nozzle DN 7 | 182 90 | – | – |

Dust Filters DN 16 KF to DN 40 KF



Filter housing FH 16 to FH 40 for dust filter insert DF

Dust filters protect the pump against sucked in dust. They are suited for oil sealed and also for dry compressing pumps.

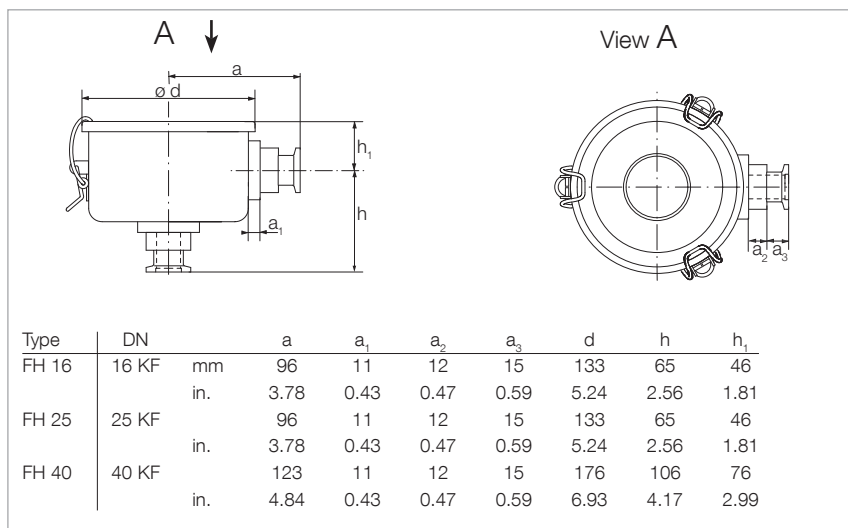
Advantages to the User

- Easy to disassemble
- Vacuum-tight steel housing
- Easily exchangeable replacement filter
- High filter capacity

Technical Information

Installing a dust filter in the intake line of the pump throttles its pumping speed at lower intake pressures much more than at higher intake pressures. Throttling reference values are stated in the Technical Data. These must be taken into account when dimensioning the vacuum system.

Since the collection capacity of dust filters is limited, we recommend the two-stage dust filters AS when larger quantities of dust are involved.



Dimensional drawing for the filter housings FH 16 to FH 40 for dust filter inserts DF

Technical Data

Dust Filter

| | | DN 16 KF | DN 25 KF | DN 40 KF |
|---|----------|-----------|-----------|-----------|
| Use for | TRIVAC | D 4/8 B | D 16/25 B | D 40/65 B |
| Share of filtered out particles > 5 µm | % | 98 | 98 | 98 |
| Throttling of pumping speed | | | | |
| at 10 mbar (7.5 Torr) | % | 3 | 3 | 3 |
| at 1 mbar (0.75 Torr) | % | 6 | 6 | 6 |
| Weight with dust filter insert | kg (lbs) | 1.3 (2.9) | 1.3 (2.9) | 2.3 (5.1) |

Ordering Information

Dust Filter

| | DN 16 KF | DN 25 KF | DN 40 KF |
|---------------------------------|-----------------|-----------------|-----------------|
| | Part No. | Part No. | Part No. |
| Dust filter | | | |
| filter housing FH ¹⁾ | 140 116T | 140 125T | 140 140T |
| dust filter insert | | | |
| DF 16-25 | 140 117S | 140 117S | - |
| DF 40-65 | - | - | 140 141S |

¹⁾ The filter housing is supplied without filter cartridge (dust filter insert) since it may also be used in connection with the adsorption trap or dust filter insert

Adsorption Traps DN 16 KF to DN 40 KF



Filter housing FH 16 to FH 40
for adsorption trap filter inserts RF

Adsorption traps are containers with a stainless steel insert which can be filled with a number of different adsorbents thereby offering a high adsorbing capacity for vapors, water vapor in particular.

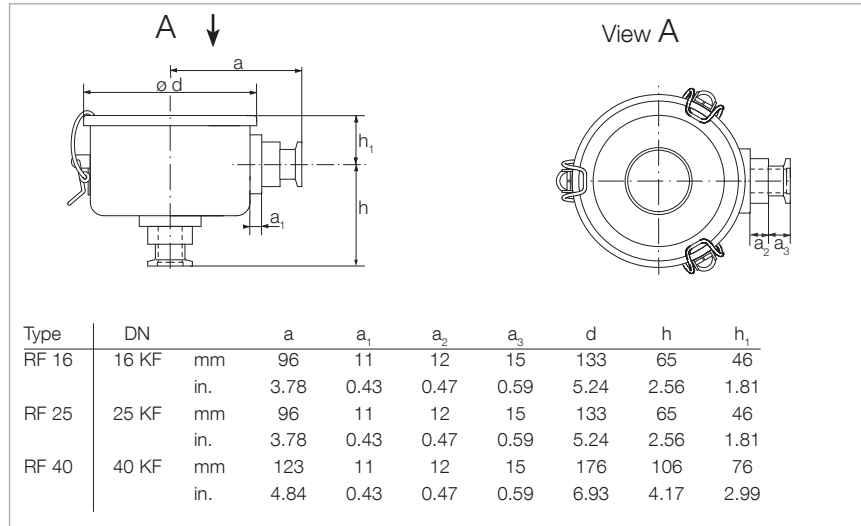
Advantages to the User

- Vacuum-tight steel housing
- Stainless steel, degassable up to 300 °C (572 °F)
- Different adsorbents and separating elements can be used
- Quick to replace
- Easy to disassemble

Technical Information

The adsorption traps have been developed specially for use in connection with oil sealed pumps. They are capable of retaining oil vapors discharged from forevacuum pumps and are at the same time in the position to separate vapors (water vapor) coming from the side of the process. Through the use of adsorption traps and a suitable adsorbent, a vacuum free of hydrocarbons can be produced. The stainless steel inserts with the corresponding adsorbent can be heated in a drying cabinet at 300 °C (572 °F) for regeneration. Depending on the type of adsorbent and operating pressure, the pumping speed of the pumps is reduced.

As to any questions relating to the selection of a suitable adsorbent, please consult us.



Dimensional drawing for the filter housings FH 16 to FH 40 for adsorption trap filter inserts RF

Technical Data

| Technical Data | | Adsorption Trap | | | |
|------------------------------------|----------|-----------------|-----------|-----------|--|
| | | DN 16 KF | DN 25 KF | DN 40 KF | |
| Use for | TRIVAC | D 4/8 B | D 16/25 B | D 40/65 B | |
| Conductance | | | | | |
| at 10 mbar (7.5 Torr) for | | | | | |
| aluminium oxide | l/s | 2 | 6 | 14 | |
| zeolite | l/s | 2 | 6 | 12 | |
| active charcoal filling | l/s | 2 | 6 | 16 | |
| baffle ring filling | l/s | 2 | 7 | 18 | |
| at 1 mbar (0.75 Torr) for | | | | | |
| aluminium oxide | l/s | 1 | 4 | 5 | |
| zeolite | l/s | 1 | 6 | 5 | |
| active charcoal filling | l/s | 2 | 6 | 6 | |
| baffle ring filling | l/s | 2 | 6 | 16 | |
| Filling quantity | | | | | |
| aluminium oxide | kg (lbs) | 0.3 (0.7) | 0.3 (0.7) | 1.0 (2.2) | |
| zeolite | kg (lbs) | 0.2 (0.4) | 0.2 (0.4) | 0.7 (1.5) | |
| active charcoal filling | kg (lbs) | 0.1 (0.2) | 0.1 (0.2) | 0.5 (1.1) | |
| baffle ring filling | kg (lbs) | 0.1 (0.2) | 0.1 (0.2) | 0.3 (0.7) | |
| Filling volume | l (qt) | 0.3 (0.3) | 0.3 (0.3) | 1.2 (1.3) | |
| Weight with adsorption trap insert | kg (lbs) | 1.3 (2.9) | 1.3 (2.9) | 2.3 (5.1) | |

Ordering Information

| | | Adsorption Trap | | |
|---|-----------------|-------------------|-------------------|-------------------|
| | | DN 16 KF | DN 25 KF | DN 40 KF |
| | Part No. | Part No. | Part No. | |
| Adsorption trap | | | | |
| filter housing FH ¹⁾ | 140 116T | 140 125T | 140 140T | |
| adsorption trap filter insert | | | | |
| RF 16-25 | 140 118A | 140 118A | - | |
| RF 40-65 | - | - | 140 142A | |
| Active charcoal, un-dried, 5 kg | | 178 10 | 178 10 | 178 10 |
| Zeolite, 1 kg | | 854 20 | 854 20 | 854 20 |
| Aluminium oxide, 1.2 kg | | 854 10 | 854 10 | 854 10 |
| Baffle ring 15 x 15 x 0.3, 1 liter | | 390 26 126 | 390 26 126 | 390 26 126 |
| Stainless steel 1.4301 | | 390 26 126 | 390 26 126 | 390 26 126 |

¹⁾ The filter housing is supplied without filter cartridge (dust filter insert) since it may also be used in connection with the adsorption trap or dust filter insert

Cold Trap TK 4-8



TK 4-8 cold trap

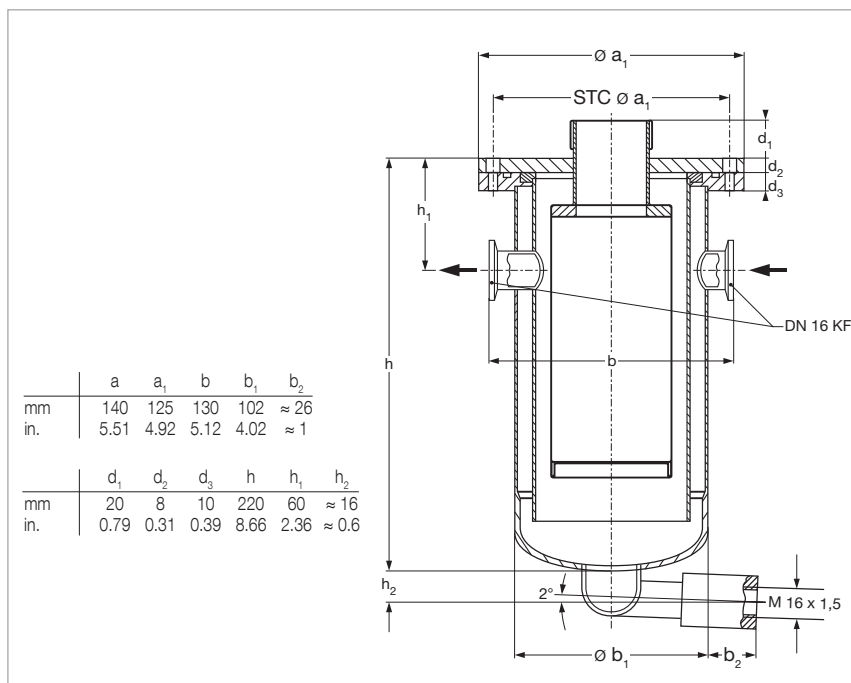
The cold trap protects the pump against damaging vapors.

Advantages to the User

- Rugged and implosion resistant
- May be fitted directly on the flange of the pump
- Safe draining of the condensate without problems
- Casing made of corrosion resistant stainless steel
- Simple filling with refrigerant (liquid nitrogen (LN_2) or a mixture of acetone and carbon di-oxide ice)

Typical Applications

- Prevention of oil from backstreaming into the vacuum system when operating at ultimate pressure
- Freezing of gases and vapors in the laboratory



Dimensional drawing for the TK 4-8 cold trap

Technical Data

TK 4-8

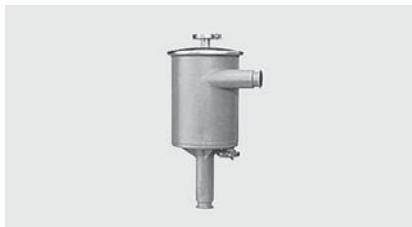
| | | |
|-----------------------------------|----------|-------------------|
| Connection to pump | TRIVAC | D 2,5 E / D 4/8 B |
| Capacity for refrigerant, approx. | l (qt) | 0.4 (0.42) |
| Connections | DN | 16 KF |
| Weight | kg (lbs) | 4 (8.8) |

Ordering Information

TK 4-8

| | Part No. |
|---|---------------|
| Cold trap | 188 20 |
| Drain tap for the intake side, vacuum-tight | 190 90 |
| Elbow (1x) | 184 36 |
| Centering ring | |
| aluminium/NBR (2x) | 183 26 |
| stainless steel/FPM (FKM) (2x) | 883 46 |
| Clamping ring (2x) | 183 41 |

Dust Separators AS 8-16 and AS 30-60 / Molecular Filters MF 8-16 and MF 30-60



AS 30-60 dust separator
(MF 30-60 molecular filter is similar)

Dust separators protect pumps against contamination and damage by sucked-in dust.

Advantages to the User

- Dust separators for large quantities of dust
- Two-stage, thus hardly any throttling
- Cyclone (for coarse dust) and wet filter (for fine dust)
- Dust separator and molecular filter have the same housing (for easy conversion)

Typical Application

- Separation of coarse and medium size dust starting at a grain size of 2 µm

Technical Information

Installing a dust filter in the intake line of the pump will throttle its pumping speed at low intake pressures more than at higher intake pressures. This must be taken into account when designing a vacuum system.

Even when large quantities of dust are deposited, the throttling effect will hardly increase.

Supplied Equipment

Blanked off drain port.

Molecular filters are used to separate vapors of a high molecular weight (i.e. monomers, vapors from resins).

Advantages to the User

- Molecular filter and dust separator have the same housing (for easy conversion)
- Separation of high-molecular weight vapors
- Protection of the pump's oil against damaging vapors

Technical Information

Installing a molecular filter in the intake line of the pump will throttle its pumping speed at low intake pressures more than at higher intake pressures. This must be taken into account when designing a vacuum system.

Supplied Equipment

Blanked off drain port.

Technical Data

AS 8-16

AS 30-60

MF 8-16

MF 30-60

| Connection to pump | TRIVAC | D 16 B | D 25 B | D 40 B | D 65 B | D 16 B/BCS | D 25 B/BCS | D 40 B/BCS | D 65 B/BCS |
|--|----------|------------|------------|-------------|-------------|------------|------------|-------------|-------------|
| Throttling of the pumping speed at 1 mbar (0.75 Torr) intake pressure, approx. | % | 10 | 15 | 8 | 16 | 10 | 15 | 8 | 16 |
| at 10 mbar (7.5 Torr) intake pressure, approx. | % | 5 | 7 | 4 | 9 | 5 | 7 | 4 | 9 |
| Capacity for dust | l (qt) | 0.6 (0.63) | 0.6 (0.63) | 2.0 (2.11) | 2.0 (2.11) | – | – | – | – |
| Capacity for resin vapors or similar | kg (lbs) | – | – | – | – | 0.15 (0.3) | 0.15 (0.3) | 0.35 (0.8) | 0.35 (0.8) |
| Impact ring filling | l (qt) | 0.5 (0.53) | 0.5 (0.53) | 3.5 (3.70) | 3.5 (3.70) | – | – | – | – |
| Active charcoal filling | kg (lbs) | – | – | – | – | 0.6 (1.3) | 0.6 (1.3) | 1.4 (3.1) | 1.4 (3.1) |
| Weight | kg (lbs) | 4.5 (9.9) | 4.5 (9.9) | 18.4 (40.6) | 18.4 (40.6) | 4.5 (9.9) | 4.5 (9.9) | 18.4 (40.6) | 18.4 (40.6) |

Ordering Information

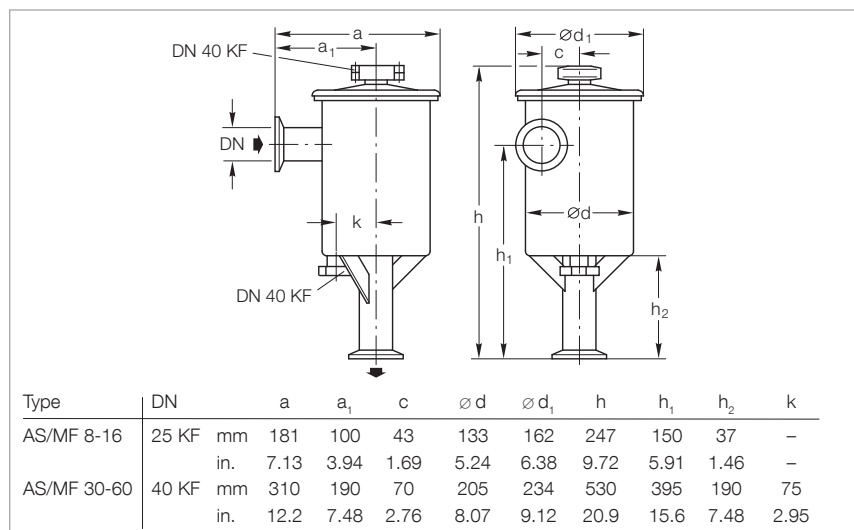
AS 8-16

AS 30-60

MF 8-16

MF 30-60

| | Part No. | Part No. | Part No. | Part No. |
|---|---------------|---------------|---------------|---------------|
| Dust separator | 186 11 | 186 16 | – | – |
| Molecular filter | – | – | 186 12 | 186 17 |
| Replacement filter insert | – | 178 43 | – | – |
| Replacement active charcoal insert | – | – | 178 07 | 178 08 |
| Active charcoal, undried, 5 kg (11 lbs) | – | – | 178 10 | 178 10 |



Dimensional drawing for the AS dust separators and MF molecular filters

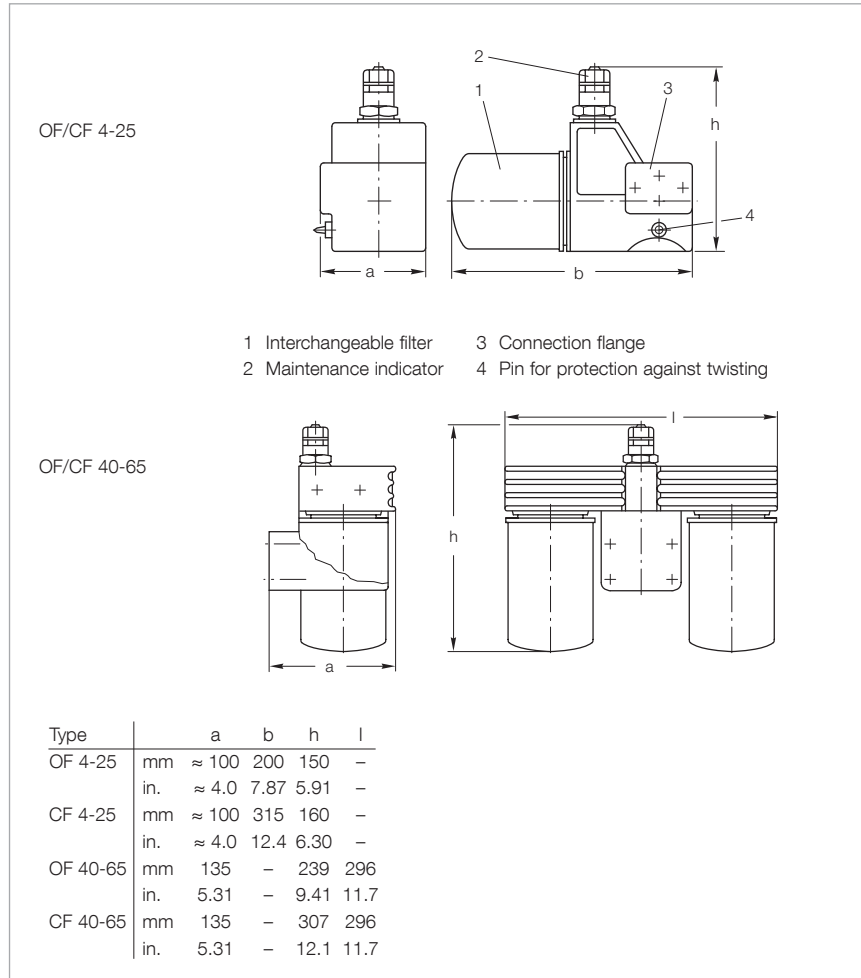
Mechanical Oil Filters OF 4-25 and OF 40-65 / Chemical Oil Filters CF 4-25 and CF 40-65



OF 4-25 mechanical oil filter

Since there is a pressure-lubrication system with an oil pump in every TRIVAC B, it is possible to connect main flow oil filters.

These filters are available either for mechanical filtering (OF types) or combined chemical/mechanical filtering (CF types).



Dimensional drawings for the OF mechanical oil filters and CF chemical oil filters

Advantages to the User

- Main flow oil filter
- Longer service life for the oil depending on the type of application
- Can be installed without problems to the TRIVAC B
- Hose connections are not required
- Easily interchangeable filters
- Only a small amount of oil needs to be added when changing the filters
- Expansion of the range of applications in case of special requirements

- Same casing for OF and CF types
- Greater reliability by standard maintenance indicator
- Built-in bypass valve
- Owing to the highly effective adsorbent for polar substances, an up to ten-fold adsorption effect is attained over normal bleaching earth (CF)
- Prevents mechanical damage to the pump

Typical Application

- Separation of fine particles from the pump's oil (sizes between 5 and 10 µm (OF))

Technical Data**OF 4-25****CF 4-25****OF 40-65****CF 40-65**

| | | | | | |
|----------------------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Connection to pump | TRIVAC | D 4/8 B, D 16/25 B | D 4/8 B, D 16/25 B | D 40/65 B | D 40/65 B |
| Nominal throughput | l x h ⁻¹ | 900 | 900 | 2000 | 2000 |
| Separation | | | | | |
| mechanical oil filter | µm | 5 to 10 | 5 to 10 | 5 to 10 | 5 to 10 |
| chemical oil filter | µm | to 3 | to 3 | to 3 | to 3 |
| Permissible operating pressure | bar (psig) | 2.5 (21.7) | 2.5 (21.7) | 2.5 (21.7) | 2.5 (21.7) |
| Opening pressure, | | | | | |
| non-return valve | bar (psid) | 0.12 (1.7) | 0.12 (1.7) | 0.12 (1.7) | 0.12 (1.7) |
| bypass valve | bar (psid) | 2.5 ±0.3 (21.7 ±4.3) | 2.5 ±0.3 (21.7 ±4.3) | 2.5 ±0.3 (21.7 ±4.3) | 2.5 ±0.3 (21.7 ±4.3) |
| Topping up amount during | | | | | |
| first time installation | l (qt) | 1.0 (1.1) | 1.0 (1.1) | 2.5 (2.6) | 2.5 (2.6) |
| filter exchange | l (qt) | 1.0 (1.1) | 1.0 (1.1) | 2.0 (2.1) | 2.0 (2.1) |
| Weight, ready for operation, dry | kg (lbs) | 4.0 (8.8) | 4.0 (8.8) | 10.0 (22.1) | 10.0 (22.1) |

Ordering Information**OF 4-25****CF 4-25****OF 40-65****CF 40-65**

| | Part No. | Part No. | Part No. | Part No. |
|--|---------------|---------------|-----------------------------|-----------------------------|
| Mechanical oil filter | 101 91 | – | 101 92 | – |
| Chemical oil filter | – | 101 96 | – | 101 97 |
| WF 4-25 interchangeable filter, paper, 0.5 l (0.5 qt) | 189 91 | – | – | – |
| WF 40-65 interchangeable filter, paper 0.75 l (0.8 qt) | – | – | 189 92 ¹⁾ | 189 92 ¹⁾ |
| WF Alu 4-65 interchangeable filter, paper and Al ₂ O ₃ , 1 l (1.1 qt) | – | 189 96 | – | 189 96 ¹⁾ |

¹⁾ 2 pieces are required

Chemical Filters with Safety Isolation Valve

CFS 16-25 and CFS 40-65



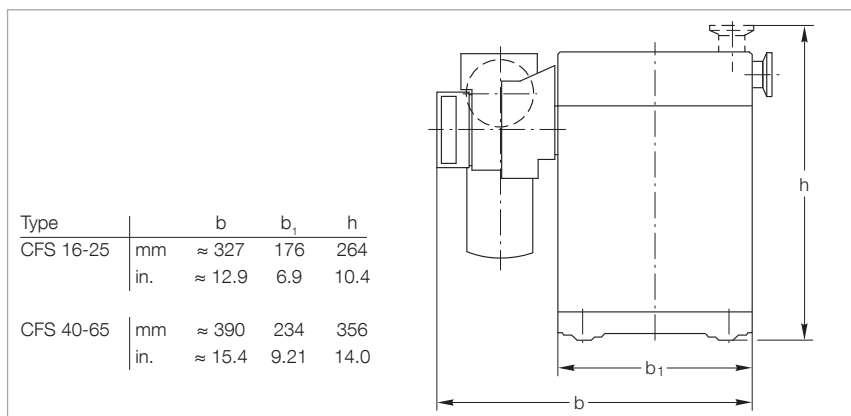
CFS 40-65

The CFS chemical filters with safety isolation valve are main flow oil filters for the TRIVAC B and BCS pumps.

The CFS is part of the TRIVAC SYSTEM.

Advantages to the User

- The CFS is included in the main lubricant flow
- Rapid filter exchange
 - the pump may continue to operate while changing the filters
- Visual indication of the filter's condition through a maintenance indicator
- Aluminium component with isolation valve for one or two interchangeable filters
- All aluminium parts are surface protected
- May be operated with different interchangeable filters
- Over-pressure relief valve in the interchangeable filters
- Prepared for connection of a differential pressure switch and an oil pressure switch
- May also be used on the TRIVAC B pumps



Dimensional drawing for the CFS (mounted on a TRIVAC BCS)

Technical Information

The CFS is cleaned in the factory to such an extent, that it may be operated either with mineral oil (e.g. LEYBONOL LVO 100) or perfluoropolyether (PFPE, e.g. LEYBONOL LVO 400).

Supplied Equipment

All gaskets and mounting parts required for installation.

Aluminium particle filters (WF Alu-Part) sealed for shipping are included separately.

Technical Data

| | TRIVAC | CFS 16-25 | CFS 40-65 |
|--|-------------------|----------------------------------|----------------------------------|
| | | D 16/25 B D 16/25 BCS (-PFPE) | D 40/65 B D 40/65 BCS (-PFPE) |
| Connection to pump | TRIVAC | | |
| Nominal throughput | $l \times h^{-1}$ | 900 | 2000 |
| Permissible operating pressure | bar (psig) | 2.5 (21.7) | 2.5 (21.7) |
| Opening pressure | | | |
| Non-return valve | bar (psid) | 2.5 (21.7) | 2.5 (21.7) |
| Bypass valve | bar (psid) | 2.5 ± 0.3 (21.7 ± 4.3) | 2.5 ± 0.3 (21.7 ± 4.3) |
| Filter medium | | Al ₂ O ₃ | Al ₂ O ₃ |
| Lubricant filling when using WF Alu-Part | l (qt) | 1.4 (1.5) | 3.3 (3.5) |
| Weight, ready for operation, dry | kg (lbs) | 7.0 (15.4) | 15.5 (34.1) |

Ordering Information

| | Part No. | Part No. |
|---|------------|--------------------------|
| Chemical filter with safety isolation valve | 101 76 | 101 77 |
| WF Alu-Part combination filter, paper and Al ₂ O ₃ , 1.6 l (1.7 qt) | 189 99 | 189 99 ¹⁾ |
| WF particle filter, paper, 1.6 l (1.7 qt) | 200 09 804 | 200 09 804 ¹⁾ |
| WFG particle filter, paper with support mesh, 1 l (1.1 qt) | 189 90 | 189 90 ¹⁾ |

¹⁾ 2 pieces are required

Inert Gas System

IGS 16-25 and IGS 40-65



IGS

This accessory, which is controlled via solenoid valves, permits the controlled admission of special gases into the TRIVAC BCS.

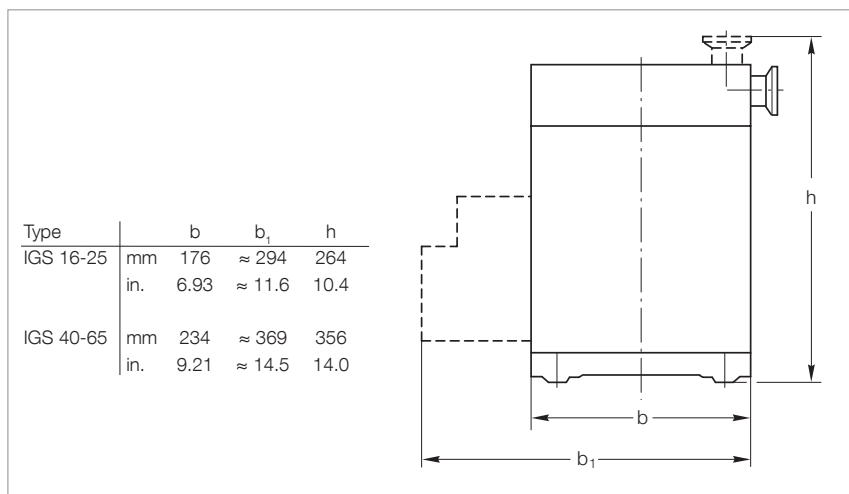
The IGS is part of the TRIVAC SYSTEM.

Advantages to the User

- Ready for connection to an inert gas supply
- Solenoid valve for reduced gas ballast
- Solenoid valve for purging the oil box
- Float throughput gauge with throttling valve adjustable from 200 to 700 l x h⁻¹
- The flowing quantity can be read directly
- System protection by a non-return valve (requires a reservoir pressure of at least 3 bar (29 psi, gauge)) – this reliably prevents the reservoir vessel from being evacuated
- Connects directly on to the TRIVAC BCS

Typical Applications

- Reduction of the contamination levels in the lubricant
- Reduction in the dwell time of volatile substances within the pump



Dimensional drawing for the IGS (mounted on a TRIVAC BCS)

Technical Information

The amount of inert gas ballast is restricted by a nozzle to 200 l x h⁻¹. Larger quantities are used for purging.

Supplied Equipment

Solenoid valves with connection cables and plugs, the required connecting pieces, mounting screws and cover panel.

Technical Data

| Connection to pump | TRIVAC | D 16/25 BCS (-PFPE) | D 40/65 BCS (-PFPE) |
|--|---------------------|---------------------|---------------------|
| Min. amount of admitted gas at a reservoir pressure of 3.0 bar (29 psig) | l x h ⁻¹ | 200 | 200 |
| Max. amount of admitted gas at a reservoir pressure of 6.0 bar (72.5 psig) | l x h ⁻¹ | 1450 | 1450 |
| Supply voltage for the solenoid valves | V DC | 24 | 24 |
| Power consumption | W | 10 | 10 |
| Weight | kg (lbs) | 1.0 (2.2) | 1.4 (3.1) |
| Connection thread | G (BPS) | 1/8" | 1/8" |

Ordering Information

| | IGS 16-25 | IGS 40-65 |
|------------------------------|-----------------|------------------|
| Inert gas system | Part No. 161 76 | Part No. - |
| Inert gas system, UL conform | - | Part No. 161 68V |

Limit Switch System

LSS 16-25 and LSS 40-65



LSS

This accessory consists of a package of limit switches. It is used to monitor system functions.

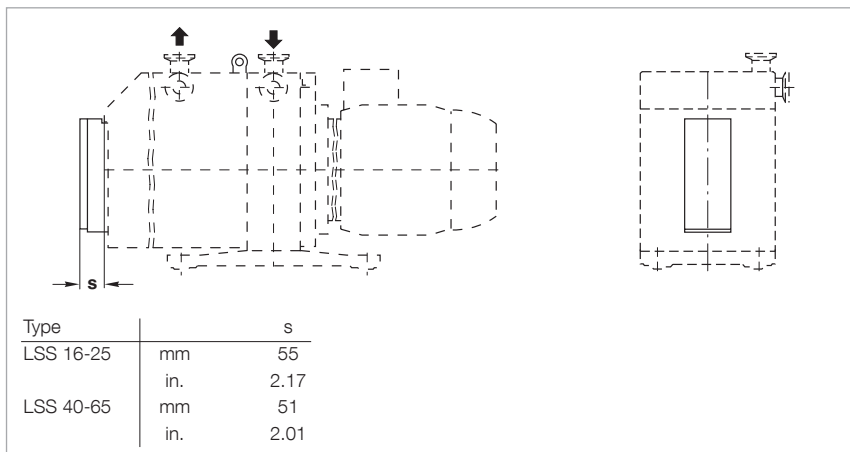
The LSS is part of the TRIVAC SYSTEM.

The package of limit switches includes:

- Differential pressure switch to monitor the CFS
- Oil pressure switch to monitor the operating pressure
- Flow switch to monitor the inert gas flow
- Pressure switch to monitor the pressure in the oil box of the pump
- Connection cable and plug for the temperature switch used for temperature monitoring
- Float switch with housing to monitor the oil level

Advantages to the User

- Errors are indicated well in advance so that it will in most cases be possible to complete the process for the running batch
- The switching action is independent of the optical displays (for optimum reliability)
- The temperature switch is already present in the TRIVAC BCS



Dimensional drawing for the LSS (mounted on a TRIVAC BCS)

Typical Application

- Changing the status in case operating conditions arise which are not permissible

Supplied Equipment

Fully wired-up switches with plugs as well as all required gaskets and mounting parts.

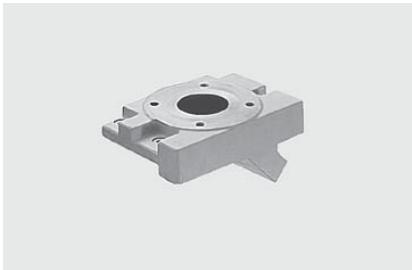
Technical Data

| | TRIVAC | LSS 16-25 | LSS 40-65 |
|--------------------|----------|---------------------|---------------------|
| Connection to pump | TRIVAC | D 16/25 BCS (-PFPE) | D 40/65 BCS (-PFPE) |
| Operating voltage | V DC | 24 | 24 |
| Switching capacity | W / A | 10.0 / 0.4 | 10.0 / 0.4 |
| Type of protection | IP | 54 | 54 |
| Weight, approx. | kg (lbs) | 2.5 (5.5) | 2.5 (5.5) |

Ordering Information

| | LSS 16-25 | LSS 40-65 |
|---------------------|-----------|-----------|
| Part No. | Part No. | Part No. |
| Limit switch system | 161 06 | 161 07 |

Roots Pump Adaptor



Roots pump adaptor

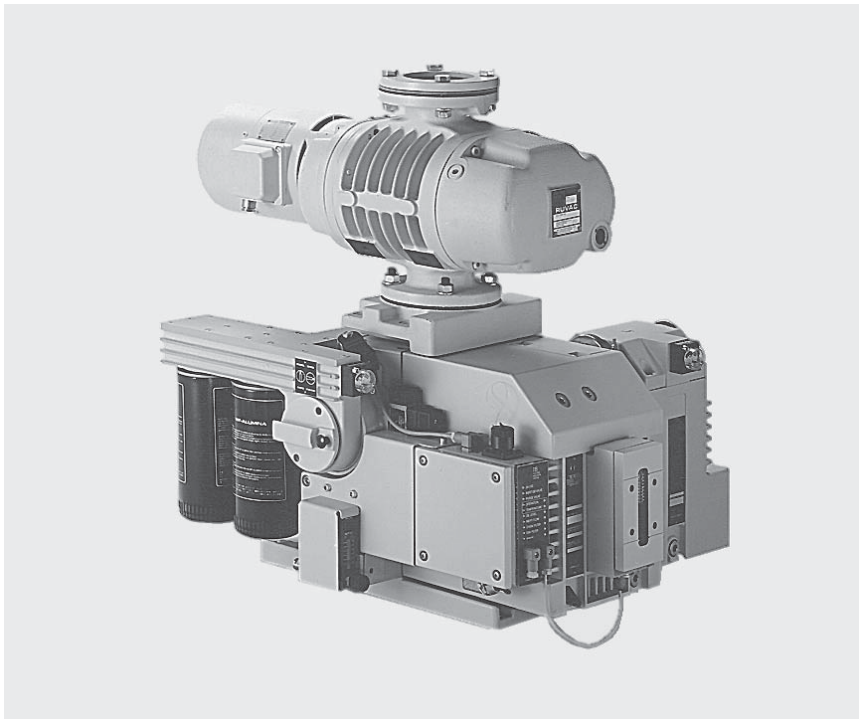
The Roots pump adaptor allows the direct installation of a Roots pump on a TRIVAC D 40/65 B/BCS.

Advantages to the User

- Compact and space-saving
- Short and direct connection between the pumps
- Minimal conductance loss
- Easy installation

Typical Application

- Simple assembly of a small pump system



Pump system consisting of a TRIVAC D 65 BCS and a RUVAC WS 251

Technical Data

| | | |
|--------------------|----------|---|
| Connection to pump | TRIVAC | D 40/65 B/BCS (-PFPE) and RUVAC WAWAU/WS/WSU 251 |
| Weight, approx. | kg (lbs) | 11.5 (25.4) |

Ordering Information

| | Part No. |
|--------------------|----------|
| Roots pump adaptor | 168 30 |

Roots Pump Adaptor

Roots Pump Adaptor

Only available for purchase in North and South America

RST Refillable Traps



RST refillable trap

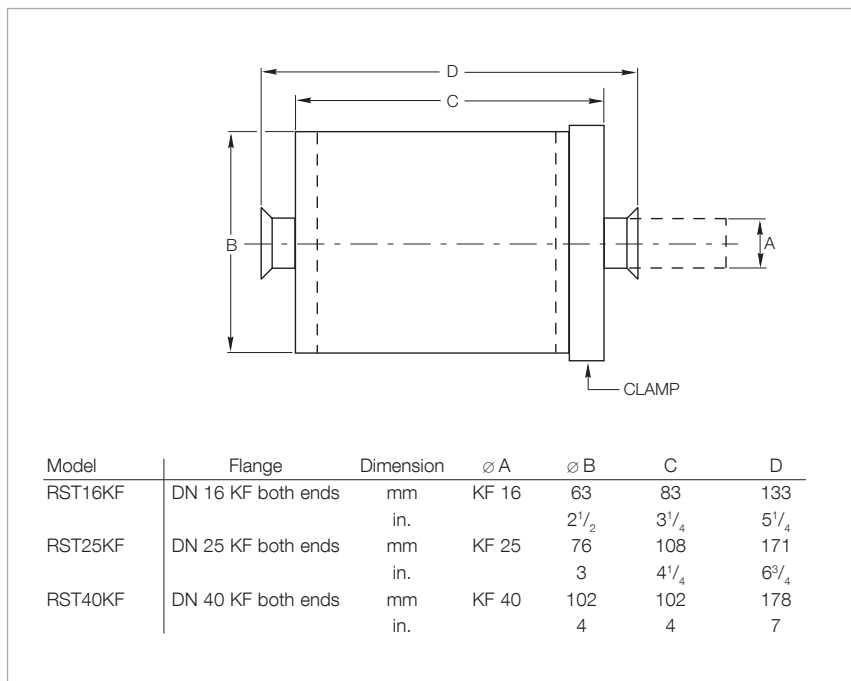
The RST traps are made from 304 stainless steel, and when specified with stainless steel filtration media, are fully suited for corrosive applications. The media is inserted directly into the trap. This ensures direct contact with the trap walls. There is no oil path between the trap wall and the retainer gasket to reduce trap effectiveness.

Advantages to the User

- Refillable
- Two filtration media
- Easy to clean
- Easy to recharge
- KF flanges

Applications

Foreline traps are utilized whenever long-term effects of mechanical pump oil back migration into the pumped chamber or higher vacuum (oil diffusion) pump may be undesirable. Copper wool for standard applications and stainless steel wool for corrosive applications are available.



Dimensional drawing for the RST

Technical Data

RST16KF RST25KF RST40KF

| Connection to pump | TRIVAC | D 4/8 B/BCS | D 16/25 B/BCS | D 40/65 B/BCS |
|--------------------|--------|-------------|---------------|---------------|
|--------------------|--------|-------------|---------------|---------------|

Ordering Information

RST16KF RST25KF RST40KF

| | Part No. | Part No. | Part No. |
|----------------------------|------------|------------|------------|
| RST16KF 1.9 lb (0.9 kg) | 99 171 135 | - | - |
| RST25KF 2.6 lb (1.2 kg) | - | 99 171 136 | - |
| RST40KF 4.1 lb (1.9 kg) | - | - | 99 171 137 |
| Filtering media | | | |
| Stainless steel | 99 171 141 | 99 171 141 | 99 171 141 |
| Copper | 99 171 145 | 99 171 146 | 99 171 147 |

Only available for purchase in North and South America

SE Smoke Eliminator



SE smoke eliminator

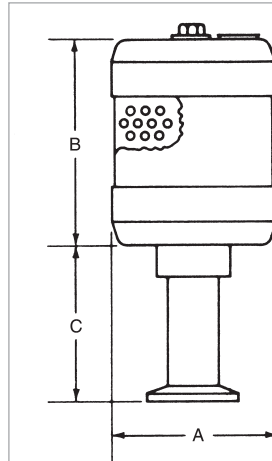
The Oerlikon Leybold Vacuum SE smoke eliminator can be utilized on all TRIVAC B rotary vane vacuum pumps where pump fluid loss at the exhaust port must be eliminated. These filters consist of a replaceable two-stage coalescing element mounted in a steel housing. For maintenance purposes, the top of the housing can be removed by loosening a single bolt. The filter assembly attaches to the exhaust port of the TRIVAC pump by means of a KF flange. Since three models are available, an SE smoke eliminator is available for each TRIVAC pump model.

Advantages to the User

- Two stage design
- Three sizes for all TRIVAC models
- KF flanges

Applications

When any oil sealed mechanical vacuum pump is used to pump a fixed volume from atmospheric pressure to some lower pressure or when a dynamic gas flow from a process stream is pumped, some mechanical pump fluid loss will occur at the exhaust of the pump. The more often a fixed volume is cycled from atmospheric pressure to a lower pressure or the longer a pump operates at a relatively high inlet pressure in a dynamic flow condition, the greater will be the fluid loss at the exhaust port of the pump.



Dimensional drawing for the SE

| Model | Flange | Dimension | A | B | C |
|----------|----------|-----------|-----|-----|----|
| SE 2-4 | DN 16 KF | mm | 64 | 76 | 70 |
| | | in. | 2½ | 3 | 2¾ |
| SE 8-16 | DN 25 KF | mm | 127 | 152 | 51 |
| | | in. | 5 | 6 | 2 |
| SE 30-60 | DN 40 KF | mm | 267 | 121 | 57 |
| | | in. | 10½ | 4¾ | 2¼ |

Technical Data

SE 2-4

SE 8-16

SE 30-60

| Connection to pump | TRIVAC | D 4/8 B | D 16/25 B | D 40/65 B |
|--------------------|--------|---------|-----------|-----------|
|--------------------|--------|---------|-----------|-----------|

Ordering Information

SE 2-4

SE 8-16

SE 30-60

| | Part No. | Part No. | Part No. |
|---------------------|-------------------|-------------------|-------------------|
| Smoke eliminator | 99 171 125 | 99 171 126 | 99 171 127 |
| Replacement element | | | |
| RE 2-4 | 99 171 128 | - | - |
| RE 8-16 | - | 99 171 129 | - |
| RE 30-60 | - | - | 99 171 130 |

By utilizing a coalescing exhaust filter for these applications, the fluid and exhaust gases are separated, and in the case of the SE smoke eliminator, the coalesced fluid is allowed to drain back into the pump fluid reservoir. Annoying oil fog to the atmosphere is thus eliminated.

Eventually, after about a year's normal operation, the coalescing element will become totally saturated and oil fog will be apparent when high inlet pressures

are prevailing. The low cost coalescing element can be easily replaced.

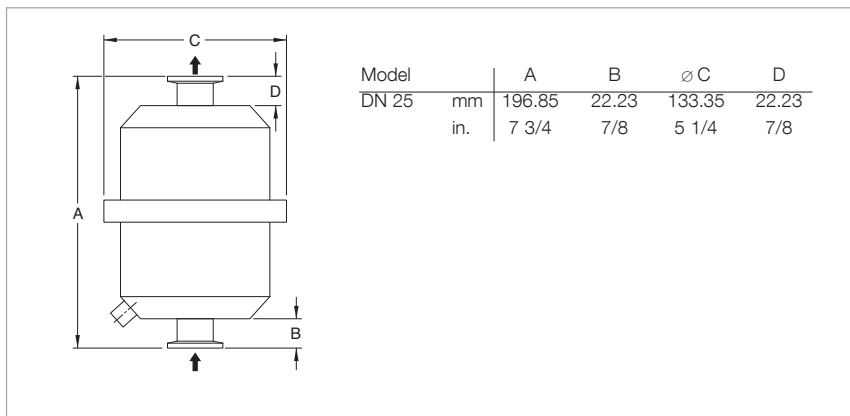
Note: For applications where toxic, corrosive, radioactive or precious gases are pumped, we highly recommend the use of our AF coalescing exhaust filters in-stead of the SE smoke eliminator. The AF is an in-line type coalescing filter and much more suitable for these applications.

Only available for purchase in North and South America

Compact Oil Mist Exhaust Filters



Compact oil mist exhaust filter



Dimensional drawing for the compact oil mist exhaust filters

Applications and Equipment

- Rotary vane pumps
- Vacuum furnaces, ovens and degassing
- Refrigeration and air condition
- Vacuum freeze drying
- Vacuum metallizing
- Vacuum coating
- Laboratory furnaces, test stands
- Autoclaving, sterilization
- Leak detection

Features and Specifications

- Minimum 99.97% D.O.P. on 3 micron particles
- Captures oil fog, mist or smoke from exhaust of oil lubricated vacuum pumps
- Compact, low profile design
- Stainless steel housing and internals
- Pleated filter element provides increased surface area for low back pressure
- Back pressure valve designed to release element at 7.35 PSI (0.5 bar) differential for pump safety
- 1/8" NPT oil drain
- Easy release V-band clamp
- Seamless drawn housings - no welds to rust or vibrate apart
- Easy field maintenance
- Operating temperature: 40 °F (4 °C) to 220 °F (104 °C)

Technical Data

Compact Oil Mist Exhaust Filter

| | | |
|----------------------------|-------------|-----------|
| Connection to pump | TRIVAC | D 16/25 B |
| Inlet and outlet | DN | 25 ISO-KF |
| Nominal vacuum pump rating | scfm (m³/h) | 20 (34) |
| Element rating | scfm (m³/h) | 20 (34) |
| Weight, approx. | kg (lbs) | 1 (2.2) |

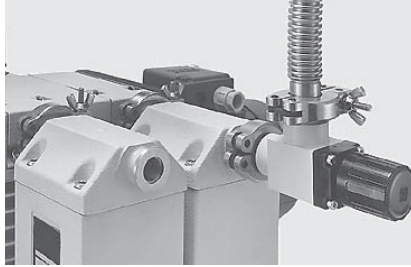
Ordering Information

Compact Oil Mist Exhaust Filter

| | Part No. |
|----------------------------------|-------------------|
| Compact oil mist exhaust filter | 721 87 113 |
| Replacement filter insert filter | 180 102 |

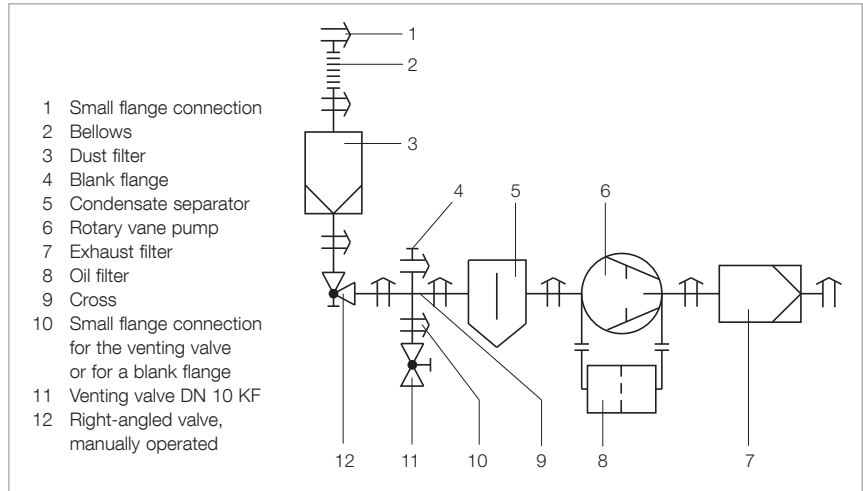
General Accessories

Flange Components, Valves



Our range of flange components and valves is described in detail in the Catalog Parts "Flanges and Fittings" and "Valves".

Given in the following are only some components which you might find particularly useful when planning your system.



Example of connecting a pump with accessories

Oil Sealed
Vacuum Pumps

Isolation Valve

- The pump is allowed to warm up with the intake line isolated
- The pump may continue to operate in the energy-saving and environmentally compatible ultimate pressure mode when the vacuum chamber is vented briefly
- The pump may be left on after completion of the process so as to regenerate the oil

Branch (Cross)

- Installing a cross in the intake line permits the connection of a vacuum gauge and a venting valve

Flange Connections

Each flange connection requires one each centering and clamping ring.

Ordering Information

DN 16 KF DN 25 KF DN 40 KF

| | Part No. | Part No. | Part No. |
|--|----------------|----------------|----------------|
| Small flange connection | | | |
| Clamping ring | 183 41 | 183 42 | 183 43 |
| Centering ring, aluminium/CR | 183 26 | 183 27 | 183 28 |
| Centering ring, stainless steel/FPM (FKM) | 883 46 | 883 47 | 883 48 |
| Bellows | 872 41 | 872 43 | 872 45 |
| Right-angled valve, manually operated | | | |
| Aluminium casing | 215 375 | 215 376 | 215 377 |
| Stainless steel casing | 215 383 | 215 385 | 215 386 |
| Blank flange for (reducing) cross | | | |
| Aluminium | 184 46 | 184 41 | 184 41 |
| Stainless steel | 884 36 | 884 41 | 884 41 |
| Reducing cross (to DN 10 KF) | | | |
| Aluminium | - | 184 17 | 184 19 |
| Stainless steel | - | 884 92 | 884 94 |
| Cross DN 16 KF | | | |
| Aluminium | 184 71 | - | - |
| Stainless steel | 884 85 | - | - |
| Small flange connection for venting valve or blank flange | | | |
| Clamping ring | 183 41 | 183 41 | 183 41 |
| (Adaptor) centering ring, aluminium/NBR | 183 56 | 183 21 | 183 21 |
| (Adaptor) centering ring, stainless steel/FPM (FKM) | 883 56 | 883 21 | 883 21 |
| Venting valve DN 10 KF | | | |
| Aluminium | 173 24 | 173 24 | 173 24 |
| Stainless steel | 173 37 | 173 37 | 173 37 |

Services

On-site Replacement of the Dynamic Seals (with LEYBONOL LVO 100)

The on-site replacement of the dynamic seals includes the following:

Partial disassembly of the pump, replacement of the complete shaft seal, mounting of the pump including new gaskets and standard oil LEYBONOL LVO 100, electrical safety test, test run including check of the attained ultimate pressure levels.

Ordering Information

On-site Replacement of the Dynamic Seals (with LEYBONOL LVO 100)

| | Part No. |
|--------------------|------------------|
| For pump | |
| TRIVAC D 4 B | AS 1130 F |
| TRIVAC D 8 B | AS 1130 F |
| TRIVAC D 16/25 B | AS 1129 F |
| TRIVAC D 40/65 B | AS 1128 F |
| TRIVAC D 40/65 BCS | AS 1137 F |

Small On-site Maintenance (with LEYBONOL LVO 100)

The small on-site maintenance includes the following:

Oil change (standard LEYBONOL LVO 100), filter replacement, visual inspection of the subassemblies, cleaning of the pump module and the oil box, electrical safety test, test run including check of the attained ultimate pressure levels.

Ordering Information

On-site Maintenance (with LEYBONOL LVO 100)

| | Part No. |
|---|------------------|
| For pump | |
| TRIVAC D 4 B | AS 1160 F |
| TRIVAC D 8 B | AS 1159 F |
| TRIVAC D 16 B + BCS with standard gaskets | AS 1158 F |
| TRIVAC D 25 B + BCS with standard gaskets | AS 1157 F |
| TRIVAC D 40/65 B + BCS with standard gaskets | AS 1156 F |

Comprehensive On-site Maintenance (with LEYBONOL LVO 100) ¹⁾

Comprehensive on-site maintenance includes the following:

Disassembly of the pump, cleaning of all individual components, replacement of all wearing parts, mounting of the pump including new gaskets and standard oil LEYBONOL LVO 100, electrical safety test, test run including check of the attained ultimate pressure levels.

Ordering Information

Comprehensive On-site Maintenance (with LEYBONOL LVO 100) ¹⁾

| | Part No. |
|---------------------------------------|------------------|
| For pump | |
| TRIVAC D 4 B | AS 1125 F |
| TRIVAC D 8 B | AS 1124 F |
| TRIVAC D 16 B | AS 1121 F |
| TRIVAC D 25 B | AS 1120 F |
| TRIVAC D 40 B | AS 1117 F |
| TRIVAC D 65 B | AS 1116 F |
| TRIVAC D 40 BCS with Viton gaskets | AS 1136 F |
| TRIVAC D 65 BCS with Viton gaskets | AS 1135 F |
| TRIVAC D 40 BCS with standard gaskets | AS 1132 F |
| TRIVAC D 65 BCS with standard gaskets | AS 1131 F |

¹⁾ Notes on our on-site after sales service

The listed services include the costs for material and working hours on-site for standard TRIVAC pumps. Services for pump variants upon request.

Transportation and travelling expenses are invoiced at cost. All services refer to the repair of freely accessible and not contaminated vacuum components.

As to services for TRIVAC B-DOT, TRIVAC B-Ex and TRIVAC B ³He please ask us for a quotation.

Complete Refurbishing at the Service Center (with LEYBONOL LVO 100)

Complete refurbishing at the service center includes the following:

Disassembly of the pump, visual inspection of the subassemblies, replacement of all wearing parts, machined reworking of the pump module, mounting of the pump including new gaskets and standard oil LEYBONOL LVO 100, electrical safety test, test run including check of the attained ultimate pressure levels.

Ordering Information

Complete Refurbishing at the Service Center (with LEYBONOL LVO 100)

| | Part No. |
|---------------------------------------|----------|
| For pump | |
| TRIVAC D 4 B | AS 1125 |
| TRIVAC D 8 B | AS 1124 |
| TRIVAC D 16 B | AS 1121 |
| TRIVAC D 25 B | AS 1120 |
| TRIVAC D 40 B | AS 1117 |
| TRIVAC D 65 B | AS 1116 |
| TRIVAC D 40 BCS with Viton gaskets | AS 1136 |
| TRIVAC D 65 BCS with Viton gaskets | AS 1135 |
| TRIVAC D 40 BCS with standard gaskets | AS 1132 |
| TRIVAC D 65 BCS with standard gaskets | AS 1131 |

Complete Refurbishing with Decontamination at the Service Center (with LEYBONOL LVO 100)

Complete refurbishing with decontamination at the service center includes the following:

Disassembly of the pump, decontamination of the individual components, visual inspection of the individual subassemblies, replacement of all wearing parts, machined reworking of the pump module, mounting of the pump including new gaskets and standard oil LEYBONOL LVO 100, electrical safety test, test run including check of the attained ultimate pressure levels.

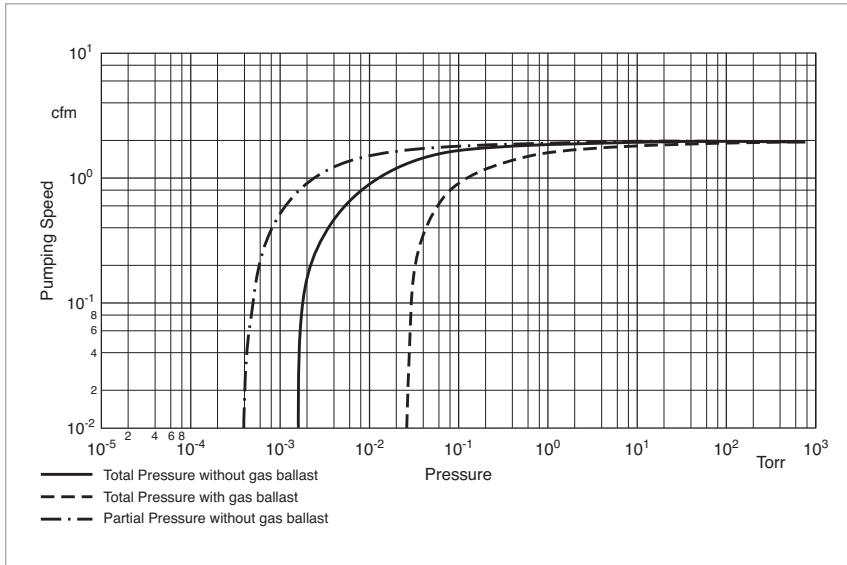
Ordering Information

Complete Refurbishing with Decontamination at the Service Center (with LEYBONOL LVO 100)

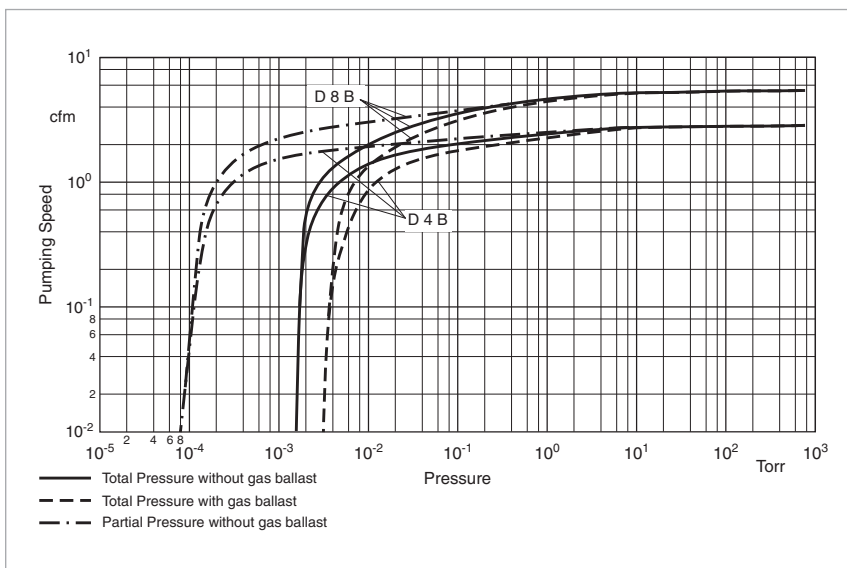
| | Part No. |
|---------------------------------------|-----------|
| For pump | |
| TRIVAC D 4 B | AS 1125 D |
| TRIVAC D 8 B | AS 1124 D |
| TRIVAC D 16 B | AS 1121 D |
| TRIVAC D 25 B | AS 1120 D |
| TRIVAC D 40 B | AS 1117 D |
| TRIVAC D 65 B | AS 1116 D |
| TRIVAC D 40 BCS with Viton gaskets | AS 1155 D |
| TRIVAC D 65 BCS with Viton gaskets | AS 1154 D |
| TRIVAC D 40 BCS with standard gaskets | AS 1132 D |
| TRIVAC D 65 BCS with standard gaskets | AS 1131 D |

Only available for purchase in North and South America

60 Hz Curves

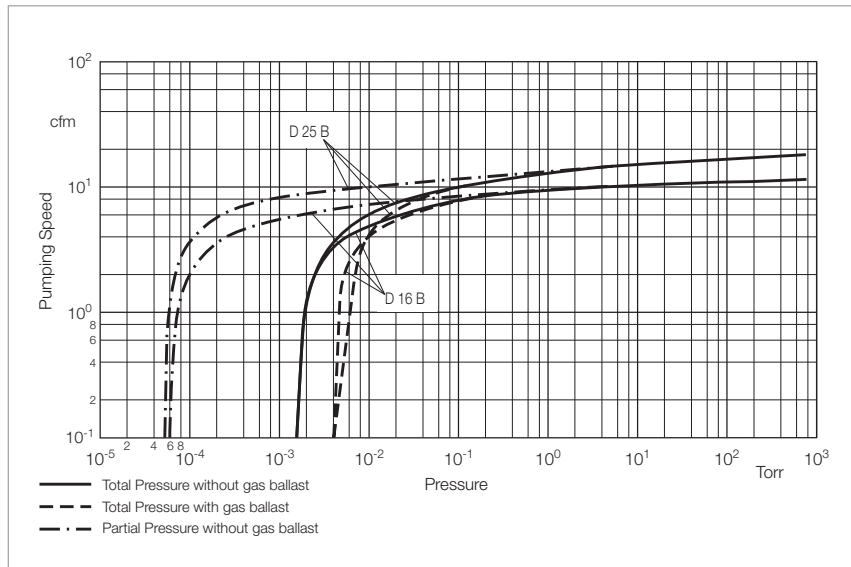


Pumping speed characteristics for the TRIVAC D 2,5 E at 60 Hz

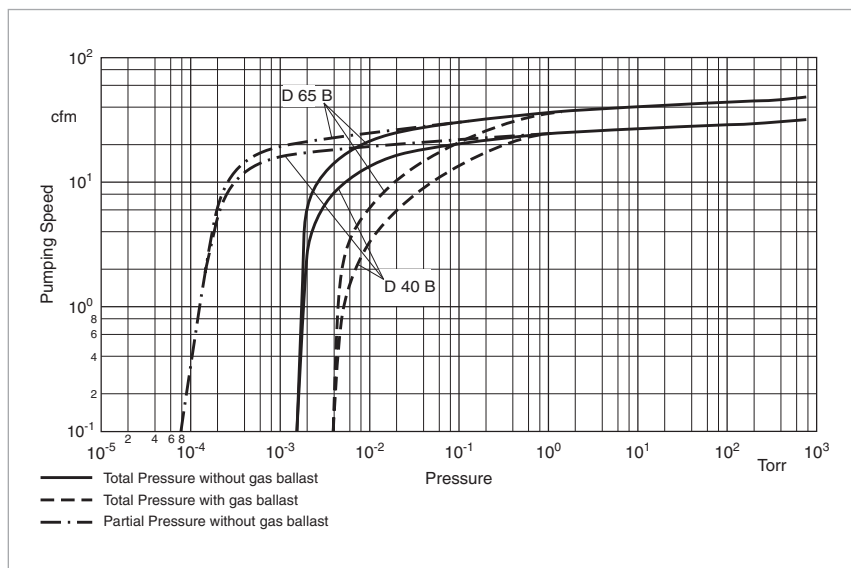


Pumping speed characteristics for the TRIVAC D 4 B and D 8 B at 60 Hz

Only available for purchase in North and South America



Pumping speed characteristics for the TRIVAC D 16 B/BCS and D 25 B/BCS at 60 Hz



Pumping speed characteristics for the TRIVAC D 40 B/BCS and D 65 B/BCS at 60 Hz

[illegible]

Oil for SOGEVAC pumps for different fields of application

| Applications | Vacuum coating | Research and development | Chemistry/Pharmaceutical | Metallurgy/Furnaces | Lamps and tubes industry | Automotive industry | Laser manufactures | Space technology | Analytical engineering | Environmental engineering | Electrical engineering | Mechanical engineering | Medicine technology | Vacuum drying cabinets | Food industry | Plant engineering | Power engineering | Cleaning | Packaging | Engineering/district heating |
|----------------------|----------------|--------------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------|------------------|------------------------|---------------------------|------------------------|------------------------|---------------------|------------------------|---------------|-------------------|-------------------|----------|-----------|------------------------------|
| LEYBONOL Oils | | | | | | | | | | | | | | | | | | | | |
| LVO 110 | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | |
| LVO 120 | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | |
| LVO 130 | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | |
| LVO 140 | | | | | | | | | | ■ | ■ | | | ■ | | | | | ■ | |
| LVO 150 | | | | | | | | | | ■ | ■ | | | ■ | | | | | ■ | |
| LVO 160 | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | |
| LVO 200 | ■ | ■ | ■ | ■ | ■ | | ■ | | ■ | ■ | | | | | | ■ | ■ | | | |
| LVO 210 | ■ | ■ | ■ | ■ | ■ | | ■ | | | | ■ | | | | | ■ | ■ | | | |
| LVO 300 | | | ■ | | | | | | ■ | ■ | ■ | ■ | ■ | | ■ | | ■ | | | |
| LVO 400 | ■ | ■ | ■ | | | | | | | ■ | | | ● | ■ | | | | | ■ | |
| DOT 4 | | | | | | ■ | | | | | | | | | | | | | | |

■ = Standard
 ● = Possible

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
“Oils / Greases / Lubricants LEYBONOL®”.**

Oil for SOGEVAC pumps for different pump types

| Pumps | Pump line | | | D | A | | | | B / BF | | | | BI | ATEX |
|---------------|------------------|-----------------|--------|----------------|------------------------|---------|---------------------|------------|-------------------|--------------------------------|-------------------------------|---------------------------|---|---|
| | SV 16 D, SV 25 D | SV 40, SV 65 | SV 100 | SV 200, SV 300 | SV 500, SV 630, SV 750 | SV 1200 | SV 10 B, SV 16 B/FP | SV 25 B/FP | SV 40 B, SV 45 FP | SV 65 B, SV 100 B, SV 120 B/FP | SV 300 B (FP) to SV 750 B (F) | SV 28 BI, SV 40 BI IIA | SV 40 B Category 1 (0/2(o)) IIB + H2 | SV 40 B to 630 B Category 3 (0/3(o)) |
| LEYBONOL Oils | | | | | | | | | | | | | | |
| LVO 110 | ■ | ■ | | | | | ■ | ■ | ▲ ¹⁾ | | | ■ | | |
| LVO 120 | ■ | ■ | | | | | ■ | ■ | ▲ ¹⁾ | | | ■ | | |
| LVO 130 | ▲ | ▲ | ■ | ■ | ■ | ■ | | | ▲ ²⁾ | ■ | ■ | | | |
| LVO 140 | ● | ● | ● | | | | ● | ● | ▲ | ▲ | | | | |
| LVO 150 | | | ● | ● | ● | ● | | ▲ | ● | ● | ● | | | |
| LVO 160 | ▲ | ▲ | ■ | ■ | ■ | ■ | | | ▲ ²⁾ | ■ | ■ | | | |
| LVO 200 | ● | ● | ● | | | | ● | ● | ▲ | ▲ | | ● | ■ | ▲ |
| LVO 210 | ▲ ²⁾ | ▲ ²⁾ | ● | ● | ● | ● | ▲ | ▲ | ● | ● | ● | | ■ | ■ |
| LVO 300 | ● | ● | ● | ● | ▲ | ▲ | | | ● | ● | ▲ | | | ▲ |
| LVO 400 | ● | ● | ● | ● | ● | ● | | | | ● | ● | | | ● ³⁾ |
| LVO 420 | | | | | | | | | | | | ■ | | |
| DOT 4 | | ● | | | | | | | ● | | | | | |

■ = Standard

● = Possible

▲ = Please contact Oerlikon Leybold Vacuum Valence

¹⁾ = with single-phase motor

²⁾ = with three-phase motor

³⁾ = ATEX outside only

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
“Oils / Greases / Lubricants LEYBONOL®”.**

Product Range, Features and Design

Oil sealed rotary vane vacuum pumps are being used in all areas of vacuum engineering. They are equally suited for both industrial production and research applications. They may be used to generate a rough and medium vacuum or as backing pumps in pump combinations with Roots vacuum pumps or high vacuum pumps. The SOGEVAC pumps excel also to their low noise levels and smooth operation.

Many years of experience in vacuum engineering and the latest developments in pump technology combine in the SOGEVAC range the capability to adapt to the requirements of both the industry and the environment. The comprehensive range (pumping speeds ranging from 10 to 1200 m³ x h⁻¹ (5.9 to 707 cfm)) allows every customer to select the right pump for his particular needs.

Application Examples

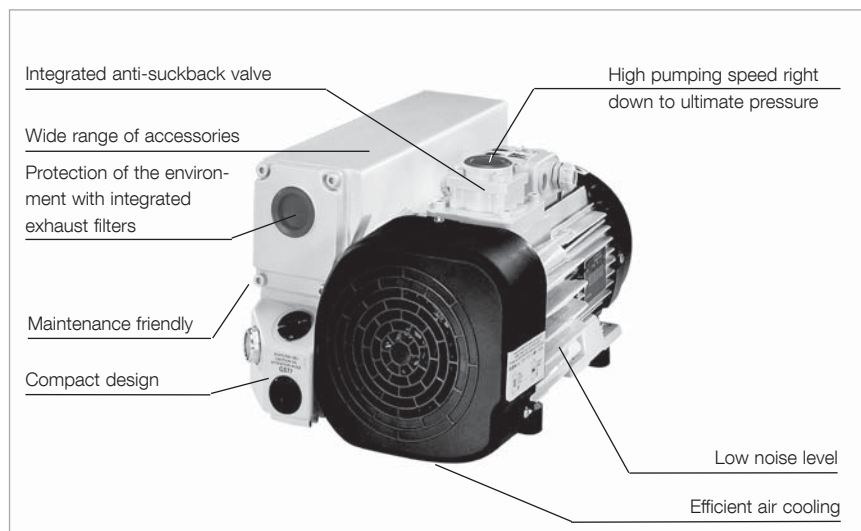
- Automotive industry
- Food industry
- Furnaces and plants
- Vacuum coating
- Metallurgy
- Power engineering, long-distance energy
- Space simulation
- Laser technology
- Medicinal technology

Remark

The impact of the European Directives 2005/32/CE and 2009/125/CE (EuP) is not shown in this catalog.

Advantages to the User

- Continuous operation from atmospheric pressure to ultimate pressure
- High pumping speed also at low pressures
- Low noise level
- Low vibrations
- Integrated exhaust filter, better than 99.9% efficient
- No oil loss owing to the integrated oil return line
- Exhaust gas free of oil mists
- Efficient air cooling (standard)
- Water cooling (optional)
- Low space requirement, easy to install
- Rugged
- Maintenance-friendly
- Compact design
- For direct fitting to Roots pumps from SV 100 B up
- Optimum size-to-performance ratio
- High water vapor tolerance
- For use in various applications
- Wide range of accessories available for adaptation to differing problems



Outstanding features of the SOGEVAC pumps

Design Principle

SOGEVAC pumps are oil sealed rotary vane pumps. Oil injected into the pump chamber for sealing, lubrication and cooling of the pump is recycled from the pump's oil reservoir and filtered, if required, before it is injected. The lubricant system is rated for continuous operation at high intake pressures (max. 1000 bar abs.) so that the pumps may be used in a versatile manner in most rough vacuum applications (accessories are required for some pumps).

The oil carried with the process gas is roughly separated in the oil box before the discharged gas enters the integrated exhaust filters where the fine oil mist is trapped. The thus filtered oil is collected in the oil box and then supplied back to the pump.

The separating system optimized in consideration of all operating conditions for the vacuum pump guarantees – also at high intake pressures and when pumping out of vapors – an exhaust gas which is free of oil mist (separation efficiency over 99.9%).

Oerlikon Leybold Vacuum rotary vane vacuum pumps from the SOGEVAC series excel through numerous special features:

Compact Design

The pumps have been so designed that efficiency of the pumps will be high.

For the SV 10 B through SV 65 B, the motor and pumping section use the same shaft. For the SV 100 B to SV 1200 the motor is linked depending on requirements to the pumping section directly via a coupling or via V-belts as a pedestal motor. All vacuum components like anti-suckback, exhaust filter with oil return line needed for a complete vacuum unit as well as the optimized placement of all controls and monitoring components allow for an extremely compact unit.

Quiet Operation

SOGEVAC pumps are designed throughout to keep the noise level as low as possible. This is ensured by optimized running and sliding speeds and the selection of low-noise drive motors, as well as perfected manufacturing techniques using CNC automatic machines for optimized tolerances and reproducibility of the individual components.

Anti-Suckback Valve

A valve is built into the intake of the SOGEVAC pumps. This “anti-suckback valve” is protected by a metal wire-mesh filter. During standstill of the pump (for example due to shutting down or a power failure) the valve closes the intake. This prevents the pressure from rising in the connected chamber while the pump is vented at the same time. Any suck-back of pump oil into the vacuum system is thus also effectively prevented. This blocking process operates under all operating conditions (below 800 mbar (600 Torr)) and even when the gas ballast valve is open.

Protection of the Environment

The built-in exhaust filter ensures an oil-mist free exhaust gases over the entire range of operating pressures – from atmospheric pressure to ultimate pressure.

Supplied Equipment

All pumps are delivered with the required quantity of oil: SV 10 B to SV 65 B in a separate canister, whereas the SV 100 B and larger pumps already contain the oil and are thus ready for operation.

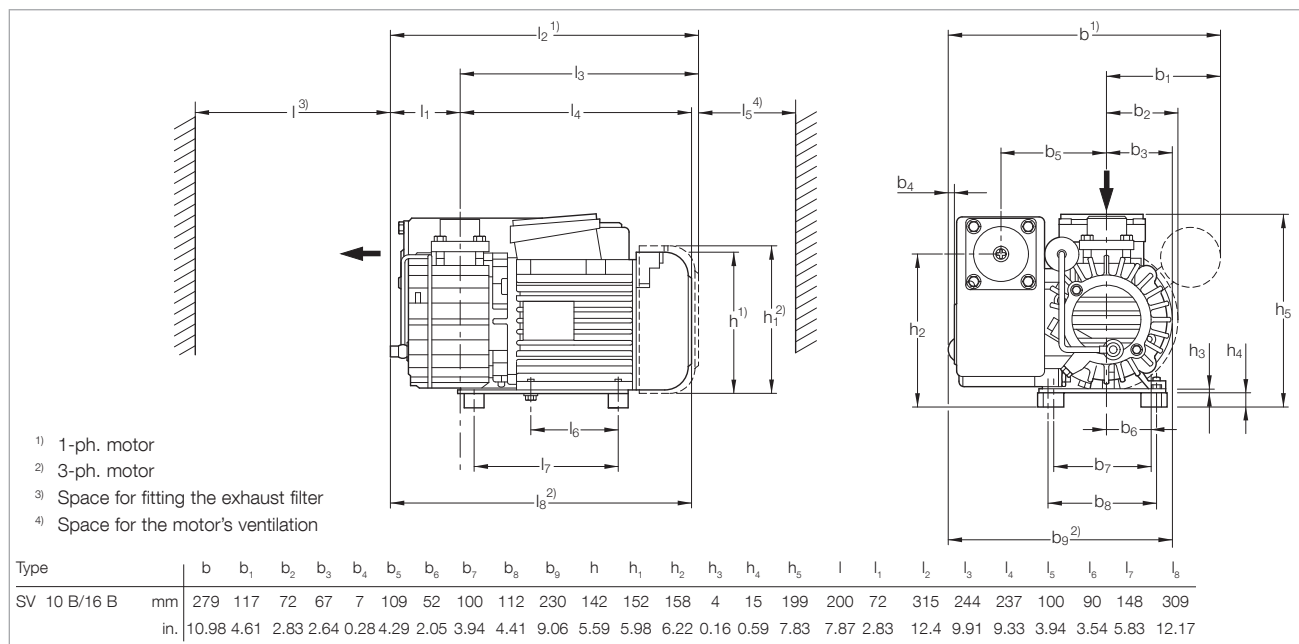
PFPE variants are typically delivered without fluid LVO 400.

Products

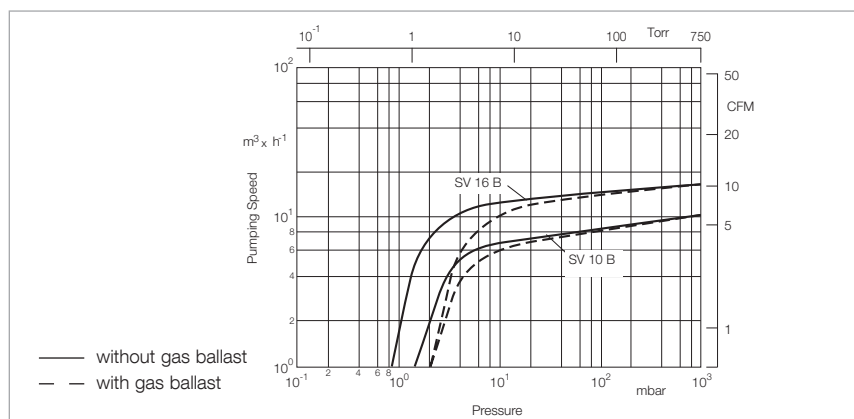
SOGEVAC SV 10 B / SV 16 B



SOGEVAC SV 16 B



Dimensional drawing for the SOGEVAC SV 10 B and SV 16 B



Pumping speed characteristics of the SOGEVAC SV 10 B and SV 16 B at 50 Hz
(60 Hz curves at the end of the chapter)

Technical Data**SOGEVAC SV 10 B****SOGEVAC SV 16 B**

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|---|--|--|--|--|--|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 11.0 (6.5) | 13.0 (7.7) | 16.0 (9.4) | 19.0 (11.2) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 9.5 (5.6) | 11.5 (6.8) | 15.0 (8.8) | 17.0 (10.0) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) | ≤ 1.0 (≤ 0.8) | ≤ 1.0 (≤ 0.8) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | ≤ 2.5 (≤ 1.9) | ≤ 2.5 (≤ 1.9) | ≤ 2.0 (≤ 1.5) | ≤ 2.0 (≤ 1.5) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 10.0 (7.5) | 15.0 (11.3) | 10.0 (7.5) | 15.0 (11.3) |
| Water vapor capacity | g x h ⁻¹ (qt/hr) | 20 (0.02) | 30 (0.03) | 30 (0.03) | 50 (0.05) |
| Oil capacity | l (qt) | 0.5 (0.53) | 0.5 (0.53) | 0.5 (0.53) | 0.5 (0.53) |
| Noise level ²⁾ | dB(A) | 62 (1-ph.) - 60 (3-ph.) | 66 (1-ph.) - 64 (3-ph.) | 62 (1-ph.) - 60 (3-ph.) | 66 (1-ph.) - 64 (3-ph.) |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power | kW (hp) | 0.55 (0.75) | 0.75 (1.02) | 0.55 (0.75) | 0.75 (1.02) |
| Nominal speed | min ⁻¹ (rpm) | 3000 (3000) | 3600 (3600) | 3000 (3000) | 3600 (3600) |
| Type of protection | IP | 55-F | 55-F | 55-F | 55-F |
| Weight (with oil filling) | kg (lbs) | 20.0 (41.55) | 20.0 (41.55) | 20.5 (45.25) | 20.5 (45.25) |
| Dimensions (L x W x H) | mm (in.) | 315 x 281 x 199 (12.4 x 11.06 x 7.83) | 315 x 281 x 199 (12.4 x 11.06 x 7.83) | 315 x 281 x 199 (12.4 x 11.06 x 7.83) | 315 x 281 x 199 (12.4 x 11.06 x 7.83) |
| Connections intake (Inside thread) ³⁾ | G | 3/4" + 1/2" | 3/4" + 1/2" | 3/4" + 1/2" | 3/4" + 1/2" |

Ordering Information**SOGEVAC SV 10 B****SOGEVAC SV 16 B**

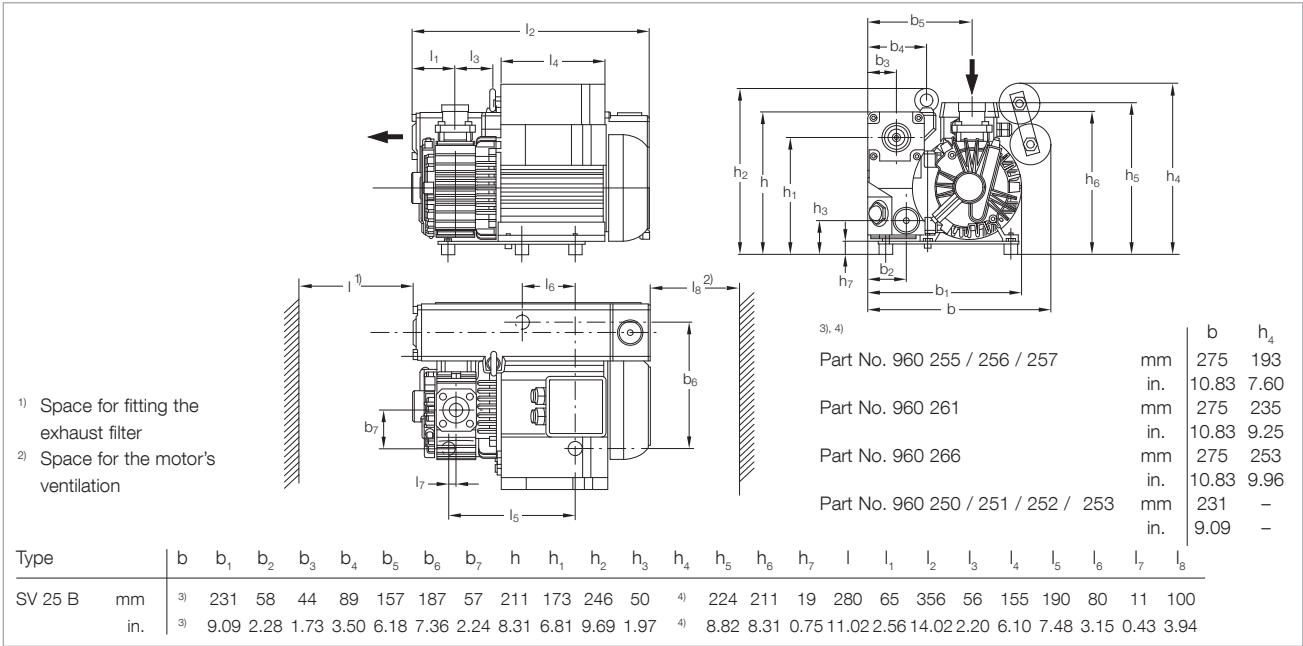
| | 50/60 Hz | 50/60 Hz |
|---|---------------------|---------------------|
| | Part No. | Part No. |
| SOGEVAC SV 10 B/SV 16 B with three-phase motor, with gas ballast 220-240/380-415 V, 50 Hz and 220-266/380-460 V, 60 Hz (CEI) | 960 100 | 960 160 |
| 200 V, 50/60 Hz | 960 115 | 960 175 |
| with single-phase motor ⁴⁾ , with gas ballast 230 V, 50/60 Hz (CEI) | 960 105 | 960 165 |
| 110-120 V, 60 Hz | 960 110 | 960 170 |
| 100 V, 50/60 Hz | 960 114 | 960 174 |
| Other voltages/frequencies ⁵⁾ | upon request | upon request |
| Filling with special oil | upon request | upon request |
| Accessories | | |
| Exhaust filter cartridge AFE SV10B/16B | 714 13 280 | 714 13 280 |
| Exhaust connection G 3/4" | 971 433 140 | 971 433 140 |
| Spare Parts | | |
| Repair kit | 714 22 230 | 714 22 230 |
| Maintenance kit | 971 444 430 | 971 444 430 |
| Seal kit FPM (FKM) | 714 22 220 | 714 22 220 |

¹⁾ To DIN 28 400 and following numbers²⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)³⁾ 1/2" adapter supplied. Basic port is 3/4"⁴⁾ Single-phase motors do not have plugs, cords or ON/OFF switches⁵⁾ Please indicate when ordering a pump**Remark:** The SV 10 B and SV 16 B cannot work continuously above 150 mbar. Please consult Oerlikon Leybold Vacuum for this application

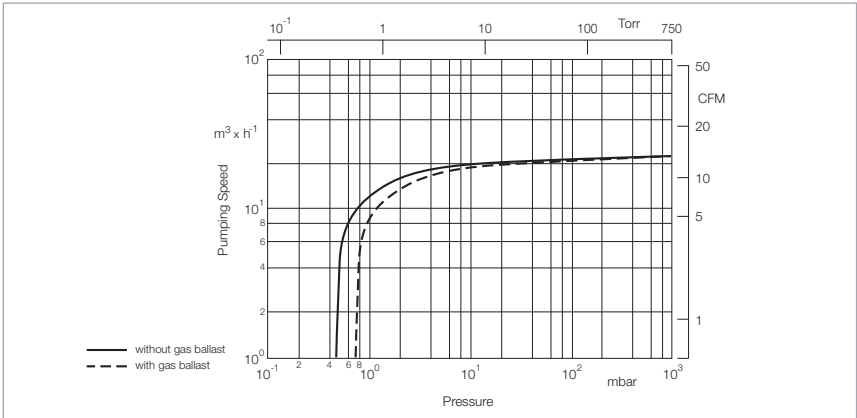
SOGEVAC SV 25 B



SOGEVAC SV 25 B



Dimensional drawing for the SOGEVAC SV 25 B



Pumping speed characteristics of the SOGEVAC SV 25 B at 50 Hz
(60 Hz curves at the end of the chapter)

Technical Data

SOGEVAC SV 25 B

| | | 50 Hz | 60 Hz |
|---|--|---|---|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 26.0 (15.3) | 31.0 (18.3) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 22.5 (13.3) | 25.0 (14.7) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | ≤ 0.8 (≤ 0.6) | ≤ 0.8 (≤ 0.6) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 10.0 (7.5) | 10.0 (7.5) |
| Water vapor capacity | g x h ⁻¹ (qt/hr) | 85 (0.09) | 100 (0.11) |
| Oil capacity | l (qt) | 0.5 (0.53) | 0.5 (0.53) |
| Noise level ²⁾ | dB(A) | 64 | 67 |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power | kW (hp) | 0.9 (1.2) | 1.1 (1.5) |
| Nominal speed | min ⁻¹ (rpm) | 3000 (3000) | 3600 (3600) |
| Type of protection | IP | 55-F | 55-F |
| Weight (with oil filling) | kg (lbs) | 26 (57.4) [three-phase] 27 (60.0) [single-phase] | 26 (57.4) [three-phase] 27 (60.0) [single-phase] |
| Dimensions (L x W x H) | mm (in.) | 356 x 275 x 246 (14.02 x 10.83 x 9.69) | 356 x 275 x 246 (14.02 x 10.83 x 9.69) |
| Connections ³⁾ | | | |
| Intake ⁴⁾ | G or NPT | 3/4" + 1/2" | 3/4" + 1/2" |
| Exhaust | G or NPT | 3/4" | 3/4" |

Ordering Information

SOGEVAC SV 25 B

50/60 Hz

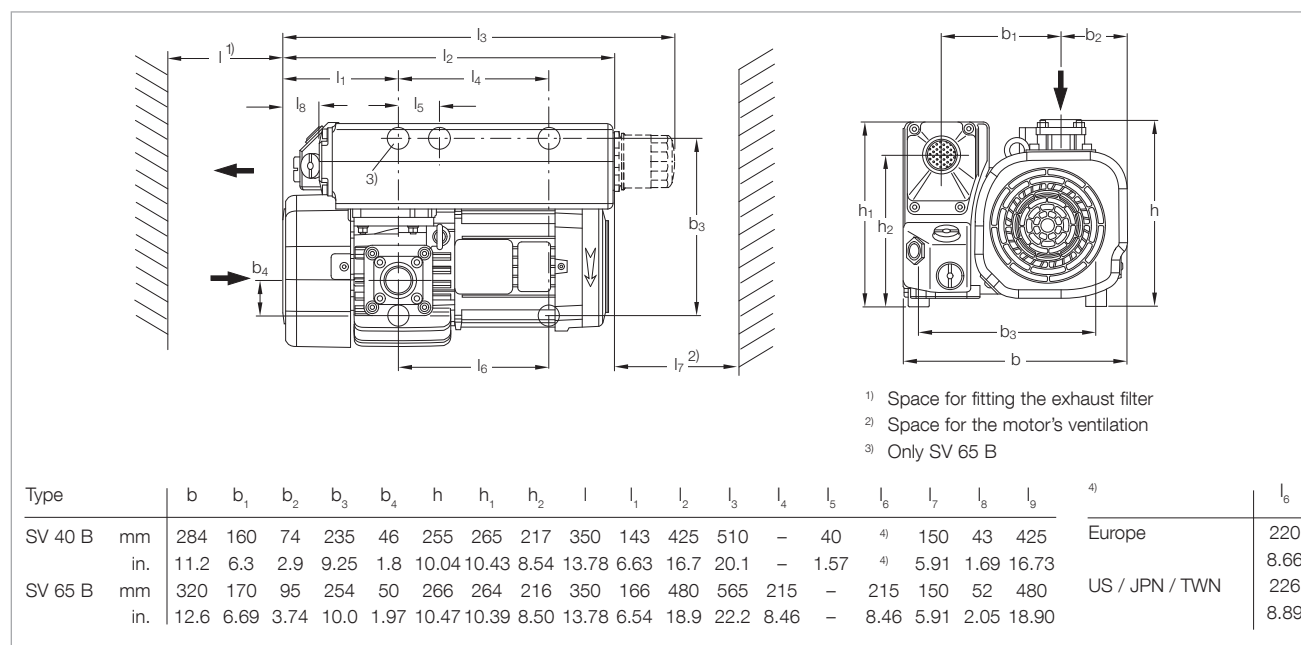
| | Part No. |
|---|---------------------|
| SOGEVAC SV 25 B with three-phase motor, without gas ballast 200-240/346-415 V, 50 Hz and 200-277/346-480 V, 60 Hz (CEI) | 960 250 |
| 200-240/346-415 V, 50 Hz and 200-277/346-480 V, 60 Hz (CEI), NPT flanges | 960 252 |
| with three-phase motor, with gas ballast 200-240/346-415 V, 50 Hz and 200-277/346-480 V, 60 Hz (CEI) | 960 251 |
| 200-240/346-415 V, 50 Hz and 200-277/346-480 V, 60 Hz (CEI), NPT flanges | 960 253 |
| with single-phase motor, without gas ballast 230 V, 50/60 Hz (CEI) | 960 255 |
| with single-phase motor, with gas ballast 230 V, 50/60 Hz (CEI) | 960 256 |
| 230 V, 50/60 Hz, NPT flanges (CEI) | 960 257 |
| 110-120 V, 60 Hz | upon request |
| 100 V, 50/60 Hz | upon request |
| Other voltages/frequencies ⁵⁾ | upon request |
| Filling with special oil ⁵⁾ | upon request |
| Accessories | |
| Exhaust filter cartridge AFE SV25B | 714 16 340 |
| Spare Parts | |
| Maintenance kit | 971 423 450 |
| Repair kit | 971 423 100 |
| Seal kit FPM (FKM) | 714 19 490 |

¹⁾ To DIN 28 400 and following numbers²⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)³⁾ Pumps with European and Japanese motors have G,
pumps with NEMA motors have NPT⁴⁾ 1/2" adapter supplied. Basic port is 3/4"⁵⁾ Please indicate when ordering a pump

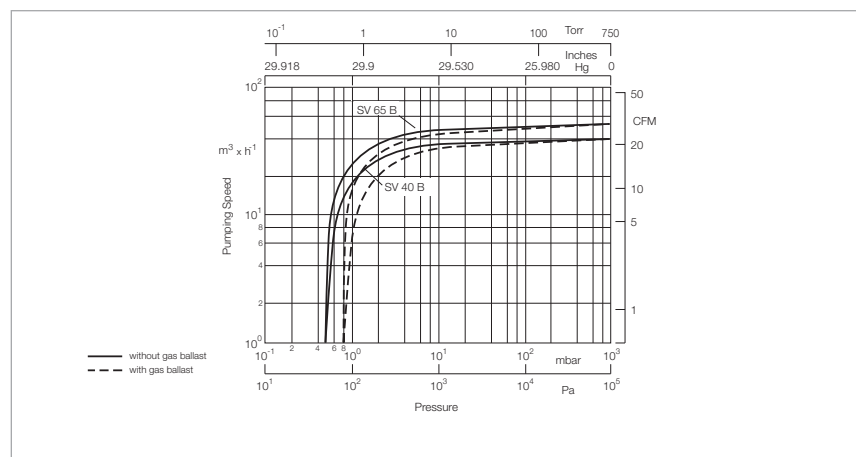
SOGEVAC SV 40 B / SV 65 B



SOGEVAC SV 65 B



Dimensional drawing for the SOGEVAC SV 40 B and SV 65 B with standard motor, European version



Pumping speed characteristics of the SOGEVAC SV 40 B and SV 65 B at 50 Hz
(60 Hz curves at the end of the chapter)

Technical Data

SOGEVAC SV 40 B

SOGEVAC SV 65 B

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|--|--|---|---|---|---|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 44.0 (25.9) | 53.0 (31.2) | 59.0 (34.8) | 71.0 (41.8) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 38.5 (22.7) | 47.0 (27.7) | 54.0 (31.8) | 64.0 (37.7) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Ultimate total pressure ¹⁾ with standard gas ballast ²⁾ | mbar (Torr) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) |
| with small gas ballast ²⁾ | mbar (Torr) | ≤ 0.8 (≤ 0.6) | ≤ 0.8 (≤ 0.6) | ≤ 0.8 (≤ 0.6) | ≤ 0.8 (≤ 0.6) |
| Water vapor tolerance ¹⁾ with standard gas ballast ²⁾ | mbar (Torr) | 30.0 (22.5) | 30.0 (22.5) | 30.0 (22.5) | 30.0 (22.5) |
| with small gas ballast ²⁾ | mbar (Torr) | 10.0 (7.5) | 10.0 (7.5) | 10.0 (7.5) | 10.0 (7.5) |
| Water vapor capacity with standard gas ballast ²⁾ | kg x h ⁻¹ (qt/hr) | 0.76 (0.80) | 0.90 (0.95) | 1.0 (1.1) | 1.25 (1.32) |
| with small gas ballast ²⁾ | kg x h ⁻¹ (qt/hr) | 0.28 (0.30) | 0.34 (0.36) | 0.36 (0.38) | 0.42 (0.44) |
| Oil capacity | l (qt) | 1.0 (1.05) | 1.0 (1.05) | 2.0 (2.1) | 2.0 (2.1) |
| Mean noise level ³⁾ | dB(A) | 58 | 60 | 60 | 64 |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power | kW (hp) | 1.1 (2.0) | 1.5 (2.0) | 1.5 (3.0) | 1.8 (3.0) |
| Nominal speed | min ⁻¹ (rpm) | 1500 (1500) | 1800 (1800) | 1500 (1500) | 1800 (1800) |
| Type of protection | IP | 55-F | 55-F | 55-F | 55-F |
| Materials (materials in contact with the gas) | | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper) Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper) Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper) Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper) Epoxy resin & Glass fibre |
| Weight (with oil filling) | kg (lbs) | 43 (94.9) | 45 (99.3) | 49 (108.2) | 52 (114.8) |
| Dimensions (L x W x H) | mm (in.) | 425 x 284 x 265 (16.7 x 11.2 x 10.4) | 425 x 284 x 265 (16.7 x 11.2 x 10.4) | 480 x 320 x 265 (18.9 x 12.6 x 10.4) | 480 x 320 x 265 (18.9 x 12.6 x 10.4) |
| Connection (inside thread) ⁴⁾ Intake | G or NPT | 1 1/4" | 1 1/4" | 1 1/4" | 1 1/4" |
| Exhaust | G or NPT | 1 1/4" | 1 1/4" | 1 1/4" | 1 1/4" |

¹⁾ To DIN 28 400 and following numbers²⁾ Ordering Information, see next page³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)⁴⁾ Pumps with European and Japanese motors have G,
pumps with US motors have NPT

Ordering Information

SOGEVAC SV 40 B

SOGEVAC SV 65 B

50/60 Hz

50/60 Hz

| | Part No. | Part No. |
|--|------------------------------|------------------------------|
| SOGEVAC SV 40 B, SV 65 B ¹⁾ | | |
| with three-phase motor, without gas ballast, without oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 300 | 960 400 |
| wide range motor (CEI) ²⁾ | 960 320 ²⁾ | 960 420 ²⁾ |
| with three-phase motor, without gas ballast, with oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 302 | 960 402 |
| with three-phase motor, with small gas ballast, without oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 301 | 960 401 |
| 230/460 V, 60 Hz and 400 V, 50 Hz, NPT flanges (UL/CSA motor) ³⁾ | 960 311 | 960 411 |
| 230/400 V, 50/60 Hz (CEI) | 960 321 ²⁾ | 960 421 ²⁾ |
| 200 V, 50/60 Hz | 960 316 | 960 416 |
| with three-phase motor, with small gas ballast, with oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 303 | 960 403 |
| 230/460 V, 60 Hz and 400 V, 50 Hz, NPT flanges (UL/CSA motor) ³⁾ | 960 313 | 960 413 |
| 230/400 V, 50/60 Hz (CEI) | 960 323 ²⁾ | 960 423 ²⁾ |
| 200 V, 50/60 Hz | 960 318 | 960 418 |
| with three-phase motor, with standard gas ballast, without oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 305 | 960 405 |
| 230/460 V, 60 Hz and 400 V, 50 Hz, NPT flanges (UL/CSA motor) ³⁾ | 960 312 | 960 412 |
| 230/400 V, 50/60 Hz (CEI) | 960 322 ²⁾ | 960 422 ²⁾ |
| 200 V, 50/60 Hz | 960 317 | 960 417 |
| with three-phase motor, with standard gas ballast, with oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 307 | 960 407 |
| 230/460 V, 60 Hz and 400 V, 50 Hz, NPT flanges (UL/CSA motor) ³⁾ | 960 314 | 960 414 |
| 230/400 V, 50/60 Hz (CEI) | 960 324 ²⁾ | 960 424 ²⁾ |
| 200 V, 50/60 Hz | 960 319 | 960 419 |
| Other voltages/frequencies ⁴⁾ | upon request | upon request |
| Filling with special oil ⁴⁾ | upon request | upon request |
| Accessories | | |
| Exhaust filter cartridge AFE SV40B | 714 21 180 | - |
| AFE SV65/100B | - | 714 17 300 |
| Spare Parts | | |
| Maintenance kit | 971 427 660 | 971 423 440 |
| Repair kit | 971 427 650 | 714 20 420 |
| Seal kit FPM (FKM) | 971 427 640 | 714 20 410 |
| Oil filter ⁵⁾ | 714 20 980 | 714 20 980 |
| Oil filter bypass | 712 30 570 | 712 30 570 |

¹⁾ Pumps with European and Japanese motors have G, pumps with US voltages motors have NPT

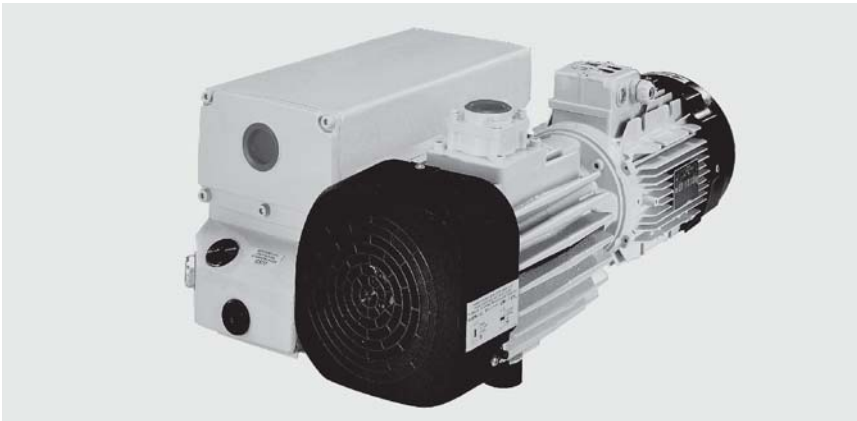
²⁾ Wide range motor: 210-240 & 360-420 V \pm 5%, 50 Hz and 210-260 & 360-460 V \pm 5%, 60 Hz

³⁾ With NEMA type electrical connections

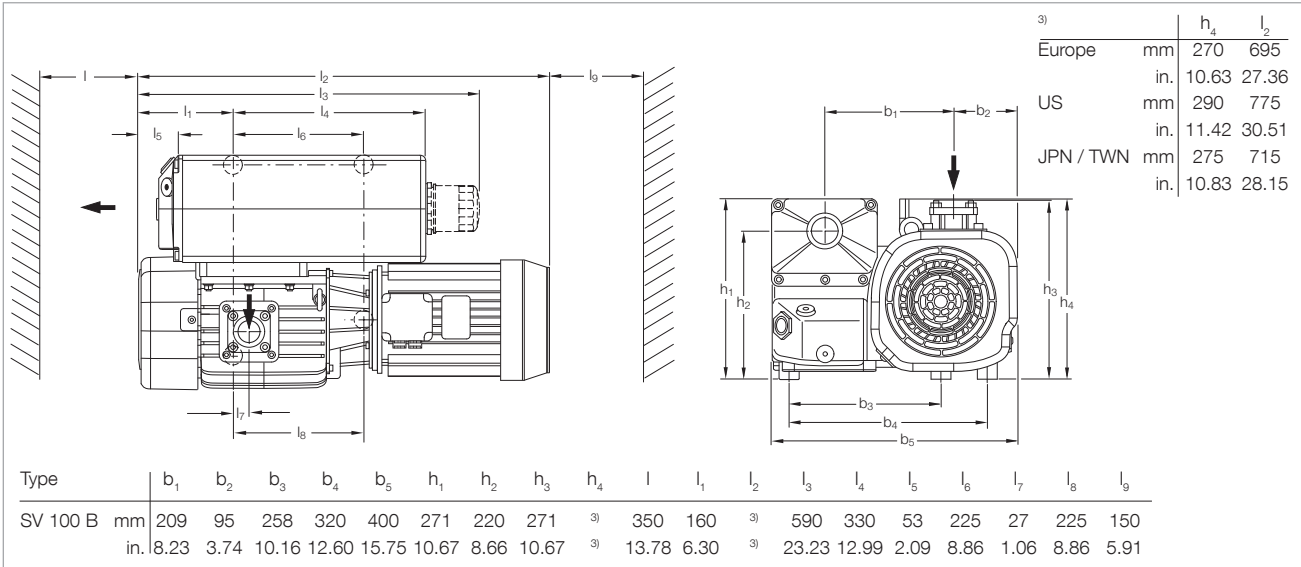
⁴⁾ Please indicate when ordering a pump

⁵⁾ Not included in maintenance kit

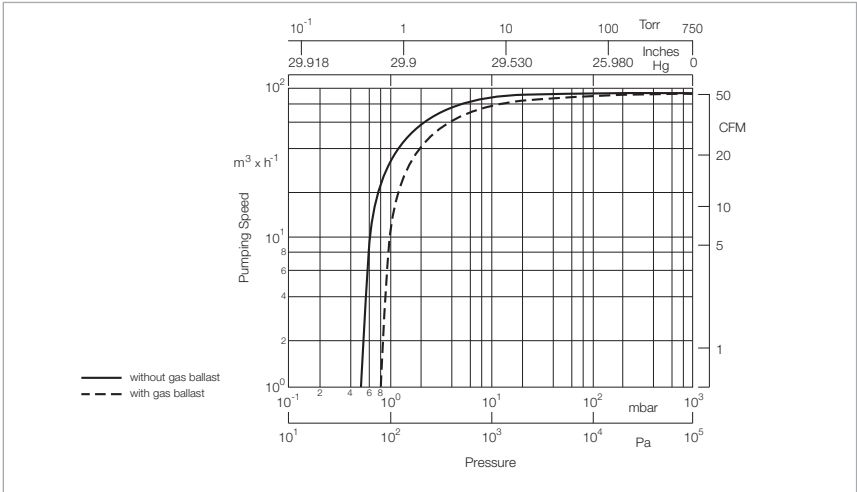
SOGEVAC SV 100 B



SOGEVAC SV 100 B



Dimensional drawing for the SOGEVAC SV 100 B



Pumping speed characteristics of the SOGEVAC SV 100 B at 50 Hz
(60 Hz curves at the end of the chapter)

Technical Data

SOGEVAC SV 100 B

| | | 50 Hz | 60 Hz |
|--|--|--|--|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 97.5 (57.4) | 117.0 (68.9) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 87.5 (51.5) | 105.0 (61.8) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Ultimate total pressure ¹⁾ with standard gas ballast ²⁾ | mbar (Torr) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) |
| with small gas ballast ²⁾ | mbar (Torr) | ≤ 0.8 (≤ 0.6) | ≤ 0.8 (≤ 0.6) |
| Water vapor tolerance ¹⁾ with standard gas ballast ²⁾ | mbar (Torr) | 30.0 (22.5) | 30.0 (22.5) |
| with small gas ballast ²⁾ | mbar (Torr) | 10.0 (7.5) | 10.0 (7.5) |
| Water vapor capacity with standard gas ballast ²⁾ | kg x h ⁻¹ (qt/hr) | 1.60 (1.69) | 1.70 (1.80) |
| with small gas ballast ²⁾ | kg x h ⁻¹ (qt/hr) | 0.45 (0.48) | 0.60 (0.63) |
| Oil capacity | l (qt) | 2.0 (2.1) | 2.0 (2.1) |
| Mean noise level ³⁾ | dB(A) | 61 | 64 |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power | kW (hp) | 2.2 (3.5) | 3.5 (5.0) |
| Nominal speed | min ⁻¹ (rpm) | 1500 (1500) | 1800 (1800) |
| Type of protection | IP | 55-F | 55-F |
| Materials (materials in contact with the gas) | | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre |
| Weight (with oil filling) | kg (lbs) | 81 (179) | 93 (205) |
| Dimensions (L x W x H) | | | |
| Europe | mm (in.) | 695 x 400 x 270 (27.4 x 15.7 x 10.6) | 695 x 400 x 270 (27.4 x 15.7 x 10.6) |
| US | mm (in.) | 755 x 400 x 290 (29.7 x 15.7 x 11.4) | 755 x 400 x 290 (29.7 x 15.7 x 11.4) |
| JPN / TWN | mm (in.) | 715 x 400 x 275 (28.1 x 15.7 x 10.8) | 715 x 400 x 275 (28.1 x 15.7 x 10.8) |
| Connection (inside thread) ⁴⁾ | | | |
| Intake | G or NPT | 1 1/4" | 1 1/4" |
| Exhaust | G or NPT | 1 1/4" | 1 1/4" |

¹⁾ To DIN 28 400 and following numbers

²⁾ Ordering Information, see next page

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

⁴⁾ Pumps with European and Japanese motors have G,
pumps with US (NEMA) motors have NPT

Ordering Information

SOGEVAC SV 100 B

50/60 Hz

| | Part No. |
|---|---------------------|
| SOGEVAC SV 100 B ¹⁾ with three-phase motor, without gas ballast, without oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 500 |
| with three-phase motor, without gas ballast, with oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 502 |
| with three-phase motor, with small gas ballast, without oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 501 |
| 230/460 V, 60 Hz and 400 V, 50 Hz (NEMA) | 960 511 |
| 230/400 V, 50/60 Hz and 460 V, 60 Hz (CEI) | 960 521 |
| 200 V, 50/60 Hz (JIS) | 960 516 |
| with three-phase motor, with small gas ballast, with oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 503 |
| 230/460 V, 60 Hz and 400 V, 50 Hz (NEMA) | 960 513 |
| 230/400 V, 50/60 Hz and 460 V, 60 Hz (CEI) | 960 523 |
| 200 V, 50/60 Hz (JIS) | 960 518 |
| with three-phase motor, with standard gas ballast, without oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 505 |
| 230/460 V, 60 Hz and 400 V, 50 Hz (NEMA) | 960 512 |
| 230/400 V, 50/60 Hz and 460 V, 60 Hz (CEI) | 960 522 |
| 200 V, 50/60 Hz (JIS) | 960 517 |
| with three-phase motor, with standard gas ballast, with oil filter 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) | 960 507 |
| 230/460 V, 60 Hz and 400 V, 50 Hz (NEMA) | 960 514 |
| 230/400 V, 50/60 Hz and 460 V, 60 Hz (CEI) | 960 524 |
| 200 V, 50/60 Hz (JIS) | 960 519 |
| Other voltages/frequencies ²⁾ | upon request |
| Filling with special oil ²⁾ | upon request |
| Accessories | |
| RUVAC adapter (WA/WS 251/501) | 971 448 740 |
| Exhaust filter cartridge AFE SV65/100B ³⁾ | 714 17 300 |
| Spare Parts | |
| Maintenance kit | 971 427 690 |
| Repair kit | 971 427 680 |
| Seal kit FPM (FKM) | 971 427 670 |
| Oil filter ⁴⁾ | 712 13 150 |
| Oil filter bypass | 712 30 570 |

¹⁾ Pumps with European and Japanese motors have G, pumps with US voltages motors have NPT

²⁾ Please indicate when ordering a pump

³⁾ 2 cartridges needed per pump

⁴⁾ Not included in maintenance kit

SOGEVAC SV 120 B



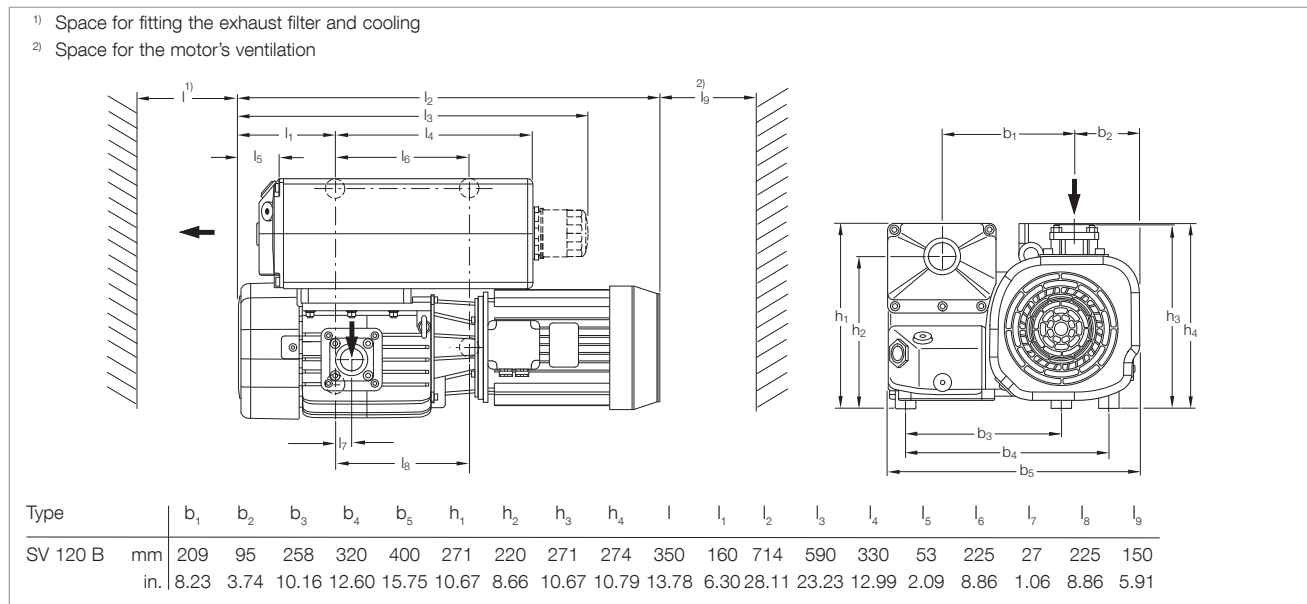
SOGEVAC SV 120 B

Advantages to the User

- Best effective pumping speed in this class
- Good pump temperature due to the cooling coil, ideal for harsh applications. Optimal oil life time thus reached
- Wide range motor as standard
- Optimized integrated lubrication without external pipes
- Integrated oil recovery system and anti suckback valve
- Low noise level

Typical Applications

- Oil purification
- Plastic & rubber injection presses
- Lamination
- ATEX and O₂ applications
- ... and more



Dimensional drawing for the SOGEVAC SV 120 B

Technical Data

SOGEVAC SV 120 B

| | | 50 Hz | 60 Hz |
|--|--|--|--|
| Nominal speed ¹ | m ³ x h ⁻¹ (cfm) | 130 (77) | 147 (86) |
| Pumping speed (according to PNEUROP) ¹ | m ³ x h ⁻¹ (cfm) | 110 (65) | 122 (72) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Ultimate total pressure ¹ with gas ballast ²⁾ | mbar (Torr) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) |
| Water vapor tolerance ¹⁾ with standard gas ballast ²⁾ | mbar (Torr) | 30.0 (22.5) | 30.0 (22.5) |
| Water vapor capacity with standard gas ballast ²⁾ | kg x h ⁻¹ (qt/hr) | 1.60 (1.69) | 1.70 (1.80) |
| Mean noise level (according to DIN 466535) ³⁾ | dB(A) | 61 | 64 |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power 3 ~ (with IEC Euro (NEMA) motor) | kW (hp) | 2.4 (3.3) | 3.2 (4.4) |
| Mains voltage and frequency 3 ~ motor | V | 220-230 and 380-400 V ± 10%, 50 Hz 230 and 400-460 V ± 10%, 60 Hz | 220-230 and 380-400 V ± 10%, 50 Hz 230 and 400-460 V ± 10%, 60 Hz |
| Rated rotational speed | min ⁻¹ (rpm) | 1500 (1500) | 1800 (1800) |
| Type of protection | IP | 55 | 55 |
| Isolation class 3 ~ motor | | F | F |
| Leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻³ | ≤ 1 x 10 ⁻³ |
| Materials (materials in contact with the gas) | | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre |
| Oil capacity | l (qt) | 2.0 (2.1) | 2.0 (2.1) |
| Net weight (with oil filling) | kg (lbs) | 84 (185) | 84 (185) |
| Dimensions (L x W x H) | mm (in.) | 755 x 400 x 290 (29.7 x 15.7 x 11.4) | 755 x 400 x 290 (29.7 x 15.7 x 11.4) |
| Connection (inside thread) ⁴⁾ | | | |
| Intake | G or NPT | 1 1/4" | 1 1/4" |
| Exhaust | G or NPT | 1 1/4" | 1 1/4" |

¹⁾ To DIN 28 400 and following numbers

²⁾ Ordering Information see next page

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

⁴⁾ Pumps with European and Japanese motors have G,
pumps with US (NEMA) motors have NPT

Ordering Information

SOGEVAC SV 120 B

50/60 Hz

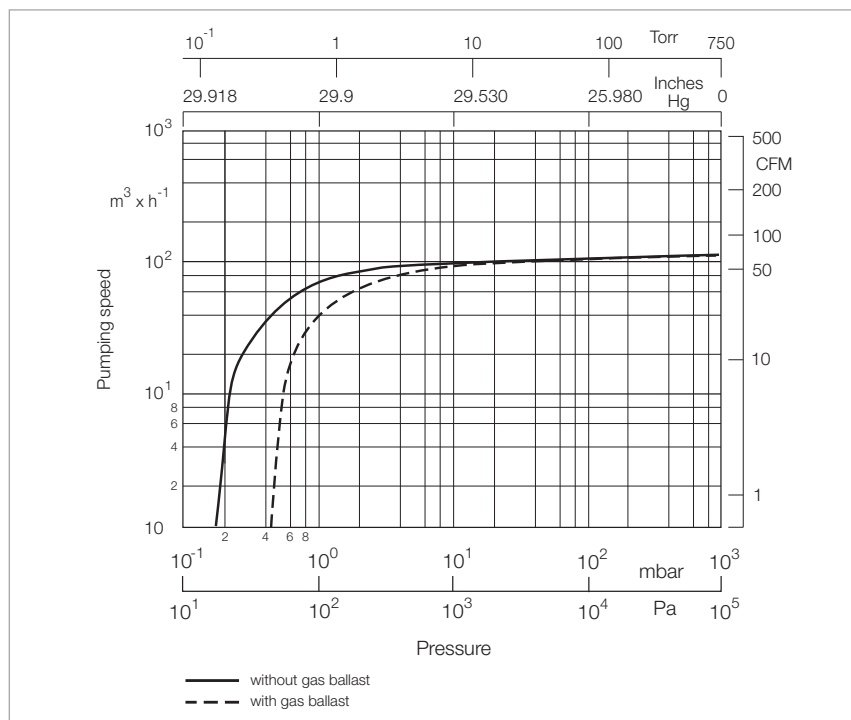
| | Part No. |
|--|--------------------------|
| SOGEVAC SV 120 B ¹⁾ with three-phase motor 230/400 V $\pm 10\%$, 50 Hz and 230/400/460 V $\pm 10\%$, 60 Hz | |
| without gas ballast, without oil filter | 960 550 V (upon request) |
| with small gas ballast, without oil filter | 960 551 |
| without gas ballast, with oil filter | 960 552 V (upon request) |
| with small gas ballast, with oil filter | 960 553 |
| with standard gas ballast, without oil filter | 960 572 |
| with standard gas ballast, with oil filter | 960 557 |
| Other voltages/frequencies ²⁾ | upon request |
| Filling with special oil ²⁾ | upon request |
| Accessories | |
| RUVAC adapter (WA/WS 251/501) | 971 448 740 |
| Exhaust filter cartridge AFE SV65/100B ³⁾ | 714 17 300 |
| Spare Parts | |
| Maintenance kit | 971 427 690 |
| Repair kit | EK 971 445 151 |
| Oil filter ⁴⁾ | 712 13 150 |
| Oil filter bypass | 712 30 570 |

¹⁾ Pumps with European and Japanese motors have G, pumps with US voltages motors have NPT

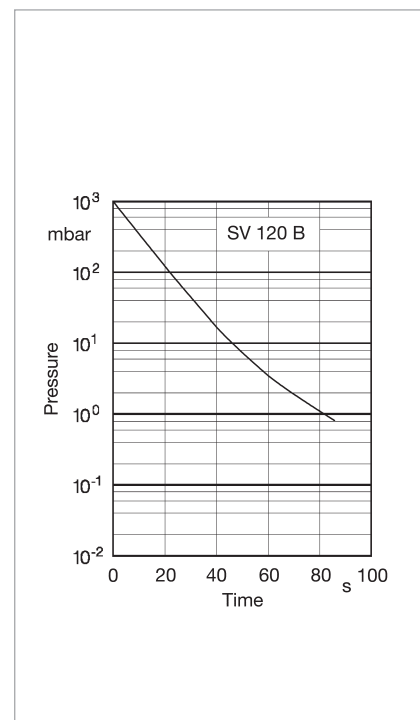
²⁾ Please indicate when ordering a pump

³⁾ 2 cartridges needed per pump

⁴⁾ Not included in maintenance kit



Pumping speed characteristics of the SOGEVAC SV 120 B at 50 Hz
(60 Hz curves at the end of the chapter)



Pump-down characteristics of a 300 l vessel
at 50 Hz

SOGEVAC SV 300 B



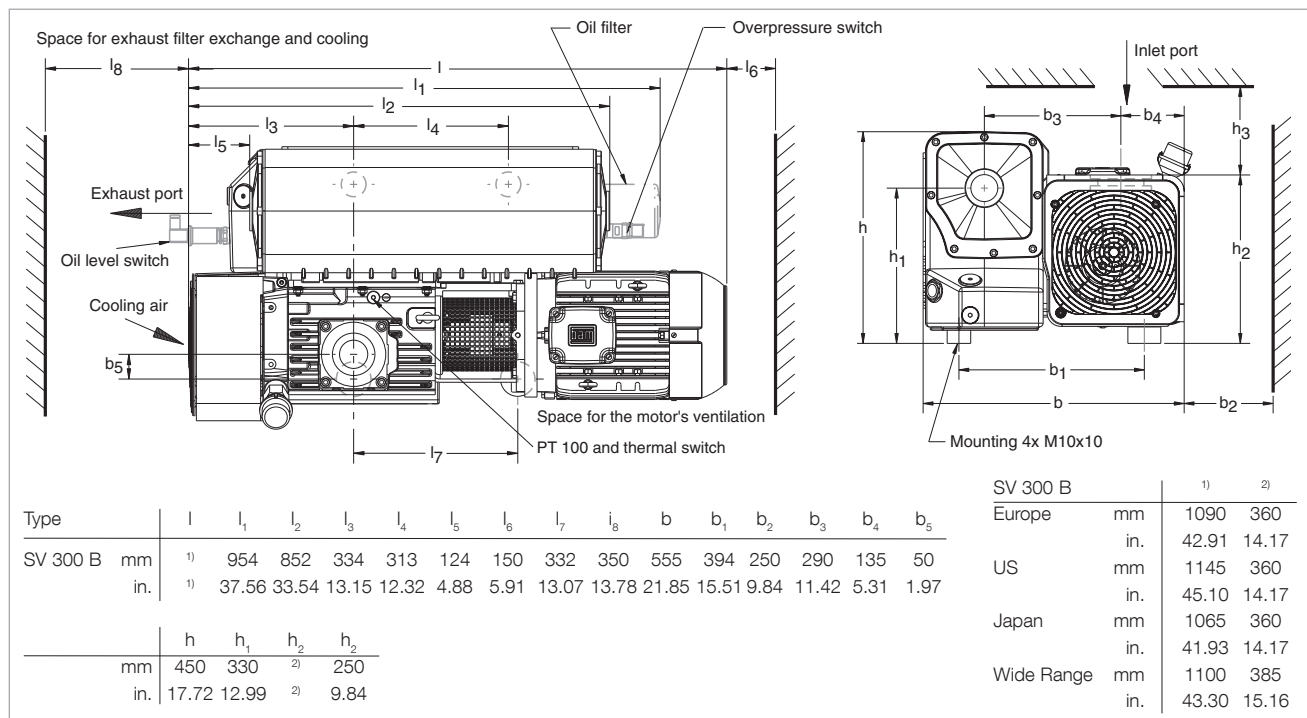
SOGEVAC SV 300 B

Advantages to the User

- Lowest pump temperature on the market: ideal for harsh applications. Optimal oil life time thus reached
- Integrated exhaust filters with low oil mist flow: long filter life time
- Optimized integrated lubrication without external pipes: yellow metal free as standard
- Integrated oil recovery system and anti-suckback valve
- Low noise level
- High reliability due to separate greased ball bearings (30.000 h life)
- Variant concept
- Best ultimate pressure
- Big oil volume for long oil life time

Typical Applications

- Coating systems and load locks
- Oil purification
- Plastic & rubber injection presses
- Heat treatment / Metallurgy
- Lamination
- ATEX and O₂ applications
- ... and more



Dimensional drawing for the SOGEVAC SV 300 B, European version

Technical Data

SOGEVAC SV 300 B

| | | 50 Hz | 60 Hz |
|---|--|---|---|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 280 (165) | 340 (200) |
| Pumping speed (according to PNEUROP) ¹⁾ | m ³ x h ⁻¹ (cfm) | 240 (141) | 290 (171) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 0.08 (≤ 0.06) | ≤ 0.08 (≤ 0.06) |
| Ultimate total pressure with small gas ballast 4 Nm ³ /h ¹⁾ | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Ultimate total pressure with standard gas ballast 7.5 Nm ³ /h also for electromagnetic gas ballast 10 Nm ³ /h ¹⁾ | mbar (Torr) | ≤ 0.7 (≤ 0.5) | ≤ 0.7 (≤ 0.5) |
| Ultimate total pressure with big gas ballast 15 Nm ³ /h ¹⁾ | mbar (Torr) | ≤ 2.0 (≤ 1.5) | ≤ 2.0 (≤ 1.5) |
| Ultimate total pressure with 2 big gas ballasts 28 Nm ³ /h ¹⁾ | mbar (Torr) | ≤ 3.0 (≤ 2.3) | ≤ 3.0 (≤ 2.3) |
| Water vapor tolerance with small ballast 4 Nm ³ /h | mbar (Torr) | 4 (3) with turbine 220 mm | 5 (4) with turbine 220 mm |
| Water vapor capacity with small ballast 4 Nm ³ /h | kg x h ⁻¹ (qt/hr) | 0.4 (0.4) with turbine 220 mm | 0.6 (0.6) with turbine 220 mm |
| Water vapor tolerance with standard gas ballast 7.5 Nm ³ /h also for electromagnetic gas ballast 10 Nm ³ /h ²⁾ | mbar (Torr) | 10.0 (7.5) with turbine 220 mm 40.0 (30.0) with turbine 150 mm ⁶⁾ | 12.0 (9.0) with turbine 220 mm 50.0 (37.5) with turbine 150 mm ⁶⁾ |
| Water vapor capacity with standard gas ballast 7.5 Nm ³ /h also for electromagnetic gas ballast 10 Nm ³ /h | kg x h ⁻¹ (qt/hr) | 1.3 (1.4) with turbine 220 mm 6.0 (6.4) with turbine 150 mm ⁶⁾ | 1.8 (1.9) with turbine 220 mm 8.0 (8.5) with turbine 150 mm ⁶⁾ |
| Water vapor tolerance with big gas ballast 15 Nm ³ /h ²⁾ | mbar (Torr) | 70.0 (52.5) with turbine 150 mm ⁶⁾ | 70.0 (52.5) with turbine 150 mm ⁶⁾ |
| Water vapor capacity with big gas ballast 15 Nm ³ /h ²⁾ | kg x h ⁻¹ (qt/hr) | 11 (12) with turbine 150 mm ⁶⁾ | 14 (15) with turbine 150 mm ⁶⁾ |
| Water vapor tolerance with 2 big gas ballasts 28 Nm ³ /h ²⁾ | mbar (Torr) | 95 (72) with turbine 150 mm ⁶⁾ | 95 (72) with turbine 150 mm ⁶⁾ |
| Water vapor capacity with 2 big gas ballasts 28 Nm ³ /h ²⁾ | kg x h ⁻¹ (qt/hr) | 15 (16) with turbine 150 mm ⁶⁾ | 17 (18) with turbine 150 mm ⁶⁾ |
| Noise level (according to DIN 466535) ³⁾ | dB(A) | 72 | 76 |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power 3 ~ (with IEC Euro motor) ⁴⁾ | kW (hp) | 5.5 (7.5) | 6.3 (8.6) |
| Mains voltage and frequency 3 ~ motor | V | see Ordering Information | see Ordering Information |
| Nominal speed | min ⁻¹ (rpm) | 1500 (1500) | 1800 (1800) |
| Type of protection | IP | 55 | 55 |
| Isolation class 3 ~ motor | | F | F |
| Leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻³ | ≤ 1 x 10 ⁻³ |
| Oil capacity, min. / max. | l (qt) | 8.5 (9.0) / 11.5 (12.2) | 8.5 (9.0) / 11.5 (12.2) |
| Net weight (with oil filling) dependant on the motor | kg (lbs) | 200 (430) | 225 (497) |
| Connections ⁵⁾ | | | |
| Intake, Thread | G or NPT | 2" | 2" |
| Exhaust, Thread | G or NPT | 2" | 2" |

¹⁾ To DIN 28 400 and following numbers

²⁾ Ordering Information see Chapter "Accessories"

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

⁴⁾ Versions with NEMA motor have 10 hp motors

⁵⁾ Pumps with European and Japanese motors have G, pumps with US (NEMA) motors have NPT

⁶⁾ Standard turbine 220 mm. Special turbine 150 mm can be retrofitted

Ordering Information

SOGEVAC SV 300 B

50/60 Hz

| | Part No. |
|---|---------------------------------|
| SOGEVAC SV 300 B ¹⁾ with oil filter with three-phase motor, without gas ballast, 230/400 V \pm 10%, 50 Hz and 460 V \pm 10%, 60 Hz (CEI) ²⁾ | 960 700 |
| with small gas ballast, 230/400 V \pm 10%, 50 Hz and 460 V \pm 10%, 60 Hz (CEI) ²⁾ | 960 701 |
| 208 V \pm 10%, 230/460 V \pm 10%, 60 Hz and 400 V \pm 10%, 50 Hz (NEMA) ²⁾ | 960 706 |
| 200 V + 10% - 15%, 50/60 Hz (JIS) ¹⁾ | 960 711 V |
| with standard gas ballast, 230/400 V \pm 10%, 50 Hz and 460 V \pm 10%, 60 Hz (CEI) ²⁾ | 960 702 |
| 208 V \pm 10%, 230/460 V \pm 10%, 60 Hz and 400 V \pm 10%, 50 Hz (NEMA) ²⁾ | 960 707 |
| 200 V + 10% - 15%, 50/60 Hz (JIS) ¹⁾ | 960 712 |
| with big gas ballast, 230/400 V \pm 10%, 50 Hz and 460 V \pm 10%, 60 Hz (CEI) ²⁾ | 960 703 ³⁾ |
| 208 V \pm 10%, 230/460 V \pm 10%, 60 Hz and 400 V \pm 10%, 50 Hz (NEMA) ²⁾ | 960 708 ³⁾ |
| 200 V + 10% - 15%, 50/60 Hz (JIS) ¹⁾ | 960 713 V ³⁾ |
| with Wide range motor, 200 V - 15% to 230 V + 10% / 380 to 400 V \pm 10%, 50 Hz, CTP; 5.5 kW & 200 V - 15% to 230 V + 10% / 380 to 400 V \pm 10% and 460 V \pm 10%, 60 Hz, CTP; 6.6 kW | |
| with small gas ballast | 960 716 V ⁴⁾ |
| with standard gas ballast | 960 717 ⁴⁾ |
| with big gas ballast | 960 718 ^{3, 4)} |

¹⁾ Pumps with European and Japanese motors have G, pumps with US (NEMA) have NPT

²⁾ IEC motor (Europe) 50/60 Hz have IP 55, NEMA motor have TEFC

³⁾ With small 150 mm turbine

⁴⁾ F and P inlet

Full option oil box with connections (bores and plugs) for

- G 3/8" for external oil filtration

- oil level sensor (vibration)

- thermostatic valve

- temperature sensor Pt100 and switch

Note: Further pump options upon request (for example, water cooled pumps)

Ordering Information

SOGEVAC SV 300 B

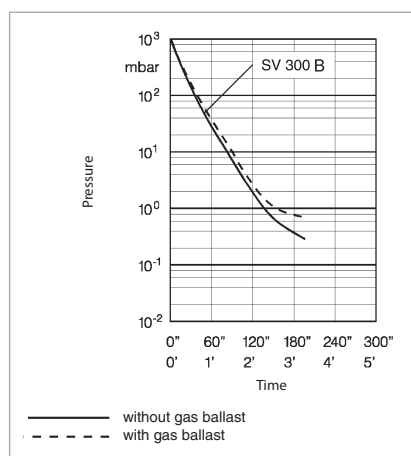
50/60 Hz

| | Part No. |
|--|---|
| Accessories | |
| Adaptor for Roots pump ^{1), 2)} RUVAC 501 (BR 2) RUVAC 1001 (BR 2) | 971 463 880 971 463 890 |
| Mounting pedestal for fitting to a Roots pump | 971 456 590 |
| Oil level monitor ^{1), 3)} (several types are available) | 712 21 992V or 971 458 110 (yellow metal free) |
| Thermal switch (105 °C) ^{2), 3)} | 971 463 930 |
| Pt100 sensor ²⁾ | 971 464 020 |
| Exhaust filter gauge, mechanical ^{1), 2)} | 951 94 |
| Exhaust filter monitoring switch, electric ^{1), 3)} | 712 22 360 |
| Manual gas ballast kit ²⁾ (incl. small, standard and big) | 971 464 130 |
| Gas ballast valve, electromagnetic 24 V DC ^{1), 2)} with end plate without end plate | 971 465 380 971 465 680 |
| Two gas ballast valves ¹⁾ | upon request |
| Water cooling with thermostatic valve only with all option oil casing ³⁾ | EK 971 449 111 |
| Oil filter bypass ^{1), 2)} | 712 30 570 |
| Spare Parts | |
| Oil filter | 710 18 850 |
| Exhaust filter cartridge (3x required) AFE SV 300 B - SV 750 B | 971 431 120 |
| Vanes (set of 3 pieces) | 971 446 880 |
| Set of gaskets FPM (FKM) (standard) | 971 464 950 |
| Repair kit | 971 464 960 |
| Maintenance kit | 971 464 970 |
| Generator kit G 2" NPT 2" | 971 447 390 971 458 970 |
| Turbine 150 mm kit ^{2), 3)} | EK 650 3 195 |

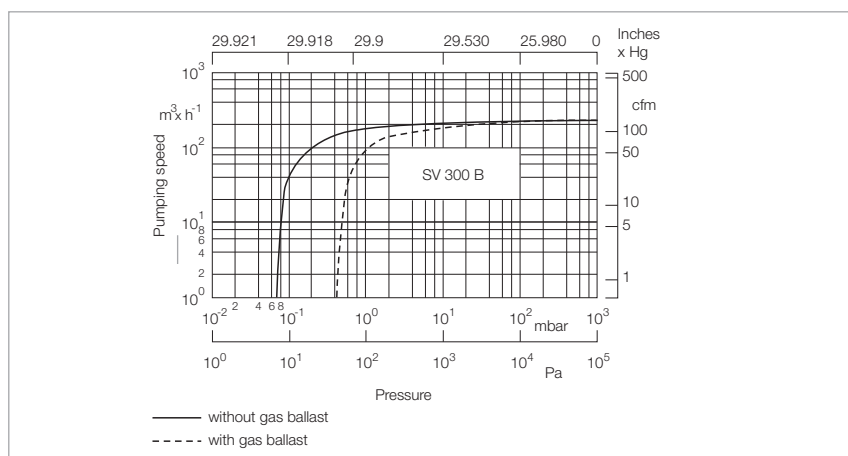
¹⁾ Please indicate when ordering a pump

²⁾ Can be retrofitted

³⁾ Can be retrofitted by OLV Service



Pump-down characteristics of a 1000 l vessel at 50 Hz



Pumping speed characteristics of the SOGEVAC SV 300 B at 50 Hz (60 Hz curves at the end of the chapter)

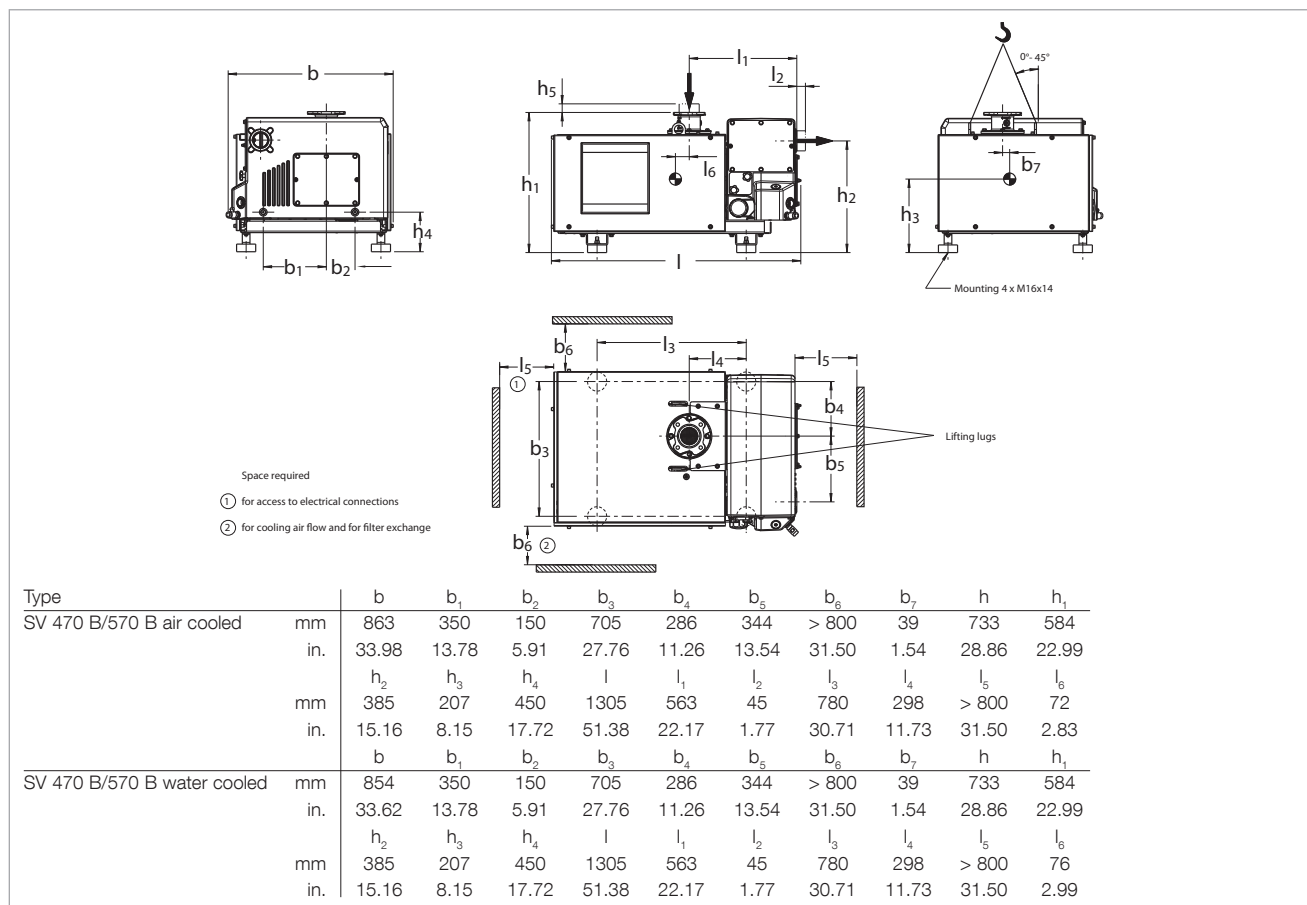
SOGEVAC SV 470 B(F) and SV 570 B(F)



SOGEVAC SV 470 B and 570 B

Advantages to the User

- Very low rotational speed increases the lifetime of the pump and leads to noise level reduction
- Extremely low noise level in any working conditions
- Reduced number of oil pipes
- Reduced operational costs
- Long lifetime of oil and exhaust filters
- Simplified maintenance thanks to an easy access to all key components
- Small size
- Air or water-cooling and many motors and options available
- Competitive price-to-performance ratio
- Adaptors for direct mounting of Roots pumps (RUVAC WH 700 to 2500)
- ATTEX IIC T3 Cat. 3 version internal/external possible
- PFPE versions available



Dimensional drawing for the SOGEVAC SV 470 B and 570 B

Technical Data

SOGEVAC SV 470 B(F)

SOGEVAC SV 570 B(F)

| | | | 50 Hz | 60 Hz | 50 Hz |
|---|--|----------|--|--|--|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | | 470 (277) | 570 (366) | 570 (366) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | | 400 (236) | 470 (277) | 470 (277) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | | 0.08 (0.06) | 0.08 (0.06) | 0.08 (0.06) |
| Ultimate total pressure with | | | | | |
| 1 gas ballast ¹⁾ | mbar (Torr) | | 0.7 (0.5) | 0.7 (0.5) | 0.7 (0.5) |
| 2 gas ballast valves ¹⁾ | mbar (Torr) | | 2.0 (1.5) | 2.0 (1.5) | 2.0 (1.5) |
| Water vapor tolerance | | | | | |
| 1 gas ballast ^{1), 2)} | mbar (Torr) | | 15.0 (11.0) | 20.0 (15.0) | 20.0 (15.0) |
| 2 gas ballast valves ^{1), 2)} | mbar (Torr) | | 40.0 (30.0) | 50.0 (38.0) | 20.0 (15.0) |
| Max. perm. water vapor capacity | | | | | |
| 1 gas ballast ^{1), 2)} | kg x h ⁻¹ (qt/hr) | | 5.0 (5.3) | 7.5 (8.0) | 7.5 (8.0) |
| 2 gas ballast valves ^{1), 2)} | kg x h ⁻¹ (qt/hr) | | 13.0 (14.0) | 17.0 (18.0) | 17.0 (14.0) |
| Oil filling, min. / max. | l (qt) | | 20 / 21 | 20 / 21 | 20 / 21 |
| Noise level (averaged) ³⁾ | dB(A) | | 72 | 75 (72 for BF pumps) | 75 (72 for BF pumps) |
| Admissible ambient temperature | °C (°F) | | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Nominal motor speed | min ⁻¹ (rpm) | | 820 (820) | 1000 (1000) | 1000 (1000) |
| Type of protection / Isolation | IP / - | | 54 / F | 54 / F | 54 / F |
| Cooling | | | Air (Water at BF variants) | Air (Water at BF variants) | Air (Water at BF variants) |
| Temperature protection | | | | | |
| Pump | | | yes | yes | yes |
| Motor PTC | | | yes | yes | yes |
| Water quality | TH | | (4 to 8 at BF variants) | (4 to 8 at BF variants) | (4 to 8 at BF variants) |
| Water pressure, min. / max. | bar (psig) | | (2 / 8 at BF variants) | (2 / 8 at BF variants) | (2 / 8 at BF variants) |
| Materials (materials in contact with the gas) | | | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre |
| Dimensions (L x W x H) | mm (in.) | | 1305 x 863 x 733 ⁴⁾ (51.38 x 33.98 x 28.86) | 1305 x 863 x 733 ⁴⁾ (51.38 x 33.98 x 28.86) | 1305 x 863 x 733 ⁴⁾ (51.38 x 33.98 x 28.86) |
| Connection | | | | | |
| Intake side | Europe / US | G or NPT | 3" | 3" | 3" |
| Pressure side | Europe / US | G or NPT | 3" | 3" | 3" |

¹⁾ To DIN 28 400 and following numbers, with standard gas ballast

²⁾ Please ask Oerlikon Leybold Vacuum for more information about water cooled pumps

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

⁴⁾ With G 3" flanges. NPT 3" flanges add. 45 mm (1.8 in.) on pump length and height

Additional Technical Data

Air Cooling

SOGEVAC SV 470 B(F)

50 Hz

60 Hz

SOGEVAC SV 570 B(F)

50 Hz

60 Hz

| | | | | | |
|--|------------------------------|-------------|-------------|-------------|-------------|
| Water vapor tolerance with | | | | | |
| 1 gas ballast ^{1), 2)} | mbar (Torr) | 15 (11) | 20 (15) | 20 (15) | 20 (15) |
| 2 gas ballast valves ^{1), 2)} | mbar (Torr) | 40 (30) | 50 (37.5) | 70 (52.5) | 50 (37.5) |
| Max. perm. water vapor capacity with | | | | | |
| 1 gas ballast ^{1), 2)} | kg x h ⁻¹ (qt/hr) | 5.0 (5.3) | 7.5 (8.0) | 7.5 (8.0) | 7.5 (8.0) |
| 2 gas ballast valves ^{1), 2)} | kg x h ⁻¹ (qt/hr) | 13.0 (13.8) | 17.0 (18.0) | 20.0 (21.2) | 17.0 (14.0) |
| Mean noise level ³⁾ | dB(A) | 72 | 75 | 75 | 75 |

¹⁾ To DIN 28 400 and following numbers, with standard gas ballast

²⁾ Please ask Oerlikon Leybold Vacuum for more information

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

Additional Technical Data

Water Cooling

SOGEVAC SV 470 B(F)

50 Hz

60 Hz

SOGEVAC SV 570 B(F)

50 Hz

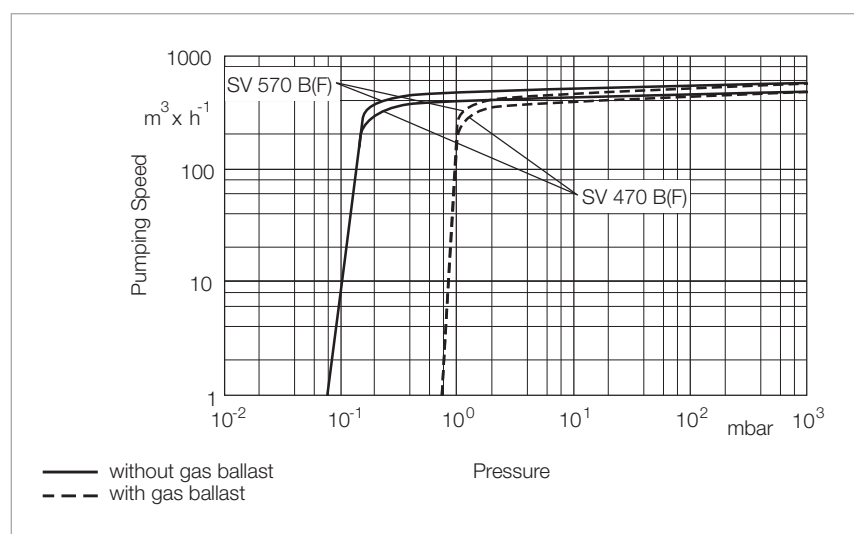
60 Hz

| | | | | | |
|--|------------------------------|------------------|------------------|------------------|------------------|
| Water vapor tolerance with | | | | | |
| 1 gas ballast ^{1), 2)} | mbar (Torr) | 15 (11) | 20 (15) | 20 (15) | 20 (15) |
| 2 gas ballast valves ^{1), 2)} | mbar (Torr) | 35 (26) | 40 (30) | 40 (30) | 40 (30) |
| Max. perm. water vapor capacity with | | | | | |
| 1 gas ballast ^{1), 2)} | kg x h ⁻¹ (qt/hr) | 5.0 (5.3) | 7.5 (8.0) | 7.5 (8.0) | 7.5 (8.0) |
| 2 gas ballast valves ^{1), 2)} | kg x h ⁻¹ (qt/hr) | 11.0 (11.7) | 13.0 (13.8) | 13.0 (13.8) | 13.0 (13.8) |
| Mean noise level ³⁾ | dB(A) | 72 | 72 | 72 | 72 |
| Thermostatic valve | | Pos 3 | Pos 3 | Pos 3 | Pos 3 |
| Water quality | TH (°F) | 4-8 | 4-8 | 4-8 | 4-8 |
| Water pressure, min. / max. | bar (psi) | 2 / 8 (29 / 114) | 2 / 8 (29 / 114) | 2 / 8 (29 / 114) | 2 / 8 (29 / 114) |
| Min. water flow for 10 °C (50 °F) water warming | l/h | 700 | 800 | 800 | 800 |

¹⁾ To DIN 28 400 and following numbers, with standard gas ballast

²⁾ Please ask Oerlikon Leybold Vacuum for more information

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)



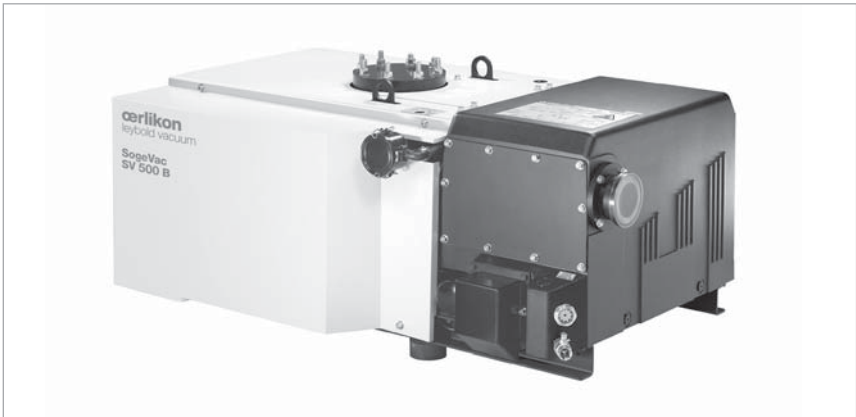
Pumping speed characteristics of the SOGEVAC SV 470 B(F) and 570 B(F) at 50 Hz operation
(60 Hz curves at the end of the chapter)

Ordering Information

SOGEVAC

| | SV 470 B | SV 470 BF | SV 570 B | SV 570 BF |
|---|--------------|--------------|--------------|--------------|
| | Part No. | Part No. | Part No. | Part No. |
| SOGEVAC SV ... B | | | | |
| Three-phase Europe motor 230 V / 400 V, 50 Hz and 460 V, 60 Hz | 960 753V | 960 757V | – | – |
| Three-phase USA motor 230 V / 460 V, 60 Hz and 400 V, 50 Hz UL/CSA with terminal board | – | – | 960 765V | 960 767V |
| Three-phase world motor 230 V / 400 V, 50 + 60 Hz / 460 V, 60 Hz | 960 754V | 960 758V | 960 766V | 960 768V |
| NEMA Premium-Version 400 V ±10%, 50 Hz, 15 hp / 200-230 V ±10%, 60 Hz; 460 V ±10%, 60 Hz, 15 hp with terminal board | – | – | 960 755V | 960 759V |
| Accessories | | | | |
| Adapter for Roots pump | | | | |
| RUVAC 700 | 9516 241V | 9516 241V | 9516 241V | 9516 241V |
| RUVAC 1001 | 9516 242V | 9516 242V | 9516 242V | 9516 242V |
| RUVAC 2001 | 9516 243V | 9516 243V | 9516 243V | 9516 243V |
| RUVAC WHU 2500 | 9516 244V | 9516 244V | 9516 244V | 9516 244V |
| Oil drain valve | Standard | Standard | Standard | Standard |
| EM gas ballast kit, 24 V DC | 971 438 170 | 971 438 170 | 971 438 170 | 971 438 170 |
| Gas ballast standard | | | | |
| manual | 9516 232V | 9516 232V | 9516 232V | 9516 232V |
| permanent | 9516 233V | 9516 233V | 9516 233V | 9516 233V |
| 2nd gas ballast valve | | | | |
| EM, 24 V DC | 9516 234V | 9516 234V | 9516 234V | 9516 234V |
| manual | 9516 235V | 9516 235V | 9516 235V | 9516 235V |
| Exhaust filter monitoring gauge | 951 94 | 951 94 | 951 94 | 951 94 |
| Oil level check | 9516 252V | 9516 252V | 9516 252V | 9516 252V |
| Temperature switch | Standard | Standard | Standard | Standard |
| Water cooling with thermostatic valve | Upon request | Upon request | Upon request | Upon request |
| Exhaust filter overpressure switch | 712 22 360 | 712 22 360 | 712 22 360 | 712 22 360 |
| Oil filter bypass | 712 36 390 | 712 36 390 | 712 36 390 | 712 36 390 |
| Spare Parts | | | | |
| Oil filter, standard | 714 05 310 | 714 05 310 | 714 05 310 | 714 05 310 |
| Exhaust filter AFE SV630/SV750B/SV300B (5 pieces are required) | 971 431 120 | 971 431 120 | 971 431 120 | 971 431 120 |
| Intake filter element | | | | |
| Paper | 710 35 242 | 710 35 242 | 710 35 242 | 710 35 242 |
| Metal | E 710 37 734 | E 710 37 734 | E 710 37 734 | E 710 37 734 |
| Activated charcoal | 710 37 724 | 710 37 724 | 710 37 724 | 710 37 724 |
| Polyester | 712 61 508 | 712 61 508 | 712 61 508 | 712 61 508 |
| Seal kit FPM (FKM) | EK971474010 | EK971474010 | EK971474010 | EK971474010 |
| Repair kit, complete | EK971474020 | EK971474020 | EK971474020 | EK971474020 |
| Generator kit | EK6700666 | EK6700666 | EK6700666 | EK6700666 |
| Maintenance kit | EK971474000 | EK971474000 | EK971474000 | EK971474000 |

SOGEVAC SV 500 B



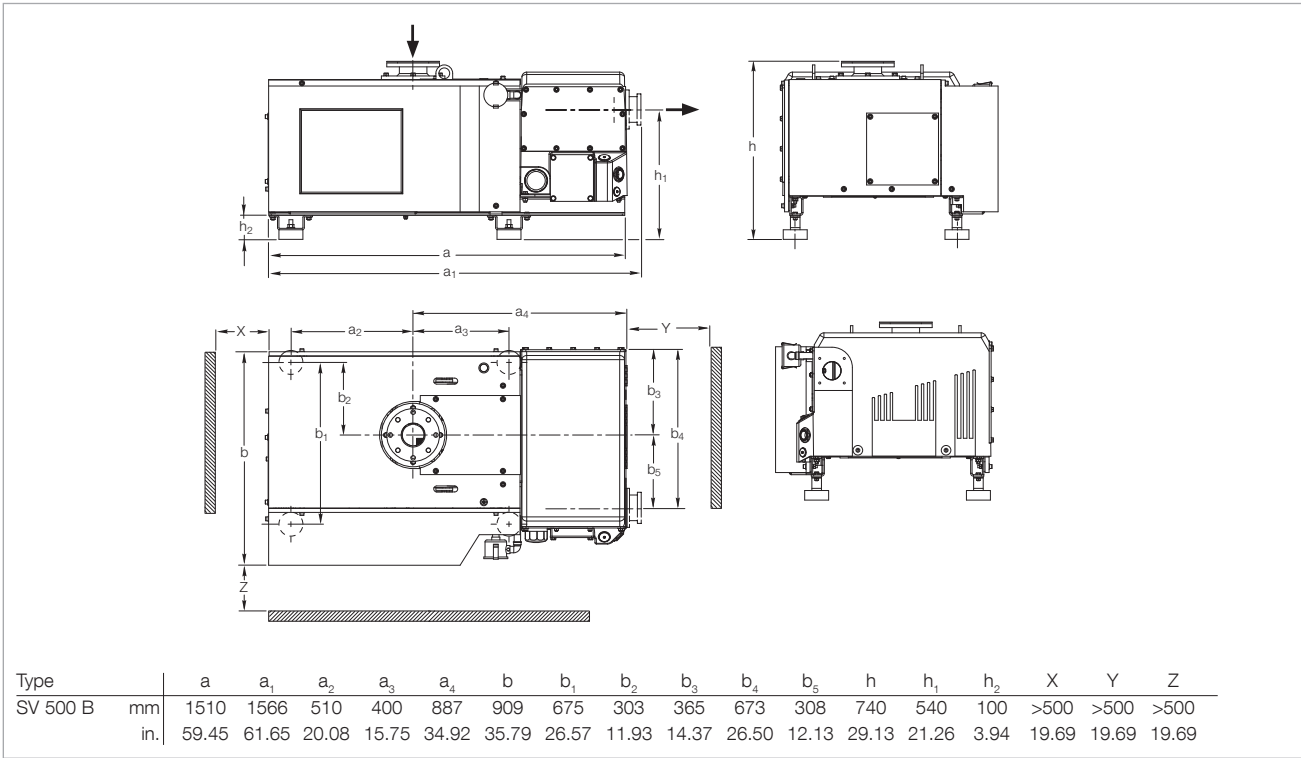
SOGEVAC SV 500 B

Advantages to the User

- Low pump temperature: ideal for harsh applications. Optimal oil life time thus reached
- Low generator rotational speed
- Integrated exhaust filters with low oil mist flow: long filter life time
- Optimized integrated lubrication without external pipes: yellow metal free as standard
- Integrated oil recovery system and anti-suckback valve
- Low noise level
- High reliability due to separate greased ball bearings (30.000 h life)
- Best ultimate pressure
- Big oil volume for long oil life time

Typical Applications

- Heat treatment / Metallurgy
- ATEX applications
- ... and more



Dimensional drawing for the SOGEVAC SV 500 B

Technical Data

SOGEVAC SV 500 B

| | | 50 Hz | 60 Hz |
|---|--|----------------------------|----------------------------|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 570 (336) | 570 (336) ³⁾ |
| Pumping speed (according to PNEUROP) ¹⁾ | m ³ x h ⁻¹ (cfm) | 520 (306) | 520 (306) ³⁾ |
| Ultimate total pressure ¹⁾ without gas ballast | mbar (Torr) | ≤ 0.08 (≤ 0.06) | ≤ 0.08 (≤ 0.06) |
| Ultimate total pressure with 1 gas ballast | mbar (Torr) | ≤ 0.7 (≤ 0.5) | ≤ 0.7 (≤ 0.5) |
| Water vapor tolerance with 1 gas ballast | mbar (Torr) | 40.0 (30.0) | 40.0 (30.0) |
| Water vapor capacity with 1 gas ballast | kg x h ⁻¹ (qt/hr) | 13.0 (14.0) | 13.0 (14.0) |
| Noise level (according to DIN 466535) ²⁾ | | | |
| Air | dB(A) | 70 | 70 |
| water | dB(A) | 68 | 68 |
| Motor power 3-ph. (with IEC Euro motor) | kW (hp) | see Ordering Information | see Ordering Information |
| Mains voltage and mains frequency for 3-ph. motor | V | see Ordering Information | see Ordering Information |
| Nominal speed | min ⁻¹ (rpm) | 630 | 630 |
| Type of protection | IP | 54 | 54 |
| Isolations class 3-ph. motor | | F | F |
| Leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻³ | ≤ 1 x 10 ⁻³ |
| Oil capacity, min. / max. | l (qt) | 20 (21) / 23 (24) | 20 (21) / 23 (24) |
| Weight, net. (with oil filling) depending on the type of motor | kg (lbs) | 680 (1501) | 730 (1611) |
| Cooling | | Air (water ⁴⁾) | Air (water ⁴⁾) |
| Connections | | | |
| Intake | DN | see Ordering Information | see Ordering Information |
| Exhaust | DN | see Ordering Information | see Ordering Information |
| Gas ballast | Number / base type | 1 + (1 option) / manual | 1 + (1 option) / manual |

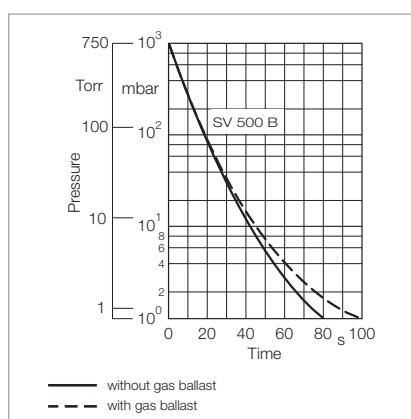
¹⁾ To DIN 28 400 and following numbers

²⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

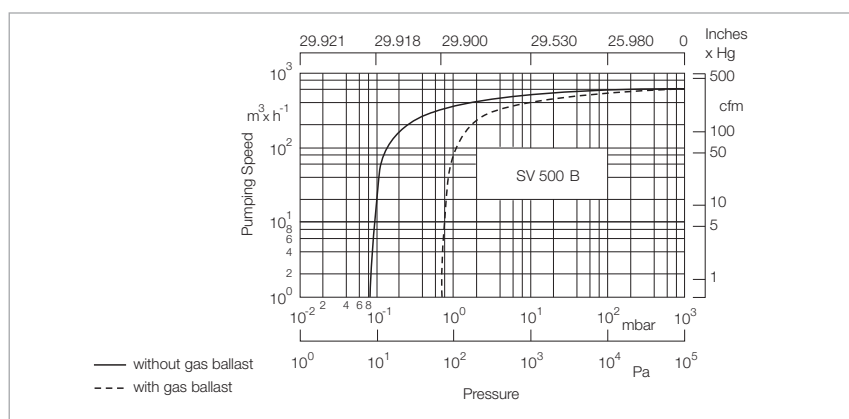
³⁾ Valid NEMA variants. Values for Japan (JIS motors) upon request

⁴⁾ Option

Note: Further pump options upon request (for example, water cooled pumps)



Pump-down characteristics of a 1000 l vessel at 50 Hz



Pumping speed characteristics of the SOGEVAC SV 500 B at 50 Hz
(60 Hz curves at the end of the chapter)

Ordering Information

SOGEVAC SV 500 B

50/60 Hz

| | Part No. |
|--|---------------------|
| SOGEVAC SV 500 B ¹⁾ air cooled, without oil filter, with thermal switch (pump) with 3 phase motor (Japan), JIS motor with PTC sensors 200 V + 10% - 15%, 50/60 Hz, 15 kW Inlet: DN 100 PN / DN 100 ISO-K Exhaust: DN 100 ISO-K | 960 852 V |
| with 3 phase motor (Europe), IEC motor with PTC sensors 380 V ± 5% / 400 V ± 10% / 690 V ± 10%/ 415 V ± 5%, 50 Hz, 11 kW 50 Hz operation only Inlet: DN 100 PN / DN 100 ISO-K Exhaust: DN 100 ISO-K | 960 853 V |
| with 3 phase motor (US), NEMA motor with PTC sensors 400 V ± 10%, 50 Hz, 15 hp / 230 V ± 10% / 460 V ± 10%, 60 Hz, 15 hp Inlet: 4" ASA 150 / DN 100 ISO-K Exhaust: 4" ASA 150 / DN 100 ISO-K | 960 855 V |
| water cooled, without oil filter, with thermal switch (pump) with 3 phase motor (Japan), JIS motor with PTC sensors 200 V + 10% - 15%, 50/60 Hz, 15 kW Inlet: DN 100 PN / DN 100 ISO-K Exhaust: DN 100 ISO-K | 960 856 V |
| with 3 phase motor (Europe), IEC motor with PTC sensors 380 V ± 5% / 400 V ± 10% / 690 V ± 10%/ 415 V ± 5%, 50 Hz, 11 kW 50 Hz operation only Inlet: DN 100 PN / DN 100 ISO-K Exhaust: DN 100 ISO-K | 960 857 V |
| with 3 phase motor (US), NEMA motor with PTC sensors 400 V ± 10%, 50 Hz, 15 hp / 230 V ± 10% / 460 V ± 10%, 60 Hz, 15 hp Inlet: 4" ASA 150 / DN 100 ISO-K Exhaust: 4" ASA 150 / DN 100 ISO-K | 960 859 V |
| Other voltages/frequencies ²⁾ | upon request |
| Filling with special oil ²⁾ | upon request |

¹⁾ Junction box with six terminals for star/delta circuit

²⁾ Please indicate when ordering a pump

Note: Further pump options upon request (for example, water cooled pumps)

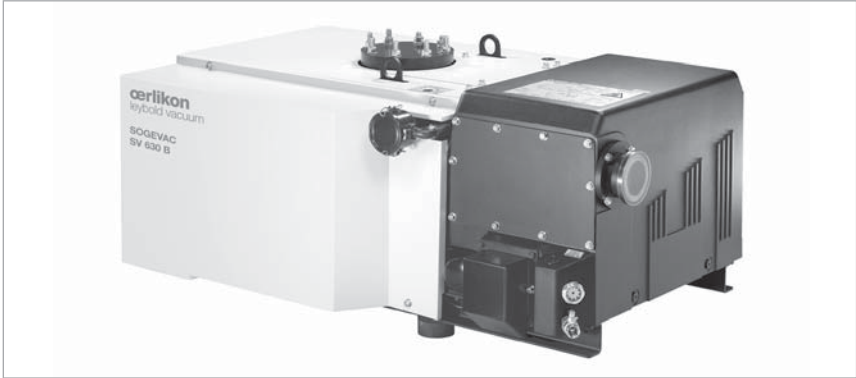
Ordering Information

SOGEVAC SV 500 B

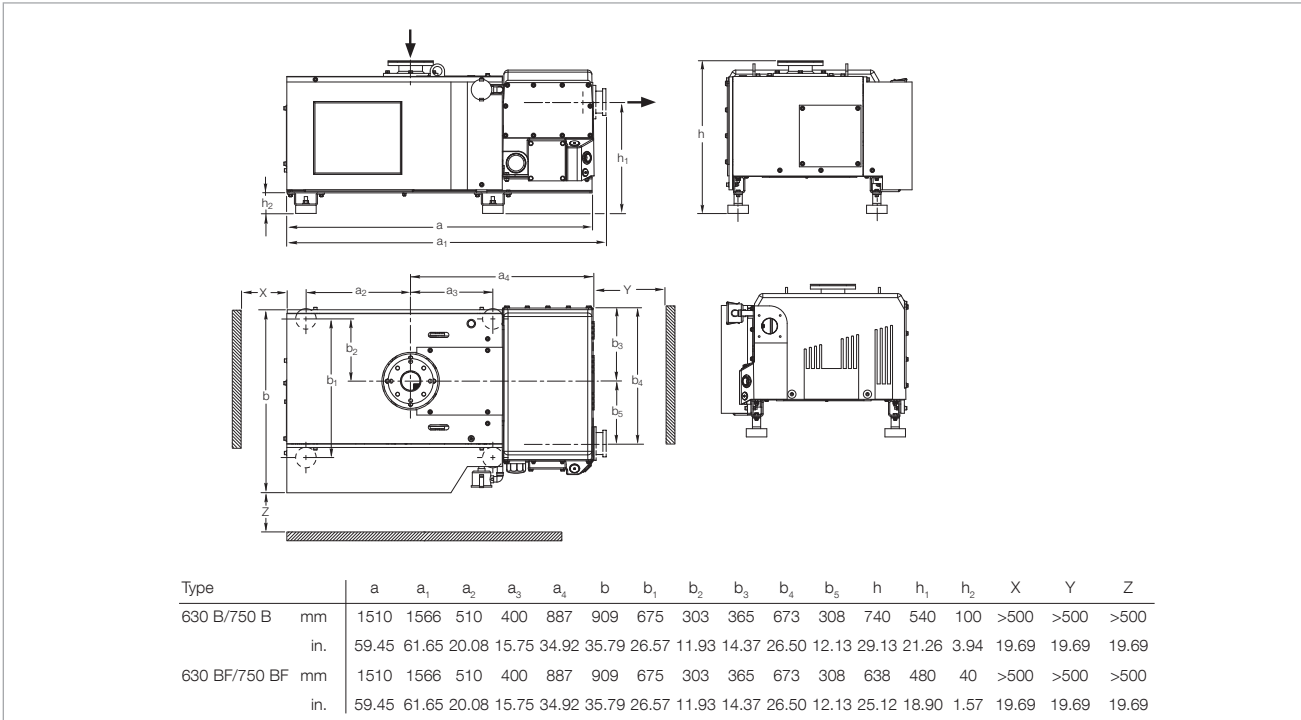
50/60 Hz

| | Part No. |
|--|---------------------|
| Accessories | |
| Adapter for Roots pump | |
| RUVAC 1001 | 971 432 340 |
| RUVAC 2001 | 971 432 350 |
| Oil drain valve | 711 30 114 |
| Gas ballast kit electromagnetic, 24 V DC | 971 438 170 |
| Gas ballast, standard manual | 971 446 490 |
| 2nd gas ballast valve electromagnetic, 24 V DC | 971 438 160 |
| manual | 971 438 340 |
| Exhaust filter monitoring gauge | 951 94 |
| Oil level check | 971 425 760 |
| Temperature switch | standard |
| Water cooling with thermostatic valve | upon request |
| Intake kit DN 100 ISO-K | standard |
| Exhaust filter overpressure switch | 712 22 360 |
| Oil filter bypass | 712 36 390 |
| Spare Parts | |
| Oil filter, standard | 714 05 310 |
| Exhaust filter AFE SV630/SV750B/SV300B (6 are required) | 971 431 120 |
| Intake filter element | |
| Paper | 710 35 242 |
| Metal | E 710 37 734 |
| Activated charcoal | 710 37 724 |
| Polyester | 712 61 508 |
| Seal kit FPM (FKM) | 971 437 310 |
| Repair kit, complete | 971 437 320 |
| Generator kit | 971 437 330 |
| Maintenance kit | 971 437 340 |

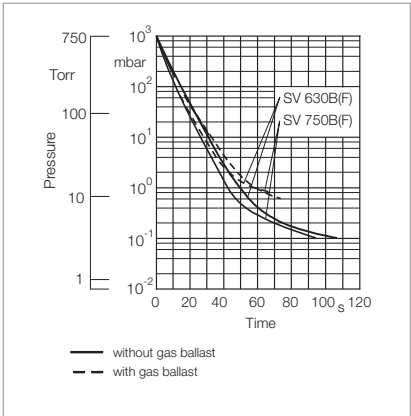
SOGEVAC SV 630 B/630 BF/750 B/750 BF



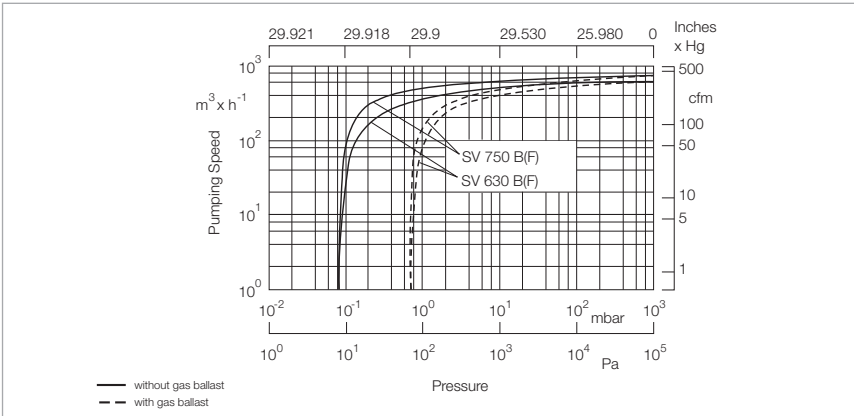
SOGEVAC SV 630 B



Dimensional drawing for the SOGEVAC SV 630 B, SV 630 BF, 750 B and 750 BF



Pumpdown curve for a 1000 l vessel for 50 Hz pump operation



Pumping speed characteristics of the SOGEVAC SV 630 B(F) and 750 B(F) (60 Hz curves at the end of the chapter)

Technical Data

SOGEVAC SV 630 B

SOGEVAC SV 630 BF

SOGEVAC
SV 750 B/BF

| | | | 50 Hz | 60 Hz | 50 Hz | 60 Hz | 50 Hz |
|---|--|----|--|--|--|--|--|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | | 700 (412.0) | 840 (494.4) | 700 (412.0) | 840 (494.4) | 840 (494.4) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | | 640 (376.7) | 755 (444.4) | 640 (376.7) | 755 (444.4) | 755 (444.4) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | | < 8 x 10 ⁻² (< 6 x 10 ⁻²) | < 8 x 10 ⁻² (< 6 x 10 ⁻²) | < 8 x 10 ⁻² (< 6 x 10 ⁻²) | < 8 x 10 ⁻² (< 6 x 10 ⁻²) | < 8 x 10 ⁻² (< 6 x 10 ⁻²) |
| Ultimate total pressure with one gas ballast valve ¹⁾ | mbar (Torr) | | ≤ 0.7 (≤ 0.5) | ≤ 0.7 (≤ 0.5) | ≤ 0.7 (≤ 0.5) | ≤ 0.7 (≤ 0.5) | ≤ 0.7 (≤ 0.5) |
| Ultimate total pressure with two gas ballast valves ¹⁾ | mbar (Torr) | | ≤ 2 (≤ 1.5) | ≤ 2 (≤ 1.5) | ≤ 2 (≤ 1.5) | ≤ 2 (≤ 1.5) | ≤ 2 (≤ 1.5) |
| Water vapor tolerance with 1 gas ballast ^{1), 2)} | mbar (Torr) | | 40.0 (30.0) | 50.0 (37.5) | 25.0 (18.8) | 30.0 (22.5) | 50.0 (37.5) |
| with 2 gas ballast valves ^{1), 2)} | mbar (Torr) | | 60.0 (45.0) | 70.0 (52.5) | 35.0 (26.3) | 40.0 (30.0) | 70.0 (52.5) |
| Max. perm. water vapor capacity with 1 gas ballast ^{1), 2)} | kg x h ⁻¹ (qt/hr) | | 17.0 (18.0) | 24.0 (25.4) | 11.0 (11.6) | 14.0 (14.8) | 24.0 (25.4) |
| with 2 gas ballast valves ^{1), 2)} | kg x h ⁻¹ (qt/hr) | | 26.0 (27.5) | 34.0 (35.9) | 15.0 (15.9) | 19.0 (20.1) | 34.0 (35.9) |
| Controlled anti-suck back valve 24 V DC | | | – | – | yes | yes | – |
| Oil filling min. / max. | l | | 20 / 23 | 20 / 23 | 20 / 23 | 20 / 23 | 20 / 23 |
| Noise level (averaged) ³⁾ | dB(A) | | 72 | 75 | 72 | 75 | 75 |
| Admissible ambient temperature | °C (°F) | | 12 - 40 (54 -104) | 12 - 40 (54 -104) | 12 - 40 (54 -104) | 12 - 40 (54 -104) | 12 - 40 (54 -104) |
| Motor power | kW (hp) | | 15.0 (20.2) | 18.5 (25.0) | 15.0 (20.2) | 18.5 (25.0) | 18.5 (–) |
| Nominal speed pump | min ⁻¹ (rpm) | | 820 (820) | 1000 (1000) | 820 (820) | 1000 (1000) | 1000 (1000) |
| Type of protection / Isolation | IP / - | | 54 / F | 54 / F | 54 / F | 54 / F | 54 / F |
| Cooling | | | air | air | water | water | air / water |
| Thermostatic valve | | | no | no | yes | yes | no / yes |
| Temperature protection Pump | | | no | no | yes | yes | no / yes |
| Motor PTC | | | no | no | yes | yes | no / yes |
| Water quality | TH | | – | – | 4 to 8 | 4 to 8 | – |
| Water pressure, min. / max. | bar (psig) | | – | – | 2/8 (29/114) | 2/8 (29/114) | – |
| Materials (materials in contact with the gas) | | | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre |
| Net weight (with oil filling) | kg (lbs) | | 730 (1611) | 760 (1678) | 730 (1611) | 760 (1678) | 750 (1656) |
| Dimensions (L x W x H) | mm (in.) | | 1510 x 909 x 740 (59.45 x 35.79 x 29.13) | 1510 x 909 x 740 (59.45 x 35.79 x 29.13) | 1566 x 638 x 909 (61.65 x 25.12 x 35.79) | 1566 x 638 x 909 (61.65 x 25.12 x 35.79) | 1510 x 909 x 740 (59.45 x 35.79 x 29.13) |
| Connection Intake | EUROPE / US | DN | DN 100 PN 10 / DN 100 ISO-K Option | DN 100 PN 10 / DN 100 ISO-K Option | DIN 160 Roots adapter 100 ISO-K | DIN 160 Roots adapter 100 ISO-K | DN 100 PN 10 / DN 100 ISO-K Option |
| Exhaust | EUROPE / US | DN | | | | | |

¹⁾ To DIN 28 400 and following numbers, with standard gas ballast²⁾ Please ask Oerlikon Leybold Vacuum for more information³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

Ordering Information

| | SV 630 B 50/60 Hz | SOGEVAC SV 630 BF 50/60 Hz | SV 750 B/BF 50 Hz |
|--|------------------------------|---|------------------------------|
| | Part No. | Part No. | Part No. |
| SOGEVAC SV 630 B | | | |
| with three-phase motor | | | |
| 400 V, 50 Hz (NEMA) and 230/460 V, 60 Hz | 960 865 | - | - |
| 380/400/415/690 V, 50 Hz and 440/460 V, 60 Hz | 960 863 | - | - |
| 200 V, 50 Hz (JIS) and 200 V, 60 Hz | 960 862 | - | - |
| SOGEVAC SV 630 BF | | | |
| with three-phase motor | | | |
| 400 V, 50 Hz (NEMA) and 230/460 V, 60 Hz | - | 960 869 | - |
| 380/400/415/690 V, 50 Hz and 440/460 V, 60 Hz | - | 960 867 | - |
| 200 V, 50 Hz (JIS) and 200 V, 60 Hz | - | 960 866 | - |
| SOGEVAC SV 750 B | | | |
| with three-phase motor | | | |
| 380/400/415/690 V, 50 Hz | - | - | 960 875 |
| SOGEVAC SV 750 BF | | | |
| with three-phase motor | | | |
| 380/400/415/690 V, 50 Hz | - | - | 960 877 |
| Other voltages/frequencies | upon request | upon request | upon request |
| Filling with special oil | upon request | upon request | upon request |

Ordering Information**SV 630 B
50/60 Hz****SOGEVAC
SV 630 BF
50/60 Hz****SV 750 B/BF
50 Hz**

| | Part No. | Part No. | Part No. |
|--|--|--|--|
| Accessories | | | |
| Adapter for Roots pump RUVAC 1000 RUVAC 2000 RUVAC WH4400 | 971 432 340 971 432 350 971 43 WH4400 | 971 432 340 standard 971 43 WH4400 | 971 432 340 971 432 350 971 43 WH4400 |
| Oil drain valve | 711 30 114 | standard | 711 30 114 |
| Gas ballast kit electromagnetic, 24 V DC | 971 438 170 | standard | 971 438 170 |
| Gas ballast, standard manual | standard | 971 446 490 | 971 446 490 |
| 2nd gas ballast valve electromagnetic, 24 V DC manual | - 971 438 340 | 971 438 160 - | - 971 438 340 |
| Exhaust filter monitoring gauge | 951 94 | 951 94 | 951 94 |
| Oil level check | 971 425 760 | 971 425 760 | 425 760 |
| Temperature switch | standard | standard | standard |
| Water cooling with thermostatic valve | upon request | standard | upon request |
| Intake kit DN 100 ISO-K | standard | 971 430 550 | standard |
| Exhaust filter overpressure switch | 712 22 360 | 712 22 360 | 712 22 360 |
| Oil filter bypass | 712 36 390 | 712 36 390 | 712 36 390 |
| Exhaust kit DN 100 PN 10 - 100 ISO-K | 971 438 540 | standard | 971 438 540 for B version, standard on SV 750 BF |
| Spare Parts | | | |
| Oil filter, standard | 714 05 310 | 714 05 310 | 714 05 310 |
| Exhaust filter AFE SV630/SV750B/SV300B (8 are required) | 971 431 120 | 971 431 120 | 971 431 120 |
| Intake filter element Paper Metal Activated charcoal Polyester | 710 35 242 E 710 37 734 710 37 724 712 61 508 | 710 35 242 E 710 37 734 710 37 724 712 61 508 | 710 35 242 E 710 37 734 710 37 724 712 61 508 |
| Seal kit FPM | 971 437 310 | 971 437 310 | 971 437 310 |
| Repair kit, complete | 971 437 320 | 971 437 320 | 971 437 320 |
| Generator kit | 971 437 330 | 971 437 330 | 971 437 330 |
| Maintenance kit | 971 437 340 | 971 437 340 | 971 437 340 |

SOGEVAC SV 28 BI



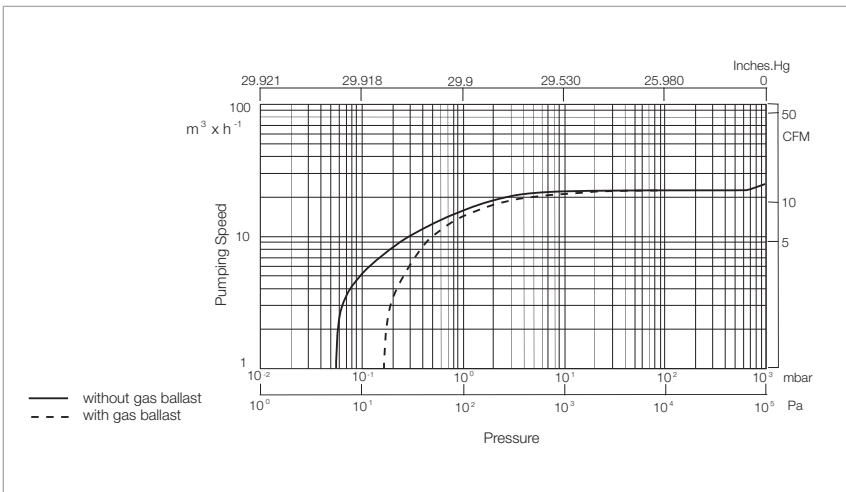
SOGEVAC SV 28 BI

Advantages to the User

- 1 decade better ultimate pressure compared to SOGEVAC SV 25 B
- Integrated exhaust filter
- Integrated oil recovery system and anti suckback valve
- Extremely low noise level
- High reliability
- Variant concept
- Customer specific configurations
- High pumping speed stability at low pressure
- 2 oil casings (0.5 and 1.5 l) are available. The bigger oil volume allows longer oil life times

Typical Applications

- Mass spectrometry
- Lyophilisation
- Laboratory
- Refrigeration and air-conditioning
- Lamps and bulbs
- ... and more



Pumping speed characteristics of the SOGEVAC SV 28 BI at 50 Hz
(60 Hz curves at the end of the chapter)

Technical Data

SOGEVAC SV 28 BI

50 Hz

60 Hz

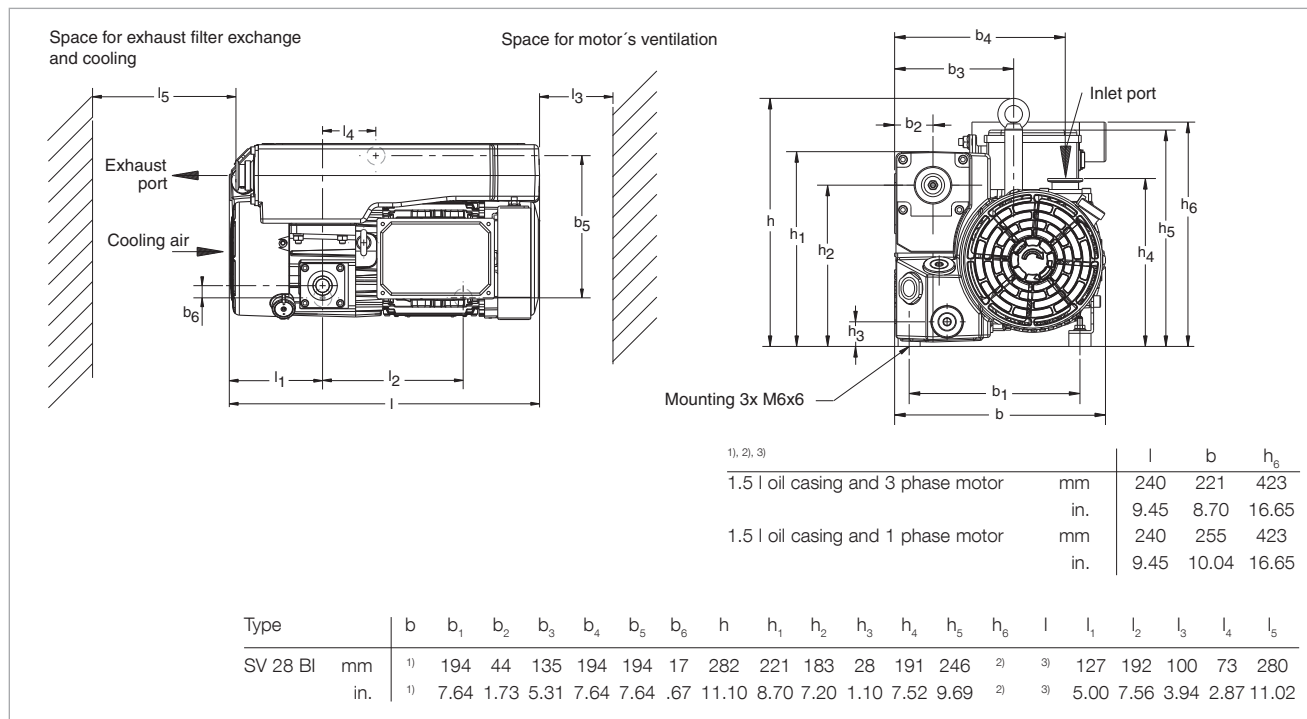
| | | | |
|---|--|--------------------------|--------------------------|
| Nominal pumping speed | m ³ x h ⁻¹ (cfm) | 25 (14.8) | 30 (17.8) |
| Pumping speed (according to PNEUROP) | m ³ x h ⁻¹ (cfm) | 23 (13.6) | 27 (15.9) |
| Ultimate total pressure without gas ballast | mbar (Torr) | ≤ 0.05 (≤ 0.04) | ≤ 0.05 (≤ 0.04) |
| Ultimate total pressure with gas ballast | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Water vapor tolerable load with gas ballast | mbar (Torr) | 10.0 (7.5) | 10.0 (7.5) |
| Noise level (according to DIN 466535) | | | |
| 3 ~ motor | dB(A) | 54 | 57 |
| 1 ~ motor | dB(A) | 57 | 60 |
| Motor power | | | |
| 3 ~ motor | kW (hp) | 0.90 (1.2) | 1.1 (1.5) |
| 1 ~ motor | kW (hp) | 0.75 (1.0) | 0.9 (1.2) |
| Mains voltage and frequency | | | |
| 3 ~ motor | V | see Ordering Information | see Ordering Information |
| 1 ~ motor | V | see Ordering Information | see Ordering Information |
| Rated rotational speed | min ⁻¹ (rpm) | 1500 (1500) | 1800 (1800) |
| Type of protection and isolation class | | | |
| 3 ~ motor | IP | 55-F | 55-F |
| 1 ~ motor | IP | 55-F | 55-F |
| Leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻³ | ≤ 1 x 10 ⁻³ |
| Oil capacity LVO 110 (depending on Part No.) | l (qt) | 1.5 (1.59) | 1.5 (1.59) |
| Net weight (with oil filling) dependant of oil casing and motor | kg (lbs) | 34 (75) to 37 (82) | 34 (75) to 37 (82) |
| Connections | | | |
| intake | DN | 25 ISO-KF | 25 ISO-KF |
| exhaust | DN | 25 ISO-KF | 25 ISO-KF |

Ordering Information

SOGEVAC SV 28 BI

50/60 Hz

| | Part No. |
|--|--------------|
| SOGEVAC SV 28 BI | |
| with wide range three-phase motor 170 - 253 / 294 - 440 V, 50 Hz and 170 - 292 / 294 - 506 V, 60 Hz with gas ballast, with 1.5 l oil casing | 960 273 |
| with wide range single-phase motor 180 - 264 V, 50/60 Hz with gas ballast, with 1.5 l oil casing | 960 277 |
| with single-phase motor (US and Japan) 100 V + 10%/- 15%, 50/60 Hz and 115 V + 10%/- 15%, 60 Hz with gas ballast, with 1.5 l oil casing | upon request |
| Other voltages/frequencies | upon request |
| Filling with special oil | upon request |
| Accessories | |
| Exhaust filter cartridge | 714 16 340 |
| Spare Parts | |
| Repair kit | 971 462 690 |
| Set of seals FPM (FKM) | 971 462 670 |
| Generator kit | |
| three-phase | 971 462 620 |
| single-phase | 971 462 630 |
| Maintenance kit | 971 462 810 |
| For further accessories see Chapter "Accessories TRIVAC" in the Catalog Part "Oil Sealed Vacuum Pumps TRIVAC" | |



Dimensional drawing for the SOGEVAC SV 28 BI with standard single-phase motor; European version (dimensions for three-phase motor smaller)

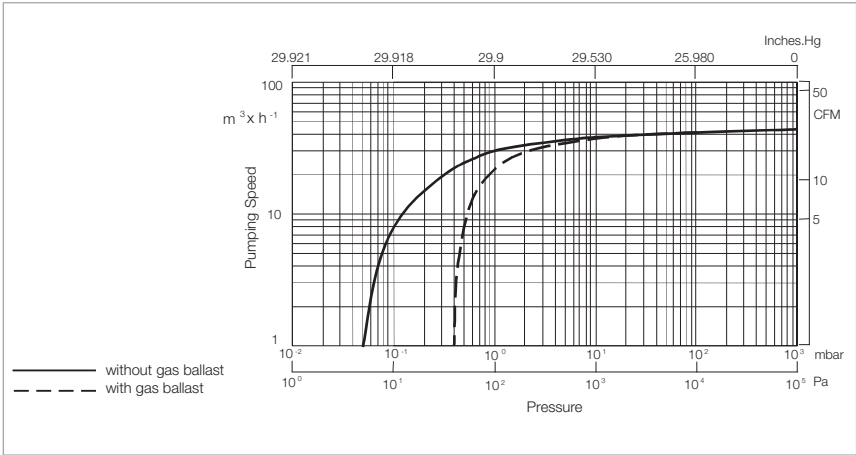
SOGEVAC SV 40 BI



SOGEVAC SV 40 BI

Advantages to the User

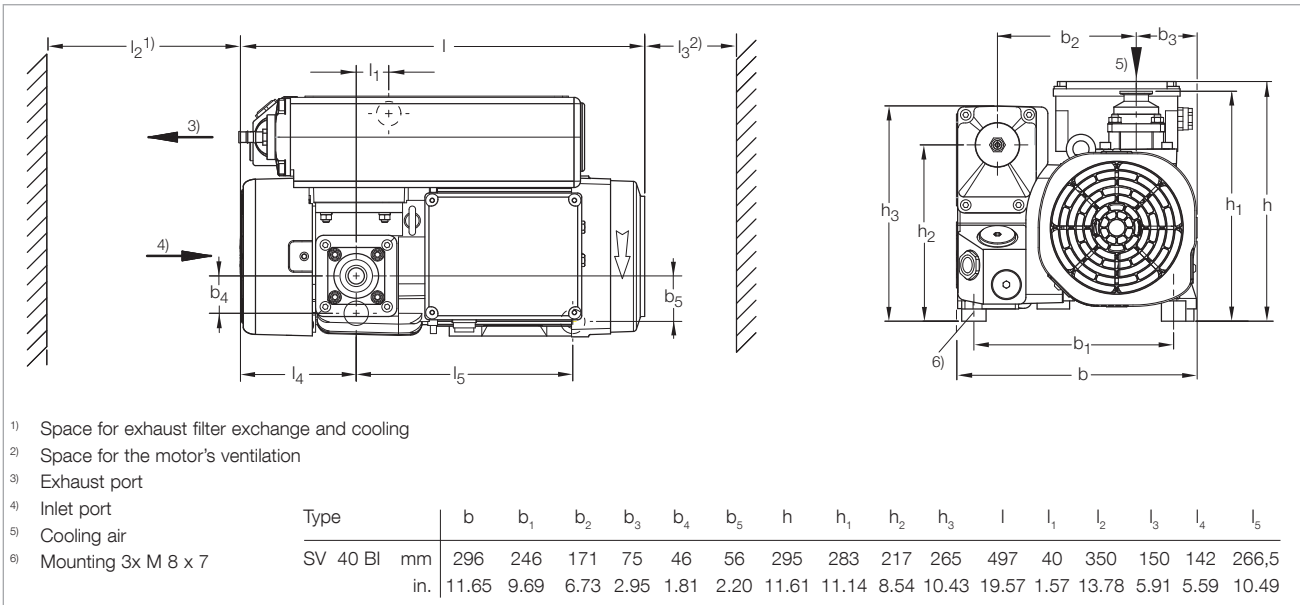
- 1 decade better ultimate pressure compared to SOGEVAC SV 40 B
- Integrated exhaust filter
- Integrated oil recovery system and anti suckback valve
- Extremely low noise level
- High reliability
- Variant concept
- Customer specific configurations
- High pumping speed stability at low pressure



Pumping speed characteristics of the SOGEVAC SV 40 BI at 50 Hz
(60 Hz curves at the end of the chapter)

Typical Applications

- Mass spectrometry
- Lyophilisation
- Refrigeration and air-conditioning
- Laboratory
- Lamps and bulbs
- ... and more



Dimensional drawing for the SOGEVAC SV 40 BI with standard single-phase motor, European version (dimensions for three-phase motor smaller)

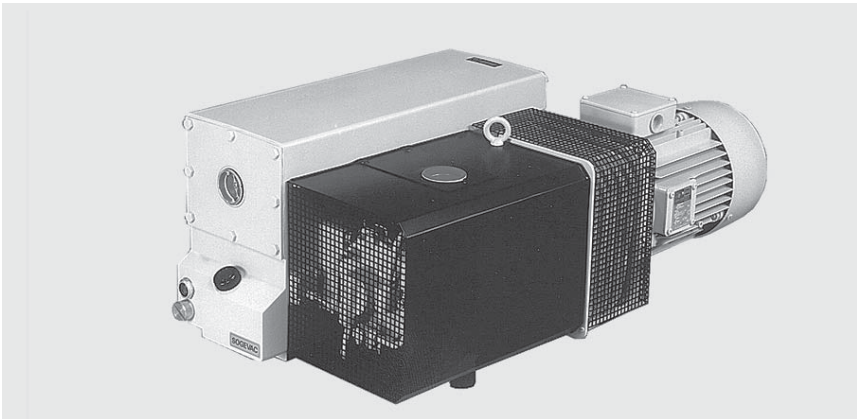
Technical Data**SOGEVAC SV 40 BI****50 Hz****60 Hz**

| | | | |
|---|--|---|---|
| Nominal pumping speed | m ³ x h ⁻¹ (cfm) | 42 (24.8) | 50 (29.5) |
| Pumping speed (according to PNEUROP) | m ³ x h ⁻¹ (cfm) | 40 (23.6) | 48 (28.3) |
| Ultimate total pressure without gas ballast | mbar (Torr) | ≤ 5 x 10 ⁻² (≤ 3.75 x 10 ⁻²) | ≤ 5 x 10 ⁻² (≤ 3.75 x 10 ⁻²) |
| Ultimate total pressure with gas ballast | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Water vapor tolerable load with gas ballast | mbar (Torr) | 0.28 (0.21) | 0.34 (0.21) |
| Motor power | kW (hp) | 1.1 (1.5) | 1.3 (1.8) |
| Mains voltage and frequency | V | see Ordering Information | see Ordering Information |
| Rated rotational speed | min ⁻¹ (rpm) | 1500 (1500) | 1800 (1800) |
| Type of protection | IP | 55-F | 55-F |
| Leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻³ | ≤ 1 x 10 ⁻³ |
| Oil capacity | l (qt) | 1.0 (1.1) | 1.0 (1.1) |
| Weight (with oil) | kg (lbs) | 43 (94.9) | 45 (99.3) |
| Connections | | | |
| intake | DN | 40 KF | 40 KF |
| exhaust | DN | 40 KF | 40 KF |

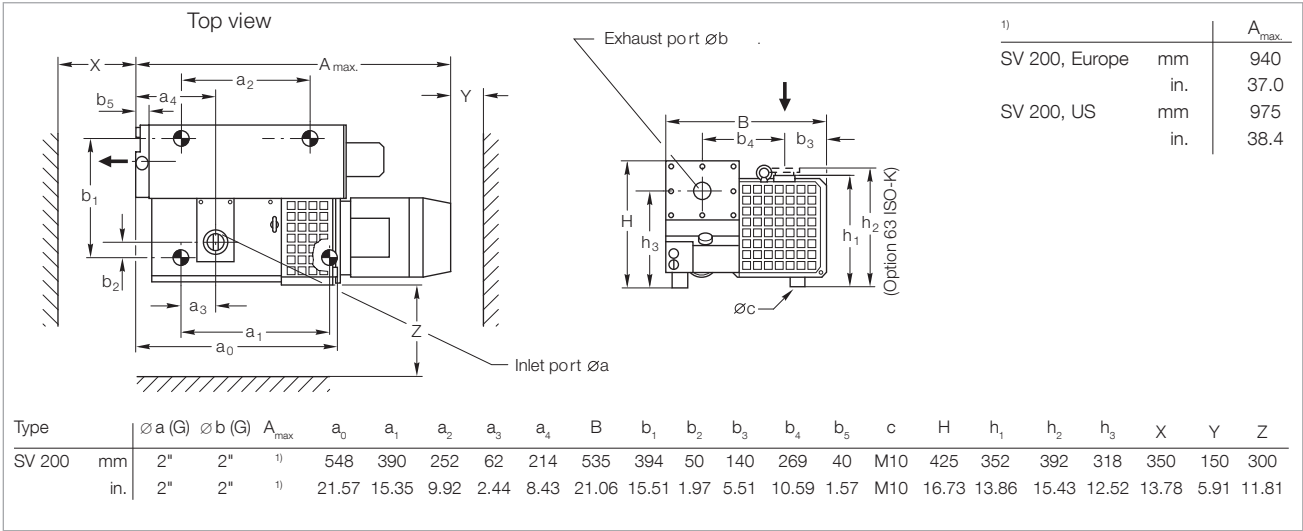
Ordering Information**SOGEVAC SV 40 BI
50/60 Hz**

| | Part No. |
|---|---------------------|
| SOGEVAC SV 40 BI | |
| with three-phase motor | |
| without gas ballast | |
| 230/400 V, 50 Hz and 460 V, 60 Hz | 960 330 |
| with small gas ballast | |
| 230/400 V, 50 Hz and 460 V, 60 Hz | 960 331 |
| Other voltages/frequencies or | |
| single-phase motors | upon request |
| Filling with special oil | upon request |
| Accessories | |
| Exhaust filter cartridge AFE SV40B I | 971 471 470 |
| Spare Parts | |
| Repair kit | 971 443 150 |
| Set of seals | 971 427 640 |
| Maintenance kit | 971 427 660 |
| Vacuum generator | |
| with gas ballast | 971 443 160 |
| without gas ballast | 971 443 170 |
| For further accessories see Chapter "Accessories TRIVAC" in the Section "Oil Sealed Vacuum Pumps TRIVAC" | |

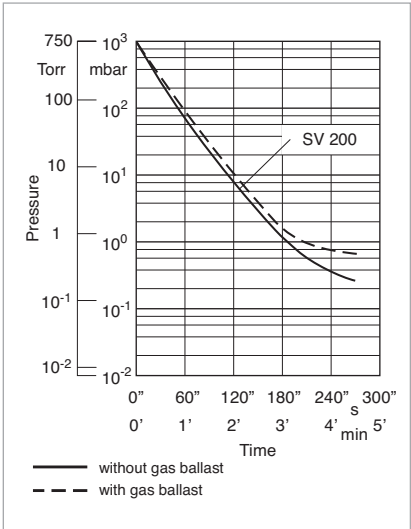
SOGEVAC SV 200



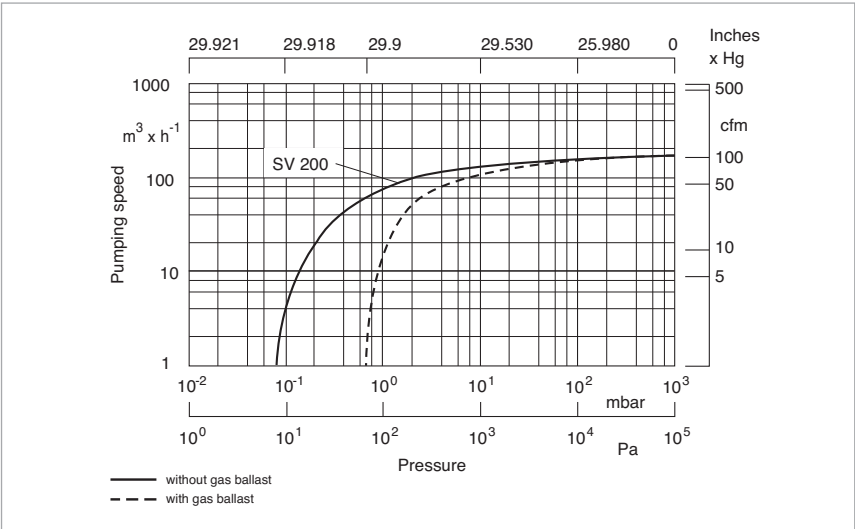
SOGEVAC SV 200



Dimensional drawing for the SOGEVAC SV 200, European version



Pump-down characteristics of a 1000 l vessel at 50 Hz



Pumping speed characteristics of the SOGEVAC SV 200 at 50 Hz (60 Hz curves at the end of the chapter)

Technical Data

SOGEVAC SV 200

| | | 50 Hz | 60 Hz |
|--|--|---|---|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 180 (106.0) | 220 (129.5) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 170 (100.1) | 200 (117.8) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 8 x 10 ⁻² (≤ 6 x 10 ⁻²) | ≤ 8 x 10 ⁻² (≤ 6 x 10 ⁻²) |
| Ultimate total pressure with gas ballast ¹⁾ | mbar (Torr) | ≤ 0.7 (≤ 0.5) | ≤ 0.7 (≤ 0.5) |
| Water vapor tolerance with standard gas ballast ¹⁾ | mbar (Torr) | 30.0 (22.5) | 40.0 (30.0) |
| with big gas ballast ²⁾ | mbar (Torr) | 50.0 (37.5) | 50.0 (37.5) |
| Water vapor capacity with standard gas ballast | kg x h ⁻¹ (qt/hr) | 3.4 (3.6) | 5.4 (5.7) |
| Oil capacity, min. / max. | l (qt) | 5.0 (5.3) / 9.0 (9.5) | 5.0 (5.3) / 9.0 (9.5) |
| Noise level ³⁾ | dB(A) | 69 | 73 |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power | kW (hp) | 4.0 (7.5) | 4.6 (7.5) |
| Nominal speed | min ⁻¹ (rpm) | 1450 (1450) | 1750 (1750) |
| Type of protection | IP | 55 | TEFC/55 ⁴⁾ |
| Materials (materials in contact with the gas) | | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre | Steel, cast iron, Aluminium, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), Epoxy resin & Glass fibre |
| Weight (with oil filling) | kg (lbs) | 140 (309) | 160 (353) |
| Connections ⁵⁾ | | | |
| Intake, Thread | G or NPT | 2" | 2" |
| Exhaust, Thread | G or NPT | 2" | 2" |

¹⁾ To DIN 28 400 and following numbers

²⁾ Ordering Information see Chapter "Accessories"

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

⁴⁾ CEI motor (Europe) 50/60 Hz has IP 55, NEMA motor (North and South America) has TEFC

⁵⁾ Pumps with European and Japanese motors have G, pumps with US (NEMA) motors have NPT

Ordering Information

SOGEVAC SV 200

50/60 Hz

| | Part No. |
|---|---|
| SOGEVAC SV 200/SV 300 ¹⁾ with three-phase motor, without gas ballast 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) ²⁾ 200 V, 50/60 Hz (JIS) | 109 26 955 26 |
| with three-phase motor and integrated gas ballast valve 230/400 V, 50 Hz and 460 V, 60 Hz (CEI) ²⁾ 208 - 230/460 V, 60 Hz (NEMA) and 400 V, 50 Hz ²⁾ 200 V, 50/60 Hz (JIS) | 109 27 950 27 955 27 |
| Other voltages/frequencies ³⁾ | upon request |
| Filling with special oil ³⁾ | upon request |

Accessories

| | |
|---|--------------------------------|
| Adaptor for Roots pump ^{3), 4)} RUVAC 501 (BR 2) RUVAC 1001 (BR 2) | 953 90 953 91 |
| Mounting pedestal for fitting to a Roots pump | 711 19 209 |
| Oil level monitor ^{3), 4)} | 953 96 |
| Thermal switch ^{3), 4)} | 951 36 |
| Exhaust filter gauge, mechanical ^{3), 4)} | 951 94 |
| Exhaust filter monitoring switch, electric ³⁾ | upon request |
| Manual gas ballast ^{3), 4)} | 951 30 |
| Gas ballast valve, electromagnetic 24 V DC ^{3), 4)} | 951 31 |
| Two gas ballast valves ³⁾ | upon request |
| Water cooling with thermostatic valve ³⁾ | upon request |

Spare Parts

| | |
|---|-------------------|
| Oil filter | 710 18 850 |
| Oil filter bypass | 712 30 570 |
| Exhaust filter cartridge (4x required) AFE SV40-SV100 / SV 180/200 | 710 64 763 |
| Vanes (set of 3 pieces) | 714 12 000 |
| Set of gaskets NBR (standard) | 971 97 552 |
| Set of gaskets FPM (FKM) | 714 36 730 |
| Repair kit complete | 714 36 190 |
| Pump module complete | 714 36 770 |

¹⁾ Pumps with European and Japanese motors have G,
pumps with US (NEMA) have NPT

²⁾ IEC motor (Europe) 50/60 Hz have IP 55, NEMA motor have TEFC

³⁾ Please indicate when ordering a pump

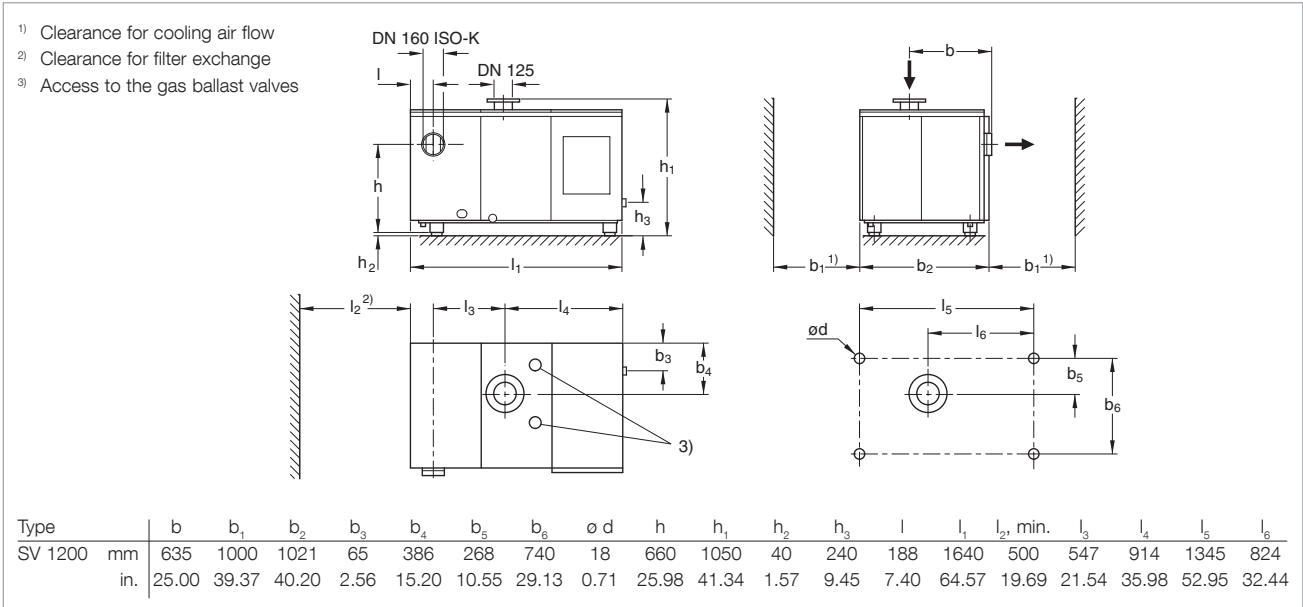
⁴⁾ Can be retrofitted

Note: Further pump options upon request (for example, water cooled pumps)

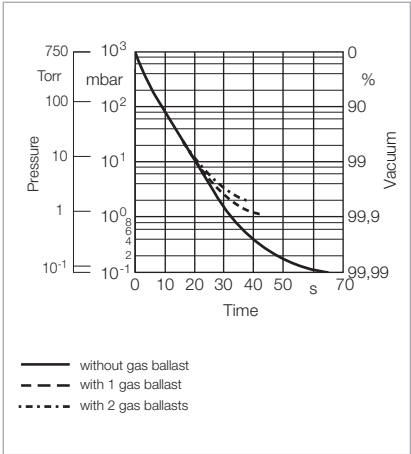
SOGEVAC SV 1200



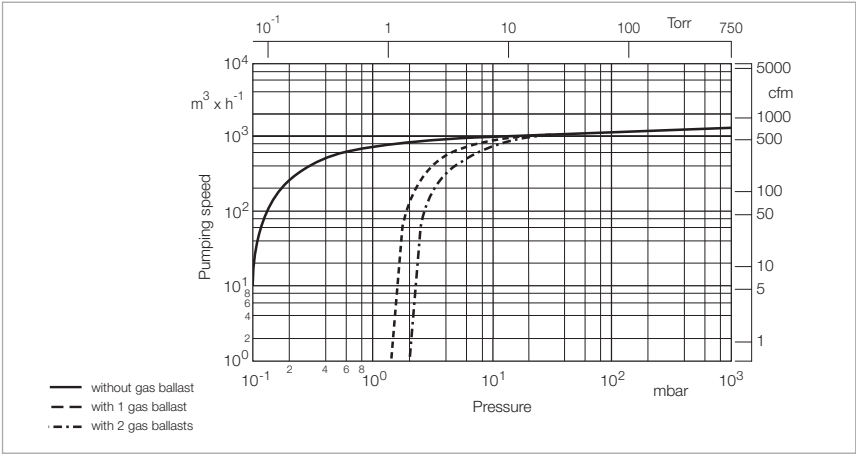
SOGEVAC SV 1200



Dimensional drawing for the SOGEVAC SV 1200



Pump-down characteristics of a 1000 l vessel at 50 Hz



Pumping speed characteristics of the SOGEVAC SV 1200 at 50 and 60 Hz

Technical Data

SOGEVAC SV 1200

| | | 50 Hz | 60 Hz |
|--|--|--|--|
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 1150 (677) | 1150 (677) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 1070 (630) | 1070 (630) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 0.1 (≤ 0.08) | ≤ 0.1 (≤ 0.08) |
| Ultimate total pressure with 1 standard gas ballast ¹⁾ | mbar (Torr) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) |
| with 2 gas ballasts ²⁾ | mbar (Torr) | ≤ 2.0 (≤ 1.5) | ≤ 2.0 (≤ 1.5) |
| Water vapor tolerance with 1 gas ballast | mbar (Torr) | 20.0 (15.0) | 20.0 (15.0) |
| with 2 gas ballasts | mbar (Torr) | 40.0 (30.0) | 40.0 (30.0) |
| Water vapor capacity with 1 gas ballast | kg x h ⁻¹ (qt/hr) | 12.5 (13.0) | 12.5 (13.0) |
| with 2 gas ballasts | kg x h ⁻¹ (qt/hr) | 25.0 (26.0) | 25.0 (26.0) |
| Oil capacity, min. / max. | l (qt) | 60 (63) / 70 (74) | 60 (63) / 70 (74) |
| Noise level ³⁾ | dB(A) | 75 | 75 |
| Admissible ambient temperature | °C (°F) | 12 to 40 (54 to 104) | 12 to 40 (54 to 104) |
| Motor power | kW (hp) | 22 (30) | 22 (30) |
| Nominal motor speed / Pump rated rotational speed | min ⁻¹ (rpm) | 1460 (1460) / 700 (700) | 1750 (1750) / 700 (700) |
| Type of protection | IP | 54-F | 54-F/TEFC ⁴⁾ |
| Weight (with oil filling) | kg (lbs) | 1450 (3200) | 1500 (3311) |
| Dimensions (L x W x H) | mm (in.) | 1640 x 1021 x 1050 (64.57x 40.20 x 41.34) | 1640 x 1021 x 1050 (64.57x 40.20 x 41.34) |
| Connection | | | |
| Intake | DN | 125 PN 10 | ASA 150 - 6" ⁵⁾ |
| Exhaust | DN | 160 ISO-K | ASA 150 - 6" ⁵⁾ |
| Option ⁶⁾ | DN | 125 PN 10 | — |

¹⁾ To DIN 28 400 and following numbers

²⁾ With 2 gas ballasts

³⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

⁴⁾ CEI motor (Europe) 50/60 Hz has IP 54, NEMA motor (North and South America) has TEFC

⁵⁾ For NEMA pumps

⁶⁾ Please indicate when ordering a pump

Note: Further pump options upon request (for example, water cooled pumps)

Ordering Information

SOGEVAC SV 1200

50/60 Hz

| | Part No. |
|--|--------------|
| SOGEVAC SV 1200 with three-phase motor, integrated gas ballast valves, air-cooled and over-temperature switch | |
| 400 V, 50 Hz (CEI) ¹⁾ | 109 70 |
| 208 - 230/460 V, 60 Hz (NEMA) | 950 70 |
| Other voltages/frequencies ²⁾ | upon request |
| Filling with special oil ²⁾ | upon request |
| Accessories | |
| Water cooling with thermostatic valve ²⁾ | upon request |
| Adaptor for Roots pump ^{2), 3)} | |
| RUVAC 2001 | 953 37 |
| RUVAC 3001 | 953 38 |
| RUVAC WH 4400/7000 | 953 3WH |
| Oil level monitor ^{2), 3)} | 953 99 |
| Exhaust filter monitoring switch electric ²⁾ | 712 22 360 |
| Spare Parts | |
| Oil filter | 712 14 598 |
| Oil filter bypass | 712 36 390 |
| Exhaust filter cartridge (14x required) AFE SV280/SV 300-SV1200 | 710 64 773 |
| Vanes (set of 3 pieces) | 712 14 310 |
| Set of gaskets NBR (standard) | 971 96 681 |
| Set of gaskets FPM (FKM) | 712 36 060 |
| Repair kit complete (50 Hz) | 712 34 800 |
| Pump module complete (50 Hz) | 712 34 820 |

¹⁾ Junction box with six terminals for star/delta circuit

²⁾ Please indicate when ordering a pump

³⁾ Can be retrofitted

Note: Further pump options upon request

SOGEVAC SV 16 D and SV 25 D



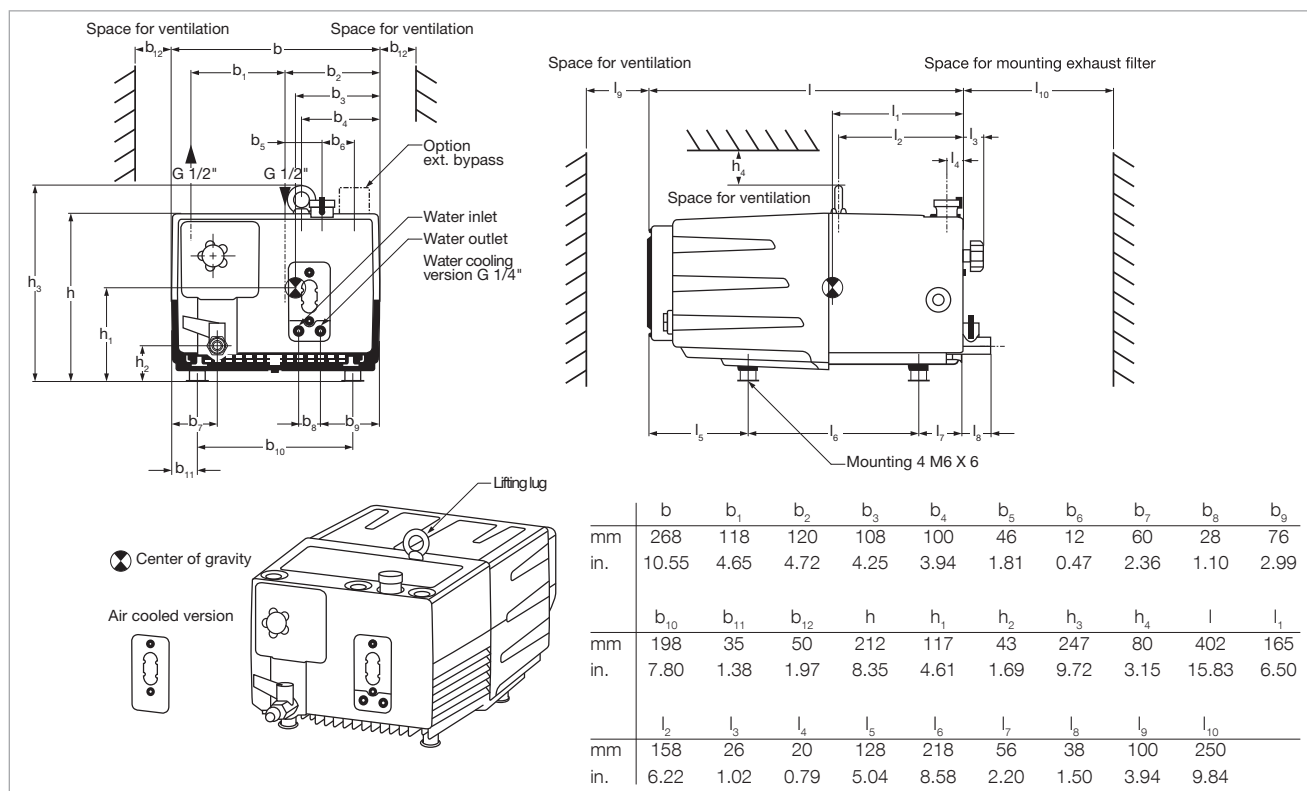
SOGEVAC SV 16 D / 25 D

Advantages to the User

- Good pump temperature due to optimized air cooling. Add water cooling possible, ideal for harsh applications and optimal oil life time thus reached
- 4 times more oil than on comparable pumps allow long oil life times
- Optimized integrated lubrication without external pipes
- Integrated oil recovery system and anti suckback valve
- Low noise level due to low pump speed
- Variant concept
- 3 phase wide range motors
- Different single phase motors with overload protection in accordance to EN 61010-1
- Compact and nice design

Typical Applications

- Oil purification, drying and de-gassing
- Plastic and rubber injection presses
- CO₂ lasers
- O₂ applications
- Analytical Instruments
- ... and more



Dimensional drawing for the SOGEVAC SV 16 D and SV 25 D

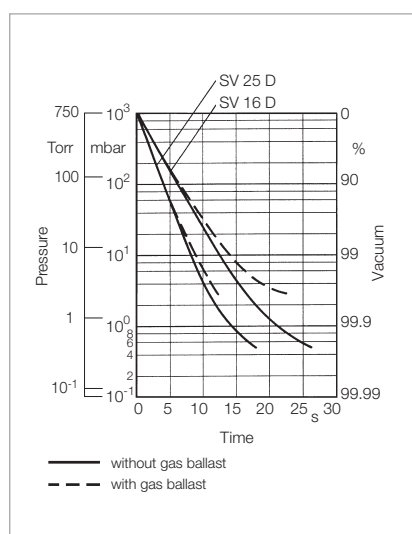
Technical Data

| | | SOGEVAC SV 16 D | | SOGEVAC SV 25 D | |
|--|--|----------------------------|----------------------------|----------------------------|----------------------------|
| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
| Nominal speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 16.0 (9.4) | 18.7 (11.0) | 25.0 (14.7) | 29.0 (17.0) |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 14.5 (8.5) | 17.0 (10.0) | 22.5 (13.3) | 25.5 (15.0) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) | ≤ 0.5 (≤ 0.4) |
| Ultimate total pressure without gas ballast ¹⁾ | mbar (Torr) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) | ≤ 1.5 (≤ 1.1) |
| Water vapor tolerance ¹⁾ | mbar (Torr) | 15.0 (11.3) | 15.0 (11.3) | 15.0 (11.3) | 15.0 (11.3) |
| Water vapor capacity | kg x h ⁻¹ (qt/hr) | 0.05 (0.05) | 0.15 (0.16) | 0.05 (0.05) | 0.15 (0.16) |
| Oil capacity | l (qt) | 2.0 (2.1) | 2.0 (2.1) | 2.0 (2.1) | 2.0 (2.1) |
| Noise level ²⁾ | dB(A) | 59 | 59 | 59 | 59 |
| Admissible ambient temperatur 1~ (oil: 32 cSt, approx.) | °C (°F) | +18 to +40 (+64 to 104) | +18 to +40 (+64 to 104) | +18 to +40 (+64 to 104) | +18 to +40 (+64 to 104) |
| 3~ | °C (°F) | +12 to +40 (+54 to 104) | +12 to +40 (+54 to 104) | +12 to +40 (+54 to 104) | +12 to +40 (+54 to 104) |
| Motor power (1~ and 3~), approx. | kW (hp) | 0.75 (1.01) | 0.90 (1.21) | 0.75 (1.01) | 0.90 (1.21) |
| Nominal speed | min ⁻¹ (rpm) | 1440 (1440) | 1750 (1750) | 1440 (1440) | 1750 (1750) |
| Weight (with oil filling) | kg (lbs) | 25 (55.1) | 25 (55.1) | 25 (55.1) | 25 (55.1) |
| Connections, Intake and Exhaust ³⁾ (Inside thread) | NPT/G | 1/2" | 1/2" | 1/2" | 1/2" |

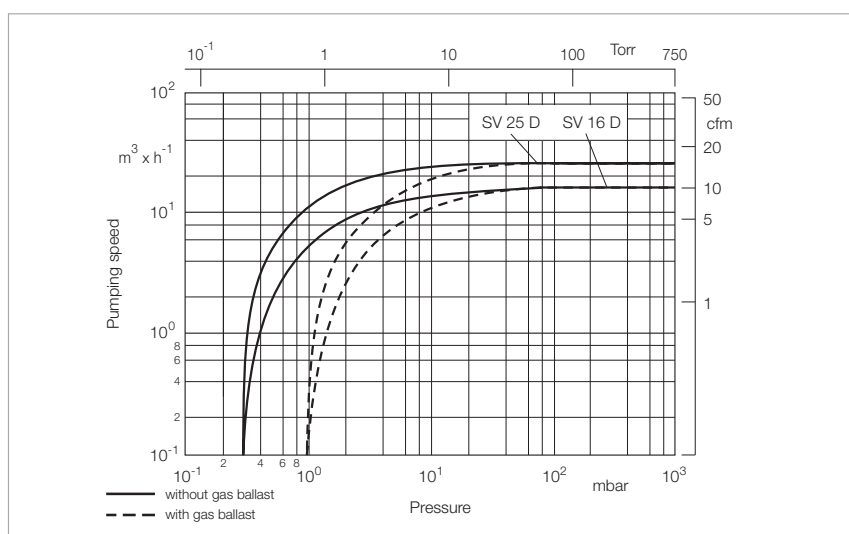
¹⁾ To DIN 28 400 ff

²⁾ Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m (3.5 ft)

³⁾ Please indicate when ordering a pump



Pump-down characteristics of a 10 l vessel at 50 Hz



Pumping speed characteristics of the SOGEVAC SV 16 D and SV 25 D at 50 Hz (60 Hz curves at the end of the chapter)

Ordering Information

SOGEVAC SV 16 D

SOGEVAC SV 25 D

| | Part No. | Part No. |
|--|-----------------------|-----------------------|
| SOGEVAC SV 16/SV 25 D | | |
| with UL/CSA world three-phase motor and integrated gas ballast valve | | |
| 200 - 240 V $\pm 10\%$ and | | |
| 380 - 415 V $\pm 10\%$, 50 Hz / | | |
| 200 - 240 V $\pm 10\%$ and | | |
| 380 - 460 V $\pm 10\%$, 60 Hz ¹⁾ | 960 181V | 960 211V |
| 200 V +10-15%, 50/60 Hz | 960 180V | 960 210V |
| with single phase motor and integrated gas ballast valve | | |
| 200 - 240 V $\pm 10\%$, 50/60 Hz | 960 185V | — |
| 230 V $\pm 10\%$, 50/60 Hz | — | 960 215V |
| 110 - 115 V $\pm 10\%$ and | | |
| 220 - 230 V $\pm 10\%$, 50/60 Hz | | |
| (swithable manually) | 960 186V | — |
| Other voltages/frequencies | upon request | upon request |
| Filling with special oil | upon request | upon request |
| Accessories | | |
| Water cooling installation kit | EK 971 473 550 | EK 971 473 550 |
| Exhaust filter monitoring gauge, mechanical G 3/4" ^{2), 3)} | 951 93 | 951 93 |
| Temperature switch conversion kit with plug, for three-phase version only ^{2), 3)} | upon request | upon request |
| Spare Parts | | |
| Exhaust filter cartridge AFE SV16/25 BR2 | 712 32 023 | 712 32 023 |
| Maintenance kit (filter, O-Ring, filling plug) | EK 971 473 420 | EK 971 473 420 |
| Seal kit FPM (FKM) | EK 971 473 430 | EK 971 473 430 |
| Repair kit complete | EK 971 473 440 | EK 971 473 440 |

¹⁾ Pumps are delivered in high voltage connection.

For an operation at low voltage, the connections at motor terminal board must be changed

²⁾ Please indicate when ordering a pump

³⁾ Can be retrofitted

Pumps Prepared with PFPE for Use with Oxygen

Application

As soon as oxygen is being pumped at concentrations exceeding 20% (atmospheric air) the SOGEVAC pump needs to be prepared especially for such operation.

Safety Precautions

As standard, the pumps are equipped with FPM (FKM) seals and an oil filter bypass. Before assembly, all parts are degreased and the pumps are tested with PFPE lubricant (LVO 400). Thereafter the pumps are emptied and delivered without PFPE lubricant (LVO 400).

The pumps are supplied with special Operating Instructions (GA), Spare Parts List (ET) and include a CE declaration. This special information must be observed.

Due to the use of PFPE lubricant (LVO 400) and grease, also the maintenance schedule has been changed accordingly.

Only degreased accessories (filters and valves) and original spare parts from Oerlikon Leybold Vacuum must be used.

Product Selection

SOGEVAC pumps of the following sizes are available:

SV 16, SV 25, SV 65 B, SV 100 B, SV 200, SV 300 B, SV 630 B (F) and SV 750 B.

The use of PFPE lubricant (LVO 400) will also impair the attainable ultimate pressure depending on the size of the pump.

Local safety regulations (handling of O₂ and PFPE (LVO 400)) must be observed!

Advantages to the User

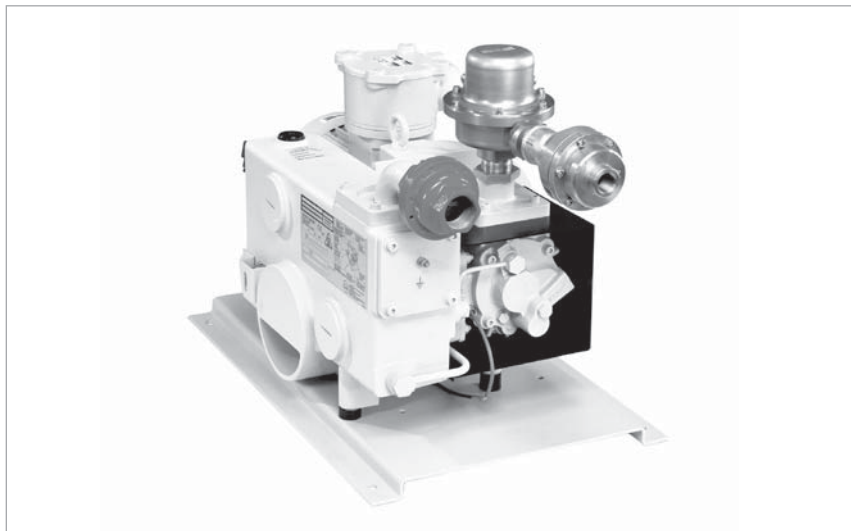
- High pumping speed down to ultimate pressure
- Operation of the pump at all pressures between 1000 mbar (750 Torr) and ultimate pressure is possible
- Integrated and effective separation of oil mist
- Compact design
- Air or water cooled
- Environment friendly (low noise and low heat radiation, low vibrations)
- Available in many different variants, motor voltages, ports etc.

Pump

Ultimate pressure (mbar (Torr)) without gas ballast with gas ballast

| | Part No. | | |
|-------------|--|-------------|------------|
| SV 16 | 1900016, 1900116, 1098116, 9550116 | 1.0 (0.75) | 1.5 (1.13) |
| SV 25 | 1090216, 1090316, 1099016, 1099116 | 1.0 (0.75) | 1.5 (1.13) |
| SV 65 B | 960400V2016, 960401V2016, 960412V2016 | 1.0 (0.75) | 2.5 (1.88) |
| SV 100 B | 960500V2016, 960505V2016, 960512V2016 | 1.0 (0.75) | 2.5 (1.88) |
| SV 200 | 1092616, 1092716, 9502716 | 0.5 (0.375) | 1.5 (1.13) |
| SV 300 B | 960702V2016, 960707V2016, 960717V2016 | 0.5 (0.38) | 1.5 (1.13) |
| SV 630 B(F) | 960863V3011 | 1.0 (0.75) | 1.5 (1.13) |
| SV 750 B(F) | 960877V3001 | 1.0 (0.75) | 1.5 (1.13) |

SOGEVAC SV 40 ATEX (Explosion Protected and Pressure Burst Resistant)



IIA version with MR 40 pressure regulator on the suction side and horizontal suction flanges

The SOGEVAC SV 40 ATEX Cat. 1 rotary vane vacuum pumps comply with the European Directive 94/9/EC regarding "Equipment and protective systems for use in potentially explosive atmospheres".

Classification

- Equipment group: II
- Categories: 1 G inside
2 G outside
- Zone: 0 inside
1 outside
- Material group: IIB + H₂ or IIA
- Temperature classes:
 - IIB + H₂ at 50 Hz, T4
 - at 60 Hz, 160 °C
 - IIA at 50 and 60 Hz, T3

Applications

These pumps are suited for pumping solvents, for drying, filling applications including IIB + H₂ or IIA material groups.

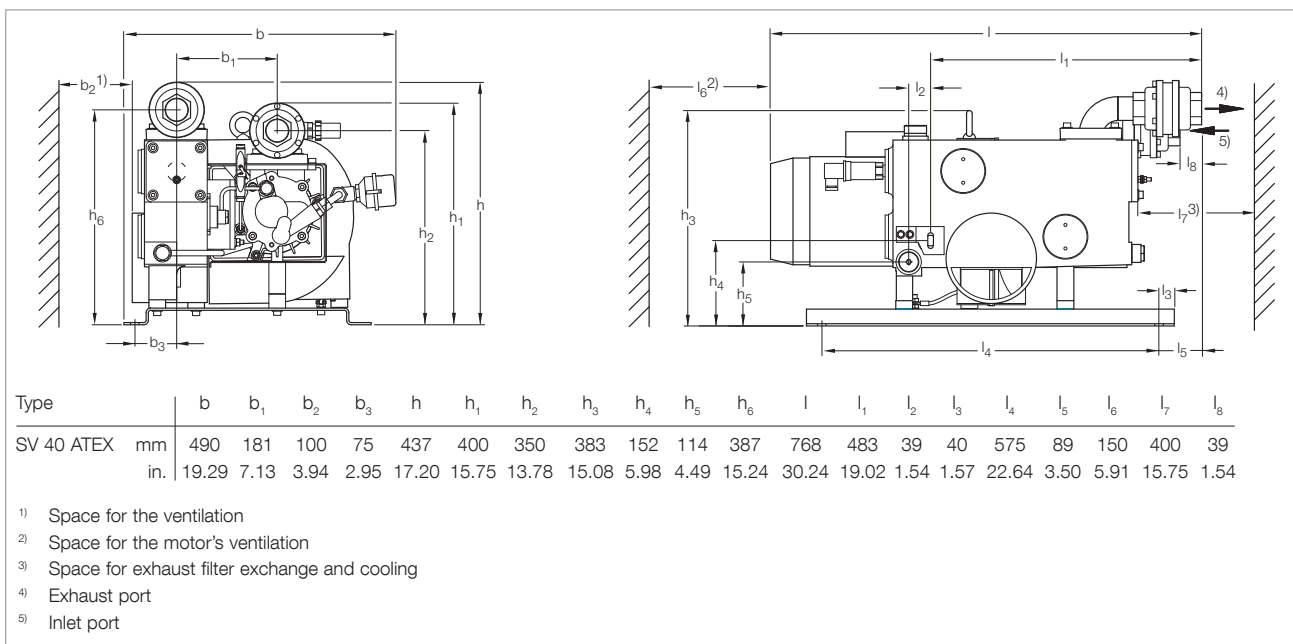
Safety Characteristics

- In order to fulfill the requirements of the safety regulations, the SOGEVAC SV 40 ATEX Cat. 1 pumps are equipped with:
- 1 flame arrester on their suction and exhaust sides
 - 1 pressure transmitter controlling the pressure in the oil casing
 - 1 temperature sensor controlling the pump temperature
 - 1 inlet gas temperature monitoring on the inlet side of the pump (for IIB + H₂ versions only).

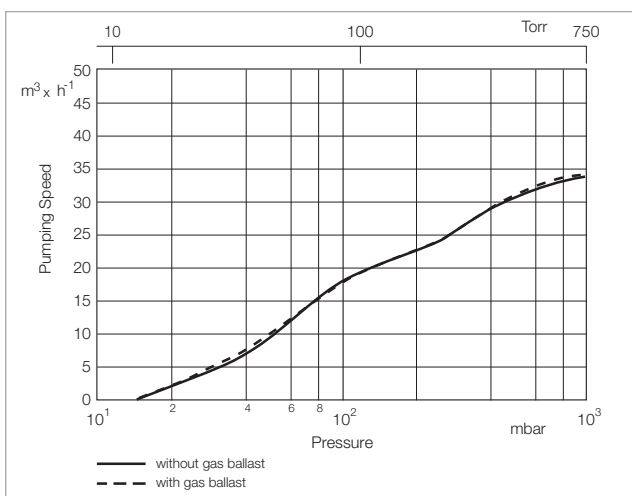
Furthermore, these pumps have an explosion-proof design.

Advantages to the User

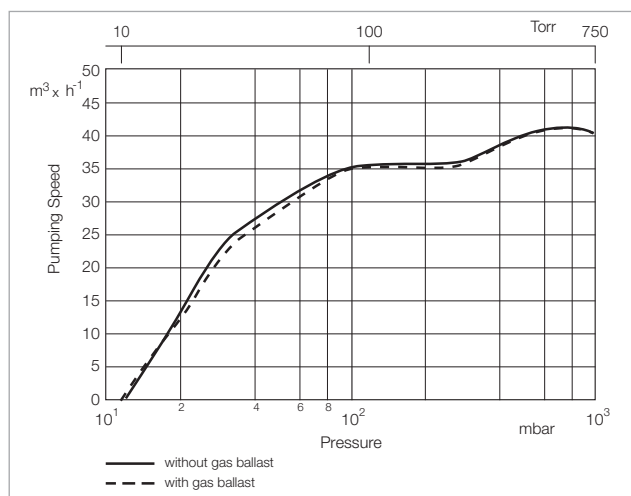
- High pumping speed down to ultimate pressure
- High vapor pumping capability
- Running possible at any pressure, from 1000 mbar (750 Torr) to ultimate pressure
- Integrated and efficient oil mist separation
- Compact design
- Air cooled
- Environment-friendliness (low noise level, no cooling water, low vibration operation)
- Many different designs available



Dimensional drawing for the SOGEVAC SV 40 ATEX with standard motor, European version



Pumping speed characteristics of the SOGEVAC SV 40 ATEX at 50 Hz for gases of the material group IIB + H₂ (60 Hz curves at the end of the chapter)



Pumping speed characteristics of the SOGEVAC SV 40 ATEX at 50 Hz for gases of the material group IIA (60 Hz curves at the end of the chapter)








Technical Data

SOGEVAC SV 40 ATEX

| | | 50 Hz | 60 Hz |
|---|--|---|---|
| Nominal pumping speed | m ³ x h ⁻¹ (cfm) | 46.0 (27.1) | 55.2 (32.5) |
| Pumping speed (according to PNEUROP) | | | |
| IIB + H ₂ | m ³ x h ⁻¹ (cfm) | 26 (15.3) | 29 (17.1) |
| IIA | m ³ x h ⁻¹ (cfm) | 35 (20.6) | 42 (24.7) |
| Ultimate total pressure without gas ballast | | | |
| IIB + H ₂ | mbar (Torr) | 0.8 (0.6) | 0.8 (0.6) |
| IIA | mbar (Torr) | 15.0 (11.3) | 15.0 (11.3) |
| Ultimate total pressure with gas ballast | | | |
| IIB + H ₂ | mbar (Torr) | 1.5 (1.1) | 1.5 (1.1) |
| IIA | mbar (Torr) | 15.0 (11.3) | 15.0 (11.3) |
| Noise level (according to DIN 45635) | dB(A) | 63 | 68 |
| Water vapor tolerable load with gas ballast | mbar (Torr) | 0.30 (0.23) | 0.30 (0.23) |
| Motor power | kW (hp) | 1.5 (2.0) | 1.8 (2.4) |
| Rated rotational speed | min ⁻¹ (rpm) | 1500 (1500) | 1800 (1800) |
| Standard voltage | V | 230/400 (± 10%) | 460 (± 10%) |
| Type of protection | IP | 55-F | 55-F |
| Leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻³ | ≤ 1 x 10 ⁻³ |
| Type of oil | | LVO 210 (IIB + H ₂) or LVO 200 (IIA) | LVO 210 (IIB + H ₂) or LVO 200 (IIA) |
| Oil capacity, approx. | l (qt) | 2 (2.1) | 2 (2.1) |
| Materials (materials in contact with the gas) | | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), epoxy resin & glass fibre | Steel, cast iron, Aluminium, Bronze, FPM (FKM), Glass, Polyamid 6.6, Filter material (Polymers, Paper), epoxy resin & glass fibre |
| Weight (with oil filling) | kg (lbs) | 110 (243) | 110 (243) |
| Connections | | | |
| intake | | | |
| IIB + H ₂ | G | 1 1/4" | 1 1/4" |
| IIA | G | 3/4" | 3/4" |
| exhaust | G | 1 1/4" | 1 1/4" |
| Maximum gas inlet temperature | °C (°F) | 40 (104) | 40 (104) |

Ordering Information

SOGEVAC SV 40 ATEX

| | 50 Hz | 60 Hz |
|--|--------------|----------------|
| | Part No. | Part No. |
| SOGEVAC SV 40 ATEX LA IIB + H ₂ in accordance with 94/9/EC [ II 1/2 G IIB + H ₂ T4 (+5 °C < t _a < 40 °C) EC Type Examination Certificate: PTB04ATEX4013X] with permanent gas ballast | 960 345 | – |
| SOGEVAC SV 40 ATEX LA IIB + H ₂ in accordance with 94/9/EC [ II 1/2 G IIB + H ₂ 160 °C (+5 °C < t _a < 40 °C) EC Type Examination Certificate: PTB04ATEX4013X] with permanent gas ballast | – | 960 345 V 3060 |
| SOGEVAC SV 40 ATEX IIB + H ₂ in accordance with 94/9/EC [ II 1/2 G IIB + H ₂ T4 (+5 °C < t _a < 40 °C) EC Type Examination Certificate: PTB04ATEX4013X] without gas ballast | 960 346 | – |
| SOGEVAC SV 40 ATEX IIB + H ₂ in accordance with 94/9/EC [ II 1/2 G IIB + H ₂ 160 °C (+5 °C < t _a < 40 °C) EC Type Examination Certificate: PTB04ATEX4013X] without gas ballast | – | 960 346 V 3060 |
| SOGEVAC SV 40 ATEX IIB + H ₂ in accordance with 94/9/EC [ II 1/2 G IIB + H ₂ T4 (+5 °C < t _a < 40 °C) EC Type Examination Certificate: PTB04ATEX4013X] with gas ballast and MR 40 pressure regulator | 960 343 | – |
| SOGEVAC SV 40 ATEX IIA in accordance with 94/9/EC [ II 1(i)/ 2(o) G IIA T3 (+5 °C < t _a < 40 °C) EC Type Examination Certificate: PTB04ATEX4011X] without gas ballast | 960 344 | 960 344 V 3060 |
| SOGEVAC SV 40 ATEX IIA in accordance with 94/9/EC [ II 1(i)/ 2(o) G IIA T3 (+5 °C < t _a < 40 °C) EC Type Examination Certificate: PTB04ATEX4011X] without gas ballast, with MR 40 pressure regulator | 960 342 | – |
| Accessories | upon request | upon request |
| Spare Parts | upon request | upon request |

For all enquiries and orders relating to category 1 and 2 ATEX products please exclusively use our ATEX questionnaire.
 You can find this questionnaire at the end of the full-line catalog together with the fax forms or
 on the Internet under “www.oerlikon.com/leyboldvacuum” under Download Documents in the area Documentation.

ATEX Category 2 Pumps

Application

As soon as gases capable of exploding are being pumped or if such gases are present in the vicinity, then the customer must perform a hazard analysis. In Europe, the ATEX Directives 94/9/EC need to be observed in this regard. For equipment in Zone 1, ATEX Category 3 SOGEVAC pumps are available.

Classification

As in the table below.

Safety Precautions

As standard, the pumps are equipped with FPM (FKM) seals, oil filter bypass and oil LEYBONOL LVO 210. Special ATEX exhaust filters, coupling components, motors, floats and final inspections are used, respectively performed. A DN 16 ISO-KF connection for the gas ballast is supplied.

All pumps are equipped with Pt100 temperature, oil level and oil casing pressure sensors. The motors are equipped with PTC thermistors.

SOGEVAC pumps of the following sizes are available:

SV 40 B, SV 65 B, SV 100 B, SV 200, SV 300 B, SV 630 B and SV 750 B

The pumps are supplied with special Operating Instructions (GA), Spare Parts List (ET) and include a CE declaration. This special information must be observed.

OLV Restrictions apply for Service and Repairs: please consult us.

Only special accessories (filters, valves, taps) and original spare parts from Oerlikon Leybold Vacuum must be used.

Advantages to be User

- High pumping speed down to ultimate pressure
- Operation of the pump at all pressures between 1000 mbar (750 Torr) and ultimate pressure is possible
- Integrated and effective separation of oil mist
- Compact design
- Air or water cooled
- Different gas ballast variants: without, manual and permanent upon request
- Available in many different variants, motor voltages, ports etc.

The pumping speed curves for ATEX Category 2 pumps are the same as for non ATEX standard SOGEVAC pumps.

Pump**Ultimate pressure (mbar (Torr))
without gas ballast with gas ballast**

| | Part No. | | |
|---|---------------------|-------------|------------|
| SV 40 B air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 2G IIC T4 (10 °C < T _a > 40 °C) X | 960305A22 | 0.5 (0.38) | 1.5 (1.13) |
| SV 65 B air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 2G IIC T4 (10 °C < T _a > 40 °C) X | 960405A22 | 0.5 (0.38) | 1.5 (1.13) |
| SV 100 B air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 2G IIC T4 (10 °C < T _a > 40 °C) X | 960505A22 | 0.5 (0.38) | 1.5 (1.13) |
| SV 120 B air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 2G IIC T4 (10 °C < T _a > 40 °C) X | upon request | 0.5 (0.38) | 1.5 (1.13) |
| SV 200 air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 2G IIC T3 (10 °C < T _a > 40 °C) X | 10927A22 | 0.15 (1.13) | 0.7 (0.53) |
| SV 200 water cooled Ex II (i) 2G b IIB + H2 T3 / (o) 2G IIC T3 (10 °C < T _a > 40 °C) X | 1092702A22 | 0.15 (1.13) | 0.7 (0.53) |
| SV 300 B air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 2G IIC T3 (10 °C < T _a > 40 °C) X | 960702A22 | 0.15 (1.13) | 0.7 (0.53) |
| SV 630 B air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 3GD IIC T3 (150 °C) (10 < T _a > 40 °C) X | upon request | 0.15 (1.13) | 0.7 (0.53) |
| SV 630 BF water cooled Ex II (i) 2G b IIB + H2 T3 / (o) 3GD IIC T3 (150 °C) (10 < T _a > 40 °C) X | upon request | 0.15 (1.13) | 0.7 (0.53) |
| SV 750 B air cooled Ex II (i) 2G b IIB + H2 T3 / (o) 3GD IIC T3 (150 °C) (10 < T _a > 40 °C) X | upon request | 0.15 (1.13) | 0.7 (0.53) |
| SV 750 BF water cooled Ex II (i) 2G b IIB + H2 T3 / (o) 3GD IIC T3 (150 °C) (10 < T _a > 40 °C) X | upon request | 0.15 (1.13) | 0.7 (0.53) |

ATEX outside Dust: upon request. For SV 630 B(F): as on existing Cat 3 pumps.

SV 630 B(F) and SV 750 B(F) are ATEX Cat 3 only outside.

Gas ballast connection: with DN 16 ISO-KF as on Cat 3 pumps. Manual gas ballast is standard.

SV 40 B to SV 120 B with manual gas ballast are T3 inside. Pumps with permanent gas ballast are T4 inside.

Big gas ballast or no gas ballast available upon request.

For all enquiries and orders relating to category 1 and 2 ATEX products please exclusively use our ATEX questionnaire.

You can find this questionnaire at the end of the full-line catalog together with the fax forms or on the Internet under "www.oerlikon.com/leyboldvacuum" under Download Documents in the area Documentation.

ATEX Category 3 Pumps

Application

As soon as gases capable of exploding are being pumped or if such gases are present in the vicinity, then the customer must perform a hazard analysis. In Europe, the ATEX Directives 94/9/EC need to be observed in this regard. For equipment in Zone 2, ATEX Category 3 SOGEVAC pumps are available.

Classification

As in the table below.

Safety Precautions

As standard, the pumps are equipped with FPM (FKM) seals, oil filter bypass and oil LEYBONOL LVO 210. Special ATEX exhaust filters, coupling components, motors, floats and final inspections are used, respectively performed. A DN 16 ISO-KF connection for the gas ballast is supplied.

All pumps are equipped with Pt100 temperature, oil level and oil casing pressure sensors. The motors are equipped with PTC thermistors.

SOGEVAC pumps of the following sizes are available:

SV 40 B, SV 65 B, SV 100 B, SV 200, SV 300 B, SV 630 B and SV 750 B.

The pumps are supplied with special Operating Instructions (GA), Spare Parts List (ET) and include a CE declaration. This special information must be observed.

Only special accessories (filters, valves, taps) and original spare parts from Oerlikon Leybold Vacuum must be used.

Advantages to be User

- High pumping speed down to ultimate pressure
- Continuous operation of the pump at all pressures between 1000 mbar (750 Torr) and ultimate pressure is possible
- Integrated and effective separation of oil mist
- Compact design
- Air or water cooled
- Environment friendly (low noise and low heat radiation, low vibrations)
- Available in many different variants, motor voltages, ports etc

The pumping speed curves for ATEX Category 3 pumps are the same as for non ATEX standard SOGEVAC pumps.

Pump**Ultimate pressure (mbar (Torr))**
without gas ballast with gas ballast

| | Part No. | | |
|---|---------------------|-------------|------------|
| SV 40 B air cooled Ex II (i) 3G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | 960305A33 | 0.5 (0.38) | 1.5 (1.13) |
| SV 65 B air cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | 960405A33 | 0.5 (0.38) | 1.5 (1.13) |
| SV 100 B air cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | 960505A33 | 0.5 (0.38) | 1.5 (1.13) |
| SV 200 air cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | 10927A33 | 0.15 (1.13) | 0.7 (0.53) |
| SV 300 B air cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | 960702A33 | 0.15 (1.13) | 0.7 (0.53) |
| SV 630 air cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | 960863A33 | 0.15 (1.13) | 0.7 (0.53) |
| SV 630 BF water cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | 960867A33 | 0.15 (1.13) | 0.7 (0.53) |
| SV 750 B air cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | upon request | 0.15 (1.13) | 0.7 (0.53) |
| SV 750 BF water cooled Ex II (i) 3 G IIC T3 / (o) 3 GD IIC T3 (150 °C)(10 < T _a < 40 °C) X | upon request | 0.15 (1.13) | 0.7 (0.53) |

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on the Internet under "www.oerlikon.com/leyboldvacuum" under Download Documents in the area Documentation.

Accessories

Double Inlet Filter and Roots Adapter TwinFilter 500 for SOGEVAC SV 470 B(F) and SV 570 B(F)



Double inlet filter and Roots adapter TwinFilter 500

To avoid dust particles in your process use the new double inlet filter and Roots adapter TwinFilter 500.

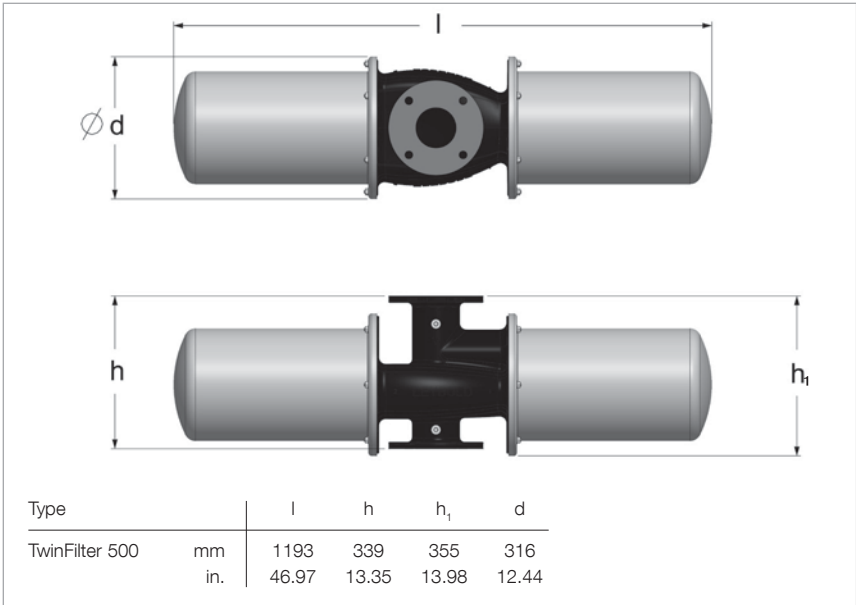
The TwinFilter replaces the otherwise needed Roots pump adapter to adapt a Roots vacuum pump. The Roots pump can be fitted directly on to the TwinFilter.

Typical Applications

- Protects the pump against dust and particles
- Compact forevacuum pump combination

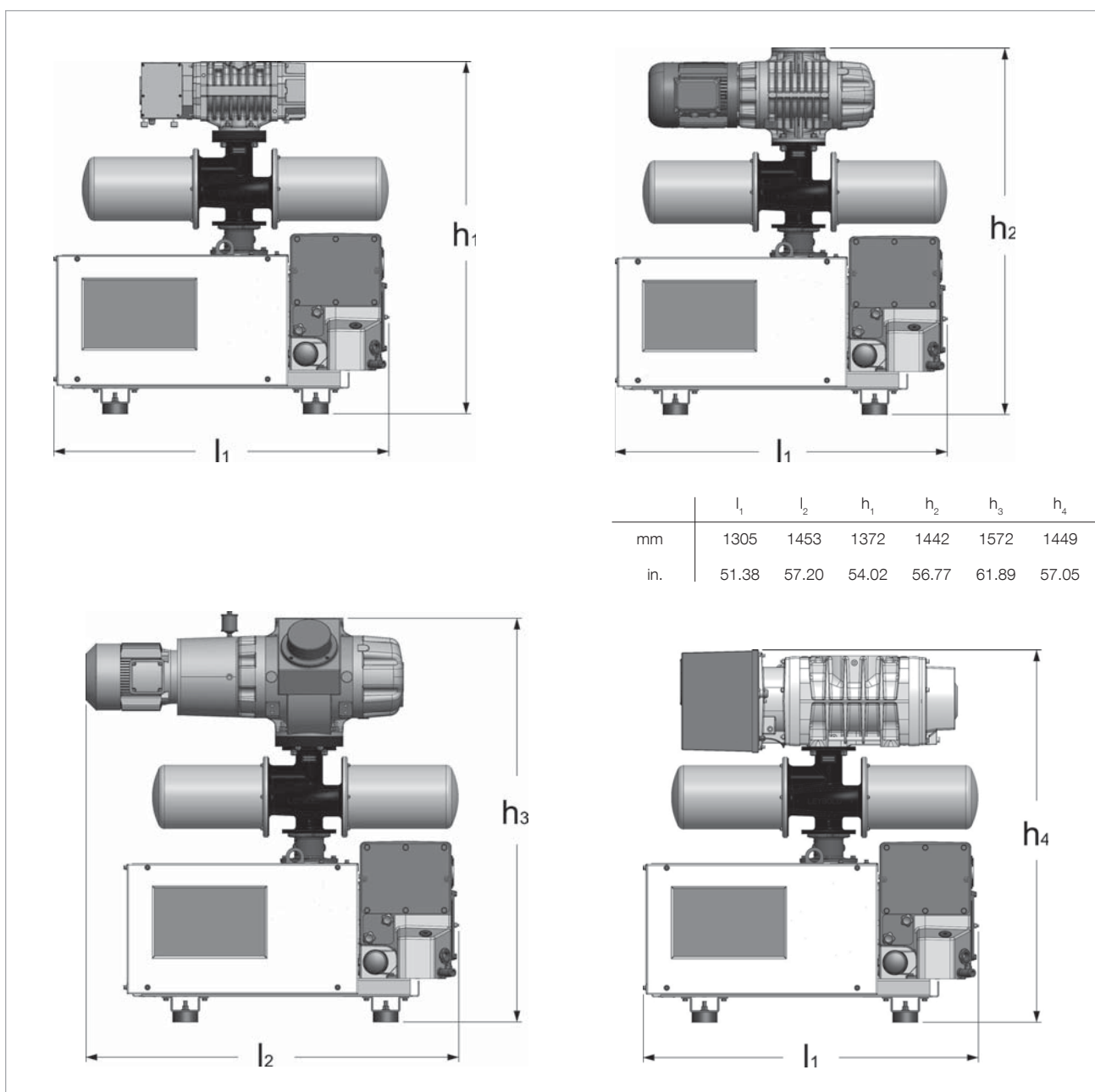
Advantages to the User

- No external frame required: costs and space savings
- Very compact combinations: space savings yet roughing pump protection
- Allows to have 2 different protection filters in series: more efficient filtration and longer filter life time
- No elbows, bellows, adapters required for filter mounting: cost savings



Dimensional drawing for the double inlet filter and Roots adapter TwinFilter 500

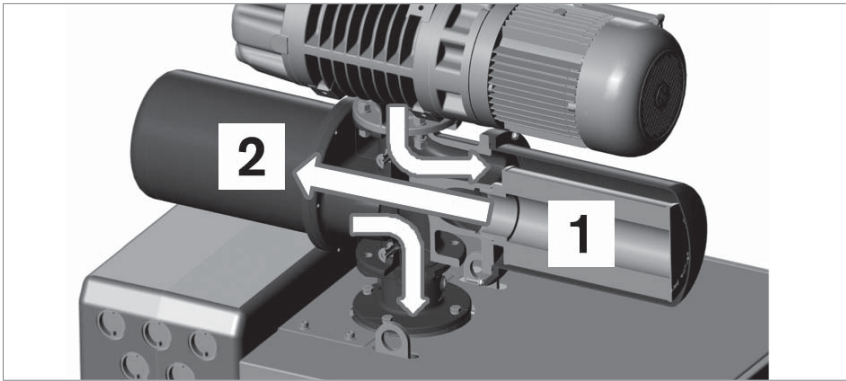
Adapter connection options



Ways in which to mount the Roots vacuum pump on the SOGEVAC SV 470 B(F) or SV 570 B(F)

Top left with RUVAC WH 700/702, top right with RUVAC WA(U)/WS(U) 1001,
bottom left with RUVAC WA(U) 2001, bottom right with RUVAC WH(U) 2500

Gas flow



Gas flow

The gas passes through the filter (1), then through the filter (2) and then enters the roughing pump.

Selection of the filter cartridges

| Filter type | Paper 2 mm | Polyester 2 µm | Polyester 25 µm | Metal 0,09 mm (0.004 in.) | Activated charcoal |
|---|------------|----------------|-----------------|---------------------------|--------------------|
| Applicationen | | | | | |
| Dry processes with dust, powders, chips etc.) | 2 | | 1 | | |
| Wet (vapor) processes with dust, powders, chips etc.) | | 2 | 1 | | |
| Heavy particles, plastics, glass, packaging materials, food stuff, etc. | | 2 | | 1 | |
| Vapors of high molecular weight (solvent, resin and acid vapors, alkaline solutions etc.) | | 2 | | | 1 |

1= Filter No. 1 in the diagram "Gas flow"

2= Filter No. 2 in the diagram "Gas flow"

Technical Data

Double Inlet Filter TwinFilter 500

| Double Inlet Filter and Roots Adapter TwinFilter 500 | Paper Cartridge | Polyester Filter Cartridge | Polyester Filter Cartridge | Metal Cartridge | Active Charcoal Cartridge |
|---|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Particle size / mesh | 2 µm | 2 µm | 25 µm | 0.09 mm (0.004 in.) | |
| Pumping speed ¹⁾ loss by new filters (approx.) | | | | | |
| 100 mbar (75.0 Torr) | < 1% | < 1% | < 1% | < 1% | < 1% |
| 10 mbar (7.5 Torr) | < 1% | < 1% | < 1% | < 1% | < 7% |
| 1 mbar (0.75 Torr) | < 13% | < 6% | < 4% | < 3% | < 33% |
| Efficiency for | | | | | |
| 2 µm particle | 98% | 98% | – | – | – |
| 5 µm particle | 99% | 99% | – | – | – |
| Weight | | | | | |
| Net max. kg (lbs) | 82 (181) | 82 (181) | 82 (181) | 82 (181) | 82 (181) |
| Cover kg (lbs) | < 10 (< 22) | < 10 (< 22) | < 10 (< 22) | < 10 (< 22) | < 10 (< 22) |
| Filter kg (lbs) | < 10 (< 22) | < 10 (< 22) | < 10 (< 22) | < 10 (< 22) | < 10 (< 22) |
| Material | Cast iron, steel, filter material | Cast iron, steel, filter material | Cast iron, steel, filter material | Cast iron, steel, filter material | Cast iron, steel, filter material |

¹⁾ Pumping speed loss of each filter adds up for the total loss

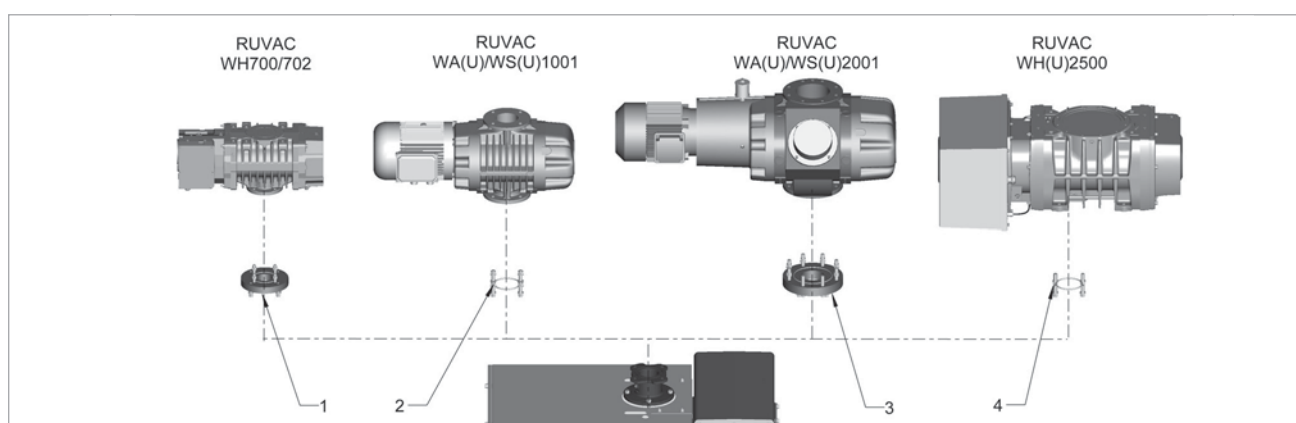
Ordering Information

Double Inlet Filter TwinFilter 500

| Double Inlet Filter and Roots Adapter TwinFilter 500 | Paper Cartridge 2 µm | Polyester Filter Cartridge 2 µm | Polyester Filter Cartridge 25 µm | Metal Cartridge 0.09 mm (0.004 in.) | Active Charcoal Cartridge |
|--|------------------------------|---------------------------------------|--|--|------------------------------|
| For fitting to SOGEVAC | SV 470 B(F) / SV 570 B(F) | SV 470 B(F) / SV 570 B(F) | SV 470 B(F) / SV 570 B(F) | SV 470 B(F) / SV 570 B(F) | SV 470 B(F) / SV 570 B(F) |
| Part No. 9516248PAPO with paper cartridge and polyester filter cartridge 2 µm | X | X | - | - | - |
| Part No. 9516248PP with polyester filter cartridge 2 µm and 25 µm | - | X | X | - | - |
| Part No. 9516248MAPO with polyester filter cartridge 2 µm and metall cartridge | - | X | - | X | - |
| Part No. 9516248CAPO with polyester filter cartridge 2 µm und aktive charcoal cartridge | - | X | - | - | X |
| Part No. 9516248V without filter | X | X | X | X | X |
| Spare inlet filter Part No. EK95162PA | X | - | - | - | - |
| Spare inlet filter Part No. EK95162PO2 | - | X | - | - | - |
| Spare inlet filter Part No. EK95162PO25 | - | - | X | - | - |
| Spare inlet filter Part No. EK95162MA | - | - | - | X | - |
| Spare inlet filter Part No. EK95162CA | - | - | - | - | X |

Oil Sealed
Vacuum Pumps

Roots adapter



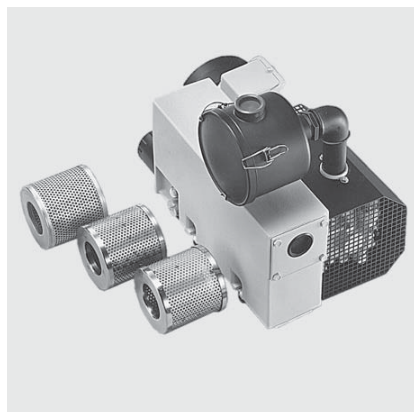
Roots adapter connections

Ordering Information

Roots adapter

| | Part No. |
|-------------------------------|-----------------|
| Adapter for Roots vacuum pump | |
| RUVAC WH 700/702 | 9516241V |
| RUVAC WA(U)/WS(U) 1001 | 9516242V |
| RUVAC WA(U)/WS(U) 2001 | 9516243V |
| RUVAC WH(U) 2500 | 9516244V |

Dust Filters (Suction Side)



SOGEVAC SV 40 with connected F 40 dust filter and different types of filter cartridges

The filters consist of a steel housing and a lid with three quick locking clips

Advantages to the User

- Same housing for different cartridges
- High separation capacity
- Quickly exchangeable cartridge

Paper Filter Cartridge (Standard)

- Separates particles down to 5 µm (Dry process: dust, powders, chips etc.)

Polyester Filter Cartridge

- Separation of particles down to 5 µm (Moist process: dust, powders, chips etc.)

| Type | | ø A | ø B | C | D | ø E | F | Weight (kg (lbs)) |
|-----------|-----|--------------|--------------|------|-------|-------|------|----------------------|
| F 16-25 | mm | G 1/2" | G 1/2" | 54 | 104 | 100 | 70 | 1 |
| | in. | G 1/2" | G 1/2" | 2.13 | 4.09 | 3.94 | 2.76 | 2.2 |
| F 40 | mm | G 1 1/4" | G 1 1/4" | 74 | 115 | 135 | 75 | 1.5 |
| | in. | G 1 1/4" | G 1 1/4" | 2.91 | 4.53 | 5.31 | 2.95 | 3.31 |
| F 65-100 | mm | G 1 1/4" | G 1 1/4" | 98 | 172 | 172 | 130 | 2 |
| | in. | G 1 1/4" | G 1 1/4" | 3.86 | 6.77 | 6.77 | 5.12 | 4.4 |
| F 200-300 | mm | G 2" | G 2" | 118 | 287 | 200 | 230 | 4.5 |
| | in. | G 2" | G 2" | 4.65 | 11.3 | 7.87 | 9.06 | 9.9 |
| F 200-300 | mm | 63 ISO-K | 63 ISO-K | 160 | 357 | 258 | 250 | 15 |
| | in. | 63 ISO-K | 63 ISO-K | 6.3 | 14.06 | 10.16 | 9.84 | 33.1 |
| F 630 | mm | DN 100 PN 10 | DN 100 PN 10 | 220 | 358 | 340 | 250 | 33 |
| | in. | DN 100 PN 10 | DN 100 PN 10 | 8.66 | 14.09 | 13.39 | 9.84 | 72.8 |
| F 630 | mm | 100 ISO-K | 100 ISO-K | 220 | 358 | 340 | 250 | 32 |
| | in. | 100 ISO-K | 100 ISO-K | 8.66 | 14.09 | 13.39 | 9.84 | 70.6 |
| F 1200 | mm | DN 125 PN 10 | DN 125 PN 10 | 225 | 498 | 340 | 250 | 44 |
| | in. | DN 125 PN 10 | DN 125 PN 10 | 8.86 | 19.61 | 13.39 | 9.84 | 1.73 |

Dimensional drawing for the dust filters F 16-25 to F 1200

Metal Filter Cartridge

- 0.08 mm (0.003 in.) mesh
- Collects solid particles down to 0.08 mm (0.003 in.) (plastics, paper, packaging materials, foodstuffs)

Activated Charcoal Cartridge

- Absorbs vapors of high molecular weight (solvent and acid vapors, alkaline solutions etc.)

Technical Notes

We recommend installing the filters horizontally on a 90° bend. This will prevent separated particles from falling into the intake line when disassembling the filter.

When using an activated charcoal filter it is recommended to also install a paper cartridge filter between the pump and the activated charcoal.

Technical Data**Dust Filter**

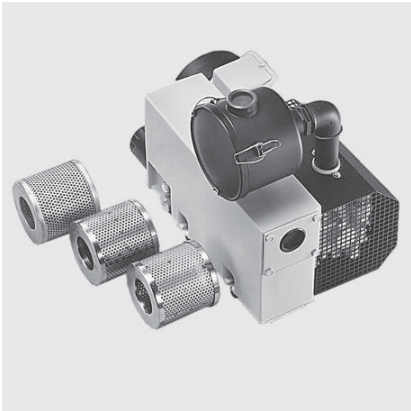
| Dust Filter | Paper Cartridge | Polyester Filter Cartridge | Metal Cartridge | Activated Charcoal Cartridge |
|--|-----------------|----------------------------|-----------------|------------------------------|
| Pumping speed reduction through a clean filter | 2% | 2% | 1% | 2% |
| Efficiency for 5 µm particles | 98% | 98% | – | – |

Ordering Information**Dust Filter**

| | Part No. | Part No. | Part No. | Part No. |
|--|-------------------|----------------------------|---------------------|------------------------------|
| Dust Filter | Paper Cartridge | Polyester Filter Cartridge | Metal Cartridge | Activated charcoal Cartridge |
| F 16-25 for pumps from 10 to 25 m³/h (G 1/2") | 951 50 | 711 27 094 | 711 27 093 | 711 27 092 |
| Spare cartridge for F 16-25 | 710 40 760 | 712 61 288 | E 710 65 813 | E 710 65 713 |
| F 40 for SV 40 B (G 1 1/4") | 951 55 | 711 27 104 | 711 27 103 | 711 27 102 |
| Spare cartridge for F 40 | 710 46 118 | 712 61 298 | 710 49 083 | 710 49 103 |
| F 65-100 for SV 65 B, SV 100 B (G 1 1/4") | 951 60 | 711 27 114 | 711 27 113 | 711 27 112 |
| Spare cartridge for F 65-100 | 712 13 283 | 712 61 308 | E 712 13 324 | E 712 13 304 |
| F 200-300 for SV 200, SV 300 B (G 2") | 951 65 | 711 27 124 | 711 27 123 | 711 27 122 |
| F 200-300 for SV 200, SV 300 B (DN 63 ISO-K) | 951 68 | 711 27 127 | 711 27 126 | 711 27 125 |
| Spare cartridge for F 200-300 (G 2" or DN 63 ISO-K) | 712 13 293 | 712 61 318 | 712 13 334 | E 712 13 314 |
| F 630 for SV 630 (B/F), SV 750 (B/F) (DN 100 PN 10) | 951 71 | 711 27 164 | 711 27 163 | 711 27 162 |
| F 630 for SV 630 (B/F), SV 750 (B/F) (DN 100 ISO-K) | 951 72 | 711 27 168 | 711 27 167 | 711 27 166 |
| Spare cartridge for F 630 (DN 100 PN 10 or DN 100 ISO-K) | 710 35 242 | 712 61 508 | E 710 37 734 | 710 37 724 |
| F 1200 for SV 1200 (DN 125 PN 10) | 951 75 | 711 27 144 | 711 27 143 | 711 27 142 |
| Spare cartridge for F 1200 (2x required) | 710 35 242 | 712 61 508 | E 710 37 734 | 710 37 724 |
| Spare Parts | | | | |
| Set of gaskets for F 16-25 | NBR (Buna N) | 714 10 820 | 714 10 820 | 714 10 820 |
| Set of gaskets for F 40 | NBR (Buna N) | 714 10 830 | 714 10 830 | 714 10 830 |
| Set of gaskets for F 65-100 | NBR (Buna N) | 714 10 840 | 714 10 840 | 714 10 840 |
| Set of gaskets for F 200-300 | NBR (Buna N) | 714 10 850 | 714 10 850 | 714 10 850 |
| O-ring gasket for F 630 / F 1200 | NBR (Buna N) | 712 41 032 | 712 41 032 | 712 41 032 |

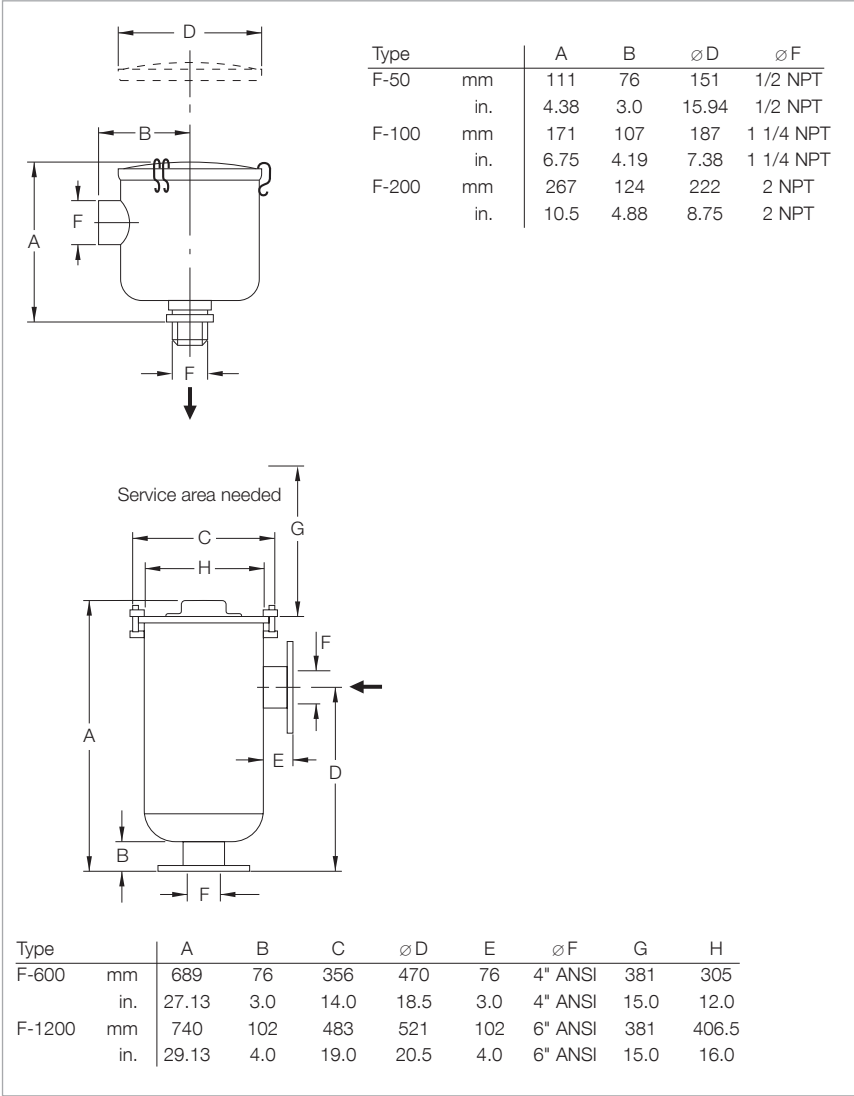
Only available for purchase in North and South America

Dust Filters F (Suction Side)



SOGEVAC SV 40 with connected F-100 dust filter and different types of filter cartridges

High efficiency F filters are recommended for use at the inlet of SOGEVAC rotary vane vacuum pumps for protection against process contaminants, e.g., fiberglass particles, plastic dusts, resins and food-processing by-products. The filters are available with easily replaceable cartridge elements for particle filtration of dusts and particulates down to one microns, or activated carbon elements for the adsorption of chemical vapor.



Dimensional drawings for the dust filters F 50 to F 200 (top) and F 600 to F 1200 (bottom)

Technical Data**Dust Filter**

| Dust Filter | Polyester Filter Cartridge | Metal Cartridge | Paper Cartridge | Activated Charcoal Cartridge |
|---|----------------------------|-----------------|-----------------|------------------------------|
| New cartridge pumping speed reduction | 2% | 1% | 2% | 2% |
| Efficiency for 1 µm particulates | 98% | – | 99% | – |
| Filter for SV 16 (B), SV 25 (B), UV 25 | – | – | F-50 | – |
| Filter for SV 40 (B), SV 65 (B), SV 100 (B) | – | F-100 | F-100 | F-100 |
| Filter for SV 200, 300 B | – | F-200 | F-200 | F-200 |
| Filter for SV 500 (B), 630 (B/F) | F-600 | – | – | – |
| Filter for SV 1200 | F-1200 | – | – | – |

Ordering Information**Dust Filter**

| | Part No. | Part No. | Part No. | Part No. |
|--------------------------------|----------------------------|-------------------|-------------------|------------------------------|
| Dust Filter | Polyester Filter Cartridge | Metal Cartridge | Paper Cartridge | Activated Charcoal Cartridge |
| F-50 | – | – | 899 460 | – |
| Replacement element for F-50 | – | – | E 899 461 | – |
| F-100 | – | 898 527 | 898 528 | 898 529 |
| Replacement element for F-100 | – | 704 44 400 | 704 13 901 | 704 13 906 |
| F-200 | – | 898 530 | 898 531 | 898 532 |
| Replacement element for F-200 | – | 704 45 400 | 704 14 901 | 704 14 908 |
| F-600 | 898 470 | – | – | – |
| Replacement element for F-600 | 898 471 | – | – | – |
| F-1200 | 898 475 | – | – | – |
| Replacement element for F-1200 | 898 476 | – | – | – |

SL Liquid Traps



SOGEVAC SV 40 with SL 40 liquid trap

The SL 16-25 liquid trap consists of a collection vessel made of transparent plastic.

Liquid traps SL 40 to SL 1200 are welded steel collection vessels acting as liquid traps. These are equipped with connecting threads.

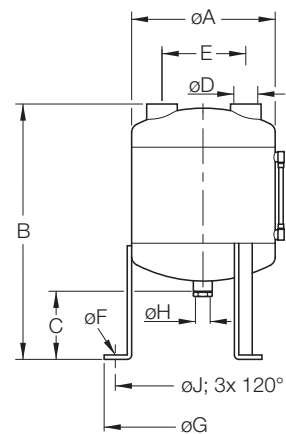
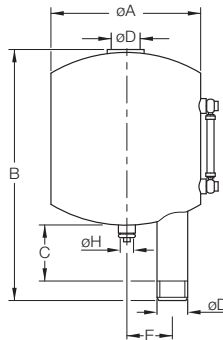
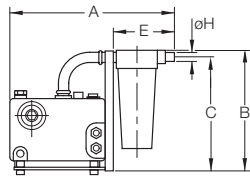
Liquid traps SL 630 and SL 1200 are equipped with a cleaning port DN 150 PN 10.

Advantages to the User

- Protection of the pumps against liquids which might condense in the intake or the exhaust line when pumping vapors

Technical Notes

The liquid traps are equipped with a sight glass tube, so that it is easy to determine when to empty the vessels. The liquid drain is sealed by a screw-in cap. This cap may be replaced by a drain valve.



| Type | | A | ø A | B | C | ø D | E | ø F | ø G | ø J | ø H |
|------------|-----|-------|-------|-------|-------|------------|-------|------|-------|-------|----------|
| SL 16-25 | mm | 465 | — | 347 | 327 | — | 202 | — | — | — | 25 |
| | in. | 18.31 | — | 13.66 | 12.87 | — | 7.95 | — | — | — | 0.98 |
| SL 40 | mm | — | 200 | 350 | 100 | G 1 1/4" | 60 | — | — | — | G 1/2" |
| | in. | — | 7.87 | 13.78 | 3.94 | G 1 1/4" | 2.36 | — | — | — | G 1/2" |
| SL 65-100 | mm | — | 300 | 510 | 150 | G 1 1/4" | 170 | 12 | 400 | 360 | G 1/2" |
| | in. | — | 11.81 | 20.08 | 5.91 | G 1 1/4" | 6.69 | 0.47 | 15.75 | 14.17 | G 1/2" |
| SL 200-300 | mm | — | 300 | 865 | 150 | G 2" | 170 | 12 | 400 | 360 | G 1/2" |
| | in. | — | 11.81 | 34.06 | 5.91 | G 2" | 6.69 | 0.47 | 15.75 | 14.17 | G 1/2" |
| SL 630 | mm | — | 550 | 900 | 210 | DN100 PN10 | 300 | 9 | 600 | 514 | G 1 1/4" |
| | in. | — | 21.65 | 35.43 | 8.27 | DN100 PN10 | 11.81 | 0.35 | 23.62 | 20.24 | G 1 1/4" |
| SL 1200 | mm | — | 550 | 900 | 133 | DN125 PN10 | 300 | 9 | 600 | 514 | G 1 1/4" |
| | in. | — | 21.65 | 35.43 | 5.24 | DN125 PN10 | 11.81 | 0.35 | 23.62 | 20.24 | G 1 1/4" |

Dimensional drawings for the liquid traps; SL 16-25 (left), SL 40 (middle) and SL 65-100 up to SL 1200 (right)

Technical Data

| | | SL 16-25 | Liquid Traps SL 40 | SL 65-100 |
|---------------------|----------|---------------------------------|-------------------------------|--------------------|
| For pump | SOGEVAC | for pumps from 10 to 25 m³/h | SV 40 B | SV 40 B/65 B/100 B |
| Condensate capacity | l (qt) | 2.0 (2.1) | 4.0 (4.2) | 16.0 (16.9) |
| Weight | kg (lbs) | 3.5 (7.7) | 5.0 (11.0) | 11.0 (24.3) |

Ordering Information

| | | SL 16-25 | Liquid Traps SL 40 | SL 65-100 |
|--|--|-----------------|-------------------------------|--------------------|
| | | Part No. | Part No. | Part No. |
| Liquid trap | | 951 38 | 951 40 | 951 42 |
| Liquid trap with electrical level switch | | - | - | 951 429 901 |
| Drain valve | | - | 711 30 111 | 711 30 113 |

Technical Data

| | | SL 200-300 | Liquid Traps SL 630 | SL 1200 |
|---------------------|----------|-------------------|--------------------------------|----------------------------|
| For pump | SOGEVAC | SV 200/300 B | SV 500/630/750 (B)(F) | SV 500/630/750 (B)(F)/1200 |
| Condensate capacity | l (qt) | 40.0 (42.3) | 80.0 (84.6) | 80.0 (84.6) |
| Weight | kg (lbs) | 17.0 (37.5) | 58.0 (127.9) | 59.0 (130.1) |

Ordering Information

| | | SL 200-300 | Liquid Traps SL 630 | SL 1200 |
|--|--|------------------------|--------------------------------|-------------------|
| | | Part No. | Part No. | Part No. |
| Liquid trap | | 951 44 | 951 47 | 951 48 |
| Liquid trap with electrical level switch | | 951 449 900 001 | - | - |
| Drain valve | | 711 30 113 | 711 30 105 | 711 30 105 |
| Double spigot for drain valve | | - | 711 18 033 | 711 18 033 |

Only available for purchase in North and South America

Technical Data

| | | SL 16-25 | Liquid Traps SL 40 | SL 65-100 |
|---------------------|----------|---------------------------------|-------------------------------|--------------------|
| For pump | SOGEVAC | for pumps from 10 to 25 m³/h | SV 40 B | SV 40 B/65 B/100 B |
| Condensate capacity | l (qt) | 2.0 (2.1) | 4.0 (4.2) | 16.0 (16.9) |
| Weight | kg (lbs) | 3.5 (7.7) | 5.0 (11.0) | 11.0 (24.3) |

Ordering Information

| | | SL 16-25 | Liquid Traps SL 40 | SL 65-100 |
|--|--|---------------------|-------------------------------|---------------------|
| | | Part No. | Part No. | Part No. |
| Liquid trap | | 951 38 (BSP) | 951 40 (NPT) | 951 43 (NPT) |
| Liquid trap with electrical level switch | | - | - | 951 429 901 |
| Drain valve | | - | 711 30 111 | 711 30 113 |

Technical Data

| | | SL 200-300 | Liquid Traps SL 630 | SL 1200 |
|---------------------|----------|-------------------|--------------------------------|----------------------------|
| For pump | SOGEVAC | SV 200/300 B | SV 500/630/750 (B)(F) | SV 500/630/750 (B)(F)/1200 |
| Condensate capacity | l (qt) | 40.0 (42.3) | 80.0 (84.6) | 80.0 (84.6) |
| Weight | kg (lbs) | 17.0 (37.5) | 58.0 (127.9) | 59.0 (130.1) |

Ordering Information

| | | SL 200-300 | Liquid Traps SL 630 | SL 1200 |
|--|--|------------------------|--------------------------------|---------------------|
| | | Part No. | Part No. | Part No. |
| Liquid trap | | 951 45 (NPT) | 951 47 (BSP) | 951 48 (BSP) |
| Liquid trap with electrical level switch | | 951 449 900 001 | - | - |
| Drain valve | | 711 30 113 | 711 30 105 | 711 30 105 |
| Double spigot for drain valve | | - | 711 18 033 | 711 18 033 |

SEP Separators / SEPC Condensers



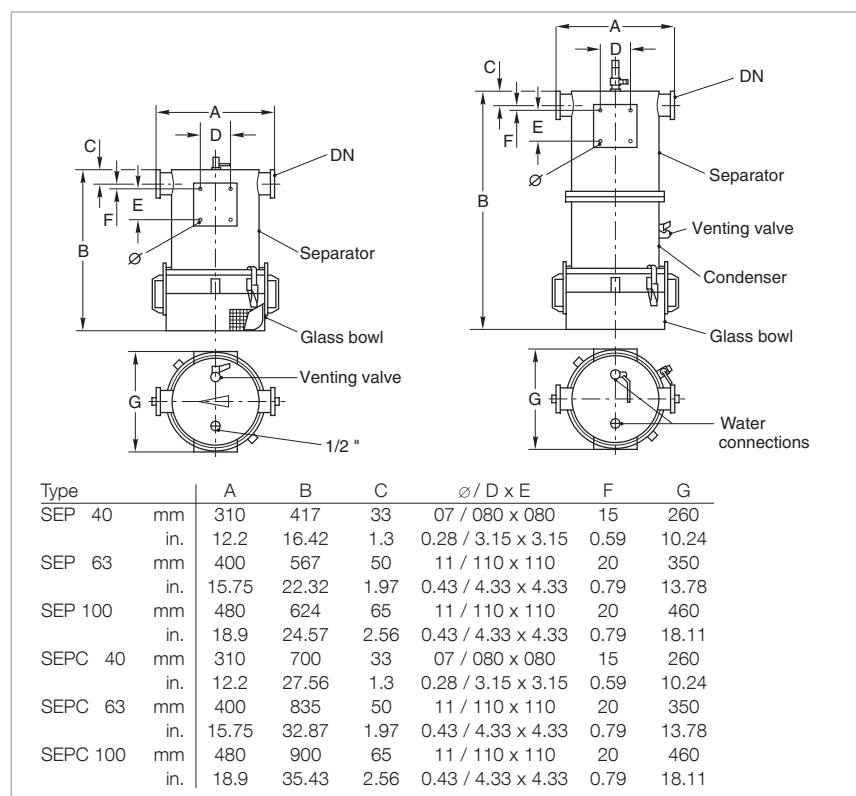
The separators from the SEP and the condensers from the SEPC range have been designed to be integrated in the vacuum circuit. They are employed in all those cases where the pumped gases may contain liquid drops (SEP), condensable vapors (SEPC) or solid particles which may impair proper operation of the pumps.

Advantages to the User

- Large capacity for solids
- Large condensation surface (SEPC)
- Visible level
- Easy to disassemble for cleaning
- Easy to drain, even in the presence of solids

Typical Applications

- Draining (SEP)
- Packaging (SEP)
- Conveying/filling under vacuum (SEP/SEPC)
- Drying (SEPC)
- Degassing (SEPC)
- and many more



Dimensional drawings for the separators (left) and condensers (right)

Technical Data**Separator**

| | | SEP 40 | SEP 63 | SEP 100 |
|----------------------|----------|--------------------|---------------|----------------|
| For pump | SOGEVAC | SV 40 B/65 B/100 B | SV 200/300 B | SV 630 (F)/750 |
| Connection flange | DN | 40 ISO-KF | 63 ISO-K | 100 ISO-K |
| Capacity of the bowl | l (qt) | 6.0 (6.3) | 12.0 (12.7) | 12.0 (12.7) |
| Weight | kg (lbs) | 15.0 (33.1) | 20.0 (44.1) | 40.0 (88.2) |

Ordering Information**Separator**

| | SEP 40 | SEP 63 | SEP 100 |
|------------------------|-------------------|-------------------|-------------------|
| | Part No. | Part No. | Part No. |
| Steel design | 953 54 | 953 56 | 953 60 |
| Stainless steel design | 953 55 | 953 57 | 953 61 |
| Support | 712 43 380 | 712 43 380 | 712 43 380 |

Technical Data**Condenser**

| | | SEPC 40 | SEPC 63 | SEPC 100 |
|---------------------------------------|----------------|--------------------|----------------|-----------------|
| For pump | SOGEVAC | SV 40 B/65 B/100 B | SV 200/300 B | SV 630 (F)/750 |
| Connection flange | DN | 40 ISO-KF | 63 ISO-K | 100 ISO-K |
| Capacity of the bowl | l (qt) | 6.0 (6.3) | 12.0 (12.7) | 12.0 (12.7) |
| Condensation area | m ² | 2.5 | 5.0 | 5.0 |
| Condensation capacity ¹⁾ | l/h | 10 | 20 | 20 |
| Cooling water flow rate ²⁾ | l/h | 1500 | 3000 | 3000 |
| Water connection dia. | mm (in.) | 19.0 (0.75) | 19.0 (0.75) | 19.0 (0.75) |
| Weight | kg (lbs) | 30.0 (66.2) | 40.0 (88.2) | 65.0 (143.3) |

Ordering Information**Condenser**

| | SEPC 40 | SEPC 63 | SEPC 100 |
|------------------------|-------------------|-------------------|-------------------|
| | Part No. | Part No. | Part No. |
| Steel design | 953 64 | 953 66 | 953 68 |
| Stainless steel design | 953 65 | 953 67 | 953 69 |
| Support | 712 43 380 | 712 43 380 | 712 43 380 |

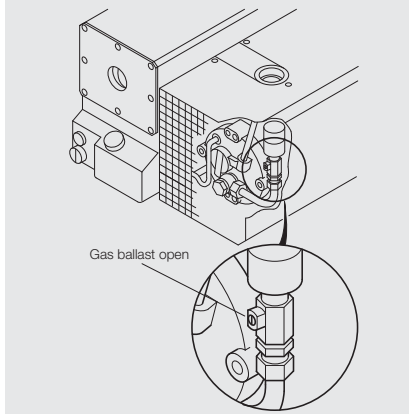
¹⁾ For water vapor at a vapor pressure of 60 mbar (45 Torr)

²⁾ Cooling water at a supply temperature of 10 °C (50 °F) and a discharge temperature < 15 °C (< 59 °F)

Remark: The stainless steel condensers have a copper heat exchanger coil

If required, the following products from the Catalog Part "Oil Sealed Vacuum Pumps TRIVAC" can be used for the small pumps SOGEVAC SV 10 to SV 25: condensate traps / separator AK, chapter "Accessories for TRIVAC".
Condensers for the large pump SOGEVAC SV 1200 upon request

Gas Ballast Valve



The pumps SOGEVAC SV 10 B, SV 16 B and SV 25 B are equipped depending of their Part No. without or with a permanent gas ballast.

The pumps SOGEVAC SV 16, SV 25, SV 40 B, SV 65 B, SV 100 B, SV 500 B(F), SV 630 B(F) and SV 750 B(F) are equipped depending of their Part No. without or with a manual, permanent or solenoid gas ballast.

The SV 1200 is equipped as standard with two manual gas ballast valves.

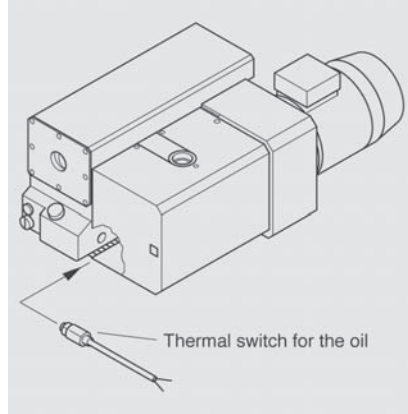
The gas ballast valve may also easily be retrofitted to the SV 40, SV 65, SV 100, SV 200 and SV 300 (either standard, large or solenoid).

Technical Notes

The gas ballast valve permits pumping of condensable vapors.

The permissible quantities of water are stated in the technical data section.

Thermal Switch



The thermal switch is installed at the hottest point of the pump module. It responds as soon as the temperature of the pump exceeds the maximum operating temperature. This accessory is recommended when operating the pump at high ambient temperatures.

Ratings for the normally closed contact:

25 V AC, 50 Hz - 5 A

60 V DC - 3 A

The SV 500, SV 630, SV 750 B(F) and SV 1200 include this switch as a standard.

Ordering Information

Accessories

| | Part No. | Part No. | Part No. | Part No. | Part No. |
|---|-------------------|---------------|--------------------------------|---------------------|---------------------|
| For pump SOGEVAC | SV 16 (B)/25 | SV 16 BI | SV 25 B | SV 28 BI | SV 40 B |
| Gas ballast valve (standard) | integrated | ¹⁾ | integrated | 971 462 640 | ²⁾ |
| Thermal switch | – | ²⁾ | ²⁾ | upon request | ³⁾ |
| Oil level monitor | 711 19 108 | ²⁾ | ²⁾ | upon request | 711 19 110 |
| Gas ballast big | – | ²⁾ | ²⁾ ⁵⁾ | – | ⁴⁾ |
| Gas ballast, electromagnetic with 24 V DC valve | – | – | – | upon request | upon request |
| Exhaust filter monitoring switch | – | – | – | – | 971 425 890 |

Ordering Information

Accessories

| | Part No. | Part No. | Part No. | Part No. |
|---|---------------------|---------------------|---------------------|--------------------------|
| For pump SOGEVAC | SV 40 BI | SV 65 B | SV 100/120 B | SV 200 ^{3), 8)} |
| Gas ballast valve (standard) | ¹⁾ | ¹⁾ | ¹⁾ | 951 29 |
| Thermal switch | ³⁾ | ³⁾ | ³⁾ | 951 36 |
| Oil level monitor | 711 19 110 | 711 19 110 | 711 19 110 | 953 96 |
| Gas ballast, big | – | ⁶⁾ | ⁷⁾ | 951 30 |
| Gas ballast, electromagnetic with 24 V DC valve | upon request | upon request | upon request | 951 31 |
| Exhaust filter monitoring switch | 971 425 890 | 971 425 890 | 971 425 890 | 712 22 360 |

Ordering Information

Accessories

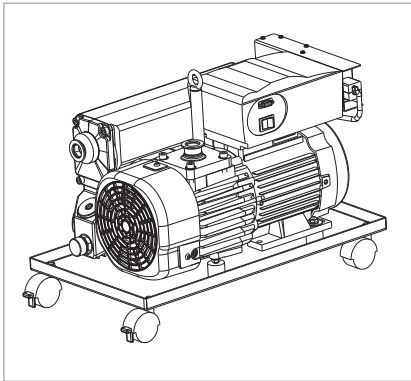
| | Part No. | Part No. | Part No. |
|---|----------------------------------|--|-----------------------------------|
| For pump SOGEVAC | SV 300 B | SV 500 B(F), SV 630 B(F), 750 B(F) ^{3), 8)} | SV 1200 |
| Gas ballast valve (standard) | 971 464 130 ⁹⁾ | integrated (24 V DC) | integrated (manual) |
| Thermal switch | 971 463 930 | integrated | integrated |
| Oil level monitor | upon request | 971 425 760 | 953 99 |
| Gas ballast kit | 971 464 130 ⁹⁾ | – | – |
| Gas ballast, electromagnetic with 24 V DC valve | upon request | 971 438 170 | upon request ³⁾ |
| Exhaust filter monitoring switch | upon request | 712 22 360 | 712 22 360 |

¹⁾ According to variant²⁾ Can not be retrofitted³⁾ Please state when ordering the pump⁴⁾ See pump with Part No. 960 305 V 2040⁵⁾ See pump with Part No. 960 251 V 2040⁶⁾ See pump with Part No. 960 405 V 0040⁷⁾ See pump with Part No. 960 505 V 2040⁸⁾ Second gas ballast possible. Contact Oerlikon Leybold Vacuum⁹⁾ SV 300 B gas ballast kit (Part No. 971 464 130) includes all parts for small, standard and big gas flow

Mobile Base Frame



Mobile base frame

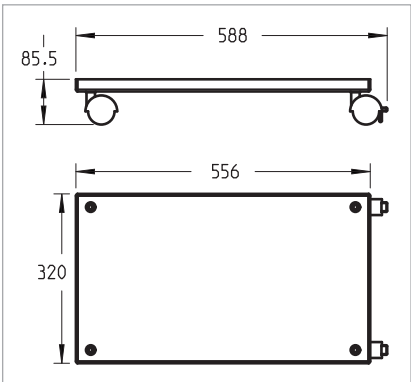


SOGEVAC pump upon mobile base frame

The mobile base frame allows moving easily single and double stage rotary vane pumps up to 65 m³/h and facilitates therefore their maintenance.

The oil tight base frame allows to hold up to 2 l (2,1 qt) oil and has swivable casters of which 2 have breaks.

The base frame doesn't alter the pump noise and facilitates oil draining and pump displacement.



Dimensional drawing for the mobile base frame

Technical Data

| | | |
|---------------------------|----------|-----------------|
| Net weight, approx. | kg (lbs) | 3 (7) |
| Max. load | kg (lbs) | 90 (200) |
| Oil recovery volume, max. | l (qt) | 2 (2.1) |
| Caster diameter | mm (in) | 50 (2) |
| Material oil pan | | Stainless steel |

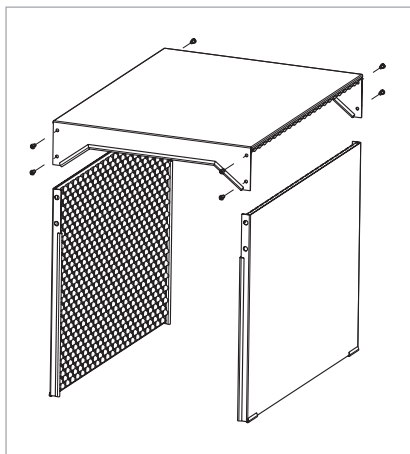
Mobile Base Frame

Ordering Information

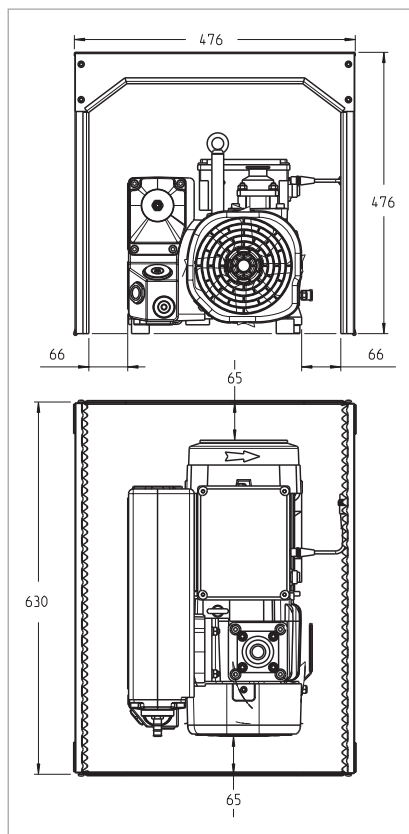
Mobile Base Frame

| | | Part No. |
|-------------------|---------|---|
| For pump | SOGEVAC | Single and double stage pumps up to 65 m³/h |
| Mobile base frame | | 960 331 BASE |

Noise Enclosure



Noise enclosure



Dimensional drawing for the noise enclosure

Oerlikon Leybold Vacuum has developed a specific noise enclosure for vacuum pumps, which reduce the noise level by approx. 5 dB(A) and which makes sure the pump doesn't overheat due to the open design on both sides.

A combination with the mobile base frame is possible.

Technical Data

| | | |
|---|----------|------------------------------------|
| Net weight, approx. | kg (lbs) | 5 (11) |
| Noise reduction, approx. | dB(A) | 5 |
| Temperature increase below top, max. | °C (°F) | 7 (45) |
| Ambient temperature , max. | °C (°F) | 34 (93) |
| Material frame absorption foam material | | Galvanised steel acc. UL-94 HF1 |

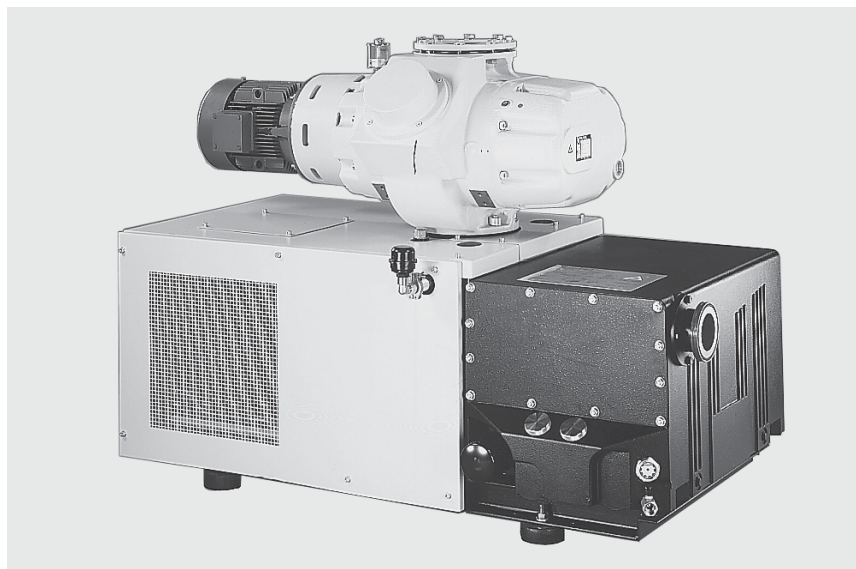
Noise Enclosure

Ordering Information

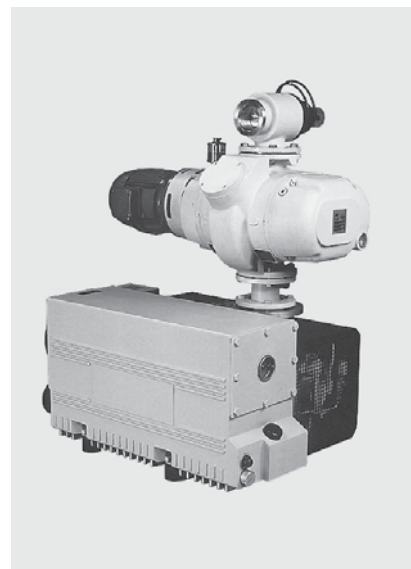
Noise Enclosure

| | | Part No. | Part No. |
|-----------------|---------|---|--|
| For pumps | SOGEVAC | Single stage rotary vane pumps up to 65 m³/h and double stage rotary vane pumps up to 25 m³/h — | — Single stage rotary vane pumps up to 120 m³/h and double stage rotary vane pumps up to 65 m³/h |
| Noise enclosure | | 960 331 NENC | 960 560 NENC |

Mounting Accessories



SOGEVAC SV 630 F with RUVAC WAU 2001



SOGEVAC SV 200 with RUVAC WAU 501

Ordering Information

Mounting Accessories

| | | Part No. | Part No. | Part No. | Part No. | Part No. |
|-----------------------------------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|
| For pump | SOGEVAC | SV 16 BI | SV 25 B | SV 28 BI | SV 40 B | SV 40 BI |
| Oil drain valve G 3/4" | | 711 30 114 | 711 30 114 | 711 30 114 | 711 30 114 | 711 30 114 |
| Base frame for Roots installation | | not possible | not possible | not possible | not possible | not possible |

Ordering Information

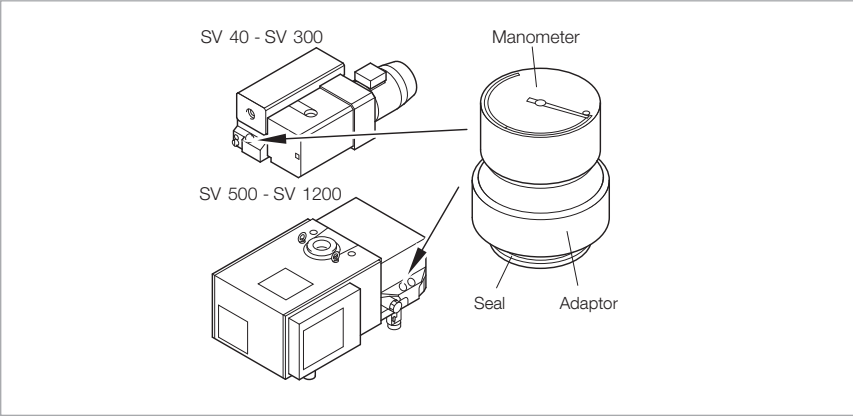
Mounting Accessories

| | | Part No. | Part No. | Part No. | Part No. |
|-----------------------------------|---------|--------------------|----------------------------------|---------------------------------|---------------------|
| For pump | SOGEVAC | SV 40 + SV 65 B | SV 100 B | SV 200 | SV 300 B |
| Base frame | | 971 453 840 | 971 434 000 | 711 19 208 | 711 19 208 |
| Oil drain valve G 3/4" | | 711 30 114 | 711 30 114 | 711 30 114 | 711 30 114 |
| Bracket for electric connections | | – | – | 711 19 226 | upon request |
| Base frame for Roots installation | | not possible | 971 448 830 ¹⁾ | 711 19 209 ²⁾ | 971 456 590 |

¹⁾ Mandatory for direct Roots mounting

²⁾ Required for mounting the WAU 1001 on to the SV 200

Exhaust Filter Gauge



The manometer (40 mm (1.58 in.) dia.), glued in the adapter, is installed instead of the oil filling plug. Dial has 2 colors:

green: 1000 < p < 1450 mbar abs.
 (760 < p< 1090 Torr abs.)
 Exhaust filter OK

red: p > 1450 mbar abs.
 (> 1090 Torr abs.)
 Exhaust filter clogged

Technical Notes

The reliability of the manometer applies only provided the pump has attained its operating temperature and when the intake pressure is high.

Ordering Information

Exhaust Filter Gauge

| | | Part No. | Part No. | Part No. |
|-----------------------------------|---------|--|---|-----------------------|
| For pump | SOGEVAC | SV 10 B to SV 65 B, SV 16 BI, SV 28 BI and SV 40 BI | SV 100 B to SV 300 B, SV 500 B(F) to SV 750 B(F) | SV 1200 ¹⁾ |
| Manometer (with adaptor and seal) | | 951 93 | 951 94 | 951 95 |

¹⁾ Not visible from outside

Ball Valves and Valves



Ball valve 1 1/4"

Advantages to the User

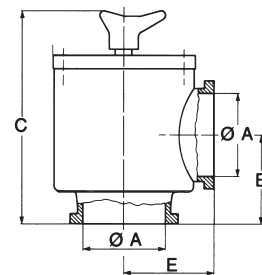
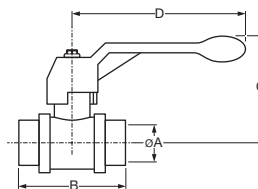
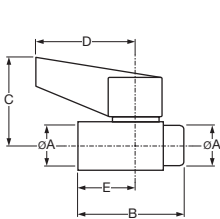
- Leak rate $< 1 \times 10^{-6} \text{ mbar} \times \text{l} \times \text{s}^{-1}$
($\leq 0.75 \times 10^{-6} \text{ Torr} \times \text{l} \times \text{s}^{-1}$)
- Seals on both sides against the atmosphere
- Opens against atmospheric pressure
- Small size
- Simple and quick to operate
- Pressure range from 10^{-2} to 1000 mbar (0.75×10^{-2} to 750 Torr)
- Smaller models serve as venting valves

Information on the blocking components is provided in the Catalog Part "Vacuum Valves".

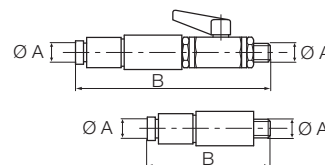
Material

The housing of the ball valves is made of brass, the ball of hard-chrome plated brass, the valve seat of PTFE.

The housing of the right angle valve is made of aluminium, the spindle and valve plate are sealed with an O-ring and are made of stainless steel.



| Type | | Ø A | B | C | D | E |
|--------------------|-----|-----------|------|-------|------|------|
| Ball valve | mm | G 3/8" | 45 | 38 | 43 | 25 |
| | in. | G 3/8" | 1.77 | 1.5 | 1.69 | 0.98 |
| Ball valve | mm | G 1/2" | 53 | 44 | 50 | 29 |
| | in. | G 1/2" | 2.09 | 1.73 | 1.97 | 1.14 |
| Ball valve | mm | G 1 1/4" | 103 | 96 | 140 | — |
| | in. | G 1 1/4" | 4.06 | 3.8 | 5.51 | — |
| Ball valve | mm | G 2" | 134 | 120 | 175 | — |
| | in. | G 2" | 5.28 | 4.72 | 6.89 | — |
| Right-angle valve | mm | 100 ISO-K | — | 345 | — | 108 |
| | in. | 100 ISO-K | — | 13.58 | — | 4.25 |
| Control valve | mm | G 1/2" | 128 | — | — | — |
| | in. | G 1/2" | 5.04 | — | — | — |
| Control valve with | mm | G 1/2" | 175 | — | — | — |
| blocking valve | in. | G 1/2" | 6.89 | — | — | — |



Dimensional drawings for the ball valves; G 3/8" and G 1/2" (left), G 1 1/4" and G 2" (middle), right-angle valves (right) and for the control valves (bottom)

Technical Data**Ball Valves and Valves ¹⁾**

| Type | | Ball valve | Ball valve | Ball valve |
|------------|----------|--------------|--------------|----------------|
| Connection | | F/M 3/8" BSP | F/M 1/2" BSP | F/F 1 1/4" BSP |
| Weight | kg (lbs) | 0.12 (0.3) | 0.15 (0.33) | 1.24 (2.7) |

Ordering Information**Ball Valves and Valves ¹⁾**

| | Part No. | Part No. | Part No. |
|------|--------------------|-------------------|-------------------|
| Type | Ball valve | Ball valve | Ball valve |
| | 971 471 220 | 711 30 113 | 711 30 100 |

Technical Data**Ball Valves and Valves ¹⁾**

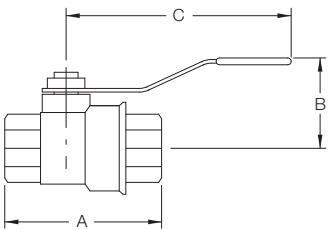
| Type | | Ball valve | Right-angle valve | Control valve | Control valve with blocking valve |
|------------|----------|------------|-------------------|---------------|-----------------------------------|
| Connection | | F/F 2" BSP | DN 100 ISO-K | F/M 1/2" BSP | F/M 1/2" BSP |
| Weight | kg (lbs) | 3.22 (7.1) | 8.0 (17.6) | 0.135 (0.3) | 0.369 (0.81) |

Ordering Information**Ball Valves and Valves ¹⁾**

| | Part No. | Part No. | Part No. | Part No. |
|------|-------------------|-------------------|---------------|-----------------------------------|
| Type | Ball valve | Right-angle valve | Control valve | Control valve with blocking valve |
| | 711 30 107 | 107 81 | 951 86 | 951 87 |

¹⁾ Special versions for oxygen applications are available upon request

Only available for purchase in North and South America



| Type | | ∅ A | B | C |
|-------|-----|------|------|-----|
| BV50 | mm | 54 | 41 | 102 |
| | in. | 2.13 | 1.63 | 4.0 |
| BV100 | mm | 102 | 67 | 140 |
| | in. | 4.0 | 2.63 | 5.5 |

Dimensional drawing for the ball valves BV

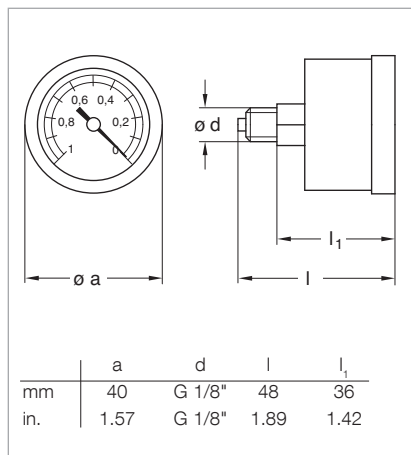
Technical Data**Ball Valves**

| Type | Ball valve | Ball valve |
|------------|-----------------|-------------------|
| Connection | 1/2-inch NPT(F) | 1 1/4-inch NPT(F) |

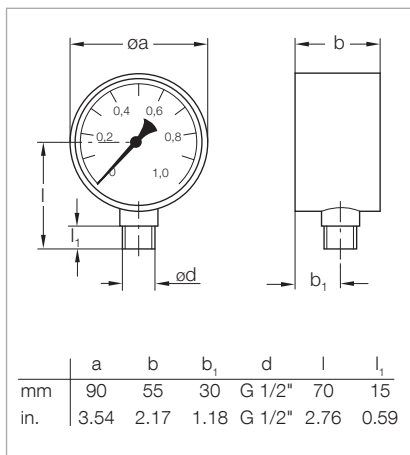
Ordering Information**Ball Valves**

| | Part No. | Part No. |
|------|----------------|----------------|
| Type | BV50 | BV100 |
| | 899 810 | 899 800 |

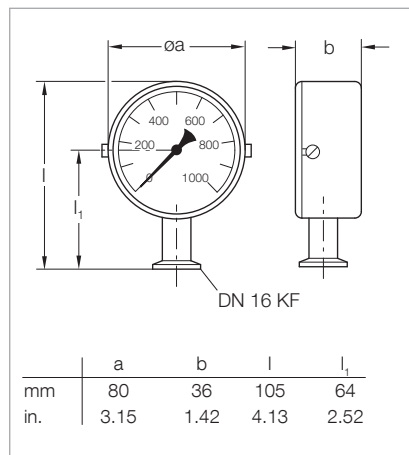
Bourdon Vacuum Gauges / DIAVAC DV 1000



Dimensional drawing for the
Bourdon vacuum gauge Part No. 951 90



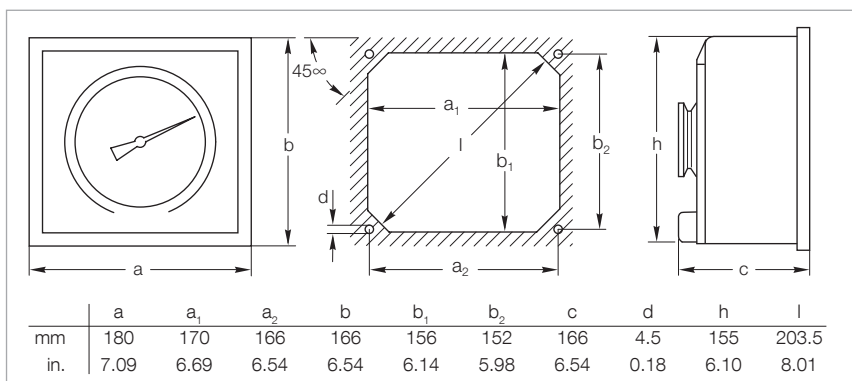
Dimensional drawing for the
Bourdon vacuum gauge Part No. 951 92



Dimensional drawing for the
Bourdon vacuum gauge Part No. 160 40



DIAVAC DV 1000



Dimensional drawing and panel cut-out for the DIAVAC DV 1000, Part No. 160 67

Advantages to the User

- Simple, rugged and vibration insensitive vacuum gauges for the rough vacuum range
- Linear response
- Clear dial which can also be read from a great distance
- Readings independent of atmospheric pressure

Technical Data

Bourdon Vacuum Gauges / DIAVAC DV 1000

| | | | | | |
|-------------------|----------|------------------------|------------------------------|------------------------------|------------------------------|
| Measuring range | | 0 to 100% | 0 to 1 bar | 0 to 1020 mbar | 1 to 1000 mbar |
| Vacuum connection | | M 1/8" BSP | M 1/2" BSP | DN 16 ISO-KF | DN 40 ISO-KF |
| Scale length | mm (in.) | 55 (2.17) | 140 (5.51) | 140 (5.51) | 270 (10.63) |
| Overall height | mm (in.) | 48 (1.89) | 115 (4.53) | 105 (4.13) | 166 (6.54) |
| Weight | g (lbs) | 60 (0.13) | 560 (1.24) | 300 (0.66) | 2700 (5.96) |
| Indication | | low pressure in bar | absolute pressure in mbar | absolute pressure in mbar | absolute pressure in mbar |

Ordering Information

Bourdon Vacuum Gauges / DIAVAC DV 1000

| | Part No. | Part No. | Part No. | Part No. |
|-----------------------|---------------|---------------|---------------|---------------|
| Bourdon Vacuum Gauges | 951 90 | 951 92 | 160 40 | - |
| DIAVAC DV 1000 | - | - | - | 160 67 |

Standard vacuum gauge for all SOGEVAC pumps is Part No. 951 92.

Further information on other vacuum gauges is provided in Catalog Part "Vacuum measuring - controlling"

Only available for purchase in North and South America

Other Accessories

External Carbon Exhaust Filters

An external type spin-on filter made of activated carbon on a polyester cloth housed in wire mesh. Used for providing additional protection from oil odor or mist expelled from pump exhaust.

Requires NPT type nipple and street elbow for preferred vertical mounting. SV 16/25 requires nipple only.

Technical Data

| | | | | |
|-------------|---------|----------------|----------------------------|------------|
| Model | | SVXCXF 50 | SVXCXF 100 | SVXCXF 200 |
| Fits pump | SOGEVAC | SV 16 / 25 (B) | SV 40 B / 65 B SV 100 B | SV 200/300 |
| Thread size | | 1/2" NPT-M | 1 1/4" NPT-M | 2" NPT-M |

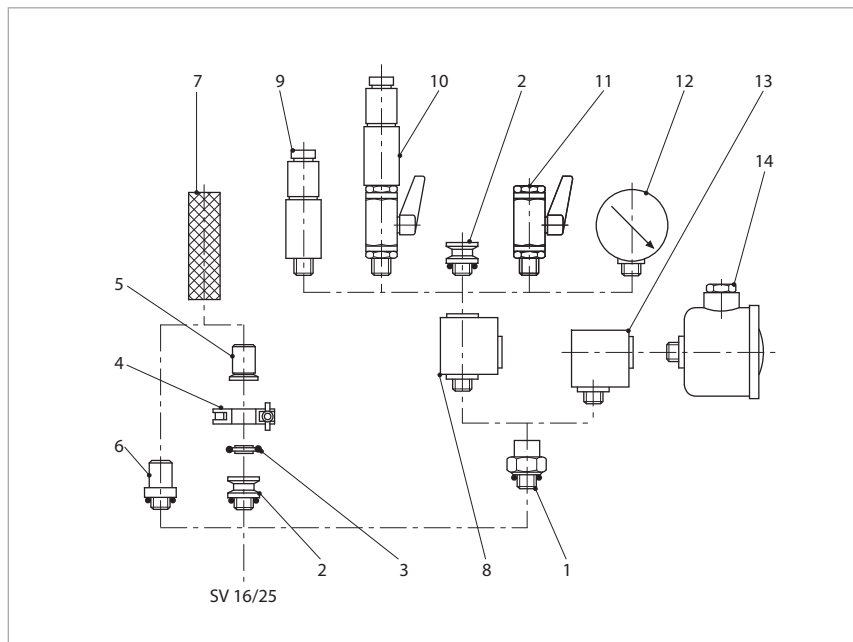
Ordering Information

| | Part No. | Part No. | Part No. |
|---------------------------------|----------------|----------------|----------------|
| Model | SVXCXF 50 | SVXCXF 100 | SVXCXF 200 |
| External carbon exhaust filters | 899 502 | 899 500 | 899 498 |
| Replacement element | 899 503 | 899 501 | 899 499 |

External Carbon Exhaust Filters

External Carbon Exhaust Filters

Connection Fittings for SOGEVAC SV 10 B, SV 16, SV 16 B, SV 16 D, SV 25, SV 25 B, SV 25 D



Connection fittings for SOGEVAC SV 10 B, SV 16 B, SV 25 B and SV 16, SV 25

The fittings presented have been specially matched to the SOGEVAC pumps. We recommend to use only these

or other components from Oerlikon Leybold Vacuum for connecting SOGEVAC pumps, so as not to impair the pumping speed of the pumps or the leak tightness of the system.

More information on further fittings is provided in Catalog Part "Flanges and Fittings".

Technical Data

Connection Fittings

| Item | Description | Connection | Material |
|------|---|--|-------------------------|
| 1 | Screw coupling | G 1/2" M/F | Aluminium |
| 2 | Threaded flange adaptor ¹⁾ | G 1/2" M – DN 16 ISO-KF | Aluminium, anodized |
| 3 | Centering ring ¹⁾ | DN 16 ISO-KF | Aluminium |
| 4 | Clamping ring | DN 10/16 ISO-KF | Aluminium |
| 5 | Hose connection | DN 16 ISO-KF – DN 25 mm (0.39 in.) | Aluminium, anodized |
| 6 | Hose connection ¹⁾ | G 1/2" M – DN 25 mm (0.39 in.) | Aluminium, anodized |
| 7 | PVC tubing | 25 mm (0.39 in.) dia., 1 m (3.5 ft) long | PVC |
| 8 | Tee piece | G 1/2" M/F/F | Aluminium, anodized |
| 9 | Vacuum control valve | G 1/2" M | Brass/Aluminium |
| 10 | Vacuum control valve with blocking valve | G 1/2" M | Brass, nicked/Aluminium |
| 11 | Ball valve | G 1/2" M/F | Brass, nicked |
| 12 | Bourdon vacuum gauge | G 1/2" M | |
| 13 | Elbow 90° | G 1/2" M/F | Aluminium, anodized |
| 14 | Dust filter | G 1/2" M/F | |
| 15 | Inlet reduction ¹⁾ (not shown) | G 1/2" M - G 3/4" F | galvanised steel |

¹⁾ With NBR-O-Ring

M = Outside thread

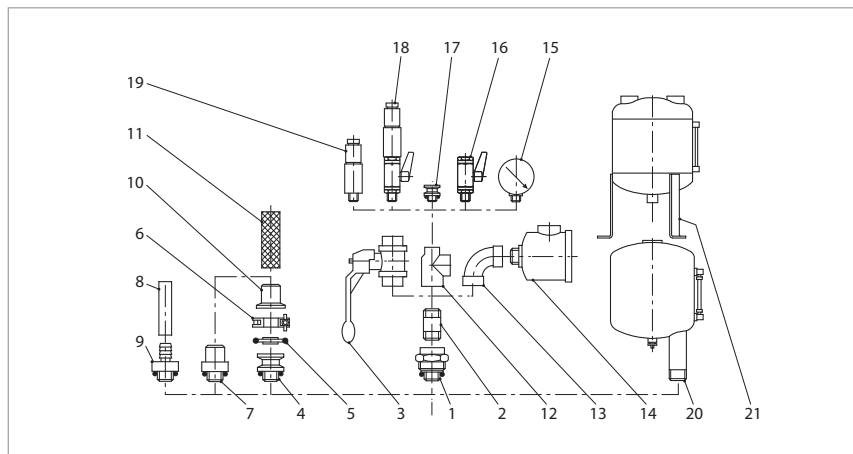
F = Inside thread

Ordering Information**Connection Fittings**

| | | SV 10 B | SV 16, 16 B, 16 D | SV 25, 25 B, 25 D |
|------|---|--|--|--|
| | | Part No. | Part No. | Part No. |
| Item | Description | | | |
| 1 | Screw coupling | 711 18 020 | 711 18 020 | 711 18 020 |
| 2 | Screw coupling ¹⁾ | 711 18 120 | 711 18 120 | 711 18 120 |
| 3 | Centering ring ¹⁾ | 183 26 | 183 26 | 183 26 |
| 4 | Clamping ring | 183 41 | 183 41 | 183 41 |
| 5 | Hose connection | 711 18 300 | 711 18 300 | 711 18 300 |
| 6 | Hose connection ¹⁾ | 711 18 011 | 711 18 011 | 711 18 011 |
| 7 | PVC tubing | 711 18 323 | 711 18 323 | 711 18 323 |
| 8 | Tee piece | 711 18 250 | 711 18 250 | 711 18 250 |
| 9 | Vacuum control valve | 951 86 | 951 86 | 951 86 |
| 10 | Vacuum control valve with blocking valve | 951 87 | 951 87 | 951 87 |
| 11 | Ball valve | 711 30 113 | 711 30 113 | 711 30 113 |
| 12 | Bourdon vacuum gauges | 951 92 | 951 92 | 951 92 |
| 13 | Elbow 90° | 711 18 210 | 711 18 210 | 711 18 210 |
| 14 | Dust filter ²⁾ with paper cartridge with activated charcoal cartridge with metal cartridge with polyester filter cartridge | 951 50 711 27 092 711 27 093 711 27 094 | 951 50 711 27 092 711 27 093 711 27 094 | 951 50 711 27 092 711 27 093 711 27 094 |
| 15 | Inlet reduction ¹⁾ (not shown) | 951 24 | 951 24 | 951 24 |

Special versions for oxygen applications are available upon request¹⁾ With NBR-O-Ring²⁾ See "Dust Filters F (Suction Side)" for other options

Connection Fittings for SOGEVAC SV 40 B, SV 65 B, SV 100 B



Connection fittings for SOGEVAC SV 40 B, SV 65 B, SV 100 B

Technical Data

Connection Fittings

| Item | Description | Connection | Material |
|------|---|--|---------------------------|
| 1 | Screw coupling ¹⁾ | G 1 1/4" M/F | Aluminium, NBR |
| 2 | Double nipple | G 1 1/4" M/M | Steel |
| 3 | Ball valve | G 1 1/4" F/F | Brass, nickered |
| 4 | Threaded flange adaptor ¹⁾ | G 1 1/4" M – DN 40 ISO-KF | Aluminium, anodized |
| 5 | Centering ring | DN 40 ISO-KF | Aluminium |
| 6 | Clamping ring | DN 32/40 ISO-KF | Aluminium |
| 7 | Hose connection ¹⁾ | G 1 1/4" M / DN 40 mm (1.58 in.) | Aluminium, anodized |
| 8 | Rubber hose | dia 10 x 25 mm (0.39 x 0.98 in.), 1 m (3.5 ft) long | |
| 9 | Hose connection ¹⁾ | G 1 1/4" M – DN 10 | Aluminium, anodized |
| 10 | Hose connection | DN 40 ISO-KF/DN 40 mm (1.58 in.) | Aluminium, anodized |
| 11 | PVC tubing | 40 mm (1.58 in.) dia., 1 m (3.5 ft) long | |
| 12 | Tee reducer bush | G 1 1/4" – 1 1/4" – 1/2" F/F/F | Gray cast iron |
| 13 | Elbow 90° | G 1 1/4" F/F | Gray cast iron |
| 14 | Dust filter | G 1 1/4" M/F | |
| 15 | Bourdon vacuum gauge | G 1/2" M | |
| 16 | Ball valve | G 1/2" M/F | Brass, nickered |
| 17 | Threaded flange adaptor ¹⁾ | G 1/2" M – DN 16 ISO-KF | Aluminium, anodized |
| 18 | Vacuum control valve with blocking valve | M 1/2" BSP | Brass, nickered/Aluminium |
| 19 | Vacuum control valve | M 1/2" BSP | Brass, nickered/Aluminium |
| 20 | Liquid trap | G 1 1/4" – 1 1/4" – 3/8" M/F | |
| 21 | Liquid trap | G 1 1/4" – 1 1/4" – 1/2" F/F/F | |

¹⁾ incl. O-ring

M = Outside thread

F = Inside thread

Ordering Information

Connection Fittings

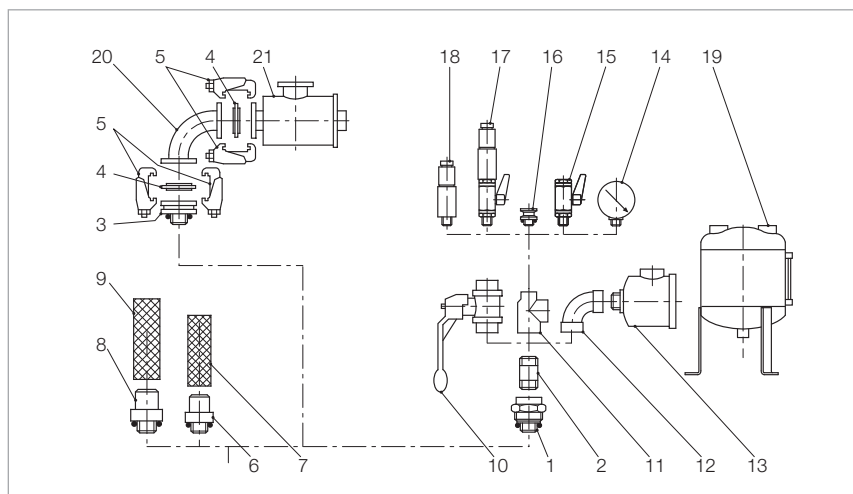
| | | SV 40 B | SV 65 B | SV 100 B |
|------|---|--|--|--|
| | | Part No. | Part No. | Part No. |
| Item | Description | | | |
| 1 | Screw coupling ¹⁾ | 711 18 023 | 711 18 023 | 711 18 023 |
| 2 | Double nipple | 711 18 033 | 711 18 033 | 711 18 033 |
| 3 | Ball valve | 711 30 105 | 711 30 105 | 711 30 105 |
| 4 | Threaded flange adaptor ¹⁾ | 711 18 123 | 711 18 123 | 711 18 123 |
| 5 | Centering ring | 183 28 | 183 28 | 183 28 |
| 6 | Clamping ring | 183 43 | 183 43 | 183 43 |
| 7 | Hose connection ¹⁾ | 711 18 013 | 711 18 013 | 711 18 013 |
| 8 | Rubber hose | 172 03 | 172 03 | 172 03 |
| 9 | Hose connection ¹⁾ | 711 18 153 | 711 18 153 | 711 18 153 |
| 10 | Hose connection | 711 18 303 | 711 18 303 | 711 18 303 |
| 11 | PVC tubing | 711 18 324 | 711 18 324 | 711 18 324 |
| 12 | Tee reducer bush | 711 18 263 | 711 18 263 | 711 18 263 |
| 13 | Elbow 90° | 711 18 213 | 711 18 213 | 711 18 213 |
| 14 | Dust filter ²⁾ with paper cartridge with activated charcoal cartridge with metal cartridge with polyester filter cartridge | 951 55 711 27 102 711 27 103 711 27 104 | 951 60 711 27 112 711 27 113 711 27 114 | 951 60 711 27 112 711 27 113 711 27 114 |
| 15 | Bourdon vacuum gauge | 951 92 | 951 92 | 951 92 |
| 16 | Ball valve | 711 30 113 | 711 30 113 | 711 30 113 |
| 17 | Threaded flange adaptor ¹⁾ | 711 18 120 | 711 18 120 | 711 18 120 |
| 18 | Vacuum control valve with blocking valve | 951 87 | 951 87 | 951 87 |
| 19 | Vacuum control valve | 951 86 | 951 86 | 951 86 |
| 20 | Liquid trap | 951 40 | – | – |
| 21 | Liquid trap | 951 42 | 951 42 | 951 42 |

Special versions for oxygen applications are available upon request

¹⁾ With NBR-O-Ring

²⁾ See "Dust Filters F (Suction Side)" for other options

Connection Fittings for SOGEVAC SV 200, SV 300 B



Connection fittings for SOGEVAC SV 200 and SV 300 B

Technical Data

Connection Fittings

| Item | Description | Connection | Material |
|------|--|---------------------------------------|---------------------------|
| 1 | Screw coupling ¹⁾ | G 2" M/F | Aluminium, anodized |
| 2 | Double nipple | G 2" M/M – 150 mm (5.9 in.) | Steel |
| 3 | Threaded flange adaptor ¹⁾ | G 2" M – DN 63 ISO-K | Steel, zinc coated |
| 4 | Centering ring with outer ring ¹⁾ | DN 63 ISO-K | Aluminium, CR |
| 5 | Set of clamping screws DN ISO-K (4 pieces) | M10 x 24 | Steel, zinc coated |
| 6 | Hose connection ¹⁾ | G 2" M – DN 50 mm (1.97 in.) | Aluminium, anodized |
| 7 | PVC tubing | ø 50 mm (1.97 in.), 1 m (3.5 ft) long | PVC |
| 8 | Hose connection ¹⁾ | G 2" M – DN 60 mm (2.36 in.) | Aluminium, anodized |
| 9 | PVC tubing | ø 60 mm (2.36 in.), 1 m (3.5 ft) long | PVC |
| 10 | Ball valve | G 2" F/F | Brass, nickered |
| 11 | Tee reducer | G 2" – 2" – 1/2" F/F/F | Gray cast iron |
| 12 | Elbow 90° | G 2" F/F | Gray cast iron |
| 13 | Dust filter | G 2" M/F | |
| 14 | Bourdon vacuum gauge | G 1/2" M | |
| 15 | Ball valve | G 1/2" M/F | Brass, nickered/Aluminium |
| 16 | Threaded ISO-KF small-flange adaptor ¹⁾ | G 1/2" M – DN 16 ISO-KF | Aluminium, anodized |
| 17 | Vacuum control valve with blocking valve | G 1/2" M | Brass, nickered/Aluminium |
| 18 | Vacuum control valve | G 1/2" M | Brass, nickered/Aluminium |
| 19 | Liquid trap | G 2" – 2" – 1/2" F/F/F | |
| 20 | Elbow 90° | DN 63 ISO-K | Stainless steel |
| 21 | Dust filter with paper cartridge | DN 63 ISO-K | |

¹⁾ incl. O-ring

M = Outside thread

F = Inside thread

Ordering Information

Connection Fittings

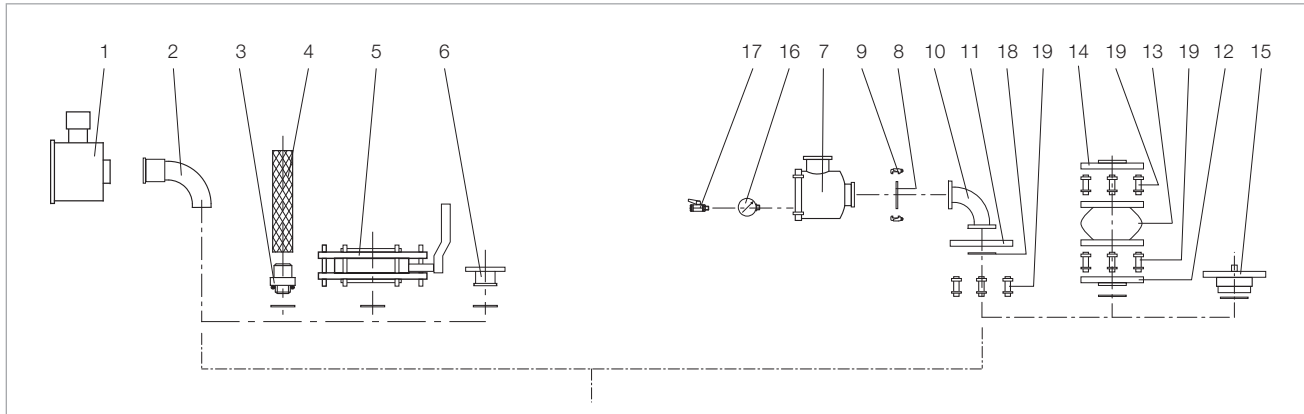
| | | SV 200 | SV 300 B |
|------|---|--|--|
| | | Part No. | Part No. |
| Item | Description | | |
| 1 | Screw coupling ¹⁾ | 711 18 025 | 711 18 025 |
| 2 | Double nipple | 711 18 035 | 711 18 035 |
| 3 | Threaded flange adaptor ¹⁾ | 711 18 126 | 711 18 126 |
| 4 | Centering ring with outer ring ¹⁾ | 268 05 | 268 05 |
| 5 | Set of clamping screws DN ISO-K (4 pieces) | 267 01 | 267 01 |
| 6 | Hose connection ¹⁾ | 711 18 015 | 711 18 015 |
| 7 | PVC tubing | 711 18 325 | 711 18 325 |
| 8 | Hose connection ¹⁾ | 711 18 016 | P711 18 016 |
| 9 | PVC tubing | 711 18 326 | 711 18 326 |
| 10 | Ball valve | 711 30 107 | 711 30 107 |
| 11 | Tee reducer | 711 18 265 | 711 18 265 |
| 12 | Elbow 90° | 711 18 215 | 711 18 215 |
| 13 | Dust filter ²⁾ with paper cartridge with activated charcoal cartridge with metal cartridge with polyester filter cartridge | 951 65 711 27 122 711 27 123 711 27 124 | 951 65 711 27 122 711 27 123 711 27 124 |
| 14 | Bourdon vacuum gauge | 951 92 | 951 92 |
| 15 | Ball valve | 711 30 113 | 711 30 113 |
| 16 | Threaded ISO-KF small-flange adaptor ¹⁾ | 711 18 120 | 711 18 120 |
| 17 | Vacuum control valve with blocking valve | 951 87 | 951 87 |
| 18 | Vacuum control valve | 951 86 | 951 86 |
| 19 | Liquid trap | 951 44 | 951 44 |
| 20 | Elbow 90° | 887 25 | 887 25 |
| 21 | Dust filter with paper cartridge | 951 68 | 951 68 |

Special versions for oxygen applications are available upon request

¹⁾ With NBR-O-Ring

²⁾ See "Dust Filters F (Suction Side)" for other options

Connection Fittings for SOGEVAC SV 470 B(F), SV 570 B(F)



Connection fittings for SOGEVAC SV 470 B(F), SV 570 B(F)

Technical Data

Connection Fittings

| Item. | Description | Connection | Material |
|-------|---|--|--|
| 1 | Dust filter with paper cartridge with metal cartridge with activated charcoal cartridge | G3" F/M | Steel, zinc coated |
| 2 | Elbow 90° | G3" M/F | Cast iron, painted |
| 3 | Adaptor | G3" M – DN 90 | Steel, painted |
| 4 | PVC hose | Ø 90 mm, 1 m long | |
| 5 | Manual valve | G3" M/F | Cast iron, painted |
| 6 | Flange | G3" M – DN 100 ISO-K | Aluminium |
| 7 | Dust filter with paper cartridge with metal cartridge with activated charcoal cartridge with polyester filter cartridge | DN 100 ISO-K DN 100 ISO-K DN 100 ISO-K DN 100 ISO-K | Steel, painted Steel, painted Steel, painted Steel, painted |
| 8 | Centering ring with O-ring | DN 100 ISO-K | Stainless steel |
| 9 | Set of clamping screws (4 pieces are required) | M10 x 24 | galvanised steel |
| 10 | Elbow 90° | DN 100 ISO-K | Stainless steel |
| 11 | Adapter flange | DN 100 ISO-K, DIN 2501 | Steel, painted |
| 12 | Collar flange | DN 100 PN 10 – G3" M | Steel, painted |
| 13 | Compensator | DN 100 PN 10 | Steel / Rubber |
| 14 | Flange | DN 100 PN 10 – G3" F | Steel, painted |
| 15 | Double nipple | DN 100 ISO-K / DN 100 PN 10 – G3" M | Steel, painted |
| 16 | Filter manometer | G1/2" M | |
| 17 | Venting valve | G1/2" M/F | Steel |
| 18 | O-ring) | | FPM (FKM) |
| 19 | Set of bolts | M16 | Steel, zinc coated |

M = Outside thread
F = Inside thread

Ordering Information

Connection Fittings

SV 470 B(F)

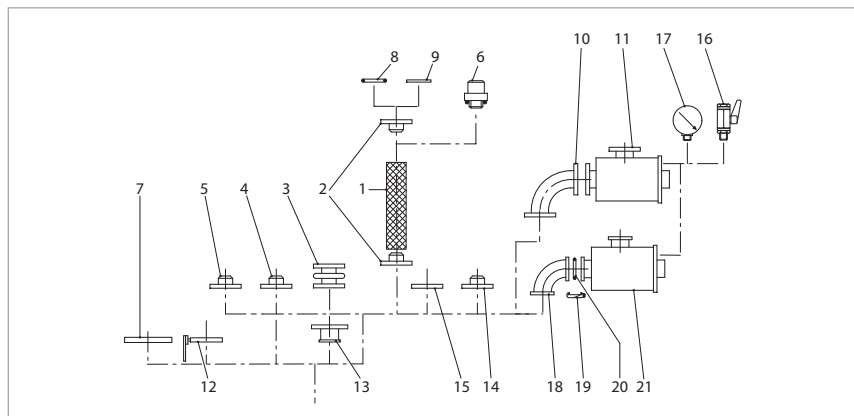
SV 570 B(F)

| | | Part No. | Part No. |
|------|---|--|--|
| Item | Description | | |
| 1 | Dust filter with paper cartridge with metal cartridge with activated charcoal cartridge | upon request upon request upon request | upon request upon request upon request |
| 2 | Elbow 90° | 9516 223V | 9516 223V |
| 3 | Adaptor | 9516 221V | 9516 221V |
| 4 | PVC hose | 711 18 329 | 711 18 329 |
| 5 | Manual valve | 9516 225V | 9516 225V |
| 6 | Flange | 711 18 127 | 711 18 127 |
| 7 | Dust filter with paper cartridge with metal cartridge with activated charcoal cartridge with polyester filter cartridge | 951 72 711 27 167 711 27 166 711 27 168 | 951 72 711 27 167 711 27 166 711 27 168 |
| 8 | Centering ring with O-ring | 268 06 | 268 06 |
| 9 | Set of clamping screws (4 pieces are required) | 267 01 | 267 01 |
| 10 | Elbow 90° | 887 26 | 887 26 |
| 11 | Adaptor flange | 267 50 | 267 50 |
| 12 | Collar flange | 9516 226V | 9516 226V |
| 13 | Compensator | 711 18 342 | 711 18 342 |
| 14 | Flange | 711 18 370 | 711 18 370 |
| 15 | Double nipple | 9516 222V | 9516 222V |
| 16 | Filter manometer | 951 92 | 951 92 |
| 17 | Venting valve | 711 30 113 | 711 30 113 |
| 18 | O-ring FPM (FKM) | 712 42 892 | 712 42 892 |
| 19 | Set of bolts | 714 12 440 | 714 12 440 |

Special versions for oxygen applications are available upon request

¹⁾ With NBR O-ring

Connection Fittings for SOGEVAC SV 500 B, SV 630 B(F), SV 750 B(F)



Connection fittings for SOGEVAC SV 500 B, SV 630 B(F), SV 750 B(F)

Technical Data

Connection Fittings

| Item | Description | Connection | Material |
|------|--|--|---|
| 1 | PVC tubing | 90 mm (3.54 in.) dia., 1 m (3.5 ft) long | |
| 2 | Hose connection | DN 100 PN 10 – DN 90 mm (3.54 in.) | Steel |
| 3 | Coupling | DN 100 – PN 10 | Stainless steel/Aluminium/Rubber |
| 4 | Adaptor flange | DN 100 PN 10 – G 4" F | Steel |
| 5 | Adaptor flange | DN 100 PN 10 – G 3" F | Steel |
| 6 | Hose connection | G 4" M – DN 90 | Steel/NBR |
| 7 | Adaptor for Roots pump | RUVAC 1001 RUVAC 2001 RUVAC WH4400 | Steel/NBR Steel/FPM (FKM) Steel/FPM (FKM) |
| 8 | O-ring | dia. 110 x 5 (3.94 x 0.2 in.) | NBR |
| 9 | Centering ring with O-ring | DN 100 PN 10 – DN 100 ISO-K | Aluminium/NBR |
| 10 | Elbow 90° | DN 100 PN 10 | Steel |
| 11 | Dust filter F 630 | DN 100 PN 10 | |
| 12 | Manually operated blocking valve | DN 100 PN 10 | Gray cast iron |
| 13 | Adaptor | DN 100 PN 10 – 100 ISO-K | Aluminium |
| 14 | Adaptor flange with tubulation | DN 100 PN 10 (tube dia. 108 (4.25 in.)) | Steel |
| 15 | Collar flange | DN 100 PN 10 – DN 100 ISO-K | Steel |
| 16 | Ball valve | G 1/2" M/F | Brass, nickered/Aluminium |
| 17 | Bourdon vacuum gauge | G 1/2" M | |
| 18 | Elbow 90° | DN 100 ISO-K | Stainless steel |
| 19 | Set of clamps for DN ISO-K Set = 4 pieces | M 10 x 24 | Steel, zinc coated |
| 20 | Centering ring | DN 100 ISO-K | Aluminium/CR |
| 21 | Dust filter | DN 100 ISO-K | |
| | Screw set (not drawn) Set = 8 screws and 8 nuts | DN 100 PN 10 | Steel, zinc coated |

M = Outside thread

F = Inside thread

Ordering Information

Connection Fittings

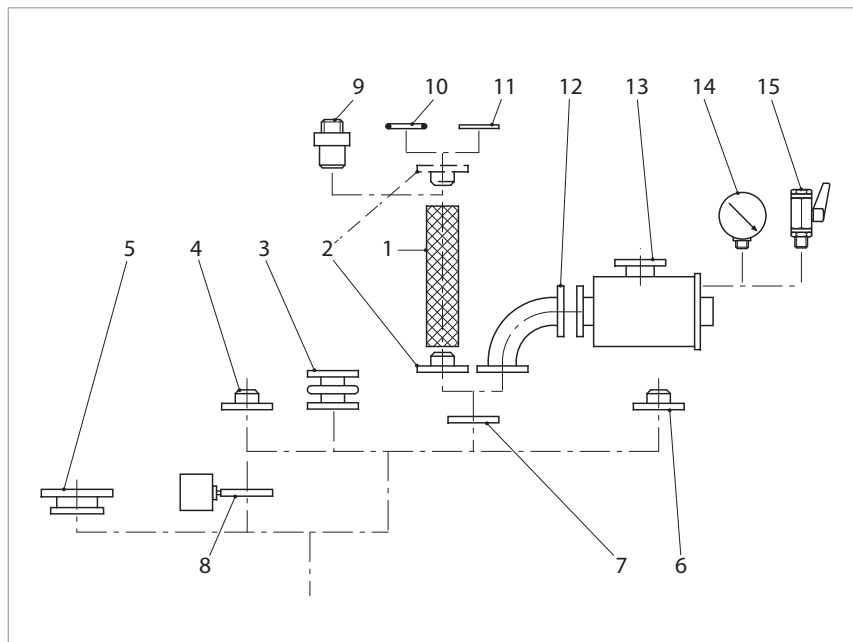
| | | SV 500 B(F) | SV 630 B(F) | SV 750 B(F) |
|------|---|--|--|--|
| | | Part No. | Part No. | Part No. |
| Item | Description | | | |
| 1 | PVC tubing | 711 18 329 | 711 18 329 | 711 18 329 |
| 2 | Hose connection | 711 18 362 | 711 18 362 | 711 18 362 |
| 3 | Coupling | 711 18 342 | 711 18 342 | 711 18 342 |
| 4 | Adaptor flange | 711 18 372 | 711 18 372 | 711 18 372 |
| 5 | Adaptor flange | 711 18 370 | 711 18 370 | 711 18 370 |
| 6 | Hose connection | 711 18 017 | 711 18 017 | 711 18 017 |
| 7 | Adaptor for Roots pump RUVAC 1000 RUVAC 2000 RUVAC WH4400 | 971 432 340 971 432 350 971 43 WH4400 | 971 432 340 971 432 350 971 43 WH4400 | 971 432 340 971 432 350 971 43 WH4400 |
| 8 | O-ring | 712 42 882 | 712 42 882 | 712 42 882 |
| 9 | Centerring ring with O-ring | 711 18 391 | 711 18 391 | 711 18 391 |
| 10 | Elbow 90° | 711 18 284 | 711 18 284 | 711 18 284 |
| 11 | Dust filter F 630 ¹⁾ with paper cartridge with activated charcoal cartridge with metal cartridge with polyester filter cartridge | 951 71 711 27 162 711 27 163 711 27 164 | 951 71 711 27 162 711 27 163 711 27 164 | 951 71 711 27 162 711 27 163 711 27 164 |
| 12 | Manually operated blocking valve | 711 30 116 | 711 30 116 | 711 30 116 |
| 13 | Adaptor | 711 18 336 | 711 18 336 | 711 18 336 |
| 14 | Adaptor flange with tubulation | 711 18 351 | 711 18 351 | 711 18 351 |
| 15 | Collar flange | 711 18 383 | 711 18 383 | 711 18 383 |
| 16 | Ball valve | 711 30 113 | 711 30 113 | 711 30 113 |
| 17 | Bourdon vacuum gauge | 951 92 | 951 92 | 951 92 |
| 18 | Elbow 90° | 887 26 | 887 26 | 887 26 |
| 19 | Clamp screws for DN ISO-K Set = 4 pieces | 267 01 | 267 01 | 267 01 |
| 20 | Centering ring ²⁾ | 268 06 | P268 06 | 268 06 |
| 21 | Dust filter ¹⁾ with paper cartridge with activated charcoal cartridge with metal cartridge with polyester cartridge | 951 72 711 27 166 711 27 167 711 27 168 | 951 72 711 27 166 711 27 167 711 27 168 | 951 72 711 27 166 711 27 167 711 27 168 |
| | Screw set (not drawn) Set = 8 screws and 8 nuts | 714 12 440 | 714 12 440 | 714 12 440 |

Special versions for oxygen applications are available upon request

¹⁾ See "Dust Filters F (Suction Side)" for other options

²⁾ incl. O-ring

Connection Fittings for SOGEVAC SV 1200



Connection fittings for SOGEVAC SV 1200

Technical Data

Connection Fittings

| Item | Description | Connection | Material |
|------|--------------------------------------|--|---|
| 1 | PVC tubing | 90 mm (3.54 in.) dia., 1 m (3.5 ft) long | PVC |
| 2 | Hose connection | DN 125 PN 10 – DN 90 mm (3.54 in.) | Steel |
| 3 | Coupling | DN 125 PN 10 | Stainless steel/Aluminium/Rubber |
| 4 | Flange with tubulation ¹⁾ | DN 125 (tube 139.7 (5.5 in.)) | Steel |
| 5 | Adaptor for Roots pump | RUVAC 2001 RUVAC 3001 RUVAC WH 4400/7000 | Steel Steel/FPM (FKM) Steel/FPM (FKM) |
| 6 | Adaptor flange | DN 125 PN 10 – G 4" F | Steel |
| 7 | Collar flange | DN 125 PN 10 – DN 160 ISO-K | Steel |
| 8 | Electropneumatic valve | DN 125 PN 10 | Gray cast iron |
| 9 | Hose connection | G 4" M – DN 90 mm (3.54 in.) | Steel/NBR |
| 10 | O-ring 165 x 5 165 x 5 | | NBR FPM (FKM) |
| 11 | Centering ring ¹⁾ | DN 125 PN 10 – DN 160 ISO-K | Aluminium |
| 12 | Elbow 90° | DN 125 PN 10 | Steel |
| 13 | Dust filter ²⁾ | DN 125 PN 10 | |
| 14 | Bourdon vacuum gauge | G 1/2" M | |
| 15 | Ball valve | G 1/2" M/F | Brass, nicked/Aluminium |

¹⁾ incl. O-ring

²⁾ See "Dust Filters F (Suction Side)" for other options

M = Outside thread

F = Inside thread

Ordering Information**Connection Fittings****SV 1200**

| | Part No. |
|--|-------------------|
| Item Description | |
| 1 PVC tubing | 711 18 329 |
| 2 Hose connection | 711 18 363 |
| 3 Coupling | 711 18 343 |
| 4 Flange with tubulation ¹⁾ | 711 18 355 |
| 5 Adaptor for Roots pump | |
| RUVAC 2001 | 953 37 |
| RUVAC 3001 | 953 38 |
| RUVAC WH 4400/7000 | 953 3WH |
| 6 Adaptor flange | 711 18 117 |
| 7 Collar flange | 711 18 386 |
| 8 Electropneumatic valve | 715 69 202 |
| 9 Hose connection | 711 18 017 |
| 10 O-ring | |
| 165 x 5 | 712 42 902 |
| 165 x 5 | 712 42 912 |
| 11 Centering ring ¹⁾ | 711 18 396 |
| 12 Elbow 90° | 711 18 287 |
| 13 Dust filter ²⁾ | |
| with paper cartridge | 951 75 |
| with activated charcoal cartridge | 711 27 142 |
| with metal cartridge | 711 27 143 |
| with polyester filter cartridge | 711 27 144 |
| 14 Bourdon vacuum gauge | 951 92 |
| 15 Ball valve | 711 30 113 |

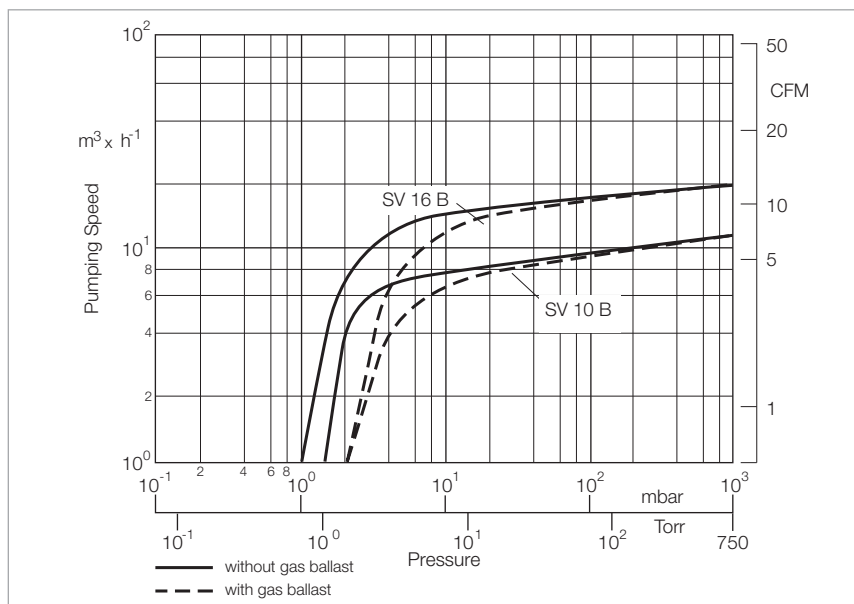
Special versions for oxygen applications are available upon request

¹⁾ incl. O-ring

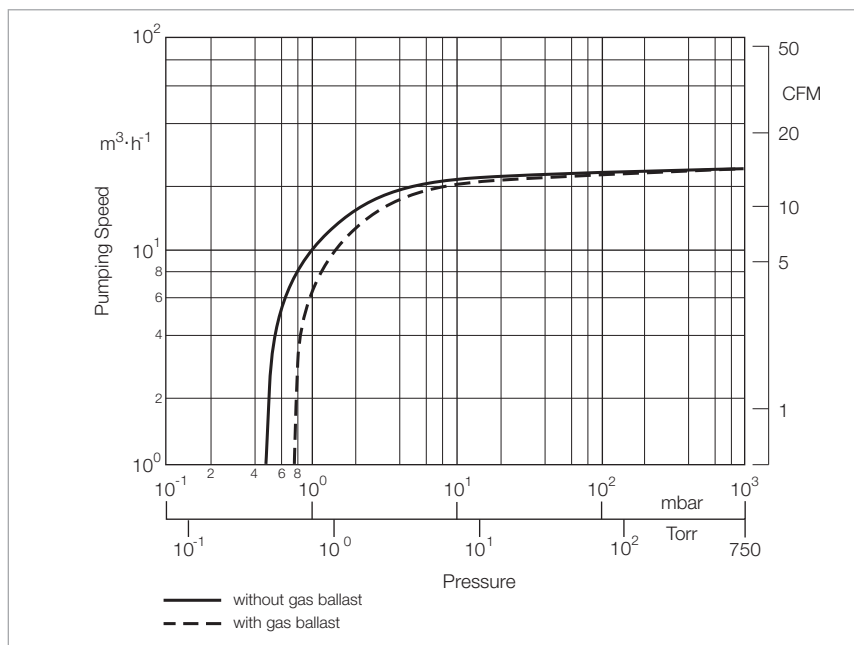
²⁾ See "Dust Filters F (Suction Side)" for other options

Only available for purchase in North and South America

60 Hz Curves

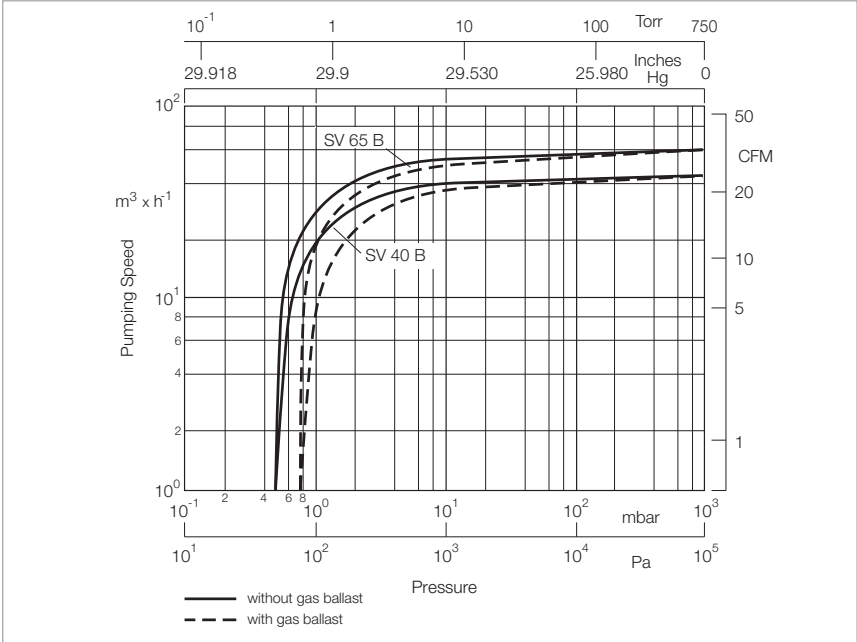


Pumping speed characteristics for the SOGEVAC SV 10 B and SV 16 B at 60 Hz

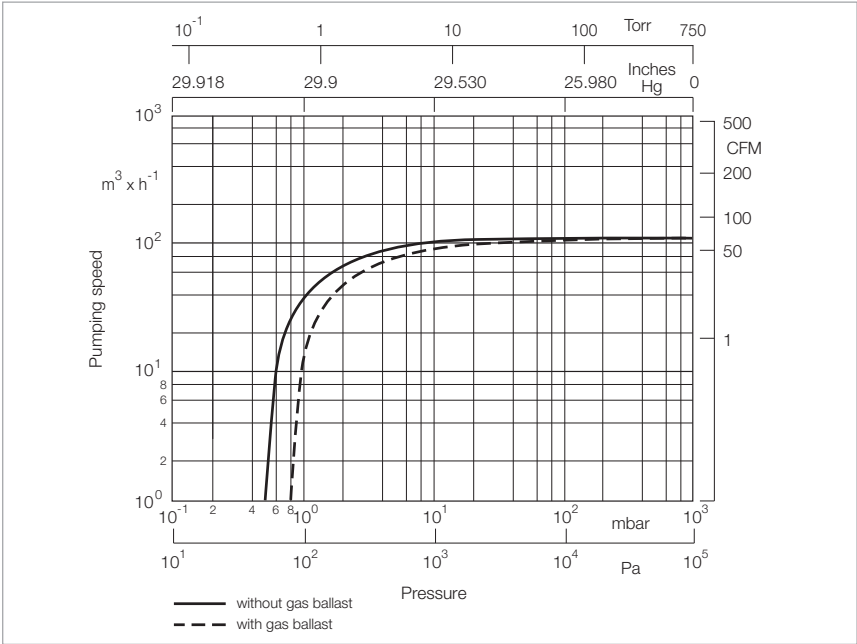


Pumping speed characteristics for the SOGEVAC SV 25 B at 60 Hz

Only available for purchase in North and South America

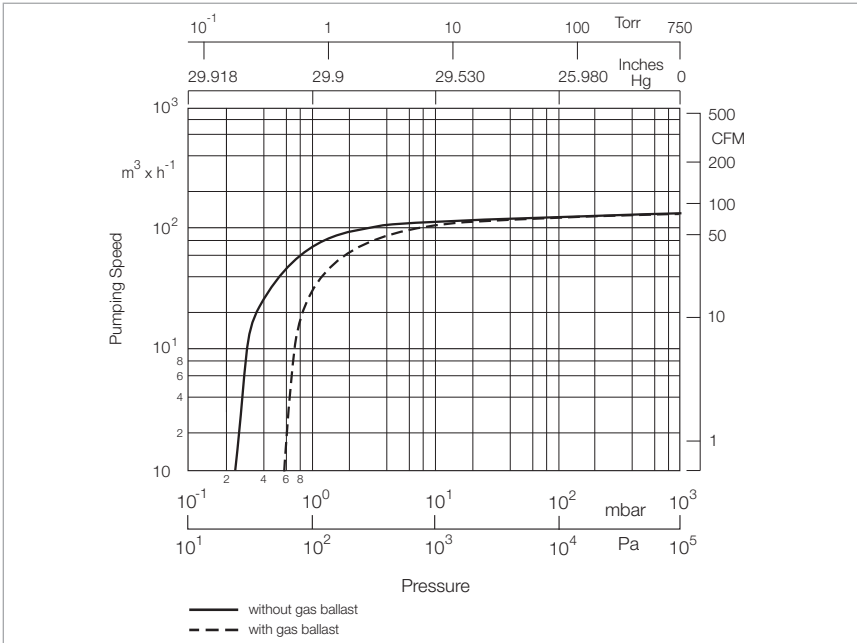


Pumping speed characteristics for the SOGEVAC SV 40 B and SV 65 B at 60 Hz

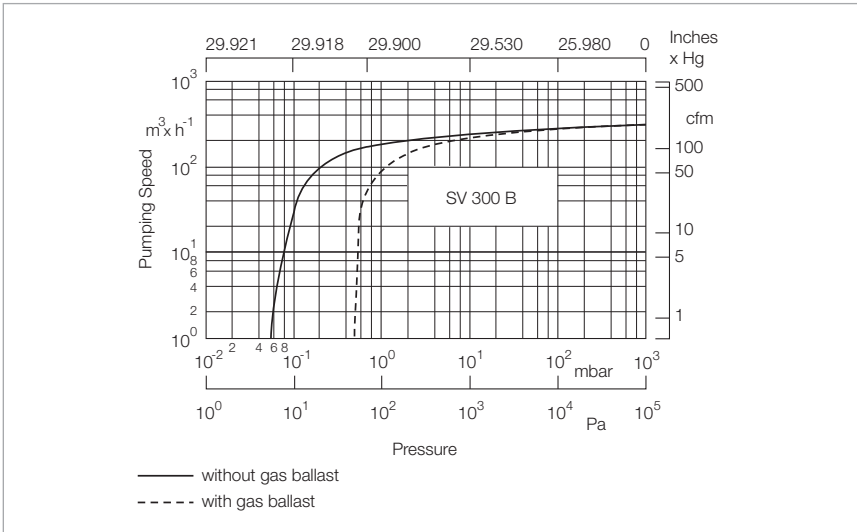


Pumping speed characteristics for the SOGEVAC SV 100 B at 60 Hz

Only available for purchase in North and South America

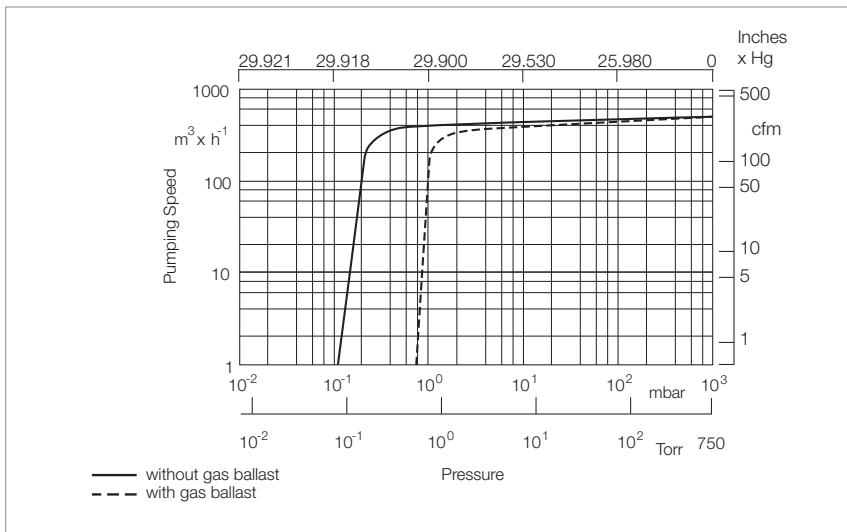


Pumping speed characteristics for the SOGEVAC SV 120 B at 60 Hz

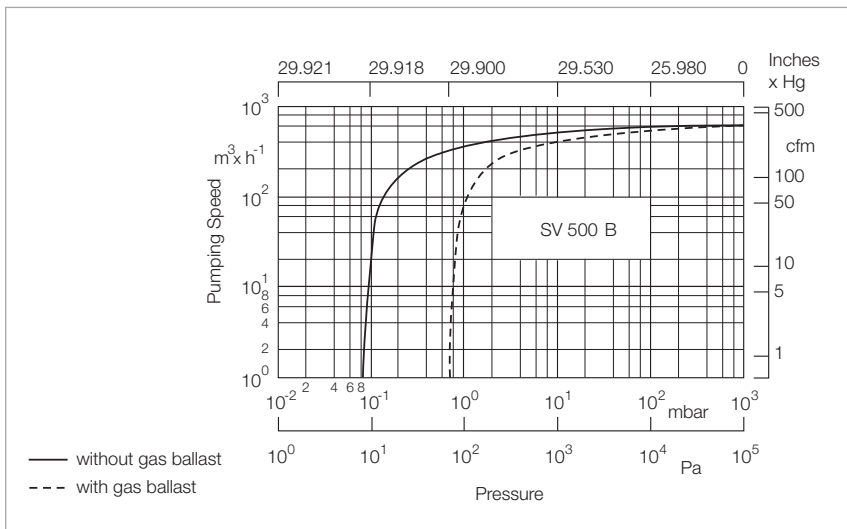


Pumping speed characteristics for the SOGEVAC SV 300 B at 60 Hz

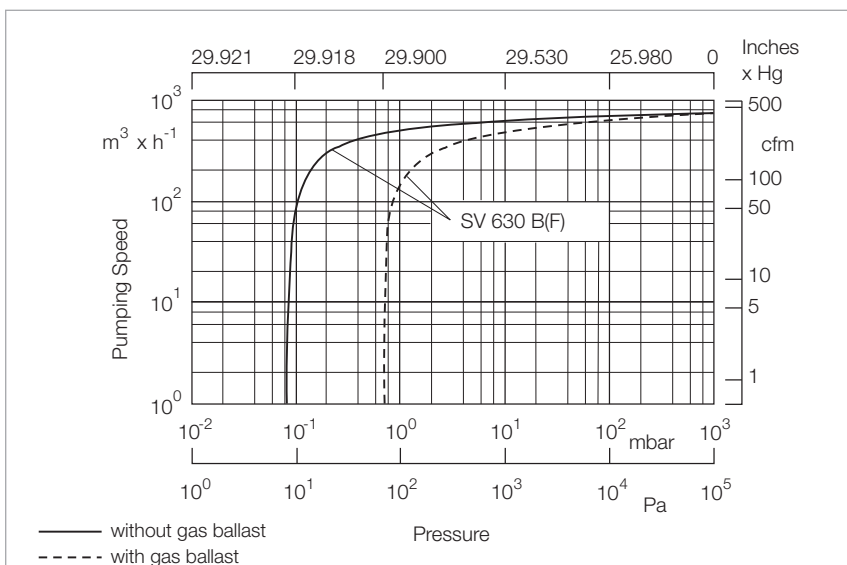
Only available for purchase in North and South America



Pumping speed characteristics of the SOGEVAC SV 470 B(F) and 570 B(F) at 60 Hz operation

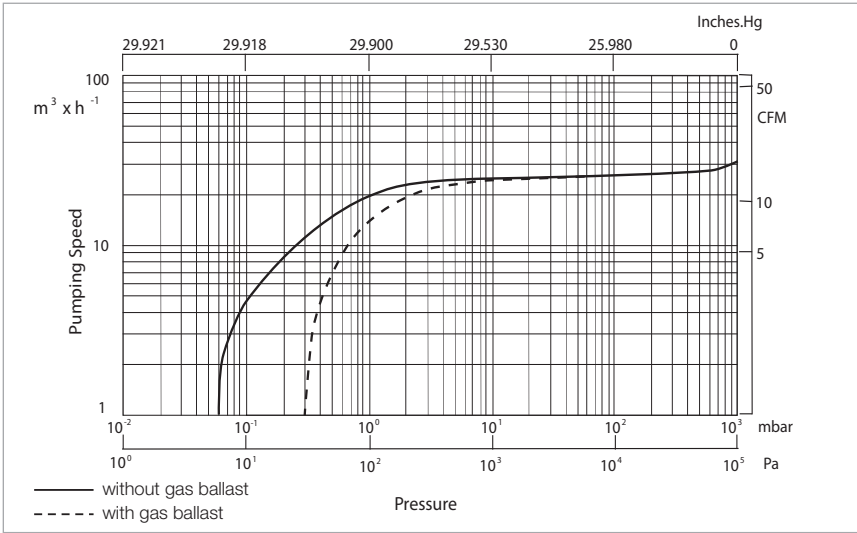


Pumping speed characteristics for the SOGEVAC SV 500 B at 60 Hz

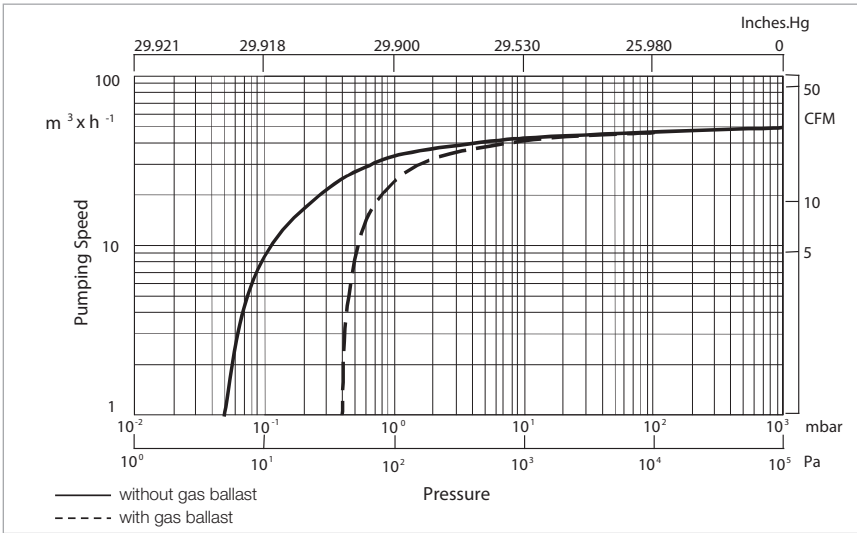


Pumping speed characteristics for the SOGEVAC SV 630 B(F) at 60 Hz

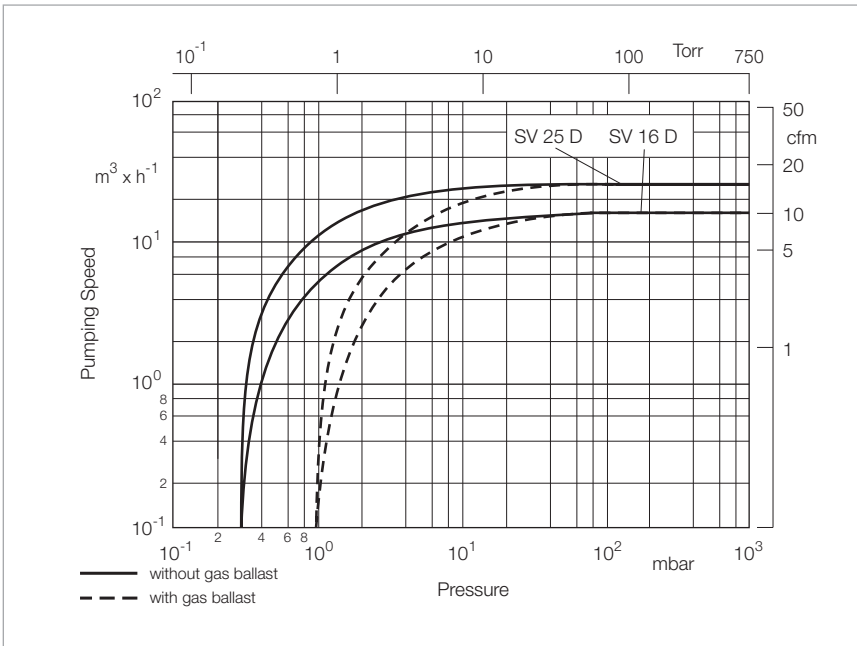
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Pumping speed characteristics for the SOGEVAC SV 28 BI at 60 Hz

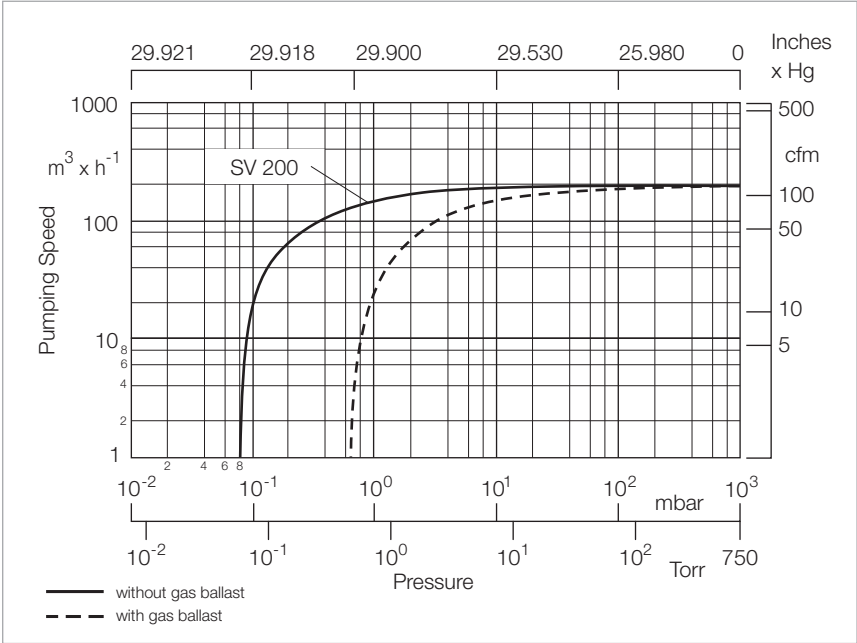


Pumping speed characteristics for the SOGEVAC SV 40 BI at 60 Hz

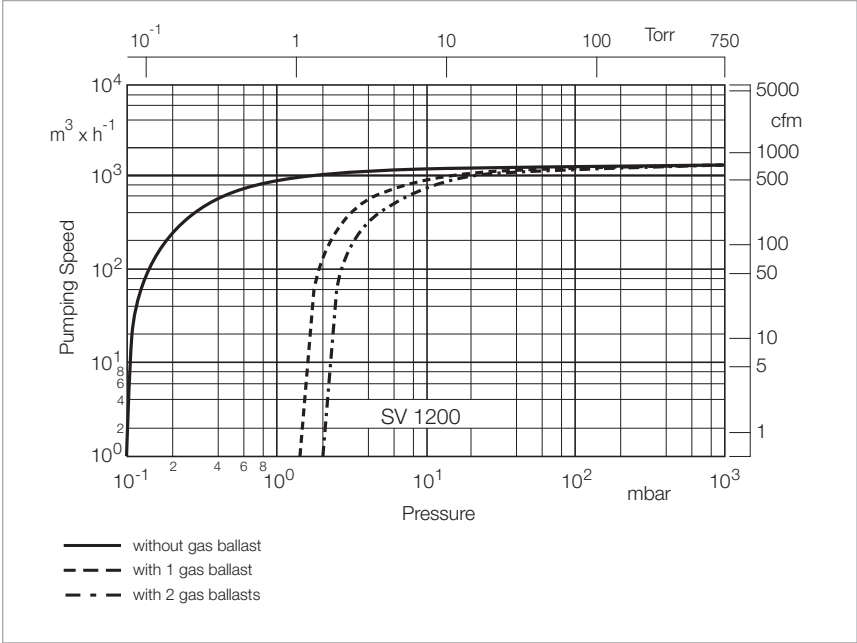


Pumping speed characteristics for the SOGEVAC SV 16 D and SV 25 D at 60 Hz

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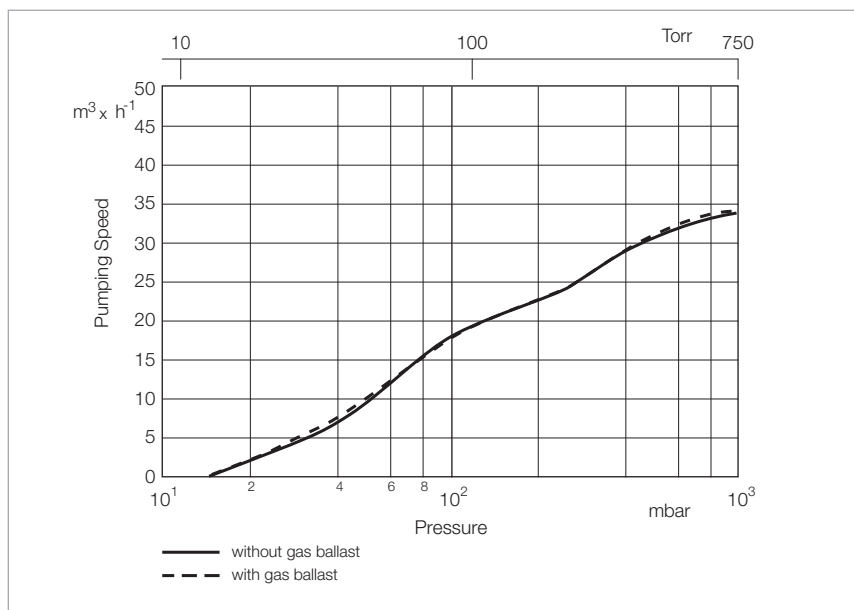


Pumping speed characteristics for the SOGEVAC SV 200 at 60 Hz

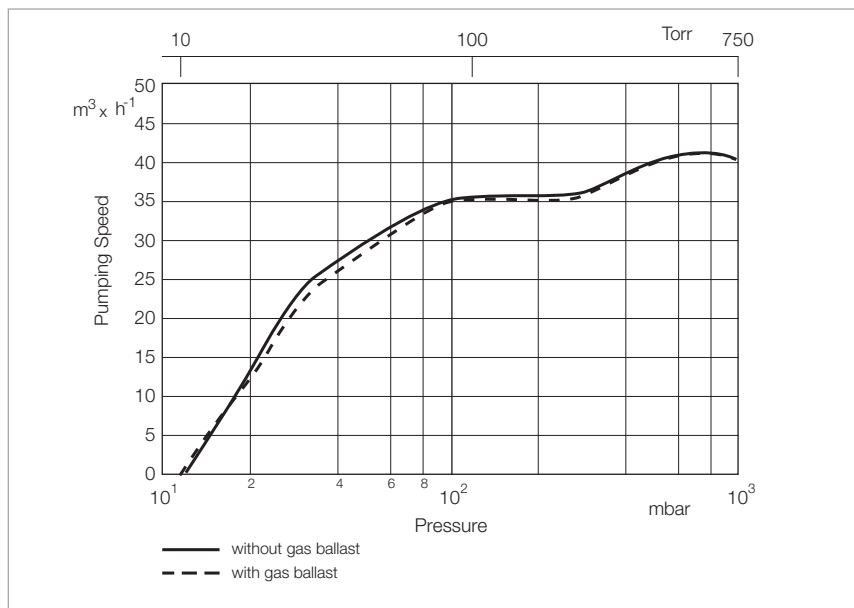


Pumping speed characteristics for the SOGEVAC SV 1200 at 60 Hz

Only available for purchase in North and South America



Pumping speed characteristics of the SOGEVAC SV 40 ATEX at 60 Hz
for gases of the material group IIB and H₂



Pumping speed characteristics of the SOGEVAC SV 40 ATEX at 60 Hz
for gases of the material group IIA

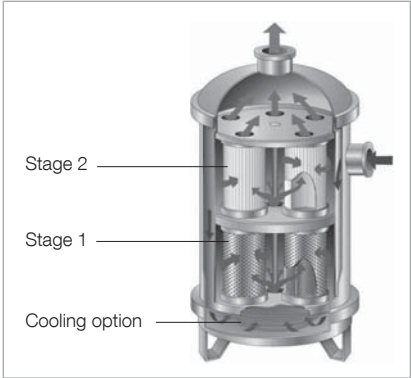
Only available for purchase in North and South America

Combination Filter

Vacuum Pump Inlet Filter



Combination filter

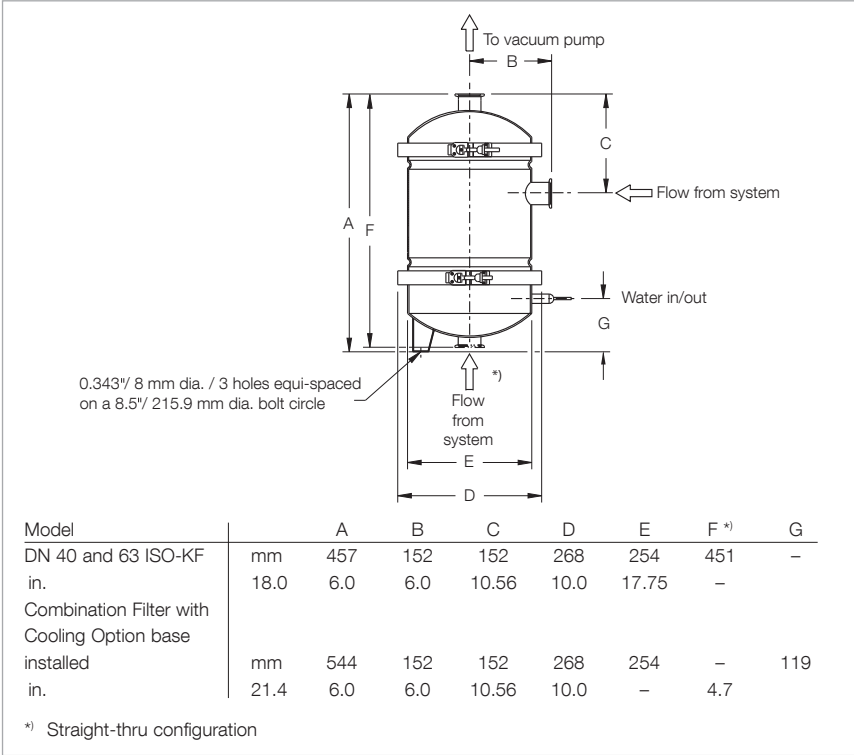


Combination filter: cutaway view

The combination filter is a high efficiency vacuum pump inlet filter designed specifically to condense, absorb, and neutralize process byproducts generated from vacuum applications in the chemical and pharmaceutical industries.



Cooling Option for combination filter



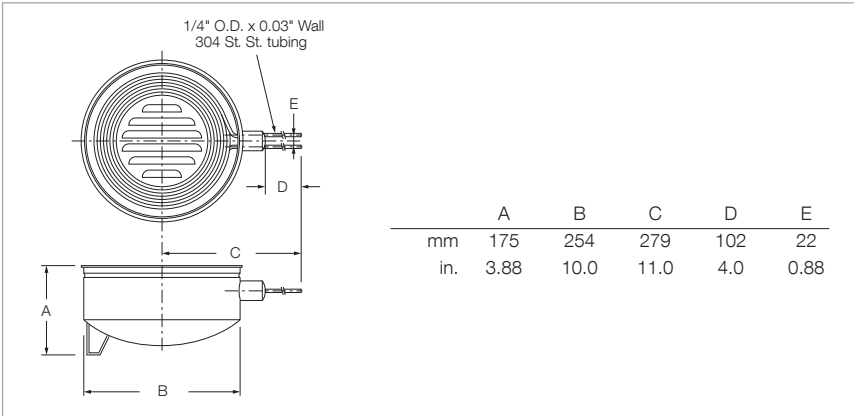
Dimensional drawing for the combination filter

Advantages to the User

- All stainless steel construction with-stands corrosive environments
- Modular design allows for numerous configurations and easy servicing
- Stacking modules available for increased capacity
- Optional drain port for solvent draining and reclamation
- Customizable absorption/neutralization stages for optimal efficiency
- Processes such as distillation, drying, degassing, central lab vacuum protection
- Cooling option: Large cooled surface area for condensing of solvents, acids and water vapor

Specifications

- Construction in stainless steel 304
- Upper and lower seals in Buna N and Viton



Dimensional drawing for the combination filter Cooling Option

Ordering Information**Combination Filter****DN 40 ISO-KF****DN 63 ISO-K**

| | Part No. | Part No. |
|---|-----------------|-----------------|
| Combination filter 5 filter elements in stage 1 and 5 elements in stage 2 (elements not included) | 180497V | 180499V |
| straight-thru configuration, same as above except inlet on bottom | 180498V | - |
| Stacking modules includes 2 stages (5 elements ea.), 11.25" (286 mm) tall, all attachment hardware included (filter elements not included) | 180500V | 180500V |
| Cooling Option base, 0.5 - 1.0 GPM (2 - 4 LPM) water flow recommended | 180501V | 180501V |

Ordering Information**Filter Elements**

| | Part No. |
|---|-----------------|
| Copper gauze | 180502V |
| Stainless steel gauze | 180503V |
| Molecular sieve | 180504V |
| Porous mixture of sodium hydroxide and potassium hydroxide | 180505V |
| Activated charcoal | 180506V |
| Pleated polypropylene 2 micron (99% efficient) | 180507V |
| Pleated polypropylene 5 micron (99% efficient) | 180508V |
| Pleated polypropylene 20 micron (99% efficient) | 180509V |

Ordering Information**Adapters (Stainless Steel)**

| | Part No. |
|-----------------------------------|-------------------|
| DN 40 ISO-KF to 1 1/4" NPT (male) | 899 627 |
| DN 40 ISO-KF to 2" NPT (male) | 899 629 |
| DN 63 ISO-K to 2" NPT (male) | 721 03 040 |

Contents

Dry Compressing Vacuum Pumps

Global Versions

Diaphragm Vacuum Pumps **DIVAC** 217

General

DIVAC Program Overview 217

The customized Diaphragm Pump and the Accessories recommended for your Applications 218

Modular Diaphragm Pump System for the Chemical Laboratory 219

Products

Diaphragm Vacuum Pumps for the Chemical Laboratory 220

Dual-Stage Diaphragm Vacuum Pumps

DIVAC 0.6 L, 1.2 L, 2.2 L 220

Three-Stage Diaphragm Vacuum Pumps

DIVAC 1.4 HV3C 222

Dry Compressing Backing Pumps for Turbomolecular Pumps 224

DIVAC 0.8 T and 0.8 LT 226

DIVAC 1.4 HV3 and 3.8 HV3. 228

DIVAC 4.8 VT 230

Scroll Vacuum Pumps **SCROLLVAC** 232

General

Applications and Accessories for SCROLLVAC Pumps 232

Products

Oil-free Scroll Vacuum Pumps SCROLLVAC SC 5 D to SC 60 D. 233

Screw Vacuum Pumps **LEYVAC** 239

General

Applications for LEYVAC Pumps 239

General 240

Products

LEYVAC LV 80 to LV 140 C 242

Screw Vacuum Pumps SCREWLINE. 245

General

Applications for SCREWLINE Pumps 245

General SCREWLINE SP 250 to SP 630 (F) 246

Products

SCREWLINE SP 250 250

SCREWLINE SP 630 252

Screw Vacuum Pumps DRYVAC 256

General

Applications for DRYVAC Pumps 256

Oil for DRYVAC pumps, for different fields of application 257

Oil for DRYVAC pumps, for different pump types 258

General DRYVAC DV 450 to DVR 5000 C-i 259

Products

DRYVAC DV / DV S / DV C 268

Versions for the North and South American Continents

**Dry Vacuum Pumps CHEMROVAC TRV
for Chemical and Pharmaceutical Applications 272**

General

Applications for CHEMROVAC Pumps 272

Products

CHEMROVAC TRV 404 to 410 274

DIVAC Program Overview

This range of vacuum pumps was developed especially for laboratory operations and as backing pumps for (wide range) turbomolecular pumps. It satisfies the highest expectations in terms of precision, reliability and ease of use.

The DIVAC line of vacuum pumps is the logical continuation of diaphragm pump technology which has proven its quality in decades of service.

Laboratory Pumps

Through the laboratory pumps and the three different pumping speeds available for the same base pressure and through the modular design, the optimum pump system can be implemented for every application.

DIVAC L diaphragm pumps are suited for almost all requirements in the chemistry lab. They are basically corrosion and solvent resistant since their parts in contact with the pumped medium are made of PTFE (Teflon), FFPM (Kalrez) and PVDF (Solef).

Backing Pumps

The DIVAC T range of diaphragm pumps comprises backing pumps which are used in all applications requiring an especially low base pressure while having to maintain an oil-free vacuum.

The DIVAC T pumps have been specially developed as backing pumps for wide range high vacuum turbomolecular pumps. They meet the requirements for a dry vacuum and a long service life.

DIVAC T pumps may be used both free-standing and integrated in applications or certain devices, and for this reason they are used in the areas of mass spectrometry, analytical and in general applications.

Application Examples

Laboratory Pumps

- Vacuum filtration
- Vacuum distillation
- Vacuum drying
- To extract and transfer gases
- On rotary evaporators
- Gel drying

Backing Pumps

- Backing pump for wide range turbomolecular pumps
- Mass spectrometry
- Medicine technology
- Analytical technology
- General rough and medium vacuum applications

The customized Diaphragm Pump and the Accessories recommended for your Applications

| Modular diaphragm pump system | Evacuating small devices (e.g. desiccator) | Sublimation | Analysis preparation | Filtration | Distillation | Drying in the drying cabinet | Drying cabinets (2 cabinets with 1 pump) | Rotary evaporator | Backing pumps for wide range turbomolecular pumps | Mass spectrometry | Medical technology | Analytical technology | General applications in the rough and medium vacuum range |
|-------------------------------|--|-------------|----------------------|------------|--------------|------------------------------|--|-------------------|---|-------------------|--------------------|-----------------------|---|
| Application | | | | | | | | | | | | | |
| DIVAC 0.6 L | ■ | ■ | ■ | ■ | ■ | | | | | | | | ■ |
| DIVAC 1.2 L | ■ | ■ | ■ | ■ | ■ | | ■ | | | | | | ■ |
| DIVAC 2.2 L | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | ■ |
| DIVAC 1.4 HV3C | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| DIVAC 0.8 T | | | | | | | | | ■ | ■ | ■ | ■ | ■ |
| DIVAC 0.8 TL | | | | | | | | | ■ | ■ | ■ | ■ | ■ |
| DIVAC 1.4 HV3 | | | | | | | | | ■ | ■ | ■ | ■ | ■ |
| DIVAC 3.8 HV3 | | | | | | | | | ■ | ■ | ■ | ■ | ■ |
| DIVAC 4.8 VT | | | | | | | | | ■ | ■ | ■ | ■ | ■ |

Modular Diaphragm Pump System for the Chemical Laboratory

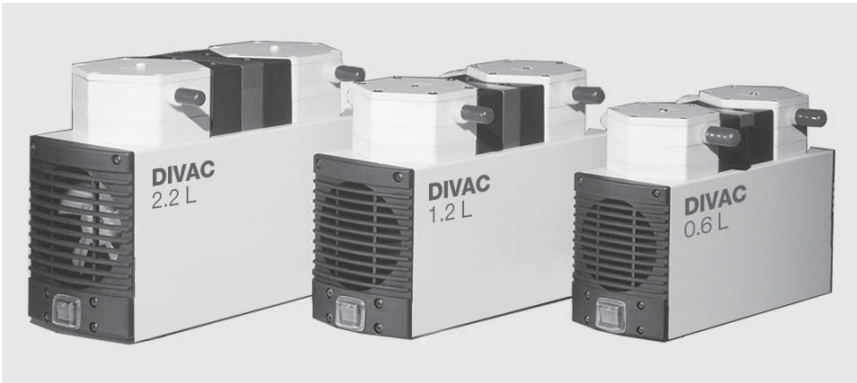
Advantages to the User

- Low base vacuum of 8 mbar (6 Torr) for two-stage and 2 mbar (1.5 Torr) for three-stage DIVAC
- All parts of the pump head in contact with the gas are resistant against aggressive media through the use of PTFE (Teflon), FFPM (Kalrez) and PVDF (Solef)
- Dry compressing, oil-free
- Water vapor tolerance
- Low maintenance costs and long service intervals through the use of high-quality components which are well-proven
- Simple maintenance by staff of the customer
- Low noise operation
- Portable, compact, small footprint
- Can be operated in any orientation
- Overheat protection for the vacuum pump by means of a thermal fuse
- Available in four pumping speed categories

Products

Diaphragm Vacuum Pumps for the Chemical Laboratory

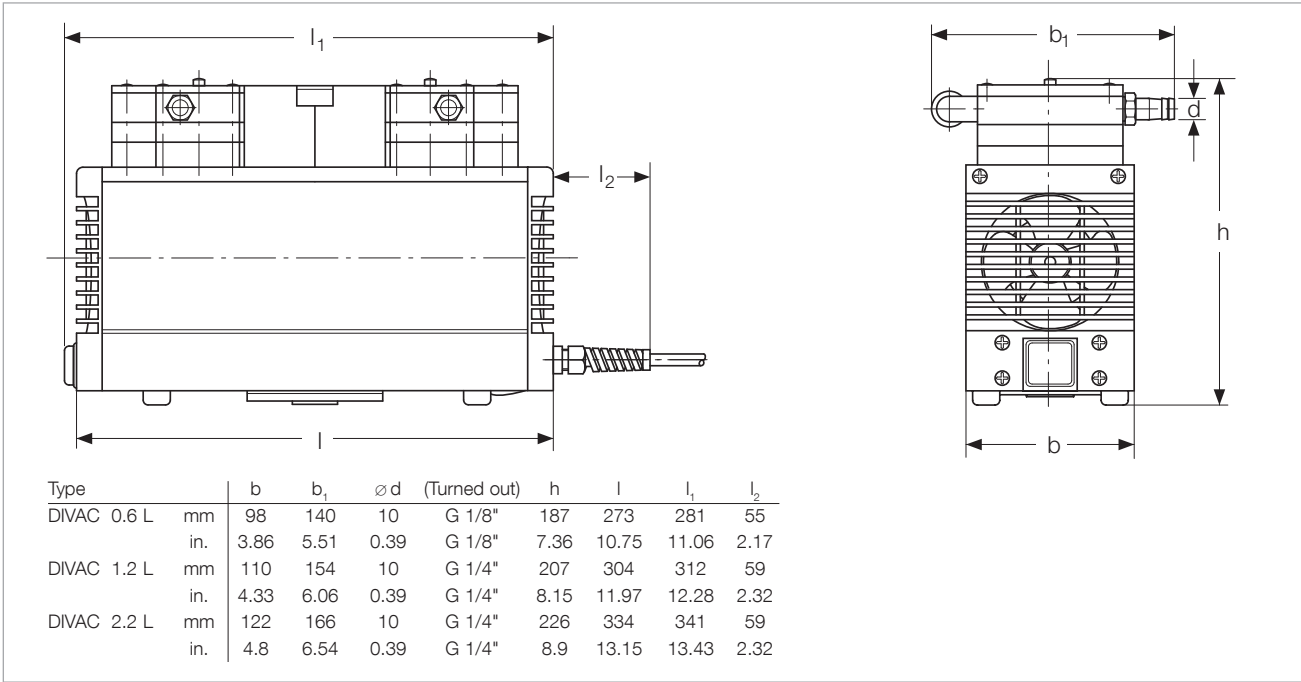
Dual-Stage Diaphragm Vacuum Pumps DIVAC 0.6 L, 1.2 L, 2.2 L



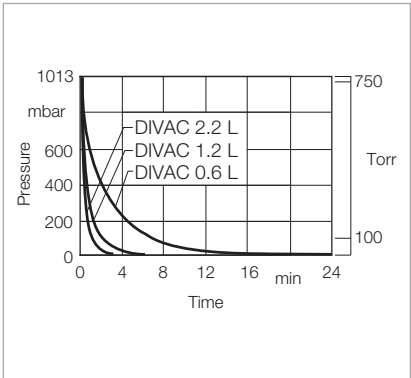
Typical Applications

- Vacuum generation for
- Rotary evaporators
 - Drying chambers
 - Filtration units
 - Distillation configurations
 - Gel dryers

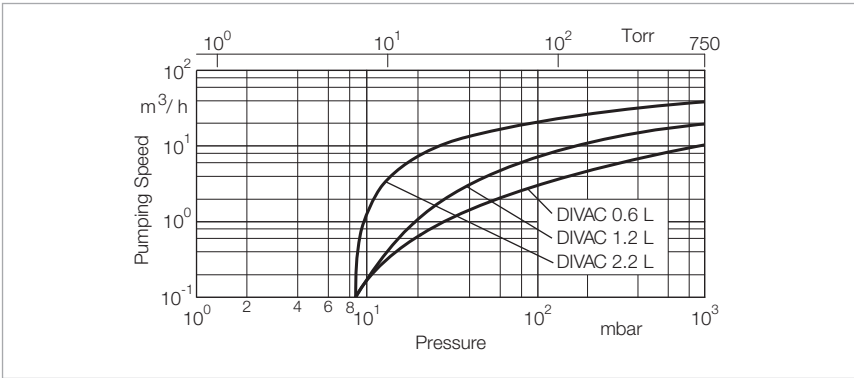
Dual-stage diaphragm vacuum pumps DIVAC 0.6 L, 1.2 L, 2.2 L



Dimensional drawing for the DIVAC 0.6 L, 1.2 L, 2.2 L



Curves of pump-down time of a 10 l vessel



Curves of pumping capacity

Technical Data

DIVAC

| | | 0.6 L | 1.2 L | 2.2 L |
|---|--|--|--|---|
| Max. pumping speed (atm.) | m ³ x h ⁻¹ (cfm) | 0.6 (0.4) | 1.2 (0.7) | 2.0 (1.2) |
| Ultimate pressure | mbar (Torr) | ≤ 8 (≤ 6) | ≤ 8 (≤ 6) | ≤ 8 (≤ 6) |
| Max. exhaust back pressure (absolute) | mbar (Torr) | 2000 (1500) | 2000 (1500) | 2000 (1500) |
| Pump heads | | 2 | 2 | 2 |
| Connection | | | | |
| Inlet (suction side) | | Hose nozzle ID 10 | Hose nozzle ID 10 | Hose nozzle ID 10 |
| Exhaust (delivery side) | | Hose nozzle ID 10 | Hose nozzle ID 10 | Hose nozzle ID 10 |
| Thread (suction and delivery side) | G | G 1/8" | G 1/4" | G 1/4" |
| Noise level acc. to DIN 45 635 Part 13, approx. | dB(A) | 47 | 50 | 52 |
| Permissible gas admission temperature, max. | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Permissible ambient temperature, max. | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Voltage / nominal frequency (1-ph. motor) | | | | |
| Schuko plug | V / Hz | 230 ± 10% / 50 | 230 ± 10% / 50 | 230 ± 10% / 50 |
| NEMA plug | V / Hz | 115 ± 10% / 60 | 115 ± 10% / 60 | 115 ± 10% / 60 |
| NEMA plug | V / Hz | 100 ± 10% / 50/60 | 100 ± 10% / 50/60 | 100 ± 10% / 50/60 |
| Protective class | IP | 44 | 44 | 44 |
| Motor power ¹⁾ | W | 90 | 120 | 245 |
| Current consumption ¹⁾ | A | 0.6 | 0.7 | 1.8 |
| Motor speed | | | | |
| 50 Hz | min ⁻¹ | 1500 | 1500 | 1500 |
| 60 Hz | min ⁻¹ | 1800 | 1800 | 1800 |
| Dimensions (W ¹⁾ x H ¹⁾ x D), approx. | mm (in.) | 281 x 140 x 187 (11.06 x 5.51 x 7.36) | 312 x 154 x 207 (12.28 x 6.06 x 8.15) | 341 x 166 x 226 (13.43 x 6.54 x 8.9) |
| Weight, approx. | kg (lbs) | 6.9 (15.2) | 9.3 (20.5) | 12.6 (27.8) |
| Material | | | | |
| Pump head | | PTFE (Teflon) | PTFE (Teflon) | PTFE (Teflon) |
| Structured diaphragm | | PTFE coated | PTFE coated | PTFE coated |
| Valves | | FFPM (Kalrez) | FFPM (Kalrez) | FFPM (Kalrez) |
| Nozzles | | PVDF (Solef) | PVDF (Solef) | PVDF (Solef) |

Ordering Information

DIVAC

| | 0.6 L | 1.2 L | 2.2 L |
|---|------------------|-------------------|-------------------|
| | Part No. | Part No. | Part No. |
| Diaphragm vacuum pump 230 V, 50 Hz, with 2.3 m (8 ft) power cord and Schuko plug | 135 00 | 135 06 | 135 12 |
| Diaphragm vacuum pump 230 V, 50/60 Hz, with 2.3 m (8 ft) power cord and Schuko plug | - | - | 135 11 |
| Diaphragm vacuum pump 100 V, 50/60 Hz, with 2.3 m (8 ft) power cord and NEMA plug | 135 02 | 135 08 | 135 14 |
| Diaphragm vacuum pump 115 V, 60 Hz, with 2.3 m (8 ft) power cord and NEMA plug | 135 03 | 135 09 | 135 15 |
| Spare parts kit consisting of 2 diaphragms, 4 gasket rings, 4 valve plates | EK 135 23 | EK 135 24 | EK 135 25 |
| Hose nozzle kit consisting of 2 hose nipples, piping | - | 200 65 006 | 200 65 007 |

¹⁾ For 230 V, 50 Hz version

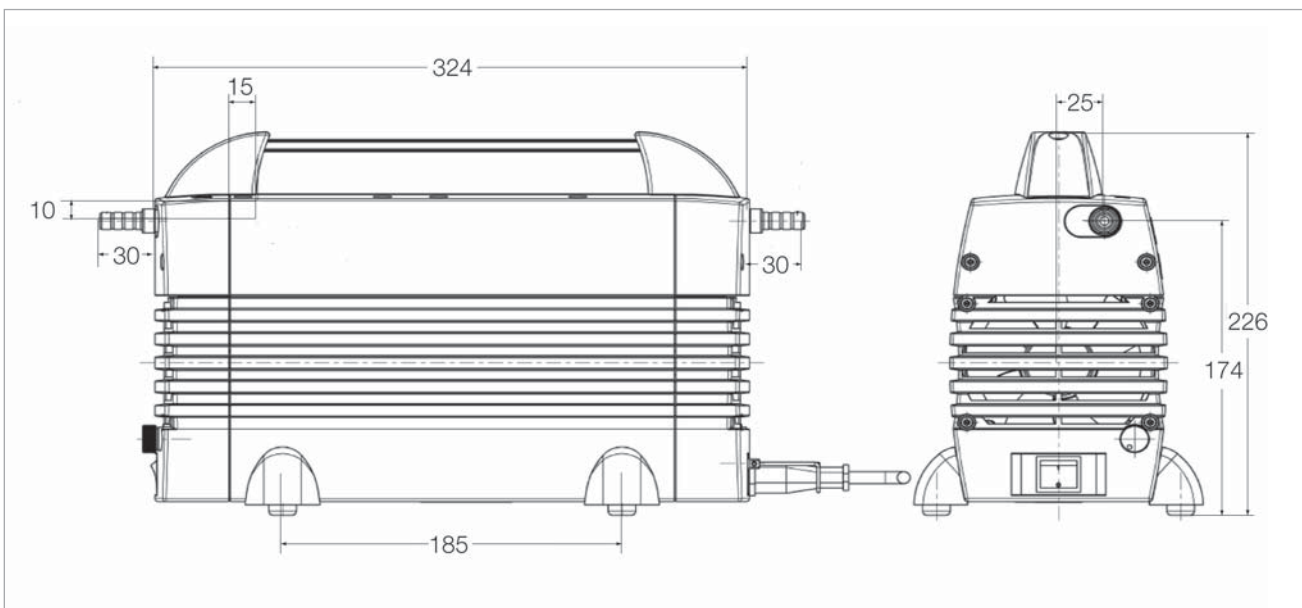
Three-Stage Diaphragm Vacuum Pumps

DIVAC 1.4 HV3C

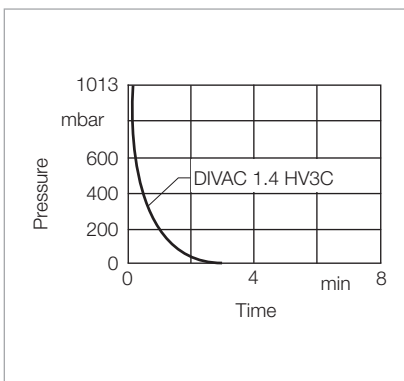


Three-stage diaphragm vacuum pump DIVAC 1.4 HV3C

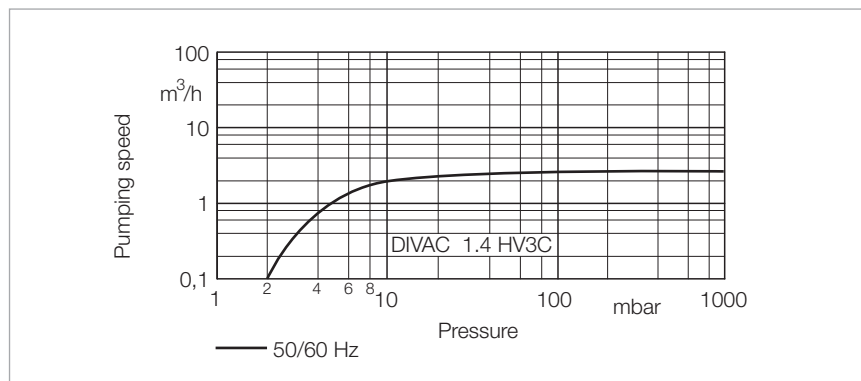
The DIVAC 1.4 HV3C is a three-stage diaphragm pump capable of resisting chemicals and offering an improved pumping performance. Its speed is infinitely variable from 700 to 1600 rpm so that the pumping speed of the pump can be easily adapted to differing requirements. The built-in textured diaphragm is made of EPDM and has been coated with PTFE. The valves are made of KALREZ® thereby ensuring excellent resistance also in connection with aggressive gases. Owing to the three-stage design, pressures of 2 mbar can be attained very easily.



Dimensional drawing for the DIVAC 1.4 HV3C



Curves of pump-down time of a 10 l vessel



Curves of pumping capacity

Technical Data

DIVAC 1.4 HV3C

| | | |
|--|--|---------------------------------------|
| Max. pumping speed | m ³ x h ⁻¹ (cfm) | 1.3 (0.77) |
| Ultimate pressure | mbar (Torr) | ≤ 2.0 (≤ 1.5) |
| Max. exhaust back pressure (absolute) | mbar (Torr) | 1500 (1125) |
| Pump heads | | 3 |
| Connection | | |
| Inlet (suction side) | DN | Hose nozzle ID 10 |
| Exhaust (delivery side) | DN | Hose nozzle ID 10 |
| Thread (suction and delivery side) | G | G 1/8" |
| Noise level acc. to DIN 45 635 Part 13, approx. | dB(A) | 48 |
| Permissible gas admission temperature | °C (°F) | +5 to +40 (+41 to +104) |
| Permissible ambient temperature | °C (°F) | +5 to +40 (+41 to +104) |
| Voltage / nominal frequency | V / Hz | 90-230 / 50-60 |
| Protective class | IP | 20 |
| Motor power ¹⁾ | W | 135 |
| at ultimate pressure | W | 35 |
| Current consumption ¹⁾ | A | 1.3 |
| Motor speed | min ⁻¹ | 700 to 1600 |
| Dimensions (W x H x D), approx. | mm (in.) | 324 x 158 x 226 (12.76 x 6.22 x 8.90) |
| Weight, approx. | kg (lbs) | 8.6 (18.99) |
| Material | | |
| Pump head | | Ryton |
| Structured diaphragm | | EPDM coated with PTFE |
| Valves | | FFPM (Kalrez) |
| Nozzles | | PTFE |

Ordering Information

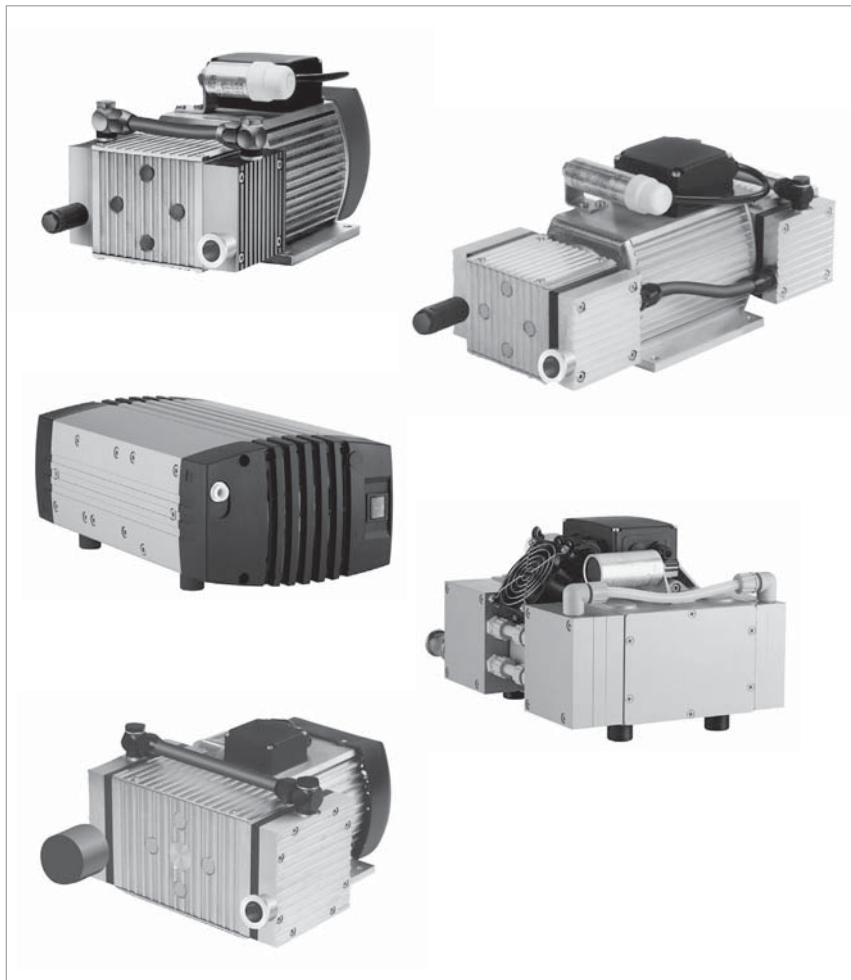
DIVAC 1.4 HV3C

| | Part No. |
|---|-----------------|
| Diaphragm vacuum pump 90-230 V, 50-60 Hz, with 2.3 m (8 ft) power cord and Schuko plug | 135 20 V |
| Accessories Exhaust silencer 1.4 with connection G 1/8" | 127 90 A |

¹⁾ For 230 V, 50 Hz version

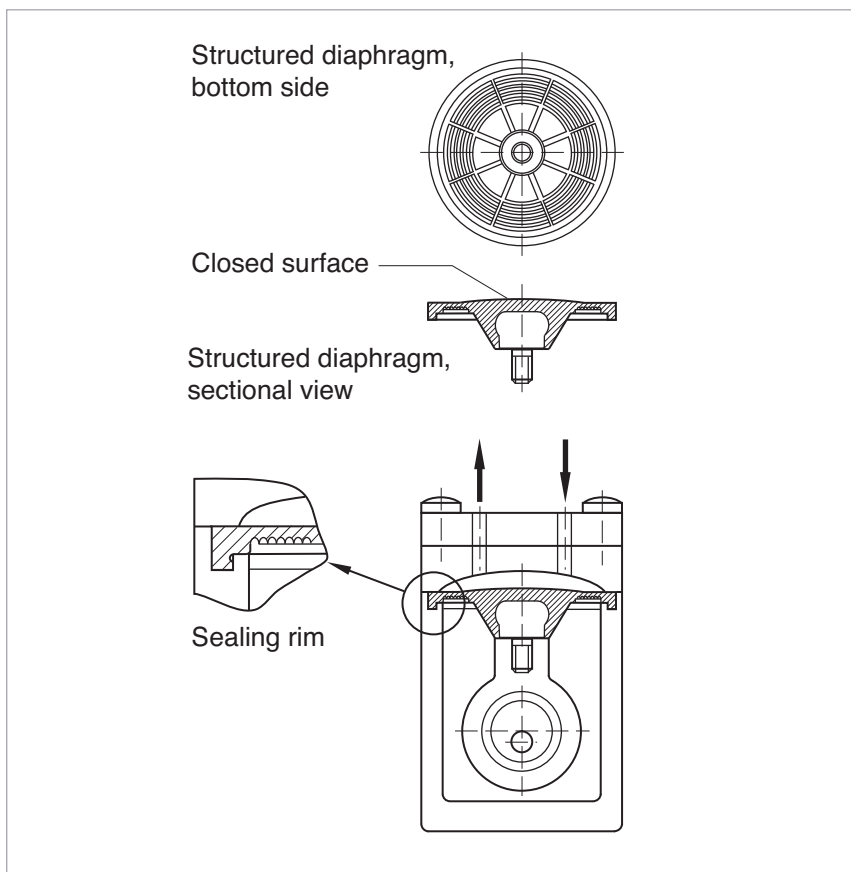
Dry Compressing Backing Pumps for Turbomolecular Pumps

DIVAC 0.8 T to 4.8 VT



Our dry compressing backing pumps from the DIVAC T series are now supplemented by the three-stage DIVAC 1.4 HV3 and the DIVAC 3.8 HV3.

Like the proven DIVAC T series, these new models also ensure a forevacuum free of hydrocarbons. Owing to their three-stage design, they provide especially within the lower pressure ranges a higher pumping speed and are therefore even better suited as backing pumps for turbomolecular pumps. But they are also used as backing pumps operating in the rough and medium vacuum range to pump clean media.



Diaphragm pump with structured diaphragm

The structured diaphragm with its sealed surface provides the basis for a long service life and a low base pressure.

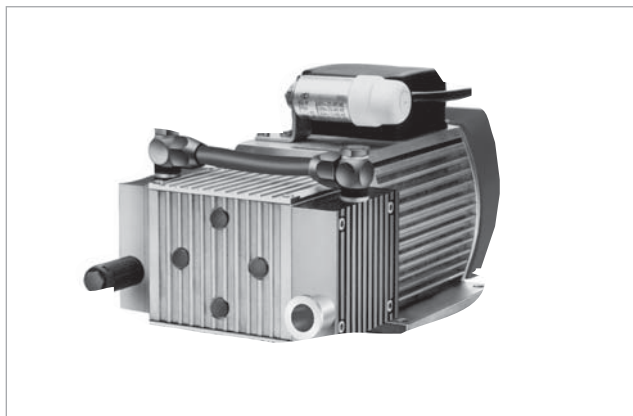
Advantages to the User

- Dry compressing, free of oil and hydro-carbons
- Matched to the turbomolecular pumps from Oerlikon Leybold Vacuum (SL 80 to TURBOVAC 450i)
- Low ultimate pressure
- ISO-KF flange at the intake port
- Fully equipped with cable, switch (ON/OFF) and plug
- Better performance and smaller size through the use of structured diaphragms
- Low vibration levels through dynamic mass balancing (in VT pumps)
- Lower maintenance costs and long maintenance intervals through the use of high-quality and well-proven components
- Simple maintenance
- Favourable price-to-performance ratio
- Can be operated in any position

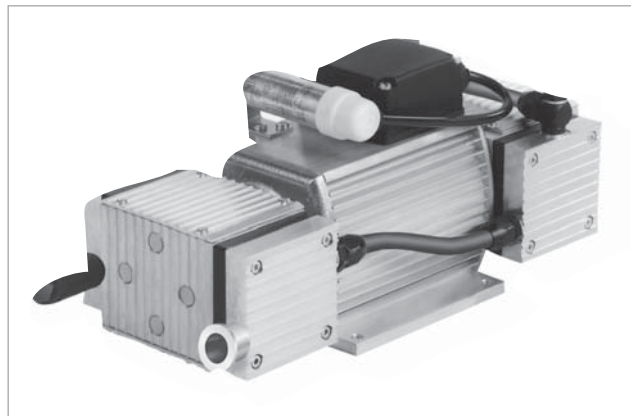
Typical Applications

- Backing pump for wide pressure range turbomolecular pumps
- Mass spectrometers
- Medical equipment
- Analyzes
- For laboratory applications also with corrosive media
- General use for rough and fine vacuum applications

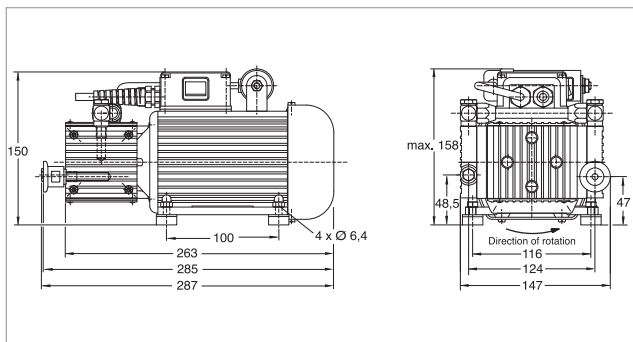
DIVAC 0.8 T and 0.8 LT



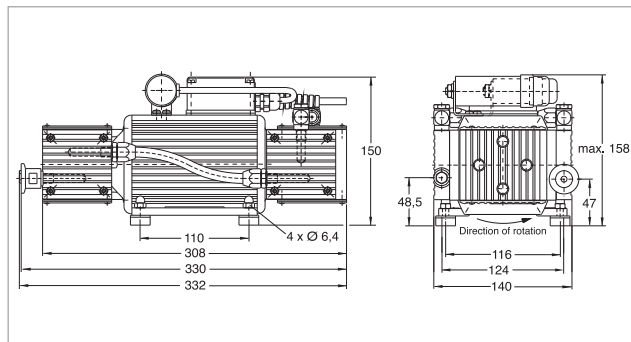
DIVAC 0.8 T



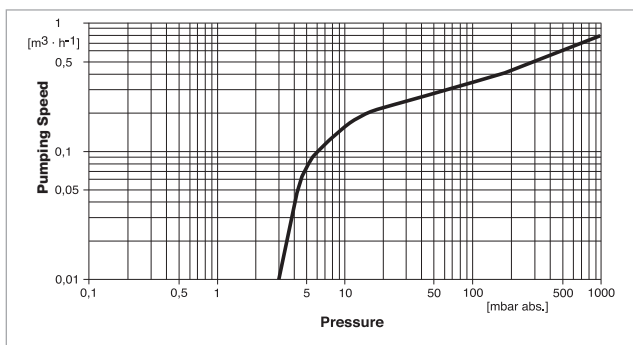
DIVAC 0.8 LT



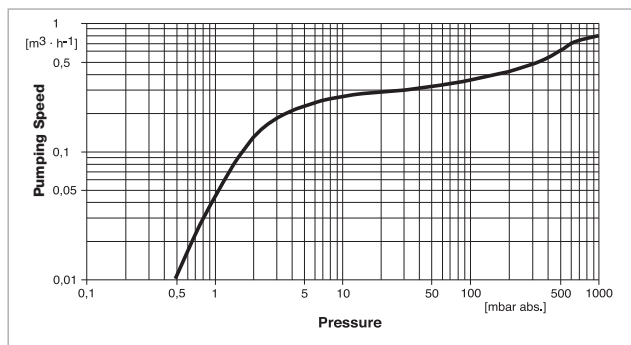
Dimensional drawing for the DIVAC 0.8 T



Dimensional drawing for the DIVAC 0.8 LT



Pumping speed curve of the DIVAC 0.8 T



Pumping speed curve of the DIVAC 0.8 LT

Technical Data

DIVAC

| | | 0.8 T | 0.8 LT |
|--|-------------|-------------------------------------|-------------------------------------|
| Max. pumping speed (atm.) | m³/h (cfm) | 0.77 (0.45) | 0.77 (0.45) |
| Ultimate pressure (absolute) | mbar (Torr) | ≤ 3.0 (≤ 2.25) | ≤ 0.5 (≤ 0.38) |
| Max. exhaust back pressure (absolute) | mbar (Torr) | 2000 (1500) | 2000 (1500) |
| Pump heads | | 2 | 4 |
| Connection | | | |
| Inlet (suction side) | DN | 16 KF | 16 KF |
| Exhaust (delivery side) | DN | Silencer | Silencer |
| Thread (suction and delivery side) | | G 1/8" | G 1/8" |
| Noise level acc. to DIN 45 635 Part 13, approx. | dB(A) | 49 | 53 |
| Permissible gas admission temperature | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Permissible ambient temperature | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Voltage / nominal frequency (1-ph. motor) | | | |
| Schuko plug | V / Hz | 198-264 / 50/60 | 230 / 50 ± 10% |
| NEMA plug | V / Hz | 90-127 / 50/60 | 115 / 60 ± 10% |
| Protective class | IP | 44 | 44 |
| Motor power | W | 50 | 80 |
| Current consumption | A | 0.4 | 0.5 |
| Nominal speed, approx. (50/60 Hz) | min⁻¹ | 1500/1800 | 1500/1800 |
| Dimensions (W x H x D), approx. | mm (in.) | 285 x 150 x 150 (11.22 x 5.9 x 5.9) | 332 x 150 x 150 (13.07 x 5.9 x 5.9) |
| Weight, approx. | kg (lbs) | 5.9 (13.02) | 7.5 (16.56) |
| Material | | | |
| Diaphragm | | Neoprene | Neoprene |
| Valves | | EPDM | EPDM |
| Pump head | | Aluminum | Aluminum |

Ordering Information

DIVAC

| | 0.8 T | 0.8 LT |
|---|--------------------|-----------------------|
| | Part No. | Part No. |
| Diaphragm vacuum backing pumps for turbomolecular pumps including 1 m (3.5 ft) long mains cord, country-specific plug, silencer, rubber feet, as well as ON/OFF switch 198-264 V / 50/60 Hz 230 V / 50 Hz ± 10% | 127 80 - | - 127 83 |
| Spare parts kit consisting of 2 diaphragms, 4 valves, 4 valve gaskets, 4 piping gaskets | EK 127 95 | EK 127 95 (2x) |
| Exhaust silencer | 127 98 | 127 98 |

T = For use in connection with Turbomolecular pumps

L = Very low ultimate pressure (Low pressure)

V = Low vibration levels (Low Vibration)

DIVAC 1.4 HV3 and 3.8 HV3

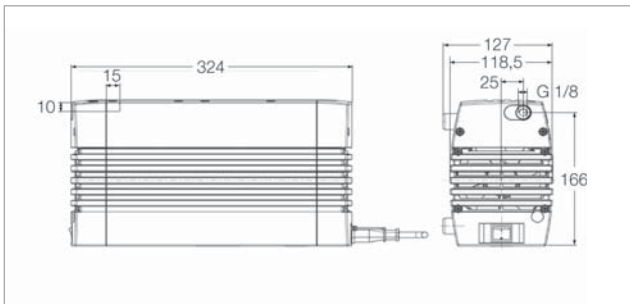


DIVAC 1.4 HV3

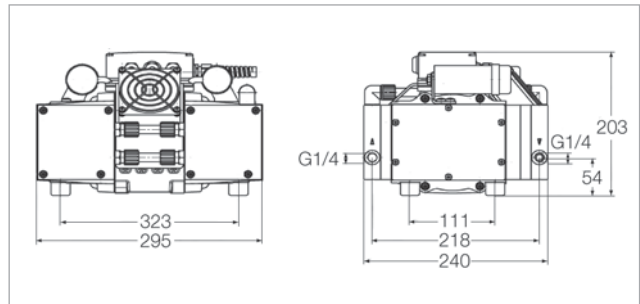


DIVAC 3.8 HV3

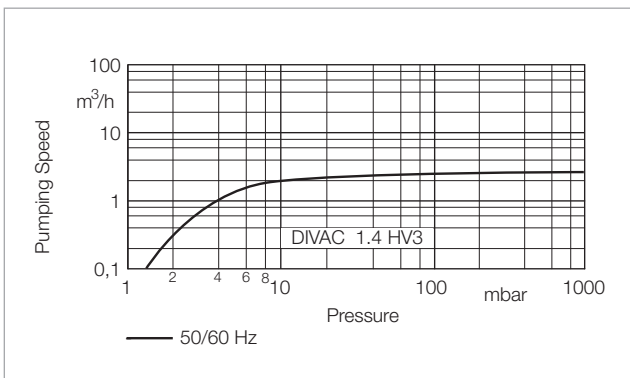
The three-stage DIVAC 1.4 HV3 and the DIVAC 3.8 HV3 provide especially in the lower pressure range a higher pumping speed compared to conventional diaphragm pumps. At the same time they are capable of attaining ultimate pressures below 2 mbar (1.5 Torr) and are thus very well suited as backing pumps for turbomolecular pumps. Owing to their compact design they are also suited for installation within pump systems.



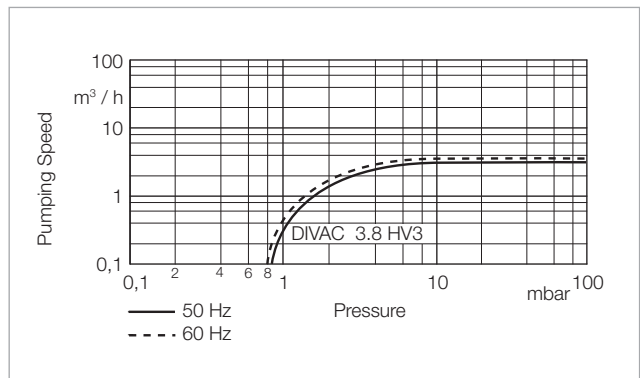
Dimensional drawing for the DIVAC 1.4 HV3



Dimensional drawing for the DIVAC 3.8 HV3



Pumping speed curve of the DIVAC 1.4 HV3



Pumping speed curve of the DIVAC 3.8 HV3

Technical Data

DIVAC

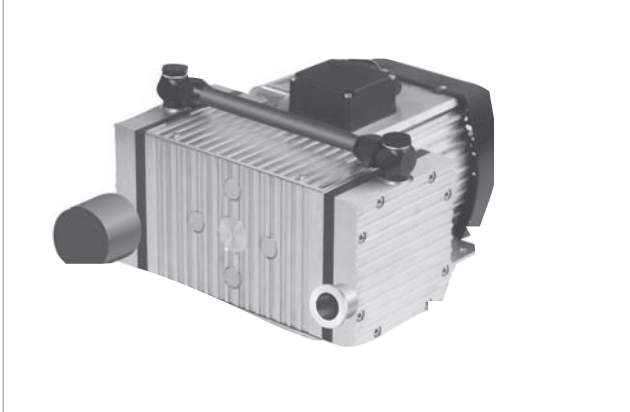
| | | 1.4 HV3 | 3.8 HV3 |
|--|-------------|---------------------------------------|---------------------------------------|
| Max. pumping speed | | | |
| 50 Hz | m³/h (cfm) | 1.3 (0.77) | 3.4 (2.00) |
| 60 Hz | m³/h (cfm) | – | 3.8 (2.24) |
| Ultimate pressure | mbar (Torr) | ≤ 1.5 (≤ 1.13) | ≤ 1.0 (≤ 0.75) |
| Max. exhaust back pressure (absolute) | mbar (Torr) | 1500 (1125) | 1500 (1125) |
| Pump heads | | 3 | 3 |
| Connection | | | |
| Inlet (suction side) | | Hose nozzle ID 9 | Hose nozzle ID 10 |
| Exhaust (delivery side) | | Hose nozzle ID 9 | Hose nozzle ID 10 |
| Thread (suction and delivery side) | | G 1/8" | G 1/4" |
| Noise level acc. to DIN 45 635 Part 13, approx. | dB(A) | 48 | 54 |
| Permissible gas admission temperature, max. | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Permissible ambient temperature, max. | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Voltage / nominal frequency (1-ph. motor) | | | |
| Schuko plug | V / Hz | 90-230 / 50-60 | 90-230 / 50-60 |
| NEMA plug | V / Hz | – | 115 / 50-60 |
| Protective class | IP | 20 | 20 |
| Motor power | W | 120 | 250 |
| at ultimate pressure | W | 35 | 190 |
| Current consumption | A | 1.3 | 1.7 |
| Nominal speed, approx. (50/60 Hz) | min⁻¹ | 1500 | 1500/1800 |
| Dimensions (W x H x D), approx. | mm (in.) | 324 x 158 x 226 (12.76 x 6.22 x 8.90) | 295 x 240 x 203 (11.61 x 9.45 x 7.99) |
| Weight, approx. | kg (lbs) | 10.5 (23.18) | 18.9 (41.72) |
| Material | | | |
| Pump head | | Aluminum | Aluminum |
| Structured diaphragm | | EPDM | EPDM |
| Valves | | EPDM | EPDM |
| Nozzles | | PA | PA |

Ordering Information

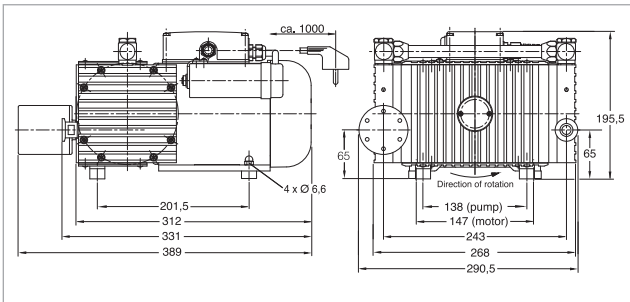
DIVAC

| | 1.4 HV3 | 3.8 HV3 |
|--|-----------------|-----------------|
| | Part No. | Part No. |
| Diaphragm vacuum backing pumps for turbomolecular pumps including 1 m (3.5 ft) long mains cord, country-specific plug, silencer, rubber feet, as well as ON/OFF switch | | |
| 90-230 V / 50-60 Hz | 127 90 V | – |
| 230 V / 50-60 Hz | – | 127 95 V |
| 115 V / 50-60 Hz | – | 127 96 V |
| Exhaust silencer | | |
| 1.4 with connection G 1/8" | 127 90 A | – |
| 3.8 with connection G 1/4" | – | 127 95 A |
| Spare parts kit | EK057456 | EK12768 |

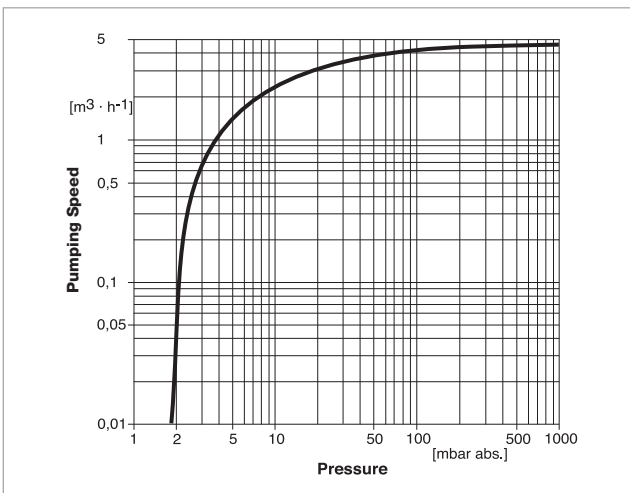
DIVAC 4.8 VT



DIVAC 4.8 VT



Dimensional drawing for the DIVAC 4.8 VT



Pumping speed curve of the DIVAC 4.8 VT

Technical Data

DIVAC 4.8 VT

| | | |
|--|-------------------|--|
| Max. pumping speed (atm.) | m³/h (cfm) | 4.8 (2.83) |
| Ultimate pressure (absolute) | mbar (Torr) | ≤ 2 (≤ 1.5) |
| Max. exhaust back pressure (absolute) | mbar (Torr) | 2000 (1500) |
| Pump heads | | 2 |
| Connection | | |
| Inlet (suction side) | DN | 16 KF |
| Exhaust (delivery side) | DN | Silencer |
| Thread (suction and delivery side) | G | G 3/8" |
| Noise level acc. to DIN 45 635 Part 13, approx. | dB(A) | 55 |
| Permissible gas admission temperature, max. | °C (°F) | +5 to +40 (+41 to +104) |
| Permissible ambient temperature, max. | °C (°F) | +5 to +40 (+41 to +104) |
| Voltage / nominal frequency (1-ph. motor) | | |
| Schuko plug | V / Hz | 230 / 50 ± 10% |
| NEMA plug | V / Hz | 115 / 60 ± 10% |
| Protective class | IP | 54 |
| Motor power | W | 350 |
| Current consumption | A | 2.6 |
| Nominal speed, approx. (50 Hz) | min ⁻¹ | 1500 |
| Dimensions (W x H x D), approx. | mm (in.) | 324 x 273 x 220 (12.76 x 10.75 x 8.66) |
| Weight, approx. | kg (lbs) | 18.0 (39.74) |
| Material | | |
| Diaphragm | | EPDM |
| Valves | | Viton |
| Pump head | | Aluminum |

Ordering Information

DIVAC 4.8 VT

| | Part No. |
|---|------------------|
| Diaphragm vacuum backing pumps for turbomolecular pumps including 1 m (3.5 ft) long mains cord, country-specific plug, silencer, rubber feet, as well as ON/OFF switch 230 V / 50 Hz ± 10% | 127 92 |
| Spare parts kit consisting of 2 diaphragms, 4 valves, 4 valve gaskets, 4 piping gaskets | EK 127 97 |
| Exhaust silencer | 127 94 |

T = For use in connection with Turbomolecular pumps

L = Very low ultimate pressure (Low pressure)

V = Low vibration levels (Low Vibration)

Applications and Accessories for SCROLLVAC Pumps

| Pumps | SC 5 D | SC 15 D | SC 30 D | SC 60 D |
|---|--------|---------|---------|---------|
| Applications | | | | |
| Electron beam melting | ■ | ■ | ■ | ■ |
| Lasers | ■ | ■ | ■ | ■ |
| Leak detection systems | ■ | | ■ | |
| Accelerators / Synchrotrons | ■ | ■ | ■ | ■ |
| Surface analysis instruments | ■ | | | |
| Scanning electron microscopy | ■ | ■ | ■ | ■ |
| Loadlock | | ■ | ■ | ■ |
| Spectroscopy | ■ | | | |
| Lamps manufacture | ■ | ■ | ■ | ■ |
| As backing pump for turbomolecular pump systems | ■ | ■ | ■ | ■ |

Products

Oil-free Scroll Vacuum Pumps SCROLLVAC SC 5 to SC 60 D



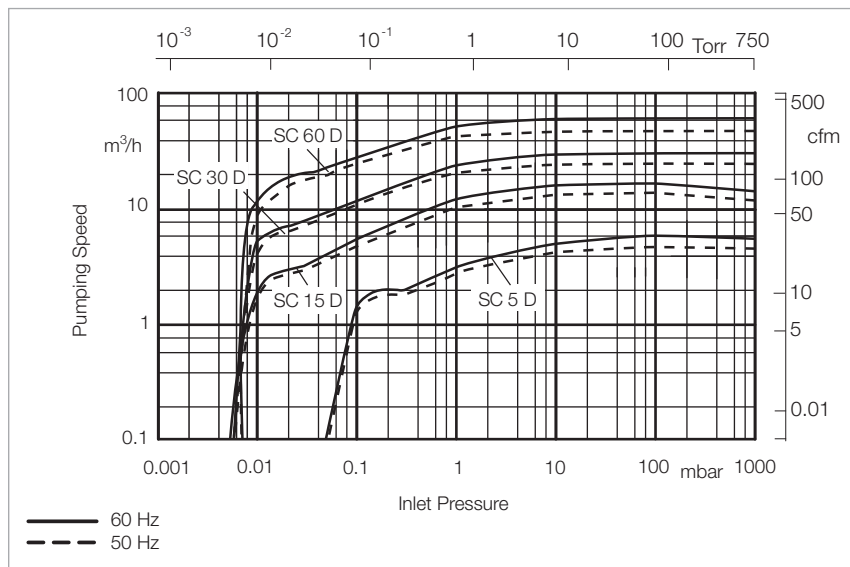
Scroll vacuum pump SCROLLVAC, from left to right: SC 60 D, SC 30 D, SC 15 D, SC 5 D

Advantage for the User

- Absolutely oil-free
- High effective pumping speed
- Low ultimate pressure
- Low noise level
- Low vibration operation
- Atmospheric inlet pressure allowable
- Low weight
- Air cooling
- Low power consumption
- Integrated operating hours counter

Typical Applications

- Electron beam welding
- Lasers
- Leak detection systems
- Accelerators / synchrotrons
- Surface analysis instruments
- Scanning electron microscopes
- Load lock
- Spectroscopy
- Lamp manufacturing
- As a backing pump for turbomolecular pump systems



Pumping speed curves for the scroll vacuum pumps SCROLLVAC SC - D

In 1905 the principle of the scroll compressor was developed by the Frenchman Leon Creux. The scroll pump is now being used as an oil-free vacuum pump. Every scroll pump consists of two Archimedes spirals engaging each other with an offset of 180°. Thus several crescent-shaped pockets of differing sizes are created. By means of an eccentric drive, a second spiral is made to orbit about a fixed spiral, thus reducing the volume of the pockets and compressing gases from the outside towards the inside thereby pumping the gases. Important to the quality of a scroll pump is that precise manufacturing tolerances are maintained and that suitable materials are selected.

Maintenance Intervals

In order to maintain the performance of the pump, a standard maintenance is required after a certain number of operating hours.

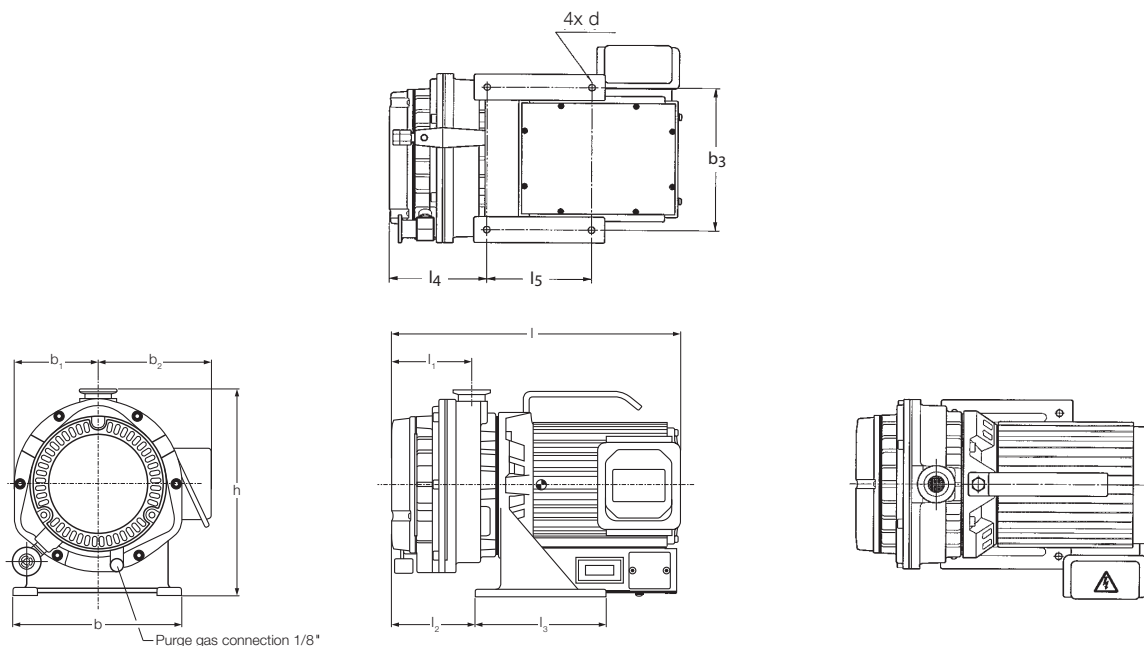
For this we are offering complete maintenance kits

- Small maintenance kit (Minor Kit) after 8,000 h or at latest after an operating time of 12 months
- Large maintenance kit (Major Kit) after 16,000 hours or at latest after an operating time of 24 months

Warranty

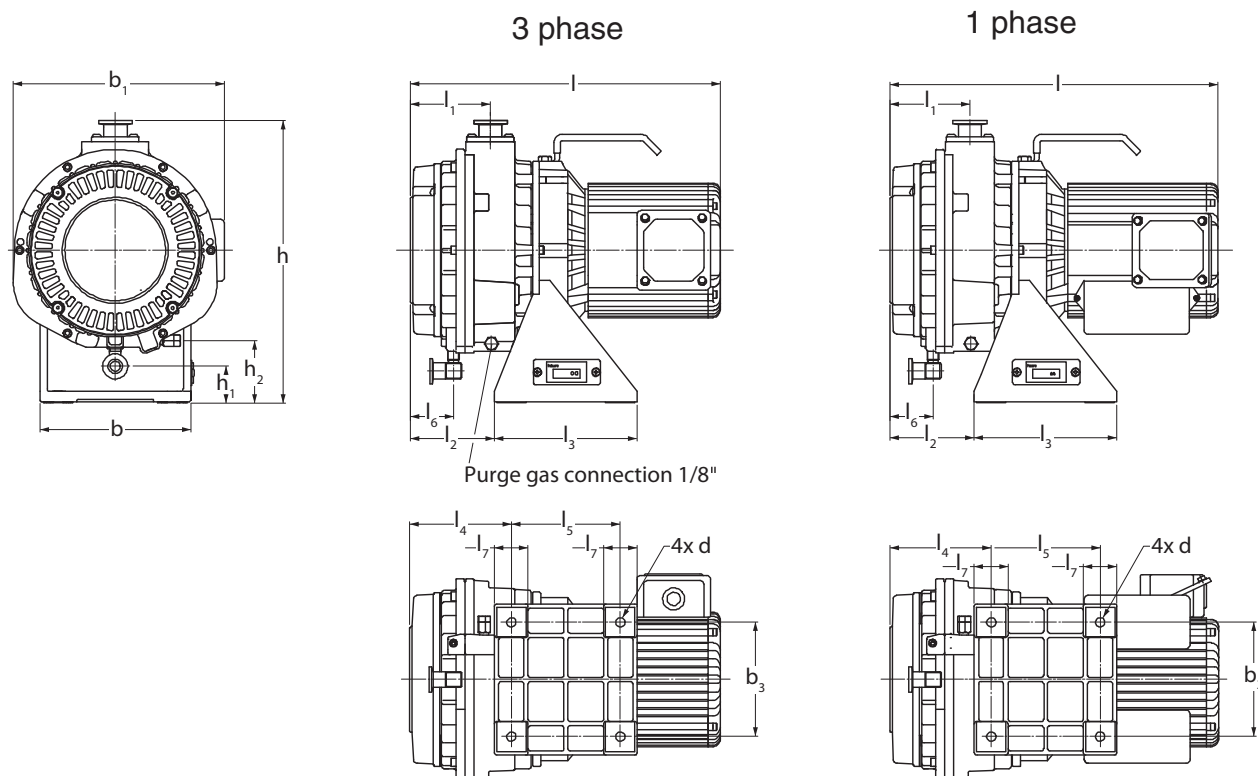
Upon signing a warranty contract, we will grant a two-year warranty for faulty material when complying with the required maintenance intervals.

Excluded are wearing parts as well as well wear due to the process.



| Type | | b | b ₁ | b ₂ | b ₃ | ∅ d | h | h ₁ | h ₂ | l | l ₁ | l ₂ | l ₃ | l ₄ | l ₅ | l ₆ | l ₇ |
|---------|-----|------|----------------|----------------|----------------|------|-------|----------------|----------------|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| SC 5 D | mm | 180 | 91 | 123 | 154 | 7 | 225 | — | — | 308 | 85 | 90 | 140 | 104 | 112 | — | — |
| | in. | 7.09 | 3.58 | 4.84 | 6.06 | 0.28 | 8.86 | — | — | 12.13 | 3.35 | 3.54 | 5.51 | 40.95 | 4.41 | — | — |
| SC 15 D | mm | 180 | 222 | — | 136 | 11 | 336 | 38 | 73.5 | 400 ¹⁾ | 96 | 101 | 170 | 121 | 130 | 52 | 40 |
| | in. | 7.09 | 8.74 | — | 5.35 | 0.43 | 13.23 | 1.50 | 2.89 | 15.75 ¹⁾ | 3.78 | 3.98 | 6.69 | 4.76 | 5.12 | 2.05 | 1.58 |

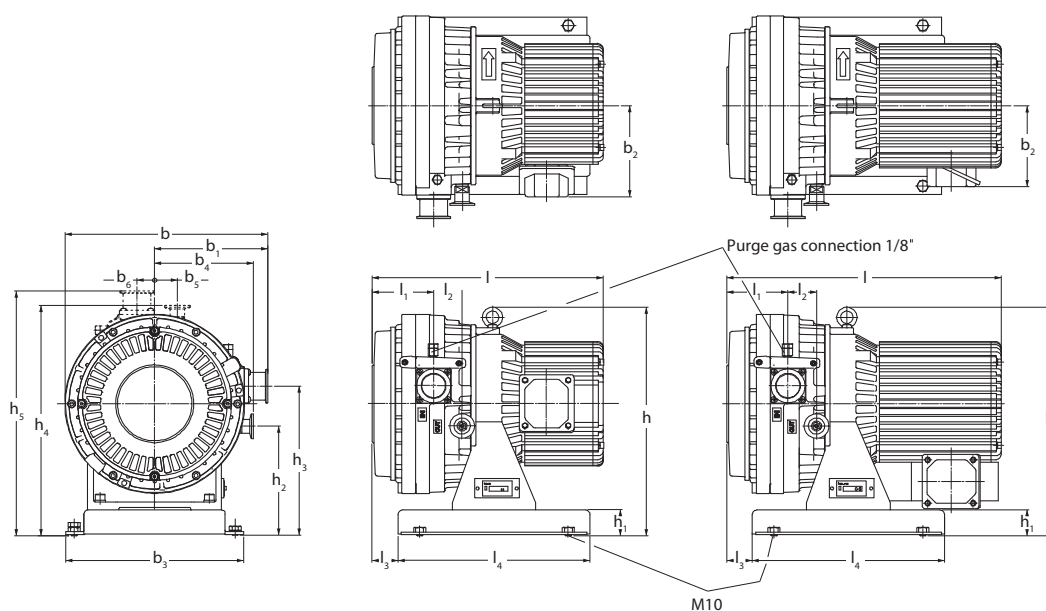
¹⁾ 370 (14.57 in.) for 3~ version



Dimensional drawing for the scroll vacuum pump SCROLLVAC SC 5 D (above) and SC 15 D (below)

3 phase

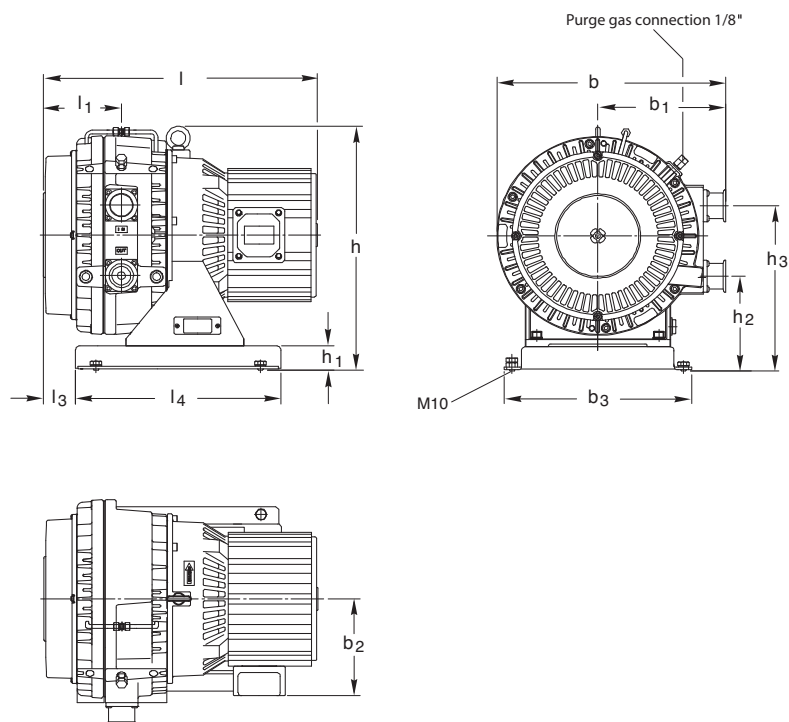
1 phase



| Type | | b | b ₁ | b ₂ | b ₃ | b ₄ | b ₅ | b ₆ | h | h ₁ | h ₂ | h ₃ | h ₄ | h ₅ | l | l ₁ | l ₂ | l ₃ | l ₄ |
|---------|-----|-------|----------------|--------------------|----------------|----------------|----------------|----------------|-------|----------------|----------------|----------------|----------------|----------------|---------------------|----------------|----------------|----------------|----------------|
| SC 30 D | mm | 328 | 183 | 131 ¹⁾ | 288 | 159 | 36 | 29 | 372 | 42 | 178 | 243 | 373 | 397 | 443 ²⁾ | 99 | 46 | 42 | 310 |
| | in. | 12.91 | 7.20 | 5.16 ¹⁾ | 11.34 | 6.26 | 1.42 | 1.14 | 4.65 | 1.65 | 7.01 | 9.57 | 14.69 | 15.63 | 17.44 ²⁾ | 3.90 | 1.81 | 1.65 | 12.20 |
| SC 60 D | mm | 390 | 218 | 168 | 320 | — | — | — | 421 | 42 | 163 | 285 | — | — | 467 | 133 | — | 55 | 350 |
| | in. | 13.35 | 8.58 | 6.61 | 12.60 | — | — | — | 16.58 | 1.65 | 6.42 | 11.22 | — | — | 18.39 | 5.24 | — | 2.17 | 13.78 |

¹⁾ 147 (5.79 in.) for 3~ version

²⁾ 372 (14.65 in.) for 3~ version



Dimensional drawing for the scroll vacuum pump SCROLLVAC SC 30 D (above) and SC 60 D (below)

Technical Data

SCROLLVAC

| | | SC 5 D | SC 15 D | SC 30 D | SC 60 D |
|--|-------------------------|---|--|--|--|
| Nominal pumping speed ¹⁾ | | | | | |
| 50 Hz | m ³ /h (cfm) | 5.4 (3.2) | 15.0 (8.8) | 30.0 (17.7) | 60.0 (35.4) |
| 60 Hz | m ³ /h (cfm) | 6.4 (3.8) | 18.0 (10.6) | 36.0 (21.2) | 72.0 (42.4) |
| Pumping speed ¹⁾ | | | | | |
| 50 Hz | m ³ /h (cfm) | 4.8 (2.8) | 13.0 (7.7) | 26.0 (13.3) | 52.0 (30.6) |
| 60 Hz | m ³ /h (cfm) | 6.0 (3.5) | 15.5 (9.1) | 31.0 (18.3) | 62.0 (36.5) |
| Attainable ultimate pressure | mbar (Torr) | ≤ 0.05 (≤ 0.038) | ≤ 0.016 (≤ 0.012) | ≤ 0.01 (≤ 0.008) | ≤ 0.01 (≤ 0.008) |
| Leak rate | mbar l/s | 1 x 10 ⁻⁶ | 1 x 10 ⁻⁶ | 1 x 10 ⁻⁶ | 1 x 10 ⁻⁴ |
| Maximum inlet pressure | | Atmosphere | Atmosphere | Atmosphere | Atmosphere |
| Permissible ambient temperature | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Connections | | | | | |
| Inlet | DN | 25 | 25 | 40 | 40 |
| Exhaust | DN | 16 | 16 | 25 | 40 |
| Cooling | | Air | Air | Air | Air |
| Water vapor capacity with purge, max. | g/h | 0.2 | 1.04 | 1.04 | 1.04 |
| | l/min | 9 | 10 | 10 | 10 |
| Protection class | IP | 20 | 20 | 20 | 20 |
| Motor power | W (hp) | 150 (0.20) | 400 (0.54) | 600 (0.82) | 1400 (1.90) |
| Motor speed | | | | | |
| 50 Hz | min ⁻¹ (rpm) | 1440 (1440) | 1450 (1450) | 1450 (1450) | 1460 (1460) |
| 60 Hz | min ⁻¹ (rpm) | 1740 (1740) | 1730 (1730) | 1730 (1730) | 1760 (1760) |
| Motor voltage | 1-ph. ²⁾ | 100 V / 50 Hz 100 - 115 V / 60 Hz 200 - 230 V / 50/60 Hz | 100 V / 50 Hz 100 - 115 V / 60 Hz 200 - 230 V / 50/60 Hz | 100 V / 50 Hz 100 - 115 V / 60 Hz 200 - 230 V / 50/60 Hz | |
| | 3-ph. | | 200 V, 380 - 415 V / 50 Hz 200 - 380 V, 460 V / 60 Hz | 200 V, 380 - 415 V / 50 Hz 200 - 380 V, 460 V / 60 Hz | 200 V, 380 - 400 - 415 V / 50 Hz 200 - 220 - 230 V, 460 V, 60 Hz |
| Noise level at 1 m (3.5 ft), free field measurement | dB(A) | ≤ 52 | ≤ 58 | ≤ 62 | ≤ 67 |
| Dimensions (W x H x D) | mm (in.) | 308 x 214 x 225 (12.13 x 8.43 x 8.86) | 400 x 252 x 336 (15.75 x 9.92 x 13.23) | 443 x 328 x 372 (17.44 x 12.91 x 14.65) | 467 x 390 x 421 (18.39 x 15.35 x 16.57) |
| Weight | | | | | |
| Single-phase motor | kg (lbs) | 14 (30.9) | 25 (55.2) | 44 (97.1) | — |
| Three-phase motor | kg (lbs) | — | 23 (50.8) | 38 (83.9) | 60 (132.5) |

¹⁾ In accordance with DIN 28 400

²⁾ The Part No. for single-phase pumps will determine the voltage range at delivery

Ordering Information

SCROLLVAC

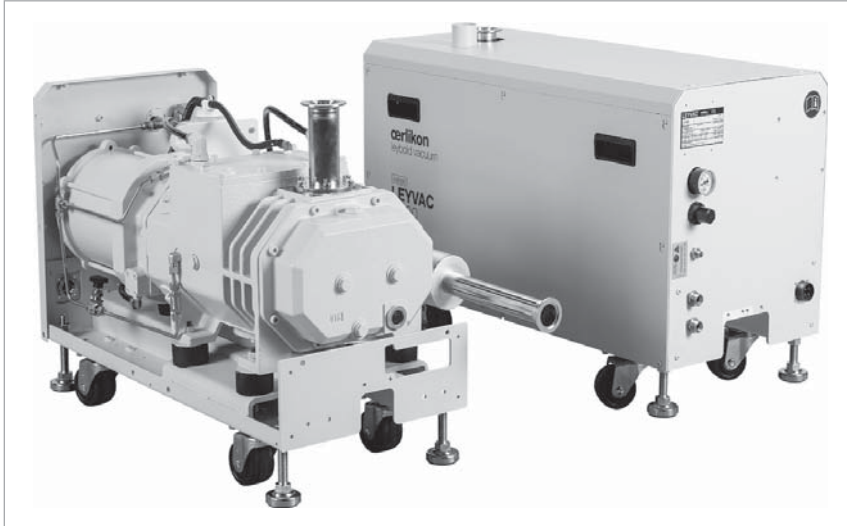
| | SC 5 D | SC 15 D | SC 30 D | SC 60 D |
|---|---------------------|---------------------|---------------------|---------------------|
| | Part No. | Part No. | Part No. | Part No. |
| Oil-free scroll vacuum pump | | | | |
| Single-phase motor, with cable and plug | | | | |
| Europe (Schuko plug, 230 V) | 133 000 | 133 001 | 133 002 | - |
| US / Japan (NEMA plug, 115 V) | 133 100 | 133 101 | 133 102 | - |
| Three-phase motor, without cable | - | 133 003 | 133 004 | 133 008 |
| Maintenance kits | | | | |
| Small maintenance kit (after 8,000 h) Minor Kit | EK 870000496 | EK 870000497 | EK 870000498 | EK 870000519 |
| Large maintenance kit (after 16,000 h) Major Kit | EK 870000499 | EK 870000500 | EK 870000501 | EK 870000520 |
| Tool kit SC 5/15/30/60 D | EK 870000502 | EK 870000503 | EK 870000503 | EK 870000521 |
| Scroll profile gasket (Tip Seal) | E 870000510 | E 870000511 | E 870000512 | E 870000522 |
| Shaft installation kit (Pin Crank Kit) | EK 870000507 | EK 870000508 | EK 870000509 | EK 870000523 |

Applications for LEYVAC Pumps

| Dry compressing vacuum pumps | | | | |
|---|--------------|----------------|---------------|-----------------|
| | LEYVAC LV 80 | LEYVAC LV 80 C | LEYVAC LV 140 | LEYVAC LV 140 C |
| Applications | | | | |
| Process industry | | | | |
| Industrial furnaces | ■ | ■ | ■ | ■ |
| Degassing | ■ | ■ | ■ | ■ |
| Charging | ■ | ■ | ■ | ■ |
| Casting | ■ | ■ | ■ | ■ |
| Drying processes in general | | | ■ | ■ |
| Freeze drying | ■ | ■ | ■ | ■ |
| Packaging | ■ | ■ | ■ | ■ |
| Coating | | | | |
| CVD coating | ■ | ■ | ■ | ■ |
| Plasma coating | ■ | ■ | ■ | ■ |
| Glass coating | ■ | ■ | ■ | ■ |
| Web coating | ■ | ■ | ■ | ■ |
| Solar | | | | |
| CVD/PECVD | ■ | ■ | ■ | ■ |
| Crystal pulling and casting | ■ | ■ | ■ | ■ |
| Support functions | | | | |
| Regeneration of cryo pumps | ■ | ■ | ■ | ■ |
| Forevacuum pumps for Turbomolecular pumps | ■ | ■ | ■ | ■ |

LEYVAC

Excellent efficiency in every respect



LEYVAC LV 80 and 140 (left), as well LEYVAC LV 80 C and 140 C (right)

Our LEYVAC dry vacuum pumps provide power combined with high performance.

This product range for the 100 m³/h market has been designed to meet the special needs of industrial processes and coating applications.

LEYVAC pumps and system combinations are rugged, reliable and durable, ready to cope with harsh processes.

The LEYVAC product line comprises the models LEYVAC LV 80, LV 80 C, LV 140 and LV 140 C

Advantages to the User

- Dry pump technology
- Shortest pumpdown times through high pumping speed for air already starting at atmospheric pressure
- High pumping speed for air and H₂
- Hermetically tight
 - No shaft seals
 - No oil leakage
 - Safe pumping of toxic gases
- High reliability
 - Long service intervals (up to 5 years)
 - High uptime
 - Robust and durable design
- One motor solution
 - Multi-voltage, dual frequency motor operable at 200 V - 460 V and 50/60 Hz
- Easy and modular
 - Direct coupling of roots booster pumps without frames for models RUVAC WS/WSU 251/501 and WH 700 provides enhanced pumping performance

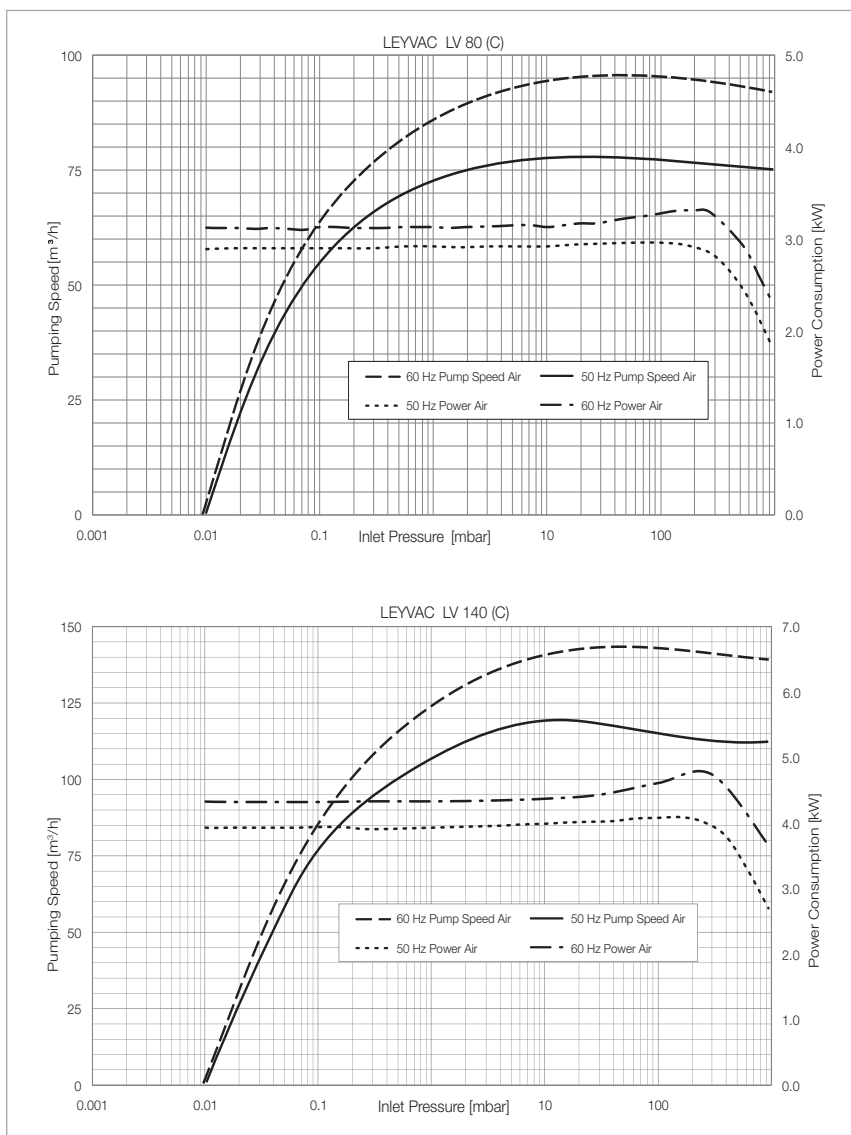
Typical Application

- Process industry
 - Industrial furnaces
 - Degassing
 - Charging
 - Casting
 - Drying processes in general
 - Freeze drying
 - Packaging
- Coating
 - CVD coating
 - Plasma coating
 - Glass coating
 - Web coating
- Solar
 - CVD/PECVD
 - Crystal pulling and casting
- Support functions
 - Regeneration of cryo pumps
 - Forevacuum pumps for turbomolecular pumps

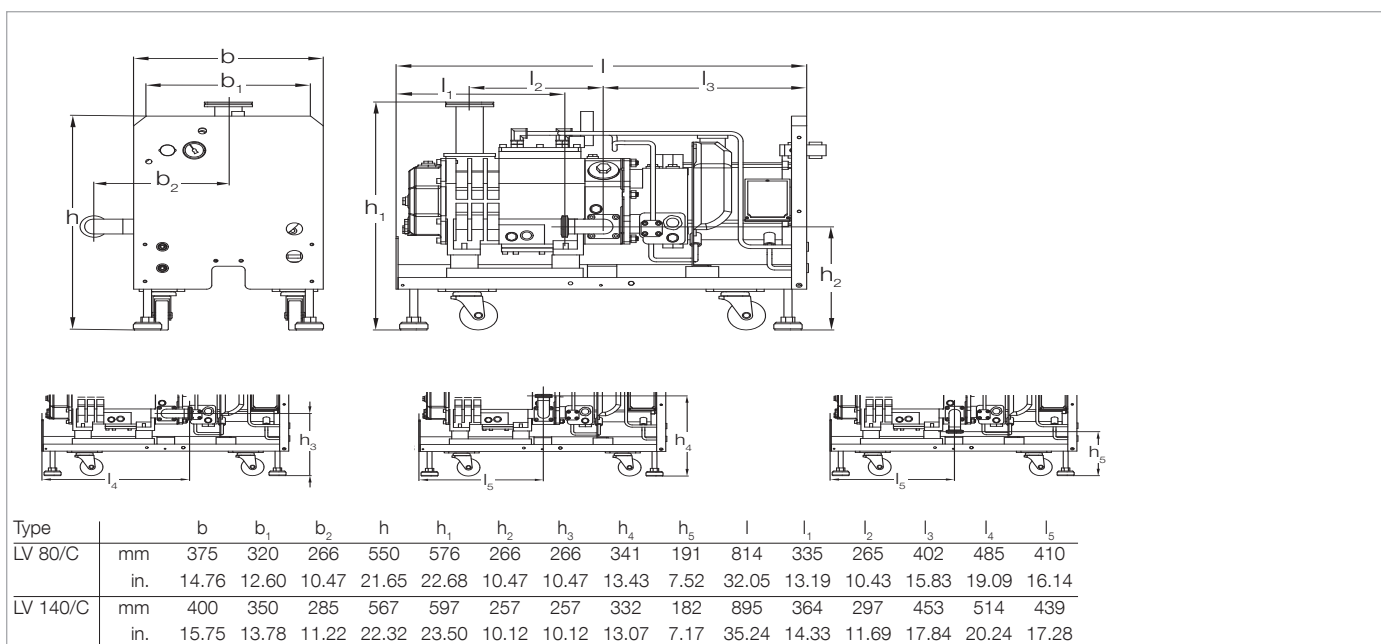
Performance Details at a Glance

LEYVAC dry vacuum pumps provide **optimized**

- System uptime
 - Robust design based on the proven RUVAC and DRYVAC technology
 - Most effective cooling system
 - Thermal switch protection
 - Tolerant to pressure shocks
 - Long intervals for bearing exchange
- Process safety
 - designed for harsh applications
- High pumping speed already at high intake pressures
- Good pumping speed also for lighter gases (with purge)
- Low noise and low heat emission
- Price-to-performance ratio
 - Low investment costs
 - Small, price optimized pumping systems



Pumping speed curves of the LEYVAC LV 80/C and LEYVAC LV 140/C



Dimensional drawing for the LEYVAC LV 80/C and LV 140/C; below for exhaust connection

Products

Technical Data

LEYVAC

with Housing

| | | LV 80 | LV 140 | LV 80 C | LV 140 C |
|---|---|--|--|--|--|
| Nominal pumping speed without gas ballast at 50/60 Hz | m ³ x h ⁻¹ (cfm) | 80/96 (47.1/56.5) | 125/145 (73.6/85.3) | 80/96 (47.1/56.5) | 125/145 (73.6/85.3) |
| Ultimate pressure with seal and rotor purge | mbar (Torr) | 1 x 10 ⁻² (0.75 x 10 ⁻²) ¹⁾ | 1 x 10 ⁻² (0.75 x 10 ⁻²) ¹⁾ | 1 x 10 ⁻² (0.75 x 10 ⁻²) ¹⁾ | 1 x 10 ⁻² (0.75 x 10 ⁻²) ¹⁾ |
| Power consumption at ultimate pressure and 50/60 Hz operation | kW (hp) | 2.9/3.2 (3.9/4.3) | 3.9/4.3 (5.2/5.8) | 2.9/3.2 (3.9/4.3) | 3.9/4.3 (5.2/5.8) |
| Weight, approx. | kg (lbs) | 280 (617) | 300 (661) | 285 (628) | 305 (672) |
| Noise level ¹⁾ | dB(A) | < 65 | < 65 | < 65 | < 65 |
| Connection flange | | | | | |
| Intake | DN | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| Discharge | DN | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| Mains voltage (± 10%) | V | 200 - 460 | 200 - 460 | 200 - 460 | 200 - 460 |
| Nominal power at 50/60 Hz | kW (hp) | 3.75 (5.0) | 5.5 (7.4) | 3.75 (5.0) | 5.5 (7.4) |
| Nominal current consumption 50/60 Hz at 400 V | A | 6 | 8 | 6 | 8 |
| Cooling | | water | water | water | water |
| Cooling water temperature | °C (°F) | +5 to +35 (+41 to +95) | +5 to +35 (+41 to +95) | +5 to +35 (+41 to +95) | +5 to +35 (+41 to +95) |
| Min. cooling water throughput | l/min | 3 | 3 | 3 | 3 |
| Water vapor tolerance (with gas ballast) 80 slm 50/60 Hz | mbar (Torr) | 20/30 (15.0/22.5) | 125/160 (93.8/120.0) | 20/30 (15.0/22.5) | 125/160 (93.8/120.0) |
| Water vapor capacity (with gas ballast) 80 slm 50/60 Hz | kg/h | 1.24/2.3 | 11.5/18.0 | 1.24/2.3 | 11.5/18.0 |
| Permissible ambient temperature | °C (°F) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) |
| Protection class EN 60529 | IP | 54 | 54 | 54 | 54 |
| Dimensions (W x H x D) | mm (in.) | 814 x 375 x 550 (32.05 x 14.76 x 21.65) | 895 x 400 x 567 (35.24 x 15.75 x 22.32) | 814 x 375 x 550 (32.05 x 14.76 x 21.65) | 895 x 400 x 567 (35.24 x 15.75 x 22.32) |

¹⁾ At ultimate pressure and with rigid exhaust line DIN EN ISO 2151

Ordering Information

LEYVAC

with Housing

| | LV 80 | LV 140 | LV 80 C | LV 140 C |
|---|--|--|--|--|
| | Part No. | Part No. | Part No. | Part No. |
| Dry compressing vacuum pump LEYVAC including LEYBONOL LVO 410 lubricant, base plate, castors, temperature switch, shaft seal and rotor purge additionally with casing | 115080V15 — | 115140V15 — | — 115080V30 | — 115140V30 |
| Accessories | | | | |
| Non-return ball valve | 115005A01 | 115005A01 | 115005A01 | 115005A01 |
| Non-return valve, spring-loaded | 115005A02 | 115005A02 | 115005A02 | 115005A02 |
| Roots pump adapter for RUVAC WS/WSU 251/501 and RUVAC WH 700 | 115005A03 | 115005A03 | 115005A03 | 115005A03 |
| Exhaust pressure sensor LV 80 | 115005A10 | 115005A10 | 115005A10 | 115005A10 |
| LV 140 | 115005A11 | 115005A11 | 115005A11 | 115005A11 |
| Gas ballast kit manually operated 24 V | 115005A12 115005A13 | 115005A12 115005A13 | 115005A12 115005A13 | 115005A12 115005A13 |
| Silencer standard (with integrated non-return valve) serviceable emptyable | 115005A20 115005A22 115005A23 | 115005A20 115005A22 115005A23 | 115005A20 115005A22 115005A23 | 115005A20 115005A22 115005A23 |
| High-performance silencer | 115005A21 | 115005A21 | 115005A21 | 115005A21 |
| Elbow for silencer, emptyable | 115005A26 | 115005A26 | 115005A26 | 115005A26 |
| Inlet screen | 115005A28 | 115005A28 | 115005A28 | 115005A28 |
| External frequency converter (including mains filter) for LEYVAC LV 80 (400 V) | 115005A30 | 115005A30 | 115005A30 | 115005A30 |
| LEYVAC LV 140 (400 V) | 115005A35 | 115005A35 | 115005A35 | 115005A35 |
| Profibus module ¹⁾ | 155212V | 155212V | 155212V | 155212V |
| Relais module (digital output) ¹⁾ | 112005A01 | 112005A01 | 112005A01 | 112005A01 |
| Ethernet interface module ¹⁾ | 112005A02 | 112005A02 | 112005A02 | 112005A02 |
| ProfiNet module ¹⁾ | 112005A35 | 112005A35 | 112005A35 | 112005A35 |
| EtherCAT module ¹⁾ | 112005A36 | 112005A36 | 112005A36 | 112005A36 |

¹⁾ For optional, external frequency converter

Applications for SCREWLINE Pumps

| Dry Compressing Scroll Vacuum Pumps | | SCREWLINE SP 250 (ATEX) | | SCREWLINE 630 (F) ATEX | |
|--|--|-------------------------|--|------------------------|--|
| Application | | | | | |
| Laser engineering | | ■ | | ■ | |
| Vacuum coating | | ■ | | ■ | |
| Lamination | | ■ | | ■ | |
| Loadlock chambers | | ■ | | ■ | |
| Mechanical engineering | | ■ | | ■ | |
| Automotive industry | | ■ | | ■ | |
| Metallurgy/Furnaces | | ■ | | ■ | |
| Crystal pulling | | ■ | | ■ | |
| Degassing | | ■ | | ■ | |
| Electrical engineering | | ■ | | ■ | |
| Energy technology | | ■ | | ■ | |
| Welding technology | | ■ | | ■ | |
| Lamps/Tubes manufacture | | ■ | | ■ | |
| Cooling and air conditioning | | ■ | | ■ | |
| Chemistry/Pharmaceuticals | | ■ | | ■ | |
| Chemical research laboratories | | ■ | | ■ | |
| Vacuum drying | | ■ | | ■ | |
| Freeze drying systems | | ■ | | ■ | |
| Environmental engineering | | ■ | | ■ | |
| Packaging | | ■ | | ■ | |
| Medical technology | | ■ | | ■ | |
| Analytical engineering | | ■ | | ■ | |
| Research and development | | ■ | | ■ | |
| Space simulation | | ■ | | ■ | |
| Backing pump for HV-Systems | | ■ | | ■ | |

General

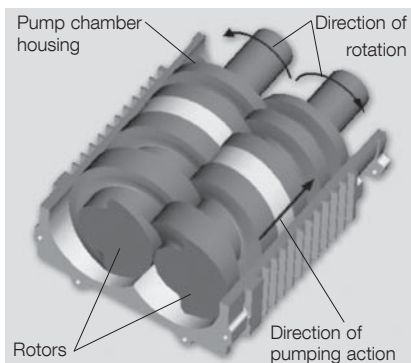


Pump system Screw Vacuum Pump SCREWLINE SP 630 with RUVAC WAU 2001

The Screw Vacuum Pumps SCREWLINE were developed in view of the special requirements of industrial applications. The innovative design allows these pumps to be used whenever reliable, compact and low maintenance vacuum solutions are required.

Principle of Operation

Screw Vacuum Pumps are dry compressing backing pumps, the operation of which is based on the screw principle. The pumping chamber of the pump is formed by two synchronised positive displacement rotors and the housing enclosing these. Since the rotors rotate in opposite directions, the chambers move steadily from the intake to the exhaust side of the pumps thereby resulting in a smooth pumping action (see figure below). Since with a single Screw Vacuum Pump rotor pair a multistage compression process is implemented, the component count in the pumping path is very low. In this way maintenance and servicing work is much simplified.



Principle of operation of the SCREWLINE Line

Properties

The direct pumping path without multiple deflections for the medium make the Screw Vacuum Pumps highly insensitive to foreign materials. This ensures a high uptime in industrial processes.

The two non-contacting shaft-seals are practically wear-free, which allows for very long maintenance intervals. For standard applications no purge gas is required. However, a purge gas supply can be connected as an option to purge the seals, should the application process require this.

Because of the cantilevered bearing arrangement for the Screw Vacuum Pump rotors, a potential source of failure (i.e. a bearing on the intake side) is entirely eliminated. On the one hand, no lubricants from the bearings can enter into the vacuum process, and the other hand also an impairment of the bearing by aggressive process media can be excluded.

A further benefit of the cantilevered bearing arrangement is the easy

accessibility of the pump chamber. This innovative design feature allows the removal of the pump housing with out time-consuming and costly disassembly of the bearings. Thus on-site cleaning of all surfaces in contact with the medium is possible. In particular, if the processes involved considerable amounts of contaminants this is a significant advantage which ensures a long uptime.

The low exhaust temperature is an important advantage of the Screw Vacuum Pumps. Owing to the design of the screw rotors, a temperature of maximum 100 °C (212 °F) is attained inside the pump. Thus deposits of many substances are avoided which react at high temperatures. This makes the pump unique and many customers, above all from the field of coating, value this highly.

Should deposits form in spite of this, then the easy to disassemble housing facilitates rapid cleaning.

Besides the integrated oil cooling arrangement for the rotors, the Screw Vacuum Pumps are air-cooled from the outside. Here rotor and housings are thermally linked via the oil cooler. Thus, Screw Vacuum Pumps adapt themselves ideally to the ambient conditions under changing operating situations.



Oil/water cooling unit SP 630 F

A water-cooled version is offered as Screw Vacuum Pumps SP 630 F. This product version is intended for operation in air-conditioned rooms.

The Screw Pumps portfolio is completed through ATEX-certified variants.

Moreover, the Screw Vacuum Pumps portfolio also includes pump versions suited for pumping pure oxygen (O₂).

Maintenance and Monitoring

During the development of the Screw Vacuum Pumps, special emphasis was placed on a particularly simple maintenance concept. This has been implemented through the cantilevered bearing arrangement, with all maintenance components and controls having been located on the so-called service side for easy accessibility. Thus, the space requirement which needs to be taken into account during planning has been optimized. The lower space requirement gives the user more flexibility during installation of the pump.

The monitoring system SP-GUARD was developed especially for constant real-time monitoring of the operational status of the Screw Vacuum Pumps. The operating parameters are con-

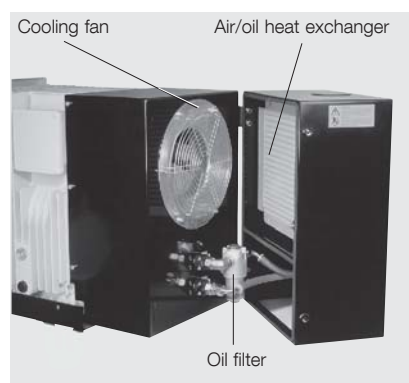
stantly acquired and processed. This enables the user to introduce preventive actions early enough so as to ensure trouble-free operation of his Screw Vacuum Pumps. The key current operating parameters can be read off from a local display. Moreover, connection to a PLC and remote monitoring is possible. Maintenance of the Screw Vacuum Pumps will generally be limited to a regular visual inspection of the pump and the annual change of gear oil and oil filter. The oil fill ports as well as the filters are readily accessible and can be easily exchanged.

With the aid of a flushing kit (optional) it is possible to clean the pump chamber, while the pump is operating without process. Deposits due to the process can thus be removed effectively and quickly without the need of having to disassemble the housing.

Also, cleaning of the air/oil heat exchanger can be done simply on-site by blowing out the heat exchanger with compressed air.

Accessories

Screw Vacuum Pumps offer to the user a high degree of flexibility. Inlet and exhaust connections are made through universal flanges, respectively clamped flanges, permit simple integration within the system. Through the accessories which are available, the pump can be optimally adapted to the individual requirements of differing applications.



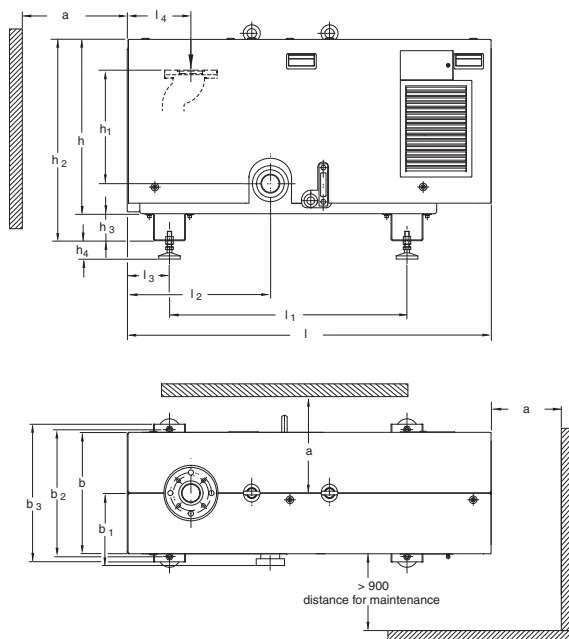
Oil/water cooling unit SP 630

Advantages to the User

- Utmost reliability
- Protection of the pump through monitoring vital parameters by means of the SP-GUARD
- Minimum downtimes owing to rapid cleaning of the pump chamber (in less than one hour)
- Avoidance of deposits through low internal temperatures
- Minimum operating costs
- The only directly air cooled screw vacuum pump on the market. No need for cooling water
- No seal gas needed for standard applications
- No oil in the pump chamber. Thus no need for disposing of contaminated oil
- Gear oil change only every two years
- Utmost flexibility
- Direct adaptation of RUVAC pumps for increased pumping speed up to approximately 7000 m³/h
- Multi-flange for all commonly used pipe connections
- Flushing kit for constant cleaning of the pump chamber
- Silencing hoods for a further reduction of noise emissions

Typical Applications

- Industrial furnaces
- Coating technology
- Load lock chambers
- Metallurgical systems
- Packaging technology
- Drying processes
- Degassing
- Research and development
- Lamps and tubes manufacture
- Automotive industry
- Packaging industry
- Space simulation
- Electrical engineering
- Energy research

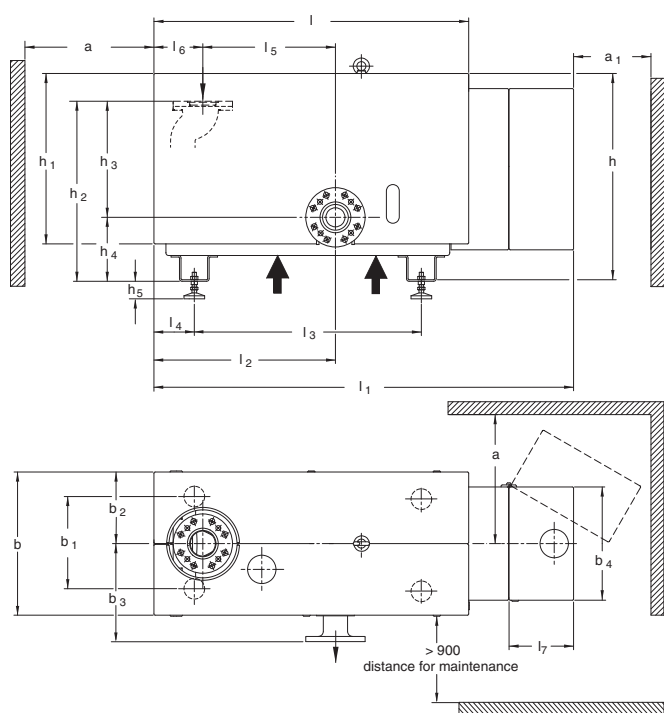


| | a | b | b ₁ | b ₂ | b ₃ |
|-----|---------|-------|----------------|----------------|----------------|
| mm | > 500 | 450 | 268 | 470 | 510 |
| in. | > 19.69 | 17.72 | 10.55 | 18.50 | 20.08 |

| | h | h ₁ | h ₂ | h ₃ | h ₄ |
|-----|-------|----------------|----------------|----------------|----------------|
| mm | 646 | 385 | 746 | 100 | 68 - 75 |
| in. | 25.43 | 15.16 | 29.37 | 3.94 | 2.68 - 2.95 |

| | l | l ₁ | l ₂ | l ₃ | l ₄ |
|-----|-------|----------------|----------------|----------------|----------------|
| mm | 1348 | 880 | 529 | 156 | 236 |
| in. | 53.08 | 34.65 | 20.83 | 6.14 | 9.29 |

Dimensional drawing for the SCREWLINE SP 250

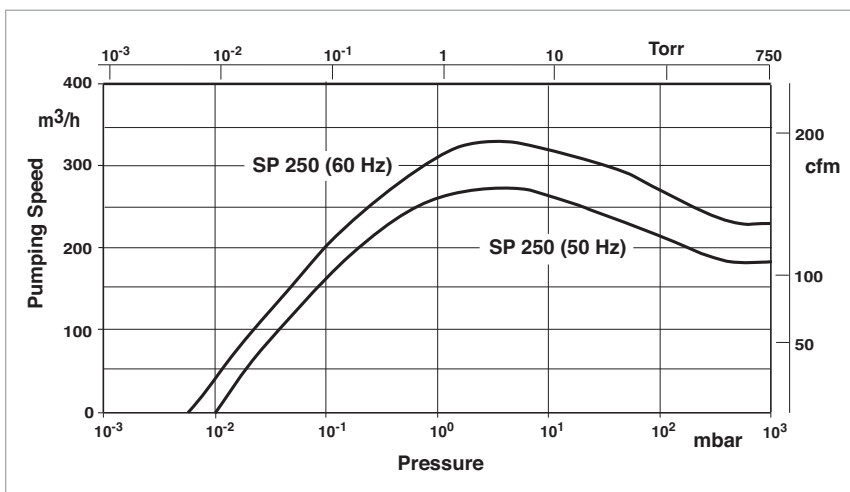


| | a | a ₁ | b | b ₁ | b ₂ | b ₃ | b ₄ |
|-----|---------|----------------|-------|----------------|----------------|----------------|----------------|
| mm | > 500 | > 300 | 555 | 470 | 276 | 380 | 439 |
| in. | > 19.69 | > 11.81 | 21.85 | 18.50 | 10.87 | 14.96 | 17.28 |

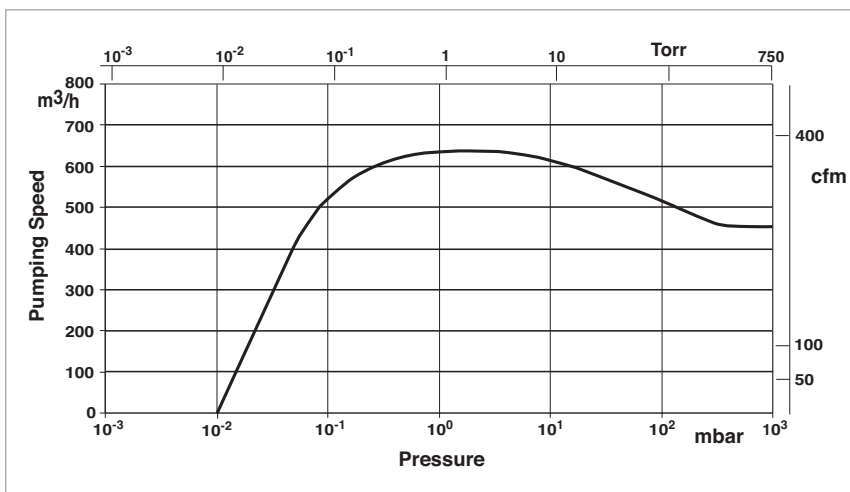
| | h | h ₁ | h ₂ | h ₃ | h ₄ | h ₅ | l |
|-----|-------|----------------|----------------|----------------|----------------|----------------|-------|
| mm | 806 | 636 | 698 | 450 | 248 | 68 | 1220 |
| in. | 31.73 | 25.04 | 27.48 | 17.72 | 9.76 | 2.68 | 48.03 |

| | l ₁ | l ₂ | l ₃ | l ₄ | l ₅ | l ₆ | l ₇ |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| mm | 1626 | 703 | 880 | 157 | 514 | 189 | 250 |
| in. | 64.02 | 27.68 | 34.65 | 6.18 | 20.24 | 7.44 | 9.84 |

Dimensional drawing for the SCREWLINE SP 630



Effective pumping speed of the SCREWLINE SP 250 for air, without gas ballast (50/60 Hz)



Effective pumping speed of the SCREWLINE SP 630 for air, without gas ballast

Products

Technical Data

SCREWLINE SP 250

| | | 50 Hz | 60 Hz |
|--|--|--|--|
| Effective pumping speed | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 270 (157) | 330 (194) |
| Ultimate pressure, total | mbar (Torr) | ≤ 0.01 (≤ 0.0075) | ≤ 0.005 (≤ 0.0038) |
| Permissible intake pressure, max. | mbar (Torr) | 1030 (773) | 1030 (773) |
| Maximum exhaust pressure with reference to the ambient pressure | | $p_{\text{ex}} = p_{\text{amb}} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mbar (37 Torr)}$ | $p_{\text{ex}} = p_{\text{amb}} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mbar (37 Torr)}$ |
| Permissible ambient temperature | °C (°F) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) |
| Water vapour tolerance (with gas ballast) | mbar (Torr) | 60 (45) | 75 (56) |
| Water vapour capacity (with gas ballast) | $\text{kg} \times \text{h}^{-1}$ (gal $\times \text{h}^{-1}$) | 10 (2.7) | 18 (4.9) |
| Installation location | | up to 3000 metres (9.800 feet) (above sea level) | up to 3000 metres (9.800 feet) (above sea level) |
| Cooling | | Air | Air |
| Power supply at operating voltage | $\Delta\Delta$ Δ | 32.0 A / 200 V (cos phi 0.88) 16.0 A / 400 V (cos phi 0.88) | 31.5 A / 210 V (cos phi 0.88) 15.5 A / 460 V (cos phi 0.88) |
| Nominal power | kW (HP) | 7.5 (10.0) | 7.5 (10.0) |
| Power consumption at ultimate pressure | kW (HP) kW (HP) | 5.9 (8.0) at 3-ph. 200 V / 400 V 6.5 (8.8) at 3-ph. 500 V | 7.2 (9.8) at 3-ph. 200 V / 400 V – |
| Energy efficiency class | | IE 2 | IE 2 |
| Motor rotational speed | rpm | 2920 | 3505 |
| Type of protection | IP | 55 | 55 |
| Thermal protection class | | F | F |
| Lubricant filling (LVO 210) | l | 7 | 7 |
| Intake flange, standard Clamping flange Bolt flange Bolt flange | | ISO 1609-1986 (E)-63 (DN 63 ISO-K) ¹⁾ ASME B 16.5 NPS 3 class 150 EN 1092-2-PN 6 - DN 65 | ISO 1609-1986 (E)-63 (DN 63 ISO-K) ¹⁾ ASME B 16.5 NPS 3 class 150 EN 1092-2-PN 6 - DN 65 |
| Exhaust flange, standard Clamping flange | | ISO 1609-1986 (E)-63 (DN 63 ISO-K) | ISO 1609-1986 (E)-63 (DN 63 ISO-K) |
| Exhaust flange, optional Clamping flange Bolt flange Bolt flange Bolt flange | | ISO 1609-1986 (E)-63 (DN 63 ISO-K) ¹⁾ ASME B 16.5 NPS 3 class 150 EN 1092-2-PN 16 - DN 65 EN 1092-2-PN 6 - DN 65 | ISO 1609-1986 (E)-63 (DN 63 ISO-K) ¹⁾ ASME B 16.5 NPS 3 class 150 EN 1092-2-PN 16 - DN 65 EN 1092-2-PN 6 - DN 65 |
| Materials (components in contact with the gas) | | Aluminum, aluminum anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) ((Viton)) | Aluminum, aluminum anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) ((Viton)) |
| Weight, approx. | kg (lbs) | 450 (992) | 450 (992) |
| Dimensions (W x D x H) | mm (in.) | 1350 x 530 x 880 (53.1 x 20.9 x 34.6) | 1350 x 530 x 880 (53.1 x 20.9 x 34.6) |
| Noise level ²⁾ | dB(A) | 67 | 72 |

¹⁾ This flange is required when ISO-K flanges are to be connected (Part No. 267 47)

²⁾ With connected exhaust gas line at ultimate pressure

Ordering Information

SCREWLINE SP 250

| | Standard | ATEX | O ₂ |
|--|------------------------------|-------------------------------------|----------------------------------|
| | Part No. | Part No. | Part No. |
| Screw Vacuum Pump SP 250 (50/60 Hz) with manual gas ballast | 115 001 ¹⁾ | – | – |
| with purge gas unit, castors and manual gas ballast valve | 115 006 ¹⁾ | – | – |
| with electromagnetic gas ballast and purge gas unit Category 3GD IIC 160 °C (320 °F) inside | – | 115 003 ^{1, 2)} | – |
| with electromagnetic gas ballast Purge vent vit, FFPM gaskets and purge gas unit Category 2G3D b IIC 135 °C (275 °F) inside/ Category 3GD Ex nA IIC 160 °C (320 °F) outside, (50 Hz only) | – | 115 012V ¹⁾ | – |
| with electromagnetic gas ballast and purge gas unit SP-GUARD | – | – | 115 019 ^{1), 3)} |
| Accessories | | | |
| Exhaust silencer | 119 002 | 119 002 | 119 002 |
| Serviceable silencer | 119 003V | 119 003V | 119 003V |
| Exhaust non-return valve (DN 65 PN 6) | 119 011 | – | – |
| Solenoid gas ballast kit, 24 V ⁴⁾ | 119 054V | – | – |
| Adaptor for RUVAC 501/1001 | 119 022 | 119 022 | 119 022 |
| Purge gas retrofit kit | 119 031 | – | – |
| Inlet filter adapter DN 63 ISO-K | 119 019 | 119 019 | – |
| Dust filter | 951 68 | – | – |
| Purge vent kit | 119 061V | 119 061V | 119 061V |
| Oil change kit | EK 110 000 820 | EK 110 000 820 | EK 110 000 820 |
| Screw inspection kit | EK 110 000 821 | EK 110 000 821 ⁵⁾ | EK 110 000 821 |
| Purge gas connection servicing kit | EK 110 000 834 | EK 110 000 834 | EK 110 000 834 |
| Filter for gas ballast | E 110 000 980 | E 110 000 980 | E 110 000 980 |
| Filter for purge gas valve unit | E 110 000 850 | E 110 000 850 | E 110 000 850 |
| Absorbing felt | E 110 002 435 | E 110 002 435 | E 110 002 435 |
| Silencer service kit | EK 500 003 476 | EK 500 003 476 | EK 500 003 476 |
| Seal kit non-return valve SP 250 | EK 110 000 828 | EK 110 000 828 | EK 110 000 828 |
| Seal kit RUVAC adaptor SP 250 | EK 110 000 835 | EK 110 000 835 | EK 110 000 835 |
| Vibration element RUVAC adaptor SP 250 | ES 110 000 2677 | ES 110 000 2677 | ES 110 000 2677 |

¹⁾ All pumps are equipped as standard with an SP-GUARD

²⁾ Only ATEX Category 3i (Directive 94/9/EG)

³⁾ T4 with max. $p_{ex} = p_{amb} + 200 \text{ mbar}$
– 50 mbar

⁴⁾ This accessory item can only be used beginning with SN (serial number) 31000530865

⁵⁾ Only for Part No.

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SCREWLINE SP 630

Technical Data

50 Hz

60 Hz

| | | | |
|---|---|---|---|
| Effective pumping speed | $\text{m}^3 \times \text{h}^{-1} \text{ (cfm)}$ | 630 (371) | 630 (371) |
| Ultimate total pressure | mbar (Torr) | $\leq 0.01 (\leq 0.0075)$ | $\leq 0.01 (\leq 0.0075)$ |
| Intake pressure limits, max. | mbar (Torr) | 1030 (773) | 1030 (773) |
| Maximum exhaust pressure with reference to the ambient pressure | | $p_{\text{ex}} = p_{\text{amb}} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mbar (37 Torr)}$ | $p_{\text{ex}} = p_{\text{amb}} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mbar (37 Torr)}$ |
| Permissible ambient temperature | °C (°F) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) |
| Water vapour tolerance (with gas ballast) | mbar (Torr) | 40 (30) | 40 (30) |
| Water vapour capacity (with gas ballast) | $\text{kg} \times \text{h}^{-1} \text{ (gal} \times \text{h}^{-1})$ | 14 (3.7) | 14 (3.7) |
| Installation location | | up to 3000 metres (9.800 feet) (above sea level) | up to 3000 metres (9.800 feet) (above sea level) |
| Cooling | | Air | Air |
| Power supply | $\Delta\Delta$ $\Delta^{1)}$ Y | 56 A / 200 V 28 A / 400 V 16 A / 690 V | 52 A / 210 V 24 A / 460 V – |
| $\cos \varphi$ | | 0.89 | 0.90 |
| Nominal power | kW (HP) | 15 (20) | 15 (20) |
| Power consumption at ultimate pressure | kW (HP) | < 11 (< 15) | < 11 (< 15) |
| Energy efficiency class | | IE 2 | IE 2 |
| Motor rotational speed | rpm | 2930 | 3530 |
| Type of protection | IP | 55 | 55 |
| Thermal protection class | | F | F |
| Lubricant filling (LVO 210) | l | 13 | 13 |
| Intake flange and exhaust flange compatible with bolt flanges | | EN 1092-2 - PN 6 - DN 100 EN 1092-2 - PN 16 - DN 100 ISO 1609-1986 (E)-100 (DN 100 ISO-K) ²⁾ ASME B 16.5 NPS4 class 150 | EN 1092-2 - PN 6 - DN 100 EN 1092-2 - PN 16 - DN 100 ISO 1609-1986 (E)-100 (DN 100 ISO-K) ²⁾ ASME B 16.5 NPS4 class 150 |
| Materials (components in contact with the gas) | | Aluminum, aluminum anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) ((Viton)) | Aluminum, aluminum anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) ((Viton)) |
| Weight, approx. | kg (lbs) | 530 (1166) | 530 (1166) |
| Dimensions (W x D x H) | mm (in.) | 1630 x 660 x 880 (64 x 26 x 35) | 1630 x 660 x 880 (64 x 26 x 35) |
| Noise level ³⁾ | dB(A) | 73 | 75 |

¹⁾ 690 V upon request

²⁾ This flange is required when ISO-K flanges are to be connected (Part No. 267 50)

³⁾ With connected exhaust gas line at ultimate pressure

SCREWLINE SP 630 F

Additional Technical Data

50 Hz

60 Hz

| | | | |
|---|------------------|------------------------|------------------------|
| Cooling | | Water | Water |
| Water connection | G | 1/2" ISO 228-1 | 1/2" ISO 228-1 |
| Water temperature | °C (°F) | +5 to +35 (+41 to +95) | +5 to +35 (+41 to +95) |
| Minimum water feed pressure | bar (psi, gauge) | 2 (15) | 2 (15) |
| Nominal flow at a water feed temperature of 25° C (77 °F) | l/min (gal/min) | 12 (3) | 12 (3) |
| Noise level ¹⁾ | dB(A) | 71 | 71 |

¹⁾ With connected exhaust gas line at ultimate pressure

Ordering Information**SCREWLINE SP 630 Standard / SP 630 F Standard**

| | 50 Hz | 60 Hz |
|--|-----------------|-----------------|
| | Part No. | Part No. |
| Screw Vacuum Pump SP 630 air cooled, with manual gas ballast | 117 007 | 117 008 |
| Screw Vacuum Pump SP 630 F water cooled, with adapter for RUVAC 2001 and electromagnetic gas ballast | 117 105 | 117 106 |
| with manual gas ballast | 117 107 | 117 108 |
| with purge gas kit and manual gas ballast | 117 113 | 117 114 |
| Screw Vacuum Pump SP 630 S1 water cooled, with castors, purge gas kit and electromagnetic gas ballast | 117 117 | 117 118 |

Dry Compressing
Vacuum Pumps

All pumps are equipped as standard with an SP-GUARD

Ordering Information**SCREWLINE SP 630 ATEX / SP 630 F ATEX**

| | 50 Hz | 60 Hz |
|---|-----------------|-----------------|
| | Part No. | Part No. |
| Screw Vacuum Pump SP 630 with purge gas kit 24 V gas ballast and water cooled, Category 3G IIC (160 °C (320 °F)) inside | 117 017 | 117 018 |
| with purge gas kit and manual gas ballast, Category 3G IIC (160 °C (320 °F)) inside | 117 115 | 117 116 |
| Screw Vacuum Pump SP 630 F water cooled Category 2G3D IIC (160 °C (320 °F)) Category 3G IIC T3 (160 °C (320 °F)) with purge gas monitor, adapter for RUVAC 2001 and electromagnetic gas ballast | 117 111 | 117 112 |

All pumps are equipped as standard with an SP-GUARD

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on the Internet under "www.oerlikon.com/leyboldvacuum" under Download Documents in the area Documentation.

Ordering Information**SP 630 O₂**

| | 50 Hz | 60 Hz |
|---|-----------------|-----------------|
| | Part No. | Part No. |
| Screw Vacuum Pump SP 630 with purge gas monitor and electromagnetic gas ballast | 117 039 | 117 040 |

All pumps are equipped as standard with an SP-GUARD

Ordering Information

SCREWLINE SP 630 Standard / SP 630 F Standard

Accessories

50 Hz / 60 Hz

| | Part No. |
|---|--|
| Exhaust silencer | 119 001 |
| Serviceable silencer | 119 004V |
| Roots pump adapter for RUVAC 1001 ¹⁾ for RUVAC 2001 for RUVAC WH 4400 | 500 003 173 119 021 119 024V |
| Dust filter ²⁾ Elbow 90° (DN 100 ISO-K) Clamping screws for DN 63-250 ISO-K Centering ring for DN 100 ISO-K | 951 72 887 26 267 01 268 06 |
| Purge vent Kit | 119 060V |
| Inlet filter adapter DN 100 ISO-K | 119 020 |
| Solenoid gas ballast kit, 24 V from serial number 31000530865 | 119 054V |
| Non-return valve (DN 100 PN 6) | 119 010 |
| Purge gas retrofit kit ³⁾ | 119 030 |
| Maintenance kit, level 1 (oil change kit) up to serial number 31000197911 from serial number 31000197911 | EK 110 000 792 EK 110 000 832 |
| Maintenance kit, level 2 (rotor inspection kit) | EK 110 000 793 |
| Purge gas connection servicing kit | EK 110 000 827 |
| Filter for gas ballast | E 110 000 980 |
| Filter for purge gas valve unit | E 110 000 850 |
| Water filter maintenance kit for SP 630 F | EK 110 000 813 |
| Silencer service kit | EK 500 003 475 |
| Seal kit for SP 630 check valve | EK 110 000 815 |

¹⁾ Must mount to adapter Part No. 119 021

²⁾ For information on the dust filter please refer to the Catalog Part "Oil sealed Vacuum Pumps", Section "SOGEVAC", Chapter "Accessories"

³⁾ Not for ATEX pumps

Applications for DRYVAC Pumps

| Pumps | DRYVAC DV 450 | DRYVAC DV 450 S | DRYVAC DV 450 C | DRYVAC DV 650 | DRYVAC DV 650-r | DRYVAC DV 650 S | DRYVAC DV 650 S-i | DRYVAC DV 650 C | DRYVAC DV 650 C-r | DRYVAC DV 650 C-i | DRYVAC DV 1200 | DRYVAC DV 1200 S-i | DRYVAC DVR 5000 C-i |
|-------------------------------------|---------------|-----------------|-----------------|---------------|-----------------|-----------------|-------------------|-----------------|-------------------|-------------------|----------------|--------------------|---------------------|
| Application | | | | | | | | | | | | | |
| Automotive industry | ■ | | | ■ | ■ | | | | | ■ | | | |
| Electrical engineering | ■ | | | ■ | ■ | | | | | ■ | | | |
| Energy technology | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | | |
| Degassing | ■ | | | ■ | ■ | | | | | ■ | | | |
| Research and development | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | |
| Freeze drying | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | |
| Industrial gases | ■ | | ■ | ■ | ■ | | ■ | ■ | | ■ | | | |
| Refrigeration and air conditioning | ■ | | | ■ | ■ | | | | | ■ | | | |
| Crystal pulling/casting | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | |
| Lamination | ■ | | | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | |
| Leak testing machines | ■ | ■ | | ■ | ■ | ■ | ■ | | | ■ | ■ | | |
| Loadlock chambers | | ■ | | | | ■ | ■ | | | | ■ | | |
| Metallurgy/Furnaces | ■ | | | ■ | ■ | | | | | ■ | | | |
| Plasma cleaning or activation | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | |
| Welding technology | ■ | ■ | | ■ | ■ | ■ | ■ | | | ■ | ■ | | |
| Sterilization | | | ■ | | | | ■ | ■ | ■ | | | ■ | |
| Vacuum coating | | | ■ | | | | ■ | ■ | ■ | | | ■ | |
| Vacuum drying | ■ | ■ | | ■ | ■ | ■ | ■ | | | ■ | ■ | | |
| Packaging | ■ | | | ■ | ■ | | | | | ■ | | | |
| Space simulation | ■ | | | ■ | ■ | | | | | ■ | | | |
| Wind turbines | ■ | | | ■ | ■ | | | | | ■ | | | |
| Backing pump for Highvacuum systems | ■ | | | ■ | ■ | | | | | ■ | | | |

Oil for DRYVAC pumps for different fields of application

| Applications | Automotive industry | Electrical engineering | Energy technology | Degassing | Research and development | Freeze drying | Industrial gases | Refrigeration and air conditioning | Crystal pulling/casting | Lamination | Leak testing machines | Loadlock chambers | Plasma cleaning or activation | Welding technology | Sterilization | Vacuum coating | Vacuum drying | Packaging | Space simulation | Wind turbines | Backing pump for | Highvacuum systems |
|----------------------|---------------------|------------------------|-------------------|-----------|--------------------------|---------------|------------------|------------------------------------|-------------------------|------------|-----------------------|-------------------|-------------------------------|--------------------|---------------|----------------|---------------|-----------|------------------|---------------|------------------|--------------------|
| LEYBONOL Oils | | | | | | | | | | | | | | | | | | | | | | |
| LVO 210 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ● | ● | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | |
| LVO 410 | | | ● | | ● | | ● | ■ | ■ | ● | ■ | | | | | ■ | | ● | ● | ■ | ■ | |

■ = Standard
 ● = Possible

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
"Oils / Greases / Lubricants LEYBONOL®".**

Oil for DRYVAC pumps for different pump types

| Pumps | DRYVAC DV 450 | DRYVAC DV 450 S | DRYVAC DV 450 C | DRYVAC DV 650 | DRYVAC DV 650-r | DRYVAC DV 650 S | DRYVAC DV 650 S-i | DRYVAC DV 650 C | DRYVAC DV 650 C-r | DRYVAC DV 650 C-i | DRYVAC DV 1200 | DRYVAC DV 1200 S-i | DRYVAC DVR 5000 C-i |
|----------------------|---------------|-----------------|-----------------|---------------|-----------------|-----------------|-------------------|-----------------|-------------------|-------------------|----------------|--------------------|---------------------|
| LEYBONOL Oils | | | | | | | | | | | | | |
| LVO 210 | ■ | | ■ | ■ | | | | | | ■ | | | |
| LVO 410 | | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |

■ = Standard

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
"Oils / Greases / Lubricants LEYBONOL®".**

DRYVAC DV 450 to DVR 5000 C-i



DRYVAC series

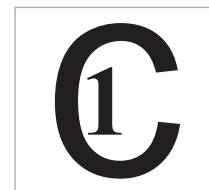
The Benefits of the Screw Principle

The direct pumping path without multiple deflections of the gas makes the DRYVAC vacuum pumps very insensitive to foreign materials. This ensures a high reliability in industrial processes. The straight and short path for the gas from the inlet of the pump to its exhaust reduces the dwell time of the gas and thereby reduces potential deposits within the pump. Through the use of a purge gas (e.g. gas ballast), any deposits, particles and condensates can be effectively removed.

Just like the Screw Vacuum Pump SP, the DRYVAC was developed for demanding applications. However, the range of applications is extended by the DRYVAC to include numerous photovoltaic and display production processes. A unique characteristic of the Screw Vacuum Pump series SCREWLINE is the availability of air cooling and the low internal surface temperatures allowing applications like lamination, for example, to be run with long uptimes and low maintenance complexity.

DRYVAC is a new family of dry compressing screw vacuum pumps available with different features depending on the specific application. The DRYVAC family was developed in consideration of the special requirements of the photovoltaic, display and process industries. All DRYVAC variants are water cooled, very compact and easy to combine into systems, in particular with the well-proven Roots pumps of the RUVAC WH, WS and WA series.

Certifications



The Best DRYVAC for every Application

The DRYVAC standard version and the DRYVAC DV S deliver an optimized pumping speed also pressures exceeding 100 mbar. DV and DV S types are suited for short cycle operation (load locks, for example) or for the evacuation of large vacuum chambers.

The DRYVAC pumps are equipped with all features necessary for process industry applications (gas ballast, for example).

The DRYVAC DV C models offer reliability in connection with harsh processes. They have been optimized for pumping media typically employed in photovoltaic and flat screen production processes. The DRYVAC DV C offers a high pumping speed for hydrogen and owing to its integrated purge gas system is insensitive to dust.

Main features and customer benefits offered by the DRYVAC are the compact design, the low-profile and the option of being able to easily build horizontally arranged pump systems and the power consumption reduced by up to 30% compared to screw pumps of the 630 m³/h pumping speed class.

These DRYVAC variants are available in different configuration levels: In the case of the DRYVAC-r the frequency converter has been designed for integration within an external electrical cabinet whereas in the case of the other variants the frequency converter has been integrated within the pump. The DRYVAC-i versions expand the DRYVAC by a PLC with a touch screen display and a software user interface allowing easy operation and configuration. The S-i versions are linked to the system as standard through a Profibus or a 24 V I/O interface (other interfaces upon request). Additionally, the S-i versions are accommodated in a full enclosure with castors, height adjustable feet and Harting socket.

The DRYVAC DV 450 and DV 650 pumps are equipped with one screw pumping stage, the DRYVAC 1200 is equipped with two pump stages running in parallel.

The DRYVAC DVR 5000 C-i is a special variant of the DRYVAC-i. This process pump is an autonomously controlled combination consisting of a DRYVAC DV 650 C screw pump and a new member of the RUVAC WH series, the WH 2500. Just like the screw pump, the RUVAC is also operated and controlled by a frequency converter (100 Hz max.) The effective pumping speed of the combination amounts to approximately 3800 m³/h for nitrogen.

Design Features of the DRYVAC Family

- Water cooled
- Hermetically sealed screw and Roots pumps, static seals only towards the outside
- Simple mechanical and electrical integration
- Integrated protection function via temperature, exhaust pressure and current consumption
- Small footprint
- Low energy consumption due to optimized rotor geometry and innovative motor design meeting IE2 efficiency class requirements
- Wide voltage and frequency range: 380-460 V, 50/60 Hz
- NRTL certified

Typical Applications

- Solar coating (SiN, ZnO, a-Si/μ-Si, CdTe, CIS/CIGS, etc.)
- Load lock
- Polysilicon production
- Display and glass coating
- Wear protection coating
- Strip coating
- Furnaces
- Metallurgy
- Vacuum drying
- Electron beam welding
- Food & Packaging

The Benefits at a Glance

Most compact dry pump, with the smallest footprint for pump systems

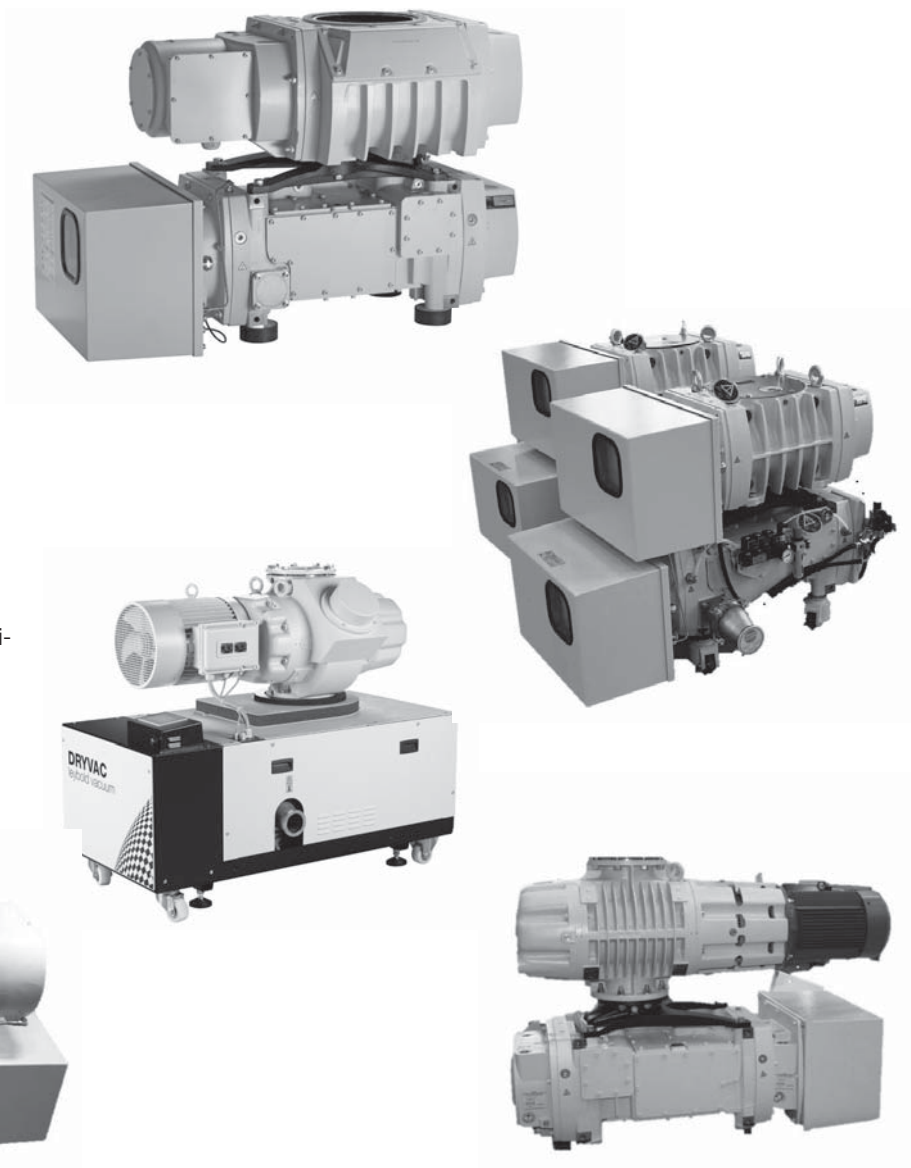
- Optimized Cost of Ownership including the lowest power consumption available on the market today
- Utmost package flexibility
- Low noise level
- Highest reliability
- Integrated self-monitoring and control
- No unscheduled down times, minor maintenance demands

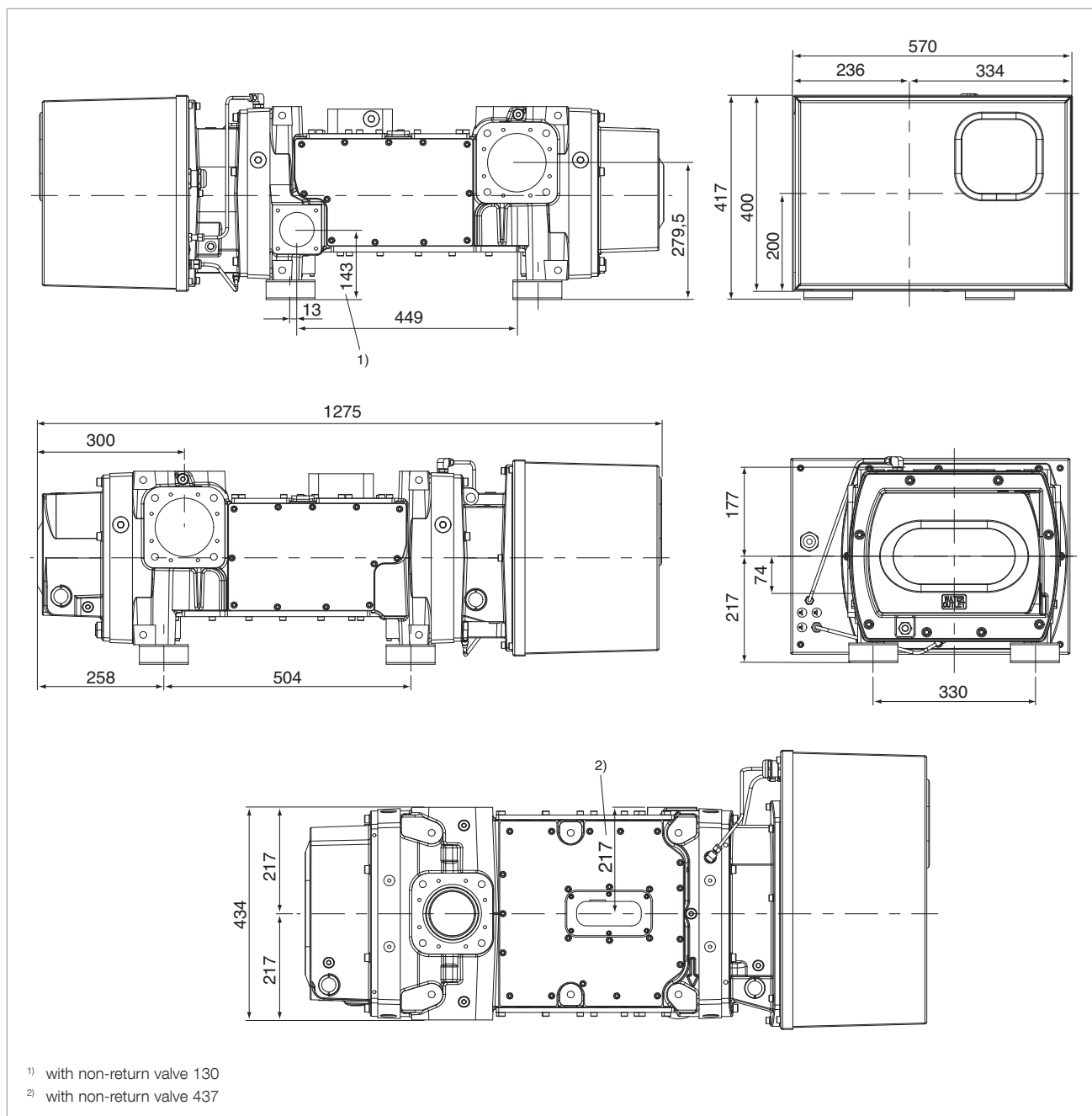
The DRYVAC series

comprises the models

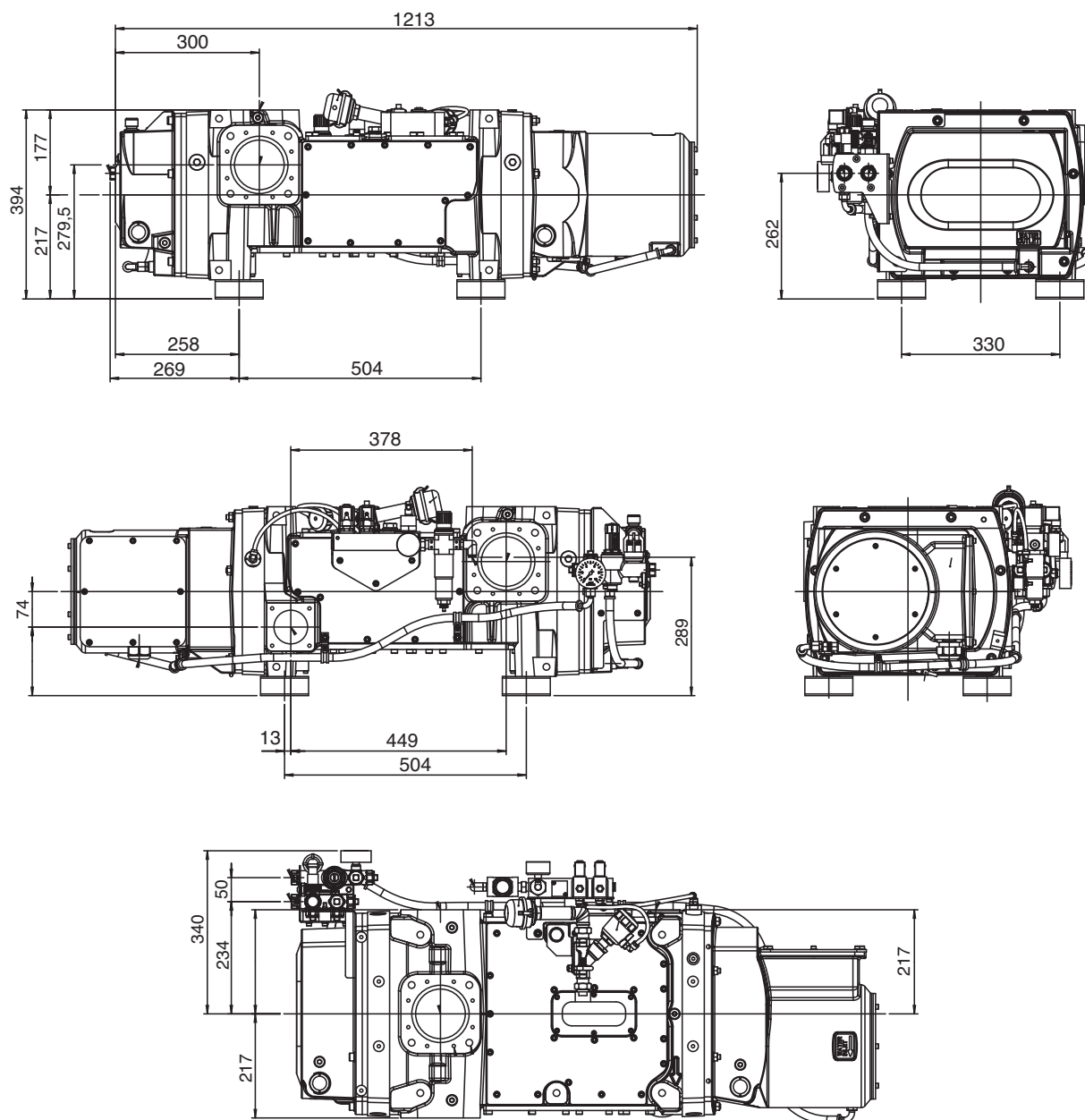
- DRYVAC DV 450
- DRYVAC DV 450-r
- DRYVAC DV 450-i
- DRYVAC DV 650
- DRYVAC DV 650-i
- DRYVAC DV 650-r
- DRYVAC DV 650 Atex Kat. 2
- DRYVAC DV 1200
- DRYVAC DV 1200 S-i
- DRYVAC DV 1200 Atex Kat. 2
- DRYVAC DVR 5000-i
- DRYVAC DVR 5000 C-i
- DRYVAC DVR 5000 S-i

and allows for numerous combinations with Roots pumps from the RUVAC series.

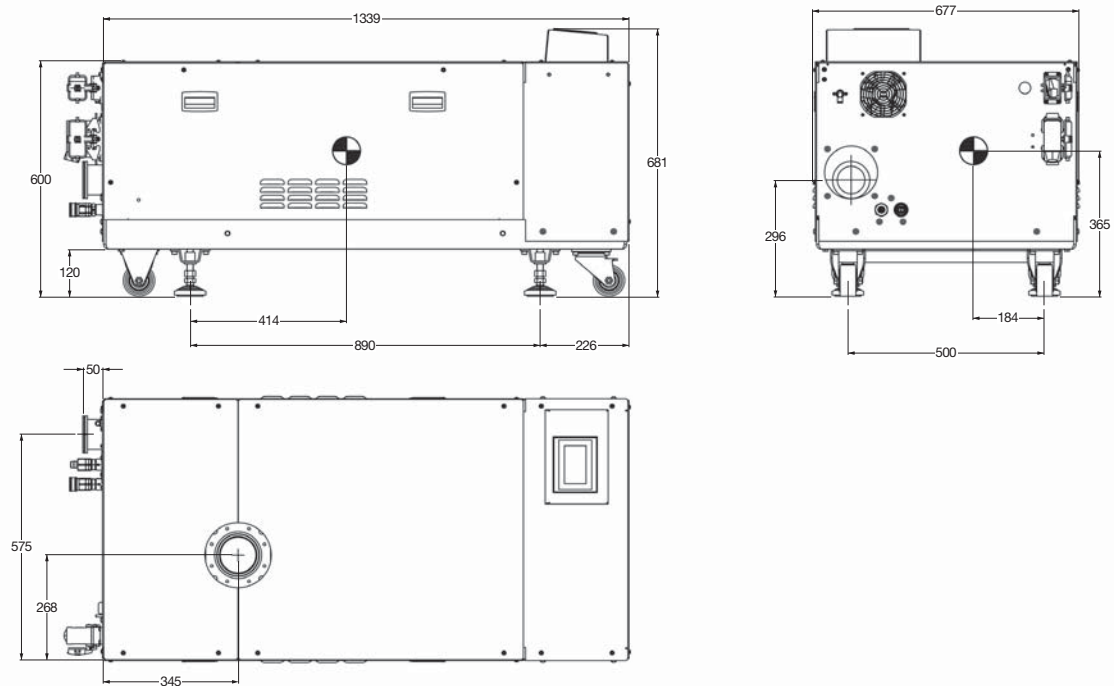




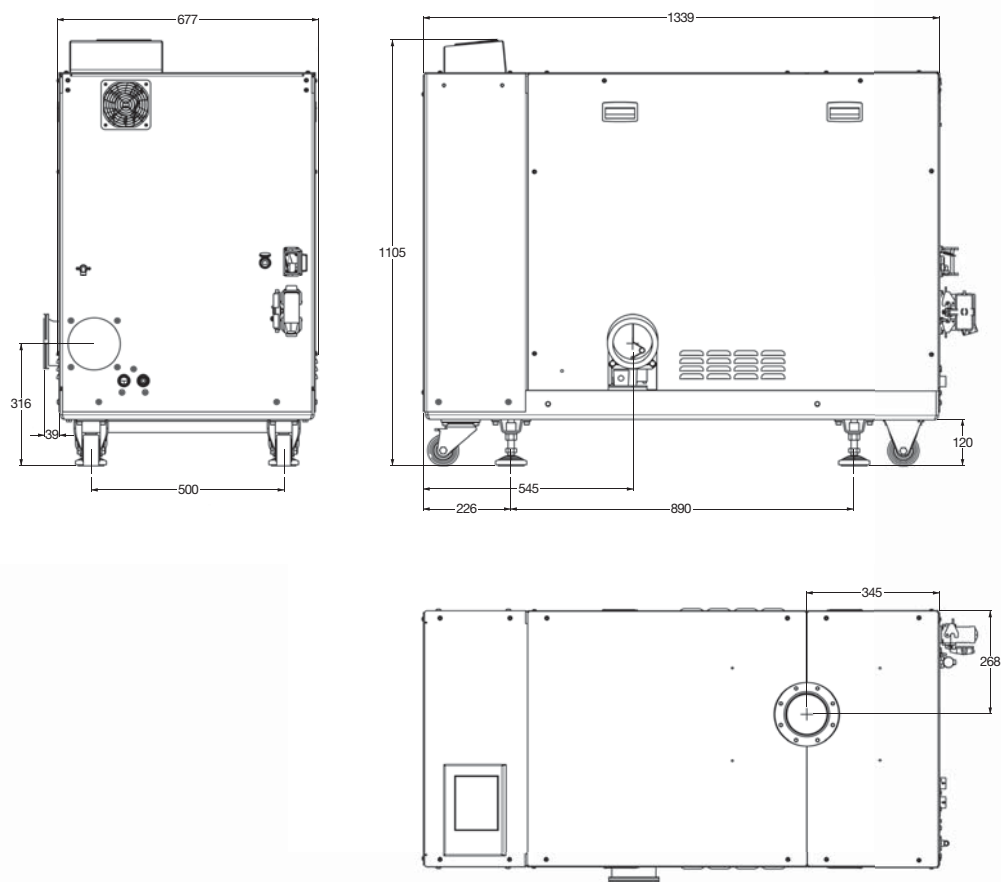
Dimensional drawing for the DRYVAC DV 450 and DV 650



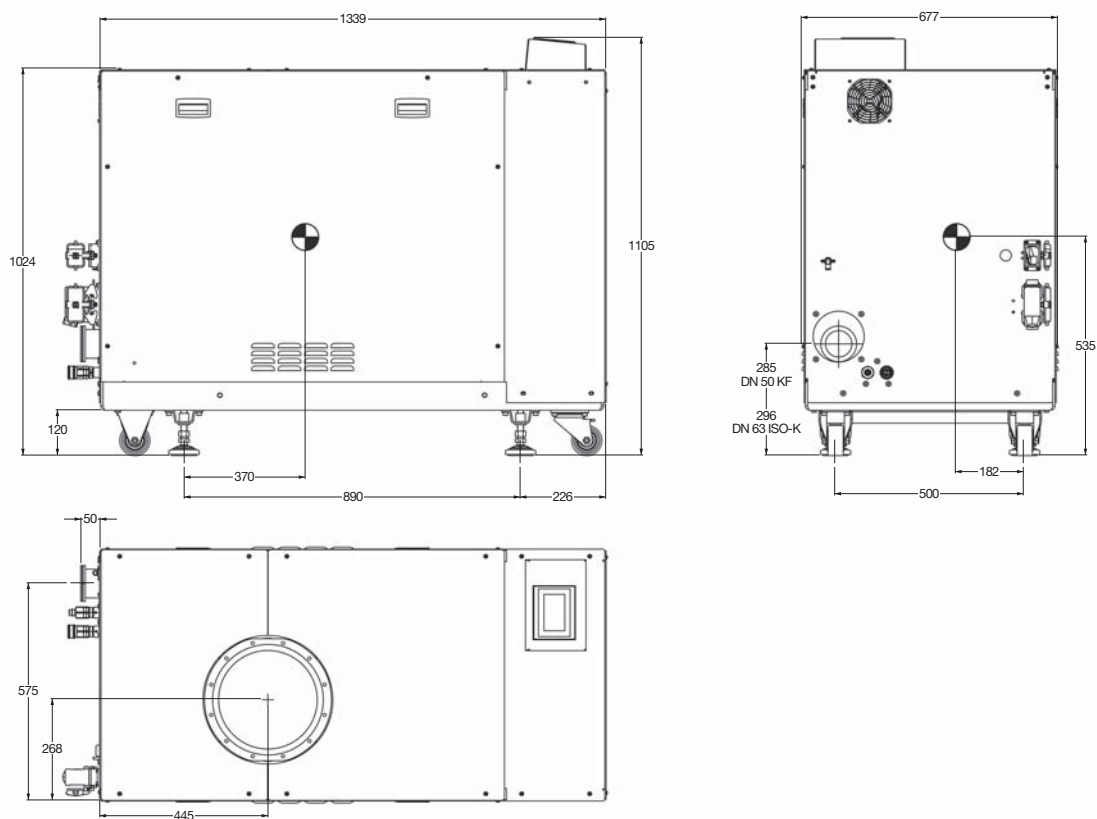
Dimensional drawing for the DRYVAC DV 450-r and DV 650-r



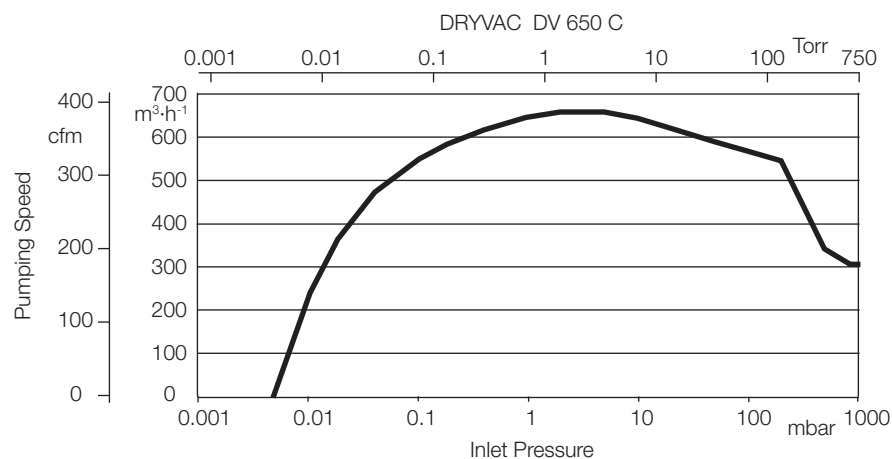
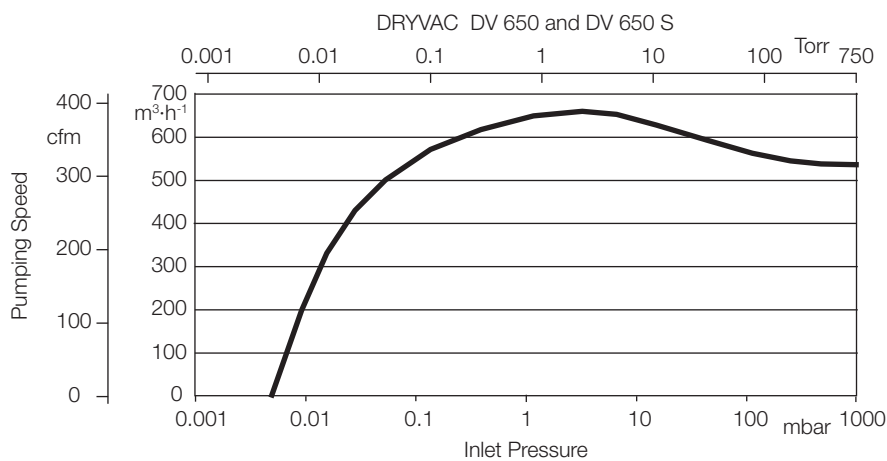
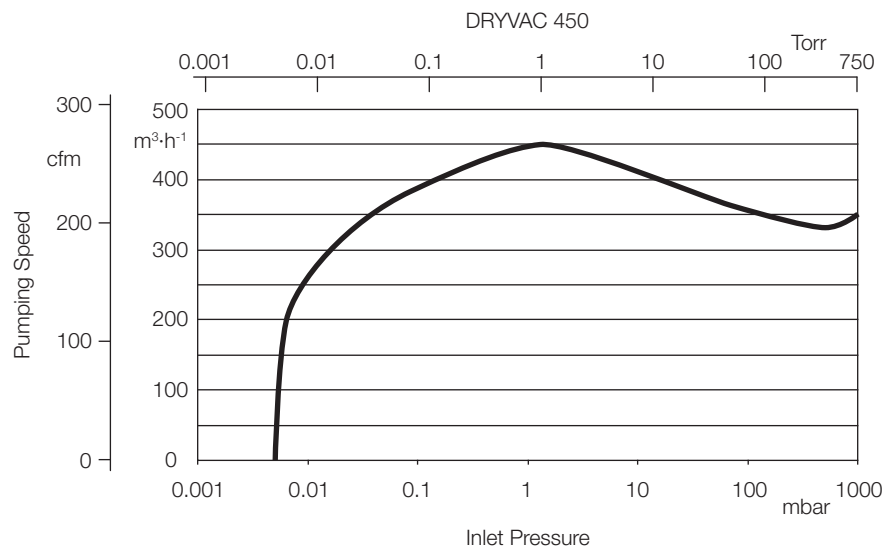
Dimensional drawing for the DRYVAC DV 450-i and DV 650-i



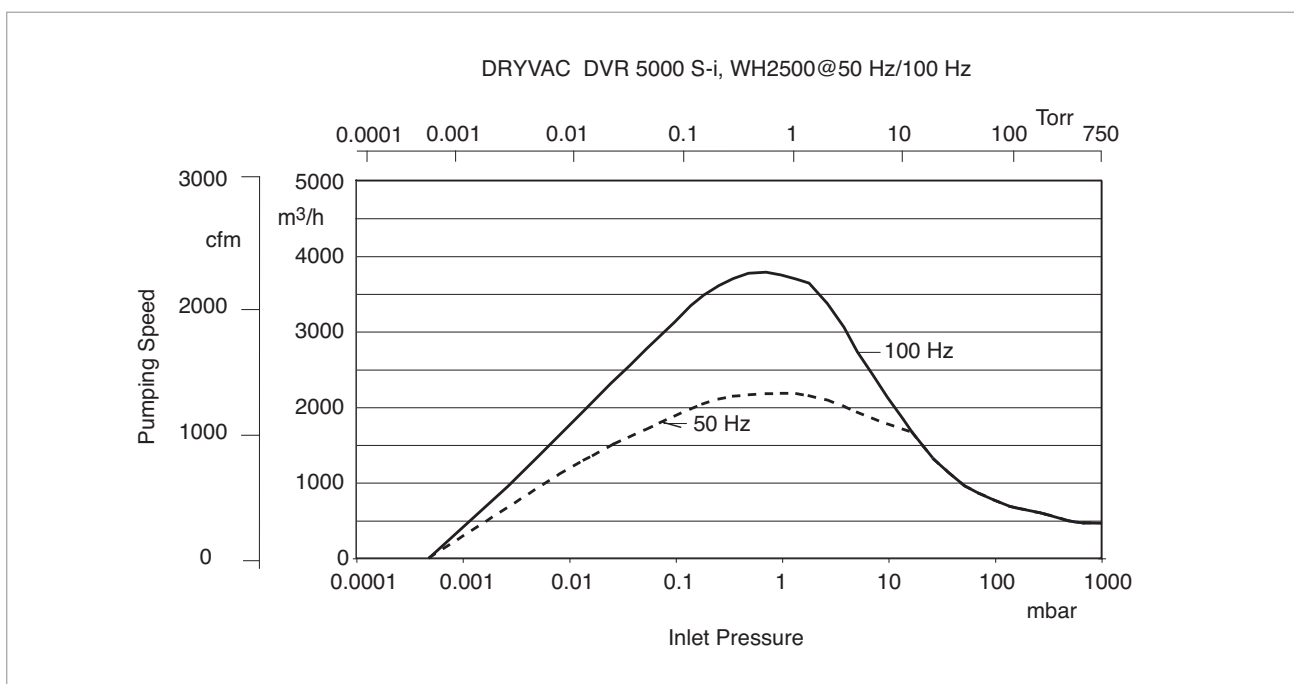
Dimensional drawing for the DRYVAC DV 1200 S-i



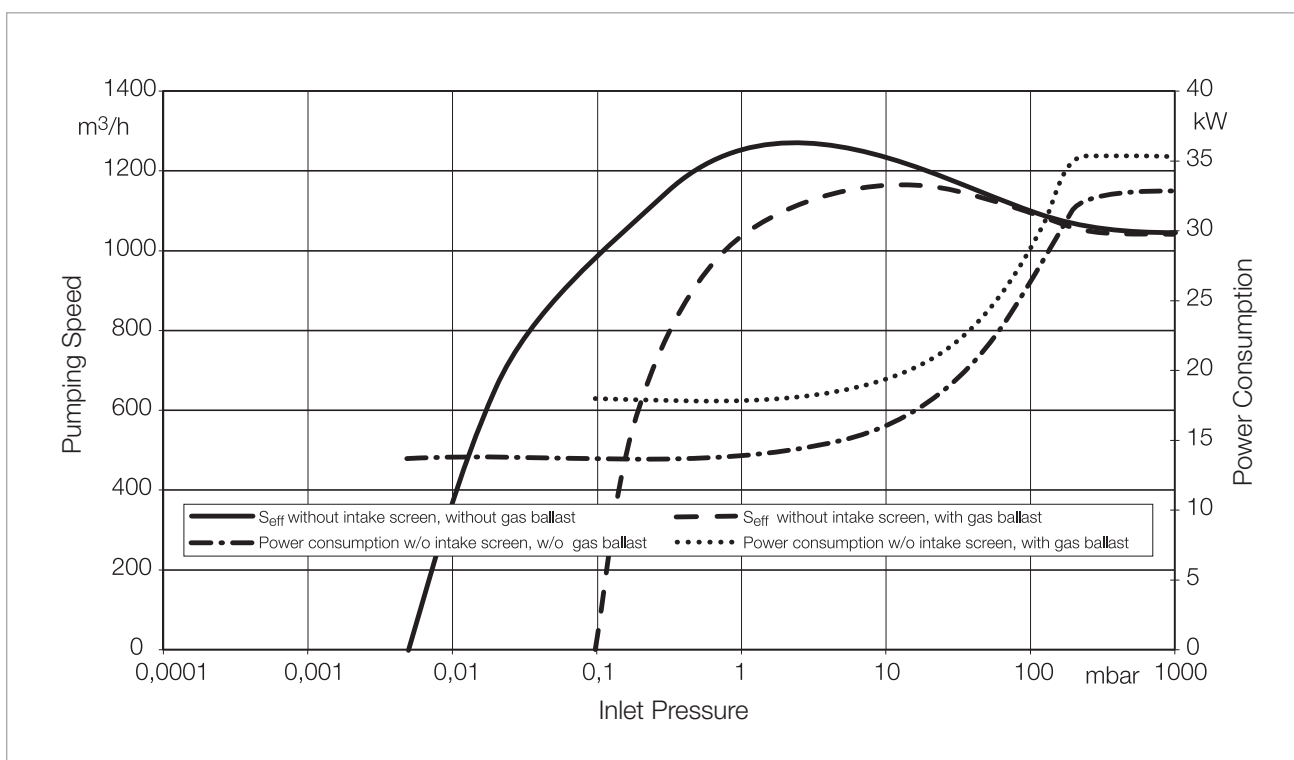
Dimensional drawing for the DRYVAC DVR 5000-i, 5000 C-i and 5000 S-i



Pumping speed curves of the DRYVAC DV 450, DV 650 (S) and DRYVAC DV 650 C



Pumping speed curves of the DRYVAC DVR 5000 S-i



Pumping speed curves of the DRYVAC DV 1200 and DV 1200 S-i

Products

Technical Data

DRYVAC DV / DV S / DV C

| | | 450 | 650-i | 650 | 650-r |
|---|----------------------------|--|---|--|--|
| Nominal pumping speed | m ³ /h (cfm) | 450 (265) | 650 (383) | 650 (383) | 650 (383) |
| Max. effective pumping speed | m ³ /h (cfm) | 450 (265) | 650 (383) | 650 (383) | 650 (383) |
| Ultimate pressure | mbar (Torr) | 5 x 10 ⁻³ (4 x 10 ⁻³) | 5 x 10 ⁻³ (4 x 10 ⁻³) | 5 x 10 ⁻³ (4 x 10 ⁻³) | 5 x 10 ⁻³ (4 x 10 ⁻³) |
| Permissible ambient temperature | °C (°F) | +5 to +50 (+41 to +122) | +5 to +40 (+41 to +104) | +5 to +50 (+41 to +122) | +5 to +50 (+41 to +122) |
| Water vapour tolerance with > 20 slm purge gas or gas ballast | mbar (Torr) | 60 (45) | 60 (45) | 60 (45) | 60 (45) |
| Water vapour capacity | kg/h | 15 | 25 | 25 | 25 |
| Noise level at ultimate pressure with silencer and exhaust line | dB(A) | 67 | 65 | 67 | 67 |
| with permanent exhaust line | | 65 | 65 | 65 | 65 |
| Power consumption at ultimate pressure | kW | 5.3 | ≤ 7 | ≤ 7 | ≤ 7 |
| Cooling | | water | water/air | water | water |
| Electrical connection | | 380-460 V, 50/60 Hz | 380-460 V, 50/60 Hz | 380-460 V, 50/60 Hz | 380-460 V, 50/60 Hz |
| Phases | | 3-ph. | 3-ph. | 3-ph. | 3-ph. |
| Nominal power at 400 V | kW | 11 | 15 | 15 | 15 |
| Nominal current at 400 V | A | 24 | 31 | 31 | 31 |
| Intake connection | DN | 100 ISO-K PN6 (1x at the top, 2x at the side) | 100 ISO-K | 100 ISO-K PN6 (1x at the top, 2x at the side) | 100 ISO-K PN6 (1x at the top, 2x at the side) |
| Exhaust side connection | DN | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| Protection class EN 60529 | IP | 54 | 20 | 54 | 55 |
| Weight | kg (lbs) | 620 | 750 (1654) | 580 (1280) | 540 (1192) |
| Dimensions (W x D x H) | mm (in.) | 1280 x 570 x 420 (50.4 x 22.4 x 16.5) | 1370 x 677 x 681 (52.8 x 26.7 x 26.8) | 1280 x 570 x 420 (50.4 x 22.4 x 16.5) | 1200 x 450 x 400 (47.2 x 17.7 x 15.7) |
| Cooling water connection Threads, female | G | 1/2 | 1/2 | 1/2 | 1/2 |
| Cooling water temperature with gear oil LEYBONOL LVO 210 | °C (°F) | 5 to 35 (41 to 95) | 5 to 35 (41 to 95) | 5 to 35 (41 to 95) | 5 to 35 (41 to 95) |
| with gear oil LEYBONOL LVO 410 | °C (°F) | 5 to 25 (41 to 77) | 5 to 25 (41 to 77) | 5 to 25 (41 to 77) | 5 to 25 (41 to 77) |
| Cooling water throughput, nominal | l/min (US gallon/min) | 6 (1.6) | 7.5 (2.0) | 7.5 (2.0) | 7.5 (2.0) |
| Purge gas connection (plugged connection) | | D10 | D10 | D10 | D10 |

Technical Data

DRYVAC DV / DV S / DV C

| | | 1200-i | 1200 | DVR 5000-i |
|---|----------------------------|---|---|---|
| Nominal pumping speed | m ³ /h (cfm) | 1250 (736) | 1250 (736) | 5000 (2945) |
| Max. effective pumping speed | m ³ /h (cfm) | 1250 (736) | 1250 (736) | 3800 (2238) |
| Ultimate pressure (Torr) | mbar | 5 x 10 ⁻³ (4 x 10 ⁻³) | 5 x 10 ⁻³ (4 x 10 ⁻³) | 5 x 10 ⁻⁴ (4 x 10 ⁻⁴) |
| Permissible ambient temperature | °C (°F) | +5 to +40 (+41 to +104) | +5 to +50 (+41 to +122) | +5 to +40 (+41 to +104) |
| Water vapour tolerance with > 20 slm purge gas or gas ballast | mbar (Torr) | | | 60 (45) |
| with > 40 slm purge gas or gas ballast | mbar (Torr) | 60 (45) | 60 (45) | |
| Water vapour capacity | kg/h | 50 | 50 | 25 |
| Noise level at ultimate pressure with silencer and exhaust line | dB(A) | 65 | 67 | 67 |
| with permanent exhaust line | dB(A) | 65 | 65 | 67 |
| Power consumption at ultimate pressure | kW | ≤ 14 | ≤ 14 | ≤ 9.5 |
| Cooling | | water/air | water | water/air |
| Electrical connection | | 380-460 V, 50/60 Hz | 380-460 V, 50/60 Hz | 380-460 V, 50/60 Hz |
| Phases | | 3-ph. | 3-ph. | 3-ph. |
| Nominal power at 400 V | kW | 30 | 30 | 21 |
| Nominal current at 400 V | A | 62 | 62 | 35 |
| Intake connection | DN | 100 ISO-K | 100 ISO-K | 250 ISO-K |
| Exhaust side connection | DN | 100 ISO-K | 100 ISO-K | 63 ISO-K or 50 KF |
| Protection class EN 60529 | IP | 20 | 54 | 20 |
| Weight | kg (lbs) | 1400 (3091) | 1400 (3091) | 1200 (2646) |
| Dimensions (W x D x H) | mm (in.) | 1370 x 677 x 1105 (53.9 x 26.7 x 43.5) | 1370 x 677 x 1105 (53.9 x 26.7 x 43.5) | 1370 x 677 x 1105 (53.9 x 26.7 x 43.5) |
| Cooling water connection Threads, female | G | 1/2 | 1/2 | 1/2 |
| Cooling water temperature with gear oil LEYBONOL LVO 210 | °C (°F) | 5 to 35 (41 to 95) | 5 to 35 (41 to 95) | 5 to 35 (41 to 95) |
| with gear oil LEYBONOL LVO 410 | °C (°F) | 5 to 25 (41 to 77) | 5 to 25 (41 to 77) | 5 to 25 (41 to 77) |
| Cooling water throughput, nominal | l/min (US gallon/min) | 15.0 (4.0) | 15.0 (4.0) | 11.0 (2.9) |
| Purge gas connection (plugged connection) | | D10 | D10 | D10 |

Ordering Information

DRYVAC DV / DV S / DV C

| DRYVAC | PLC/Touch Screen/ Software | Frequency converter | Purge module | Gas ballast module (ambient air) | Housing and feet | Lubricant LEYBONOL | Part No. |
|---|-------------------------------|------------------------|-----------------|--|--------------------------------------|-----------------------|--------------------|
| DV | | | | | | | |
| 450-r, 400 V | no | external (rack) | triple | none | rubber feet | LVO 210 | 112045V07-1 |
| 450, 400 V | no | on board | double | 24 V valve | rubber feet | LVO 210 | 112045V15-1 |
| 450, 200 V | no | on board | double | 24 V valve | rubber feet | LVO 210 | 112045V19-1 |
| 450-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 210 | 112045V50-1 |
| 650-r, 400 V | no | external (rack) | double | 24 V valve | rubber feet | LVO 210 | 112065V05-1 |
| 650-r, 200 V | no | external (rack) | double | 24 V valve | rubber feet | LVO 210 | 112065V19-1 |
| 650, 400 V ATEX Cat. 2i | no | on board | double | 24 V valve | rubber feet | LVO 210 | 112065V11-1 |
| 650, 400 V | no | on board | double | 24 V valve | rubber feet | LVO 210 | 112065V15-1 |
| 650, 400 V | no | on board | triple | none | rubber feet | LVO 210 | 112065V17-1 |
| 650-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 210 | 112065V50-1 |
| 1200, 400 V ATEX Cat. 2i | no | on board | double | 24 V valve | housing, castors, adjustable feet | LVO 210 | 112120V11-1 |
| 1200, 400 V with Profibus | no | on board (2x) | double | 24 V valve | housing, castors, adjustable feet | LVO 210 | 112120V17-1 |
| 1200-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 210 | 112120V50-1 |
| DV S | | | | | | | |
| 450 S, 400 V | no | on board | single | none | rubber feet | LVO 210 | 112045V09-1 |
| 450 S, 400 V | no | on board | single | none | rubber feet | LVO 410 | 112045V20-1 |
| 450 S, 200 V | no | on board | single | none | rubber feet | LVO 410 | 112045V29-1 |
| 650 S, 400 V | no | on board | single | none | rubber feet | LVO 210 | 112065V09-1 |
| 650 S, 400 V | no | on board | single | none | rubber feet | LVO 410 | 112065V20-1 |
| 650 S-r, 400 V | no | external (rack) | double | none | rubber feet | LVO 410 | 112065V23-1 |
| 650 S-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 410 | 112065V40-1 |
| 1200 S-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 410 | 112120V40-1 |
| DV C | | | | | | | |
| 450 C, 400 V | no | on board | triple | none | rubber feet | LVO 410 | 112045V30-1 |
| 650 C, 400 V | no | on board | triple | none | rubber feet | LVO 410 | 112065V30-1 |
| 650 C-r, 200 V | no | external (rack) | triple | none | rubber feet | LVO 410 | 112065V35-1 |
| 650 C-r, 400 V with relay option board | no | external (rack) | triple | none | rubber feet | LVO 410 | 112065V36-1 |
| 650 C-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 410 | 112065V45-1 |
| DVR | | | | | | | |
| 5000-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 210 | 112500V50-1 |
| 5000 C-i, 400 V Exhaust connection DN 63 ISO-K | yes | on board | triple | none | housing, castors, adjustable feet | LVO 410 | 112500V45-1 |
| 5000 C-i, 400 V Exhaust connection DN 50 ISO-KF | yes | on board | triple | none | housing, castors, adjustable feet | LVO 410 | 112500V60-1 |
| 5000 S-i, 400 V | yes | on board | triple | none | housing, castors, adjustable feet | LVO 410 | 112500V40-1 |

Ordering Information

Accessories

| | Part No. |
|--|------------------|
| Profibus module for DRYVAC DV / DV-r | 155212V |
| ProfiNet module for DRYVAC DV / DV-r | 112005A35 |
| EtherCAT module for DRYVAC DV / DV-r | 112005A36 |
| Relay module (digital output) for DRYVAC DV / DV-r | 112005A01 |
| Ethernet interface board for DRYVAC DV / DV-r | 112005A02 |
| Interface kit 24 Volt I/O for DRYVAC DV / DV-r | 112005A22 |
| Adapter DRYVAC for | |
| RUVAC WH 700 | 112005A03 |
| RUVAC WS(U) 1001 | 112005A04 |
| RUVAC WS(U) 2001 | 112005A05 |
| RUVAC WH(U) 2500 | 112005A07 |
| RUVAC WH(U) 4400/7000 | 112005A10 |
| Cooling water unit | |
| DRYVAC 450/650 S | 112005A12 |
| DRYVAC 450/650 S-r | 112005A13 |
| Non-return valve DRYVAC, DN 63 ISO-K ¹⁾ | 112005A15 |
| Gas ballast kit DRYVAC, 24 V electro-pneumatic | 112005A17 |
| Silencer | |
| DN 63 ISO-K for DRYVAC DV 450/650 and SCREWLINE SP 250 | 119002 |
| DN 100 ISO-K for DRYVAC 1200 and SCREWLINE SP 630 | 119001 |
| Serviceable silencer | |
| DN 63 ISO-K for DRYVAC DV 450/650 and SCREWLINE SP 250 | 119003V |
| DN 100 ISO-K for DRYVAC 1200 and SCREWLINE SP 630 | 119003V |
| External display (only for 650, 650-r and 1200) | 155213V |
| Harting plug DRYVAC S-i/C-i | 112005A20 |
| Set of nozzles for DRYVAC purge gas | 112005A30 |
| Permanent inlet purge kit | 112005A32 |

¹⁾ Already integrated in all -i/C-i versions

Only available for purchase in North and South America

General

Applications for CHEMROVAC Pumps

| Pumps | TRV 404 | TRV 405 | TRV 406 | TRV 408 | TRV 410 |
|----------------------------|---------|---------|---------|---------|---------|
| Typical Application | | | | | |
| Pharmaceuticals | ■ | ■ | ■ | ■ | ■ |
| Fine chemicals | ■ | ■ | ■ | ■ | ■ |
| Flavours and fragrances | ■ | ■ | ■ | ■ | ■ |
| Fatty acids | ■ | ■ | ■ | ■ | ■ |

General

The CHEMROVAC TRV pumps are not designed to the European ATEX directive (94/9/EC). They can therefore not be installed in Europe into flame proof

environments or be used to pump flammable materials. This has always to be considered if you want to export these pumps into

Europe or install it in accordance to European directives and legal requirements.

Operating Principle

The CHEMROVAC TRV pumps are 4-stage roots pumps. Each stage consists of two rotors rotating in opposite directions inside a casing (pumping chamber) and having slight clearances against the inside wall surface of the casing and also between the rotors. In the sequence from (1) to (4) in the figures on this and the following page each phase of rotor rotation is shown. The light area in the figure shows inlet pressure regions of a stage whereas the slash area shows discharge pressure regions. The pumping principle of this pump is explained below, using a

cold wall type back flow mechanism, referring to left rotor in each figure. As described above, compression takes place using the properly cooled gas of the same pressure as the discharge pressure, and therefore, the temperature rise inside the case is kept low. That means, gas discharged out of the discharge port A is cooled by the cold wall B, and a portion of this cooled gas is injected as a back flow cooling medium via the port C into the moving volume S for back flow compression. Therefore, the gas has a circulating

flow of A-B-C-S-A, and in the part of A-B-C the internal compression heat is continuously dissipated. By this a high-efficiency and a high pressure ratio are obtained.

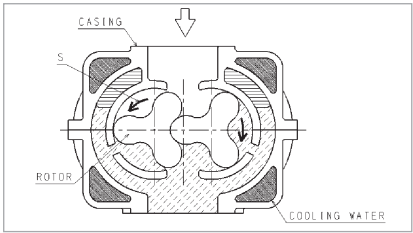


Fig. 1
This figure shows a condition just before the rotor catches the gas of the inlet pressure region into the moving volume S.

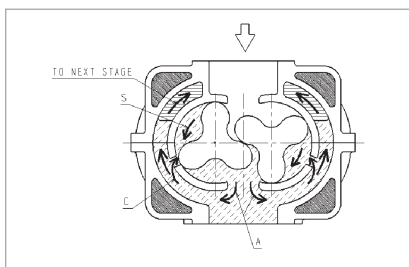


Fig. 2

In this figure, the rotor has completely caught the gas of the inlet pressure region into the moving volume S. Gas which is already discharged out at exit port A is properly cooled by the cold outside wall of the gas path B. One part of this gas flows back through the port C into the moving volume S. The other part of the cooled exhausted gas is flowing into the next stage of the pump.

Moreover, because the casing enclosing the rotors is not cooled directly, the clearances between the rotor and the casing is not reduced due to heat contraction, reducing the possibility of contact between both.

In some cases condensable gas can condense in the different stages according to its vapor pressure. Condensate either condensed in the pump or as liquid carry over from the

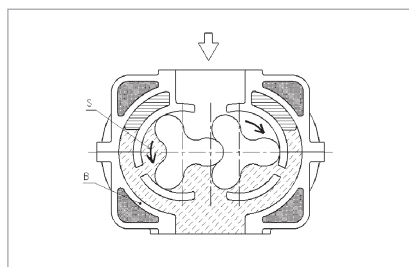


Fig. 3

As the rotor rotates further, the gas which has been cooled properly by the cold wall B flows sufficiently into the S cavity; the pressure in the chamber S is approaching the discharge pressure.

process will flow down with the gas stream and discharged to atmosphere in an exhaust drain tank.

The exhaust drain tank is mounted at the exhaust of the last pump stage. It is located either below the exhaust cooler (large pumps) or pump outlet flange (small pumps). It collects liquid condensed from the pump or the exhaust cooler.

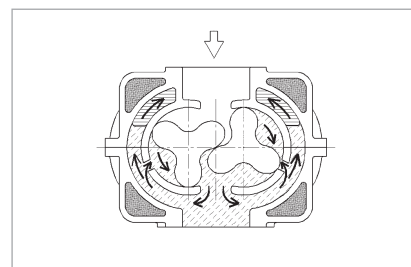


Fig. 4

In this condition the pressure in the moving volume portion S is approximately equal to the discharge pressure, and the discharge port A and the cavity S are just before opening to each other.

The larger pumps are equipped with a water cooled exhaust cooler as standard. The cooler is designed as shell and tube cooler. This reduces the exhaust gas temperature to an acceptable limit. Also vapors from the exhaust gas stream are partially condensed. Condensed liquid is drained into the exhaust drain tank below the condenser.

Advantages to the User

- Oil-free compression
- Reliable separation between swept volume and gear box side (avoiding of oil back streaming)
- Motor not on gear box side, no oil leaking by motor shaft
- Safe separation of motor and gear box area by additional shaft seal purge
- Materials of construction suitable for most chemicals to be pumped
- Flat speed curve from atmosphere to 10 mbar (7.5 Torr)
- Good liquid handling because of vertical orientation
- Easy access of swept volume for cleaning
- Easy to equip with local certified flame proof motor
- Nearly no electrical control for standard operation needed

Typical Applications

- Distillation
- Drying
- Freeze drying
- Degassing
- Central house vacuum
- Crystallisation
- Evaporation

Accessories

As standard accessory an exhaust silencer is available for each pump.

The pumps can be combined with mechanical roots blowers to increase pumping speed and to achieve lower ultimate pressure.

CHEMROVAC TRV pumps can also be the basic part of a bespoke system that complies to special process requirements to customer's needs.

Supplied Equipment

The basic pump CHEMROVAC TRV is a pump without a motor. A suitable motor complying with the local regulations will normally be mounted by Oerlikon Leybold Vacuum. In this case the CHEMROVAC TRV is supplied ready for installation and connection.

In some cases the motor will be delivered and mounted by the end-user. In this case the user is responsible for correct selection and safe mounting of the motor. OLV will not take over any responsibility for the motor and motor mounting in such a case.

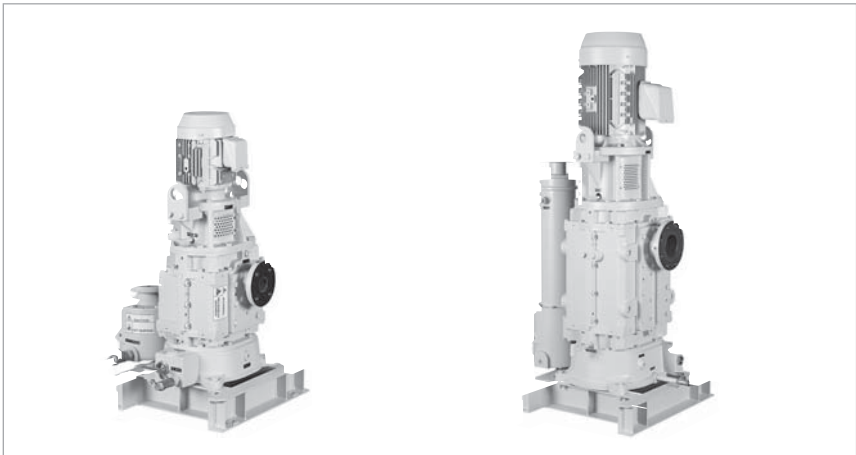
The electrical connections to the pump must be provided by suitably trained staff of the customer.

The basic CHEMROVAC TRV pump is delivered with:

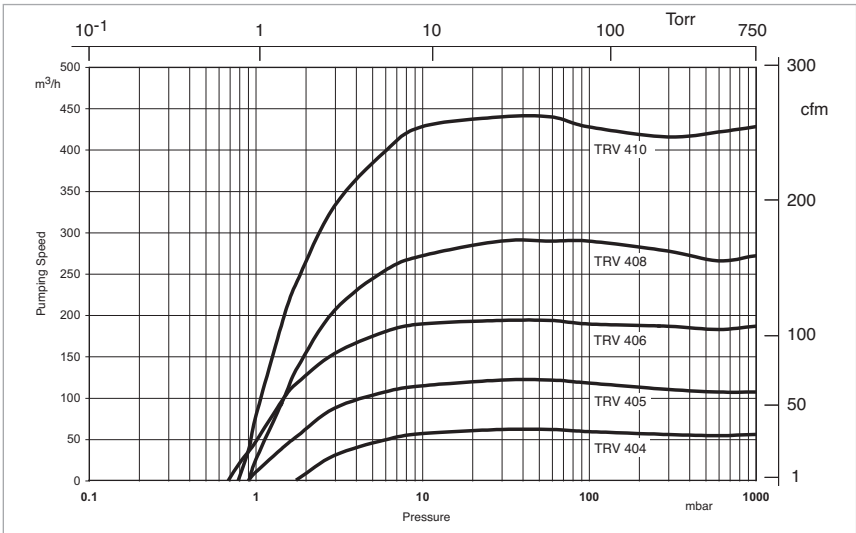
- Nitrogen shaft seal purge unit
- The required amount of gear oil (is supplied separately)
- 2 crane eyes for transporting the pump
- Operating Instructions

Products

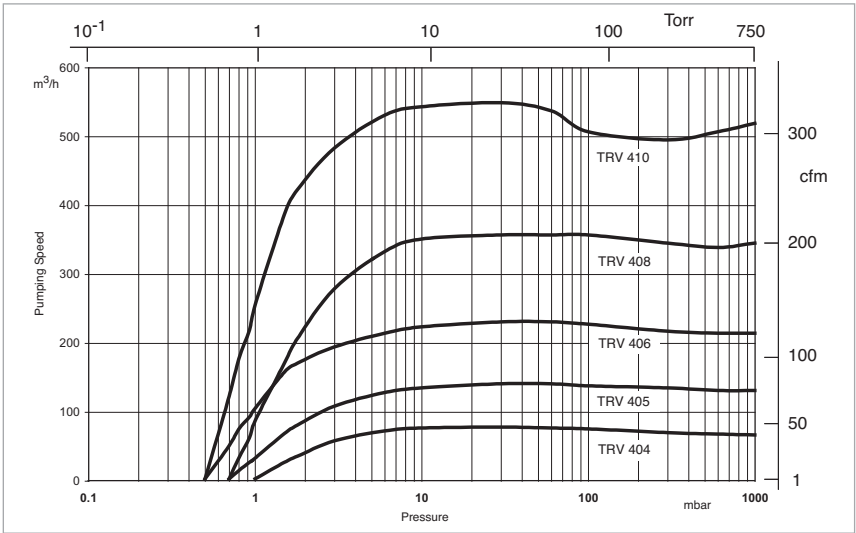
CHEMROVAC TRV 404 to 410



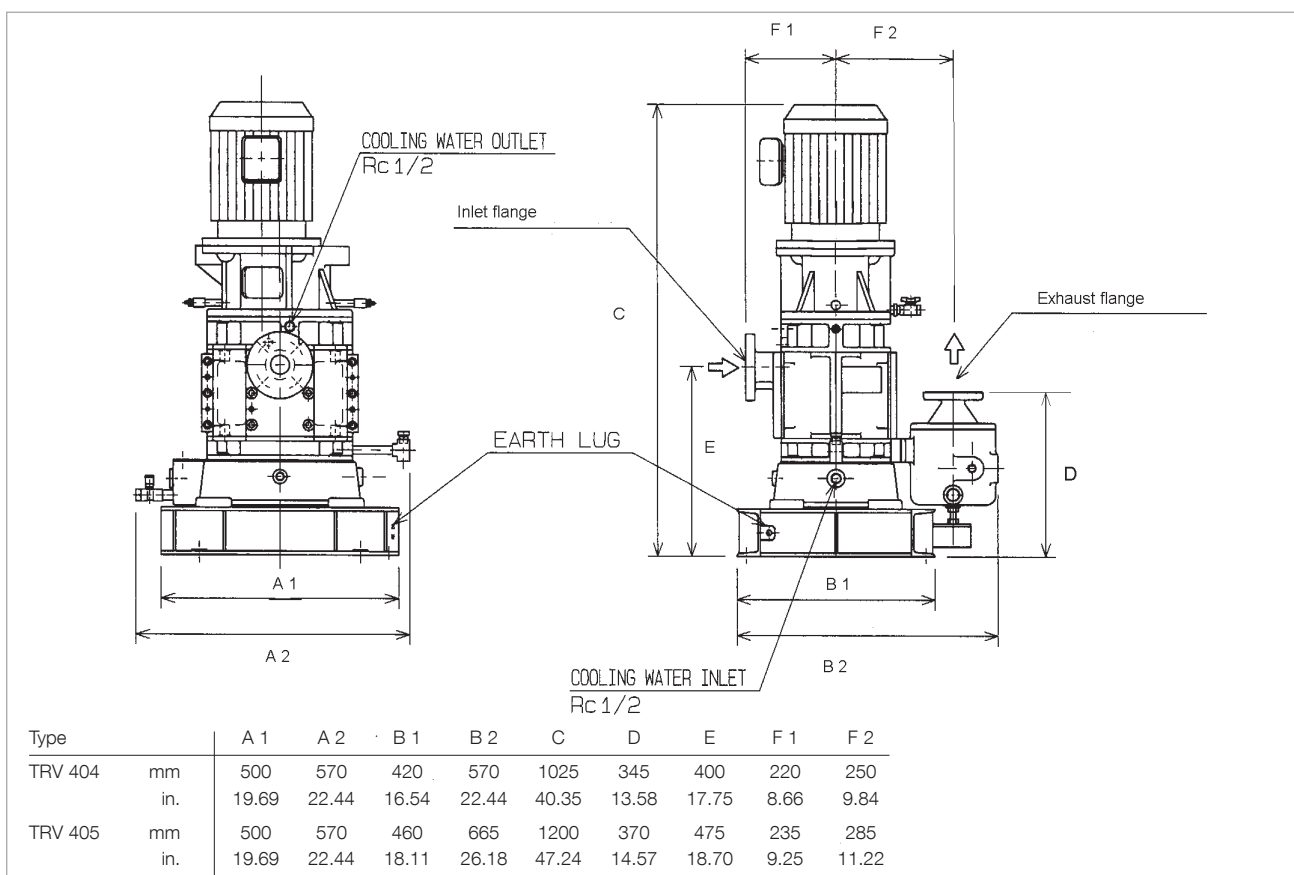
CHEMROVAC TRV 404 (left) and TRV 410 (right)



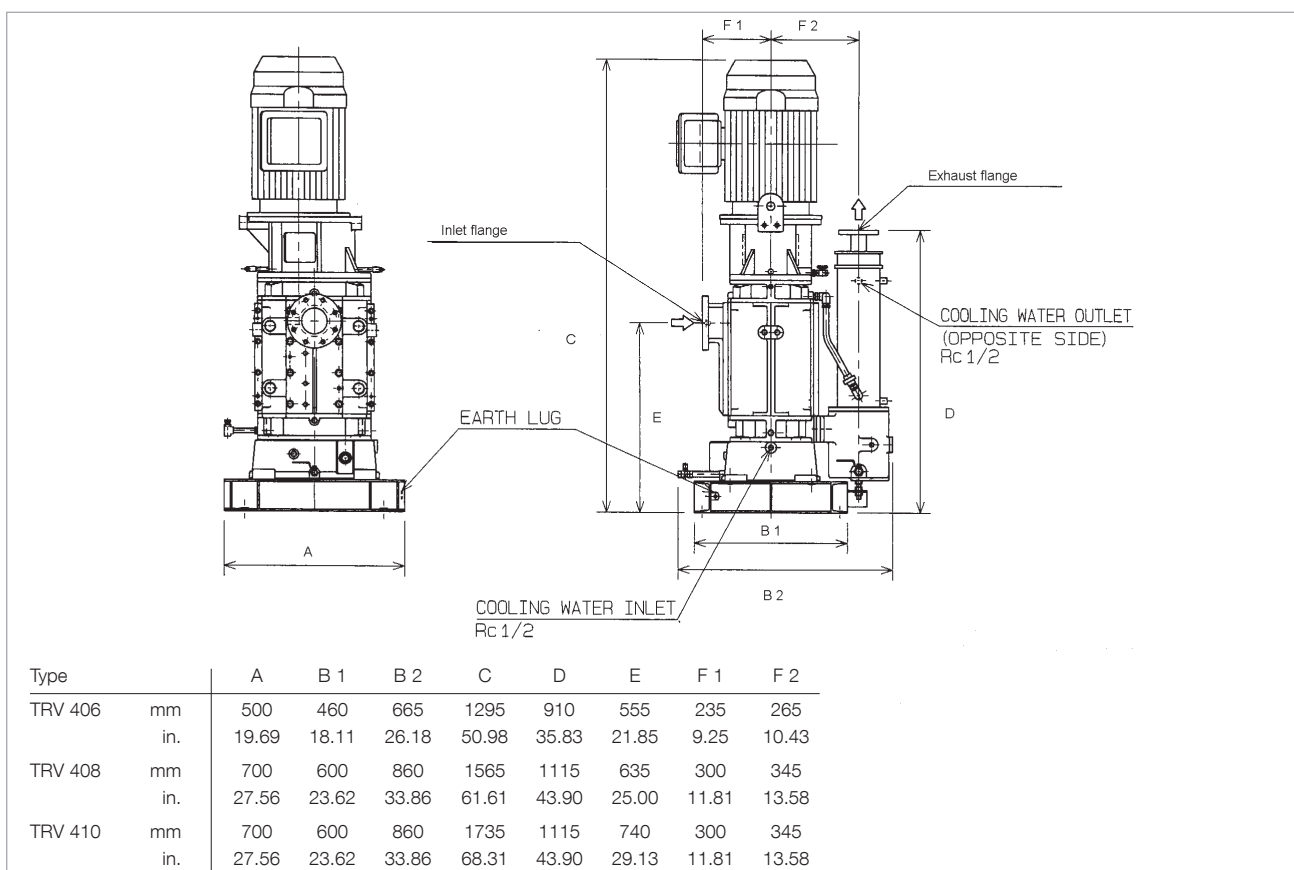
Pumping speed curves for the CHEMROVAC TRV at 50 Hz



Pumping speed curves for the CHEMROVAC TRV at 60 Hz



Dimensional drawing of the CHEMROVAC TRV 404 and 405



Dimensional drawing of the CHEMROVAC TRV 406 to 410

Technical Data

CHEMROVAC

| | | TRV 404 | TRV 405 | TRV 406 | TRV 408 | TRV 410 |
|--|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Max. pumping speed (+/- 10%) | | | | | | |
| 60 Hz | m ³ x h ⁻¹ (cfm) | 75 (44) | 138 (81) | 228 (134) | 354 (208) | 546 (321) |
| 50 Hz | m ³ x h ⁻¹ (cfm) | 60 (36) | 120 (71) | 192 (113) | 288 (170) | 438 (258) |
| Ultimate total pressure, abs. | | | | | | |
| 60 Hz | mbar (Torr) | 1.0 (0.75) | 0.7 (0.53) | 0.5 (0.38) | 0.7 (0.53) | 0.5 (0.38) |
| 50 Hz | mbar (Torr) | 1.8 (1.35) | 0.9 (0.68) | 0.7 (0.53) | 0.9 (0.68) | 0.8 (0.60) |
| Max. permissible exhaust back pressure, abs. | mbar (Torr) | 1200 (900) | 1200 (900) | 1200 (900) | 1200 (900) | 1200 (900) |
| Max. permissible inlet pressure, abs. | mbar (Torr) | 1050 (788) | 1050 (788) | 1050 (788) | 1050 (788) | 1050 (788) |
| Max. permissible inlet temperature | °C (°F) | 50 (122) | 50 (122) | 50 (122) | 50 (122) | 50 (122) |
| Permissible ambient temperature for constant operation ¹⁾ | °C (°F) | -20 to +40 (-4 to +104) | -20 to +40 (-4 to +104) | -20 to +40 (-4 to +104) | -20 to +40 (-4 to +104) | -20 to +40 (-4 to +104) |
| Max. relative ambient moisture | % | up to 90 | up to 90 | up to 90 | up to 90 | up to 90 |
| Max. permissible installation height | m (ft) | up to 1000 (up to 3280) | up to 1000 (up to 3280) | up to 1000 (up to 3280) | up to 1000 (up to 3280) | up to 1000 (up to 3280) |
| Noise level with silencer at ultimate (± 3 dB(A)) | | | | | | |
| 60 Hz | dB(A) | 76 | 79 | 81 | 81 | 82 |
| 50 Hz | dB(A) | 73 | 75 | 77 | 78 | 79 |
| Process flange size | | | | | | |
| inlet | ANSI / lb ff | 1 1/2" / 125 | 2" / 125 | 2 1/2" / 125 | 3" / 125 | 4" / 125 |
| outlet | ANSI / lb ff | 1 1/2" / 125 | 1 1/2" / 125 | 2 1/2" / 150 | 2 1/2" / 150 | 2 1/2" / 150 |
| Cooling water flange size | | | | | | |
| inlet | Rc | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| outlet | Rc | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| Shaft seal purge gas connection | Rc | 3/8" | 3/8" | 3/8" | 3/8" | 3/8" |
| Recommended shaft seal purge flow | | | | | | |
| gear side | l/min (gallon/min) | 3.0 (0.8) | 5.0 (1.3) | 5.0 (1.3) | 6.0 (1.6) | 6.0 (1.6) |
| motor side | l/min (gallon/min) | 0.5 (0.15) | 1.0 (0.3) | 1.0 (0.3) | 2.0 (0.6) | 2.0 (0.6) |
| Type of gas, shaft seal purge | | Nitrogen | Nitrogen | Nitrogen | Nitrogen | Nitrogen |
| Supply pressure, shaft seal purge | bar / psi abs. | 2 / 29 | 2 / 29 | 2 / 29 | 2 / 29 | 2 / 29 |
| Dew point of supply gas | °C (°F) | -15 (+5) | -15 (+5) | -15 (+5) | -15 (+5) | -15 (+5) |
| Maximum particle size in gas | µm | 3 | 3 | 3 | 3 | 3 |
| Weight without motor | kg (lbs) | 180 (397) | 235 (520) | 280 (617) | 535 (1180) | 590 (1300) |
| Assumed weight with motor | kg (lbs) | 235 (520) | 319 (705) | 396 (875) | 708 (1560) | 816 (1800) |

¹⁾ If you operate the pump in an ambient temperature between -20 and +5 °C (-4 to +41 °F) we recommend that you leave the pump constantly operating and only shut down the pump for maintenance purposes. The pump must be pre-warmed if you want to start it in an ambient temperature range between -20 and +5 °C (-4 to +41 °F).

Additional Technical Data

CHEMROVAC

| | | TRV 404 | TRV 405 | TRV 406 | TRV 408 | TRV 410 |
|---|--------------------|--|----------------------------|----------------------------|----------------------------|----------------------------|
| Motor flame proof protection | | to local standards, e.g. class 1, division 1, C&D, or Ex d IIB | | | | |
| Start-up method | | direct on line or via frequency converter | | | | |
| Voltage | V | depending on local requirements | | | | |
| Installed power | | | | | | |
| 60 Hz | kW (HP) | 3.7 (5.0) | 5.5 (7.5) | 7.5 (10.0) | 15.0 (20.0) | 18.5 (25.0) |
| 50 Hz | kW (HP) | 3.7 (5.0) | 5.5 (7.5) | 7.5 (10.0) | 15.0 (20.0) | 18.5 (25.0) |
| Absorbed power at ultimate pressure | | | | | | |
| 60 Hz | kW (HP) | 2.1 (2.8) | 3.3 (4.4) | 4.8 (6.4) | 9.0 (12.1) | 12.5 (16.8) |
| 50 Hz | kW (HP) | 1.8 (2.4) | 3.0 (4.0) | 4.1 (5.5) | 7.0 (9.4) | 10.0 (13.4) |
| Motor frame size | NEMA IEC | 184TC 112 M | 213TC 132 S | 215TC 132 S | 256TC 160 M | 284TSC 160 L |
| No. of phases | | 3 | 3 | 3 | 3 | 3 |
| No. of poles | | 2 | 2 | 2 | 2 | 2 |
| Motor frequency | Hz | 50 or 60, depending on local conditions | | | | |
| Operating frequency | Hz | 26 to 60 | | | | |
| Nominal revolution | 1/min | 3000 or 3600, depending on motor frequency | | | | |
| Cooling | | water, direct without temperature control valve | | | | |
| Minimum cooling water consumption (at 25 °C (77 °F) inlet temperature) | | | | | | |
| 60 Hz | l/min (gallon/min) | 5.0 (1.3) | 7.0 (1.9) | 10.0 (2.7) | 20.0 (5.3) | 28.0 (7.4) |
| 50 Hz | l/min (gallon/min) | 5.0 (1.3) | 7.0 (1.9) | 10.0 (2.7) | 20.0 (5.3) | 28.0 (7.4) |
| Cooling water temperature | °C (°F) °C (°F) | +10 to +35 (+50 to +95) | +10 to +35 (+50 to +95) | +10 to +35 (+50 to +95) | +10 to +35 (+50 to +95) | +10 to +35 (+50 to +95) |
| Cooling water supply pressure, abs. | bar (psi) | 3 to 7 (44 to 102) | 3 to 7 (44 to 102) | 3 to 7 (44 to 102) | 3 to 7 (44 to 102) | 3 to 7 (44 to 102) |
| Lubrication bearing motor side (grease) gear side (oil) | ml | 100 | 200 | 200 | 260 | 260 |
| | | depends on oil capacity | | | | |
| Oil type for gear box | | LVO 130 | LVO 130 | LVO 130 | LVO 130 | LVO 130 |
| Volume gear box oil | l (gallon) | 1.0 (0.3) | 1.0 (0.3) | 1.0 (0.3) | 4.0 (1.1) | 4.0 (1.1) |

Ordering Information

CHEMROVAC

| | TRV 404 | TRV 405 | TRV 406 | TRV 408 | TRV 410 |
|--|------------------|------------------|------------------|------------------|------------------|
| | Part No. | Part No. | Part No. | Part No. | Part No. |
| Dry vacuum pump | | | | | |
| for chemical and pharmaceutical application CHEMROVAC TRV (without motor) | 134 101 | 134 102 | 134 103 | 134 104 | 134 105 |
| CHEMROVAC TRV (with NEMA motor Class 1, Div. 1, Group C & D, 406/460 V, 60 Hz) | 134 201 V | 134 202 V | 134 203 V | 134 204 V | 134 205 V |
| Accessories | | | | | |
| Exhaust silencer, filled with mineral wool | 134 121 | 134 121 | 134 122 | 134 122 | 134 122 |

Contents

Roots Vacuum Pumps

General

| | |
|--|-----|
| Applications and Accessories for RUVAC Pumps | 280 |
| Oil for RUVAC pumps, for different fields of application | 281 |
| Oil for RUVAC pumps, for different pump types. | 282 |
| General Information on Roots Vacuum Pumps | 283 |
| Types | 287 |

Products

| | |
|---|-----|
| RUVAC WA/WAU Roots Vacuum Pumps with Air-Cooled Flange-Mounted Motors | 290 |
| RUVAC WS/WSU Roots Vacuum Pumps with Air-Cooled Canned Motors | 296 |
| RUVAC WH/WHU Roots Vacuum Pumps with Water-Cooled Hermetically Sealed Motors | 302 |
| RUVAC WSLF Roots Vacuum Pumps for Laser Gas Systems | 310 |

Accessories

| | |
|------------------------------------|-----|
| Pressure Switches | 312 |
| Temperature Sensor Pt100 | 312 |

Miscellaneous

| | |
|--------------------|-----|
| Services | 314 |
|--------------------|-----|

Applications and Accessories for RUVAC Pumps

| Roots Vacuum Pumps | | WAWAU 251 | WAWAU(H) 501-2001 | WSWSU 251 | WSWSU(H) 501-2001 | WH 700 | WH/WHU 2500/400/7000 | WSLF 1001 |
|---|---|-----------|-------------------|-----------|-------------------|--------|----------------------|-----------|
| Applications | | | | | | | | |
| Semiconductor production | | | | ■ | | | | |
| Vacuum coating | ■ | | | ■ | | ■ | | |
| Large scale research | | | ■ | | | ■ | | |
| Chemistry/Pharmaceutical | ■ | | | | | | | |
| Metallurgy/Furnaces | ■ | ■ | ■ | ■ | | ■ | | |
| Lamps and tubes manufacturing | | | ■ | | | | | |
| Laser engineering | | | | | | | ■ | |
| Packaging | ■ | | | | | | | |
| Central vacuum supply systems | ■ | ■ | ■ | ■ | | ■ | | |
| Freeze drying | ■ | ■ | ■ | ■ | | | | |
| Leak testing systems | | | ■ | ■ | | ■ | | |
| Electrical engineering | ■ | ■ | ■ | ■ | | ■ | | |
| High purity gases/closed refrigerant cycles | | | ■ | ■ | | ■ | | |
| Mechanical engineering | ■ | ■ | ■ | ■ | | ■ | | |
| Automotive industry | ■ | ■ | ■ | ■ | | ■ | | |

Accessories

Page

| | | | | | | |
|--------------------------|-----|-----------------|---|---|---|---|
| Frequency converters | 297 | ■ | ■ | ■ | ■ | ■ |
| Pressure switches | 320 | ■ | ■ | ■ | ■ | ■ |
| Temperature sensor Pt100 | 320 | ■ ¹⁾ | | | | |

¹⁾ For ATEX pumps only

Oil for RUVAC Pumps for different fields of application

| Applications | Semi conductor production | Vacuum coating | Research and development | Chemistry/Pharmaceutical | Metallurgy/Furnaces | Lamps and tubes manufacturing | Laser technology | Packaging | Central vacuum supply | Freeze drying | Leak testing systems | Electrical engineering | High purity gases/closed refrigerant cycles | Mechanical engineering | Automotive industry |
|----------------------|---------------------------|----------------|--------------------------|--------------------------|---------------------|-------------------------------|------------------|-----------|-----------------------|---------------|----------------------|------------------------|---|------------------------|---------------------|
| LEYBONOL Oils | | | | | | | | | | | | | | | |
| LVO 100 | ▲ | ■ | ■ | ■ | ■ | ■ | ● | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| LVO 210 | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | | | | ● |
| LVO 220 | | | | | | | ■ | | | | | | | | |
| LVO 400 | ■ | ● | ● | ● | ■ | | | | ■ | | | | | | ● |

■ = Standard

● = Possible

▲ = Please contact Oerlikon Leybold Vacuum

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
"Oils / Greases / Lubricants LEYBONOL®".**

Oil for RUVAC pumps for different pump types

| Pumps | WAWAU 251 | WAWAU(H) 501-2001 | WSWSU 251 | WSWSU(H) 501-2001 | WS 501 W | WSWSU 1001 und 2001 W | WH 700 | WH/WHU 2500 | WH/WHU 4400/7000 | WSLF 1001 |
|----------------------|-----------|-------------------|-----------|-------------------|----------|-----------------------|--------|-------------|------------------|-----------|
| LEYBONOL Oils | | | | | | | | | | |
| LVO 100 | ■ | ■ | ■ | ■ | ■ | ■ | | | ● | ● |
| LVO 210 | ● | ● | ● | ● | ● | ● | ■ | ■ | ■ | ● |
| LVO 220 | | | | | | | | | | ■ |
| LVO 400 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

■ = Standard

● = Possible

■ = Please contact Oerlikon Leybold Vacuum

The table only lists general applications. Your specific requirements might be subject to deeper analysis. For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
"Oils / Greases / Lubricants LEYBONOL®".**

General Information on Roots Vacuum Pumps

Applications

For many years now Roots vacuum pumps have been well established in the area of vacuum technology. In combination with backing pumps, which compress against the atmosphere, these pumps offer the following advantages:

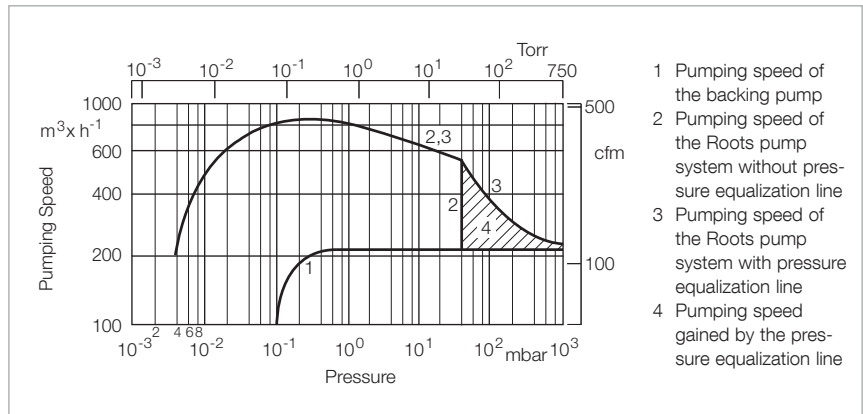
Shifting the Operating Pressure into the High Vacuum Range

As a rule of the thumb one may say that Roots vacuum pumps are capable of improving the attainable ultimate pressure of a pump system by a factor of 10. With two Roots vacuum pump stages and a corresponding backing pump it is possible to attain pressures in the range down to 10^{-5} mbar (0.75×10^{-5} Torr). Under certain circumstances this will make the use of additional high vacuum pumps (turbo-molecular pumps or diffusion pumps) unnecessary.

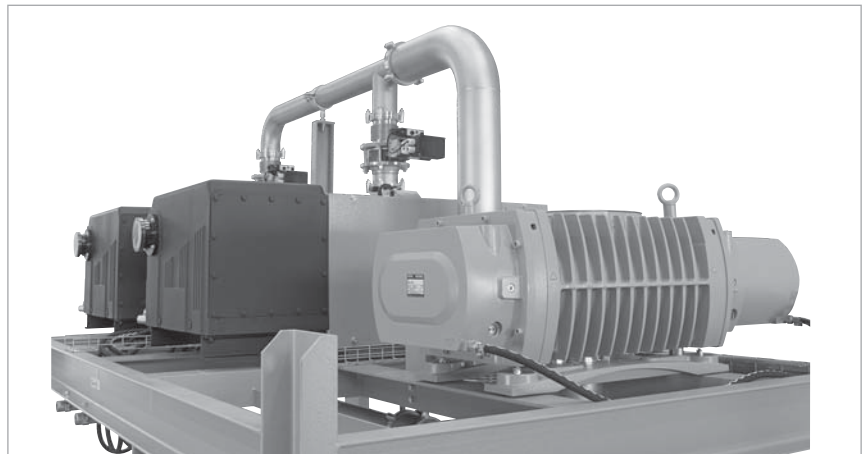
Multiplied Pumping Speed

Due to the non-contact rotation of the impellers, Roots vacuum pumps are able to run at higher speeds. Thus a high pumping speed is obtained with a relatively small size pump. Pumping speeds in excess of $1500 \text{ m}^3/\text{h}$ (589 cfm) can only be attained with Roots vacuum pumps.

When selecting the right kind of backing pump (sizing) it will be possible to pump large quantities of gas in connection with smaller backing pumps. Energy consumption of such a pump system is much less compared to a single backing pump offering the same pumping speed.



Comparison of pumping speed characteristics with and without pressure equalization line



Pump system with WH 7000 Roots vacuum pump and SOGEVAC SV 630 B rotary vane vacuum pump

The use of Roots vacuum pumps in the area of vacuum technology has resulted in further specializations and improvements:

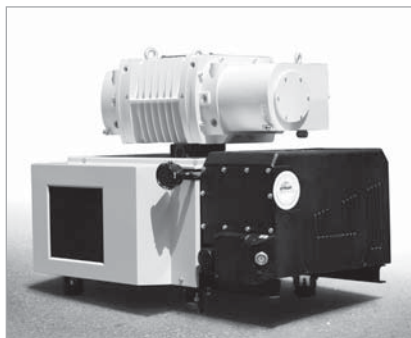
- Through an integrated bypass (pressure equalization line) it is also possible to utilize the pumping speed of the Roots vacuum pump at high pressures and large quantities of gas at an early stage. This reduces the pumpdown time especially for cyclic operation (see figure "Comparison of pumping speed characteristics with and without pressure equalization line").

- High-purity gases or hazardous gases impose strict requirements on the leak-tightness of the system. Canned motors from the WS line or canned motors from the WH line are hermetically sealed. There are no seals in contact with the atmosphere which might be subject to wear. This prevents leaks and failures due to oil leaks. A service life of over 20,000 hours without maintenance is quite common.

- Tolerances and the quality of the balancing combined with forced lubricated bearings and toothed gears permit high speeds and the use of frequency converters. Thus it is possible to attain a high pumping speed while the process is in progress and to reduce the speed when the process has been stopped or while changing the batch. This results in a lower consumption of energy and a longer service life with uncompromised reliability.
- Conversion from vertical to horizontal flow is easily implemented and can be performed at the place where the pump has been installed. Thus the pump can be adapted more closely to the operating conditions of your system.

Lately, a further characteristic is gaining prominence: Roots vacuum pumps are capable of compressing the media in the pump chamber without the presence of any further media. This mostly avoids interaction between different media in the pump itself and also in the connected vacuum chamber. Therefore

- the medium which is pumped is not contaminated with lubricants or sealants; complex accessories (exhaust filters, separators, etc.) are not needed;
- the lubricant in the side chambers is hardly affected, so that service life is not reduced;
- backstreaming of oil from the backing pump into the connected vacuum chamber is prevented.



Pump system consisting of RUVAC WH 4400 and SOGEVAC SV 630 B

These characteristics make the Roots vacuum pump attractive for almost all rough and medium vacuum applications.

Semiconductor Technology (RUVAC WH and WS)

In the area of semiconductor technology, Roots vacuum pumps are found in etching processes among others, and in use with dry compressing backing pumps.

The pumping speed of the combination of backing pumps amounts to 200 to 500 m³/h (118 to 295 cfm) and it ensures a cut-in pressure of 10⁻¹ mbar (0.75 x 10⁻¹ Torr) for the

turbomolecular pump. In the process, corrosive gases need to be pumped together with a high particle count.

Owing to the usage of media which present a health hazard, hermetically sealed pump versions are used. Due to the LVO 400 lubricant filling in the gear, a high degree of media resistance, long service intervals a high reliability and thus very low costs of ownership are attained.

For use in clean rooms, Roots vacuum pumps with a water cooled motor without a motor fan are used.

This type of motor reduces the quantity of heat dissipated to the surroundings to a minimum.



Pump system with WH 7000 Roots vacuum pump and SOGEVAC SV 630 B rotary vane vacuum pump

Central Vacuum Supply Systems

Large Roots vacuum pumps, usually in connection with single-stage rotary vane vacuum pumps serve several consumers of vacuum (packaging machines, for example) at the same time.

The pressure can be controlled in a highly flexible manner through the speed controller of the Roots pump, which allows for a flexible adaptation of the pumping speed. In the case of the RUVAC WH and WS types a significantly higher pumping speed can also be attained by means of a frequency converter compared to operation off the normal mains power.

Solar

In the solar industry, Roots vacuum pumps can be found in almost all production steps. In connection with the Czochralski process or at DSS furnaces for the manufacture of silicon crystals, Roots vacuum pumps are deployed to rapidly attain the demanded conditioning pressure. In connection with the various coating processes they ensure the necessary pumping speed at process pressure and very fast cycles at the load lock chambers. In connection with lamination processes for the modules they assist in pumping down the laminators quickly and ensure a high pumping speed at lamination pressure.

Owing to the high production pressure, very much is demanded as to the reliability of the pumps during all process steps and this despite of reduced maintenance and service complexity.

Process Industry

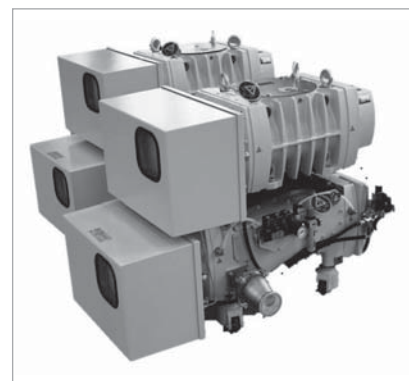
Typical process industry applications are highly demanding regarding the ruggedness of Roots pumps. These need not only to pump clean media but must also be suited for pumping dusty or vapor containing media within an industrial environment. Here a high level of ruggedness is demanded at a good price-to-performance ratio.

Whether during metallurgical processing or heat treatment of metals, in connection with drying processes, the plasma treatment of surfaces or in vacuum packaging processes – everywhere Roots pumps from the different RUVAC lines can excel. They permit a rapid pump down and offer a high pumping speed at process pressure. In combination with a frequency converter, extremely high pumping speeds are possible with a small footprint.

Laser Systems (WSLF 1001)

Continuous circulation of the gas in order to remove heat from a closed cycle in which pressure differentials of up to 100 mbar (75 Torr) must be maintained. The high cleanness requirements necessitate an absolute freedom from oil and particles. This is ensured through a reduced pressure level within the oil-filled gear chambers as well as a nickel coated pump chamber. Assembly and testing is run under clean room conditions.

The canned motor ensures a high degree of leak-tightness to the outside and permits operation in connection with a frequency converter.



Pump system consisting of RUVAC WH 2500 und DRYVAC DV 650

Operating Principle

Roots vacuum pumps, which are also called Roots blowers, are rotary plunger type pumps where two symmetrical shaped impellers rotate in opposite directions inside the pump housing.

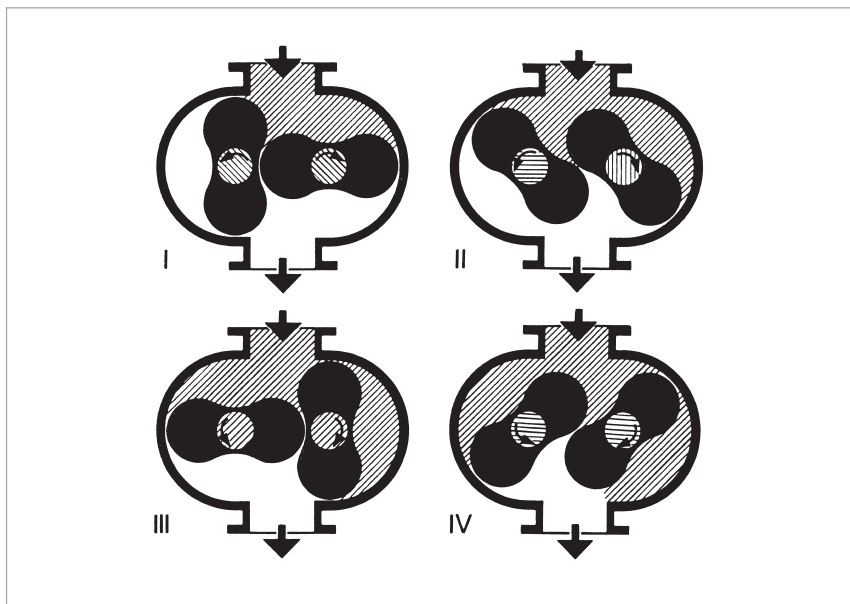
The figure-of-eight rotors are synchronized by a gear which ensures that the impellers are counter-rotating in such a way, that they are near to one another and to the housing without actual contacting.

In rotor positions I and II (see figure "Operational diagram of a single-stage Roots vacuum pump (with vertical pumping action)") the volume of the intake is increased. As the rotors turn further to position III a part of the volume is cut off from the intake side.

In position IV this volume is opened to the exhaust side and gas under fore-vacuum pressure (higher than the intake pressure) flows in. This gas compresses the gas coming from the intake. As the rotors turn further the compressed gas is ejected through the exhaust flange.

This process repeats itself twice for each rotor per full turn.

As the rotors do not come into contact with the pump's housing Roots vacuum pumps may be operated at high speeds. Thus a high pumping speed is obtained from comparably small pumps.



Operational diagram of a single-stage Roots vacuum pump (with vertical pumping action)

The pressure difference and the compression ratio between intake and exhaust is limited in Roots vacuum pumps.

In practice the maximum attainable pressure difference is of significance only in the rough vacuum range ($p > 10 \text{ mbar}$ ($p > 7.5 \text{ Torr}$)) whereas in the medium vacuum range ($p < 1 \text{ mbar}$ ($p < 0.75 \text{ Torr}$)) the attainable compression ratio is of importance.

Roots vacuum pumps from Oerlikon Leybold Vacuum have been designed to specially meet the requirements of the fine vacuum range. They are normally used in connection with backing pumps or in closed gas cycles (WSLF series).

Design

The pump chamber of Roots vacuum pumps is free of any sealing agents or lubricants. Only the toothed wheels of the synchronous gear are lubricated with oil. Toothed gear wheels and bearings of the RUVAC are placed in two side chambers which also contain the oil reservoir. These two side chambers are separated from the pump chamber by piston ring seals.

Suitably designed oil supply systems in both chambers ensure that a sufficient quantity of oil is supplied to the gear wheels and bearings at all permissible speeds.

Almost all RUVAC Roots vacuum pumps are designed for a horizontal and vertical pumping action.

Types

Various types of Roots vacuum pumps have been developed to ensure optimum adaptation to the widely varying applications for this type of pump.

- **Flange mounted motor**
The drive shaft of the pump is directly connected to an electric motor via a flexible coupling. The required seal of the drive shaft against atmospheric pressure is obtained by oiled shaft seals.
- **Canned motor**
In the canned motor, rotor and stator pack are separated by a vacuum-tight can made of a non-magnetic material. The rotor operates on the drive shaft of the pump in the vacuum, so that a shaft seal which would be subject to wear is not required.
- **Hermetically sealed motor**
The hermetically sealed motor is the latest technology step for Roots vacuum pumps. It integrates the complete motor assembly into the vacuum reaching the same efficiency as a standard flange mounted motor without the need of a shaft seal. The hermetically sealed motor is the most compact, efficient and reliable motor technology available for roots pumps.
- **Pressure equalization line**
The integrated pressure equalization line connects the exhaust flange to the intake flange by means of a differential pressure valve.
In the event of an excessively high pressure difference between the

flanges, the valve will open. Then a part of the pumped gas will flow through this line back to the intake flange.

Therefore the pump may be switched on together with the backing pump at atmospheric pressure. This increases the pumping speed of the pump combination also at high intake pressures.

- **Special ACE vibration absorber**
These pumps are best used in applications involving frequent pump-down cycles. The vibration absorber is of an oil sealed or filled design where minute amounts of oil may enter the vacuum system via the piston of the vibration attenuator.

RUVAC WA/WAU, WS/WSU

The series WA/WAU Roots vacuum pumps are provided with directly flange-mounted air-cooled standard three-phase motors. The oiled radial sealing rings of the RUVAC WA/WAU for sealing the shaft against the atmosphere are made of FPM (FKM) (fluoropolymer).

The WS/WSU series pumps have a air-cooled hermetically canned motor.

Roots vacuum pumps of the series WAU/WSU/WHU are provided with an additional integrated pressure equalization line and a differential pressure valve.

Pumps from these series are supplied with a vertical pumping action as standard.

RUVAC WH/WHU

The series WH/WHU pumps are technological leaders in the area of Roots vacuum pumps.

Both motors and oil reservoirs are water cooled thereby perfectly balancing the internal temperature management of the pumps resulting in significantly lower oil temperatures and thus a longer oil service life. At ultimate pressure, emissions are reduced by approximately 50% and the motor coils can sustain higher loads while at the same time offering improved efficiency. The new drive concept with potted motors replaces the can for hermetically sealed drives. This improves efficiency even further whereby the motors are capable of complying with the IE2 requirements of the new efficiency standard without problems.

In order to increase pumping speed thereby cutting pumpdown times, optionally available specially parameterized frequency converters can be used. Moreover, the pump may be operated at its maximum power already at atmospheric pressure.

Especially for short cycles the new WHU pump is being equipped with improved valve technology. Due to the bypass line, this pump can be operated starting at atmospheric pressure. The bypass valve already closes at a very early stage, whereby the cycle times can be significantly reduced. Pumps from the WHU series should not be operated over longer periods of time at high pressures.

Using the RUVAC WS and RUVAC WH in combination with a frequency converter

Simulation of a pressure equalization line

The available frequency converters have been matched to the pump so that the possibility of mechanically overloading it is excluded. In the case of a pressure difference which is too high, the rotational speed of the pump is automatically reduced until its load drops in to the permissible range.

Operation at any rotational speeds

The frequency converter can be used to adjust the pumping speed of the Roots pump during operation. This allows maximum flexibility to find the right setup for any application.

Increasing the pumping speed

The pumps were developed to handle a maximum rotational speed between 4200 rpm and 7200 rpm depending on the respective pump size.

Therefore the use of a frequency converter permits an increase in the nominal pumping speed of up to 140%.

Note

Please enquire about possibly existing usage limits (process dependent).

RUVAC WSLF

The pumps of these series are especially adapted Roots vacuum pumps from the RUVAC WS series which are intended for operation with gas lasers.

They are driven by a canned motor so that a shaft seal for sealing against atmospheric pressure is not required.

Air-cooled series with nominal pumping speeds of $1000 \text{ m}^3 \times \text{h}^{-1}$ (589 cfm) are available.

The RUVAC WSLF series with increased motor ratings is intended for operation in connection with frequency converters.

These pumps are available with nickel-plated or plasma-nitrated surface as standard.

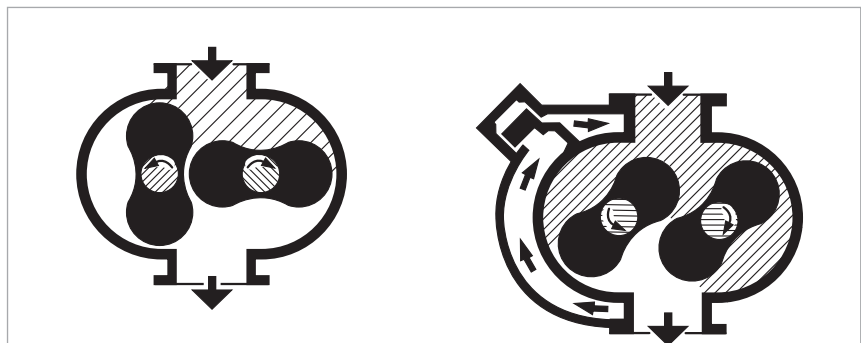
All pumps of these series are supplied with a horizontal pumping action.

Vertical pumping action is available upon request.

Backing Pumps

The backing pumps from Oerlikon Leybold Vacuum listed in the following are recommended for connection to the RUVAC Roots vacuum pumps:

- Rotary vane vacuum pumps
 - TRIVAC B with pumping speeds between 16 and $65 \text{ m}^3 \times \text{h}^{-1}$ (9.4 and 38.3 cfm)
- Rotary vane vacuum pumps
 - SOGEVAC with pumping speeds between 16 and $1200 \text{ m}^3 \times \text{h}^{-1}$ (9.4 and 707 cfm)
- Dry compressing screw vacuum pumps
 - SCREWLINE SP 250 and SP 630 with pumping speed of 250 and $630 \text{ m}^3 \times \text{h}^{-1}$ (147.3 and 371 cfm)
- Dry compressing screw vacuum pumps
 - DRYVAC with pumping speed of 450 to $3800 \text{ m}^3 \times \text{h}^{-1}$ (265 and 2238 cfm)
 - directly adaptable
 - smallest system
 - smart control



Schematic section through a RUVAC WA/WS (left) and a RUVAC WAU/WSU (right)

Accessories

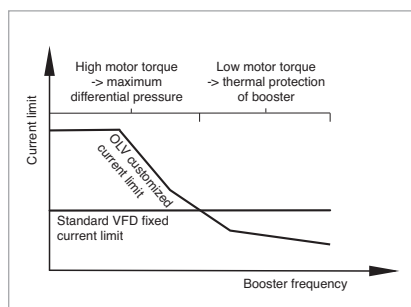
Frequency Converter V1000

A frequency converter was specially developed for the WH series which perfectly matches the requirements of vacuum engineering applications.

Owing to the flexible current limiting, the maximum pumping speed is available within the high pressure range whereas in the lower pressure ranges the current limit is reduced correspondingly so as to best protect the pump against thermal overloads.

This combination of power and protection can only be attained through our specially developed frequency converter.

“Plug and play operation” allows for simple installation. The frequency converters are set up in the factory so that they only need to be connected for optimised pump operation. It is not necessary to set up any additional parameters, and no further expert know-how is required.



Flexible motor current limit V 1000

Frequency Converter RUVATRONIC RT 5

The electronic frequency converters RUVATRONIC RT 5/251 to 5/16000 have been designed specially for use in connection with Oerlikon Leybold Vacuum Roots pumps of the RUVAC WA and WS series.

The main characteristics of the RUVATRONIC RT 5 are:

Simulation of a pressure equalization line

The software of the frequency converters is adapted to each pump and ensures that the risk of mechanically overloading the pump can be excluded. In the case of too high pressure differences, the rotational speed will be decreased automatically until the load is reduced to within the pump's limits. RUVAC Roots vacuum pumps of the types WA and WS (without pressure equalization line) can be switched on together with the forepump at atmospheric pressure. Through this, the pumpdown time can be reduced drastically. The minimum pumping speed of the backing pump needs to be considered in this case.

In connection with this kind of operation, the minimum pumping speed of the backing pump needs to be observed.

| Pump | Required pumping speed for the backing pump |
|-------------|---|
| WA/WS 251 | 50 m³/h (29 cfm) |
| WA/WS 501 | 100 m³/h (59 cfm) |
| WA/WS 1001 | 200 m³/h (118 cfm) |
| WA/WS 2001 | 410 m³/h (241 cfm) |
| WH 700 | 140 m³/h (82 cfm) |
| WH/WHU 2500 | 430 m³/h (253 cfm) |
| WH/WHU 4400 | 880 m³/h (518 cfm) |
| WH/WHU 7000 | 1200 m³/h (707 cfm) |

Operation at up to 3 predefined speeds

Via floating contacts, the pump can be operated at one of the 3 predefined speeds. Switching over to another predefined speed is possible during operation.

Operation at any rotational speed

With a 0 to 10 V signal, any speed can be predefined to operate the pump between the minimum and maximum rotational speed. The software reliably ensures that the rotational speed cannot drop below the minimum speed or exceed the maximum speed.

Increase in the pumping speed

By operating the Roots vacuum pumps at frequencies over 50 Hz, the nominal pumping speed of the pumps can be increased. Depending on the type of pump, an increase between 20 and 100% is possible.

Note

Please enquire about possible application limitations (process dependent).

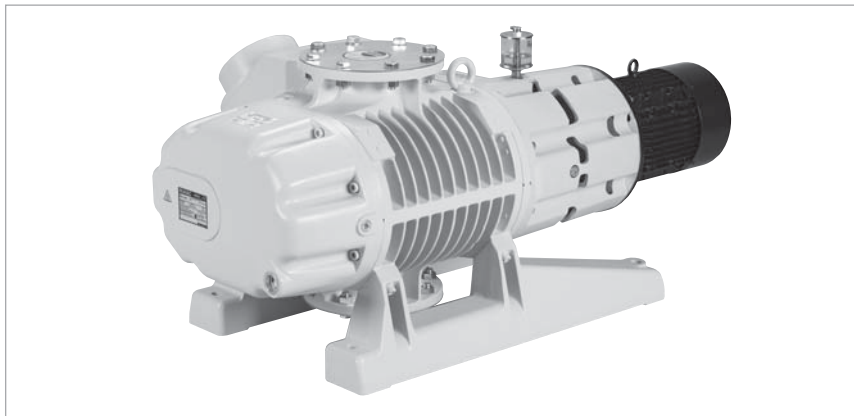
Dust Separators and Dust Filters

Vacuum processes with a high particle count or involving significant quantities of dust require special measures for protecting the vacuum pumps.

Dust separators and dust filters can be found in the Catalog Part “Vacuum Pump Systems”, Chapter “Accessories for oil sealed and dry compressing vacuum pumps”.

Products

RUVAC WA/WAU 251 to 2001 Roots Vacuum Pumps with Air-Cooled Flange-Mounted Motors



RUVAC WAU 2001 single-stage Roots vacuum pump

Advantages to the User

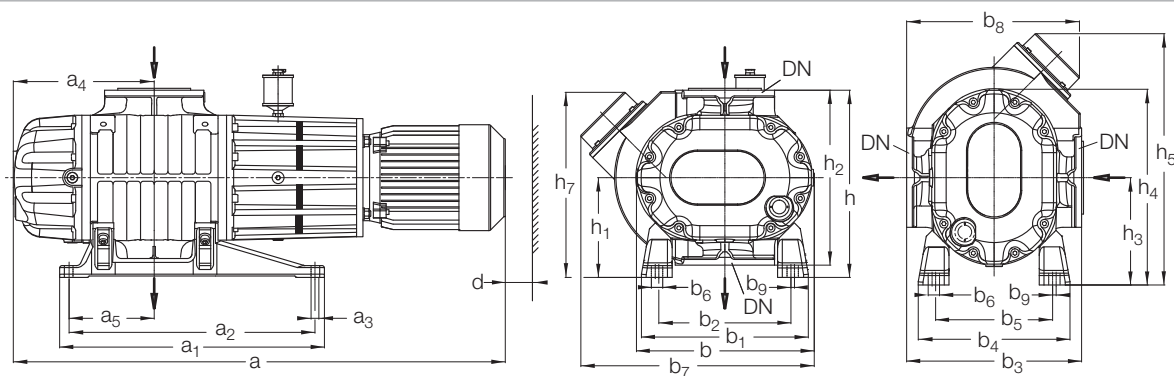
- Two air-cooled lines WA/WAU, each with four pump sizes
- Motors of efficiency class IE 2 (WA/WAU 2001: efficiency class IE 3)
- Reliable and trouble-free
- Sealing rings with their housing can be readily replaced
- Shaft seals and elastomer seals made of FPM (FKM)/Viton
- Easy to exchange with custom motors
- Integrated pressure equalization line for protection against overloading at high pressures on WAU models
- Conversion from vertical to horizontal pumping action can be done from the side of the customer
- All WA(U) pumps comply as standard with ATEX Cat. 3i
- Depending on requirements, motors from different ATEX categories can be fitted

Typical Applications

- For oil-free compression of gases and vapors in combination with a backing pump
- Short cycle pumping processes also in the presence of large quantities of gas and vapor

Supplied Equipment

- RUVAC WA/WAU are supplied as standard for a vertical pumping action, horizontal pumping action upon request
- Mineral oil LVO 100 is used as standard
- Gasket in the intake flange with dirt sieve
- The required lubricant filling is included in separate bottles



| Type | | DN | a ¹⁾ | a ₁ | a ₂ | a ₃ | a ₄ | a ₅ | a ₆ | b |
|--------------|-----|-----|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------|
| WA/WAU 251 | mm | 63 | 732 | 405 | 365 | 14 | 209 | 120 | 194 | 250 |
| | in. | | 28.82 | 15.94 | 14.37 | 0.55 | 8.23 | 4.72 | 7.64 | 9.84 |
| WA/WAU 501 | mm | 63 | 830 | 486 | 450 | 14 | 237 | 155 | 218 | 310 |
| | in. | | 32.68 | 19.13 | 17.72 | 0.55 | 9.33 | 6.10 | 8.58 | 12.20 |
| WA/WAU 501H | mm | 63 | 830 | 486 | 450 | 14 | 237 | 155 | 218 | 310 |
| | in. | | 32.88 | 19.13 | 17.72 | 0.55 | 9.33 | 6.10 | 8.58 | 12.20 |
| WA/WAU 1001 | mm | 100 | 1054 | 560 | 520 | 16.5 | 298 | 180 | 262 | 376 |
| | in. | | 41.50 | 22.05 | 20.47 | 0.65 | 11.73 | 6.10 | 10.31 | 14.80 |
| WA/WAU 1001H | mm | 100 | 1054 | 560 | 520 | 16.5 | 298 | 180 | 262 | 376 |
| | in. | | 41.50 | 22.05 | 20.47 | 0.65 | 11.73 | 6.10 | 10.31 | 14.80 |
| WA/WAU 2001 | mm | 160 | 1275 | 800 | 740 | 18 | 367 | 220 | 310 | 463 |
| | in. | | 50.20 | 31.50 | 29.13 | 0.71 | 14.45 | 8.66 | 12.20 | 18.23 |
| WA/WAU 2001H | mm | 160 | 1275 | 800 | 740 | 18 | 367 | 220 | 310 | 463 |
| | in. | | 50.20 | 31.50 | 29.13 | 0.71 | 14.45 | 8.66 | 12.20 | 18.23 |

| | | b ₁ | b ₂ | b ₃ | b ₄ | b ₅ | b ₆ | b ₇ ²⁾ | b ₈ | b ₉ | d |
|--------------|-----|----------------|----------------|----------------|----------------|----------------|----------------|------------------------------|----------------|----------------|------|
| WA/WAU 251 | mm | 270 | 210 | 280 | 230 | 170 | 24 | 305 | 285 | 7.5 | 50 |
| | in. | 10.63 | 8.27 | 11.02 | 9.06 | 6.69 | 0.94 | 12.01 | 11.22 | 0.30 | 2.00 |
| WA/WAU 501 | mm | 299 | 229 | 320 | 271 | 201 | 24 | 390 | 313 | 7.5 | 50 |
| | in. | 11.77 | 9.02 | 12.60 | 10.67 | 7.91 | 0.94 | 15.35 | 12.32 | 0.30 | 2.00 |
| WA/WAU 501H | mm | 299 | 229 | 320 | 271 | 201 | 24 | 414 | 330 | 7.5 | 50 |
| | in. | 11.77 | 9.02 | 12.60 | 10.67 | 7.91 | 0.94 | 16.30 | 12.99 | 0.30 | 2.00 |
| WA/WAU 1001 | mm | 352 | 278 | 370 | 320 | 246 | 24 | 494 | 366 | 7.5 | 50 |
| | in. | 13.86 | 10.94 | 14.57 | 12.60 | 7.91 | 0.94 | 19.45 | 14.41 | 0.30 | 2.00 |
| WA/WAU 1001H | mm | 352 | 278 | 370 | 320 | 246 | 24 | 524 | 398 | 7.5 | 50 |
| | in. | 13.86 | 10.94 | 14.57 | 12.60 | 7.91 | 0.94 | 20.63 | 15.67 | 0.30 | 2.00 |
| WA/WAU 2001 | mm | 518 | 388 | 460 | 422 | 292 | 24 | 638 | 456 | 7.5 | 50 |
| | in. | 20.39 | 15.28 | 18.11 | 16.61 | 11.50 | 0.94 | 25.12 | 17.95 | 0.30 | 2.00 |
| WA/WAU 2001H | mm | 518 | 388 | 460 | 422 | 292 | 24 | 642 | 460 | 7.5 | 50 |
| | in. | 20.39 | 15.28 | 18.11 | 16.61 | 11.50 | 0.94 | 25.28 | 18.11 | 0.30 | 2.00 |

| | | h | h ₁ | h ₂ | h ₃ | h ₄ | h ₅ ²⁾ | h ₆ | h ₇ |
|--------------|-----|-------|----------------|----------------|----------------|----------------|------------------------------|----------------|----------------|
| WA/WAU 251 | mm | 300 | 160 | 280 | 180 | 306 | 360 | 330 | 307 |
| | in. | 11.81 | 6.30 | 11.02 | 7.09 | 12.05 | 14.17 | 12.99 | 12.09 |
| WA/WAU 501 | mm | 340 | 180 | 320 | 194 | 348 | 430 | 370 | 332 |
| | in. | 13.39 | 7.09 | 12.60 | 7.48 | 13.70 | 16.93 | 14.57 | 13.07 |
| WA/WAU 501H | mm | 340 | 180 | 320 | 194 | 348 | 450 | 370 | 350 |
| | in. | 13.39 | 7.09 | 12.60 | 7.48 | 13.70 | 17.72 | 14.57 | 13.78 |
| WA/WAU 1001 | mm | 396 | 211 | 370 | 227 | 414 | 532 | 425 | 392 |
| | in. | 15.59 | 8.31 | 14.57 | 8.94 | 16.30 | 20.94 | 16.30 | 15.43 |
| WA/WAU 1001H | mm | 396 | 211 | 370 | 227 | 414 | 564 | 425 | 424 |
| | in. | 15.59 | 8.31 | 14.57 | 8.94 | 16.30 | 22.20 | 16.69 | 16.69 |
| WA/WAU 2001 | mm | 530 | 300 | 460 | 351 | 578 | 753 | 541 | 523 |
| | in. | 20.87 | 11.81 | 18.11 | 13.82 | 22.76 | 29.65 | 21.3 | 20.59 |
| WA/WAU 2001H | mm | 530 | 300 | 460 | 351 | 578 | 760 | 541 | 530 |
| | in. | 20.87 | 11.81 | 18.11 | 13.82 | 22.76 | 29.92 | 21.3 | 20.87 |

¹⁾ This dimension "a" relates to pumps with the IEC motor used as standard by Oerlikon Leybold Vacuum

²⁾ For RUVAC WAU only

DN = PN 6 pump flange in accordance with DIN 2501

Outside dimensions ± 3 mm (0.12 in.)

Dimensional drawing for the RUVAC WA/WAU(H) pumps

Technical Data

WA/WAU 251

WA/WAU(H) 501

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|--|---|--|--|--|--|
| Nominal pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 253.0 (149.0) | 304.0 (179.0) | 505.0 (297.4) | 606.0 (357.0) |
| Max. effective pumping speed with backing pump | m ³ x h ⁻¹ (cfm) | 210.0 (123.7) | 251.0 (148.0) | 410.0 (241.0) | 530.0 (312.0) |
| | TRIVAC SOGEVAC | D 65 B – | D 65 B – | – SV 200 | – SV 200 |
| Ultimate total pressure ²⁾ | mbar (Torr) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) |
| Max. permissible pressure difference during continuous operation ³⁾ | mbar (Torr) | 80.0 (60.0) | 80.0 (60.0) | 80.0 (60.0) | 80.0 (60.0) |
| Leak rate, integral | mbar x l x s ⁻¹ | < 5 x 10 ⁻⁴ | < 5 x 10 ⁻⁴ | < 5 x 10 ⁻⁴ | < 5 x 10 ⁻⁴ |
| Mains supply | V | 200-240 | 200-240 | 200-240 | 200-240 |
| | V | 380-400 | 380-480 | 380-400 | 380-480 |
| Thermal class | | F | F | F | F |
| Permissible ambient temperatures | °C (°F) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) |
| Motor power | kW (hp) | 1.1 (1.5) | 1.1 (1.5) | 2.2 (3.0) | 2.2 (3.0) |
| Energy efficiency class | | IE 2 | IE 2 | IE 2 | IE 2 |
| Nominal speed, approx. | rpm | 3000 | 3600 | 3000 | 3600 |
| Max. permissible speed | rpm | 3600 | 3600 | 3600 | 3600 |
| Type of protection | IP | 55 | 55 | 55 | 55 |
| ATEX protection category ⁴⁾ | | Category 3i | Category 3i | Category 3i | Category 3i |
| Lubricant for the bearing chamber ⁵⁾ | | | | | |
| | vertical pumping action, approx. l (qt) | 0.6 (0.63) | 0.6 (0.63) | 0.8 (0.85) | 0.8 (0.85) |
| Lubricant of the shaft sealing ring housing | horizontal pumping action, approx. l (qt) | 0.45 (0.48) | 0.45 (0.48) | 0.7 (0.74) | 0.7 (0.74) |
| | | | | | |
| | l (qt) | 0.6 (0.63) | 0.6 (0.63) | 1.0 (1.06) | 1.0 (1.06) |
| Connection flanges | DN | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| Materials (materials in contact with the gas) | | C steel, CrNi steel, grey cast iron, FPM (FKM) | C steel, CrNi steel, grey cast iron, FPM (FKM) | C steel, CrNi steel, grey cast iron, FPM (FKM) | C steel, CrNi steel, grey cast iron, FPM (FKM) |
| Weight WA / WAU | kg (lbs) | 85.0 / 89.0 (187.4 / 196.2) | 85.0 / 89.0 (187.4 / 196.2) | 128.0 / 133.0 (282.2 / 293.3) | 128.0 / 133.0 (282.2 / 293.3) |
| Noise level ⁶⁾ | dB(A) | < 62 | < 64 | < 65 | < 67 |

¹⁾ To DIN 28 400 and subsequent numbers

²⁾ With double-stage rotary vane vacuum pump TRIVAC, resp. single-stage rotary vane vacuum pump SOGEVAC (Type of backing pump look at max. pumping speed).

When using 2-stage backing pumps the ultimate pressures will be correspondingly lower

³⁾ Applicable for ratio up to 1 : 10 between backing pump and Roots vacuum pump at 3000 rpm

⁴⁾ For ATEX category 3o a appropriate motor has to be used.

Please contact Oerlikon Leybold Vacuum (Solution)

⁵⁾ Authoritative, however, is the oil level at the oil-level glass

⁶⁾ Valid under ultimate pressure conditions. Pressures over 10 mbar (7.5 Torr) produce a higher operating noise

Technical Data

WA/WAU (H) 1001

WA/WAU(H) 2001

| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
|--|---|--|--|--|--|
| Nominal pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 1000 (589) | 1200 (707) | 2050 (1207.5) | 2460 (1449) |
| Max. effective pumping speed with backing pump | m ³ x h ⁻¹ (cfm) SOGEVAC | 800 (470) SV 300 B | 1000 (588) SV 300 B | 1850 (1089) SV 630 BF | 2100 (1236) SV 630 BF |
| Ultimate total pressure ²⁾ | mbar (Torr) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) |
| Max. permissible pressure difference during continuous operation ³⁾ | mbar (Torr) | 80.0 (60.0) | 80.0 (60.0) | 50.0 (37.5) | 50.0 (37.5) |
| Leak rate, integral | mbar x l x s ⁻¹ | < 5 x 10 ⁻⁴ | < 5 x 10 ⁻⁴ | < 5 x 10 ⁻⁴ | < 5 x 10 ⁻⁴ |
| Mains supply | V | 200-240 | 200-240 | 200-240 | 200-240 |
| | V | 380-400 | 380-480 | 380-400 | 380-480 |
| Thermal class | | F | F | F | F |
| Permissible ambient temperatures | °C (°F) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) |
| Motor power | kW (hp) | 4.0 (5.4) | 4.0 (5.4) | 7.5 (10.0) | 7.5 (10.0) |
| Energy efficiency class | | IE 2 | IE 2 | IE 2 | IE 2 |
| Nominal speed, approx. | rpm | 3000 | 3600 | 3000 | 3600 |
| Max. permissible speed | rpm | 3600 | 3600 | 3600 | 3600 |
| Type of protection | IP | 55 | 55 | 55 | 55 |
| ATEX protection category ⁴⁾ | | Category 3i | Category 3i | Category 3i | Category 3i |
| Lubricant for the bearing chamber ⁵⁾ | | | | | |
| vertical pumping action, approx. | l (qt) | 1.8 (1.90) | 1.8 (1.90) | 3.6 (3.81) | 3.6 (3.81) |
| horizontal pumping action, approx. | l (qt) | 1.1 (1.16) | 1.1 (1.16) | 2.4 (2.54) | 2.4 (2.54) |
| Lubricant of the shaft sealing ring housing | l (qt) | 1.3 (1.37) | 1.3 (1.37) | 1.6 (1.69) | 1.6 (1.69) |
| Connection flanges | DN | 100 ISO-K | 100 ISO-K | 160 ISO-K | 160 ISO-K |
| Materials (materials in contact with the gas) | | C steel, CrNi steel, grey cast iron, FPM (FKM) | C steel, CrNi steel, grey cast iron, FPM (FKM) | C steel, CrNi steel, grey cast iron, FPM (FKM) | C steel, CrNi steel, grey cast iron, FPM (FKM) |
| Weight WA / WAU | kg (lbs) | 220.0 / 225.0 (485.1 / 496.1) | 220.0 / 225.0 (485.1 / 496.1) | 400.0 / 406.0 (882.0 / 895.2) | 400.0 / 406.0 (882.0 / 895.2) |
| Noise level ⁶⁾ | dB(A) | < 70 | < 73 | < 72 | < 77 |

¹⁾ To DIN 28 400 and subsequent numbers

²⁾ With single-stage rotary vane vacuum pump SOGEVAC (Type of backing pump look at max. pumping speed).
When using 2-stage backing pumps the ultimate pressures will be correspondingly lower

³⁾ Applicable for ratio up to 1 : 10 between backing pump and Roots vacuum pump at 3000 rpm

⁴⁾ For ATEX category 3o a appropriate motor has to be used.
Please contact Oerlikon Leybold Vacuum (Solution)

⁵⁾ Authoritative, however, is the oil level at the oil-level glass

⁶⁾ Valid under ultimate pressure conditions. Pressures over 10 mbar (7.5 Torr) produce a higher operating noise

Ordering Information

| | WA/WAU 251 | WA/WAU(H) 501 | WA/WAU(H) 1001 | WA/WAU(H) 2001 |
|--|----------------------|-------------------------|--------------------------|--------------------------|
| | Part No. | Part No. | Part No. | Part No. |
| Roots vacuum pump | | | | |
| RUVAC WA | 117 20 | 117 30 | 117 40 | 117 50 |
| RUVAC WAU | 117 21 | 117 31 | 117 41 | 117 51 |
| RUVAC WA, without motor | 117 24 | 117 34 | 117 44 | 112 54 |
| RUVAC WAU, without motor | – | 155 008 | 112 17 | 113 22 |
| RUVAC WAU(H), with special ACE vibration absorber | – | 118 31 | 118 41 | 118 51 |

Mandatory Accessories

| | | | | |
|---|---------------|---------------|---------------|---------------|
| Collar flange with retaining ring, DIN 2501 ¹⁾ | | | | |
| DN 63 ISO-K | 267 47 | 267 47 | – | – |
| DN 100 ISO-K | – | – | 267 50 | – |
| DN 160 ISO-K | – | – | – | 267 51 |

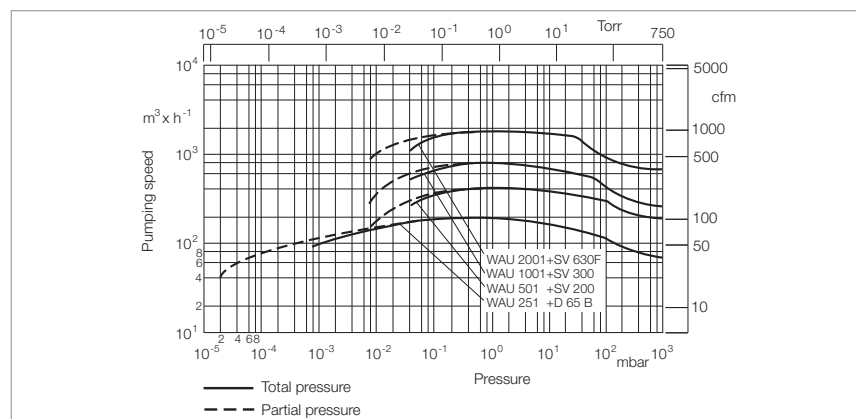
Accessories

| | | | | |
|---|--------------------------------|--------------------------------|---------------------------------|---------------------------------|
| RUVAC WS/WSU(H) seal kit | 194 60 | 194 64 | 194 68 | 194 72 |
| Flange adapter set, consisting of Flange adapter with screws, bolts, washers and nuts for ANSI flange | (3" ANSI) | (3" ANSI) | (4" ANSI) | (6" ANSI) |
| WA/WS pump | 200 03 179 | 200 03 179 | 200 03 180 | 200 03 181 |
| WAU/WSU pump | 200 03 179 | 200 03 179 | 200 03 180 | 200 03 182 |
| RUVAC WA US conversion kit, consisting of ANSI flanges 3 in., NEMA motor flange, coupling and installation components WA(U) pumps | 155 013V | 155 014V | 155 015V | 155 016V |
| Frequency converter RUVATRONIC (see description in chapter "General", paragraph "Accessories") | RT 5/251 500 001 381 | RT 5/501 500 001 382 | RT 5/1001 500 001 383 | RT 5/2001 500 001 384 |

Accessories

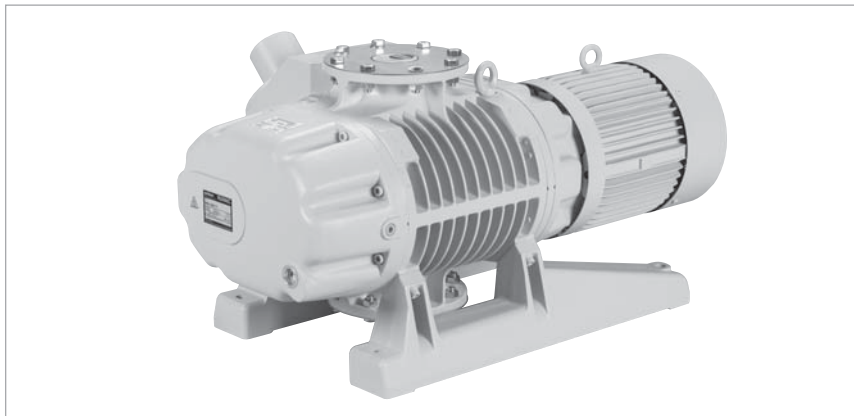
| | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| Shaft sealing ring replacement kit WA/WAU | EK 110 002 661 | EK 110 002 661 | EK 110 002 662 | EK 110 002 662 |
| Major maintenance kit WA | EK 110 002 663 | EK 110 002 664 | EK 110 002 667 | EK 110 002 669 |
| WAU | EK 110 002 665 | EK 110 002 666 | EK 110 002 668 | EK 110 002 670 |

¹⁾ For connection to flange system DN 63 ISO-K, resp. DN 100 ISO-K, resp. DN 160 ISO-K



Pumping speed of the RUVAC WA/WAU, 50 Hz

RUVAC WS/WSU 251 to 2001 Roots Vacuum Pumps with Air-Cooled Canned Motors



Single-stage Roots vacuum pump RUVAC WSU 2001

Advantages to the User

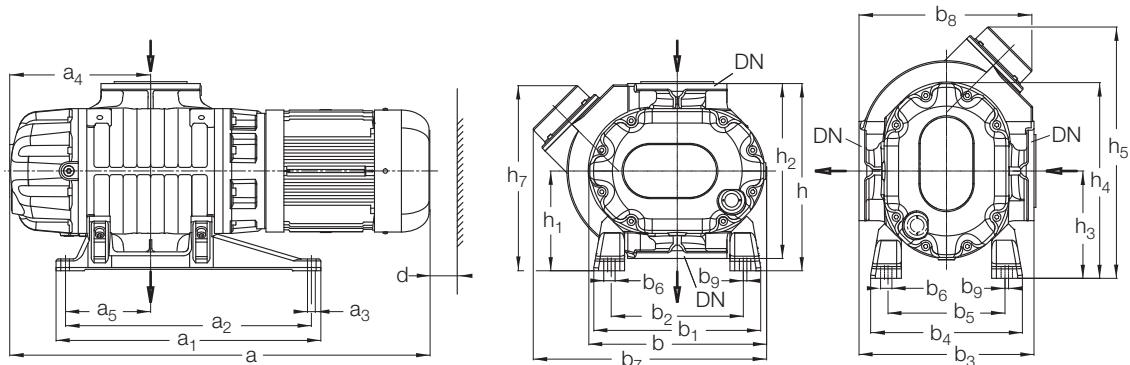
- Two air-cooled lines WS/WSU, each with four pump sizes
- Highly leak-tight air-cooled pumps driven by a air-cooled canned motor
- Lubricated with mineral oil (alternatively with LVO 400)
- Over-temperature switch in the stator coil of the motor
- All elastomer seals made of FPM (FKM)/Viton
- Integrated pressure equalization line with differential pressure valve prevents overloading on WSU model (optional)
- A frequency converter can be used to operate the RUVAC WS 251 to 2001 pumps between 20 and 100 Hz
- No shaft feedthrough to the atmosphere, thus particularly leak-tight
- Conversion from vertical to horizontal pumping action can be done from the side of the customer

Typical Applications

- For applications which require a high pumping speed at pressures between 10^{-2} and 10^{-4} mbar (0.75×10^{-2} and 0.75×10^{-4} Torr)
- Used where the possibility of contamination due air ingress or pumped media leakage must be avoided
- Suction or pumping of high-purity or radioactive gases
- Is used in clean rooms where the air must not be recirculated by the motor's fan

Supplied Equipment

- The required quantity of oil is supplied separately with the pump (exceptions from this are indicated)
- If no other type of oil is stated, then mineral oil LVO 100 is used as standard
- Purged with nitrogen for corrosion protection
- Gasket in the intake flange with integrated dirt sieve



| Type | | DN | a | a ₁ | a ₂ | a ₃ | a ₄ | a ₅ | |
|--------------|-----|-----|-------|----------------|----------------|----------------|----------------|----------------|--|
| WS/WSU 251 | mm | 63 | 694 | 405 | 365 | 14 | 212 | 120 | |
| | in. | | 27.32 | 15.94 | 14.37 | 0.55 | 8.35 | 4.72 | |
| WS/WSU 501 | mm | 63 | 752 | 486 | 450 | 14 | 237 | 155 | |
| | in. | | 29.61 | 19.13 | 17.72 | 0.55 | 9.33 | 6.10 | |
| WS/WSU 501H | mm | 63 | 752 | 486 | 450 | 14 | 237 | 155 | |
| | in. | | 29.61 | 19.13 | 17.72 | 0.55 | 9.33 | 6.10 | |
| WS/WSU 1001 | mm | 100 | 885 | 560 | 520 | 16,5 | 298 | 180 | |
| | in. | | 34.84 | 22.05 | 20.47 | 0.65 | 11.73 | 7.09 | |
| WS/WSU 1001H | mm | 100 | 885 | 560 | 520 | 16,5 | 298 | 180 | |
| | in. | | 34.84 | 22.05 | 20.47 | 0.65 | 11.73 | 7.09 | |
| WS/WSU 2001 | mm | 160 | 1042 | 800 | 740 | 18 | 367 | 220 | |
| | in. | | 41.02 | 31.50 | 29.13 | 0.71 | 14.45 | 8.66 | |
| WS/WSU 2001H | mm | 160 | 1042 | 800 | 740 | 18 | 367 | 220 | |
| | in. | | 41.02 | 31.50 | 29.13 | 0.71 | 14.45 | 8.66 | |

| | | b | b ₁ | b ₂ | b ₃ | b ₄ | b ₅ | b ₆ | b ₇ ¹⁾ | b ₈ |
|--------------|-----|-------|----------------|----------------|----------------|----------------|----------------|----------------|------------------------------|----------------|
| WS/WSU 251 | mm | 250 | 270 | 210 | 280 | 230 | 170 | 24 | 305 | 285 |
| | in. | 9.84 | 10.63 | 8.27 | 11.02 | 9.06 | 6.69 | 0.94 | 12.01 | 11.22 |
| WS/WSU 501 | mm | 310 | 299 | 229 | 320 | 271 | 201 | 24 | 390 | 313 |
| | in. | 12.20 | 11.77 | 9.02 | 12.60 | 10.67 | 7.91 | 0.94 | 15.35 | 12.32 |
| WS/WSU 501H | mm | 310 | 299 | 229 | 320 | 271 | 201 | 24 | 414 | 330 |
| | in. | 12.20 | 11.77 | 9.02 | 12.60 | 10.67 | 7.91 | 0.94 | 16.30 | 12.99 |
| WS/WSU 1001 | mm | 376 | 352 | 278 | 370 | 320 | 246 | 24 | 494 | 366 |
| | in. | 14.80 | 13.86 | 10.94 | 14.57 | 12.60 | 9.69 | 0.94 | 19.45 | 14.41 |
| WS/WSU 1001H | mm | 376 | 352 | 278 | 370 | 320 | 246 | 24 | 524 | 398 |
| | in. | 14.80 | 13.86 | 10.94 | 14.57 | 12.60 | 9.69 | 0.94 | 20.63 | 15.67 |
| WS/WSU 2001 | mm | 463 | 518 | 388 | 460 | 422 | 292 | 24 | 638 | 456 |
| | in. | 18.23 | 20.39 | 15.28 | 18.11 | 16.61 | 11.50 | 0.94 | 25.12 | 17.95 |
| WS/WSU 2001H | mm | 463 | 518 | 388 | 460 | 422 | 292 | 24 | 642 | 460 |
| | in. | 18.23 | 20.39 | 15.28 | 18.11 | 16.61 | 11.50 | 0.94 | 25.28 | 18.11 |

| | | b ₉ | d | h | h ₁ | h ₂ | h ₃ | h ₄ | h ₅ ¹⁾ | h ₆ |
|--------------|-----|----------------|------|-------|----------------|----------------|----------------|----------------|------------------------------|----------------|
| WS/WSU 251 | mm | 7.5 | 50 | 300 | 160 | 280 | 180 | 306 | 360 | 307 |
| | in. | 0.30 | 2.00 | 11.81 | 6.3 | 11.02 | 7.09 | 12.05 | 14.17 | 12.09 |
| WS/WSU 501 | mm | 7.5 | 50 | 340 | 180 | 320 | 194 | 348 | 430 | 332 |
| | in. | 0.30 | 2.00 | 13.39 | 7.09 | 12.60 | 7.48 | 13.70 | 16.93 | 13.07 |
| WS/WSU 501H | mm | 7.5 | 50 | 340 | 180 | 320 | 194 | 348 | 450 | 350 |
| | in. | 0.30 | 2.00 | 13.39 | 7.09 | 12.60 | 7.48 | 13.70 | 17.72 | 13.78 |
| WS/WSU 1001 | mm | 7.5 | 50 | 396 | 211 | 370 | 227 | 414 | 532 | 392 |
| | in. | 0.30 | 2.00 | 15.59 | 8.31 | 14.57 | 8.94 | 16.30 | 20.94 | 15.43 |
| WS/WSU 1001H | mm | 7.5 | 50 | 396 | 211 | 370 | 227 | 414 | 564 | 424 |
| | in. | 0.30 | 2.00 | 15.59 | 8.31 | 14.57 | 8.94 | 16.30 | 22.20 | 16.69 |
| WS/WSU 2001 | mm | 7.5 | 50 | 530 | 300 | 460 | 351 | 578 | 760 | 523 |
| | in. | 0.30 | 2.00 | 20.87 | 11.81 | 18.11 | 13.82 | 22.76 | 29.92 | 20.59 |
| WS/WSU 2001H | mm | 7.5 | 50 | 530 | 300 | 460 | 351 | 578 | 753 | 530 |
| | in. | 0.30 | 2.00 | 20.87 | 11.81 | 18.11 | 13.82 | 22.76 | 29.65 | 20.87 |

¹⁾ For RUVAC WSU only

Outside dimensions ±3 mm (0.12 in.)

DN₁ = PN 6 pump flange in accordance with DIN 2501

Dimensional drawing for the RUVAC WS/WSU(H) pumps

Technical Data

| | | WS/WSU 251 | | WS/WSU(H) 501 | |
|--|---|--|--|--|--|
| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
| Nominal pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 253 (149) | 304 (179) | 505 (297.4) | 606 (357) |
| Max. effective pumping speed with backing pump | m ³ x h ⁻¹ (cfm) TRIVAC SOGEVAC | 210.0 (123.7) D 65 B – | 251.0 (148.0) D 65 B – | 410.0 (241.0) – SV 200 | 530.0 (312.0) – SV 200 |
| Ultimate total pressure ²⁾ | mbar (Torr) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 8 x 10 ⁻⁴ (< 6 x 10 ⁻⁴) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) |
| Max. permissible pressure difference during continuous operation ³⁾ | mbar (Torr) | 80.0 (60.0) | 80.0 (60.0) | 80.0 (60.0) | 80.0 (60.0) |
| Leak rate, integral | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁴ | < 1 x 10 ⁻⁴ | < 1 x 10 ⁻⁴ | < 1 x 10 ⁻⁴ |
| Mains supply | | | | | |
| V / Y | V | 200 / – | 200-208 / – | 200 / – | 200-208 / – |
| V / Y | V | 230 / 400 | 265 / 460 | 208-265 / 460 | 265 / 460 |
| Thermal class | | F | F | F | F |
| Permissible ambient temperatures | °C (°F) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) |
| Motor power | kW (hp) | 1.1 (1.5) | 1.4 (1.9) | 2.2 (3.0) | 2.4 (3.3) |
| Nominal speed, approx. | rpm | 3000 | 3600 | 3000 | 3600 |
| Max. permissible speed | rpm | 6000 | 6000 | 6000 | 6000 |
| Type of protection | IP | 20 | 20 | 20 | 20 |
| Lubricant for the bearing chamber ⁴⁾ | | | | | |
| LVO 400 | | | | | |
| vertical pumping action, approx. | l (qt) | 0.55 (0.58) | 0.55 (0.58) | 0.75 (0.79) | 0.75 (0.79) |
| horizontal pumping action, approx. | l (qt) | 0.45 (0.48) | 0.45 (0.48) | 0.7 (0.74) | 0.7 (0.74) |
| other oils | | | | | |
| vertical pumping action, approx. | l (qt) | 0.6 (0.63) | 0.6 (0.63) | 0.8 (0.85) | 0.8 (0.85) |
| horizontal pumping action, approx. | l (qt) | 0.45 (0.48) | 0.45 (0.48) | 0.7 (0.74) | 0.7 (0.74) |
| Connection flanges | DN | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| Weight WS / WSU | kg (lbs) | 90.0 / 95.0 (198.5 / 209.5) | 90.0 / 95.0 (198.5 / 209.5) | 130.0 / 135.0 (286.7 / 297.7) | 130.0 / 135.0 (286.7 / 297.7) |
| Noise level ⁵⁾ | dB(A) | < 58 | < 60 | < 52 | < 56 |

¹⁾ To DIN 28 400 and subsequent numbers

²⁾ With double-stage rotary vane vacuum pump TRIVAC or single-stage rotary vane vacuum pump SOGEVAC
(Type of backing pump look at max. pumping speed)

When using 2-stage backing pumps the ultimate pressures will be correspondingly lower

³⁾ Applicable for ratio up to 1 : 10 between backing pump and Roots vacuum pump at 3000 rpm

⁴⁾ Authoritative, however, is the oil level at the oil-level glass

⁵⁾ Valid under ultimate pressure conditions. Pressures over 10 mbar (7.5 Torr) produce a higher operating noise

Technical Data

| | | WS/WSU(H) 1001 | | WS/WSU(H) 2001 | |
|--|---|--|--|--|--|
| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
| Nominal pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 1000 (589) | 1200 (707) | 2050 (1207.5) | 2460 (1449) |
| Max. effective pumping speed with backing pump | m ³ x h ⁻¹ (cfm) SOGEVAC | 800 (470) SV 300 B | 1000 (588) SV 300 B | 1850 (1089) SV 630 BF | 2100 (1236) SV 630 BF |
| Ultimate total pressure ²⁾ | mbar (Torr) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) | < 4 x 10 ⁻² (< 3 x 10 ⁻²) |
| Max. permissible pressure difference during continuous operation ³⁾ | mbar (Torr) | 80.0 (60.0) | 80.0 (60.0) | 50.0 (37.5) | 50.0 (37.5) |
| Leak rate, integral | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁴ | < 1 x 10 ⁻⁴ | < 1 x 10 ⁻⁴ | < 1 x 10 ⁻⁴ |
| Mains supply | | | | | |
| V / Y | V | 200 / – | 200-208 / – | 200 / – | 200-208 / – |
| V / Y | V | 230 / 400 | 265 / 460 | 230 / 400 | 265 / 460 |
| Thermal class | | F | F | F | F |
| Permissible ambient temperatures | °C (°F) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) | +5 to +40 (+ 41 to +104) |
| Motor power | kW (hp) | 4.0 (5.4) | 4.4 (6.0) | 7.5 (10.0) | 8.5 (11.6) |
| Nominal speed, approx. | rpm | 3000 | 3600 | 3000 | 3600 |
| Max. permissible speed | rpm | 6000 | 6000 | 4200 ⁴⁾ | 4200 ⁴⁾ |
| Type of protection | IP | 20 | 20 | 20 | 20 |
| Lubricant for the bearing chamber ⁵⁾ | | | | | |
| LVO 400 | | | | | |
| vertical pumping action, approx. | l (qt) | 1.75 (1.85) | 1.75 (1.85) | 2.7 (2.85) | 2.7 (2.85) |
| horizontal pumping action, approx. | l (qt) | 1.1 (1.16) | 1.1 (1.16) | 1.9 (2.00) | 1.9 (2.00) |
| other oils | | | | | |
| vertical pumping action, approx. | l (qt) | 1.8 (1.90) | 1.8 (1.90) | 3.6 (3.81) | 3.6 (3.81) |
| horizontal pumping action, approx. | l (qt) | 1.1 (1.16) | 1.1 (1.16) | 2.4 (2.54) | 2.4 (2.54) |
| Connection flanges | DN | 100 ISO-K | 100 ISO-K | 160 ISO-K | 160 ISO-K |
| Weight WS / WSU | kg (lbs) | 228.0 / 233.0 (502.7 / 513.8) | 228.0 / 233.0 (502.7 / 513.8) | 458.0 / 465.0 (1009.9 / 1025.3) | 458.0 / 465.0 (1009.9 / 1025.3) |
| Noise level ⁶⁾ | dB(A) | < 60 | < 62 | < 65 | < 67 |

¹⁾ To DIN 28 400 and subsequent numbers

²⁾ With single-stage rotary vane vacuum pump SOGEVAC
(Type of backing pump look at max. pumping speed)

When using 2-stage backing pumps the ultimate pressures will be correspondingly lower

³⁾ Applicable for ratio up to 1 : 10 between backing pump and Roots vacuum pump at 3000 rpm

⁴⁾ Also 6000 rpm upon order

⁵⁾ Authoritative, however, is the oil level at the oil-level glass

⁶⁾ Valid under ultimate pressure conditions. Pressures over 10 mbar (7.5 Torr) produce a higher operating noise

Ordering Information

| | WS/WSU | WS/WSU(H) | WS/WSU(H) | WS/WSU(H) |
|---|---------------|---------------|---------------|-------------------|
| | 251 | 501 | 1001 | 2001 |
| | Part No. | Part No. | Part No. | Part No. |
| Roots vacuum pump | | | | |
| RUVAC WS, (LVO 100) | 117 22 | 117 32 | 117 42 | 117 52 |
| RUVAC WSU, (LVO 100) | 117 23 | 117 33 | 117 43 | 117 53 |
| RUVAC WS-PFPE oil, (LVO 400) | 117 27 | 117 37 | 117 47 | 117 57 |
| RUVAC WSU-PFPE oil, (LVO 400) | 117 28 | 117 38 | – | 200 03 123 |
| RUVAC WS 2001-Ester oil (LVO 210) (max. 100 Hz) | – | – | – | 167 007 |
| RUVAC WS 2001-PFPE oil, (LVO 400) (max. 100 Hz) | – | – | – | 150 95 |
| RUVAC WSU 2001-Ester oil (LVO 210) (max. 100 Hz) | – | – | – | 150 96 |
| RUVAC WSU H, (LVO 100) with special ACE vibration absorber | – | 118 33 | 118 43 | 118 53 |
| RUVAC WSU H-PFPE oil (LVO 210) with special ACE vibration absorber | – | – | 150 47 | 167 129V |

Mandatory Accessories

| | | | | |
|---|---------------|---------------|---------------|---------------|
| Collar flange with retaining ring, DIN 2501 ¹⁾ | | | | |
| DN 63 ISO-K | 267 47 | 267 47 | – | – |
| DN 100 ISO-K | – | – | 267 50 | – |
| DN 160 ISO-K | – | – | – | 267 51 |

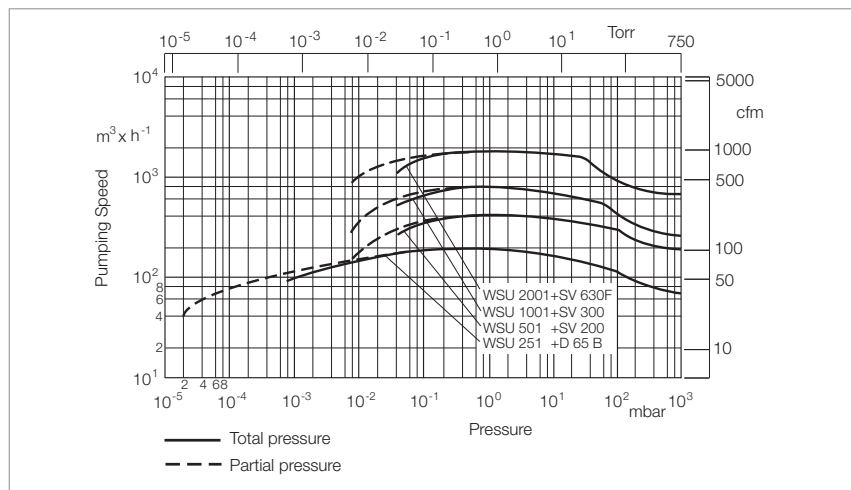
Accessories

| | | | | |
|---|--------------------|--------------------|--------------------|--------------------|
| Flange adapter set, consisting of flange adapter with screws, bolts, washers and nuts for ANSI flange | (3" ANSI) | (3" ANSI) | (4" ANSI) | (6" ANSI) |
| WA/WS pump | 200 03 179 | 200 03 179 | 200 03 180 | 200 03 181 |
| WAU/WSU pump | 200 03 179 | 200 03 179 | 200 03 180 | 200 03 182 |
| Frequency converter RUVATRONIC (see description in chapter "General", paragraph "Accessories") | RT 5/251 | RT 5/501 | RT 5/1001 | RT 5/2001 |
| | 500 001 381 | 500 001 382 | 500 001 383 | 500 001 384 |

Spare Parts

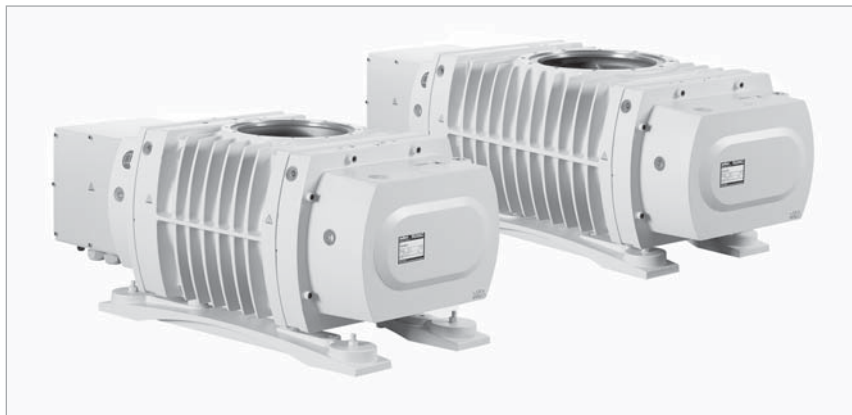
| | | | | |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Major maintenance kit | | | | |
| WS | EK 110 002 671 | EK 110 002 672 | EK 110 002 673 | EK 110 002 674 |
| WSU | EK 110 002 675 | EK 110 002 676 | EK 110 002 677 | EK 110 002 678 |
| RUVAC WS/WSU(H) seal kit | 194 62 | 194 66 | 194 70 | 194 74 |

¹⁾ For connection to flange system DN 63 ISO-K, resp. DN 100 ISO-K, resp. DN 160 ISO-K



Pumping speed of the RUVAC WS/WSU, 50 Hz

RUVAC WH/WHU Roots Vacuum Pumps with Water-Cooled Hermetically Sealed Motors with Synthetic Oil or PFPE filling



RUVAC WH 4400 and WH 7000 single-stage Roots vacuum pump with hermetically sealed motor

Advantages to the User

- Lower energy costs through innovative motor technology IE 2
- Minimized space requirements due to an extremely compact design
- Easy system integration
- Optimum price-to-performance ratio; high pumping speed up to 9800 m³/h @ 70 Hz with optional frequency converter
- Integrated water cooling system for installation within closed systems
- Parts in contact with the cooling water are made of stainless steel (corrosion-free)
- Trouble-free operation with toxic or corrosive media owing to the hermetically sealed motor
- No shaft seals towards atmosphere, therefore high reliability, long service intervals and no oil leaks

Conversion from vertical to horizontal pumping action can be done from the side of the customer (for WH 4400/7000)

- Secure operation and faster pump down in short cycle operation with optional bypass-line (does not apply to WH 700)
- Motor protection PTC and PTO

RUVAC WHU with Bypass Line

- Maximum efficiency in short cycle operation for the WHU types with bypass line and newly developed control flap
- Reduced pumpdown time
- Pump start-up at atmospheric pressure possible
- Maximum pumpdown time with bypass line active not over three minutes
- Optimized cycle time for the control flap (patent pending); delivers an even faster response compared to operation with frequency converter
- Extreme contamination resistance of the control flap

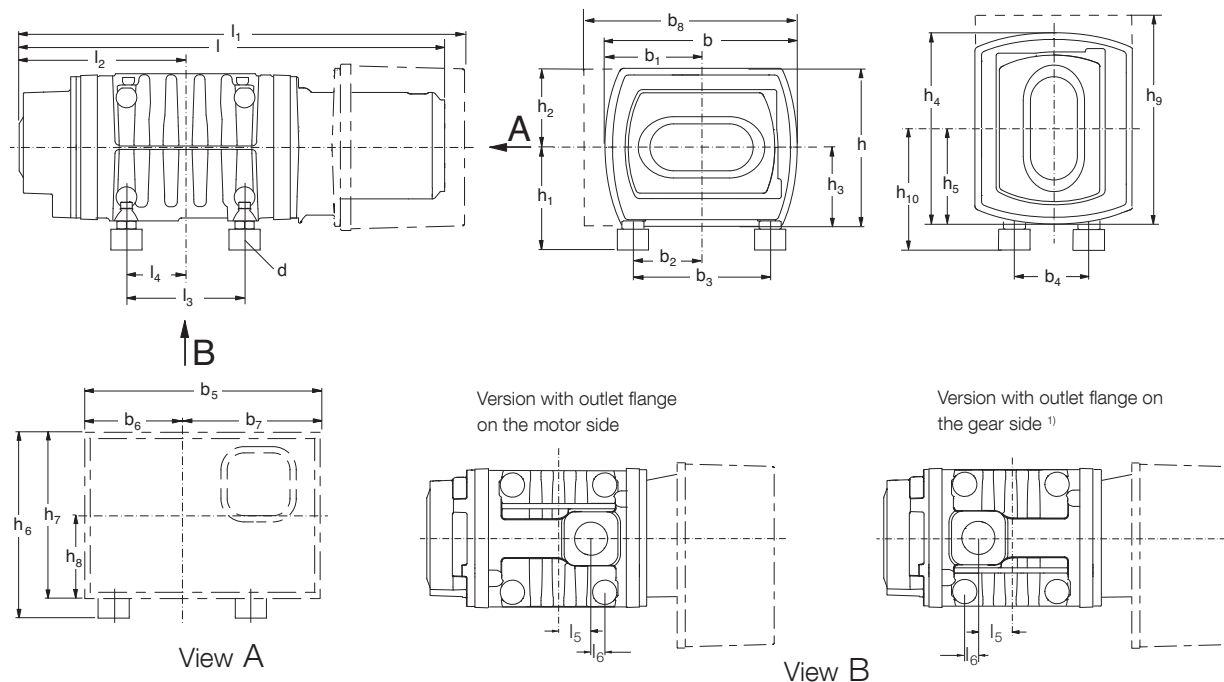
Typical Applications

The Roots pumps of the WH series were developed for deployment in all applications with high requirements regarding operating pressure, cycle times and system uptime.

- Solar industry
- Furnace construction
- Industrial coating processes
- Research
- Space simulation

Supplied Equipment

- Pump will be delivered with standard shock absorbers
- Gasket in the intake flange with dirt sieve
- The required lubricant is included in separate bottles



| Type | | Inlet flange | Outlet flange | l | l ₁ | l ₂ | l ₃ | l ₄ | l ₅ | l ₆ | d |
|----------|-----|--------------|---------------|-------|----------------|----------------|----------------|----------------|----------------|----------------|------|
| WH 700 | mm | 100 ISO-K | 63 PN 6 | 705 | — | 259 | 276 | 138 | — | — | M 8 |
| | in. | | | 27.76 | — | 10.20 | 10.87 | 5.43 | — | — | M 8 |
| WH 2500 | mm | 250 ISO-K | 100 ISO-K | 1015 | 1076 | 400 | 284 | 142 | 42 | 100 | M 12 |
| | in. | | | 39.96 | 42.36 | 15.75 | 11.18 | 5.59 | 1.65 | 3.94 | M 12 |
| WHU 2500 | mm | 250 ISO-K | 100 ISO-K | 1015 | — | 400 | 284 | 142 | 42 | 100 | M 12 |
| | in. | | | 39.96 | — | 15.75 | 11.18 | 5.59 | 1.65 | 3.94 | M 12 |
| WH 4400 | mm | 250 ISO-K | 160 ISO-K | 1183 | — | 457 | 310 | 155 | — | — | M 12 |
| | in. | | | 46.58 | — | 17.99 | 12.21 | 6.10 | — | — | M 12 |
| WHU 4400 | mm | 250 ISO-K | 160 ISO-K | 1183 | — | 237 | 310 | 155 | — | — | M 12 |
| | in. | | | 46.58 | — | 9.33 | 12.21 | 6.10 | — | — | M 12 |
| WH 7000 | mm | 320 ISO-K | 160 ISO-K | 1433 | — | 582 | 560 | 280 | — | — | M 12 |
| | in. | | | 56.42 | — | 22.91 | 22.05 | 11.02 | — | — | M 12 |
| WHU 7000 | mm | 320 ISO-K | 160 ISO-K | 1433 | — | 582 | 560 | 280 | — | — | M 12 |
| | in. | | | 56.42 | — | 22.91 | 22.05 | 11.02 | — | — | M 12 |

| Type | | b | b ₁ | b ₂ | b ₃ | b ₄ | b ₅ | b ₆ | b ₇ | b ₈ | h |
|----------|-----|-------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------|
| WH 700 | mm | 269 | 129 | 100 | 200 | — | — | — | — | — | 270 |
| | in. | 10.59 | 5.08 | 3.94 | 7.87 | — | — | — | — | — | 10.63 |
| WH 2500 | mm | 428 | 214 | 165 | 330 | — | 570 | 236 | 334 | — | — |
| | in. | 16.85 | 8.43 | 6.50 | 12.99 | — | 22.44 | 9.29 | 13.15 | — | — |
| WHU 2500 | mm | — | 214 | 165 | 330 | — | — | — | — | 508 | 354 |
| | in. | — | 8.43 | 6.50 | 12.99 | — | — | — | — | 20.00 | 13.94 |
| WH 4400 | mm | 540 | 330 | 155 | 310 | 260 | — | — | — | — | 419 |
| | in. | 21.26 | 12.99 | 6.10 | 12.21 | 10.24 | — | — | — | — | 16.50 |
| WHU 4400 | mm | — | 330 | 238 | 393 | 260 | — | — | — | 600 | 419 |
| | in. | — | 12.99 | 9.37 | 15.47 | 10.24 | — | — | — | 23.62 | 16.50 |
| WH 7000 | mm | 540 | 330 | 155 | 310 | 260 | — | — | — | — | 419 |
| | in. | 21.26 | 12.99 | 6.10 | 12.21 | 10.24 | — | — | — | — | 16.50 |
| WHU 7000 | mm | — | 330 | 238 | 393 | 260 | — | — | — | 600 | 419 |
| | in. | — | 12.99 | 9.37 | 15.47 | 10.24 | — | — | — | 23.62 | 16.50 |

| Type | | h ₁ | h ₂ | h ₃ | h ₄ | h ₅ | h ₆ | h ₇ | h ₈ | h ₉ | h ₁₀ |
|----------|-----|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| WH 700 | mm | 176 | 114 | 156 | — | — | — | — | — | — | — |
| | in. | 6.93 | 4.49 | 6.14 | — | — | — | — | — | — | — |
| WH 2500 | mm | 247 | 177 | 177 | — | — | 447 | 400 | 200 | — | — |
| | in. | 9.72 | 6.97 | 6.97 | — | — | 17.60 | 15.75 | 7.87 | — | — |
| WHU 2500 | mm | 247 | 177 | 177 | — | — | 447 | 400 | 200 | — | — |
| | in. | 9.72 | 6.97 | 6.97 | — | — | 17.60 | 15.75 | 7.87 | — | — |
| WH 4400 | mm | 298 | 207 | 212 | 540 | 315 | — | — | — | 645 | 315 |
| | in. | 11.73 | 8.15 | 8.35 | 21.26 | 12.40 | — | — | — | 25.39 | 12.40 |
| WHU 4400 | mm | 298 | 207 | 212 | 540 | 315 | — | — | — | 645 | 315 |
| | in. | 11.73 | 8.15 | 8.35 | 21.26 | 12.40 | — | — | — | 25.39 | 12.40 |
| WH 7000 | mm | 298 | 207 | 212 | 540 | 315 | — | — | — | 645 | 315 |
| | in. | 11.73 | 8.15 | 8.35 | 21.26 | 12.40 | — | — | — | 25.39 | 12.40 |
| WHU 7000 | mm | 298 | 207 | 212 | 540 | 315 | — | — | — | 645 | 315 |
| | in. | 11.73 | 8.15 | 8.35 | 21.26 | 12.40 | — | — | — | 25.39 | 12.40 |

¹⁾ The outlet flange for WH 700/4400/7000 is centric of the housing. For WH 2500 the outlet flange is peripheral arbitrary

Dimensional drawing for the RUVAC WH/WHU pumps

Technical Data

WH 700

| | | 50 Hz | 60 Hz | 80 Hz ¹⁾ | 120 Hz ¹⁾ |
|---|--|--|--|--|--|
| Nominal pumping speed ²⁾ | m ³ x h ⁻¹ (cfm) | 710 (418) | 860 (507) | 1150 (677) | 1730 (1019) |
| Max. effective pumping speed with backing pump SOGEVAC SV 300 B | m ³ x h ⁻¹ (cfm) | 620 (365) | 740 (436) | 950 (560) | 1310 (772) |
| Max. permissible pressure difference during continuous operation ^{3), 4), 5)} | mbar (Torr) | 75.0 (56.3) | 65.0 (48.8) | 50.0 (37.5) | 30.0 (22.5) |
| Leak rate, integral | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁵ | < 1 x 10 ⁻⁵ | < 1 x 10 ⁻⁵ | < 1 x 10 ⁻⁵ |
| Mains voltage | | | | | |
| WH 700 | | 340 to 530 | 340 to 530 | 340 to 530 | 340 to 530 |
| FC operation | V | 180 to 260 | 180 to 260 ⁶⁾ | 180 to 260 | 180 to 260 |
| Mains operation | V | 360 to 440 | 410 to 500 | – | – |
| | | 180 to 260 | 210 to 260 ⁶⁾ | – | – |
| Max. permissible pressure difference at mains voltage ⁵⁾ | | | | | |
| 200 V | mbar (Torr) | 50.0 (37.5) | 50.0 (37.5) | 40.0 (30.4) | 25.0 (9.0) |
| 400 V | mbar (Torr) | 60.0 (45.6) | 60.0 (45.6) | 45.0 (34.2) | 25.0 (19.0) |
| Permissible ambient temperatures | | | | | |
| WH 700 | °C (°F) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) |
| Nominal power consumption | | | | | |
| WH 700 | | | | | |
| FC operation | kW (hp) | 3.5 (4.7) | 3.5 (4.7) | 3.5 (4.7) | 3.5 (4.7) |
| Mains operation | kW (hp) | 2.2 (2.9) | 2.6 (3.5) | – | – |
| Idle mode power consumption | kW (hp) | 0.5 (0.7) | 0.5 (0.7) | 0.5 (0.7) | 0.5 (0.7) |
| Energy efficiency class | | IE 2 | IE 2 | IE 2 | IE 2 |
| Nominal speed | | | | | |
| WH 700 | rpm | 3000 | 3600 | 4800 | 7200 |
| Max. permissible speed ⁷⁾ | rpm | 7200 | 7200 | 7200 | 7200 |
| Type of protection | | | | | |
| WH 700 | IP | 55 | 55 | 55 | 55 |
| Water connection (4 pcs.) | G | 1/4", female | 1/4", female | 1/4", female | 1/4", female |
| Cooling water quantity ⁸⁾ | l/min | 1 to 3 | 1 to 3 | 1 to 3 | 1 to 3 |
| Cooling water admission temperature | °C (°F) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) |
| Permissible cooling water pressure | bar | 2 to 6 | 2 to 6 | 2 to 6 | 2 to 6 |
| Lubricant ⁹⁾ | | | | | |
| gear side | l (qt) | 0.6 (0.63) | 0.6 (0.63) | 0.6 (0.63) | 0.6 (0.63) |
| motor side | l (qt) | 0.3 (0.31) | 0.3 (0.31) | 0.3 (0.31) | 0.3 (0.31) |
| Connection flange | | | | | |
| Inlet | ISO-K | 100 | 100 | 100 | 100 |
| Outlet | ISO-K | 63 | 63 | 63 | 63 |
| Weight | | | | | |
| WH 700 | kg (lbs) | 125 (276) | 125 (276) | 125 (276) | 125 (276) |
| Dimension (W x B x H) | | | | | |
| WH 700 | mm (in.) | 709 x 265 x 270 (27.91x10.43x10.63) | 709 x 265 x 270 (27.91x10.43x10.63) | 709 x 265 x 270 (27.91x10.43x10.63) | 709 x 265 x 270 (27.91x10.43x10.63) |
| Noise level ¹⁰⁾ | dB(A) | < 56 | < 56 | < 60 | < 60 |

¹⁾ Only possible with frequency converter motor and external frequency converter

²⁾ To DIN 28 426 and subsequent numbers

³⁾ Higher pressure differences are possible. Please contact Oerlikon Leybold Vacuum (OLV)

⁴⁾ Gas temperatures over 40 °C (104 °F) can result in a reduction of the pressure difference values; please consult OLV on this

⁵⁾ The optional frequency converter automatically reduces the rotational speed of the rotors so as to compensate for overloads. During operation do not expose the pump to sudden pressure increases like shock venting to atmospheric pressure, for example

⁶⁾ Requires 200 V FC variant and 200 V motor

⁷⁾ Min. permissible speed: 1200 rpm if run for more than 1 hour

⁸⁾ The cooling water quantity can be reduced provided the temperature of the discharged water does not exceed 45 °C (113 °F)

⁹⁾ Authoritative, however, is the oil level at the oil-level glass

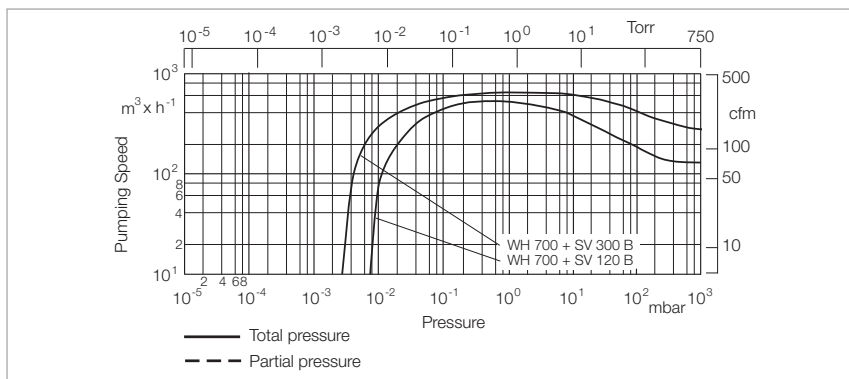
¹⁰⁾ Valid under ultimate pressure conditions. Pressures over 10 mbar (7.5 Torr) produce a higher operating noise

Ordering Information

WH 700

| | Part No. |
|--|-----------------------|
| Roots vacuum pump RUVAC WH vertical flow direction 3.8 kW 400 V, internal FC, IP 55, PFPE oil (LVO 400) | 167 186V |
| 2.2 / 2.6 kW for direct inline operation 50/60 Hz 200 / 240 V, Ester oil (LVO 210) | 155 202 |
| 400 / 460 V, Ester oil (LVO 210) | 155 203 |
| 400 V, PFPE oil (LVO 400) | 155 208V |
| 3.5 kW for FC operation (external FC) 200 V, Ester oil (LVO 210) | 155 204V |
| 400 V, Ester oil (LVO 210) | 155 205V |
| 400 V, PFPE oil (LVO 400) | 155 207V |
| 200 V, PFPE | 155 209V |
| Accessories | |
| Frequency converter with integrated mains filter 200 / 240 V, motor power 4 kW (for Part. No. 155 204V) | 155 218V |
| 400 / 480 V, motor power 4 kW (for Part. No. 155 205V and 155 207V) | 155 217V |
| LCD display (for Part. No. 155 217V and 155 218V) | 155 213V |
| USB Copy Unit (for Part. No. 155 217V and 155 218V) | 155 214V |
| Profibus DP module ¹⁾ (for Part. No. 155 217V and 155 218V) | 155 212V |
| ProfiNet module for (DRYVAC/LEYVAC/RUVAC) | 112005A35 |
| EtherCAT module for (DRYVAC/LEYVAC/RUVAC) | 112005A36 |
| Relay module (digital output) for (DRYVAC/LEYVAC/RUVAC) | 112005A01 |
| Ethernet interface board for (DRYVAC/LEYVAC/RUVAC) | 112005A02 |
| Oil drain facility (M 16 x 1.5) with 90° drain coupling | 200 14 271 |
| Reducer DN 100/63 ISO-K | 267 47 |
| Spare Parts | |
| Major maintenance kit | EK 110 002 691 |

¹⁾ For further bus options please contact Oerlikon Leybold Vacuum Sales



Pumping speed of the RUVAC WH 700

Technical Data

WH /WHU 2500

| | | 50 Hz | 60 Hz | 80 Hz ¹⁾ | 100 Hz ¹⁾ |
|---|--|--|--|--|--|
| Nominal pumping speed ²⁾ | m ³ x h ⁻¹ (cfm) | 2500 (1473) | 3000 (1767) | 4000 (2356) | 5000 (2945) |
| Max. effective pumping speed with backing pump DRYVAC DV 650 | m ³ x h ⁻¹ (cfm) | 2200 (1296) | 2500 (1473) | 3200 (1885) | 3900 (2297) |
| Max. permissible pressure difference ^{3), 4), 5)} during continuous operation (WH) | mbar (Torr) | 50 to 75 (37.5 to 56.3) | 40 to 60 (30.0 to 45.0) | 30 to 40 (22.5 to 30.0) | 20 (15.0) |
| for short-cycle operation < 2 min. (WHU) | mbar (Torr) | 160 (120) | 160 (120) | – (–) | – (–) |
| Leak rate, integral | mbar x l x s ⁻¹ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ |
| Mains voltage | | | | | |
| FC operation | V | 340 to 530 180 to 260 | 340 to 530 180 to 260 | 340 to 530 180 to 260 | 340 to 530 180 to 260 |
| Mains operation | V | 360 to 440 | 410 to 500 | – | – |
| Permissible ambient temperatures | °C (°F) | +5 to +50 (+41 to +122) | +5 to +50 (+41 to +122) | +5 to +50 (+41 to +122) | +5 to +50 (+41 to +122) |
| Nominal power rating | | | | | |
| FC operation (WH) | kW (hp) | 11.0 (14.8) | 11.0 (14.8) | 11.0 (14.8) | 11.0 (14.8) |
| Mains operation | | | | | |
| WH | kW (hp) | 6.5 (8.7) | 7.5 (10.0) | – | – |
| WHU (S6 operation) | kW (hp) | 15.0 (20.1) | 18.0 (24.1) | – | – |
| Idle mode power consumption | kW (hp) | 0.7 (0.9) | 0.9 (1.2) | 1.2 (1.6) | 1.4 (1.9) |
| Energy efficiency class | | IE 2 | IE 2 | IE 2 | IE 2 |
| Nominal speed | rpm | 3000 | 3600 | 4800 | 6000 |
| Max. permissible speed with FC ⁶⁾ | rpm | 6000 | 6000 | 6000 | 6000 |
| Type of protection (int. FC/ext. FC) | IP | 54/55 | 54/55 | 54/55 | 54/55 |
| Cooling water connection (2 pcs.) | G | 1/4", female | 1/4", female | 1/4", female | 1/4", female |
| Cooling water quantity ⁷⁾ | l/min | 1 to 3 | 1 to 3 | 1 to 3 | 1 to 3 |
| Cooling water admission temperature | °C (°F) | +5 to +35 (+41 to +95) | +5 to +35 (+41 to +95) | +5 to +35 (+41 to +95) | +5 to +35 (+41 to +95) |
| Permissible cooling water pressure | bar | 2 to 6 | 2 to 6 | 2 to 6 | 2 to 6 |
| Lubricant ⁸⁾ | l (qt) | 1.2 (1,27) | 1.2 (1,27) | 1.2 (1,27) | 1.2 (1,27) |
| Connection flange | | | | | |
| Inlet | ISO-K | 250 | 250 | 250 | 250 |
| Outlet | ISO-K | 100 | 100 | 100 | 100 |
| Weight | | | | | |
| WH/WHU | kg (lbs) | 390/410 (861/905) | 390/410 (861/905) | 390/410 (861/905) | 390/410 (861/905) |
| WH with integrated FC | kg (lbs) | 430 (946) | 430 (946) | 430 (946) | 430 (946) |
| Dimension (W x B x H) | | | | | |
| WH | mm (in.) | 1015 x 428 x 354 (39.96 x 16.85 x 13.94) | 1015 x 428 x 354 (39.96 x 16.85 x 13.94) | 1015 x 428 x 354 (39.96 x 16.85 x 13.94) | 1015 x 428 x 354 (39.96 x 16.85 x 13.94) |
| WH with integrated FC | mm (in.) | 1076 x 570 x 354 (42.36 x 22.44 x 13.94) | 1076 x 570 x 354 (42.36 x 22.44 x 13.94) | 1076 x 570 x 354 (42.36 x 22.44 x 13.94) | 1076 x 570 x 354 (42.36 x 22.44 x 13.94) |
| Noise level ⁹⁾ | dB(A) | < 63 | < 63 | < 63 | < 63 |

¹⁾ Only possible with frequency converter motor or external frequency converter

²⁾ To DIN 28 426 and subsequent numbers

³⁾ Higher pressure differences are possible. Please contact Oerlikon Leybold Vacuum (OLV)

⁴⁾ Gas temperatures over 40 °C (104 °F) can result in a reduction of the pressure difference values; please consult OLV on this

⁵⁾ The optional frequency converter automatically reduces the rotational speed of the rotors so as to compensate for overloads. During operation do not expose the pump to sudden pressure increases like shock venting to atmospheric pressure, for example

⁶⁾ Min. permissible speed: 1200 rpm if run for more than 1 hour

⁷⁾ The cooling water quantity can be reduced provided the temperature of the discharged water does not exceed 45 °C (113 °F)

⁸⁾ Authoritative, however, is the oil level at the oil-level glass

⁹⁾ Valid under ultimate pressure conditions. Pressures over 10 mbar (7.5 Torr) produce a higher operating noise

Technical Data
WH/WHU 4400
WH/WHU 7000

| | | 50 Hz | 60 Hz | 80 Hz ¹⁾ | 50 Hz | 60 Hz | 70 Hz ¹⁾ |
|--|--|---|---|---|--|--|--|
| Nominal pumping speed ²⁾ | m ³ x h ⁻¹ (cfm) | 4400 (2592) | 5280 (3100) | 7040 (4147) | 7000 (4123) | 8400 (4948) | 9800 (5772) |
| Max. effective pumping speed with backing pump | | | | | | | |
| DRYVAC DV 650 | m ³ x h ⁻¹ (cfm) | 3300 (1944) | 3900 (2297) | 4800 (2827) | 4700 (2768) | 5300 (3122) | 5800 (3416) |
| and RUVAC WH 2500 | m ³ x h ⁻¹ (cfm) | 3700 (2179) | 4400 (2592) | 5800 (3416) | 5700 (3357) | 6800 (4005) | 7800 (4594) |
| Max. permissible pressure difference ^{3), 4), 5)} during continuous operation (WH) | mbar (Torr) | 30 to 45 (22.5 to 33.75) | 20 to 30 (15.0 to 22.5) | 8 to 12 (6.0 to 9.0) | 20 to 30 (15.0 to 22.5) | 14 to 21 (10.5 to 15.75) | 11 to 14 (8.25 to 10.5) |
| for short-cycle operation < 2 min. (WHU) | mbar (Torr) | 120 (90) | 120 (90) | – (–) | 60 (45) | 60 (45) | – (–) |
| Leak rate, integral | mbar x l x s ⁻¹ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ | 1 x 10 ⁻⁵ |
| Mains voltage | | | | | | | |
| FC operation | V | 340 to 530 180 to 260 | 340 to 530 180 to 260 ⁶⁾ | 340 to 530 180 to 260 | 340 to 530 180 to 260 | 340 to 530 180 to 260 ⁶⁾ | 340 to 530 180 to 260 |
| Mains operation | V | 360 to 440 180 to 220 | 410 to 500 210 to 260 ⁶⁾ | – – | 360 to 440 180 to 220 | 410 to 500 210 to 260 ⁶⁾ | – – |
| Permissible ambient temperatures | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Nominal power consumption (alternatively) | | | | | | | |
| FC operation | kW (hp) | 11.0 / 15.0 (14.75 / 20.12) | 11.0 / 15.0 (14.75 / 20.12) | 11.0 / 15.0 (14.75 / 20.12) | 11.0 / 15.0 (14.75 / 20.12) | 11.0 / 15.0 (14.75 / 20.12) | 11.0 / 15.0 (14.75 / 20.12) |
| Mains operation | kW (hp) | 11.0 / 18.5 (14.75 / 24.81) | 11.0 / 18.5 (14.75 / 24.81) | – – | 11.0 / 18.5 (14.75 / 24.81) | 11.0 / 18.5 (14.75 / 24.81) | – – |
| Idle mode power consumption | kW (hp) | 1.2 (1.6) | 1.4 (1.9) | 2.0 (2.7) | 1.2 (1.6) | 1.4 (1.9) | 2.0 (2.7) |
| Energy efficiency class | | IE 2 | IE 2 | IE 2 | IE 2 | IE 2 | IE 2 |
| Nominal speed | rpm | 3000 | 3600 | 4800 | 3000 | 3600 | 4200 |
| Max. permissible speed ⁷⁾ | rpm | 4800 | 4800 | 4800 | 4200 | 4200 | 4200 |
| Type of protection | IP | 54 | 54 | 54 | 54 | 54 | 54 |
| Water connection (2 pcs.) | G | 1/4", female | 1/4", female | 1/4", female | 1/4", female | 1/4", female | 1/4", female |
| Cooling water quantity ⁸⁾ | l/min | 1 to 3 | 1 to 3 | 1 to 3 | 1 to 3 | 1 to 3 | 1 to 3 |
| Cooling water admission temperature | °C (°F) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) | 5 to 35 (+41 to +95) |
| Permissible cooling water pressure | bar | 2 to 6 | 2 to 6 | 2 to 6 | 2 to 6 | 2 to 6 | 2 to 6 |
| Lubricant ⁹⁾ | l (qt) | 4.75 (5.0) | 4.75 (5.0) | 4.75 (5.0) | 4.75 (5.0) | 4.75 (5.0) | 4.75 (5.0) |
| Connection flange | | | | | | | |
| Inlet | ISO-K | 250 | 250 | 250 | 320 | 320 | 320 |
| Outlet | ISO-K | 160 | 160 | 160 | 160 | 160 | 160 |
| Weight | | | | | | | |
| WH | kg (lbs) | 590 (1301) | 590 (1301) | 590 (1301) | 650 (1433) | 650 (1433) | 650 (1433) |
| WHU | kg (lbs) | 620 (1369) | 620 (1369) | 620 (1369) | 715 (1578) | 715 (1578) | 715 (1578) |
| Dimension (W x B x H) | mm (in.) | 1183 x 540 x 415 (46.57x21.26x16.34) | 1183 x 540 x 415 (46.57x21.26x16.34) | 1183 x 540 x 415 (46.57x21.26x16.34) | 1433 x 540 x 415 (56.427x21.26x16.34) | 1433 x 540 x 415 (56.427x21.26x16.34) | 1433 x 540 x 415 (56.427x21.26x16.34) |
| Noise level ¹⁰⁾ | dB(A) | < 63 | < 63 | < 63 | < 63 | < 63 | < 63 |

¹⁾ Only possible with external frequency converter

²⁾ To DIN 28 400 and subsequent numbers

³⁾ Higher pressure differences are possible. Please contact Oerlikon Leybold Vacuum (OLV)

⁴⁾ Gas temperatures over 40 °C (104 °F) can result in a reduction of the pressure difference values; please consult OLV on this

⁵⁾ The optional frequency converter automatically reduces the rotational speed of the rotors so as to compensate for overloads. During operation do not expose the pump to sudden pressure increases like shock venting to atmospheric pressure, for example

⁶⁾ Requires 200 V FC variant and 200 V motor

⁷⁾ Min. permissible speed: 1200 rpm if run for more than 1 hour

⁸⁾ The cooling water quantity can be reduced provided the temperature of the discharged water does not exceed 45 °C (113 °F)

⁹⁾ Authoritative, however, is the oil level at the oil-level glass

¹⁰⁾ Valid under ultimate pressure conditions. Pressures over 10 mbar (7.5 Torr) produce a higher operating noise

Ordering Information

RUVAC WH/WHU

2500

| | Part No. |
|-------------------------------|-----------------|
| Roots vacuum pump | |
| RUVAC WH | |
| 400 V | |
| int. FC | |
| PFPE oil (LVO 410) | |
| gear side ¹⁾ | 155 250V |
| motor side | 155 251V |
| Ester oil (LVO 210) | |
| gear side ¹⁾ | 155 252V |
| motor side | 155 253V |
| ext. FC | |
| PFPE oil (LVO 410) | |
| gear side ¹⁾ | 155 260V |
| motor side | 155 261V |
| Ester oil (LVO 210) | |
| gear side ¹⁾ | 155 262V |
| motor side | 155 263V |
| without FC, DOL ²⁾ | |
| PFPE oil (LVO 410) | |
| gear side ¹⁾ | 155 270V |
| motor side | 155 271V |
| Ester oil (LVO 210) | |
| gear side ¹⁾ | 155 272V |
| motor side | 155 273V |
| 200 V, ext. FC | |
| PFPE oil (LVO 410) | |
| gear side ¹⁾ | 155 265V |
| motor side | 155 264V |
| RUVAC WHU | |
| without FC, DOL ²⁾ | |
| PFPE-Öl (LVO 410) | |
| 400 V | |
| gear side ¹⁾ | 155 280V |
| motor side | 155 281V |
| 200 V | |
| gear side ¹⁾ | 155 284V |
| motor side | 155 285V |

¹⁾ Discharge flange on the motor, respectively gear side

²⁾ DOL is the mains power version for direct connection to 50 or 60 Hz mains power

Ordering Information

RUVAC WH/WHU

4400

7000

| | Part No. | Part No. |
|---|-----------------|-------------------|
| Roots vacuum pump | | |
| RUVAC WH-Ester oil (LVO 210) | | |
| 11.0 kW, 400 V | 155 150 | 155 160 |
| 18.5 kW, 400 V | – | 155 167 |
| 18.5 kW, heavy duty ¹⁾ | 155 154V | 155 163V |
| 18.5 kW, heavy duty, ATEX Cat. 2i ¹⁾ | – | 155 163V11 |
| RUVAC WH-PFPE oil (LVO 400), 11.0 kW | | |
| 400 V | 155 155 | 155 165 |
| 200 V | 155 156 | 155 164V |
| RUVAC WH-Ester oil (LVO 210), 11.0 kW | | |
| 200 V | 155 151V | 155 161V |
| RUVAC WHU, 18.5 kW, bypass valve | | |
| Ester oil (LVO 210) | 155 158V | 155 162 |
| PFPE oil (LVO 400) | 155 153 | – |

¹⁾ With large motor, gas-sealed impellers and purge gas option

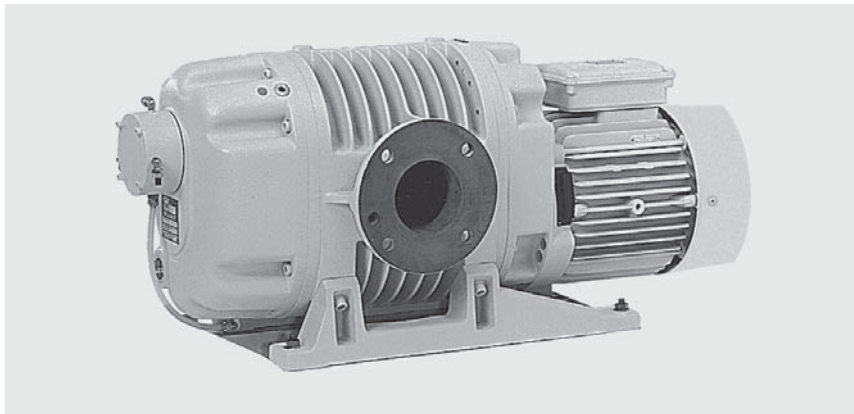
Ordering Information

RUVAC WH/WHU

| | 2500 | 4400 | 7000 |
|--|-----------------------|-----------------------|-----------------------|
| | Part No. | Part No. | Part No. |
| Accessories | | | |
| Frequency converter, inclusive mains filter | | | |
| 11 kW / 200 V | – | 155 193V | 155 193V |
| 11 kW / 400 V | – | 155 191V | 155 191V |
| 15 kW / 200 V | 155 231V | – | – |
| 15 kW / 400 V | 155 230V | – | – |
| 18 kW / 400 V | – | 155 192V | 155 192V |
| LCD display (for Part. No. 155 191V, 155 192V and 155 193V) | 155 213V | 155 213V | 155 213V |
| USB copy unit (for Part. No. 155 191V, 155 192V and 155 193V) | 155 214V | 155 214V | 155 214V |
| Profibus DP module ¹⁾ (for Part. No. 155 191V, 155 192V and 155 193V) | 155 212V | 155 212V | 155 212V |
| ProfiNet module for (DRYVAC/LEYVAC/RUVAC) | 112005A35 | 112005A35 | 112005A35 |
| EtherCAT module for (DRYVAC/LEYVAC/RUVAC) | 112005A36 | 112005A36 | 112005A36 |
| Relay module (digital output) for (DRYVAC/LEYVAC/RUVAC) | 112005A01 | 112005A01 | 112005A01 |
| Ethernet interface board for (DRYVAC/LEYVAC/RUVAC) | 112005A02 | 112005A02 | 112005A02 |
| Pump feet set for horizontal operation | – | 155 181V | 155 181V |
| Gear chamber evacuation kit for WHU pumps | – | 155 183V | 155 183V |
| Spare Parts | | | |
| Major maintenance kit | EK 110 003 000 | EK 110 002 828 | EK 110 002 828 |
| Spare motor, 400 V | | | |
| 11.0 kW | – | E 110 000 406 | E 110 000 406 |
| 15.0 kW | upon request | – | – |
| 18.5 kW | – | E 110 000 405 | E 110 000 405 |

¹⁾ For further bus options please contact Oerlikon Leybold Vacuum Sales

RUVAC WSLF Roots Vacuum Pumps for Laser Gas Systems



RUVAC WSLF 1001 LF Roots vacuum pump

Roots vacuum pumps driven by canned motors are available for gas laser systems.

Advantages to the User

- A gas mixture of helium, nitrogen and carbon monoxide is continuously circulated at a reduced system pressure
- High pumping speed from a small, quiet running pump
- Operation with a frequency converter is possible
- Nickel-plated pump chamber surfaces
- Through an additional vacuum pump the bearing chambers may be evacuated to a pressure lower than the pressure within the pumping chamber of the RUVAC
- Water-cooled oil separating system
- Integrated oil separating system for extended maintenance intervals

Typical Applications

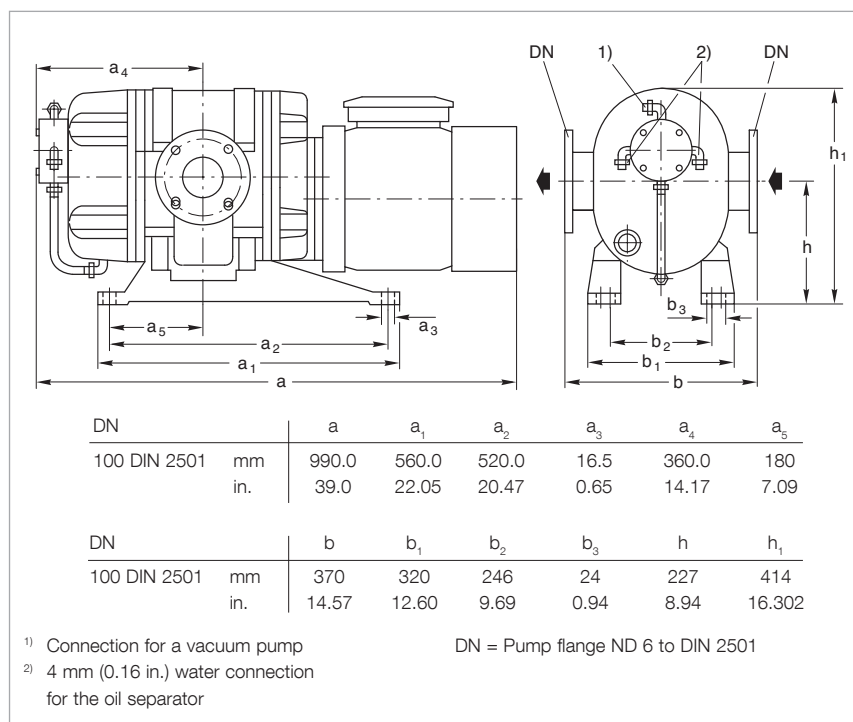
- Processing of ferrous and non-ferrous materials like welding, cutting and surface refinement

Technical Note

- The gas circulation system must be very clean and entirely free of hydrocarbons

Supplied Equipment

- Horizontal pumping action as standard
- With oil pressure switch and oil drain facility
- The required lubricant is included separately (LEYBONOL LVO 220)
- Purged with nitrogen for corrosion protection



Dimensional drawing for the RUVAC WSLF 1001 pump

Technical Data

WSLF 1001

| | | 50 Hz | 60 Hz |
|--|--|-----------------------|-----------------------|
| Nominal pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 1000 (589) | 1200 (707) |
| Max. permissible pressure difference during continuous operation | mbar (Torr) | 80 (60) | 80 (60) |
| Mains supply V / Y | V | 200-230 / 400 | 200-265 / 460 |
| Motor power | kW (hp) | 7.5 (10.2) | 8.5 (11.6) |
| Nominal speed | rpm | 3000 | 3600 |
| Max. permissible speed | rpm | 6000 | 6000 |
| Type of protection | IP | 20 | 20 |
| Cooling water pressure | bar (psi) | 1 to 5 (14.5 to 72.5) | 1 to 5 (14.5 to 72.5) |
| Cooling water throughput | l x h ⁻¹ (cfm) | 200.0 (0.9) | 200.0 (0.9) |
| Hose connection for hose | | 6 x 1 | 6 x 1 |
| Lubricant of the bearing chambers | l (qt) | 1.2 (1.27) | 1.2 (1.27) |
| Connection flange DIN 2501 | DN | 100 | 100 |
| Weight | kg (lbs) | 275 (606.4) | 275 (606.4) |

Ordering Information

WSLF 1001

| | Part No. |
|---|---------------|
| RUVAC WSLF Roots vacuum pump RUVAC WSLF 1001 | 117 94 |
| Spare Parts | |
| RUVAC WSLF seal kit | 194 70 |

¹⁾ To DIN 28 400 and subsequent numbers

Accessories

Pressure Switches

The RUVAC vacuum pumps may be switched on and off automatically through a pressure switch driven by a SV 110 switching amplifier and a contactor.

The pressure switch may be installed in the intake of the RUVAC using a screw-in adaptor, an elbow and two centering and two clamping rings.

Upon request the pressure switch may be set by Oerlikon Leybold Vacuum to a fixed value. Please state this pressure value in your order.

Ordering Information

Pressure Switches

| | Part No. |
|---|---------------|
| Pressure switch | |
| PS 115, adjustable setting | 160 04 |
| Pressure switch setting | 160 05 |
| Accessories for fitting the PS 115 pressure switch | |
| Screw-in adaptor DN 16 ISO-KF, M 16 x 1.5 mm (0.06 in.) | 168 40 |
| Elbow DN 16 KF | 184 36 |
| Centering ring DN 16 KF (2 are required) | 183 26 |
| Clamping ring DN 16 KF (2 are required) | 183 41 |
| SV 110 switching amplifier (for PS 114/115) | 160 78 |
| Oil pressure switch for RUVAC WSLF 1001 and WS-PFPE | 194 82 |

Temperature Sensor Pt100

The temperature sensor measures the gas temperature at the centre of the RUVAC delivery flange.

Depending on the size of the RUVAC pump, respectively its flange size, the Pt100 sensor is fitted at different positions.

Ordering Information

Temperature Sensor

| | Part No. |
|--------------------------|----------------|
| Temperature sensor Pt100 | 155 010 |

Miscellaneous

Services

On-site Replacement of the Dynamic Seals (with oil LVO 100) *)

The on-site replacement of the dynamic seals includes the following:

Oil change (standard oil LVO 100), partial disassembly of the pump, replacement of the complete shaft seal, visual inspection of the subassemblies, electrical safety test, test run including check of the attained ultimate pressure levels (depending on the installation situation)

Ordering Information

On-site Replacement of the Dynamic Seals (with oil LVO 100) *)

| | Part No. |
|----------------|------------------|
| For pump | |
| WA/WAU 151/251 | AS 1181 F |
| WA/WAU 501 | AS 1182 F |
| WA/WAU 1001 | AS 1183 F |
| WA/WAU 2001 | AS 1184 F |

Small On-site Maintenance (with oil LVO 100) *)

The small on-site maintenance includes the following:

Oil change (standard oil LVO 100), visual inspection of the subassemblies, electrical safety test, test run including check of the attained ultimate pressure levels (depending on the installation situation)

Ordering Information

Small On-site Maintenance (with oil LVO 100) *)

| | Part No. |
|---------------|------------------|
| For pump | |
| WA/WS 151/251 | AS 1185 F |
| WA/WS 501 | AS 1186 F |
| WA/WS 1001 | AS 1187 F |
| WA/WS 2001 | AS 1188 F |

*) Notes on our on-site after sales service

The listed services include the costs for material and working hours on site for standard RUVAC pumps. Services for pump variants upon request.

Transportation and travelling expenses are invoiced at cost. All services refer to the repair of freely accessible and not contaminated vacuum components.

Complete Refurbishing at the Service Centre (with oil LVO 100)

Complete refurbishing at the service centre includes the following:

Disassembly of the pump, cleaning of all individual components including visual inspection, machined reworking of the housing sections; if required rebalancing of the pair of impellers, replacement of the wearing parts, assembly of the pump including new seals and standard oil LVO 100, electrical safety test, test run including check of the attained ultimate pressure levels.

Ordering Information

Complete Refurbishing at the Service Centre (with oil LVO 100)

| | Part No. |
|-------------|----------|
| For pump | |
| WA 151/251 | AS 1189 |
| WA 501 | AS 1190 |
| WA 1001 | AS 1191 |
| WA 2001 | AS 1192 |
| WS 151/251 | AS 1193 |
| WS 501 | AS 1194 |
| WS 1001 | AS 1195 |
| WS 2001 | AS 1196 |
| WAU 151/251 | AS 1197 |
| WAU 501 | AS 1198 |
| WAU 1001 | AS 1199 |
| WAU 2001 | AS 1200 |
| WSU 151/251 | AS 1201 |
| WSU 501 | AS 1202 |
| WSU 1001 | AS 1203 |
| WSU 2001 | AS 1204 |

Complete Refurbishing with Decontamination at the Service Centre (with oil LVO 100)

Complete refurbishing with decontamination at the service centre includes the following:

Disassembly of the pump, cleaning and decontamination of all individual components, visual inspection of all components, machined reworking of the housing sections; if required rebalancing of the pair of impellers, replacement of the wearing parts, assembly of the pump including new seals and standard oil LVO 100, electrical safety test, test run including check of the attained ultimate pressure levels.

Ordering Information

Complete Refurbishing with Decontamination at the Service Centre (with oil LVO 100)

| | Part No. |
|-------------|-----------|
| For pump | |
| WA 151/251 | AS 1189 D |
| WA 501 | AS 1190 D |
| WA 1001 | AS 1191 D |
| WA 2001 | AS 1192 D |
| WS 151/251 | AS 1193 D |
| WS 501 | AS 1194 D |
| WS 1001 | AS 1195 D |
| WS 2001 | AS 1196 D |
| WAU 151/251 | AS 1197 D |
| WAU 501 | AS 1198 D |
| WAU 1001 | AS 1199 D |
| WAU 2001 | AS 1200 D |
| WSU 151/251 | AS 1201 D |
| WSU 501 | AS 1202 D |
| WSU 1001 | AS 1203 D |
| WSU 2001 | AS 1204 D |

Contents

High Vacuum Pumps

Turbomolecular Pumps **TURBOVAC / TURBOVAC MAG** 320

General

| | |
|---|-----|
| General to TURBOVAC Pumps | 320 |
| Applications for TURBOVAC Pumps | 326 |
| Accessories for TURBOVAC Pumps | 327 |

Products

Turbomolecular Pumps with Hybrid (magnetic/mechanical) Rotor Suspension

| | |
|---|-----|
| General to Hybrid Pumps. | 328 |
| with integrated Frequency Converter | 336 |
| with integrated Frequency Converter and integrated Vacuum System Controller | 336 |

Special Turbomolecular Pumps. 344

Turbomolecular Pumps with Mechanical Rotor Suspension

| | |
|--|-----|
| without Compound Stage | 346 |
| with or without Compound Stage | |
| with Frequency Converter for Attaching or Separate | 370 |
| with Compound Stage | |
| with integrated Frequency Converter | 374 |
| without integrated Frequency Converter. | 378 |

Turbomolecular Pumps with Magnetic Rotor Suspension

| | |
|-------------------------------------|-----|
| MAG INTEGRA | |
| with integrated Frequency Converter | |
| with Compound Stage | 382 |
| MAG DIGITAL | |
| with separate Frequency Converter | |
| with Compound Stage | 396 |

Accessories

Electronic Frequency Converters

| | |
|---|-----|
| for Turbomolecular Pumps with Mechanical Rotor Suspension | 424 |
| for Turbomolecular Pumps with Magnetic Rotor Suspension. | 430 |

| | |
|------------------------------|-----|
| Vibration Absorber | 436 |
|------------------------------|-----|

Air Cooling Unit

| | |
|--|-----|
| for TURBOVAC ClassicLine Pumps | 436 |
| for TURBOVAC SL Pump | 437 |

| | |
|--|-----|
| Flange Heater for CF High Vacuum Flanges | 437 |
|--|-----|

| | |
|-----------------------|-----|
| Fine Filter | 438 |
|-----------------------|-----|

| | |
|--|-----|
| Securing Collar for Octal Socket Plugs | 438 |
|--|-----|

| | |
|----------------------------------|-----|
| Solenoid Venting Valve | 438 |
|----------------------------------|-----|

| | |
|--------------------------------------|-----|
| Power Failure Venting Valve. | 438 |
|--------------------------------------|-----|

| | |
|---|-----|
| Power Failure Venting Valve, electromagnetically actuated | 439 |
|---|-----|

| | |
|---------------------------------------|-----|
| Purge Gas and Venting Valve | 439 |
| for ClassicLine and SL Pump | 440 |

| | |
|---|-----|
| Adapter Set for Seal Gas and Venting Valve for the SL pumps | 440 |
|---|-----|

| | |
|---|-----|
| Gas Filter to G 1/4" for Purge Gas and Venting Valve. | 440 |
|---|-----|

| | |
|---|-----|
| Accessories for Serial Interfaces RS 232 C and RS 485 C | 441 |
|---|-----|

Miscellaneous

| | |
|--------------------|-----|
| Services | 442 |
|--------------------|-----|

Oil Diffusion Pumps DIP, LEYBOJET, OB 444

General

| | |
|--|-----|
| Applications and Accessories for Oil Diffusion Pumps | 444 |
| Oil for Diffusion Pumps, for different fields of application | 445 |
| Oil for Diffusion Pumps, for different pump types | 446 |

Products

| | |
|--------------------------------------|-----|
| DIP Pumps, Water-Cooled | 450 |
| LEYBOJET 630, Water-Cooled | 454 |
| Oil Booster OB | 456 |

Accessories

| | |
|--|-----|
| Astrotorus Baffles | 458 |
| Temperature dependant Switching Components for Automatic Pump System Control | 460 |
| Adsorption Traps with Aluminium Oxide Insert | 464 |
| Monitoring Instruments | 461 |
| Power Controller | 462 |

Cryo Pumps, Cold Heads and Compressor Units

COOLVAC / COOLPOWER / COOLPAK 465

General

| | |
|--|-----|
| Applications and Accessories | |
| Cryo Pumps | 465 |
| Cryogenics | 466 |
| Cryo Pumps | 467 |
| Refrigerating Capacity of Cryogenic Cold Heads | 469 |
| Cold Heads | 470 |
| Compressor Units | 473 |

Products

Cryo Pumps

| | |
|---|-----|
| Standard Cryo Pumps | |
| BasicLine | |
| COOLVAC 800 BL | 474 |
| Cryo Pumps with Fully Automatic Control | |
| ClassicLine | |
| COOLVAC 800 CL, 1.500 CL | 476 |
| COOLVAC 2.000 CL, 3.000 CL | 480 |
| COOLVAC 5.000 CL, 10.000 CL | 484 |
| COOLVAC 18.000 CL, 30.000, 60.000 | 488 |

Cryogenics

| | |
|---|-----|
| Cold Heads | |
| Pneumatically driven | |
| Single-Stage Cold Head COOLPOWER 50 and 140 T | 490 |
| Dual-Stage Cold Heads COOLPOWER 7/25, 5/100 and 5/100 T | 492 |
| Mechanically driven | |
| Dual-Stage Cold Heads COOLPOWER 10 MD | 494 |

| | |
|---|-----|
| Compressor Units | |
| for pneumatically driven cold heads and pumps | |
| with air cooling | |
| COOLPAK 2000 A/2200 A | 496 |
| with water cooling | |
| COOLPAK 2000/2200 | 498 |
| COOLPAK 6000 H/6200 H/6000 HD | 500 |
| for mechanically driven cold heads and pumps | |
| with water cooling | |
| COOLPAK 6000 HMD/6200 HMD | 502 |
| General Accessories for Compressor Units COOLPAK | 504 |
| Refrigerator Cryostats | |
| based on the RDK 6-320 | 505 |
| optical, based on the RDK 6-320 | 506 |
| Accessories | |
| Cryo Pumps / Cryogenics | |
| Controllers and Monitoring Units for Cryo Pumps. | 508 |
| COOLVAC ClassicLine, System Configuration | |
| Single Operation | 511 |
| Dual Operation | 512 |
| Dual and Multiple Operation | 513 |
| Low Temperature Controller MODEL 9700 | 514 |
| Low Temperature Measurement Instrument MODEL 211S | 515 |
| Temperature Sensor | 516 |
| Safety Valve. | 517 |

General to TURBOVAC Pumps

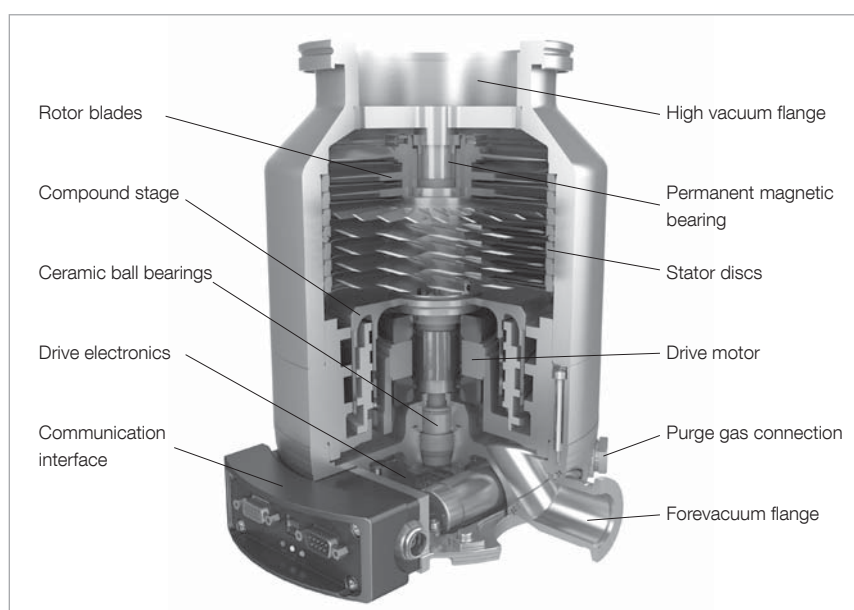
Turbomolecular vacuum pumps (TURBOVAC) are used in applications which require a clean high or ultrahigh vacuum like, for example, in research, development or in industrial fields like the semiconductor industry, analytical instrumentation or coating technology.

Principle of Operation

In principle, the turbomolecular pump is a turbine rapidly revolving in a housing where the rotor stages of the turbine

are equipped with a number of rotor blades. Located between the rotating rotor blades are stationary stator disks with blades arranged in the opposite direction. By means of a momentum transfer from the rotating rotor blades to the gas molecules their initially non-directional thermal motion is changed in to a directional motion from the inlet flange of the pump in the axial direction towards the forevacuum flange. In the molecular flow range (i.e. at pressures below 10^{-3} mbar (0.75×10^{-3} Torr)) the mean free path of the gas molecules is

larger than the spacing between the rotor and the stator blades (typically a few tenths of a millimetre). Correspondingly the molecules chiefly collide with the optically dense rotor blades, resulting in a highly efficient pumping action. In the laminar flow range (i.e. at pressures over 10^{-1} mbar (0.75×10^{-1} Torr)) the effect of the rotor is impaired by frequent collisions between molecules themselves. For this reason, a turbomolecular pump is not capable of pumping gases at atmospheric pressure.



Sectional drawing of a turbomolecular pump (TURBOVAC i)

Rotor Bearing

Oerlikon Leybold Vacuum offers different rotor bearing systems. A purely classic mechanical type of rotor bearing (TURBOVAC) or a magnetic rotor bearing (TURBOVAC MAG) and also

a hybrid bearing (TURBOVAC i / iX) where the bearing on the forevacuum side is a ceramic ball bearing lubricated for life and where the bearing on the high vacuum side is implemented by way of a non-wearing magnetic bear

ing. Typical for all these types of bearing is that they do not require any lubricating oil which under circumstances like standstill of the pump might diffuse back into the vacuum chamber due to the lack of any pumping action.

Drive Electronics/Control Unit

Driving and monitoring the turbomolecular pump requires an electronic frequency converter (inverter). The frequency converter delivers the driving voltage and the output frequency for the motor and also automatically monitors the system. Optimum running up of the pump rotor is attained by a steadily increasing voltage and frequency feed. After attaining the nominal speed, the start-up current is reduced in a controlled manner to the level necessary for normal operation.

The frequency converter and the motor of the TURBOVAC have been designed for a minimal drop of speed even at high intake pressures. This ensures the highest possible gas throughput also in the transition range from molecular to viscous flow

Depending on the given system and installation conditions, the control unit may be supplemented by a comprehensive range of optional accessories facilitating easy integration within existing installations.

Forevacuum Pump

Since turbomolecular pumps are not capable of compressing directly against atmospheric pressure their operation will always require a sufficiently rated forevacuum pump. For the classic rotor arrangement with rotor blades, generally two-stage rotary vane pumps (TRIVAC) will be suitable. In some cases also single-stage rotary vane vacuum pumps (SOGEVAC BI) or scroll vacuum pumps (SCROLLVAC). In the case of the wide range variant where the rotor is equipped with an additional compression stage (compound stage) also diaphragm vacuum pumps (DIVAC) may be used.

Characteristic Quantities

Pumping speed (volume flow rate)

The pumping speed "S" is the conveyed volume flow through the intake opening of the pump. It is dependent on the type of gas so that for this reason the nominal pumping speed, i.e. the maximum attainable pumping speed of the pump is commonly stated for air, respectively nitrogen. In the field of high vacuum engineering it is common to state the pumping speed in the unit of measurement [l/s]. The pumping speed is a nonlinear function of the inlet pressure $S = S(p_i)$

Gas throughput

Gas throughput "Q", unit of measurement [mbar x l/s] is linked to the pumping speed through the inlet pressure.
 $Q = Q(p_i) = p_i \times S(p_i)$.

Compression

Compression "K" is defined as the ratio between the pressure on the forevacuum side of the turbomolecular pump and the pressure on the high vacuum side.
 $K = K(p_{VV}) = p_{VV}/p_{HV}$
Compression is dependent on the type of gas.

Ultimate pressure (base pressure)

The ultimate pressure " p_{ult} " of a turbomolecular pump which can be baked out is defined through the ratio between forevacuum pressure and compression ratio which is attained in a test chamber 48 hours after a 24-hour bake-out (degassing) of the measurement arrangement.

$$p_{ult} = p_{FV}/K_0$$

The maximum attainable ultimate pressure depends among other things on the cleanness of the apparatus, the type of forevacuum pump used, the types of seals used for the high vacuum flange and the bake-out conditions.

TURBOVAC Product Line

The TURBOVAC pumps are turbomolecular pumps with mechanical rotor suspension which are used in the pressure range from 10^{-1} mbar (0.75×10^{-1} Torr) to 10^{-10} mbar (0.75×10^{-10} Torr). Pumping speeds for air vary from 35 l s^{-1} (inlet flange diameter = 40 mm (1.57 in.)) to $1,150 \text{ l s}^{-1}$ (inlet flange diameter = 250 mm (9.84 in.)).

Besides a variant with extremely reliable ceramic ball bearings on the forevacuum and the high vacuum side, Oerlikon Leybold Vacuum also offers a line of turbomolecular pumps equipped with hybrid bearings which on the forevacuum side are equipped with a ceramic ball bearing and on the high vacuum side with a permanent magnetic bearing (TURBOVAC i line).

Owing to their compact design and ease of operation, these pump lines are

used in all high vacuum and ultrahigh vacuum fields of application. In particular, the TURBOVAC pumps are running very successfully in mass spectrometers, in CD, DVD and hard disk production units, in the manufacture of large area optical coatings, in non-corrosive semiconductor production processes and in laboratories as well as research institutes

The most important advantages of the TURBOVAC product line are:

- Oil-free pumps for the generation of clean high and ultra-high vacuum conditions
- Highest performance in any orientation
- Highest degree of operating reliability
- Easy to operate
- Compact design



TURBOVAC (T) 350 iX

TURBOVAC MAG Product Line

The TURBOVAC MAG pumps are turbomolecular pumps with magnetic rotor suspension which are used in the pressure range from 10^{-1} mbar (0.75×10^{-1} Torr) to 10^{-10} mbar (0.75×10^{-10} Torr). Pumping speeds for air vary from 300 l s^{-1} (inlet flange diameter = 100 mm (3.94 in.)) to $3,200 \text{ l s}^{-1}$ (inlet flange diameter = 320 mm (12.6 in.)).

The TURBOVAC MAG pumps are mostly installed on semiconductor processing lines like etching, CVD, PVD and ion implantation, i.e. in applications where corrosive gases need to be pumped. Also electron beam microscopy is an important area of application for these pumps.

The most important advantages of the TURBOVAC MAG product line are:

- Hydrocarbon-free pumps for the generation of clean high and ultra-high vacuum conditions
- High performance in any orientation
- High degree of operating reliability
- Extremely low vibration
- Designed for pumping of corrosive gases
- Almost maintenance-free



TURBOVAC MAG 2200 iPL

Use of Turbomolecular Pumps in Analytical Instruments

All modern analytical methods for gas, liquid and plasma analysis – like for example GC-MS, LC-MS and ICP-MS – rely on mass spectrometers and for this reason require adequate high vacuum conditions. Also in electron microscopes and many surface analysis instruments the production of a high vacuum is essential. In over 90% of all high vacuum applications, the turbomolecular pump has been found to be ideal. Thanks to the hydrocarbon-free vacuum, most simple operation, compact design and almost maintenance-free operation it has in most cases displaced above all the diffusion pump.

On the basis of decades of experience and in cooperation with research facilities and the manufacturers of analytical instruments, Oerlikon Leybold Vacuum has continually optimized its products.



TURBOVAC MAG W 600 iP

Through the TURBOVAC wide range series, a further improvement has been attained, making available to users in the area of analytical engineering highly flexible and reliable products.

Owing to the modular concept the user may adapt the vacuum system precisely to his requirements. The components can be integrated perfectly and thus find the most cost-effective system configuration. Through the introduction of the TURBOVAC multi inlet series, Oerlikon Leybold Vacuum has, based on special customer requirements, achieved a major step ahead for analytical instruments.

Two or more analysis chambers can be pumped down simultaneously by a single multi-inlet pump. These pumps have been tailored for pumping speed and gas throughput in order to attain a higher detection sensitivity of analytical systems, for a smaller footprint and an increased sample throughput, for example. The benefits for the customers are the extreme compactness of the vacuum systems without sacrificing performance density, simple installation, stable vacuum connections and, compared to the use of discrete individual pumps, significantly lower investment costs for the entire system. The cartridge solution, moreover, allows for an innovative and cost-effective design of the customer's system and during servicing a simple replacement of the active unit without involved assembly work and leak searching.

Cartridge benefits, which convince

- Higher effective pumping speed
- No losses in conductance
- Compact vacuum system
- Easy pump replacement without having to disassemble the highly sensitive mass spectrometer chambers

The benefits for the customers are reflected by the efficiency of the analytical instruments:

- Increase in detection sensitivity
- Smaller analytical systems
- Increase in sample throughput
- Reduction of system costs
- Lower maintenance costs

In combination with backing pumps like the SOGEVAC, TRIVAC or SCROLLVAC, Oerlikon Leybold Vacuum is able to offer the best vacuum system optimized for all major applications in the area of analytical instrumentation.



TURBOVAC i Multi Inlet

Use of Turbomolecular Pumps in the Area of Semiconductor Processes

In the semiconductor industry turbomolecular pumps are used on the following processes, among others:

- Etching
- Sputtering
- Ion implantation
- CVD
- Lithography.

In these applications pumping of aggressive gases is often required. This may necessitate the use of pumps equipped with a purge gas facility or a magnetic suspension in order to avoid damaged bearings. Especially during metal etching, deposits may occur in the forevacuum space of the turbomolecular pump. In order to prevent this the pumps must be heated to a certain

temperature. Such temperature controlled variants are optionally available for the MAG 1500 C, MAG 2000 C, MAG 2800 and MAG 3200.

In contrast to turbomolecular pumps with mechanical bearings, magnetically levitated pumps provide the advantage that they prevent overheating of the bearings at high gas flows and effectively exclude any damage to the magnetic bearings by aggressive media.

In electron microscopes and in lithographic equipment, low vibration levels are exceptionally important. For this reason magnetically levitated turbomolecular pumps should be used here. The recommended backing pumps are

rotary vane pumps from the TRIVAC range, possibly fitted with the BCS system.



TURBOVAC MAG W 2000 CT

Use of Turbomolecular Pumps in the Area of Coating Systems

Coating of optical and magnetic storage media, optical components as well as architectural glass requires high vacuum conditions. This is the only way to ensure that the formed layers will be uniform and adhere to the substrate.

The way in which the vacuum is generated has a significant impact on the quality of the coating. By pumping the vacuum chamber down to pressures in the range of 10^{-6} mbar (0.75×10^{-6} Torr), interfering gas and water molecules are removed from the processing chamber. In the case of sputtering the coating process is run in the pressure range between 10^{-3} and 10^{-2} mbar (0.75×10^{-3} and $0.75 \times$

10^{-2} Torr), and in the case of evaporation coating, pressures below 10^{-4} mbar (0.75×10^{-4} Torr) are utilized.

The turbomolecular pump meets all requirements of the customers as to a hydrocarbon-free vacuum, very simple operation, compact design and almost maintenance-free operation in an almost ideal manner. The range of pumps from Oerlikon Leybold Vacuum includes pumps with flange diameters ranging from 40 mm to 250 mm (1.57 in. to 9.84 in.) nominal width.

Thus the right pump is available for each application, be it coating of data memories (CD, DVD, hard discs), coat

ing of tools and coating of precision lenses in the area of optical components, displays or architectural glass.



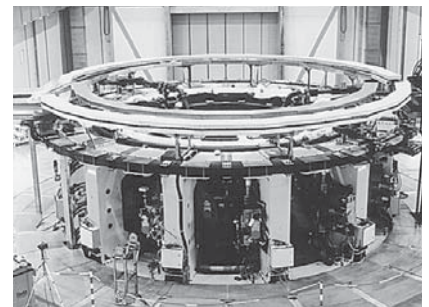
Entire high vacuum equipment of a CD/DVD coating system with TURBOVAC TW 250 S pumps

Use of turbomolecular pumps in research and development

In many applications in which new ideas shall be transformed into technical processes, vacuum technology is a basic requirement for being able to implement these processes at all.

In the field of research and development, all types of turbomolecular pumps from Oerlikon Leybold Vacuum are being used. Since the application

requirements differ widely, for example are being used. Since the application requirements differ widely, for example between university basic research, industrial development, in research and in large laboratories, the right component or the matching system can be put together from the comprehensive range of equipment being offered.



Nuclear fusion technology

Applications for TURBOVAC Pumps

| Pumps | TURBOVAC 50 | TURBOVAC 151 / 361 (C) | TURBOVAC 600 C | TURBOVAC 1000 C | TURBOVAC 1100 C | TURBOVAC SL 80 | TURBOVAC TW 250 S | TURBOVAC (T) 350/450 i | TURBOVAC i Multi Inlet | MAG W 300/400/600/700 iP | MAG W 1300/1600/1700/2200 iP(L) | MAG W 830/1300 C | MAG W 1500 CT | MAG W 2200 C | MAG W 2000 C/CT | MAG W 2800/3200 C/CT |
|---|-------------|------------------------|----------------|-----------------|-----------------|----------------|-------------------|------------------------|------------------------|--------------------------|---------------------------------|------------------|---------------|--------------|-----------------|----------------------|
| Applications | | | | | | | | | | | | | | | | |
| Analytical Instruments | | | | | | | | | | | | | | | | |
| Leak detectors | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Mass spectrometers | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Gas chromatography (GC-MS) | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Liquid chromatography (LC-MS) | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Quadrupol time of flight (Q-TOF) | | | | | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Matrix assisted laser desorption time of flight (MALDI-TOF) | ■ | | | | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Inductively coupled plasma mass spectrometry (ICP-MS) | ■ | | | ■ | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Electron beam microscopy | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Coating | | | | | | | | | | | | | | | | |
| Data storage / optical | | ■ | | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | |
| Data storage / magnetic | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | |
| Flat panel displays | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | ■ | ■ | ■ | | |
| Optical coating | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | |
| Large area coating | | | | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | | |
| Decorative coating | | | | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | | |
| Metallization | | | | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | | |
| Wear protection | | | ■ | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | | |
| Metallurgy | | | | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | | |
| R & D (Research and Development) | | | | | | | | | | | | | | | | |
| Surface analysis | | | | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | |
| UHV / XHV systems | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | | |
| Particle accelerators | | ■ | | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | |
| Fusion experiments | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Space simulation | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Semiconductor Processes | | | | | | | | | | | | | | | | |
| Load locks and transfer chambers | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Etch | | | | | | | | | | | ■ | ■ | | | ■ | |
| PECVD | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| PVD | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Ion implantation | | | | | | | | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | |

Accessories for TURBOVAC Pumps

| Pumps | TURBOVAC 50 | TURBOVAC 151, 361 (C) | TURBOVAC 800 C | TURBOVAC 1000 C | TURBOVAC 1100 C | TURBOVAC SL 80 | TURBOVAC TW 250 S | TURBOVAC (T) 350/450 i | TURBOVAC i Multi Inlet | MAG W 300/400/600/700 iP | MAG W 1300/1600/1700 iP | MAG W 300/400/600/700 P | MAG W 830/1300 C | MAG W 1500 CT | MAG W 2200 C | MAG W 2000 C/CT | MAG W 2800/3200 C/CT |
|---|-------------|-----------------------|----------------|-----------------|-----------------|----------------|-------------------|------------------------|------------------------|--------------------------|-------------------------|-------------------------|------------------|---------------|--------------|-----------------|----------------------|
| Applications | | | | | | | | | | | | | | | | | |
| Integrated Frequency Converter | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| External Frequency Converter | | | | | ■ | ■ | | | | | | | | | | | |
| External Frequency Converter and Power Supply | ■ | ■ | ■ | ■ | ■ | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Power Supply | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| Mounting Kit | | ■ | ■ | | | ■ | ■ | ■ | ■ | | | | | | | | |
| Inlet screen / Splinter guard | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Vibration absorber | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Air cooling unit | ■ | ■ | ■ | ■ | | ■ | | ■ | ■ | ■ | ■ | | | | | | |
| Water cooling kit | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Flange heaters for CF flanges | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Venting valve | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | | | | | | |
| Purge gas valve | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Purge gas and venting valve | | ■ | ■ | ■ | ■ | ■ | | | | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| Power failure venting valve | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Electronic brake module | | | | | | | | ■ | | ■ | | | | | | | |
| Relais box | | | | | | ■ | ■ | ■ | | | | | | | | | |
| Accessories for serial interfaces | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Control Software for TURBOVAC | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

General to TURBOVAC i / iX Pumps

Turbomolecular Pumps with Hybrid (mechanical/magnetic) Rotor Suspension

TURBOVAC i, iX / T i, T iX

The TURBOVAC i / iX series is a modular line of turbomolecular vacuum pumps. With the integrated drive electronics (frequency converter) it forms a single unit.

In the development of the TURBOVAC i / iX special emphasis was placed on the maximum attainable pump performance in consideration of its footprint. The specially developed rotor/stator design, upon request with an additional compression stage, guarantees excellent performance data as to pumping speed, gas throughput and compression especially also for light gases.

In all pumps of this line, the bearing consists of a non-wearing permanent magnetic bearing on the high vacuum side and an oil-free ceramic ball bearing which is lubricated for life on the forevacuum side. For this reason, the usually required standard maintenance involving an oil change is no longer necessary. The ceramic ball bearing is replaceable on-site, should this be required.

The pumps are equipped as standard with a venting and purge gas facility for directly connecting a venting valve, purge gas valve or purge gas throttle to the pump.

Owing to the many possible combinations (electronics, pump stage design, housing and the range of accessories) the TURBOVAC i / iX can be flexibly adapted to the specific application in each case.

For example, in comparison with the TURBOVAC i, the TURBOVAC iX is equipped with an integrated vacuum system control unit which drives accessory components like vacuum gauge, valves, fans and forevacuum pumps. Moreover, numerous optionally available communication interfaces facilitate easy integration within your installation.

The pump stage design (rotor, stator and Holweck stage) can be selected specifically in consideration of the respective process requirements and offers variants for highest possible gas throughput, pumping speed and/or compression in single or multi-chamber systems. Equally comprehensive is the range of housing and flange variants being offered where the vacuum connections can be adapted flexibly to the on-site installation conditions. The comprehensive range of accessories completes the TURBOVAC i / iX line thereby extending the fields of application for these pumps.

Advantages to the User

- High pumping performance from a compact size
- Cost-effective price-to-performance ratio
- Highly reliable, maintenance-free bearing concept without oil lubrication
- Owing to the overall modular concept, individually adaptable to the respective conditions and requirements
- Variety of housings and flange options
- Easy and easily adaptable installation, any mounting position
- Easy process integration due to the numerous interfacing options
- Flexible accessory options (power supply, cooling, heating, venting, installation etc.)

Overview of Variants

Electronics Variants

All pumps are equipped with integrated drive electronics with a 24 V/48 V power supply which controls the amount of drive power and which monitors all pump functions.

The individual requirements with regard to communication interfaces and the functional scope of the driving options for accessory components can be covered through a number of different electronics variants.



Left: TURBOVAC i with standard interface

Centre: **TURBOVAC i** with Anybus interface extension

Right: **TURBOVAC iX** with integrated vacuum system control unit and Anybus interface extension

Electronics Variants

TURBOVAC i (Standard)

Cost-effective solution equipped with basic functions and interfaces.

- Internal 24/48 V DC frequency converter
- Status LEDs
- Accessory connection for up to 2 controllable accessory components
- User-friendly interfaces (USB, RS 485, 15-pin digital I/O)

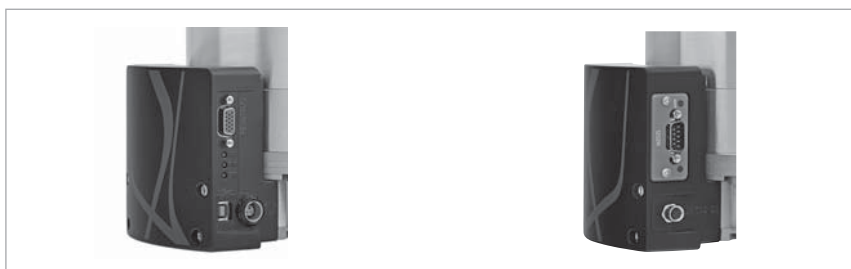


Standard interface USB, RS 485 and 15-pin digital I/O for TURBOVAC i

TURBOVAC i (Anybus interface extension)

Features like TURBOVAC I, additionally:

- User-friendly interfaces (USB, 15-pin digital I/O) and Anybus interface instead of the RS 485 for further interface options: RS 232, Profibus, Ethernet/IP (further interfaces upon request)



Anybus interface expansion for TURBOVAC i

TURBOVAC iX (Vacuum system control unit)

With integrated vacuum system control unit and Anybus interface extension.

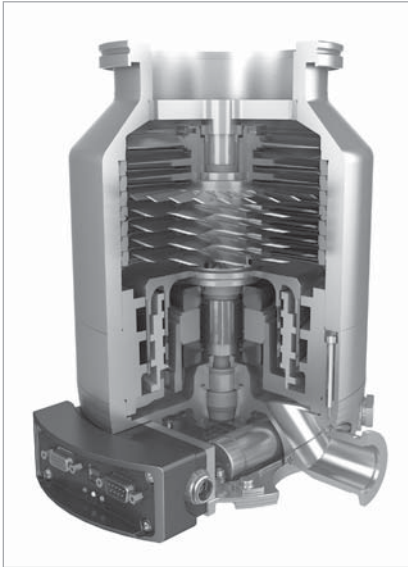
Features like TURBOVAC i (Anybus interface extension), additionally:

- 3 outputs for controlling vacuum pump accessories
- 1 vacuum gauge head connection for powering and data recording of vacuum gauge heads and application of pressure data for pump system control
- Flexibly programmable software, for customising the configuration of the control connections



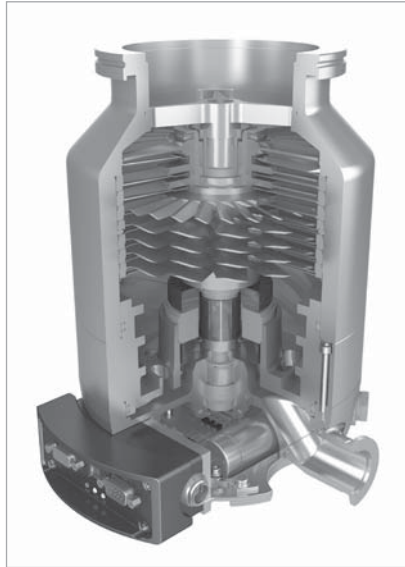
Integrated vacuum system control unit of the TURBOVAC iX

Performance Variants



TURBOVAC i, iX

The standard variant for UHV applications and compact pump system solutions. Owing to the additional Holweck compression stage it delivers a high pumping speed and a high compression especially for light gases, and due to its high forevacuum tolerance it is suited for operation in connection with diaphragm or scroll forevacuum pumps.



TURBOVAC T i, T iX

The "T" version with its classic rotor design without additional compression stage is suited for deployment under more stringent process conditions and high gas loads. Compared to the standard variant it stands for faster run-up times, increased gas throughput and an improved tolerance with regard to pumping of particle or dust containing media.



TURBOVAC i Multi-Inlet

The variant with a special rotor design and two or more inlets as an efficient and compact vacuum solution for multi-chamber systems. It allows for a high degree of system integration and convinces compared to systems with discrete turbomolecular pumps through its lower weight and smaller footprint as well as an increased reliability of the entire vacuum system through the reliance on fewer components compared to similar systems equipped with discrete turbomolecular pumps.

Housing and Flange Variants

The optimised rotor geometry has been specially adapted to the industrial standard sizes for maximum pump performance. Housings with ISO-K as well as CF flanges are available. Moreover, the standard housings with an additional inlet stage are available upon request.

Multiple inlet stages can be implemented through the **TURBOVAC Multi-Inlet**. Here in addition to the special cartridge solution which facilitates easy replacement in the field, also custom housing and chamber solutions are offered for utmost system integration.

Flexibility

The forevacuum connection on all pumps is rotatable thereby facilitating flexible installation within existing systems making optimum use of the available space. Moreover, the required amount of installation space may be reduced by a detachable cable connected interface module



Left: TURBOVAC i with radial forevacuum flange
Right: TURBOVAC i with axial forevacuum flange

Accessories for TURBOVAC i, iX / T i, T iX

Power Supply

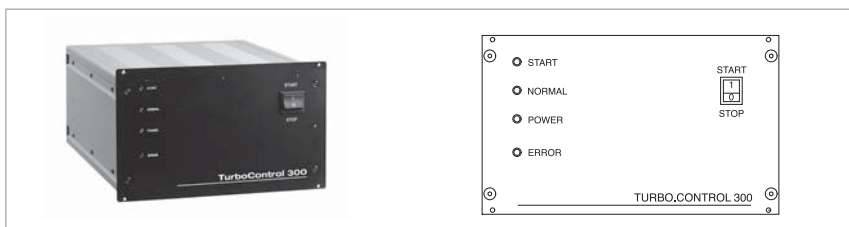
TURBO.POWER integra

- Plug-and-play power supply for fitting underneath the pump, 100-240 V
- Including short connecting cable to the pump
- Also for benchtop placement with optional extension cable (1, 3, 5 m (3.5, 10.5, 17.5 ft))
- Requires a country-specific mains cord (EU, US, UK ...)



Pump control unit with Power Supply TURBO.CONTROL 300

- Control unit and power supply for rack installation
- With on/off switch for the turbo-molecular pump
- Status LEDs and status relays for monitoring the pump
- For remote control via interface
- Requires a connection cable to the pump (1, 3, 5, 10, 20 m (3.5, 10.5, 17.5, 35.0, 70.0 ft)) and country-specific mains cord (EU, US, UK ...)



Connecting cables to the pump with bare wire ends of for customer specific power supply units



Relay Box

The relay box allows you to control via the 24 V DC output on the TURBOVAC i a mains powered electric consumer, like a backing pump, for example. Mains power and consumer are connected using mains power cords, the control voltage is connected through an M 8 connector.

- incl. connection cable with a M 8 plug, 2 m (7.0 ft) long



DC Pump Plug

for adapting the supply voltage by the customer.

- 24/48 V DC-In plug TURBOVAC i



Radial air cooler

for lateral installation on the pump, including connection plug

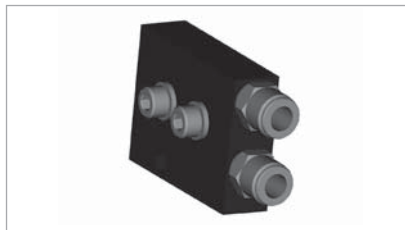
- Flexible positioning

**Axial air cooler**

For installation underneath the pump, including connection plug

**Water cooling**

for flexible installation on the pump (required for degassing the turbomolecular pump)

**Heating Collar**

for degassing the pump

- Degassing temperature 100 °C (212 °F)
- Requires a country-specific mains cord (EU, US, UK ...)
- With optional relay box and accessory cable, automatic control via the electronics of the TURBOVAC i / iX is possible



Accessory Valves

- Power supply 24 V DC
- G 1/8" inlet (inside thread) and discharge (outside thread) connection
- Including O-ring and connecting cable with M 8 plug for connection to the accessory input on the TURBOVAC i / iX

Purge Gas Valve (for connection to the purge gas connection on the turbomolecular pump)

for controlling the admitted purge gas quantity

- The valve is normally closed

Venting Valve (for connection the venting connection)

for venting the turbomolecular pump

- The valve is normally closed

Power Failure Venting Valve (for connection the venting connection)

for venting the turbomolecular pump

- The valve is normally open



Purge Gas Throttle

for passively controlling the admitted purge gas quantity

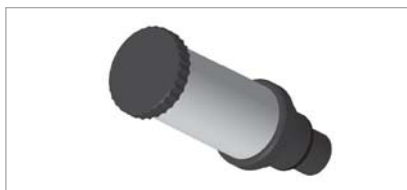
- G 1/8" inlet (inside thread) and discharge (outside thread) connection
- Purge gas throttle 24 sccm



Air Filter

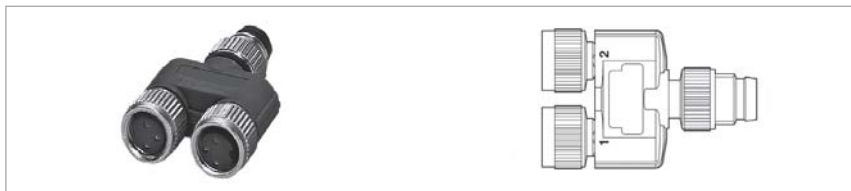
for connection to the valves or throttles

- Prevents contamination and clogging of valves and throttles
- G1/8"



Y-Splitter

- Extends the M 8 accessory connection on the TURBOVAC i by a further connection for parallel driving of two accessory components. Here both accessory components are switched synchronously



Installation and Mounting Accessories

Mounting kit for safe mounting of the pump

The mounting kits include:

ISO-K kit (100 und 160):

centering rings and clamps

ISO-F kit (100 und 160):

collar flange, outside ring, bolts and nuts

CF kit (100 und 160):

2 copper gaskets, bolts, nuts and washers



Mounting kits (left ISO-KF, centre ISO-F, right CF)

Centering Rings with Splinter Guard (DN 100 and 160 ISO-K/F)

Centering Rings with Inlet Screens (DN 100 and 160 ISO-K/F)

Splinter Guards (DN 100 und 160 CF)

Inlet Screens (DN 100 und 160 CF)

for protecting the pump against ingesting parts.

Inlet screen, 3.2 mm (0.01 ft) mesh

Splinter guard, 0.8 mm (0.003 ft) mesh

Note:

For ISO-K/F, both inlet screen and splinter guard have been integrated in the centering ring.



Vibration Absorber (DN 100/160 ISO-K and 100/160 CF)

Prevents any possible vibration transfer from the pump to sensitive instrumentation or apparatus.



Software LEYASSIST

Software for PC-based communication, control and monitoring of turbomolecular pumps via USB, RS 485 or RS 232 interface with automatic pump detection.

Functions

- Display of vacuum system status
- Trend configuration and report
- Configuring the accessory functions of the TURBOVAC i / iX
- Reading/writing of parameters
- Data logging
- Alarm/warning message logging
- Interface uses USB (with USB cable 2.0, Type A/B, 1.8 m (6.3 ft) long), RS 485 or RS 232 (with dongle)
 - Functions: reading/writing of parameters, control and data acquisition
- Automatic detection of connected Leybold pump type or instrument
- Different languages and with different user access levels are available

Ordering Information

Software LEYASSIST for turbomolecular vacuum pumps

Part. No. 230439V01



Products

TURBOVAC
with Hybrid (mag/mech) Rotor Suspension
with integrated Frequency Converter
TURBOVAC (T) 350 i and (T) 450 i



TURBOVAC (T) 350 i (left) and (T) 450 i (right)

with integrated Frequency Converter and
integrated Vacuum System Controller
TURBOVAC (T) 350 iX and (T) 450 iX



TURBOVAC (T) 350 iX (left) and (T) 450 iX (right)

Typical Applications

- Analytical technologies / Research & Development
 - Mass spectrometers
 - Electron microscopes
 - Surface analysis
 - X-ray-analysis
 - Particle accelerators and synchrotrons
 - Laboratory coating systems
 - MBE (Molecular Beam Epitaxy)
 - UHV systems
- Life Sciences
 - Proton therapy
 - Gamma sterilisation
 - Production of high quality implants
- Industrial and Coating applications
 - PVD- Physical Vapour deposition
 - Optical coatings
 - CD/DVD/Blu-Ray Disc production
 - Thin film technologies, photovoltaics
- Load locks, transfer chambers, handling systems
- Electron beam welders
- Insulation vacuum and leak detection

Technical Features

TURBOVAC i

- Integrated electronic drive unit with 24/48 V DC supply
- Best in class pumping speed and compression especially for light gases
- Vacuum port design flexibility
- Installation in any orientation
- Superior reliability due to innovative pump and bearing design
- The only maintenance free hybrid mechanical TMP
 - no need for oil changes
- On-site maintenance possibility (bearing exchange) to reduce service costs and time
- Widest range of interface options (USB ,RS 485 and 15 pin Dig I/O as standard)
- Optimized size/performance ratio on 100 and 160 flanges

TURBOVAC iX

- Integrated vacuum system controller with flexible interfaces and several accessory ports for control of cooling units, valves, gauges, fore-vacuum pumps etc.
- Flexible accessory program options for easy plug & play
- Flexibility to match different process and application requirements

TURBOVAC T i, T iX

- Variant without Compound Stage
- increased gas throughput
- Increased tolerance against dust and particles
- Improved run-up time

Advantages to the User

TURBOVAC i

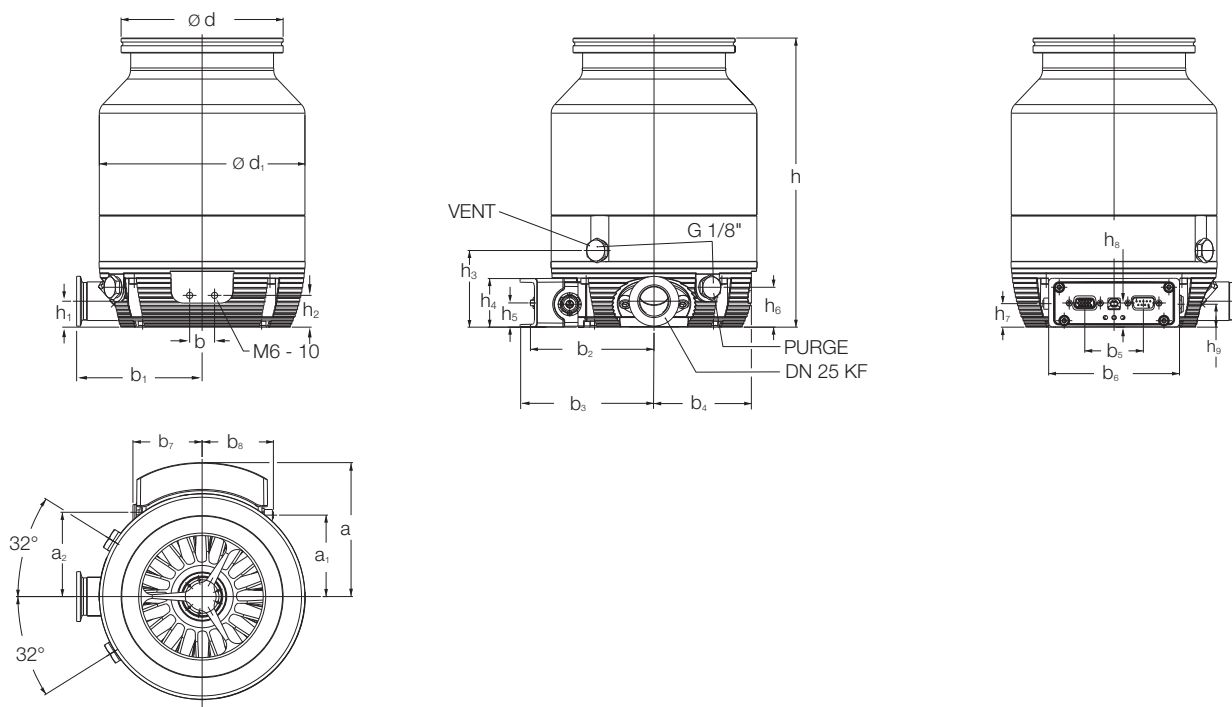
- Best performance and functionality for your money
- Maximum user flexibility for easy system integration, operation and control
- Highest productivity and system uptime at lowest CoO (Cost of Ownership)
- Improved pump-down time and target pressures
- Superior pumping performance for light gases
- Down-sizing of vacuum system in terms of costs and dimensions (use of small forevacuum pumps)

TURBOVAC iX

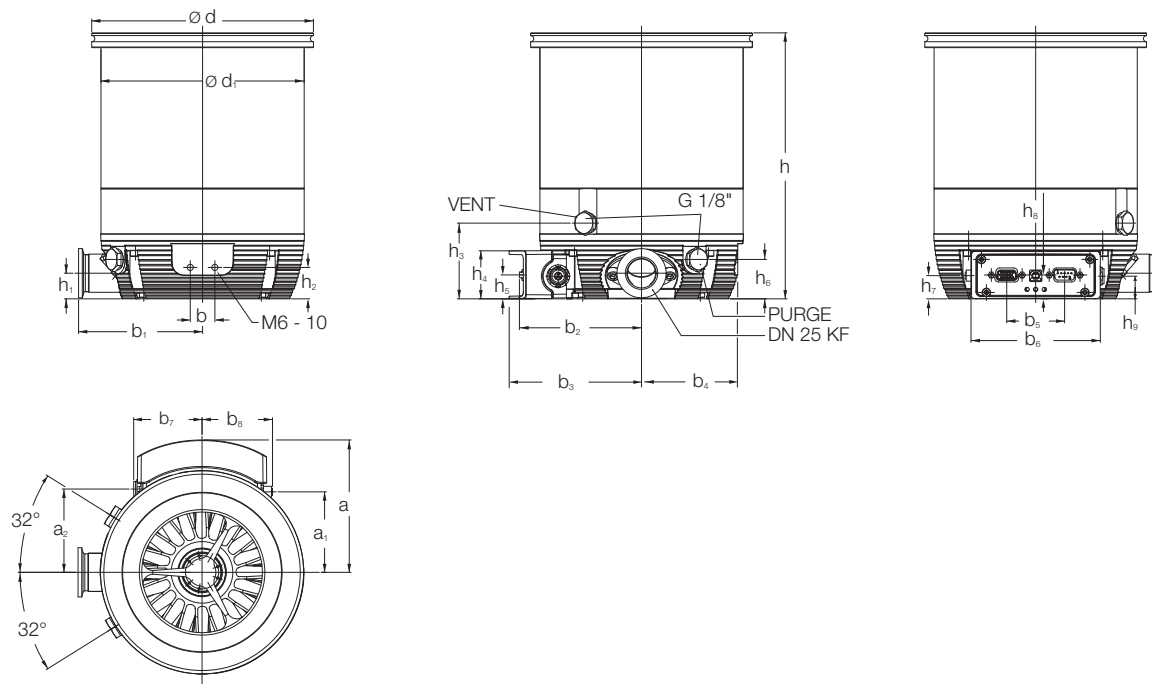
- Easy plug & play pump system control
- Avoid extra costs for separate pump system control units and cabling

TURBOVAC T i, T iX

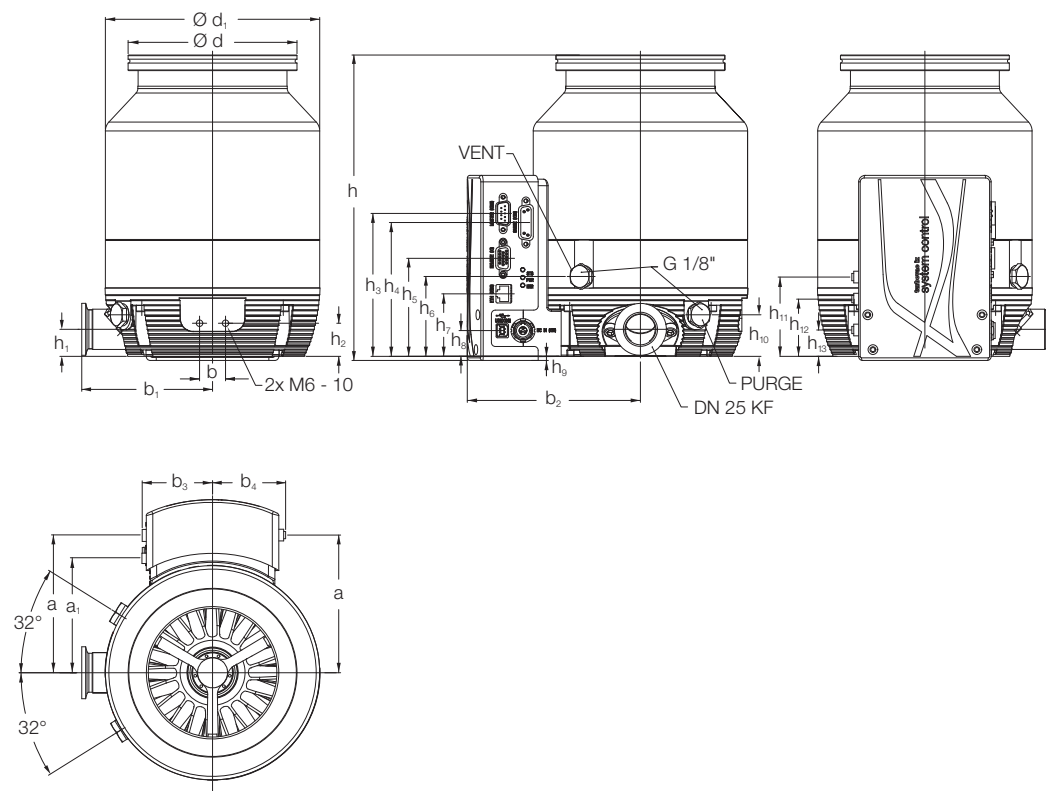
- Suitable for demanding process applications and high throughput operation
- Fast cycle operation and pump down possible



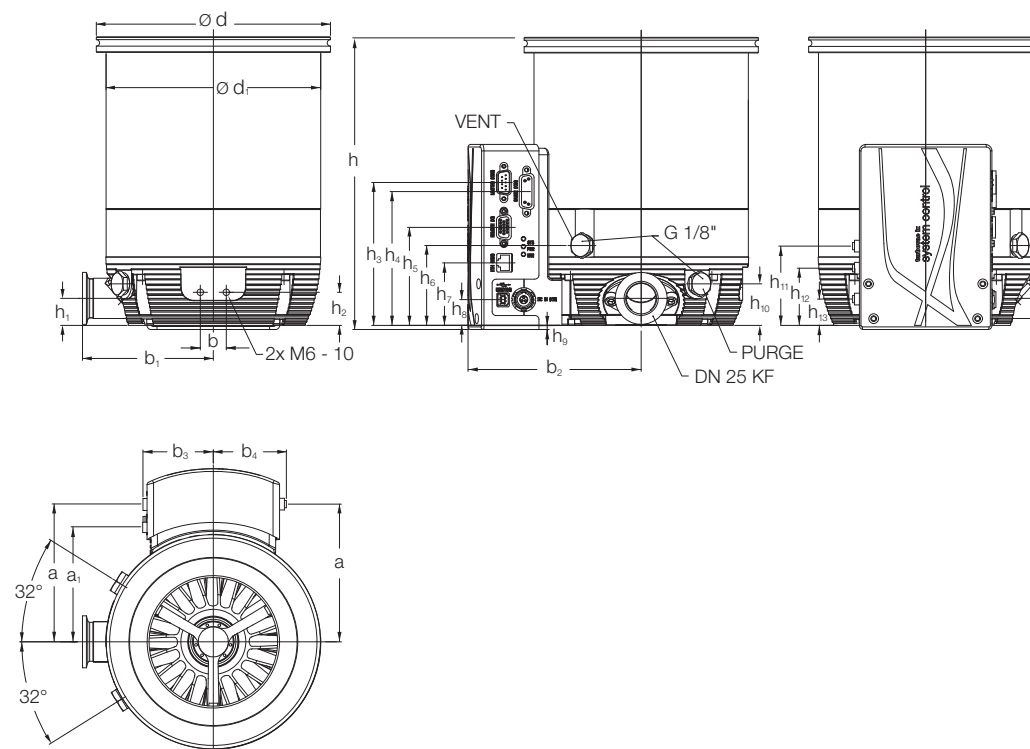
| Type | DN | | a | a ₁ | a ₂ | b | b ₁ | b ₂ | b ₃ | b ₄ |
|--------------------|-------|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| TURBOVAC (T) 350 i | ISO-K | mm (in.) | 107.5 (4.23) | 65.4 (2.57) | 67.6 (2.66) | 20.0 (0.79) | 100.7 (3.96) | 99.2 (3.91) | 107.5 (4.23) | 78.1 (3.07) |
| | CF | mm (in.) | 107.5 (4.23) | 65.4 (2.57) | 67.6 (2.66) | 20.0 (0.79) | 100.7 (3.96) | 99.2 (3.91) | 107.5 (4.23) | 78.1 (3.07) |
| TURBOVAC (T) 450 i | ISO-K | mm (in.) | 107.5 (4.23) | 65.4 (2.57) | 67.6 (2.66) | 20.0 (0.79) | 100.7 (3.96) | 99.2 (3.91) | 107.5 (4.23) | 78.1 (3.07) |
| | CF | mm (in.) | 107.5 (4.23) | 65.4 (2.57) | 67.6 (2.66) | 20.0 (0.79) | 100.7 (3.96) | 99.2 (3.91) | 107.5 (4.23) | 78.1 (3.07) |
| | DN | | b ₅ | b ₆ | b ₇ | b ₈ | d | d ₁ | h | h ₁ |
| TURBOVAC (T) 350 i | ISO-K | mm (in.) | 47.0 (1.85) | 105.0 (4.13) | 55.5 (2.19) | 57.2 (2.25) | 130.0 (5.12) | 165.0 (6.5) | 232.0 (9.13) | 20.8 (0.82) |
| | CF | mm (in.) | 47.0 (1.85) | 105.0 (4.13) | 55.5 (2.19) | 57.2 (2.25) | 180.0 (7.09) | 165.0 (6.5) | 245.0 (9.65) | 20.8 (0.82) |
| TURBOVAC (T) 450 i | ISO-K | mm (in.) | 47.0 (1.85) | 105.0 (4.13) | 55.5 (2.19) | 57.2 (2.25) | 130.0 (5.12) | 165.0 (6.5) | 216.0 (8.5) | 20.8 (0.82) |
| | CF | mm (in.) | 47.0 (1.85) | 105.0 (4.13) | 55.5 (2.19) | 57.2 (2.25) | 180.0 (7.09) | 165.0 (6.5) | 222.0 (8.74) | 20.8 (0.82) |
| | DN | | h ₂ | h ₃ | h ₄ | h ₅ | h ₆ | h ₇ | h ₈ | h ₉ |
| TURBOVAC (T) 350 i | ISO-K | mm (in.) | 25.5 (1.0) | 61.5 (2.42) | 39.0 (1.54) | 19.4 (0.76) | 32.0 (1.26) | 19.0 (0.75) | 18.8 (0.74) | 18.4 (0.72) |
| | CF | mm (in.) | 25.5 (1.0) | 61.5 (2.42) | 39.0 (1.54) | 19.4 (0.76) | 32.0 (1.26) | 19.0 (0.75) | 18.8 (0.74) | 18.4 (0.72) |
| TURBOVAC (T) 450 i | ISO-K | mm (in.) | 25.5 (1.0) | 61.5 (2.42) | 39.0 (1.54) | 19.4 (0.76) | 32.0 (1.26) | 19.0 (0.75) | 18.8 (0.74) | 18.4 (0.72) |
| | CF | mm (in.) | 25.5 (1.0) | 61.5 (2.42) | 39.0 (1.54) | 19.4 (0.76) | 32.0 (1.26) | 19.0 (0.75) | 18.8 (0.74) | 18.4 (0.72) |



Dimensional drawing for the TURBOVAC (T) pumps, 350 i top and 450 i bottom



| Type | DN | | a | a ₃ | b | b ₁ | b ₂ | b ₃ | b ₄ | |
|---------------------|-------|----------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| TURBOVAC (T) 350 iX | ISO-K | mm (in.) | 111.0 (4.37) | 78.0 (3.07) | 20.0 (0.79) | 101.0 (3.98) | 138.0 (5.43) | 54.0 (2.13) | 56.0 (2.2) | |
| | CF | mm (in.) | 111.0 (4.37) | 78.0 (3.07) | 20.0 (0.79) | 101.0 (3.98) | 138.0 (5.43) | 54.0 (2.13) | 56.0 (2.2) | |
| TURBOVAC (T) 450 iX | ISO-K | mm (in.) | 111.0 (4.37) | 78.0 (3.07) | 20.0 (0.79) | 101.0 (3.98) | 138.0 (5.43) | 54.0 (2.13) | 56.0 (2.2) | |
| | CF | mm (in.) | 111.0 (4.37) | 78.0 (3.07) | 20.0 (0.79) | 101.0 (3.98) | 138.0 (5.43) | 54.0 (2.13) | 56.0 (2.2) | |
| | DN | | d | d ₁ | h | h ₁ | h ₂ | h ₃ | h ₄ | h ₅ |
| TURBOVAC (T) 350 iX | ISO-K | mm (in.) | 130.0 (5.12) | 165.0 (6.5) | 235.0 (9.25) | 21.0 (0.83) | 26.0 (1.02) | 110.0 (4.33) | 103.0 (4.06) | 76.0 (2.99) |
| | CF | mm (in.) | 180.0 (7.09) | 165.0 (6.5) | 248.0 (9.76) | 21.0 (0.83) | 26.0 (1.02) | 110.0 (4.33) | 103.0 (4.06) | 76.0 (2.99) |
| TURBOVAC (T) 450 iX | ISO-K | mm (in.) | 130.0 (5.12) | 165.0 (6.5) | 219.0 (8.62) | 21.0 (0.83) | 26.0 (1.02) | 110.0 (4.33) | 103.0 (4.06) | 76.0 (2.99) |
| | CF | mm (in.) | 180.0 (7.09) | 165.0 (6.5) | 225.0 (8.86) | 21.0 (0.83) | 26.0 (1.02) | 110.0 (4.33) | 103.0 (4.06) | 76.0 (2.99) |
| | DN | | h ₆ | h ₇ | h ₈ | h ₉ | h ₁₀ | h ₁₁ | h ₁₂ | h ₁₃ |
| TURBOVAC (T) 350 iX | ISO-K | mm (in.) | 62.0 (2.44) | 48.0 (1.89) | 20.0 (0.79) | 3.0 (0.12) | 32.0 (1.26) | 64.0 (2.52) | 47.0 (1.85) | 23.0 (0.91) |
| | CF | mm (in.) | 62.0 (2.44) | 48.0 (1.89) | 20.0 (0.79) | 3.0 (0.12) | 32.0 (1.26) | 64.0 (2.52) | 47.0 (1.85) | 23.0 (0.91) |
| TURBOVAC (T) 450 iX | ISO-K | mm (in.) | 62.0 (2.44) | 48.0 (1.89) | 20.0 (0.79) | 3.0 (0.12) | 32.0 (1.26) | 64.0 (2.52) | 47.0 (1.85) | 23.0 (0.91) |
| | CF | mm (in.) | 62.0 (2.44) | 48.0 (1.89) | 20.0 (0.79) | 3.0 (0.12) | 32.0 (1.26) | 64.0 (2.52) | 47.0 (1.85) | 23.0 (0.91) |



Dimensional drawing for the TURBOVAC (T) pumps, 350 iX top and 450 iX bottom

Technical Data

TURBOVAC

| | | 350 i / iX | 450 i / iX | T 350 i / iX | T 450 i / iX |
|---|----------------------------|--|--|--|--|
| High-vacuum connection | DN | 100 ISO-K 100 CF | 160 ISO-K 160 CF | 100 ISO-K 100 CF | 160 ISO-K 160 CF |
| Forevacuum connection | DN | 25 ISO-KF | 25 ISO-KF | 25 ISO-KF | 25 ISO-KF |
| Pumping speed | | | | | |
| N ₂ | l x s ⁻¹ | 290 | 430 | 290 | 430 |
| Ar | l x s ⁻¹ | 260 | 400 | 260 | 400 |
| He | l x s ⁻¹ | 360 | 440 | 360 | 440 |
| H ₂ | l x s ⁻¹ | 350 | 420 | 320 | 400 |
| Gas throughput | | | | | |
| N ₂ | mbar x l x s ⁻¹ | 4.5 | 4.5 | 11.5 | 11.5 |
| Ar | mbar x l x s ⁻¹ | 2.0 | 2.0 | 6.0 | 6.0 |
| He | mbar x l x s ⁻¹ | 8.0 | 8.0 | 20.0 | 20.0 |
| H ₂ | mbar x l x s ⁻¹ | 8.0 | 8.0 | 20.0 | 20.0 |
| Compression ratio | | | | | |
| N ₂ | | 1 x 10 ¹¹ | 1 x 10 ¹¹ | 1 x 10 ¹⁰ | 1 x 10 ¹⁰ |
| Ar | | 1 x 10 ¹¹ | 1 x 10 ¹¹ | 1 x 10 ¹¹ | 1 x 10 ¹¹ |
| He | | 1 x 10 ⁸ | 1 x 10 ⁸ | 1 x 10 ⁶ | 1 x 10 ⁶ |
| H ₂ | | 1 x 10 ⁶ | 1 x 10 ⁶ | 1 x 10 ⁴ | 1 x 10 ⁴ |
| Ultimate pressure with 2-stage oil-sealed rotary vane vacuum pump ISO-K / CF flange | mbar (Torr) | < 10 ⁻⁸ / < 10 ⁻¹⁰ (< 0.75 x 10 ⁻⁸ / < 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ / < 10 ⁻¹⁰ (< 0.75 x 10 ⁻⁸ / < 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ / < 10 ⁻¹⁰ (< 0.75 x 10 ⁻⁸ / < 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ / < 10 ⁻¹⁰ (< 0.75 x 10 ⁻⁸ / < 0.75 x 10 ⁻¹⁰) |
| Max. forevacuum pressure | | | | | |
| N ₂ | mbar (Torr) | 10.0 (7.5) | 10.0 (7.5) | 0.5 (0.375) | 0.5 (0.375) |
| Recommended forevacuum pumps | | | | | |
| TRIVAC | | D 4 B | D 4 B | D 16 B | D 16 B |
| SCROLLVAC | | SC 5 D / 15 D | SC 5 D / 15 D | SC 15 D / 30 D | SC 15 D / 30 D |
| DIVAC | | 3.8 HV3 | 3.8 HV3 | – | – |
| Operating speed | min ⁻¹ (rpm) | 60 000 | 60 000 | 60 000 | 60 000 |
| Speed adjustment range | % | 50 to 100 | 50 to 100 | 50 to 100 | 50 to 100 |
| Run-up time, approx. | min | 5.5 | 5.5 | 3.5 | 3.5 |
| Ambient temperature during operation | °C (°F) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) | +5 to +45 (+41 to +113) |
| during storage | °C (°F) | -15 to -70 (+5 to -94) | -15 to -70 (+5 to -94) | -15 to -70 (+5 to -94) | -15 to -70 (+5 to -94) |
| Cooling standard optional | | Convection Air or water | Convection Air or water | Convection Air or water | Convection Air or water |
| Cooling water connection | | Plug connection for 6 x 1 hose G 1/8" | Plug connection for 6 x 1 hose G 1/8" | Plug connection for 6 x 1 hose G 1/8" | Plug connection for 6 x 1 hose G 1/8" |
| alternatively | | Screw-in thread | Screw-in thread | Screw-in thread | Screw-in thread |
| Cooling water consumption | l/h | 50 to 100 | 50 to 100 | 50 to 100 | 50 to 100 |
| Permissible cooling water pressure | bar(g) | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 |
| Permissible cooling water temperature | °C (°F) | +15 to +35 (+59 to +95) | +15 to +35 (+59 to +95) | +15 to +35 (+59 to +95) | +15 to +35 (+59 to +95) |
| Noise level | | | | | |
| with convection cooling | db(A) | < 44 | < 44 | < 44 | < 44 |
| with radial cooler | db(A) | < 47 | < 47 | < 47 | < 47 |
| with axial cooler | db(A) | < 49 | < 49 | < 49 | < 49 |

**Additional Technical Data for the
Frequency Converter (i Version)**
TURBOVAC

| | | 350 i | 450 i | T 350 i | T 450 i |
|--|---------------------|--|--|--|--|
| Technical Data for the integrated Drive Electronics | | | | | |
| Supply voltage | V DC | 24/48 ±10% | 24/48 ±10% | 24/48 ±10% | 24/48 ±10% |
| Max. current consumption | A | 10 at 24 V DC | 10 at 24 V DC | 10 at 24 V DC | 10 at 24 V DC |
| Max. power consumption | W | 240 | 240 | 240 | 240 |
| Power consumption at ultimate pressure | W | 20 | 20 | 20 | 20 |
| Type of protection | IP | 40 | 40 | 40 | 40 |
| Interfaces | | RS 485, USB, 15-pin digital I/O Upon request | RS 485, USB, 15-pin digital I/O Upon request | RS 485, USB, 15-pin digital I/O Upon request | RS 485, USB, 15-pin digital I/O Upon request |
| Other interfaces | | | | | |
| Accessory connection | | 1 pcs. M 8 connector 24 V DC | 1 pcs. M 8 connector 24 V DC | 1 pcs. M 8 connector 24 V DC | 1 pcs. M 8 connector 24 V DC |
| Weight ISO-K / CF | kg (lbs) | 7.5 / 11.5 (16.5 / 25.4) | 7.7 / 12.5 (17.0 / 27.6) | 7.0 / 11.0 (15.4 / 14.3) | 7.2 / 12.0 (15.9 / 26.5) |

**Additional Technical Data for the
Frequency Converter (iX Version)**
TURBOVAC

| | | 350 iX | 450 iX | T 350 iX | T 450 iX |
|---|---------------------|---|---|---|---|
| Technical Data for the integrated Drive Electronics and Vacuum System Controller | | | | | |
| Supply voltage | V DC | 24/48 ±10% | 24/48 ±10% | 24/48 ±10% | 24/48 ±10% |
| Max. current consumption | A | 10 at 24 V DC | 10 at 24 V DC | 10 at 24 V DC | 10 at 24 V DC |
| Max. power consumption | W | 240 | 240 | 240 | 240 |
| Power consumption at ultimate pressure | W | 20 | 20 | 20 | 20 |
| Type of protection | IP | 40 | 40 | 40 | 40 |
| Interfaces | | USB+, 15 pin standard, Anybus (either RS 485, RS 232, Profibus, ...) | USB+, 15 pin standard, Anybus (either RS 485, RS 232, Profibus, ...) | USB+, 15 pin standard, Anybus (either RS 485, RS 232, Profibus, ...) | USB+, 15 pin standard, Anybus (either RS 485, RS 232, Profibus, ...) |
| Accessory connections | | 3 pcs. M 8 connector 24 V DC | 3 pcs. M 8 connector 24 V DC | 3 pcs. M 8 connector 24 V DC | 3 pcs. M 8 connector 24 V DC |
| Max. load for the 24 V DC output (cooler or valve supply) | V / W | 24 / max. 12 | 24 / max. 12 | 24 / max. 12 | 24 / max. 12 |
| Gauge head connection | | 15-way Sub-D | 15-way Sub-D | 15-way Sub-D | 15-way Sub-D |
| Weight ISO-K / CF | kg (lbs) | 8.0 / 12.0 (17.6 / 26.5) | 8.2 / 13.0 (18.1 / 28.7) | 7.5 / 11.5 (16.5 / 25.4) | 7.7 / 12.5 (17.0 / 27.6) |

Ordering Information

TURBOVAC

| | Wide Range | | Classic | |
|--|-----------------|-----------------|-----------------|-----------------|
| | 350 i | 450 i | T 350 i | T 450 i |
| TURBOVAC | Part No. | Part No. | Part No. | Part No. |
| with integrated frequency converter, RS 485, USB+ and 15-Pin digital I/O interface | | | | |
| DN 100 ISO-K | 830051V1000 | — | 830050V1000 | — |
| DN 100 CF | 830061V1000 | — | 830060V1000 | — |
| DN 160 ISO-K | — | 830071V1000 | — | 830070V1000 |
| DN 160 CF | — | 830081V1000 | — | 830080V1000 |
| other interfaces | Upon request | Upon request | Upon request | Upon request |

Ordering Information

TURBOVAC

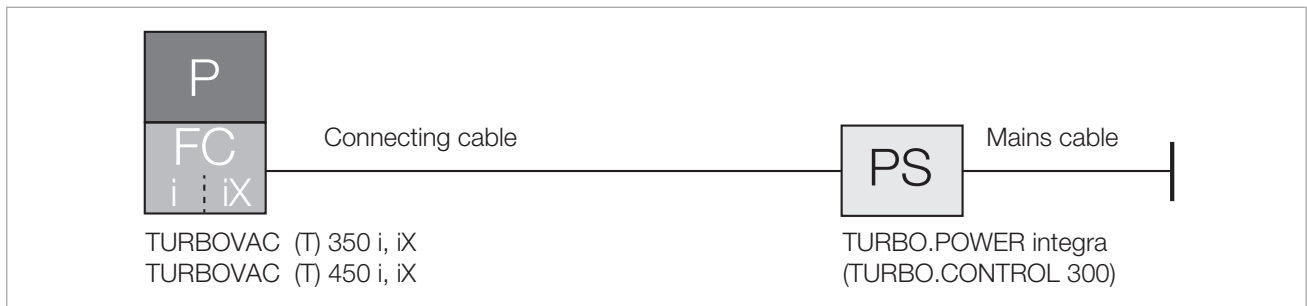
| | Wide Range | | Classic | |
|--|-----------------|-----------------|-----------------|-----------------|
| | 350 iX | 450 iX | T 350 iX | T 450 iX |
| TURBOVAC | Part No. | Part No. | Part No. | Part No. |
| with integrated frequency converter and vacuum system controller, RS 485, USB+ and 15-Pin digital I/O interface | | | | |
| DN 100 ISO-K | 830051V3300 | — | 830050V3300 | — |
| DN 100 CF | 830061V3300 | — | 830060V3300 | — |
| DN 160 ISO-K | — | 830071V3300 | — | 830070V3300 |
| DN 160 CF | — | 830081V3300 | — | 830080V3300 |
| other interfaces | Upon request | Upon request | Upon request | Upon request |

Ordering Information

TURBOVAC (T)

350 i, iX / 450 i, iX

| Mandatory Accessories | P PS | Part No. |
|---|------|-------------|
| Power supply TURBO.POWER integra, including 0.3 (1.1 ft) long cable | | 800100V0003 |
| Mains cable, 3 m (10.5 ft) | | |
| EU plug | | 800102V0002 |
| UK plug | | 800102V0003 |
| US plug 5-15P, 115 V | | 800102V1002 |
| Cable pump - TURBO.POWER integra | | |
| 1 m (3.5 ft) | | 800096V0100 |
| 3 m (10.5 ft) | | 800096V0300 |
| 5 m (17.5 ft) | | 800096V0500 |
| Mounting kit TURBOVAC | | |
| DN 100 ISO-K | | 800134V0020 |
| DN 160 ISO-K | | 800134V0030 |
| DN 100 ISO-K auf ISO-F | | 800134V0025 |
| DN 160 ISO-K auf ISO-F | | 800134V0035 |
| DN 100 CF | | 800134V0021 |
| DN 160 CF | | 800134V0031 |
| Forevacuum pump | | |
| TRIVAC D 4 B | | |
| TRIVAC D 16 B | | |
| see Catalog Part „Oil Sealed Vacuum Pumps“ | | |
| SCROLLVAC SC 5 D | | |
| SCROLLVAC SC 15 D | | |
| DIVAC 3.8 HV3 | | |
| see Catalog Part „Dry Compressing Vacuum Pumps“ | | |



Ordering Information

TURBOVAC (T) 350 i / 450 i

| Accessories, optional P | Part No. |
|--|-------------|
| Power supply, cable, other accessories | |
| Power supply and control unit TURBO.CONTROL 300 | 800100V0001 |
| Cable pump - TURBO.CONTROL 300 | |
| 1 m (3.5 ft) | 800092V0100 |
| 3 m (10.5 ft) | 800092V0300 |
| 5 m (17.5 ft) | 800092V0500 |
| 10 m (35 ft) | 800092V1000 |
| 20 m (70 ft) | 800092V2000 |
| 24/48 V DC In plug TURBOVAC | 800090V0000 |
| USB cable 2.0, Type A/B, 1.8 m (6.3 ft) long | 800110V0108 |
| Y cable M 8 | 800110V0020 |
| Relay box for forevacuum pump, 1-phase, 10 A | 800110V0030 |
| Start stop switch | 800110V0021 |
| Cooling | |
| Air cooler TURBOVAC 350/450 i | |
| radial | 800136V0005 |
| axial | 800136V0006 |
| Water cooling TURBOVAC 350/450 i | 800135V0005 |
| Venting and purge gas | |
| Venting valve, 24 V DC, G 1/8" | 800120V0012 |
| Power failure venting valve, 24 V DC, G 1/8" | 800120V0022 |
| Purge gas valve, 24 V DC, G 1/8", 24 sccm | 800120V0013 |
| Purge gas throttle, 24 sccm | 800120V0014 |
| Air filter, G 1/8" | 800110V0022 |
| Heating | |
| Flange heater | |
| DN 100 CF, 230 V | 800137V0005 |
| DN 100 CF, 115 V | 800137V0006 |
| DN 160 CF, 230 V | 800137V0007 |
| DN 160 CF, 115 V | 800137V0008 |
| Mains cable, 3 m (10.5 ft) (for connection of the heating collar) | |
| EU-plug | 800102V0002 |
| UK-plug | 800102V0003 |
| US-plug 5-15P, 115 V | 800102V1002 |
| Vibration absorber | |
| DN 100 ISO-K | 800131V1100 |
| DN 160 ISO-K | 500073 |
| DN 100 CF | 500071 |
| DN 160 CF | 500072 |
| Centering ring | |
| with fine inlet screen, 0.8 mm (0.03") mesh | |
| DN 100 ISO-K/F | 800133V0022 |
| DN 160 ISO-K/F | 800133V0032 |
| with coarse inlet screen, 3.2 mm (0.13") mesh | |
| DN 100 ISO-K/F | 800133V0021 |
| DN 160 ISO-K/F | 800133V0031 |
| Fine Inlet screen, 0.8 mm (0.03") mesh | |
| DN 100 CF | 800132V0022 |
| DN 160 CF | 800132V0032 |
| Coarse inlet screen, 3.2 mm (0.13") mesh | |
| DN 100 CF | 800132V0021 |
| DN 160 CF | 800132V0031 |
| Included in the Delivery of the Pump P | |
| High and forevacuum flanges are protective-capped | |
| The flange mounting components and the inlet screen are not included in the delivery | |

Special Turbomolecular Pumps



TURBOVAC i Multi Inlet Cartridge

Precision is key when it comes to analytical instruments.

Outfitted with two or more inlets, the innovative turbopumps with integrated drive electronics provide extraordinary pumping performance and are adaptable to the system requirements of each instrument.

In combination with our support for the whole vacuum system design, it will result in the best possible level of pump system integration you have ever experienced.



The TURBOVAC 350-400 i Multi Inlet line has been especially developed to meet the requirements of analytical instruments and features an extremely high level of flexibility, allowing you to choose the number, height and position of the multiple vacuum ports. The result: a pump that is perfectly fitted to your specific performance needs and installation requirements.

Additionally, we offer the support and experience in vacuum system design which opens a wide range of possibilities, from the adaptation of the pump housing to your vacuum chamber through to the design of a custom-built housing/chamber that meets your particular needs. Your benefit: optimum system integration of the pump(s) into your instrument and a reduced time to market.

Your Advantage

- Perfect integration of the pump(s) within your instrumentation
- Cutting of system costs
- Smaller size of the analytical system
- Reduction in the number of individual vacuum components
- Choice between cartridge and custom pump housing

In order to simplify installation, operation and control, all TURBOVAC i variants feature an integrated electronic drive with 24/48 V DC supply and a detachable operator interface with USB, RS 485 and digital I/O connections.

Performance

- Industry-leading pumping speed especially for light gases (up to 60 % higher than existing products)
- Optimized rotor diameter to provide maximum pumping performance
- > 40 l/s pumping speed at Inter-stage port 2

Flexibility

- Vacuum port design flexibility
 - Rotatable fore-vacuum port
 - Multiple interstage ports
 - High level of flexibility in terms of height and position of vacuum ports
- Unique cartridge solutions for optimized system integration with fast and simple field replacement
- Special pump housing solutions adapted to your instrument
- Complete vacuum system design including your vacuum chamber
- Variable rotor and Holweck design to adapt the performance to your application

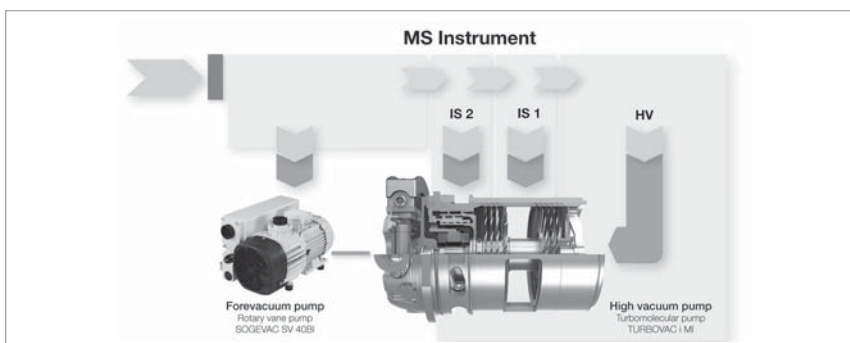
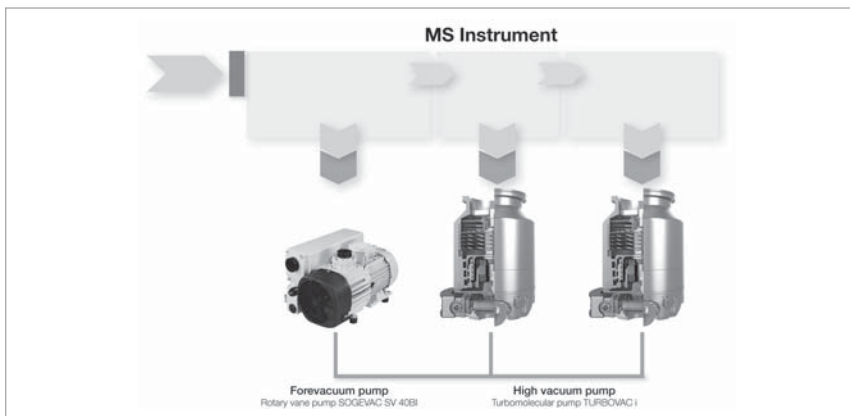
Installation, operation and control

- Integrated 24/48 V DC drive electronics to avoid expensive cabling
- Widest range of communication interfaces: USB, RS 485 and remote 15 pin digital I/O as standard options
- Highly efficient motor
- Thermal isolation by design for optimized cooling of bearing and improved pump lifetime
- Simply-supported shaft reduces vibration
- Maintenance free upper passive magnetic bearing
- Oil free, lifetime lubricated lower mechanical ceramic ball bearing, field-replaceable

Outstanding performance

Thanks to its variable rotor and drag stage design, our new Multi Inlet product line provides the highest performance for all mass spectrometer applications. With increased pumping speed levels especially for light gases which are up to 60% higher than those

offered by other products currently on the market, it provides significant advantages for your instruments: lower pressures, improved detection sensitivity levels and higher sample throughput rates.



Superior reliability

The unique maintenance and oil free hybrid bearing system is characterized by its extreme reliability and durability – that's because we equipped it with an innovative lifetime lubrication system that never needs an oil change. The simply-supported shaft system results in a low vibration pump design which reduces noise, mechanical stress and negative impact on vibration sensitive applications. Optimized cool-

ing of the bearings is ensured through thermal isolation and the highly efficient motor. To protect the bearings from critical gases or particles, all pumps are equipped with a purge port. As a consequence, not only pump lifetime is increased significantly, but also system uptime as well as productivity. In combination with low costs of ownership, the operation of your vacuum system will be more efficient than ever.

Advantages to the User

- High gas throughput
- High effective pumping speed
- High efficiency for analytical instruments
- High detection sensitivity
- High sample throughput
- Free of hydrocarbons
- Hybrid bearing suspension for low vibration levels
- Space and weight saving
- Low component count
- Favourable price-to-performance ratio
- Installation and user friendly
- Practically maintenance free

Typical Applications

For example

- LC-MS (linking of a liquid chromatograph to a mass spectrometer)
- GC/MS (linking of a gas chromatograph to a mass spectrometer)
- TOF-MS (time-of-flight mass spectrometer)
- ICP-MS (inductively coupled plasma mass spectrometry)
- Helium leak detectors

Technical Features

- Dual Inlet (pumping down of two analysis chambers)
- Triple inlet (pumping down of three analysis chambers)
- High effective pumping speed

| | |
|-----------------|---------------|
| HV stage | up to 400 l/s |
| Interstage IS 1 | up to 300 l/s |
| Interstage IS 2 | up to 50 l/s |
- Cartridge solutions (without pump housing) are available
- Compact vacuum system

Customized versions are available upon request

Mechanical Rotor Suspension without Compound Stage

TURBOVAC 50

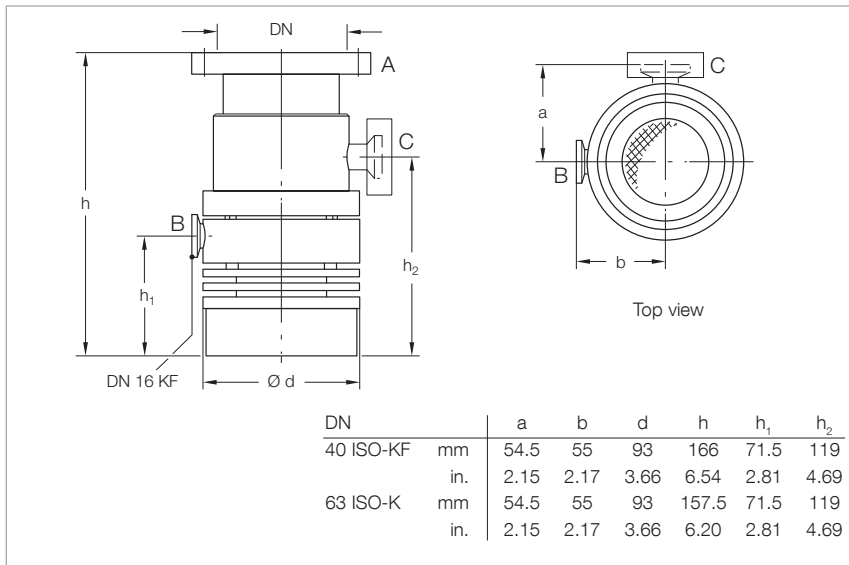


Typical Applications

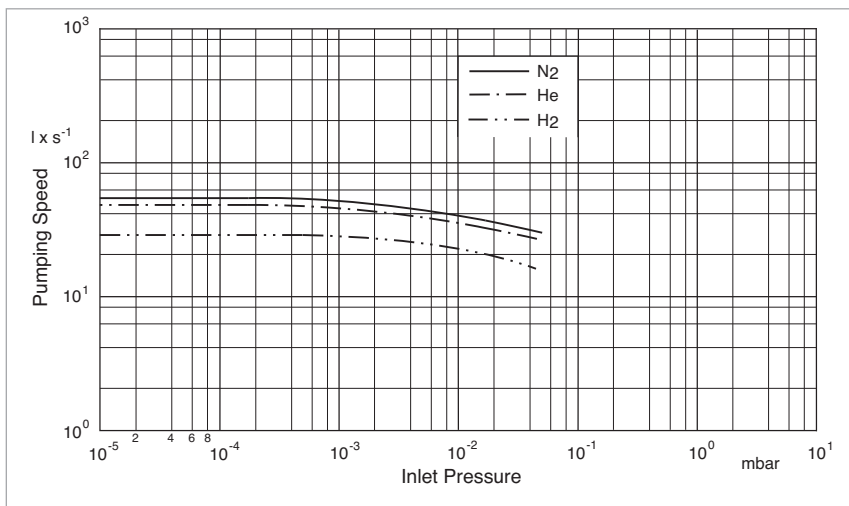
- Leak detectors
- Mass spectrometers
- Electron beam microscopy
- TV tube manufacturing
- Load locks and transfer chambers
- High vacuum chambers

Technical Features

- Small footprint
- Installation in any orientation
- Cooling by convection is sufficient for most applications
- Air and water cooling can be added easily
- Oil-free pump for generating clean high and ultra-high vacuum conditions



Dimensional drawing for the TURBOVAC 50



Pumping speed as a function of the inlet pressure (TURBOVAC 50 with flange DN 63 ISO-K)

Advantages to the User

- Space-saving
- Easy to integrate into complex vacuum systems
- Low operating costs
- Highly reliable operation also in processes loaded with particles

Technical Data

TURBOVAC 50

| | | | |
|---|----------------------------|--|--|
| Connection | | | |
| Inlet | DN | 40 ISO-KF • 40 CF | 63 ISO-K • 63 ICF |
| Outlet | DN | 16 ISO-KF | 16 ISO-KF |
| Pumping speed | | | |
| N ₂ | l x s ⁻¹ | 33 | 55 |
| Ar | l x s ⁻¹ | 30 | 50 |
| He | l x s ⁻¹ | 36 | 48 |
| H ₂ | l x s ⁻¹ | 28 | 30 |
| Gas throughput | | | |
| N ₂ | mbar · l x s ⁻¹ | 0.90 | 1.00 |
| Ar | mbar · l x s ⁻¹ | 0.70 | 0.80 |
| He | mbar · l x s ⁻¹ | 0.30 | 0.40 |
| H ₂ | mbar · l x s ⁻¹ | 0.25 | 0.30 |
| Compression ratio | | | |
| N ₂ | | 2 x 10 ⁶ | 2 x 10 ⁶ |
| Ar | | 2 x 10 ⁶ | 2 x 10 ⁶ |
| He | | 5 x 10 ² | 5 x 10 ² |
| H ₂ | | 2 x 10 ² | 2 x 10 ² |
| Ultimate pressure | mbar (Torr) | < 5 x 10 ⁻⁸ (< 3.8 x 10 ⁻⁸) | < 5 x 10 ⁻⁸ (< 3.8 x 10 ⁻⁸) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 1 x 10 ⁻¹ (7.5 x 10 ⁻²) | 1 x 10 ⁻¹ (7.5 x 10 ⁻²) |
| Recommended forevacuum pump | | TRIVAC D 2,5 E | TRIVAC D 2,5 E |
| Nominal rotation speed | min ⁻¹ (rpm) | 72 000 | 72 000 |
| Run-up time, approx. | min | 2 | 2 |
| Max. power consumption | W | 45 | 45 |
| Power consumption at ultimate pressure | W | 15 | 15 |
| Admissible ambient temperature | °C (°F) | +10 to +55 (+50 to +131) | +10 to +55 (+50 to +131) |
| Cooling | | | |
| standard | | Convection | Convection |
| optional | | Air / Water | Air / Water |
| Cooling water connection | | 10 mm hose nozzle | 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 15 to 25 | 15 to 25 |
| Permissible cooling water pressure | bar | 3 to 7 | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | +10 to +35 (+50 to +95) | +10 to +35 (+50 to +95) |
| Weight | kg (lbs) | 2.0 (4.4) | 2.0 (4.4) |



Technical Data

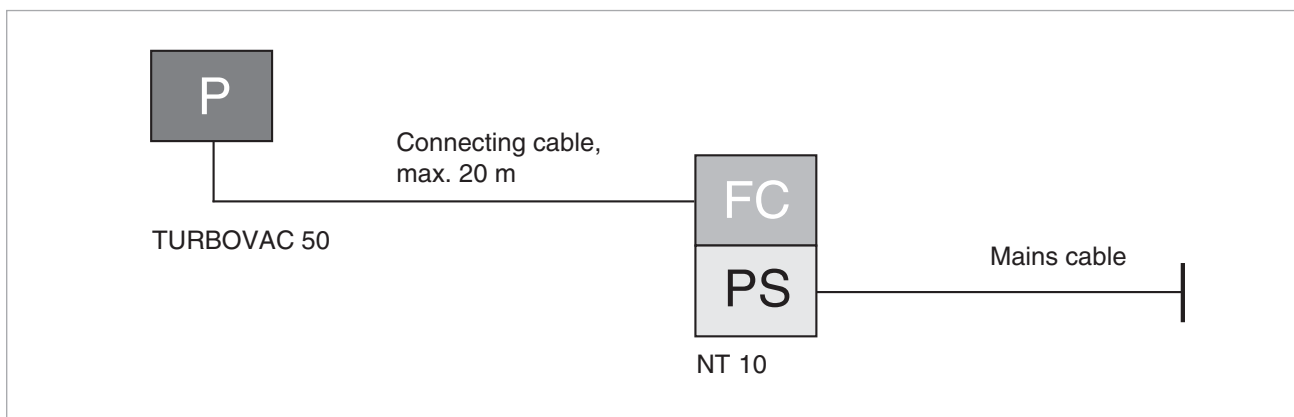
TURBOTRONIK NT 10

| | | |
|--------------------------------|----------|--------------------------------------|
| Mains connection | 50/60 Hz | 100-120 or 200-240 V |
| Max. power consumption | W | 45 |
| Max. output voltage | V | 3 x 150 |
| Max. output current | A | 6 |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +40 (+32 to +104) |
| Dimensions (W x H x D) | mm (in.) | 106 x 128 x 233 (4.17 x 5.04 x 9.17) |
| Weight, approx. | kg (lbs) | 1.5 (3.3) |

Ordering Information

TURBOVAC 50

| TURBOVAC 50 without Compound Stage | P | Part No. | |
|--|----|--|--|
| DN 40 ISO-KF, convection DN 40 CF, convection DN 63 ISO-K, convection DN 63 CF, convection | | 854 00 853 99 854 01 854 02 |  |
| Mandatory Accessories | FC | PS | |
| Electronic frequency converter TURBOTRONIK NT 10 with EURO plug, 180-240 V with US plug, 90-140 V | | 859 00 859 01 |  |
| Connecting cable converter – TURBOVAC 1.0 m (3.5 ft) 3.0 m (10.5 ft) 5.0 m (17.5 ft) 10.0 m (35.0 ft) 20.0 m (70.0 ft) | | 200 11 609 121 08 121 09 161 10 800150V2000 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V, 200-240 V, 50/60 Hz; without plug, world version 110-120 V, 50/60 Hz; NEMA plug, US version 100 V, 50/60 Hz; NEMA plug, Japan version | | 140 000 140 001 140 002 140 003 | |
| For further types, see Catalog Part "Oil sealed Vacuum Pumps" | | | |



Ordering Information

TURBOVAC 50

| Accessories, optional | Part No. |
|---|-------------------------------------|
| Air cooling unit 230 V AC 100 - 115 V AC | 854 05 800152V0015 |
| Water cooling kit (hose nozzles \varnothing 10 mm (0.4 in.)) | 800135V0003 |
| Vibration absorber DN 63 ISO-K | 800131V0063 |
| Solenoid venting valve, normally closed 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, normally open 24 V DC, DN 16 ISO-KF | 800120V0021 |
| Included in the Delivery of the Pump | P |
| Inlet screen, centering ring with FPM sealing ring, outer ring | ISO-K |
| Inlet screen, centering ring with FPM O-ring, clamping ring | ISO-KF |
| Centering ring with O-ring, clamping ring | Foreline Flange |
| Included in the Delivery of the Frequency Converter | FC PS |
| Mains cable | |

Mechanical Rotor Suspension without Compound Stage

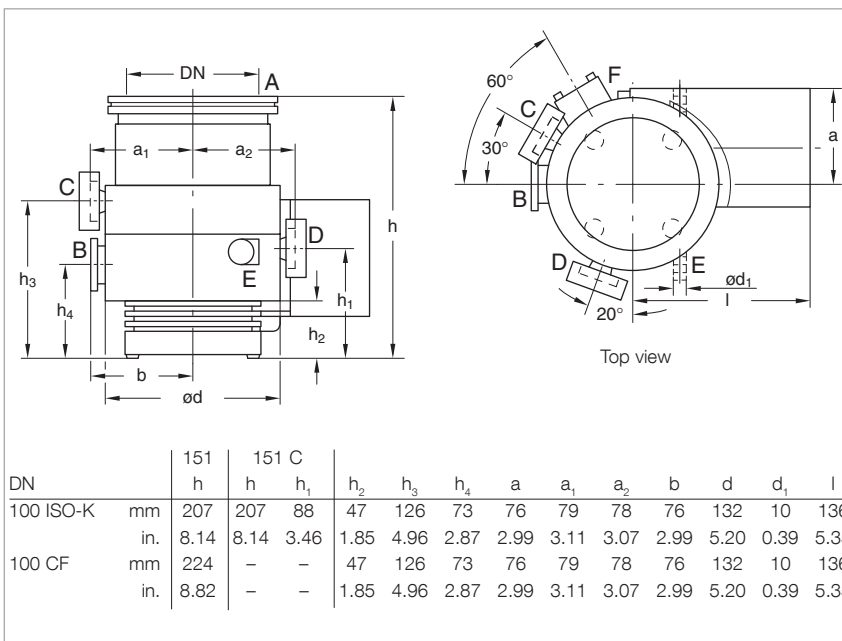
TURBOVAC 151, 151 C ClassicLine



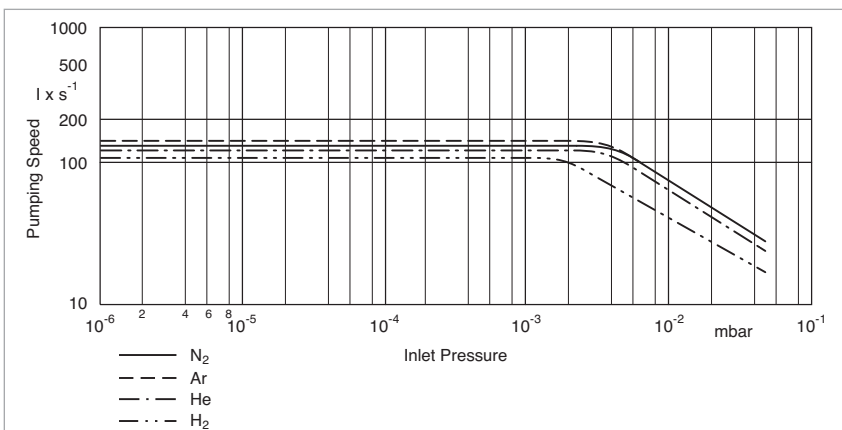
Turbomolecular pumps without a purge gas facility are only suited for pumping of air or inert gases. They are not suited for pumping of aggressive or reactive gases.

TURBOVAC pumps with a "C" in the type designation are equipped with a purge gas facility.

The purge gas protects the bearing area and the motor of the TURBOVAC.



Dimensional drawing for the TURBOVAC 151 and 151 C



Pumping speed as a function of the inlet pressure (TURBOVAC 151 with flange DN 100)

Typical Applications

- Leak detectors
- Mass spectrometers
- Optical coating
- R & D
 - UHV systems
 - Particle accelerators
- Load locks and transfer chambers

Technical Features

- Small footprint
- Operation in any orientation
- Oil-free pump for generating clean high and ultra-high vacuum conditions
- Bearing temperature measurement through the TURBO.DRIVE TD 20 *classic*

Advantages to the User

- Space-saving
- Easy to integrate into complex vacuum systems
- Low operating costs
- Highly reliable operation also in processes loaded with particles

Technical Data

TURBOVAC 151 (C)

| | | | |
|---|----------------------------|--|--|
| Connection | | | |
| Inlet | DN | 100 ISO-K | 100 CF |
| Outlet | DN | 25 ISO-KF | 25 ISO-KF |
| Pumping speed | | | |
| N ₂ | l x s ⁻¹ | 145 | 145 |
| Ar | l x s ⁻¹ | 150 | 150 |
| He | l x s ⁻¹ | 135 | 135 |
| H ₂ | l x s ⁻¹ | 115 | 115 |
| Gas throughput | | | |
| N ₂ | mbar · l x s ⁻¹ | 1.5 | 1.5 |
| Ar | mbar · l x s ⁻¹ | 1.3 | 1.3 |
| He | mbar · l x s ⁻¹ | 1.5 | 1.5 |
| H ₂ | mbar · l x s ⁻¹ | 1.0 | 1.0 |
| Compression ratio | | | |
| N ₂ | | 1 x 10 ⁹ | 1 x 10 ⁹ |
| Ar | | 1 x 10 ⁹ | 1 x 10 ⁹ |
| He | | 2 x 10 ⁴ | 2 x 10 ⁴ |
| H ₂ | | 8 x 10 ² | 8 x 10 ² |
| Ultimate pressure | mbar (Torr) | < 1 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) | < 1 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 5 x 10 ⁻¹ (3.8 x 10 ⁻¹) | 5 x 10 ⁻¹ (3.8 x 10 ⁻¹) |
| Recommended forevacuum pump | | from TRIVAC D 4 B to D 16 B | from TRIVAC D 4 B to D 16 B |
| Nominal rotation speed | min ⁻¹ (rpm) | 50 000 | 50 000 |
| Run-up time, approx. | min | 2 | 2 |
| Max. power consumption | W | 300 | 300 |
| Power consumption at ultimate pressure | W | 70 | 70 |
| Admissible ambient temperature | °C (°F) | 10 to 55 (50 to 131) | 10 to 55 (50 to 131) |
| Cooling | | | |
| standard | | Water | Water |
| optional | | Air | Air |
| Cooling water connection | | 10 mm hose nozzle | 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 15 to 35 | 15 to 35 |
| Permissible cooling water pressure | bar | 3 to 7 | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | 10 to 25 (50 to 77) | 10 to 25 (50 to 77) |
| Weight | kg (lbs) | 8 (17) | 8 (17) |



Technical Data

TURBO.DRIVE TD 20 *classic*

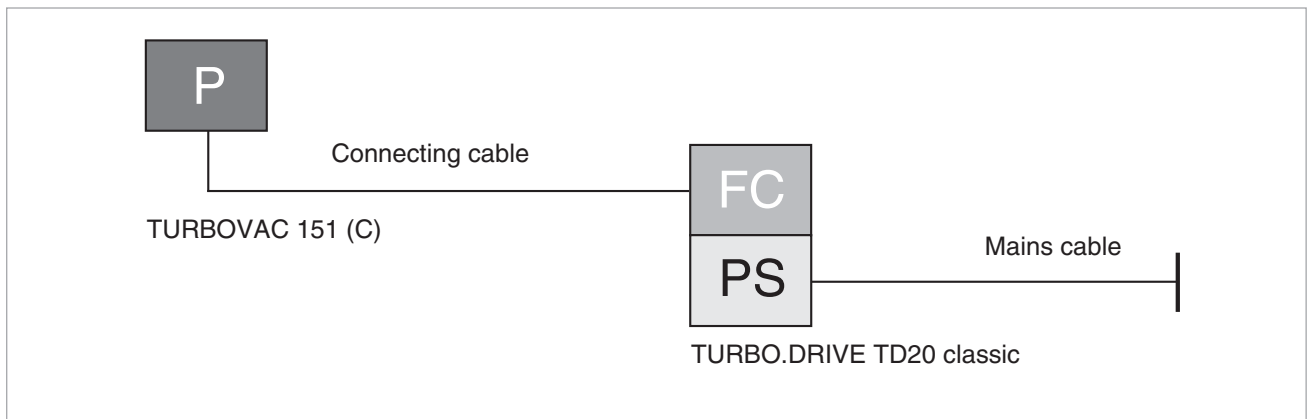
| | | |
|--------------------------------|----------|--|
| Mains connection | 50/60 Hz | 100 to 240 V (+15 % / -10 %) |
| Max. power consumption | W | 500 |
| Max. output voltage | V | 3 x 47 |
| Max. output current | A | 5 |
| Interface | | Without, RS 232 C, RS 485 C, Profibus or 25-way terminal strip |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 213 x 128 x 315 (8.39 x 5.04 x 12.40) |
| Weight, approx. | kg (lbs) | 4.0 (8.8) |

Ordering Information

TURBOVAC 151 (C)

| TURBOVAC 151 (C) without Compound Stage | P | Part No. | |
|--|----|--|---|
| DN 100 ISO-K, water-cooled DN 100 ISO-K, water-cooled (C version) DN 100 CF, water-cooled DN 100 CF, water-cooled (C version) | | 856 31 856 35 856 32 103 41 |  |
| Mandatory Accessories | FC | PS | |
| TURBO.DRIVE TD 20 <small>classic</small> without interface with RS 232 C interface with RS 485 C interface with Profibus with 25-pol I/O | | 800075V0001 800075V0002 800075V0004 800075V0003 800075V0005 |  |
| Connecting cable TURBOVAC - frequency converter 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) 50 m (175.0 ft) 60 m (210.0 ft) 80 m (280.0 ft) 140 m (490.0 ft) | | 857 65 857 66 857 67 857 68 800152V0008 800152V0007 800152V0080 800152V0140 | |
| Mains cable 3 m (10.5 ft) EURO plug UK plug US plug 5-15 P 2 m (7.5 ft) US plug 115 V AC | | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 4 B 1 phase motor; 230 V, 50 Hz 1 phase dual voltage motor; 100-120 V / 200-240 V; 50/60 Hz | | 112 45 140 081 ¹⁾ | |
| TRIVAC D 8 B 1 phase motor; 230 V, 50 Hz 1 phase dual voltage motor; 100-220 V / 200-240 V; 50/60 Hz | | 112 55 140 082 ¹⁾ | |
| TRIVAC D 16 B 1 phase motor; 230 V, 50 Hz 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 200-240 V/380-400 V, 50 Hz / 200-240 V/380-480 V, 60 Hz | | 112 65 113 25 112 66 | |
| SCROLLVAC SC 30 D 1 phase motor; 200-230 V, 50/60 Hz 1 phase motor; 100-115 V, 50/60 Hz 3 phase motor; 380-415 V, 50 Hz / 200-230 V, 460 V 60 Hz | | 133 002 133 102 133 004 | |
| For further types, see Catalog Parts "Oil Sealed Vacuum Pumps" and "Dry Compressing Vacuum Pumps" | | | |

¹⁾ The mains cord (Part No. 200 81 091) must be ordered additionally



Ordering Information

TURBOVAC 151 (C)

| Accessories, optional | Part No. |
|---|--|
| Air cooling unit 230 V AC 100 - 115 V AC | 855 31 800152V0016 |
| Flange heater DN 100 CF, 230 V, 50 Hz DN 100 CF, 115 V, 60 Hz | 854 27 854 28 |
| Vibration absorber DN 100 ISO-K DN 100 CF | 800131V0100 500 071 |
| Solenoid venting valve, with gas admission filter, normally closed 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, with gas admission filter, normally open 24 V DC, DN 16 ISO-KF | 800120V0021 |
| Purge gas and venting valve gas flow at 1 bar 0.4 mbar x l x s ⁻¹ (24 sccm), pump connection DN 10 ISO-KF / gas connection G 1/4" 230 V AC 100 - 115 V AC 24 V DC | 800152V0014 800152V0041 800152V0013 |
| Gas filter to G 1/4" for purge gas and venting valve | 800110V0012 |
| Replacement filter (for gas filter to G 1/4" for purge gas and venting valve) | E 200 18 515 |
| Included in the Delivery of the Pump P | |
| Inlet screen, centering ring with FPM sealing ring, outer ring | ISO-K |
| Inlet screen | CF |
| Centering ring with O-ring, clamping ring | Foreline Flange |
| Pivoted threaded fittings to replace the included hose nipples | Water Cooling |

Mechanical Rotor Suspension without Compound Stage

TURBOVAC 361, 361 C ClassicLine

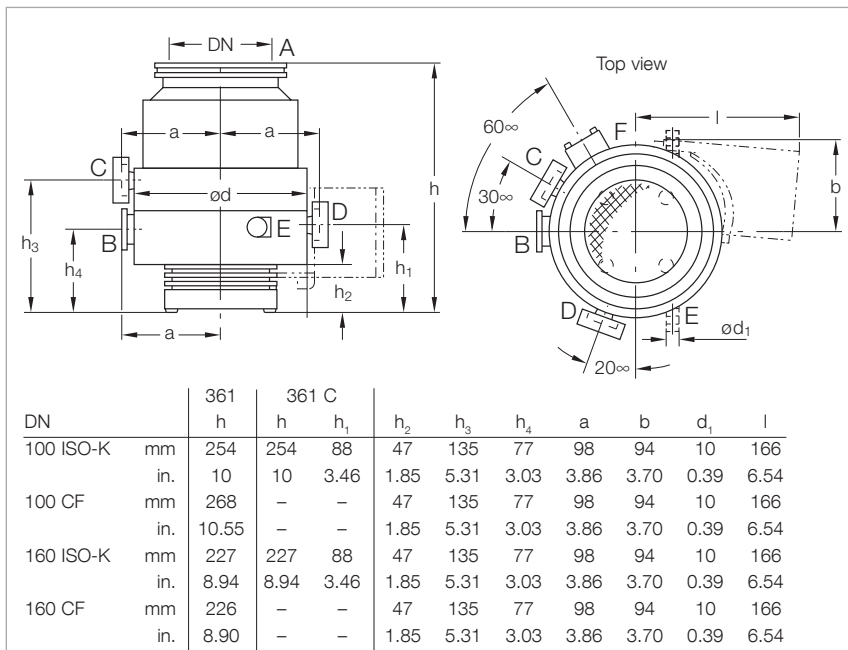


Turbomolecular pumps without a purge gas facility are only suited for pumping of air or inert gases.

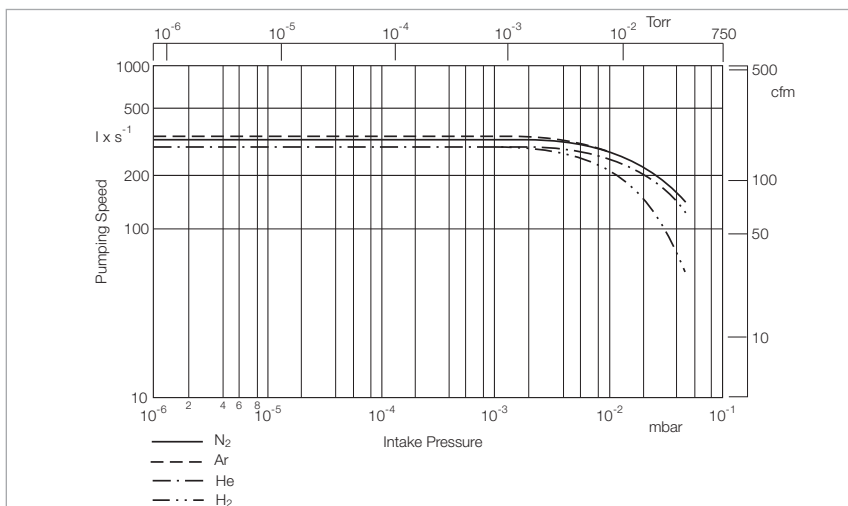
They are not suited for pumping of aggressive or reactive gases.

TURBOVAC pumps with a "C" in the type designation are equipped with a purge gas facility.

The purge gas protects the bearing area and the motor of the TURBOVAC.



Dimensional drawing for the TURBOVAC 361 and 361 C



Pumping speed as a function of the inlet pressure (TURBOVAC 361 with flange DN 100)

Typical Applications

- Leak detectors
- Mass spectrometers
- Data storage
- Optical coating
- R & D
- UHV systems
- Particle accelerators
- Load locks and transfer chambers

Technical Features

- Small footprint
- Installation in any orientation
- Oil-free pump for generating clean high and ultra-high vacuum conditions
- Bearing temperature measurement through the TURBO.DRIVE TD 20 *classic*

Advantages to the User

- Space-saving
- Easy to integrate into complex vacuum systems
- Low operating costs
- Highly reliable operation also in processes loaded with particles

Technical Data

TURBOVAC 361 (C)

| | | | |
|---|----------------------------|--|--|
| Connection | | | |
| Inlet | DN | 100 ISO-K • 100 CF | 160 ISO-K • 160 CF |
| Outlet | DN | 25 ISO-KF | 25 ISO-KF |
| Pumping speed | | | |
| N ₂ | l x s ⁻¹ | 345 | 400 |
| Ar | l x s ⁻¹ | 350 | 410 |
| He | l x s ⁻¹ | 340 | 380 |
| H ₂ | l x s ⁻¹ | 340 | 370 |
| Gas throughput | | | |
| N ₂ | mbar · l x s ⁻¹ | 3.0 | 3.0 |
| Ar | mbar · l x s ⁻¹ | 2.5 | 2.5 |
| He | mbar · l x s ⁻¹ | 3.0 | 3.0 |
| H ₂ | mbar · l x s ⁻¹ | 2.0 | 2.0 |
| Compression ratio | | | |
| N ₂ | | 1 x 10 ⁹ | 1 x 10 ⁹ |
| Ar | | 1 x 10 ⁹ | 1 x 10 ⁹ |
| He | | 6 x 10 ⁴ | 6 x 10 ⁴ |
| H ₂ | | 3 x 10 ³ | 3 x 10 ³ |
| Ultimate pressure | mbar (Torr) | < 1 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) | < 1 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 5 x 10 ⁻¹ (4 x 10 ⁻¹) | 5 x 10 ⁻¹ (3.8 x 10 ⁻¹) |
| Recommended forevacuum pump | | from TRIVAC D 16 B to D 25 B | from TRIVAC D 16 B to D 25 B |
| Nominal rotation speed | min ⁻¹ (rpm) | 45 000 | 45 000 |
| Run-up time, approx. | min | 2 | 2 |
| Max. power consumption | W | 300 | 300 |
| Power consumption at ultimate pressure | W | 70 | 70 |
| Admissible ambient temperature | °C (°F) | 10 to 55 (50 to 131) | 10 to 55 (50 to 131) |
| Cooling | | | |
| standard | | Water | Water |
| optional | | Air | Air |
| Cooling water connection | | 10 mm hose nozzle | 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 15 to 35 | 15 to 35 |
| Permissible cooling water pressure | bar | 3 to 7 | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | 10 to 25 (50 to 77) | 10 to 25 (50 to 77) |
| Weight | kg (lbs) | 12 (26) | 12 (26) |



Technical Data

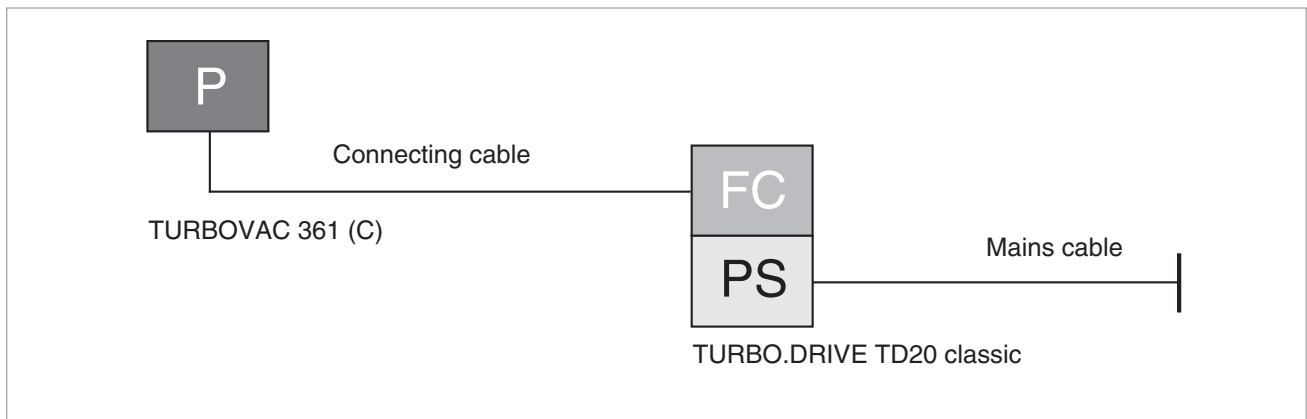
TURBO.DRIVE TD 20 classic

| | | |
|--------------------------------|----------|--|
| Mains connection | 50/60 Hz | 100 to 240 V (+15 % / -10 %) |
| Max. power consumption | W | 500 |
| Max. output voltage | V | 3 x 47 |
| Max. output current | A | 5 |
| Interface | | Without, RS 232 C, RS 485 C, Profibus or 25-way terminal strip |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 213 x 128 x 315 (8.39 x 5.04 x 12.40) |
| Weight, approx. | kg (lbs) | 4.0 (8.8) |

Ordering Information

TURBOVAC 361 (C)

| TURBOVAC 361 (C) without Compound Stage | P | Part No. | |
|---|----|--|---|
| DN 100 ISO-K, water-cooled DN 100 ISO-K, water-cooled (C version) DN 100 CF, water-cooled DN 100 CF, water-cooled (C version) DN 160 ISO-K, water-cooled DN 160 ISO-K, water-cooled (C version) DN 160 CF, water-cooled | | 856 70 856 75 856 71 112 09 856 72 856 77 856 73 |  |
| Mandatory Accessories | FC | PS | |
| TURBO.DRIVE TD 20 <small>classic</small> without interface with RS 232 C interface with RS 485 C interface with Profibus with 25-pol I/O | | 800075V0001 800075V0002 800075V0004 800075V0003 800075V0005 |  |
| Connecting cable TURBOVAC - frequency converter 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) 50 m (175.0 ft) 60 m (210.0 ft) 80 m (280.0 ft) 140 m (490.0 ft) | | 857 65 857 66 857 67 857 68 800152V0008 800152V0007 800152V0080 800152V0140 | |
| Mains cable 3 m (10.5 ft) EURO plug UK plug US plug 5-15 P 2 m (7.5 ft) US plug 115 V AC | | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 16 B 1 phase motor; 230 V, 50 Hz 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 200-240 V/380-400 V, 50 Hz / 200-240 V/380-480 V, 60 Hz | | 112 65 113 25 112 66 | |
| TRIVAC D 25 B 1 phase motor; 230 V, 50 Hz 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz | | 112 75 113 35 112 76 | |
| SCROLLVAC SC 30 D 1 phase motor; 200-230 V, 50/60 Hz 1 phase motor; 100-115 V, 50/60 Hz 3 phase motor; 380-415 V, 50 Hz / 200-230 V, 460 V, 60 Hz | | 133 002 133 102 133 004 | |
| For further types, see Catalog Parts "Oil Sealed Vacuum Pumps" and "Dry Compressing Vacuum Pumps" | | | |



Ordering Information

TURBOVAC 361 (C)

| Accessories, optional | Part No. |
|---|--|
| Air cooling unit 230 V AC 100 - 115 V AC | 855 31 800152V0016 |
| Flange heater DN 100 CF, 230 V, 50 Hz DN 100 CF, 115 V, 60 Hz DN 160 CF, 230 V, 50 Hz DN 100 CF, 115 V, 60 Hz | 854 27 854 28 854 37 854 38 |
| Vibration absorber DN 100 ISO-K DN 100 CF DN 160 ISO-K DN 160 CF | 800131V0100 500 071 500 073 500 072 |
| Solenoid venting valve, with gas admission filter, normally closed 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, with gas admission filter, normally open 24 V DC, DN 16 ISO-KF | 800120V0021 |
| Purge gas and venting valve gas flow at 1 bar 0.4 mbar x l x s ⁻¹ (24 sccm), pump connection DN 10 ISO-KF / gas connection G 1/4" 230 V AC 100 - 115 V AC 24 V DC | 800152V0014 800152V0042 800152V0013 |
| Gas filter to G 1/4" for purge gas and venting valve | 800110V0012 |
| Replacement filter | E 200 18 515 |
| Included in the Delivery of the Pump P | |
| Inlet screen, centering ring with FPM sealing ring, outer ring | ISO-K |
| Inlet screen | CF |
| Centering ring with O-ring, clamping ring | Foreline Flange |
| Pivoted threaded fittings to replace the included hose nipples | Water Cooling |

Mechanical Rotor Suspension without Compound Stage

TURBOVAC 600 C ClassicLine

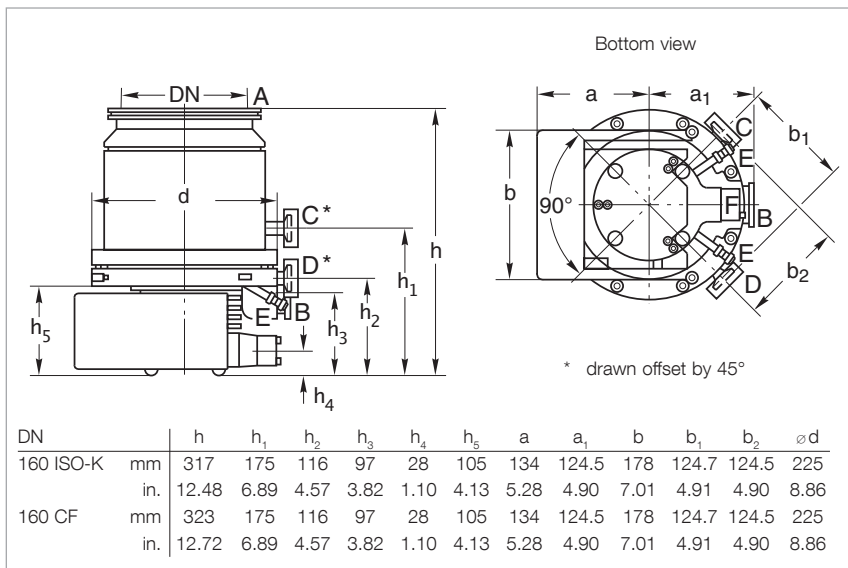


Typical Applications

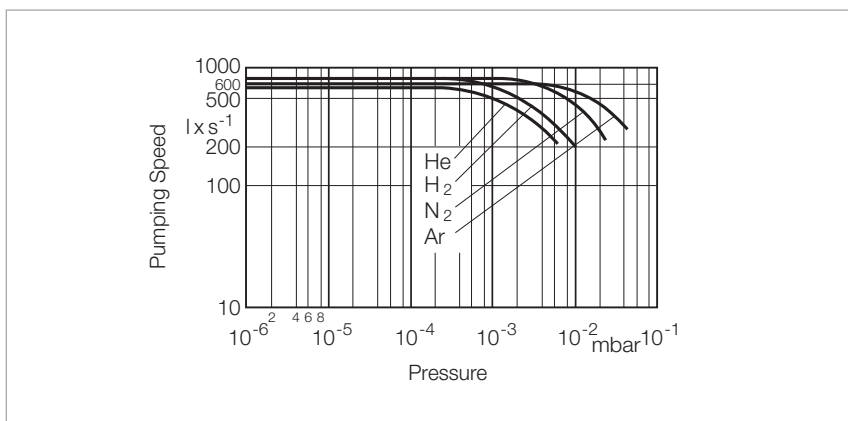
- Load locks and transfer chambers
- Optical coating
- Flat panel displays
- R & D

Technical Features

- Small footprint
- Installation in any orientation
- Oil-free pump for generating clean high and ultra-high vacuum conditions
- Bearing temperature measurement through the TURBO.DRIVE TD 20 *classic*
- Seal gas connection
- Venting connection



Dimensional drawing for the TURBOVAC 600 C



Pumping speed for different gases as a function of intake pressure
(TURBOVAC 600 C with flange DN 160 ISO-K)

Advantages to the User

- Installation in any orientation
- Highly reliable due to hybrid ceramic ball bearings

Technical Data

TURBOVAC 600 C

| | | |
|---|----------------------------|--|
| Connection | | |
| Inlet | DN | 160 ISO-K • 160 CF |
| Outlet | DN | 40 ISO-KF |
| Pumping speed | | |
| N ₂ | l x s ⁻¹ | 560 |
| Ar | l x s ⁻¹ | 550 |
| He | l x s ⁻¹ | 600 |
| H ₂ | l x s ⁻¹ | 570 |
| Gas throughput | | |
| N ₂ | mbar · l x s ⁻¹ | 4.0 |
| Ar | mbar · l x s ⁻¹ | 4.0 |
| He | mbar · l x s ⁻¹ | 5.5 |
| H ₂ | mbar · l x s ⁻¹ | 4.0 |
| Compression ratio | | |
| N ₂ | | > 10 ⁹ |
| Ar | | > 10 ⁹ |
| He | | 2.0 x 10 ⁴ |
| H ₂ | | 1.1 x 10 ³ |
| Ultimate pressure | mbar (Torr) | < 1.0 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 1.0 x 10 ⁻¹ (7.5 x 10 ⁻²) |
| Recommended forevacuum pump | | TRIVAC D 25 B / D 40 B |
| Nominal rotation speed | min ⁻¹ (rpm) | 36 000 |
| Run-up time, approx. | min | 3 |
| Max. power consumption | W | 400 |
| Power consumption at ultimate pressure | W | 90 |
| Admissible ambient temperature | °C (°F) | 10 to 55 (50 to 131) |
| Cooling | | |
| standard | | Water |
| optional | | Air |
| Cooling water connection | | 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 20 to 80 |
| Permissible cooling water pressure | bar | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | 10 to 30 (50 to 86) |
| Weight | kg (lbs) | 17.0 (37.5) |



Technical Data

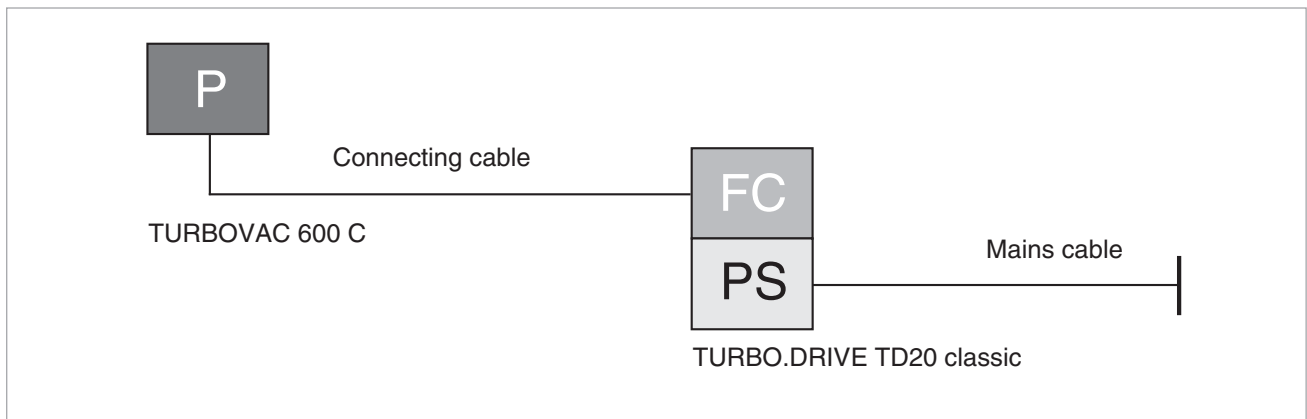
TURBO.DRIVE TD 20 *classic*

| | | |
|--------------------------------|----------|--|
| Mains connection | 50/60 Hz | 100 to 240 V (+15 % / -10 %) |
| Max. power consumption | W | 500 |
| Max. output voltage | V | 3 x 47 |
| Max. output current | A | 5 |
| Interface | | Without, RS 232 C, RS 485 C, Profibus or 25-way terminal strip |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 213 x 128 x 315 (8.39 x 5.04 x 12.40) |
| Weight, approx. | kg (lbs) | 4.0 (8.8) |

Ordering Information

TURBOVAC 600 C

| TURBOVAC 600 C without Compound Stage | P | Part No. | |
|--|---|--|---|
| DN 160 ISO-K, water-cooled DN 160 CF, water-cooled | | 800150V0015 800150V0017 |  |
| FC PS | | | |
| TURBO.DRIVE TD 20 <small>classic</small> without interface with RS 232 C interface with RS 485 C interface with Profibus with 25-pol I/O | | 800075V0001 800075V0002 800075V0004 800075V0003 800075V0005 |  |
| Connecting cable TURBOVAC - frequency converter 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) 50 m (175.0 ft) 60 m (210.0 ft) 80 m (280.0 ft) 140 m (490.0 ft) | | 857 65 857 66 857 67 857 68 800152V0008 800152V0007 800152V0080 800152V0140 | |
| Mains cable 3 m (10.5 ft) EURO plug UK plug US plug 5-15 P 2 m (7.5 ft) US plug 115 V AC | | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 25 B 1 phase motor; 230 V, 50 Hz 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz; | | 112 75 113 35 112 76 | |
| TRIVAC D 40 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 200/346 V, 50 Hz / 208/360 V, 60 Hz | | 112 86 113 47 | |
| SCROLLVAC SC 30 D 1 phase motor; 200-230 V, 50/60 Hz 1 phase motor; 100-115 V, 50/60 Hz 3 phase motor; 380-415 V, 50 Hz / 200-230 V, 460 V, 60 Hz | | 133 002 133 102 133 004 | |
| For further types, see Catalog Parts "Oil Sealed Vacuum Pumps" and "Dry Compressing Vacuum Pumps" | | | |



Ordering Information

TURBOVAC 600 C

| Accessories, optional | Part No. |
|---|--|
| Air cooling unit 230 V AC 100 - 115 V AC | 855 41 800152V0017 |
| Flange heater DN 160 CF, 230 V, 50 Hz DN 100 CF, 115 V, 60 Hz | 854 37 854 38 |
| Vibration absorber DN 160 ISO-K DN 160 CF | 500 073 500 072 |
| Solenoid venting valve, with gas admission filter, normally closed 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, with gas admission filter, normally open 24 V DC, DN 16 ISO-KF | 800120V0021 |
| Purge gas and venting valve gas flow at 1 bar 0.6 mbar x l x s ⁻¹ (36 sccm), pump connection DN 10 ISO-KF / gas connection G 1/4" 230 V AC 100 - 115 V AC 24 V DC | 800152V0040 800152V0043 800152V0012 |
| Gas filter to G 1/4" for purge gas and venting valve | 800110V0012 |
| Replacement filter | E 200 18 515 |
| Included in the Delivery of the Pump P | |
| Inlet screen, centering ring with FPM sealing ring, outer ring | ISO-K |
| Inlet screen | CF |
| Centering ring with O-ring, clamping ring | Foreline Flange |
| Pivoted threaded fittings to replace the included hose nipples | Water Cooling |

Mechanical Rotor Suspension without Compound Stage

TURBOVAC 1000 C ClassicLine

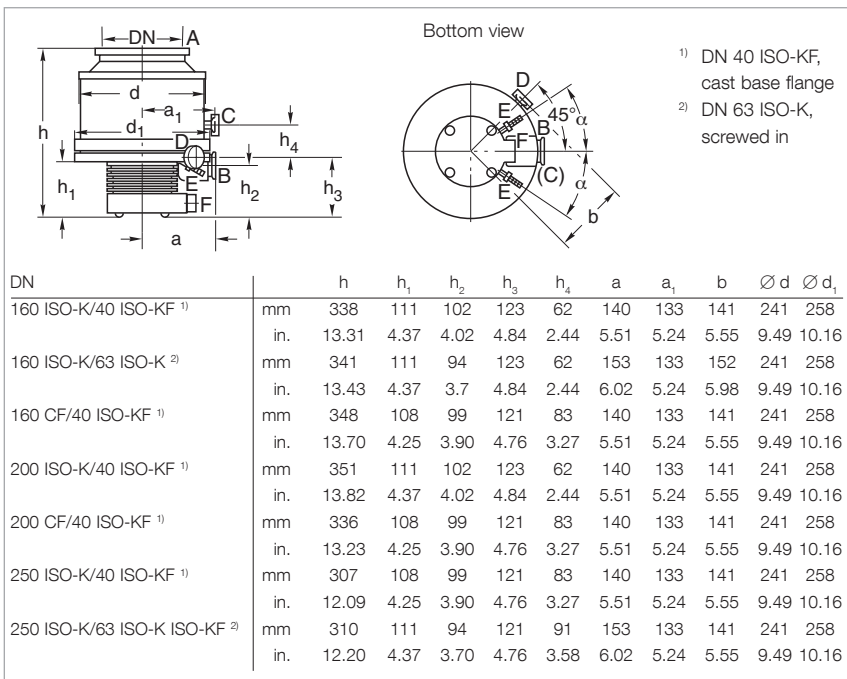


Typical Applications

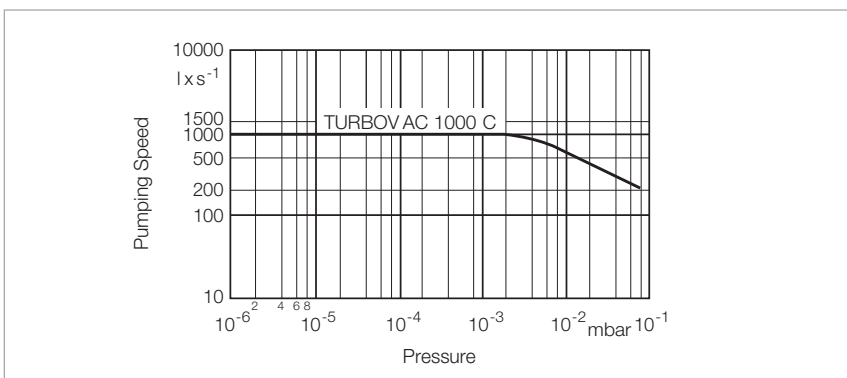
- Research systems

Technical Features

- Robust rotor design
- Installation in any orientation
- Highest pumping speed and highest throughput
- Bearing temperature measurement through the TURBO.DRIVE TD 20 *classic*
- Seal gas connection
- Venting connection



Dimensional drawing for the TURBOVAC 1000 C



Pumping speed for air as a function of intake pressure (TURBOVAC 1000 C with DN 250 flange)

Advantages to the User

- Installation in any orientation
- Highly reliable due to hybrid ceramic ball bearings
- Standard model: water cooling
- Purge gas facility

Technical Data

TURBOVAC 1000 C

| | | | | |
|--|----------------------------|--|--|--|
| Connection | | | | |
| Inlet | DN | 160 ISO-K • 160 CF | 200 ISO-K • 200 CF | 250 ISO-K |
| Outlet | DN | 40 ISO-KF • 63 ISO-K | 40 ISO-KF | 40 ISO-KF • 63 ISO-K |
| Pumping speed | | | | |
| N ₂ | l x s ⁻¹ | 850 | 1100 | 1150 |
| Ar | l x s ⁻¹ | 810 | 1050 | 1100 |
| He | l x s ⁻¹ | 880 | 975 | 1000 |
| H ₂ | l x s ⁻¹ | 900 | 970 | 1000 |
| Gas throughput | | | | |
| N ₂ | mbar · l x s ⁻¹ | 6.5 | 6.5 | 6.5 |
| Ar | mbar · l x s ⁻¹ | 4.0 | 4.0 | 4.0 |
| He | mbar · l x s ⁻¹ | 7.0 | 7.0 | 7.0 |
| H ₂ | mbar · l x s ⁻¹ | 8.0 | 8.0 | 8.0 |
| Compression ratio | | | | |
| N ₂ | | > 1 x 10 ⁹ | > 1 x 10 ⁹ | > 1 x 10 ⁹ |
| Ar | | > 1 x 10 ⁹ | > 1 x 10 ⁹ | > 1 x 10 ⁹ |
| He | | 5 x 10 ⁴ | 5 x 10 ⁴ | 5 x 10 ⁴ |
| H ₂ | | 1 x 10 ⁴ | 1 x 10 ⁴ | 1 x 10 ⁴ |
| Ultimate pressure | mbar (Torr) | < 1 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) | < 1 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) | < 1 x 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 5 x 10 ⁻² (3.8 x 10 ⁻²) | 5 x 10 ⁻² (3.8 x 10 ⁻²) | 5 x 10 ⁻² (3.8 x 10 ⁻²) |
| Recommended forevacuum pump for standard operation for purge gas operation | | TRIVAC D 25 B / D 40 B TRIVAC D 40 B / D 65 B | TRIVAC D 25 B / D 40 B TRIVAC D 40 B / D 65 B | TRIVAC D 25 B / D 40 B TRIVAC D 40 B / D 65 B |
| Nominal rotation speed | min ⁻¹ (rpm) | 36 000 | 36 000 | 36 000 |
| Run-up time, approx. | min | 9 | 9 | 9 |
| Max. power consumption | W | 300 | 300 | 300 |
| Power consumption at ultimate pressure | W | 200 | 200 | 200 |
| Admissible ambient temperature | °C (°F) | 10 to 55 (50 to 131) | 10 to 55 (50 to 131) | 10 to 55 (50 to 131) |
| Cooling standard optional | | Water Air | Water Air | Water Air |
| Cooling water connection | | 10 mm hose nozzle | 10 mm hose nozzle | 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 20 to 80 | 20 to 80 | 20 to 80 |
| Permissible cooling water pressure | bar | 3 to 7 | 3 to 7 | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | 10 to 30 (50 to 86) | 10 to 30 (50 to 86) | 10 to 30 (50 to 86) |
| Weight | kg (lbs) | 25.0 (55.1) | 25.0 (55.1) | 25 (55.1) |



Technical Data

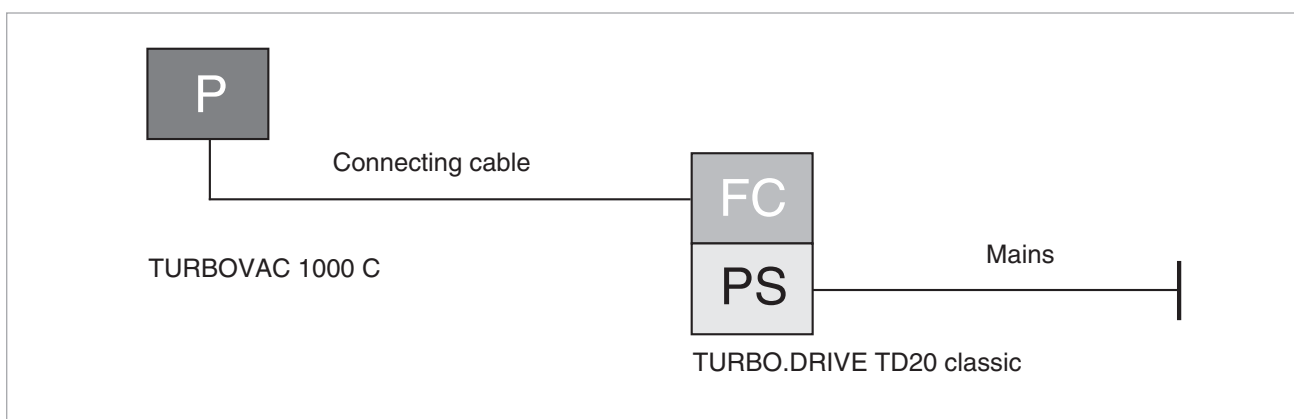
TURBO.DRIVE TD 20 *classic*

| | | |
|--------------------------------|----------|--|
| Mains connection | 50/60 Hz | 100 to 240 V (+15 % / -10 %) |
| Max. power consumption | W | 500 |
| Max. output voltage | V | 3 x 47 |
| Max. output current | A | 5 |
| Interface | | Without, RS 232 C, RS 485 C, Profibus or 25-way terminal strip |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 213 x 128 x 315 (8.39 x 5.04 x 12.40) |
| Weight, approx. | kg (lbs) | 4.0 (8.8) |

Ordering Information

TURBOVAC 1000 C

| TURBOVAC 1000 C without Compound Stage | P | Part No. | |
|---|----|--|---|
| DN 160 ISO-K / DN 40 ISO-KF, water-cooled DN 160 ISO-K / DN 63 ISO-K, water-cooled DN 160 CF / DN 40 ISO-KF, water-cooled DN 200 ISO-K / DN 40 ISO-KF, water-cooled DN 200 CF / DN 40 ISO-KF, water-cooled DN 250 ISO-K / DN 40 ISO-KF, water-cooled DN 250 ISO-K / DN 63 ISO-K, water-cooled | | 855 35 855 38 854 91 153 00 117 64 855 36 855 39 |  |
| Mandatory Accessories | FC | PS | |
| TURBO.DRIVE TD 20 <small>classic</small> without interface with RS 232 C interface with RS 485 C interface with Profibus with 25-pol I/O | | 800075V0001 800075V0002 800075V0004 800075V0003 800075V0005 |  |
| Connecting cable TURBOVAC - frequency converter 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) 50 m (175.0 ft) 60 m (210.0 ft) 80 m (280.0 ft) 140 m (490.0 ft) | | 857 65 857 66 857 67 857 68 800152V0008 800152V0007 800152V0080 800152V0140 | |
| Mains cable 3 m (10.5 ft) EURO plug UK plug US plug 5-15 P 2 m (7.5 ft) US plug 115 V AC | | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 25 B 1 phase motor; 230 V, 50 Hz 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz | | 112 75 113 35 112 76 | |
| TRIVAC D 40 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 200/346 V, 50 Hz / 208/360 V, 60 Hz | | 112 86 113 47 | |
| TRIVAC D 65 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 230/346 V, 50 Hz / 208/360 V, 60 Hz | | 112 96 113 57 | |
| SCROLLVAC SC 30 D 1 phase motor; 200-230 V, 50/60 Hz 1 phase motor; 100-115 V, 50/60 Hz 3 phase motor; 380-415 V, 50 Hz / 200-230 V, 460 V, 60 Hz | | 133 002 133 102 133 004 | |
| For further types, see Catalog Parts "Oil Sealed Vacuum Pumps" and "Dry Compressing Vacuum Pumps" | | | |



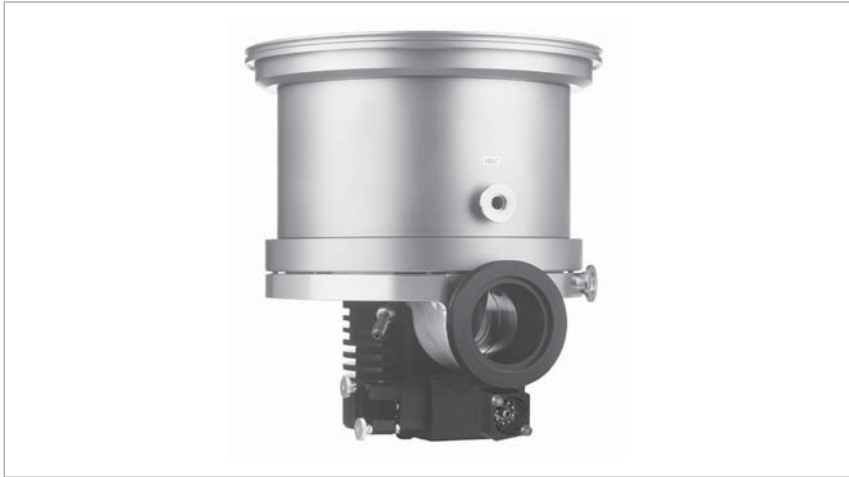
Ordering Information

TURBOVAC 1000 C

| Accessories, optional | Part No. |
|---|--|
| Air cooling unit 230 V AC 100 - 115 V AC | 855 41 800152V0017 |
| Flange heater DN 160 CF, 230 V, 50 Hz DN 100 CF, 115 V, 60 Hz | 854 37 854 38 |
| Vibration absorber DN 160 ISO-K DN 160 CF | 500 073 500 072 |
| Solenoid venting valve, with gas admission filter, normally closed 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, with gas admission filter, normally open 24 V DC, DN 16 ISO-KF | 800120V0021 |
| Purge gas and venting valve gas flow at 1 bar 0.6 mbar x l x s ⁻¹ (36 sccm), pump connection DN 10 ISO-KF / gas connection G 1/4" 230 V AC 100-115 V AC 24 V DC | 800152V0040 800152V0043 800152V0012 |
| Gas filter to G 1/4" for purge gas and venting valve | 800110V0012 |
| Replacement filter | E 200 18 515 |
| Included in the Delivery of the Pump P | |
| Inlet screen, centering ring with FPM sealing ring, outer ring | ISO-K |
| Inlet screen | CF |
| Centering ring with O-ring, clamping ring | Foreline Flange |
| Pivoted threaded fittings to replace the included hose nipples | Water Cooling |

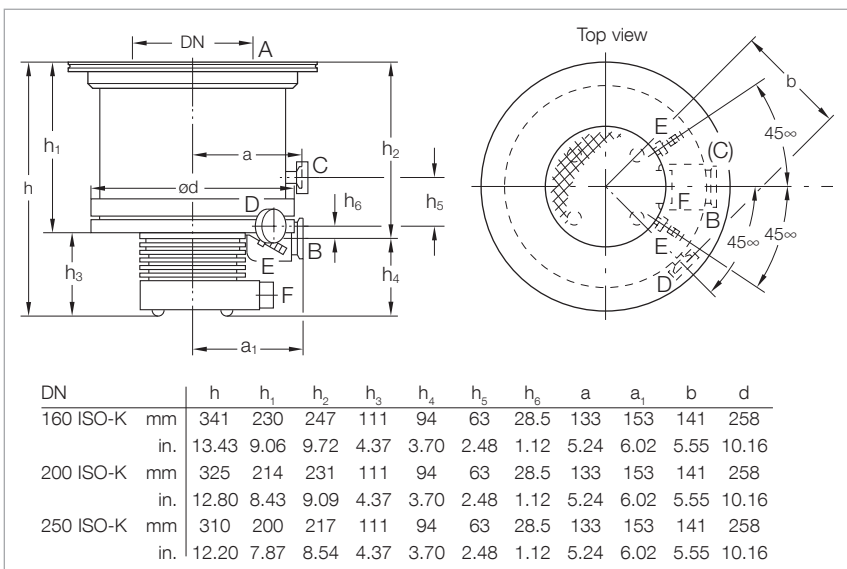
Mechanical Rotor Suspension without Compound Stage

TURBOVAC 1100 C ClassicLine

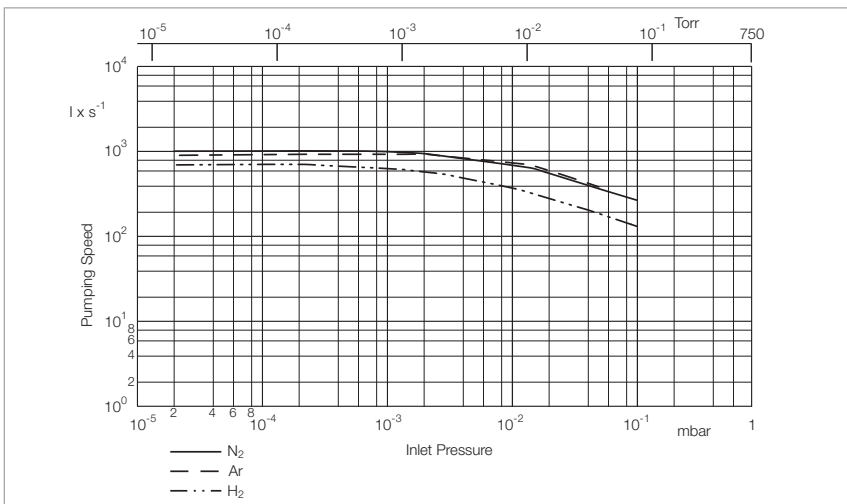


Typical Applications

- Data storage
- Flat panel displays
- Optical coating
- Large area coating
- Load locks and transfer chambers



Dimensional drawing for the TURBOVAC 1100 C



Pumping speed as a function of the inlet pressure (TURBOVAC 1100 C with flange DN 250)

Technical Features

- Robust rotor design
- Installation in any orientation
- Highest pumping speed and highest throughput
- Bearing temperature measurement through the TURBO.DRIVE TD 20 *classic*
- Oil-free pump for generating clean high and ultra-high vacuum conditions
- Seal gas connection
- Venting connection

Advantages to the User

- Space-saving
- Easy to integrate into complex vacuum systems
- High productivity
- Low operating costs
- Highly reliable operation also in processes loaded with particles

Technical Data

TURBOVAC 1100 C

| | | | | |
|---|----------------------------|---|---|---|
| Connection | | | | |
| Inlet | DN | 160 ISO-K | 200 ISO-K | 250 ISO-K |
| Outlet | DN | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| Pumping speed | | | | |
| N ₂ | l x s ⁻¹ | 710 | 830 | 1050 |
| Ar | l x s ⁻¹ | 660 | 760 | 980 |
| He | l x s ⁻¹ | 650 | 750 | 850 |
| H ₂ | l x s ⁻¹ | 520 | 600 | 630 |
| Gas throughput | | | | |
| N ₂ | mbar · l x s ⁻¹ | 6.5 | 6.5 | 6.5 |
| Ar | mbar · l x s ⁻¹ | 6.5 | 6.5 | 6.5 |
| He | mbar · l x s ⁻¹ | 8.0 | 8.0 | 8.0 |
| H ₂ | mbar · l x s ⁻¹ | 9.0 | 9.0 | 9.0 |
| Compression ratio | | | | |
| N ₂ | | $> 1 \times 10^7$ | $> 1 \times 10^7$ | $> 1 \times 10^7$ |
| Ar | | $> 1 \times 10^7$ | $> 1 \times 10^7$ | $> 1 \times 10^7$ |
| He | | 3×10^4 | 3×10^4 | 3×10^4 |
| H ₂ | | 1×10^3 | 1×10^3 | 1×10^3 |
| Ultimate pressure | mbar (Torr) | $< 3.0 \times 10^{-10}$ ($< 2.3 \times 10^{-10}$) | $< 3.0 \times 10^{-10}$ ($< 2.3 \times 10^{-10}$) | $< 3.0 \times 10^{-10}$ ($< 2.3 \times 10^{-10}$) |
| Max. foreline pressure for N ₂ | mbar (Torr) | $< 1.0 \times 10^{-1}$ ($< 7.5 \times 10^{-2}$) | $< 1.0 \times 10^{-1}$ ($< 7.5 \times 10^{-2}$) | $< 1.0 \times 10^{-1}$ ($< 7.5 \times 10^{-2}$) |
| Recommended forevacuum pump | | TRIVAC D 65 B / SCROLLVAC SC 15/30 D | TRIVAC D 65 B / SCROLLVAC SC 15/30 D | TRIVAC D 65 B / SCROLLVAC SC 15/30 D |
| Nominal rotation speed | min ⁻¹ (rpm) | 30 000 | 30 000 | 30 000 |
| Run-up time, approx. | min | 9 | 9 | 9 |
| Max. power consumption | W | 400 | 400 | 400 |
| Power consumption at ultimate pressure | W | 300 | 300 | 300 |
| Admissible ambient temperature | °C (°F) | 10 to 55 (50 to 131) | 10 to 55 (50 to 131) | 10 to 55 (50 to 131) |
| Cooling | | | | |
| standard | | Water | Water | Water |
| optional | | Air | Air | Air |
| Cooling water connection | | 10 mm hose nozzle | 10 mm hose nozzle | 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 24 to 60 | 24 to 60 | 24 to 60 |
| Permissible cooling water pressure | bar | 3 to 7 | 3 to 7 | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | 10 to 30 (50 to 86) | 10 to 30 (50 to 86) | 10 to 30 (50 to 86) |
| Weight | kg (lbs) | 22 (48) | 22 (48) | 22 (48) |



Technical Data

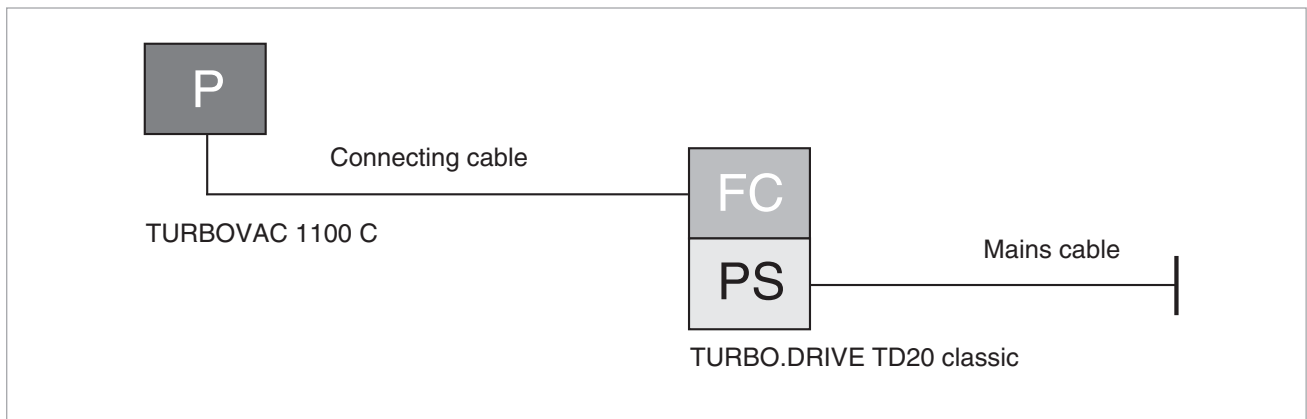
TURBO.DRIVE TD 20 *classic*

| | | |
|--------------------------------|----------|--|
| Mains connection | 50/60 Hz | 100 to 240 V (+15 % / -10 %) |
| Max. power consumption | W | 500 |
| Max. output voltage | V | 3 x 47 |
| Max. output current | A | 5 |
| Interface | | Without, RS 232 C, RS 485 C, Profibus or 25-way terminal strip |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 213 x 128 x 315 (8.39 x 5.04 x 12.40) |
| Weight, approx. | kg (lbs) | 4.0 (8.8) |

Ordering Information

TURBOVAC 1100 C

| TURBOVAC 1100 C without Compound Stage | Part No. | |
|--|--|---|
| DN 160 ISO-K / DN 63 ISO-K, water-cooled DN 200 ISO-K / DN 63 ISO-K, water-cooled DN 250 ISO-K / DN 63 ISO-K, water-cooled | 800150V0030 800150V0031 800150V0032 |  |
| Mandatory Accessories | FC | PS |
| TURBO.DRIVE TD 20 <small>classic</small> without interface with RS 232 C interface with RS 485 C interface with Profibus with 25-pol I/O | 800075V0001 800075V0002 800075V0004 800075V0003 800075V0005 |  |
| Connecting cable TURBOVAC - frequency converter 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) 50 m (175.0 ft) 60 m (210.0 ft) 80 m (280.0 ft) 140 m (490.0 ft) | 857 65 857 66 857 67 857 68 800152V0008 800152V0007 800152V0080 800152V0140 | |
| Mains cable 3 m (10.5 ft) EURO plug UK plug US plug 5-15 P 2 m (7.5 ft) US plug 115 V AC | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 65 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 230/346 V, 50 Hz / 208/360 V, 60 Hz | 112 96 113 57 | |
| SCROLLVAC SC 30 D 1 phase motor; 200-230 V, 50/60 Hz 1 phase motor; 100-115 V, 50/60 Hz 3 phase motor; 380-415 V, 50 Hz / 200-230 V, 460 V, 60 Hz | 133 002 133 102 133 004 | |
| For further types, see Catalog Parts "Oil Sealed Vacuum Pumps" and "Dry Compressing Vacuum Pumps" | | |



Ordering Information

TURBOVAC 1100 C

| Accessories, optional | Part No. |
|---|--|
| Vibration absorber DN 160 ISO-K | 500 073 |
| Solenoid venting valve, with gas admission filter, normally closed 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, with gas admission filter, normally open 24 V DC, DN 16 ISO-KF | 800120V0021 |
| Purge gas and venting valve gas flow at 1 bar 0.6 mbar x l x s ⁻¹ (36 sccm), pump connection DN 10 ISO-KF / gas connection G 1/4" 230 V AC 100-115 V AC 24 V DC | 800152V0040 800152V0043 800152V0012 |
| Gas filter to G 1/4" for purge gas and venting valve | 800110V0012 |
| Replacement filter | E 200 18 515 |
| Included in the Delivery of the Pump P | |
| Inlet screen, centering ring with FPM sealing ring, outer ring | ISO-K |
| Inlet screen | CF |
| Centering ring with O-ring, clamping ring | Foreline Flange |
| Pivoted threaded fittings to replace the included hose nipples | Water Cooling |

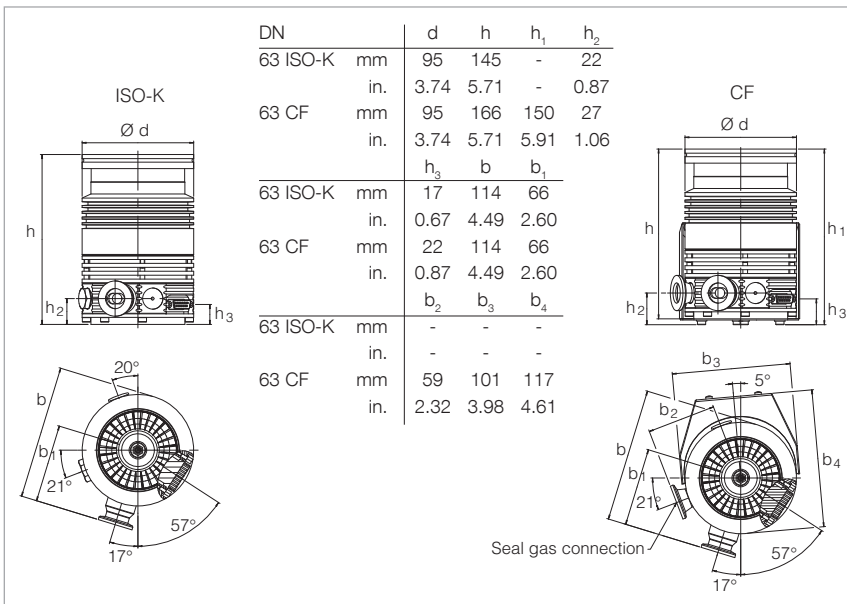
Mechanical Rotor Suspension with Frequency Converter for Attaching or Separate with or without Compound Stage

TURBOVAC SL 80 / L 80 H / SL 80 C



Typical Applications

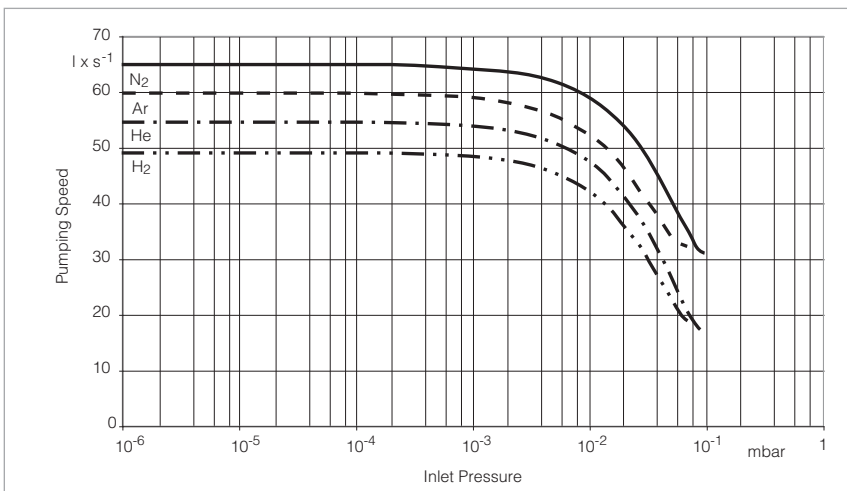
- Helium leak detectors
- Mass spectrometers (gas chromatography GC-MS), liquid chromatography (LC-MS), residual gas analysis, mobile analytical systems, etc.)
- Electron beam microscopy
- XHV-/UHV systems
- Transfer chambers



Dimensional drawing for the TURBOVAC SL 80: attachment examples

Technical Features

- Oil-free pump
- High pressure foreline tolerance
- Excellent resistance to vibration due to proven mechanical bearings
- Efficient convection cooling due to a large number of cooling fins
- Purge gas/venting connection
- Installation in any orientation
- Flexible attachment of the frequency converter to the pump
- Small footprint
- Delayed venting through the frequency converter TURBO.DRIVE TD 400 (optional)
- Selection of interfaces, USB, RS 232 C, RS 485 C, Profibus



Pumping speed as a function of the inlet pressure

Advantages to the User

- Easy to integrate into complex vacuum systems
- Space-saving
- Prepared for pumping of slightly corrosive gases owing to the seal gas connection
- High reliability, MTTF over 200,000 hours
- Matching accessories (fan, water cooling, seal gas/venting valves, power failure venting valves, flange heaters, different cable lengths etc.)
- High reliability due to self-monitoring

Technical Data

TURBOVAC

| | | SL 80 | | | SL 80 H | | SL 80 C | |
|---|----------------------------|--|---------------|---------------|--|---------------|--|--|
| Connection | | | | | | | | |
| Inlet | DN | 40 ISO-KF | 63 ISO-K | 63 CF | 63 ISO-K | 63 CF | 63 ISO-K | |
| Outlet | DN | 16 ISO-KF | | | 16 ISO-KF | | 16 ISO-KF | |
| Pumping speed | | | | | | | | |
| N ₂ | l x s ⁻¹ | 40 | 65 | 65 | 65 | | 70 | |
| Ar | l x s ⁻¹ | 34 | 60 | 60 | 60 | | 65 | |
| He | l x s ⁻¹ | 44 | 55 | 55 | 55 | | 50 | |
| H ₂ | l x s ⁻¹ | 40 | 49 | 49 | 49 | | 45 | |
| Gas throughput | | | | | | | | |
| N ₂ | mbar · l x s ⁻¹ | 2.0 | | | 0.9 | | 3.5 | |
| Ar | mbar · l x s ⁻¹ | 1.6 | | | 0.8 | | 3.5 | |
| He | mbar · l x s ⁻¹ | 1.2 | | | 1.5 | | 2.0 | |
| H ₂ | mbar · l x s ⁻¹ | 0.5 | | | 0.6 | | 1.0 | |
| Compression ratio | | | | | | | | |
| N ₂ | | > 1 x 10 ¹¹ | | | > 1 x 10 ¹¹ | | 2 x 10 ⁶ | |
| Ar | | > 1 x 10 ¹¹ | | | > 1 x 10 ¹¹ | | 2 x 10 ⁶ | |
| He | | 2 x 10 ⁶ | | | 6 x 10 ⁶ | | 6 x 10 ² | |
| H ₂ | | 4 x 10 ⁴ | | | 8 x 10 ⁴ | | 2 x 10 ² | |
| Ultimate pressure | mbar Torr) | < 2 x 10 ⁻¹⁰ ($< 1.5 \times 10^{-10}$) | | | < 2 x 10 ⁻¹⁰ ($< 1.5 \times 10^{-10}$) | | < 5 x 10 ⁻⁸ ($< 4.0 \times 10^{-6}$) | |
| Max. foreline pressure for N ₂ | mbar (Torr) | 16 (12) | | | 16 (12) | | 0.35 (0.26) | |
| Recommended forevacuum pump | | TRIVAC D 2,5 E / D 4 B SCROLLVAC SC 5 D / 15 D DIVAC 1.4 HV3 | | | TRIVAC D 2,5 E / D 4 B SCROLLVAC SC 5 D / 15 D DIVAC 1.4 HV3 | | TRIVAC D 2,5 E / D 4 B SCROLLVAC SC 5 D / 15 D – | |
| Nominal rotation speed | min ⁻¹ (rpm) | 72 000 | | | 72 000 | | 72 000 | |
| Run-up time, approx. | min | 1.5 | | | 1.5 | | 1.5 | |
| Max. power consumption | W | 120 | | | 120 | | 120 | |
| Power consumption at ultimate pressure | W | 17 | | | 17 | | 17 | |
| Admissible ambient temperature | °C (°F) | +15 to +45 (+50 to +113) | | | +15 to +45 (+50 to +113) | | +15 to +45 (+50 to +113) | |
| Cooling | | | | | | | | |
| standard | | Convection | | | Convection | | Convection | |
| optional | | Water / Air | | | Water / Air | | Water / Air | |
| Cooling water connection | | G 1/8", inside thread / 8 mm hose nozzle | | | G 1/8", inside thread / 8 mm hose nozzle | | G 1/8", inside thread / 8 mm hose nozzle | |
| Cooling water consumption | l x h ⁻¹ | 15 to 60 | | | 15 to 60 | | 15 to 60 | |
| Permissible cooling water pressure | bar | 2 to 7 | | | 2 to 7 | | 2 to 7 | |
| Permissible cooling water temperature | °C (°F) | 10 to 40 (50 to 104) | | | 10 to 40 (50 to 104) | | 10 to 40 (50 to 104) | |
| Weight, approx. | kg (lbs) | 1.8 (3.97) | 1.9 (4.19) | 3.1 (6.84) | 1.9 (4.19) | 3.1 (6.84) | 1.9 (4.19) | |





Technical Data

TURBO.DRIVE TD 400

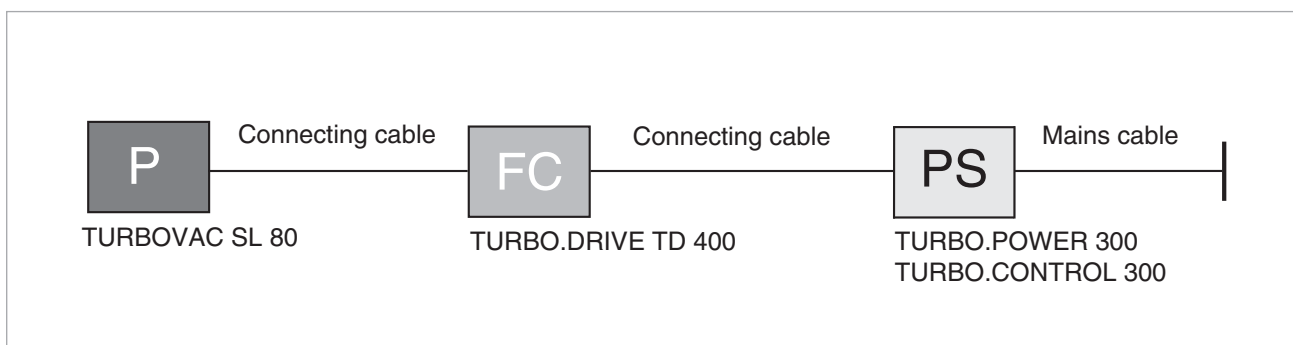
| | | |
|--------------------------------|----------|-------------------------------------|
| Mains connection | V DC | 24 |
| Max. current consumption | A | 8 |
| Max. power consumption | W | 190 |
| Max. output voltage | V | 3 x 24 |
| Interface | | USB, RS 232 C, RS 485 C or Profibus |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | +5 to +45 (+41 to +113) |
| Dimensions (W x H x D) | mm (in.) | 100 x 90 x 100 (3.9 x 3.5 x 3.9) |
| Weight, approx. | kg (lbs) | 0.7 (1.6) |

Ordering Information

TURBOVAC SL 80 / SL 80 H / SL 80 C

| TURBOVAC SL 80 P | Part No. | |
|---|---|---|
| with compound stage DN 40 ISO-KF DN 63 ISO-K / DN 16 ISO-KF DN 63 ISO-K / DN 16 ISO-KF (SL 80 H) DN 63 CF / DN 16 ISO-KF DN 63 CF / DN 16 ISO-KF (SL 80 H) without compound stage DN 63 ISO-K / DN 16 ISO-KF (SL 80 C) | 800002V3004 800002V3001 800002V3005 800002V3002 800002V3006 800002V3008 |  |
| Mandatory Accessories P FC PS | | |
| Electronic frequency converter TURBO.DRIVE TD 400 with USB interface with RS 232 C interface with RS 485 C interface with Profibus | 800073V0008 800073V0002 800073V0003 800073V0004 |  |
| Connecting cable pump - frequency converter 0.2 m (0.7 ft) 0.3 m (1.1 ft) 0.4 m (1.4 ft) 0.5 m (1.75 ft) 1.0 m (3.5 ft) 2.5 m (8.75 ft) 3.0 m (10.5 ft) 5.0 m (17.5 ft) 10.0 m (35.0 ft) | 800152V0021 800152V0023 800152V0022 800152V0050 152 47 864 49 864 40 864 50 800080V1000 | |
| Power supply and control unit TURBO.CONTROL 300 | 800100V0001 | |
| 24 V connecting cable power supply - TURBO.CONTROL 300 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | 800091V0100 800091V0300 800091V0500 800091V1000 800091V2000 |  |
| Power supply TURBO.POWER 300 | 800100V0002 | |
| 24 V connecting cable power supply - TURBO.POWER 300 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | 800094V0100 800094V0300 800094V0500 800094V1000 800094V2000 |  |
| Mains cable 3 m (10.5 ft) - TURBO.CONTROL 300 / TURBO.POWER 300 with EURO plug with UK plug with US plug 5-15 P with US plug 115 V AC, 2 m (7.5 ft) | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| START/STOP switch for manual operation of the turbomolecular pump | 152 48 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V / 220-240 V, 50/60 Hz, without plug, (world version) | 140 000 140 001 | |
| TRIVAC D 4 B 1 phase EURO motor; 230 V, 50 Hz 1 phase dual voltage motor; 100-120 V / 200-240 V; 50/60 Hz | 112 45 140 081 ¹⁾ | |
| DIVAC 1.4 HV3 90-230 V, 50/60 Hz | 127 90 V | |
| SCROLLVAC SC 5 D 1 phase motor; 200-230 V, 50/60 Hz 1 phase motor; 100-115 V, 50/60 Hz | 133 000 133 100 | |
| SCROLLVAC SC 15 D 1 phase motor; 200-230 V, 50/60 Hz 1 phase motor; 100-115 V, 50/60 Hz 3 phase motor; 380-415 V, 50 Hz / 200-230 V, 460 V, 60 Hz | 133 001 133 101 133 003 | |
| For further types, see Catalog Parts "Oil Sealed Vacuum Pumps" and "Dry Compressing Vacuum Pumps" | | |

¹⁾ The mains cord (Part No. 200 81 091) must be ordered additionally



Ordering Information

TURBOVAC SL 80 / SL 80 H / SL 80 C

| Accessories, optional | PFCPS | Part No. |
|---|-------|--|
| Mounting kit TD 400 for SL 80, incl. 0.2 m (0.7 ft.) long connecting cable pump - frequency converter for installing the frequency converter beside the pump for installing the frequency converter beneath the pump (not for 800073V0007) | | 800110V0005 800110V0008 |
| Water cooling unit with 2x G 1/8" connections, including 2 hose nozzles G 1/8" 8 mm (0.3 in.) OD, 2 gaskets (copper) 10 x 14 x 1 mm (0.4 x 0.6 x 0.04 in.) and hose clamps | | 800135V0001 |
| Air cooling unit | | 800136V0001 |
| Flange heater DN 63 CF, 230 V, 50 Hz DN 63 CF, 115 V, 60 Hz | | 854 04 854 07 |
| Inlet screen DN 40 ISO-KF DN 63 ISO-K (coarse) DN 63 CF (coarse) | | E 200 17 169 E 200 17 170 E 200 17 171 |
| Fine filter with centering ring DN 63 ISO-K | | 887 20 |
| Vibration absorber DN 63 ISO-K DN 63 CF | | 800131V0063 500 070 |
| Pump connection adapter DN 10 ISO-KF / pump connection M 8 (incl. O-ring, filter and clamping ring) | | 800110V0011 |
| Purge gas and venting valve gas flow at 1 bar 0.4 mbar x l x s ⁻¹ (24 sccm), pump connection DN 10 ISO-KF / gas connection G 1/4" 230 V AC 100 - 115 V AC 24 V DC | | 800152V0014 800152V0042 800152V0013 |
| Gas filter to G 1/4" for purge gas and venting valve | | 800110V0012 |
| Replacement filter | | E 200 18 515 |
| Power failure venting valve, normally open 24 V DC, DN 16 ISO-KF | | 800120V0021 |
| Power failure venting valve, normally open 24 V DC, DN 10 ISO-KF 230 V AC / 50/60 Hz, DN 10 ISO-KF | | 174 46 174 26 |
| Hat rail adaptor as mounting aid | | 800110V0003 |
| Fin type cooler | | 800110V0001 |

Mechanical Rotor Suspension with integrated Frequency Converter with Compound Stage

TURBOVAC TW 250 S

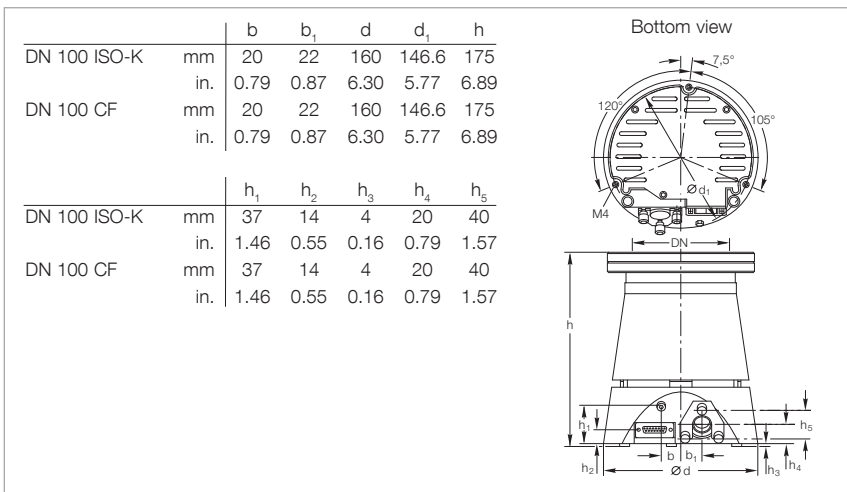


Typical Applications

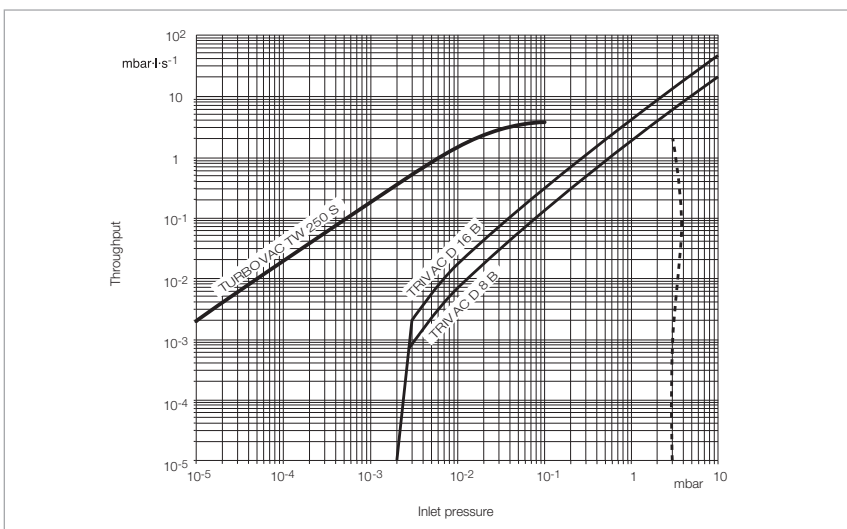
- Analytical Instruments
- Coating
- R & D
- Transfer chambers

Technical Features

- High gas throughput
- Oil-free pump
- Insensitive to impact and movement due to the mechanical bearing concept
- Installation in any orientation
- Small footprint
- Integrated fan
- Purge gas/venting connection



Dimensional drawing for the TURBOVAC TW 250 S without frequency converter



Operation diagram for nitrogen for TURBOVAC TW 250 S

Advantages to the User

- Highest throughput for N₂ and Ar
- Highest reliability in operation
- Space-saving
- High reliability due to self-monitoring
- Easy to integrate into complex vacuum systems

Technical Data**TURBOVAC TW 250 S**




| | | |
|--|----------------------------|---|
| Connection | | |
| Inlet | DN | 100 ISO-K • 100 CF |
| Outlet | DN | 16 ISO-KF |
| Pumping speed | | |
| N ₂ | l x s ⁻¹ | 230 |
| Ar | l x s ⁻¹ | 210 |
| He | l x s ⁻¹ | 150 |
| H ₂ | l x s ⁻¹ | 80 |
| Gas throughput | | |
| N ₂ | mbar · l x s ⁻¹ | 3.7 |
| Ar | mbar · l x s ⁻¹ | 3.5 |
| He | mbar · l x s ⁻¹ | 2.4 |
| H ₂ | mbar · l x s ⁻¹ | 1.1 |
| Compression ratio | | |
| N ₂ | | 1 x 10 ⁸ |
| Ar | | 1 x 10 ⁸ |
| He | | 1 x 10 ⁴ |
| H ₂ | | 5 x 10 ² |
| Ultimate pressure | mbar (Torr) | < 2 x 10 ⁻⁹ (< 1.5 x 10 ⁻⁸) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 3.0 (2.3) |
| Recommended forevacuum pump | | TRIVAC D 2,5 E TRIVAC D 8 B (at purge gas operation) |
| diaphragm pump with an ultimate pressure < 3 mbar (< 2.3 Torr) | | upon request |
| Nominal rotation speed | min ⁻¹ (rpm) | 51 600 |
| Run-up time, approx. | min | 3 |
| Max. power consumption | W | 140 |
| Power consumption at ultimate pressure | W | 20 |
| Admissible ambient temperature | °C (°F) | +15 to +40 (+59 to +104) |
| Cooling | | |
| standard | | Air |
| optional | | Water |
| Cooling water connection | | G 1/8", inside thread / 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 30 to 60 |
| Permissible cooling water pressure | bar | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | 20 to 40 (+68 to +104) |
| Weight | kg (lbs) | 5.8 (12.8) |

Technical Data**TURBO.DRIVE TD 400**

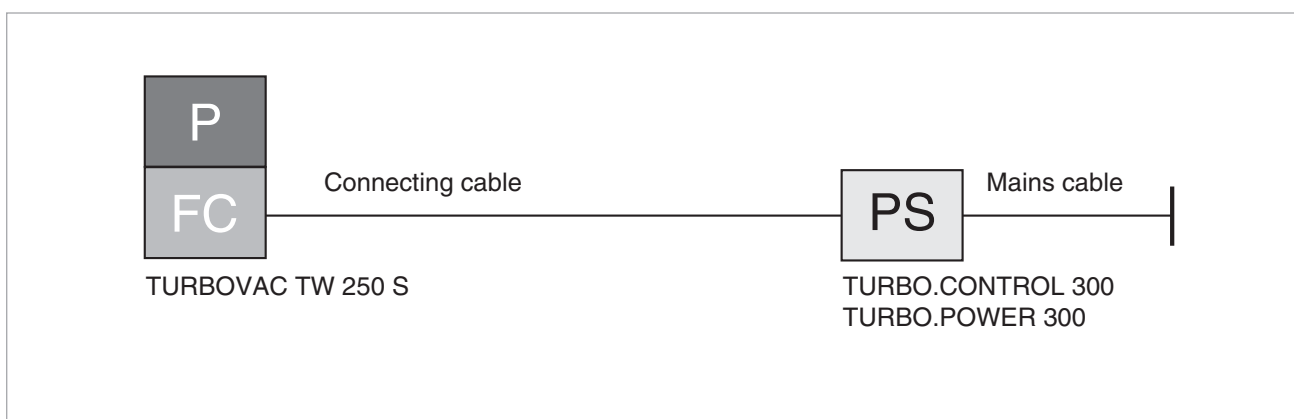
| | | |
|--------------------------------|----------|-------------------------------------|
| Mains connection | V DC | 24 |
| Max. current consumption | A | 8 |
| Max. power consumption | W | 190 |
| Max. output voltage | V | 3 x 24 |
| Interface | | USB, RS 232 C, RS 485 C or Profibus |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | +5 to +45 (+41 to +113) |
| Dimensions (W x H x D) | mm (in.) | 100 x 90 x 100 (3.9 x 3.5 x 3.9) |
| Weight, approx. | kg (lbs) | 0.7 (1.6) |

Ordering Information

TURBOVAC TW 250 S

| TURBOVAC TW 250 S with Compound Stage | | P | Part No. | |
|--|--|---|--|---|
| DN 100 ISO-K / DN 16 ISO-KF, water-cooled, Profibus DN 100 ISO-K / DN 16 ISO-KF, water-cooled, Profibus, inlet screen coarse DN 100 ISO-K / DN 16 ISO-KF, air-cooled, Profibus, inlet screen coarse DN 100 ISO-K / DN 16 ISO-KF, air-cooled, RS 232 C interface DN 100 ISO-K / DN 16 ISO-KF, air-cooled, RS 485 C interface DN 100 CF/ DN 16 ISO-KF, air-cooled, RS 232 C interface DN 100 CF / DN 16 ISO-KF, air-cooled, RS 485 C interface | | | 114 37 800150V0016 800150V0009 800150V0011 800150V0013 800150V0012 800150V0014 |  |
| Mandatory Accessories | | P | FC | PS |
| Power supply and control unit TURBO.CONTROL 300 | | | 800100V0001 |  |
| 24 V connection line frequency converter TD 400 - TURBO.CONTROL 300 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | | | 800091V0100 800091V0300 800091V0500 800091V1000 800091V2000 | |
| Power supply TURBO.POWER 300 | | | 800100V0002 |  |
| 24 V connection line frequency converter TD 400 - TURBO.POWER 300 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | | | 800094V0100 800094V0300 800094V0500 800094V1000 800094V2000 | |
| Mains cable 3 m (10.5 ft) - TURBO.CONTROL 300 / TURBO.POWER 300 with EURO plug with UK plug with US plug 5-15 P with US plug 115 V AC, 2 m (7.5 ft) | | | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| START/STOP switch for manual operation of the turbomolecular pump | | | 152 48 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V / 220-240 V, 50/60 Hz, without plug, (world version) | | | 140 000 140 001 | |
| TRIVAC D 8 B 1 phase EURO motor; 230 V, 50 Hz 1 phase dual voltage motor; 100-120 V / 200-240 V; 50/60 Hz | | | 112 55 140 082 ¹⁾ | |
| For further types, see Catalog Part “Oil Sealed Vacuum Pumps” | | | | |

¹⁾ The mains cord (Part No. 200 81 091) must be ordered additionally



Ordering Information

TURBOVAC TW 250 S

| Accessories, optional | PFCPS | Part No. |
|--|-------|------------------------|
| Flange heater | | |
| DN 100 CF, 230 V, 50 Hz | | 854 27 |
| DN 100 CF, 115 V, 60 Hz | | 854 28 |
| Inlet screen | | |
| DN 100 ISO-K (coarse) | | 800132V0101 |
| DN 100 ISO-K (fine) | | 800132V0102 |
| Vibration absorber | | |
| DN 100 ISO-K | | 800131V0100 |
| DN 100 CF | | 500 071 |
| Included in the Delivery of the Pump | P | |
| Centering ring with FPM sealing ring, clamping shoe with gasket | | Foreline Flange |
| Sealing screw and a gasket ring | | Vent Port |
| High vacuum connection elements are not part of the supplied equipment | | |

Mechanical Rotor Suspension without integrated Frequency Converter with Compound Stage

TURBOVAC TW 250 S

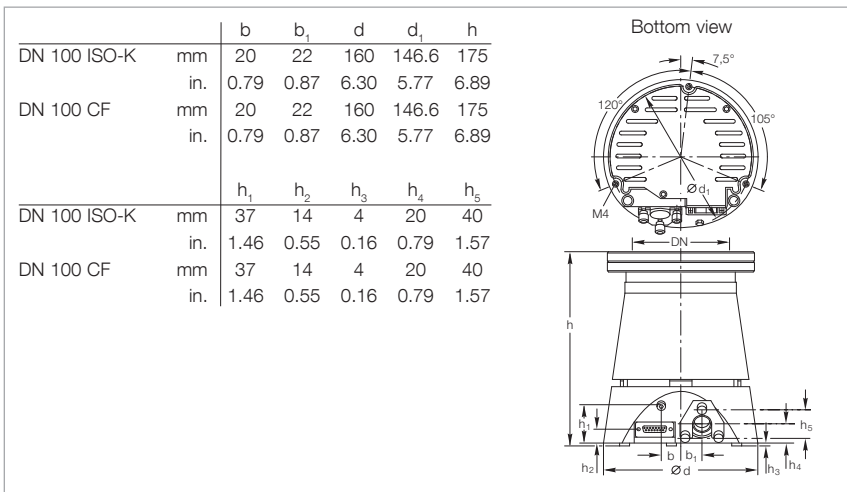


Typical Applications

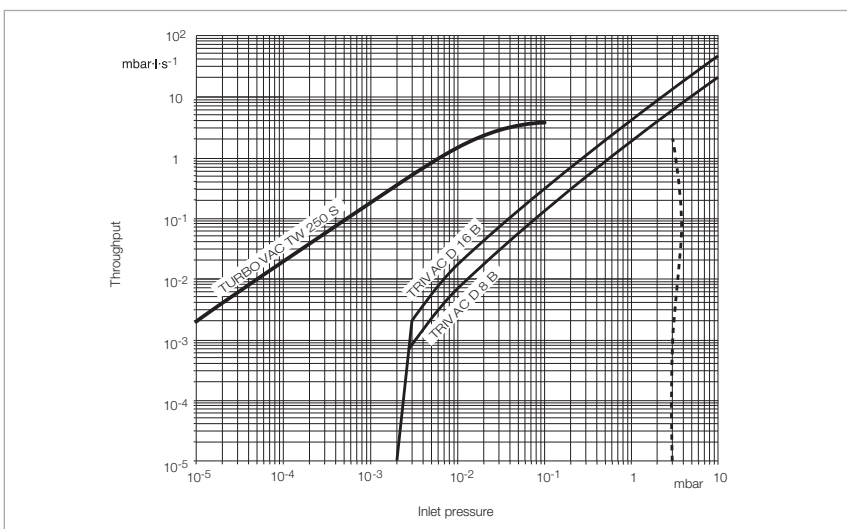
- Analytical Instruments
- Coating
- R & D
- Transfer chambers

Technical Features

- High gas throughput
- Oil-free pump
- Insensitive to impact and movement due to the mechanical bearing concept
- Installation in any orientation
- Small footprint
- Integrated fan
- Purge gas/venting connection



Dimensional drawing for the TURBOVAC TW 250 S without frequency converter



Operation diagram for nitrogen for TURBOVAC TW 250 S

Advantages to the User

- Highest throughput for N₂ and Ar
- Highest reliability in operation
- Space-saving
- High reliability due to self-monitoring
- Easy to integrate into complex vacuum systems

Technical Data

TURBOVAC TW 250 S

| | | |
|--|----------------------------|---|
| Connection | | |
| Inlet | DN | 100 ISO-K |
| Outlet | DN | 16 ISO-KF |
| Pumping speed | | |
| N ₂ | l x s ⁻¹ | 230 |
| Ar | l x s ⁻¹ | 210 |
| He | l x s ⁻¹ | 150 |
| H ₂ | l x s ⁻¹ | 80 |
| Gas throughput | | |
| N ₂ | mbar · l x s ⁻¹ | 3.7 |
| Ar | mbar · l x s ⁻¹ | 3.5 |
| He | mbar · l x s ⁻¹ | 2.4 |
| H ₂ | mbar · l x s ⁻¹ | 1.1 |
| Compression ratio | | |
| N ₂ | | 1 x 10 ⁸ |
| Ar | | 1 x 10 ⁸ |
| He | | 1 x 10 ⁴ |
| H ₂ | | 5 x 10 ² |
| Ultimate pressure | mbar (Torr) | < 2 x 10 ⁻⁹ (< 1.5 x 10 ⁻⁸) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 3.0 (2.3) |
| Recommended forevacuum pump | | TRIVAC D 2,5 E TRIVAC D 8 B (at purge gas operation) |
| diaphragm pump with an ultimate pressure < 3 mbar (< 2.3 Torr) | | upon request |
| Nominal rotation speed | min ⁻¹ (rpm) | 51 600 |
| Run-up time, approx. | min | ≈ 3 |
| Max. power consumption | W | 140 |
| Power consumption at ultimate pressure | W | 20 |
| Admissible ambient temperature | °C (°F) | +15 to +40 (+59 to +104) |
| Cooling | | |
| standard | | Air |
| optional | | Water |
| Cooling water connection | | G 1/8", inside thread / 10 mm hose nozzle |
| Cooling water consumption | l x h ⁻¹ | 30 to 60 |
| Permissible cooling water pressure | bar | 3 to 7 |
| Permissible cooling water temperature | °C (°F) | +20 to +40 (+68 to +104) |
| Weight | kg (lbs) | 5 (11) |





Technical Data

TURBO.DRIVE TD 400

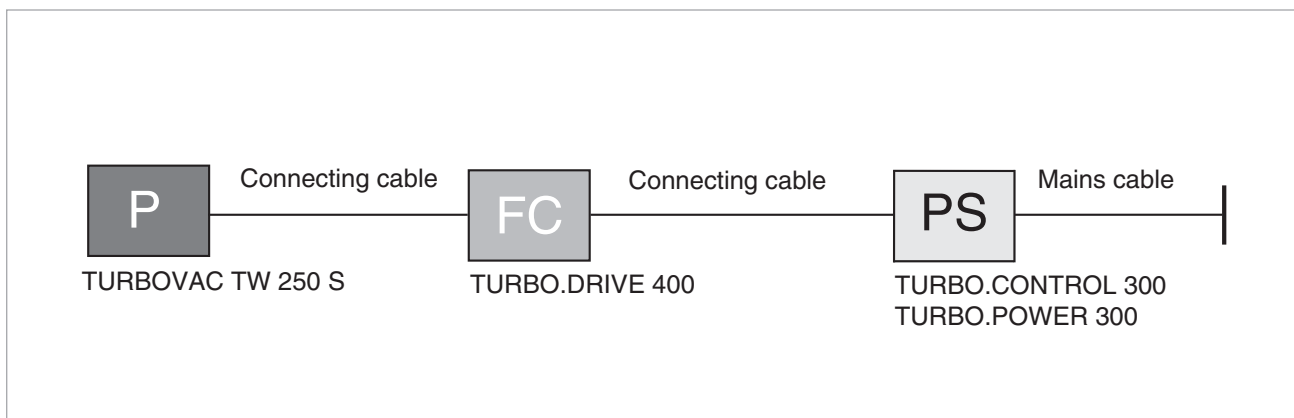
| | | |
|--------------------------------|----------|-------------------------------------|
| Mains connection | V DC | 24 |
| Max. current consumption | A | 8 |
| Max. power consumption | W | 190 |
| Max. output voltage | V | 3 x 24 |
| Interface | | USB, RS 232 C, RS 485 C or Profibus |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | +5 to +45 (+41 to +113) |
| Dimensions (W x H x D) | mm (in.) | 100 x 90 x 100 (3.9 x 3.5 x 3.9) |
| Weight, approx. | kg (lbs) | 0.7 (1.6) |

Ordering Information

TURBOVAC TW 250 S

| TURBOVAC TW 250 S with Compound Stage | P | Part No. | |
|--|---|--|---|
| DN 100 ISO-K / DN 16 ISO-KF, air-cooled, inlet screen coarse DN 100 ISO-K / DN 16 ISO-KF, air-cooled, inlet screen coarse (with vibration absorber) | | 113 52 800150V0007 |  |
| Mandatory Accessories | P | FC | PS |
| Electronic frequency converter TURBO.DRIVE TD 400 with USB interface RS 232 C interface RS 485 C interface | | 800073V0008 800073V0002 800073V0003 |  |
| Connecting cable pump - TURBO.DRIVE TD 400 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) | | 152 47 864 40 864 50 | |
| Power supply and control unit TURBO.CONTROL 300 | | 800100V0001 |  |
| 24 V connecting cable TURBO.DRIVE TD 400 - TURBO.CONTROL 300 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | | 800091V0100 800091V0300 800091V0500 800091V1000 800091V2000 | |
| Power supply TURBO.POWER 300 | | 800100V0002 |  |
| 24 V connecting cable TURBO.DRIVE TD 400 - TURBO.POWER 300 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | | 800094V0100 800094V0300 800094V0500 800094V1000 800094V2000 | |
| Mains cable 3 m (10.5 ft) - TURBO.CONTROL 300 / TURBO.POWER 300 with EURO plug with UK plug with US plug 5-15 P with US plug 115 V AC, 2 m (7.5 ft) | | 800102V0002 800102V0003 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V / 220-240 V, 50/60 Hz, without plug, (world version) | | 140 000 140 001 | |
| TRIVAC D 8 B 1 phase EURO motor; 230 V, 50 Hz 1 phase dual voltage motor; 100-120 V / 200-240 V; 50/60 Hz | | 112 55 140 082 ¹⁾ | |
| For further types, see Catalog Part "Oil Sealed Vacuum Pumps" | | | |

¹⁾ The mains cord (Part No. 200 81 091) must be ordered additionally



Ordering Information

TURBOVAC TW 250 S

| Accessories, optional | PFCPS | Part No. |
|---|-------|------------------------|
| Inlet screen | | |
| DN 100 ISO-K (coarse) | | 800132V0101 |
| DN 100 ISO-K (fine) | | 800132V0102 |
| Vibration absorber | | |
| DN 100 ISO-K | | 800131V0100 |
| DN 100 CF | | 500 071 |
| Included in the Delivery of the Pump | P | |
| Centering ring with FPM sealing ring, blank flange with clamping shoe | | Foreline Flange |
| Sealing screw and a gasket ring | | Vent Port |
| DC coupling for the power supply is included | | |

MAG INTEGRA - Magnetic Rotor Suspension with integrated Frequency Converter, with Compound Stage

TURBOVAC MAG W 300/400 iP

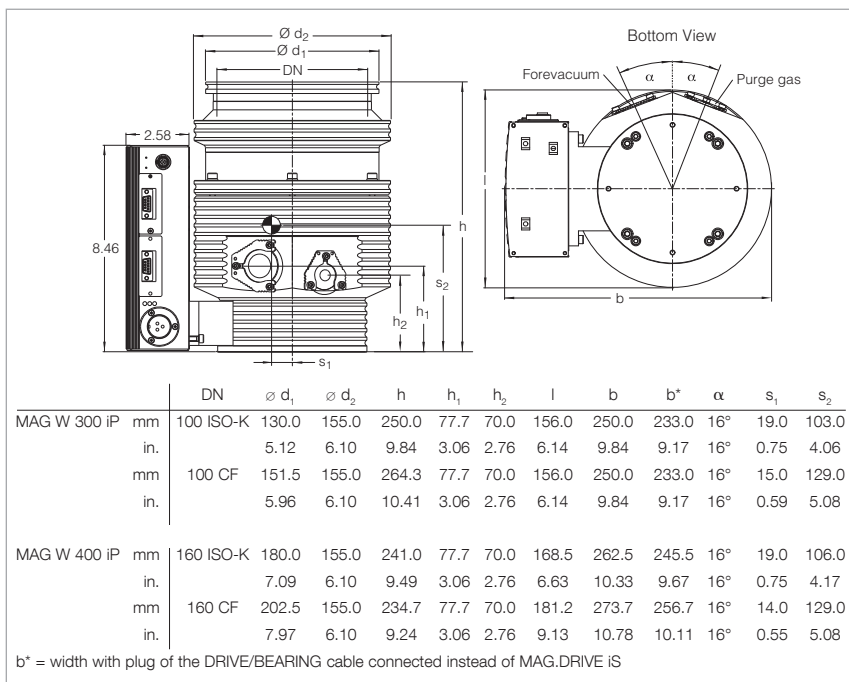


Typical Applications

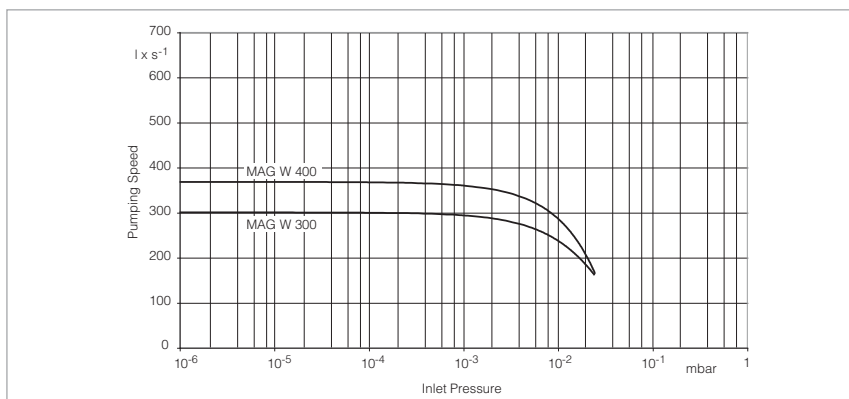
- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

- Installation in any orientation
- DN 100 or 160 ISO-K and/or CF high vacuum connection
- DN 16 ISO-KF with clamped fore vacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional
- 2 slots for industrial communications modules
- Standard 9 pin 24 V SPS PLC-IO in Control Slot
- RS 232 C in Service Slot
- further interfaces can be fitted: Profibus, RS 485 C, DeviceNet, EtherNet IP, EtherCat



Dimensional drawing for the TURBOVAC MAG W 300/400 iP



Pumping speed for N_2 of the TURBOVAC MAG W 300/400 iP as a function of the inlet pressure

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; the converter is optionally also available by way of a bench top unit

Technical Data

TURBOVAC MAG

W 300 iP

W 400 iP

| Inlet flange | DN | 100 ISO-K | 100 CF | 160 ISO-K | 160 CF |
|---|---------------------|--|--|--|--|
| Pumping speed | | | | | |
| N ₂ | l x s ⁻¹ | 300 | 300 | 365 | 365 |
| Ar | l x s ⁻¹ | 260 | 260 | 330 | 330 |
| He | l x s ⁻¹ | 260 | 260 | 280 | 280 |
| H ₂ | l x s ⁻¹ | 190 | 190 | 200 | 200 |
| Operating speed | min ⁻¹ | 58 800 | 58 800 | 58 800 | 58 800 |
| Compression ratio | | | | | |
| N ₂ | | 1.0 x 10 ¹⁰ | 1.0 x 10 ¹⁰ | 1.0 x 10 ¹⁰ | 1.0 x 10 ¹⁰ |
| H ₂ | | 3.2 x 10 ⁹ | 3.2 x 10 ⁹ | 3.2 x 10 ⁹ | 3.2 x 10 ⁹ |
| He | | 9.2 x 10 ⁴ | 9.2 x 10 ⁴ | 9.2 x 10 ⁴ | 9.2 x 10 ⁴ |
| Ultimate pressure | mbar (Torr) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁹) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁹) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) |
| Max. degassing temperature | °C (°F) | – | 80 (176) | – | 80 (176) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 8 (6) | 8 (6) | 8 (6) | 8 (6) |
| Recommended backing pump | | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B |
| Run-up time | min | < 5 | < 5 | < 5 | < 5 |
| Foreline flange (clamped) | DN | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF |
| Purge / vent port (clamped) | DN | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF |
| Water cooling connection (optional) | G | 1/8" | 1/8" | 1/8" | 1/8" |
| Weight, approx. | kg (lbs) | 12 (26) | 12 (26) | 12 (26) | 12 (26) |

Technical Data



Integrated Frequency Converter

TURBO.DRIVE iS

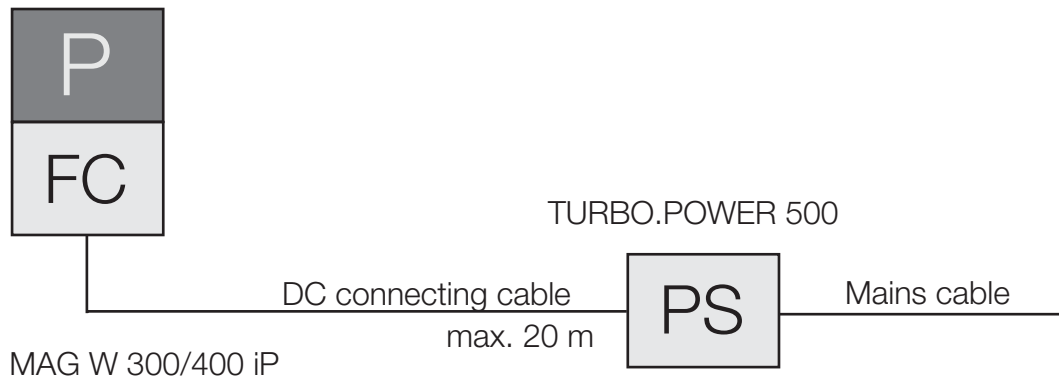
| | | | | | |
|---|------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Power supply | V | 48 | 48 | 48 | 48 |
| Ripple | % | < 2 | < 2 | < 2 | < 2 |
| Power consumption | | | | | |
| maximum | W | 400 | 400 | 400 | 400 |
| at ultimate pressure | W | 259 | 259 | 259 | 259 |
| DC current consumption, max. | A | 7.5 to 9.3 | 7.5 to 9.3 | 7.5 to 9.3 | 7.5 to 9.3 |
| DC power supply voltage range | V | 43 to 53 | 43 to 53 | 43 to 53 | 43 to 53 |
| Length of the DC connection cable, max. | | | | | |
| at 3 x 1.5 mm ² | m (ft) | 5 (17.5) | 5 (17.5) | 5 (17.5) | 5 (17.5) |
| at 3 x 2.5 mm ² | m (ft) | 20 (70.0) | 20 (70.0) | 20 (70.0) | 20 (70.0) |
| Contact rating for the relays, max. | | 32 V; 0,5 A | 32 V; 0,5 A | 32 V; 0,5 A | 32 V; 0,5 A |
| Permissible ambient temperature | | | | | |
| during operation | °C (°F) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) |
| during storage | °C (°F) | 0 to +60 (0 to +140) | 0 to +60 (0 to +140) | 0 to +60 (0 to +140) | 0 to +60 (0 to +140) |
| Relative humidity of the air, non-condensing | % | 5 to 85 | 5 to 85 | 5 to 85 | 5 to 85 |
| Protection class | IP | 30 | 30 | 30 | 30 |
| Overvoltage category | | II | II | II | II |
| Pollution category | | 2 | 2 | 2 | 2 |

Ordering Information

TURBOVAC MAG W 300/400 iP

| TURBOVAC MAG W 300 iP with Integrated Frequency Converter and Seal Gas Connection | Part No. | |
|--|---|---|
| DN 100 ISO-K DN 100 CF | 410300V0505 410300V0506 |  |
| TURBOVAC MAG W 400 iP with Integrated Frequency Converter and Seal Gas Connection | | |
| DN 160 ISO-K DN 160 CF | 410400V0505 410400V0506 | |
| Mandatory Accessories | | |
| Power supply TURBO.POWER 500 | 410300V0221 |  |
| DC cable frequency converter - power supply 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | 410300V2001 410300V2003 410300V2005 410300V2010 410300V2020 | |
| Mains cable, 3 m (10.5 ft) with EURO plug with US plug 5-15 P | 800102V0002 800102V1002 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V, 50/60 Hz; NEMA plug, US version | 140 000 140 002 | |
| TRIVAC D 8 B 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz | 112 55 112 56 | |

With integrated Frequency Converter



Ordering Information

TURBOVAC MAG W 300/400 iP

High
Vacuum Pumps

| Accessories, optional P | Part No. |
|---|---------------------|
| Inlet screen | |
| DN 100 ISO-K | |
| coarse (3.2 x 3.2 mm (0.13 x 0.13 in.)) | 800132V0101 |
| fine (1.6 x 1.6 mm (0.06 x 0.06 in.)) | 800132V0102 |
| DN 100 CF | |
| coarse (3.2 x 3.2 mm (0.13 x 0.13 in.)) | 200 91 514 |
| fine (1.6 x 1.6 mm (0.06 x 0.06 in.)) | E 200 17 195 |
| DN 160 ISO-K | E 200 00 307 |
| DN 160 CF | E 200 17 247 |
| Flange heater | |
| 100 CF, 230 V, 50 Hz | 854 27 |
| 100 CF, 115 V, 60 Hz | 854 28 |
| 160 CF, 230 V, 50 Hz | 854 37 |
| 160 CF, 115 V, 60 Hz | 854 38 |
| Water cooling unit | 410300V0101 |
| Air cooling unit | 410300V0102 |
| START/STOP switch for manual operation of the turbomolecular pump | 152 48 |
| DC plug | 800 001 694 |
| Solenoid venting valve, normally closed | |
| 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, normally open | 800120V0021 |
| Included in the Delivery of the Pump P | |
| Flanges for forevacuum, venting and purge gas are blank-flanged | |
| Centering ring with FPM sealing ring and a clamping yoke | |

MAG INTEGRA - Magnetic Rotor Suspension with integrated Frequency Converter, with Compound Stage

TURBOVAC MAG W 600/700 iP

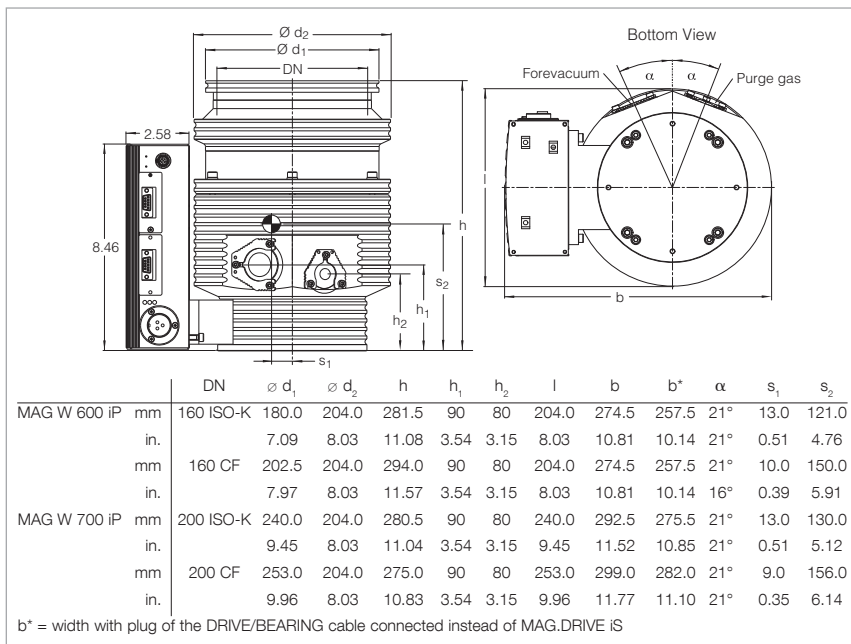


Typical Applications

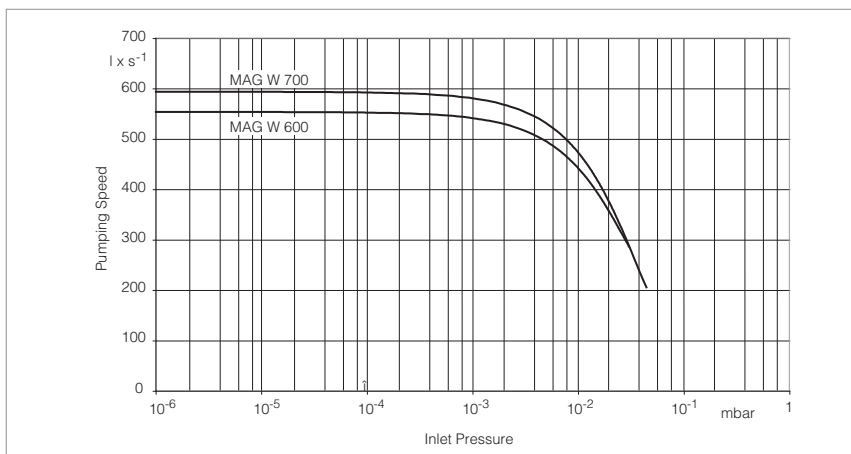
- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

- Installation in any orientation
- DN 160 or 200 ISO-K and/or CF high vacuum connection
- DN 25 ISO-KF with clamped fore-vacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional
- 2 slots for industrial communications modules
- Standard 9 pin 24 V SPS PLC-IO in Control Slot
- RS 232 C in Service Slot
- further interfaces can be fitted: Profibus, RS 485 C, DeviceNet, EtherNet IP, EtherCat



Dimensional drawing for the TURBOVAC MAG W 600/700 iP



Pumping speed for N₂ of the TURBOVAC MAG W 600/700 iP as a function of the inlet pressure

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; the converter is optionally also available by way of a bench top unit

Technical Data

TURBOVAC MAG

W 600 iP

W 700 iP

| Inlet flange | DN | 160 ISO-K | 160 CF | 200 ISO-K | 200 CF |
|---|---------------------|--|--|--|--|
| Pumping speed | | | | | |
| N ₂ | l x s ⁻¹ | 550 | 550 | 590 | 590 |
| Ar | l x s ⁻¹ | 520 | 520 | 540 | 540 |
| He | l x s ⁻¹ | 570 | 570 | 600 | 600 |
| H ₂ | l x s ⁻¹ | 410 | 410 | 430 | 430 |
| Operating speed | min ⁻¹ | 48 000 | 48 000 | 48 000 | 48 000 |
| Compression ratio | | | | | |
| N ₂ | | 1.6 x 10 ¹⁰ | 1.6 x 10 ¹⁰ | 1.6 x 10 ¹⁰ | 1.6 x 10 ¹⁰ |
| H ₂ | | 3.4 x 10 ⁴ | 3.4 x 10 ⁴ | 3.4 x 10 ⁴ | 3.4 x 10 ⁴ |
| He | | 1.7 x 10 ⁶ | 1.7 x 10 ⁶ | 1.7 x 10 ⁶ | 1.7 x 10 ⁶ |
| Ultimate pressure | mbar (Torr) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) |
| Max. degassing temperature | °C (°F) | – | 80 (176) | – | 80 (176) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 6.0 (4.5) | 6.0 (4.5) | 6.0 (4.5) | 6.0 (4.5) |
| Recommended backing pump | | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B |
| Run-up time | min | < 6 | < 6 | < 6 | < 6 |
| Foreline flange (clamped) | DN | 25 ISO-KF | 25 ISO-KF | 25 ISO-KF | 25 ISO-KF |
| Purge / vent port (clamped) | DN | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF |
| Water cooling connection (optional) | G | 1/8" | 1/8" | 1/8" | 1/8" |
| Weight, approx. | kg (lbs) | 17 (37.5) | 17 (37.5) | 17 (37.5) | 17 (37.5) |

Technical Data



Integrated Frequency Converter

TURBO.DRIVE iS

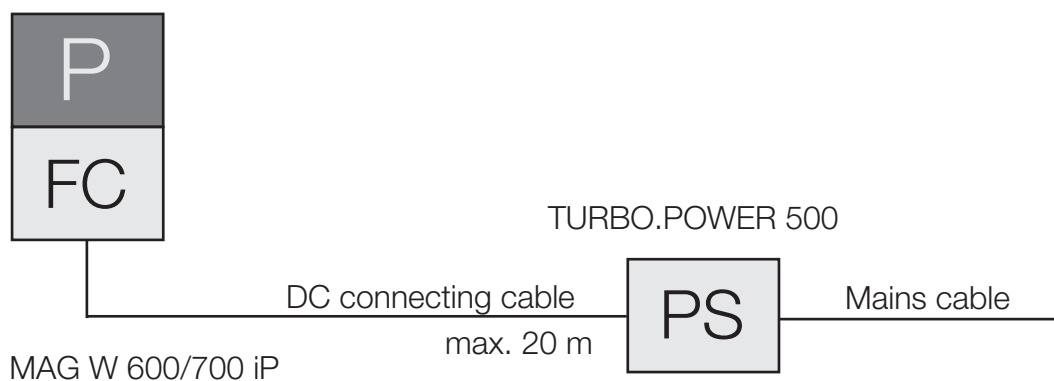
| | | | | | |
|---|------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Power supply | V | 48 | 48 | 48 | 48 |
| Ripple | % | < 2 | < 2 | < 2 | < 2 |
| Power consumption maximum at ultimate pressure | W W | 400 259 | 400 259 | 400 259 | 400 259 |
| DC current consumption, max. | A | 7.5 to 9.3 | 7.5 to 9.3 | 7.5 to 9.3 | 7.5 to 9.3 |
| DC power supply voltage range | V | 43 to 53 | 43 to 53 | 43 to 53 | 43 to 53 |
| Length of the DC connection cable, max. at 3 x 1.5 mm ² at 3 x 2.5 mm ² | m (ft) m (ft) | 5 (17.5) 20 (70.0) | 5 (17.5) 20 (70.0) | 5 (17.5) 20 (70.0) | 5 (17.5) 20 (70.0) |
| Contact rating for the relays, max. | | 32 V; 0,5 A | 32 V; 0,5 A | 32 V; 0,5 A | 32 V; 0,5 A |
| Permissible ambient temperature during operation | °C (°F) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) |
| during storage | °C (°F) | 0 to +60 (0 to +140) | 0 to +60 (0 to +140) | 0 to +60 (0 to +140) | 0 to +60 (0 to +140) |
| Relative humidity of the air, non-condensing | % | 5 to 85 | 5 to 85 | 5 to 85 | 5 to 85 |
| Protection class | IP | 30 | 30 | 30 | 30 |
| Overvoltage category | | II | II | II | II |
| Pollution category | | 2 | 2 | 2 | 2 |

Ordering Information

TURBOVAC MAG W 600/700 iP

| TURBOVAC MAG W 600 iP with Integrated Frequency Converter and Seal Gas Connection | PFC | Part No. | |
|--|-----|---|---|
| DN 160 ISO-K DN 160 CF | | 410600V0505 410600V0506 |  |
| TURBOVAC MAG W 700 iP with Integrated Frequency Converter and Seal Gas Connection | PFC | | |
| DN 200 ISO-K DN 200 CF | | 410700V0505 410700V0506 | |
| Mandatory Accessories | PFC | | |
| Power supply TURBO.POWER 500 | | 410300V0221 |  |
| DC cable frequency converter - power supply 1 m (3.5 ft) 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | | 410300V2001 410300V2003 410300V2005 410300V2010 410300V2020 | |
| Mains cable, 3 m (10.5 ft) with EURO plug with US plug 5-15 P | | 800102V0002 800102V1002 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V, 50/60 Hz; NEMA plug, US version | | 140 000 140 002 | |
| TRIVAC D 8 B 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz | | 112 55 112 56 | |

With integrated Frequency Converter



Ordering Information

TURBOVAC MAG W 600/700 iP

| Accessories, optional P | Part No. |
|---|---------------------|
| Inlet screen | |
| DN 160 ISO-K | E 200 00 307 |
| DN 160 CF | E 200 17 247 |
| DN 200 ISO-K | 200 91 639 |
| DN 200 CF | 400 001 515 |
| Flange heater | |
| 160 CF, 230 V, 50 Hz | 854 37 |
| 160 CF, 115 V, 60 Hz | 854 38 |
| Water cooling unit | 410600V0101 |
| Air cooling unit | 410600V0102 |
| START/STOP switch for manual operation of the turbomolecular pump | 152 48 |
| DC plug | 800 001 694 |
| Solenoid venting valve, normally closed | |
| 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, normally open | 800120V0021 |
| Included in the Delivery of the Pump P | |
| Flanges for forevacuum, venting and purge gas are blank-flanged | |
| Centering ring with FPM sealing ring and a clamping yoke | |

MAG INTEGRA - Magnetic Rotor Suspension with integrated Frequency Converter, with Compound Stage

TURBOVAC MAG W 1300 iP(L) to 2200 iP(L)

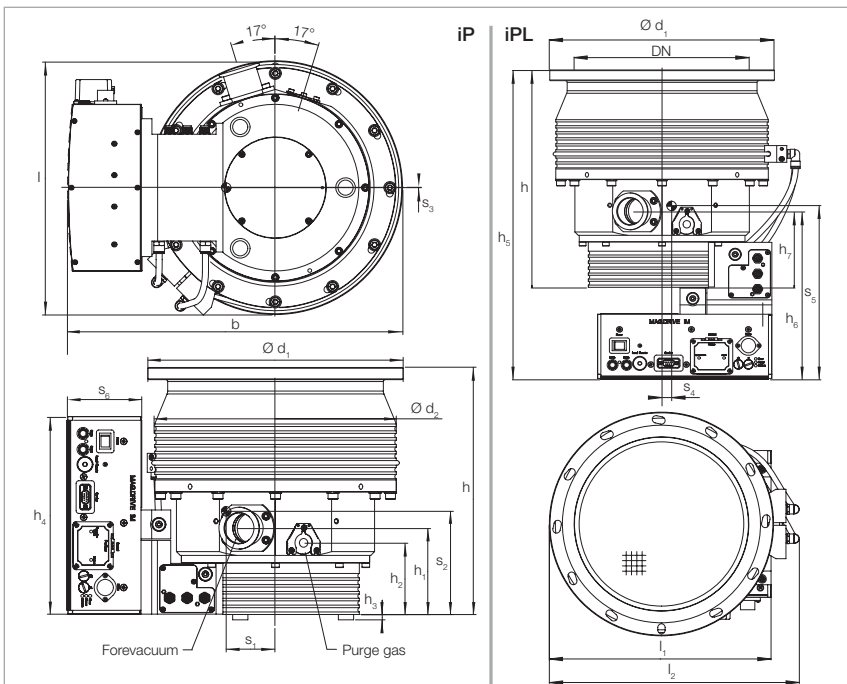


Typical Applications

- PVD coatings systems
- Coating of architectural glass
- Optical coatings
- LC displays
- Flat panels
- Research
- Analytical systems

Technical Features

- Installation in any orientation
- DN 200 and/or 250 in ISO-F and/or CF high vacuum connection
- DN 40 KF forevacuum connection
- Purge gas/venting connection
DN 16 KF with clamped connection (purge/vent)
- Water cooling
- Protection class IP 54
- 2 slots for industrial communications modules
 - Standard ProfiBus
 - RS 232 C in Service Slot
 - further interfaces can be fitted:
RS 485 C, 9 pin 24 V PLC,
DeviceNet, EtherNet IP, EtherCat



| Type | DN | | b | d ₁ | d ₂ | h | h ₁ | h ₂ | h ₃ | h ₄ | h ₅ | h ₆ |
|-----------------|-----------|-----|---------------------|---------------------|---------------------|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| MAG W 1300 | 200 ISO-F | mm | 420 ¹⁾ | 285 | 285 | 305 | 114 | 94 | 7 | 260 | 442 | 251 |
| | | in. | 16.54 ¹⁾ | 11.22 | 11.22 | 12.01 | 4.49 | 3.70 | 0.38 | 10.24 | 17.40 | 9.88 |
| | 200 CF | mm | 416 | 254 | 285 | 335 | 114 | 94 | 7 | 260 | 472 | 251 |
| | | in. | 16.38 | 10.00 | 11.22 | 13.19 | 4.49 | 3.70 | 0.38 | 10.24 | 18.58 | 9.88 |
| MAG W 1600/1700 | 250 ISO-F | mm | 442 | 335 | 317 | 325 | 114 | 94 | 7 | 260 | 463 | 251 |
| | | in. | 17.40 | 13.19 | 12.48 | 12.80 | 4.49 | 3.70 | 0.38 | 10.24 | 18.23 | 9.88 |
| | 250 CF | mm | 432 | 305 | 317 | 330 | 114 | 94 | 7 | 260 | 467 | 251 |
| | | in. | 17.01 | 12.01 | 12.48 | 12.99 | 4.49 | 3.70 | 0.38 | 10.24 | 18.39 | 9.88 |
| MAG W 2200 | 250 ISO-F | mm | 450 | 335 | 349 | 355 | 114 | 94 | 7 | 260 | 492 | 251 |
| | | in. | 17.18 | 13.19 | 13.74 | 13.19 | 4.49 | 3.70 | 0.38 | 10.24 | 19.37 | 9.88 |
| | 250 CF | mm | 446 | 305 | 349 | 372 | 114 | 94 | 7 | 260 | 506 | 251 |
| | | in. | 17.56 | 12.01 | 13.74 | 14.65 | 4.49 | 3.70 | 0.38 | 10.24 | 19.92 | 9.88 |
| | | | h ₇ | l | l ₁ | l ₂ | s ₁ | s ₂ | s ₃ | s ₄ | s ₅ | s ₆ |
| MAG W 1300 | 200 ISO-F | mm | 114 | 311 ¹⁾ | 311 ¹⁾ | 332 ¹⁾ | 42 | 140 | 0 | 15 | 241 | 98 |
| | | in. | 4.49 | 12.24 ¹⁾ | 12.24 ¹⁾ | 13.07 ¹⁾ | 1.65 | 5.51 | 0 | 0.59 | 9.49 | 3.86 |
| | 200 CF | mm | 114 | 307 | 307 | — | 32 | 164 | 0 | — | — | 98 |
| | | in. | 4.49 | 12.09 | 12.09 | — | 1.26 | 6.46 | 0 | — | — | 3.86 |
| MAG W 1600/1700 | 250 ISO-F | mm | 114 | 335 | 331 | 374 | 39 | 154 | 0 | 14 | 259 | 98 |
| | | in. | 4.49 | 13.19 | 12.24 | 14.72 | 1.54 | 6.06 | 0 | 0.55 | 10.20 | 3.86 |
| | 250 CF | mm | 114 | 335 | 322 | — | 29 | 173 | 0 | 9 | 285 | 98 |
| | | in. | 4.49 | 13.19 | 12.68 | — | 1.14 | 6.81 | 0 | 0.35 | 11.22 | 3.86 |
| MAG W 2200 | 250 ISO-F | mm | 114 | 343 | 340 | 392 | 34 | 165 | 0 | 12 | 272 | 98 |
| | | in. | 4.49 | 13.50 | 13.39 | 15.43 | 1.34 | 6.50 | 0 | 0.47 | 10.71 | 3.86 |
| | 250 CF | mm | 114 | 339 | 340 | — | 26 | 187 | 0 | 8 | 302 | 98 |
| | | in. | 4.49 | 13.35 | 13.39 | — | 1.02 | 7.36 | 0 | 0.32 | 11.89 | 3.86 |

¹⁾ 4 mm (0.16 in.) for cooling coil

Dimensional drawing for the MAG INTEGRA, dimensions in mm

Advantages to the User

- Highest pumping speed and gas throughput from a very small size
- Rugged and reliable operation in industrial applications
- Sets new benchmarks for maintenance-free systems
- Suited for vibration sensitive applications in the areas of analytical, thin-film, electron microscopy, research and development among others.
- Flexibility through the modular concept; the converter is either attached to the side or under the pump

Technical Data

TURBOVAC MAG W

| | | 1300 iP(L) | 1600 iP(L) Booster | 1700 iP(L) | 2200 iP(L) |
|--|---------------------|--|--|--|--|
| Inlet flange | DN | 200 ISO-F 200 CF | 250 ISO-F | 250 ISO-F 250 CF | 250 ISO-F 250 CF |
| Pumping speed | | | | | |
| N ₂ | l x s ⁻¹ | 1100 | 1600 | 1610 | 2100 |
| Ar | l x s ⁻¹ | 1050 | 1470 | 1480 | 1900 |
| He | l x s ⁻¹ | 1220 | 1770 | 1710 | 2050 |
| H ₂ | l x s ⁻¹ | 1130 | 1570 | 1660 | 1750 |
| Operating speed | min ⁻¹ | 37 800 | 33 000 | 33 000 | 30 600 |
| standby speed adjustable from to nominal speed | min ⁻¹ | 13 800 (230 Hz) | 13 800 (230 Hz) | 13 800 (230 Hz) | 13 800 (230 Hz) |
| Max. compression ratio | | | | | |
| N ₂ | | > 10 ⁸ | > 10 ⁷ | > 10 ⁸ | > 10 ⁸ |
| Ar | | > 10 ⁸ | > 10 ⁷ | > 10 ⁸ | > 10 ⁸ |
| He at 1 sccm | | 2.0 x 10 ⁵ | 6.0 x 10 ⁴ | 2.0 x 10 ⁵ | 5.0 x 10 ⁴ |
| H ₂ at 1 sccm | | 8.0 x 10 ³ | 1.0 x 10 ³ | 4.0 x 10 ³ | 5.0 x 10 ³ |
| Max. gas throughput | | | | | |
| N ₂ briefly, e.g. during pumpdown | | | | | |
| mbar x l x s ⁻¹ | | 30 | 60 | 30 | 30 |
| N ₂ in continuous operation | | | | | |
| mbar x l x s ⁻¹ | | 20 | 30 | 20 | 17 |
| Ar briefly, e.g. during pumpdown | | | | | |
| mbar x l x s ⁻¹ | | 20 | 30 | 20 | 20 |
| Ar in continuous operation | | | | | |
| mbar x l x s ⁻¹ | | 15 | 20 | 15 | 12 |
| Ultimate pressure | | | | | |
| ISO-F flange | mbar (Torr) | < 10 ⁻⁸ (< 7.5 x 10 ⁻⁹) | < 10 ⁻⁸ (< 7.5 x 10 ⁻⁹) | < 10 ⁻⁸ (< 7.5 x 10 ⁻⁹) | < 10 ⁻⁸ (< 7.5 x 10 ⁻⁹) |
| CF flange | mbar (Torr) | < 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) | — | < 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) | < 10 ⁻¹⁰ (< 7.5 x 10 ⁻¹¹) |
| Max. degassing temperature | °C (°F) | 80 (176) | 80 (176) | 80 (176) | 80 (176) |
| Max. foreline pressure | | | | | |
| N ₂ | mbar (Torr) | 4.0 (3.00) | 1.0 (0.75) | 4.0 (3.00) | 2.5 (1.9) |
| Ar | mbar (Torr) | 0.6 (0.45) | 1.0 (0.75) | 0.6 (0.45) | 2.5 (1.9) |
| Recommended backing pump | | TRIVAC B or dry compressing pumps | | | |
| Run-up time | min | < 5 | < 7 | < 7 | < 10 |
| Foreline flange | DN | 40 KF | 40 KF | 40 KF | 40 KF |
| Purge / vent port (clamped) | DN | 16 KF | 16 KF | 16 KF | 16 KF |
| Water cooling connection | G | 1/8" | 1/8" | 1/8" | 1/8" |
| Weight, approx. | kg (lbs) | 40 (88) | 45 (99) | 45 (99) | 50 (110) |
| Noise level acc. ISO 3744 | dB(A) | < 41 | < 41 | < 41 | < 41 |
| Vibration level at high vacuum flange at max. speed | µm | 0.01 | 0.01 | 0.01 | 0.01 |

Technical Data


Integrated Frequency Converter

MAG.DRIVE iM

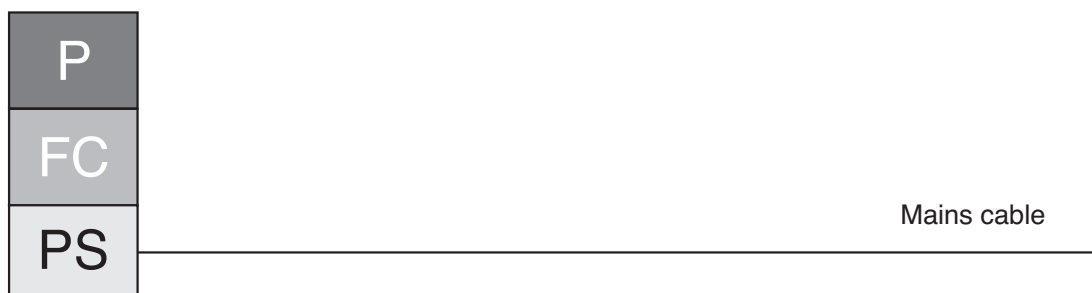
| | | |
|---|---------|--------------------------|
| Power supply | V | 200 - 240 ±10% |
| Mains frequency | Hz | 50 / 60 |
| Power consumption | | |
| maximum | W | 750 |
| at ultimate pressure | W | 150 |
| Contact rating for the relays, max. | | 32 V, 0.5 A |
| Permissible ambient temperature | | |
| during operation | °C (°F) | +10 to +45 (+50 to +113) |
| during storage | °C (°F) | -10 to +60 (+14 to +140) |
| Relative humidity of the air, non-condensing | % | 5 to 85 |
| Protection class | IP | 54 |
| Overvoltage category | | II |
| Pollution category | | 2 |

Ordering Information

TURBOVAC MAG W 1300/1600/1700/2200 iP(L)

| TURBOVAC MAG W 1300 with Integrated Frequency Converter and Purge Gas Connection | Part No. | |
|--|--|---|
| <div>PFCPS</div> MAG W 1300 iP, DN 200 ISO-F, Profibus MAG W 1300 iP, DN 200 ISO-F, 24 V SPS interface MAG W 1300 iP, DN 200 CF, Profibus MAG W 1300 iP, DN 200 CF, 24 V SPS interface MAG W 1300 iPL, DN 200 ISO-F, Profibus MAG W 1300 iPL, DN 200 ISO-F, 24 V SPS interface MAG W 1300 iPL, DN 200 CF, Profibus MAG W 1300 iPL, DN 200 CF 24 V SPS interface | 411300V0504 411300V0514 411300V0506 411300V0516 411300V0704 411300V0714 411300V0706 411300V0716 |  |
| <div>PFCPS</div> TURBOVAC MAG W 1600 Booster with Integrated Frequency Converter and Purge Gas Connection | | |
| <div>PFCPS</div> TURBOVAC MAG W 1700 with Integrated Frequency Converter and Purge Gas Connection | | |
| <div>PFCPS</div> TURBOVAC MAG W 2200 with Integrated Frequency Converter and Purge Gas Connection | | |
| Other interfaces upon request | | |

With integrated Frequency Converter and Power Supply



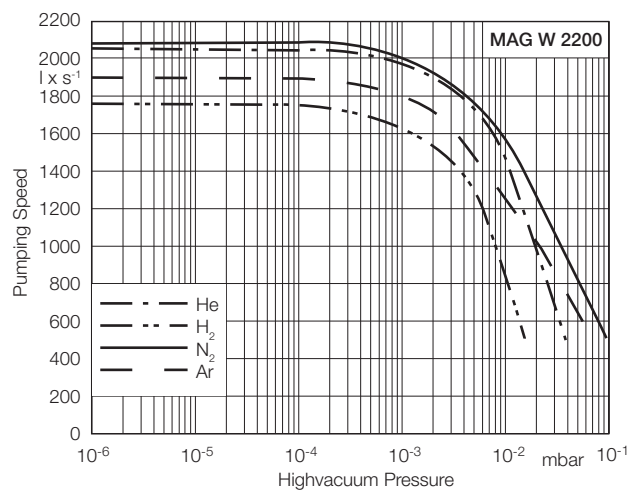
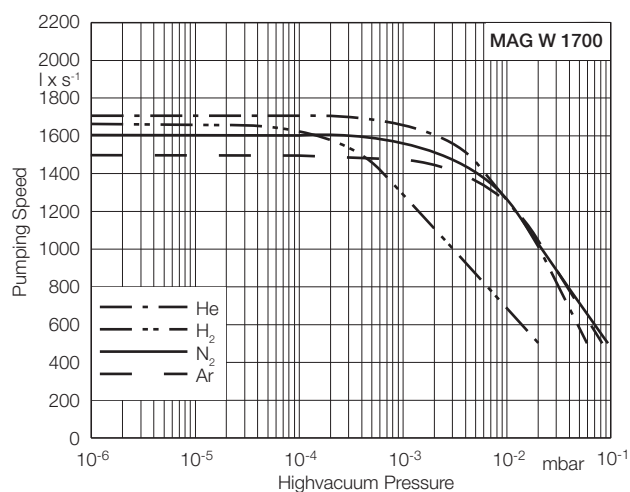
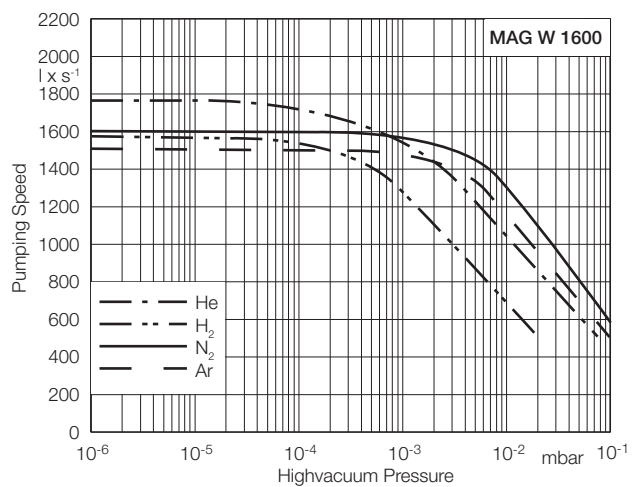
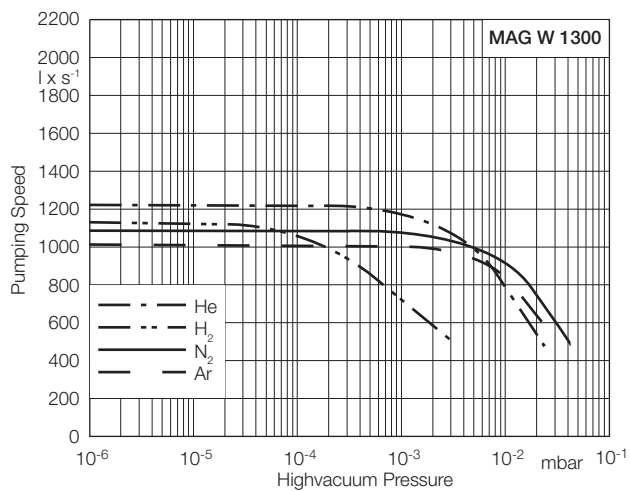
MAG W 1300 iP(L),
MAG W 1600 iP(L) Booster,
MAG W 1700 iP(L),
MAG W 2200 iP(L)

Ordering Information

TURBOVAC MAG W 1300/1600/1700/2200 iP(L)

High
Vacuum Pumps

| Mandatory Accessories | P | Part No. |
|--|---------|--------------------------------------|
| Set of bolts, nuts and washers for ISO-F flange (12 each) Bolts M 10 x 50 Bolts M 10 x 35 | | 400153V0012 400153V0010 |
| Centering with O-ring Al/FPM DN 200 DN 250 Stainless steel/FPM DN 200 DN 250 | | 268 44 268 45 887 02 887 08 |
| Set of bolts, nuts and washers for CF flange (8 each) Bolts M 8 x 40 (For DN 200, 3 sets are required; for DN 250, 4 sets) | | 400153V0016 |
| Copper gasket rings for CF flange DN 200 (Set of 10 pieces) DN 250 (Set of 5 pieces) | | 839 47 839 48 |
| Set of hex. bolts with nuts, bolts and washers for CF flange DN 200 DN 250 (2 sets required) | | 839 07 839 07 |
| Accessories, optional | P FC PS | |
| Mains cable, 2.5 m (8.75 ft) with EURO plug with US plug | | 411310V03 411320V03 |
| Seal Kit DN 250 Metal | | 200 07 901 |
| Seal kit, metal, for other flanges | | upon request |
| Purge gas and venting valve 24 V DC 0.6 mbar-l/s at 1.5 to 6 bar 0.6 mbar-l/s at 1 to 1.5 bar Cable set (2 pieces) for connection to the pump | | 121 33 800152V0010 411300V01 |
| Cooling water valve kit | | 411300V02 |
| Spare Parts Inlet screen DN 200 ISO-F and DN 200 CF DN 250 ISO-F and DN 250 CF | | E 200 04 558 E 200 04 557 |
| Included in the Delivery of the Pump | P | |
| Flanges for forevacuum, venting and purge gas are blank-flanged | | |
| Converter-side mains plug (IP 54) | | |
| Inlet screen | | |



Pumping speed curves of the MAG W 1300, W 1600, W 1700 and W 2200

MAG DIGITAL - Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 300/400 P



Typical Applications

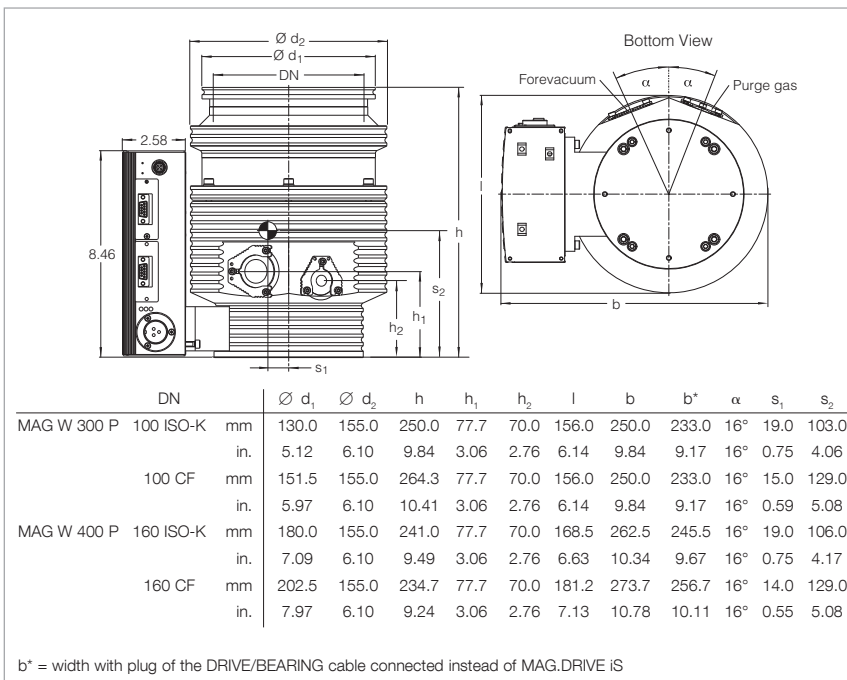
- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

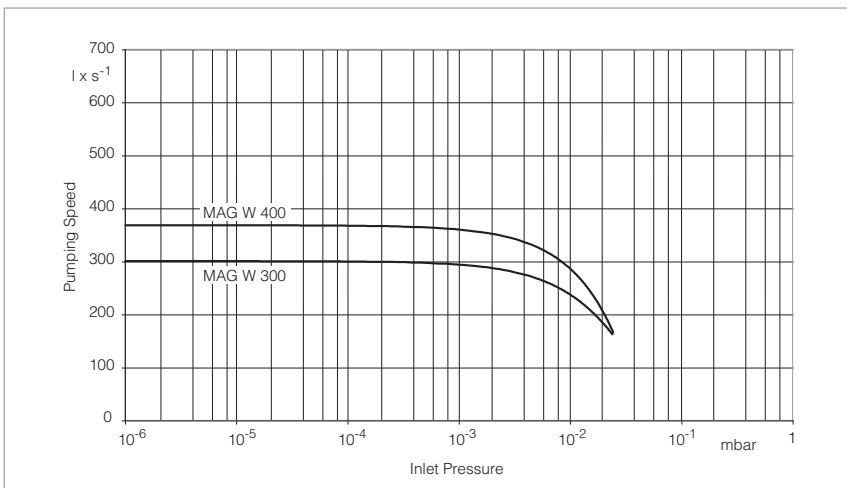
- Installation in any orientation
- DN 100 or 160 ISO-K and/or CF high vacuum connection
- DN 16 ISO-KF with clamped forevacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; alternatively the pump is available also with an integrated frequency converter



Dimensional drawing for the TURBOVAC MAG W 300/400 P



Pumping speed for N₂ of the TURBOVAC MAG W 300/400 P as a function of the inlet pressure

Technical Data

TURBOVAC MAG

W 300 P

W 400 P

| Inlet flange | DN | 100 ISO-K | 100 CF | 160 ISO-K | 160 CF |
|---|---------------------|--|--|--|--|
| Pumping speed | | | | | |
| N ₂ | l x s ⁻¹ | 300 | 300 | 365 | 365 |
| Ar | l x s ⁻¹ | 260 | 260 | 330 | 330 |
| He | l x s ⁻¹ | 260 | 260 | 280 | 280 |
| H ₂ | l x s ⁻¹ | 190 | 190 | 200 | 200 |
| Operating speed | min ⁻¹ | 58 800 | 58 800 | 58 800 | 58 800 |
| Compression ratio | | | | | |
| N ₂ | | 1.0 x 10 ⁻¹⁰ | 1.0 x 10 ⁻¹⁰ | 1.0 x 10 ⁻¹⁰ | 1.0 x 10 ⁻¹⁰ |
| H ₂ | | 3.2 x 10 ⁻³ | 3.2 x 10 ⁻³ | 3.2 x 10 ⁻³ | 3.2 x 10 ⁻³ |
| He | | 9.2 x 10 ⁻⁴ | 9.2 x 10 ⁻⁴ | 9.2 x 10 ⁻⁴ | 9.2 x 10 ⁻⁴ |
| Ultimate pressure | mbar (Torr) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) |
| Max. degassing temperature | °C (°F) | – | 80 (176) | – | 80 (176) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 8 (6) | 8 (6) | 8 (6) | 8 (6) |
| Recommended backing pump | | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B |
| Run-up time | min | < 5 | < 5 | < 5 | < 5 |
| Foreline flange (clamped) | DN | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF |
| Purge / vent port (clamped) | DN | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF |
| Water cooling connection (optional) | G | 1/8" | 1/8" | 1/8" | 1/8" |
| Weight, approx. | kg (lbs) | 12 (26) | 12 (26) | 12 (26) | 12 (26) |



Technical Data

MAG.DRIVE S

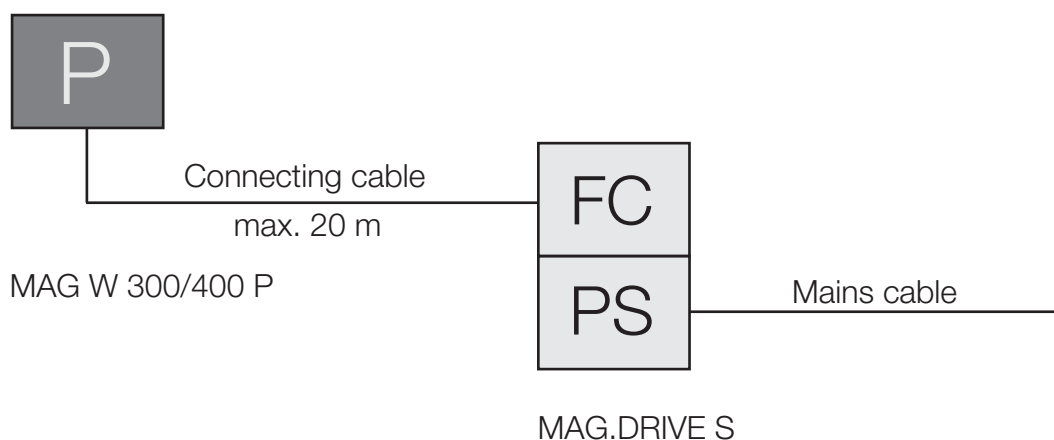
| | | |
|----------------------------------|---------|--|
| Voltage range | V | 100 - 240, ±10 % |
| Nominal frequency | Hz | 50 / 60 |
| Power consumption | | |
| stand-by | W | 100 |
| maximum | W | 400 |
| Max. motor voltage | V | 48 |
| Max. pump current | A | 6 |
| Fuses F1, F2 5 x 20 mm | | 10 A fast blow high breaking capacity 250 V |
| System fuse | | L or G characteristic |
| Max. frequency | Hz | 0 to 2000 |
| Load capability, relay output X1 | V / A | 32 / 0,5 |
| Temperature | | |
| during operation | °C (°F) | 0 to +45 (+32 to +113) |
| during storage | °C (°F) | -10 to +60 (+14 to +140) |
| Relative humidity of the air | % | 95 (non-condensing) |

Ordering Information

TURBOVAC MAG W 300/400 P

| TURBOVAC MAG W 300 P with separate Frequency Converter and Compound Stage | P | Part No. | |
|---|-----|--|---|
| DN 100 ISO-K DN 100 CF | | 410300V0005 410300V0006 |  |
| TURBOVAC MAG W 400 P with separate Frequency Converter and Compound Stage | P | | |
| DN 160 ISO-K DN 160 CF | | 410400V0005 410400V0006 | |
| Mandatory Accessories | PFC | | |
| Electronic frequency converter MAG.DRIVE S MAG.DRIVE S with display | | 410300V0202 410300V0212 |  |
| Connecting cable DRIVE/BEARING (connection between pump and MAG.DRIVE S) 3.0 m (10.5 ft) 5.0 m (17.5 ft) 10.0 m (35.0 ft) 20.0 m (70.0 ft) | | 410300V4003 410300V4005 410300V4010 410300V4020 | |
| Mains cable 3.0 m (10.5 ft) EURO plug US plug 5-15 P 2.0 m (7.5 ft) US plug 115 V AC | | 800102V0002 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V, 50/60 Hz; NEMA plug, US version | | 140 000 140 002 | |
| TRIVAC D 8 B 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz | | 112 55 112 56 | |

With separate Frequency Converter



Ordering Information

TURBOVAC MAG W 300/400 P

High
Vacuum Pumps

| Accessories, optional P | Part No. |
|---|---------------------|
| Inlet screen | |
| DN 100 ISO-K | |
| coarse (3.2 x 3.2 mm (0.13 x 0.13 in.)) | 800132V0101 |
| fine (1.6 x 1.6 mm (0.06 x 0.06 in.)) | 800132V0102 |
| DN 100 CF | |
| coarse (3.2 x 3.2 mm (0.13 x 0.13 in.)) | 200 91 514 |
| fine (1.6 x 1.6 mm (0.06 x 0.06 in.)) | E 200 17 195 |
| DN 160 ISO-K | E 200 00 307 |
| DN 160 CF | E 200 17 247 |
| Flange heater | |
| 100 CF, 230 V, 50 Hz | 854 27 |
| 100 CF, 115 V, 60 Hz | 854 28 |
| 160 CF, 230 V, 50 Hz | 854 37 |
| 160 CF, 115 V, 60 Hz | 854 38 |
| Water cooling unit | 410300V0101 |
| Air cooling unit | 410300V0102 |
| Solenoid venting valve, normally closed | |
| 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, normally open | 800120V0021 |
| Included in the Delivery of the Pump P | |
| Flanges for forevacuum, venting and purge gas are blank-flanged | |
| Centering ring with FPM sealing ring and a clamping yoke | |

MAG DIGITAL - Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 600/700 P



Typical Applications

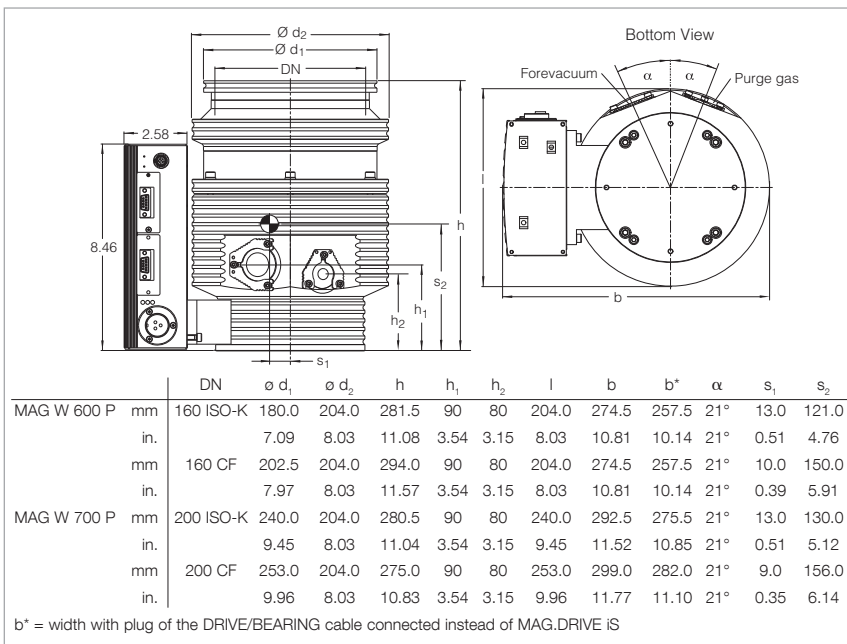
- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

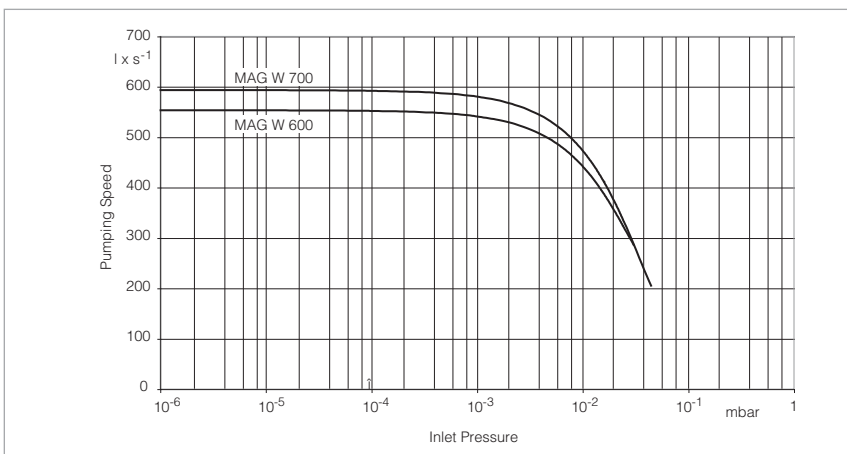
- Installation in any orientation
- DN 160 or 200 ISO-K and/or CF high vacuum connection
- DN 25 ISO-KF with clamped forevacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; alternatively the pump is available also with an integrated frequency converter



Dimensional drawing for the TURBOVAC MAG W 600/700 P



Pumping speed for N₂ of the TURBOVAC MAG W 600/700 P as a function of the inlet pressure

Technical Data

TURBOVAC MAG

W 600 P

W 700 P

| Inlet flange | DN | 160 ISO-K | 160 CF | 200 ISO-K | 200 CF |
|---|---------------------|--|--|--|--|
| Pumping speed | | | | | |
| N ₂ | l x s ⁻¹ | 550 | 550 | 590 | 590 |
| Ar | l x s ⁻¹ | 520 | 520 | 540 | 540 |
| He | l x s ⁻¹ | 570 | 570 | 600 | 600 |
| H ₂ | l x s ⁻¹ | 410 | 410 | 430 | 430 |
| Operating speed | min ⁻¹ | 48 000 | 48 000 | 48 000 | 48 000 |
| Compression ratio | | | | | |
| N ₂ | | 1.6 x 10 ⁻¹⁰ | 1.6 x 10 ⁻¹⁰ | 1.6 x 10 ⁻¹⁰ | 1.6 x 10 ⁻¹⁰ |
| H ₂ | | 3.4 x 10 ⁻⁴ | 3.4 x 10 ⁻⁴ | 3.4 x 10 ⁻⁴ | 3.4 x 10 ⁻⁴ |
| He | | 1.7 x 10 ⁻⁶ | 1.7 x 10 ⁻⁶ | 1.7 x 10 ⁻⁶ | 1.7 x 10 ⁻⁶ |
| Ultimate pressure | mbar (Torr) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) |
| Max. degassing temperature | °C (°F) | – | 80 (176) | – | 80 (176) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 6.0 (4.5) | 6.0 (4.5) | 6.0 (4.5) | 6.0 (4.5) |
| Recommended backing pump | | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B | TRIVAC D 2,5 E TRIVAC D 8 B |
| Run-up time | min | < 6 | < 6 | < 6 | < 6 |
| Foreline flange (clamped) | DN | 25 ISO-KF | 25 ISO-KF | 25 ISO-KF | 25 ISO-KF |
| Purge / vent port (clamped) | DN | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF |
| Water cooling connection (optional) | G | 1/8" | 1/8" | 1/8" | 1/8" |
| Weight, approx. | kg (lbs) | 17 (37.5) | 17 (37.5) | 17 (37.5) | 17 (37.5) |



Technical Data

MAG.DRIVE S

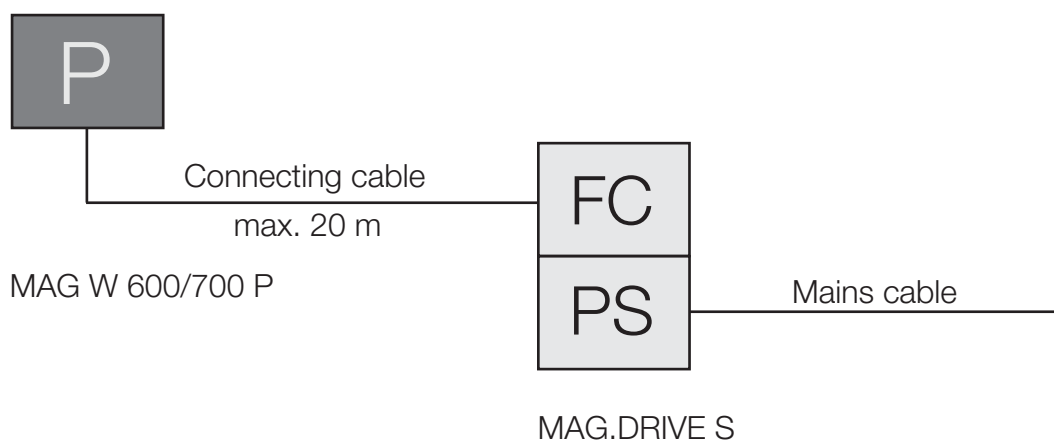
| | | |
|----------------------------------|---------|--|
| Voltage range | V | 100 - 240, ±10 % |
| Nominal frequency | Hz | 50 / 60 |
| Power consumption | | |
| stand-by | W | 100 |
| maximum | W | 400 |
| Max. motor voltage | V | 48 |
| Max. pump current | A | 6 |
| Fuses F1, F2 5 x 20 mm | | 10 A fast blow high breaking capacity 250 V |
| System fuse | | L or G characteristic |
| Max. frequency | Hz | 0 to 2000 |
| Load capability, relay output X1 | V / A | 32 / 0,5 |
| Temperature | | |
| during operation | °C (°F) | 0 to +45 (+32 to +113) |
| during storage | °C (°F) | -10 to +60 (+14 to +140) |
| Relative humidity of the air | % | 95 (non-condensing) |

Ordering Information

TURBOVAC MAG W 600/700 P

| TURBOVAC MAG W 600 P with separate Frequency Converter and Compound Stage | P | Part No. | |
|---|---|--|---|
| DN 160 ISO-K DN 160 CF | | 410600V0005 410600V0006 |  |
| TURBOVAC MAG W 700 P with separate Frequency Converter and Compound Stage | P | | |
| DN 200 ISO-K DN 200 CF | | 410700V0005 410700V0006 | |
| Mandatory Accessories | P | FC | |
| Electronic frequency converter MAG.DRIVE S MAG.DRIVE S with display | | 410300V0202 410300V0212 |  |
| Connecting cable DRIVE/BEARING (connection between pump and MAG.DRIVE S) 3.0 m (10.5 ft) 5.0 m (17.5 ft) 10.0 m (35.0 ft) 20.0 m (70.0 ft) | | 410300V4003 410300V4005 410300V4010 410300V4020 | |
| Mains cable 3.0 m (10.5 ft) EURO plug US plug 5-15 P 2.0 m (7.5 ft) US plug 115 V AC | | 800102V0002 800102V1002 992 76 513 | |
| Forevacuum pump TRIVAC D 2,5 E 220-240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version 110-120 V, 50/60 Hz; NEMA plug, US version | | 140 000 140 002 | |
| TRIVAC D 8 B 1 phase motor; 230 V, 50/60 Hz 3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz | | 112 55 112 56 | |

With separate Frequency Converter



Ordering Information

TURBOVAC MAG W 600/700 P

| Accessories, optional P | Part No. |
|---|---------------------|
| Inlet screen | |
| DN 160 ISO-K | E 200 00 307 |
| DN 160 CF | E 200 17 247 |
| DN 200 ISO-K | 200 91 639 |
| DN 200 CF | 400 001 515 |
| Flange heater | |
| 160 CF, 230 V, 50 Hz | 854 37 |
| 160 CF, 115 V, 60 Hz | 854 38 |
| Water cooling unit | 410600V0101 |
| Air cooling unit | 410600V0102 |
| Solenoid venting valve, normally closed | |
| 24 V DC, DN 16 ISO-KF | 800120V0011 |
| Power failure venting valve, normally open | 800120V0021 |
| Included in the Delivery of the Pump P | |
| Flanges for forevacuum, venting and purge gas are blank-flanged | |
| Centering ring with FPM sealing ring and a clamping yoke | |

MAG DIGITAL - Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 830/1300 C

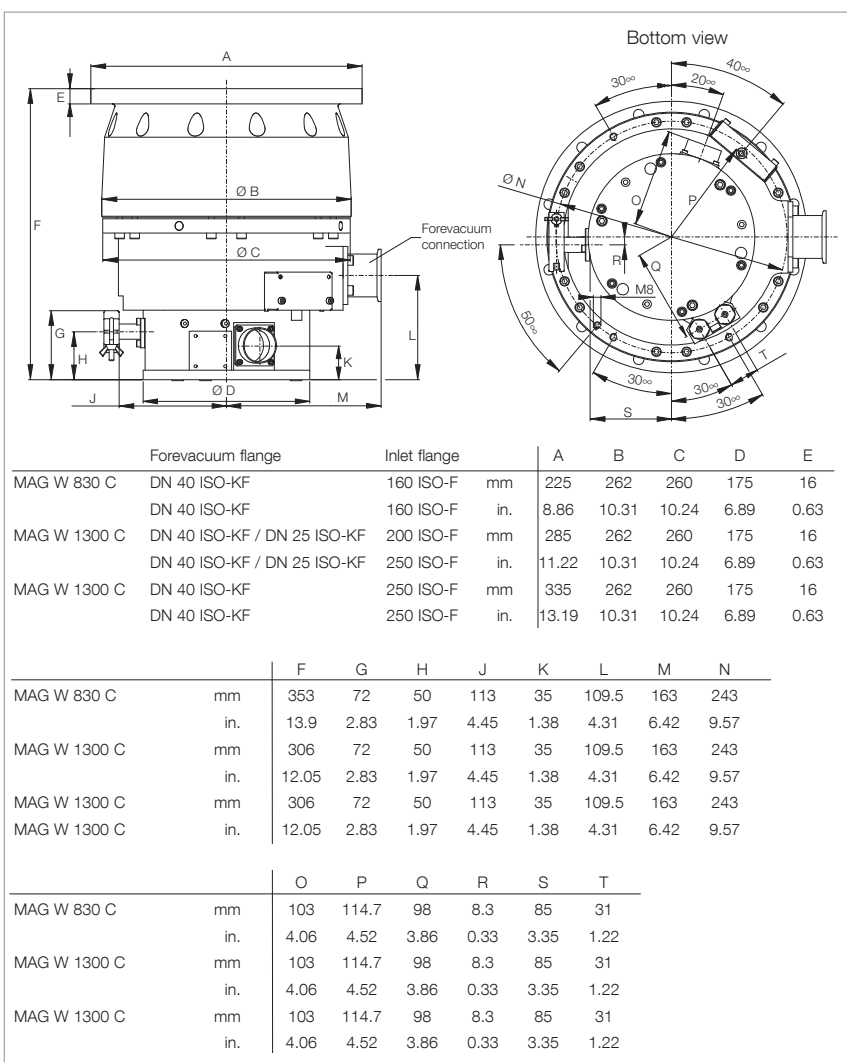


Typical Applications

- Semiconductor processes, like PVD and ion implantation
- Transfer chambers
- Particle accelerators
- Research
- Coating systems

Technical Features

- Active 5-axis magnetic bearing system
- Digital monitoring of the bearing system
- Low noise and vibration levels
- Installation in any orientation
- Advanced rotor design for high throughput
- Purge gas connection
- Intelligent power control system



Dimensional drawing for the TURBOVAC MAG W 830/1300 C

Advantages to the User

- Maintenance-free
- High throughput for all process gases
- High pumping speed at low pressure
- High foreline pressure tolerance: up to 2 mbar (1.5 Torr)
- Lowest weight and size in its class
- Application specific design

Technical Data

TURBOVAC MAG

| | | W 830 | W 830 C | W 1300 | W 1300 C | |
|--|---------------------|--|--|--|--|--|
| Inlet flange | DN | 160 CF | 160 ISO-F | 200 CF | 200 ISO-F | 250 ISO-F |
| Pumping speed according to PNEUROP | | | | | | |
| N ₂ | l x s ⁻¹ | 900 | 700 | 1170 | 1100 | 1220 |
| Ar | l x s ⁻¹ | 750 | 650 | 1100 | 1050 | 1180 |
| He | l x s ⁻¹ | 900 | 500 | 1150 | 1100 | 1200 |
| H ₂ | l x s ⁻¹ | 740 | 350 | 920 | 920 | 1020 |
| Operating speed | min ⁻¹ | 36 000 | 24 000 | 36 000 | 36 000 | 36 000 |
| Compression ratio | | | | | | |
| N ₂ | | 1.5 x 10 ⁸ | > 5 x 10 ⁷ | 1.5 x 10 ⁸ | > 10 ⁸ | > 10 ⁸ |
| Ultimate pressure according to DIN 28 400 | | | | | | |
| | mbar (Torr) | < 1 x 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 1 x 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) |
| Max. foreline pressure for N ₂ | | | | | | |
| with convection cooling | mbar (Torr) | 0.2 (0.15) | – | 0.2 (0.15) | – | – |
| with water cooling | mbar (Torr) | 2.0 (1.5) | 2.0 (1.5) | 2.0 (1.5) | 2.0 (1.5) | 2.0 (1.5) |
| Recommended backing pump | | | | | | |
| Rotary vane pump | | TRIVAC D 65 BCS | TRIVAC D 65 BCS | TRIVAC D 65 BCS | TRIVAC D 65 BCS | TRIVAC D 65 BCS |
| or dry compressing pump offering a pumping speed of 100 m ³ /h | | | | | | |
| Run-up time | min | < 6 | < 4 | < 6 | < 6 | < 6 |
| Foreline flange | DN | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| Purge and vent port | DN | 10 ISO-KF/ 16 ISO-KF | 10 ISO-KF/ 16 ISO-KF | 10 ISO-KF/ 16 ISO-KF | 10 ISO-KF/ 16 ISO-KF | 10 ISO-KF/ 16 ISO-KF |
| Cooling water connection (OD of tube) | mm (in.) | 1/4" | 1/4" | 1/4" | 6 | 6 |
| Weight, approx. | kg (lbs) | 35 (77.3) | 32 (70.6) | 35 (77.3) | 32 (70.6) | 32 (70.6) |



Technical Data

MAG.DRIVE digital

| | | |
|---|----------|--|
| Mains connection, 50/60 Hz | V | 200 - 240, +10 %/-15 % |
| Current for connected consumers max. | A | 20 |
| Max. motor voltage | V | 60 |
| Nominal frequency | Hz | 50/60 |
| Permissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 483 x 213 x 1/2 19" (19.02 x 8.39 x 1/2 19") |
| Weight, approx. | kg (lbs) | 10 (22) |

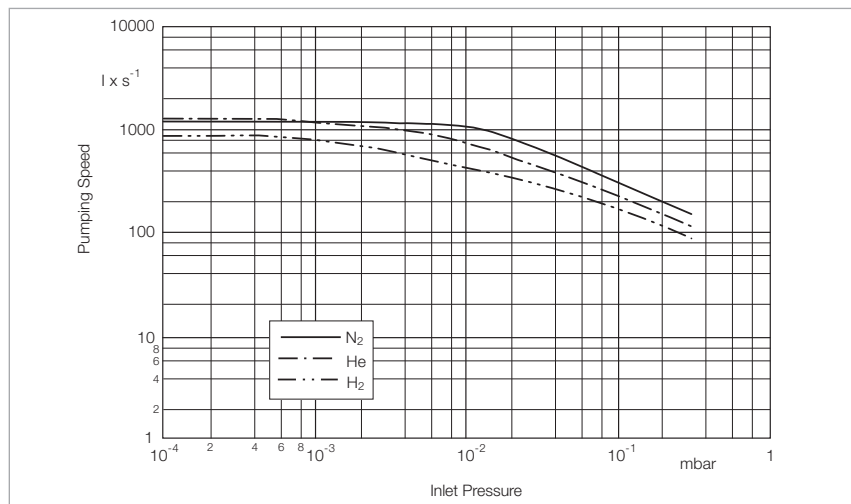
Ordering Information

TURBOVAC MAG W 830 (C) / W 1300 (C)

| TURBOVAC MAG W 830 (C) with separate Frequency Converter and Compound Stage | Part No. | |
|--|---|---|
| DN 160 CF (MAG W 830) DN 160 ISO-F (MAG W 830 C) | 400100V0041 400100V0005 |  |
| TURBOVAC MAG W 1300 (C) with separate Frequency Converter and Compound Stage | | |
| DN 200 CF (MAG W 1300) DN 200 ISO-F (MAG W 1300 C) DN 250 ISO-F (MAG W 1300 C) | 400110V0051 400110V0011 400110V0021 | |
| Mandatory Accessories | P FC | |
| Electronic frequency converter ¹⁾ MAG.DRIVE digital MAG.DRIVE digital, Profibus MAG.DRIVE digital, RS 232 C interface | 400035V0011 400035V0013 400035V0014 |  |
| Plug-in control | 121 36 | |
| Connecting cable converter – pump ²⁾ 1.5 m (5.25 ft) DRIVE/BEARING 3.0 m (10.5 ft) DRIVE/BEARING 5.0 m (17.5 ft) DRIVE/BEARING 10.0 m (35.0 ft) DRIVE/BEARING 20.0 m (70.0 ft) DRIVE/BEARING | 400036V0001 400036V0008 400036V0004 400036V0002 400036V0003 | |
| Forevacuum pump TRIVAC D 65 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 208-23/460 V, 60 Hz / 200-220/380 V, 60 Hz | 113 98 913 98-2 | |
| For further types, see Catalog Part “Oil Sealed Vacuum Pumps” | | |

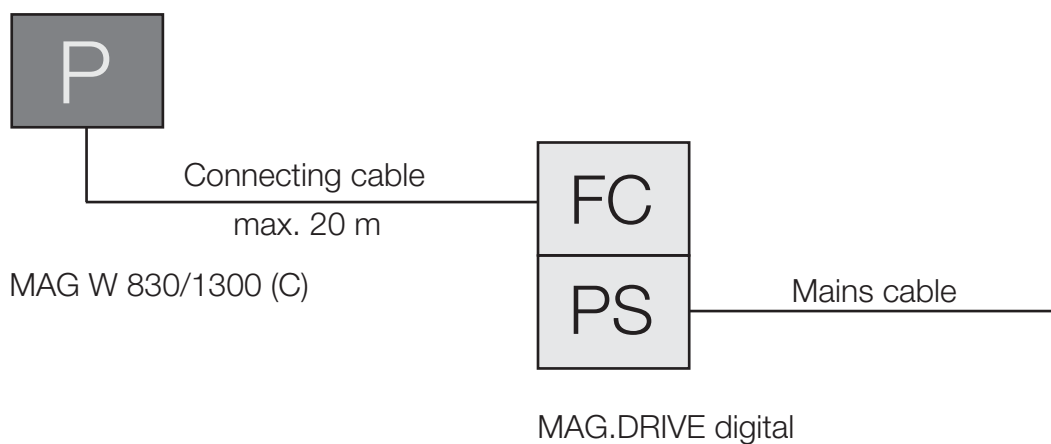
¹⁾ Included are 2 mains cords. One with EURO plug and one with US plug (220 V AC).
Replacement mains cord are Part Numbers 180 097 or 180 096 respectively

²⁾ Further connecting cables can be found under MAG.DRIVE digital in the chapter
“Turbomolecular Pumps with Magnetic Rotor Suspension”,
para. “Electronic Frequency Converters”



Pumping speed of the TURBOVAC MAG W 1300 C (DN 250) as a function of the inlet pressure

With separate Frequency Converter



Ordering Information

TURBOVAC MAG W 830 (C) / W 1300 (C)

| Accessories, optional | P | Part No. |
|--|---|--------------|
| Purge gas and venting valve | | 121 33 |
| Connecting cable for optional purge gas valve (pump/converter) | | |
| 1.5 m (5.25 ft) | | 400038V0007 |
| 3.0 m (10.5 ft) | | 400038V0006 |
| 10.0 m (35.0 ft) | | 400038V0002 |
| 20.0 m (70.0 ft) | | 400038V0009 |
| Included in the Delivery of the Pump | P | |
| Inlet screen | | |
| DN 160 ISO-F | | E 200 00 307 |
| DN 160 CF | | E 200 17 247 |
| DN 200 ISO-F | | 200 91 470 |
| DN 200 CF | | E 200 17 248 |
| DN 250 ISO-F | | 200 91 471 |

MAG DIGITAL - Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 1500 CT



Typical Applications

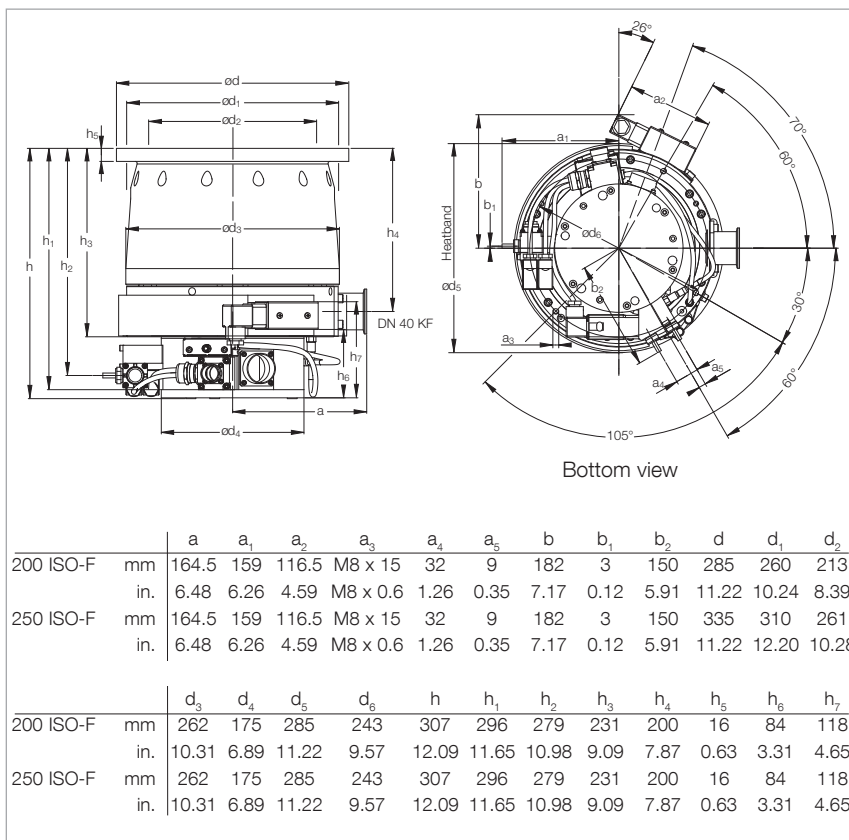
- All major semiconductor processes such as Etch, CVD, PVD and Ion Implantation

Technical Features

- Active 5-axis magnetic bearing system
- Bearing and temperature system are controlled digitally
- Corrosion resistant
- Low noise and vibration levels
- Installation in any orientation
- Advanced rotor design for high pump speeds and forevacuum pressures
- Integrated purge gas system
- Integrated temperature management system (TMS)
- Intelligent power control system

Advantages to the User

- Maintenance-free
- High throughput for all process gases
- High pumping speed at low pressure
- High foreline pressure tolerance: up to 2.6 mbar (1.95 Torr)
- High resistance against corrosive gases
- Robust against particles and deposits
- Temperature control up to 90 °C (194 °F) to avoid condensation
- Lowest weight and size in its class
- Application specific design



Dimensional drawing for the TURBOVAC MAG W 1500 CT

Technical Data**TURBOVAC MAG W 1500 CT**



| | | | | |
|---|---------------------|---|---|---|
| Inlet flange | DN | 200 ISO-F | 250 ISO-F | 200 CF |
| Pumping speed according to PNEUROP | | | | |
| N ₂ | l x s ⁻¹ | 1100 | 1220 | 1100 |
| Ar | l x s ⁻¹ | 1050 | 1180 | 1050 |
| He | l x s ⁻¹ | 1100 | 1200 | 1100 |
| H ₂ | l x s ⁻¹ | 920 | 1020 | 920 |
| Operating speed | min ⁻¹ | 36 000 | 36 000 | 36 000 |
| Compression ratio | | | | |
| N ₂ | | > 10 ⁸ | > 10 ⁸ | > 10 ⁸ |
| Ultimate pressure according to DIN 28 400 | | | | |
| mbar (Torr) | | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻¹⁰ (< 0.75 10 ⁻¹⁰) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 2.6 (1.95) | 2.6 (1.95) | 2.6 (1.95) |
| Recommended backing pump | | | | |
| Rotary vane pump | | TRIVAC D 65 BCS | TRIVAC D 65 BCS | TRIVAC D 65 BCS |
| or dry compressing pump | | | | |
| offering a pumping speed of 100 m ³ /h | | | | |
| Run-up time | | | | |
| at 95% of nominal speed | min | < 6 | < 6 | < 6 |
| Foreline flange | DN | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| Purge and vent port | VCR | 1/4" | 1/4" | 1/4" |
| Cooling water connection | | | | |
| (OD of tube) | mm (in.) | 6.4 (0.25) | 6.4 (0.25) | 6.4 (0.25) |
| Weight, approx. | kg (lbs) | 32 (70.6) | 32 (70.6) | 32 (70.6) |

Technical Data**MAG.DRIVE digital**

| | | |
|---------------------------------|----------|--|
| Mains connection, 50/60 Hz | V | 200 - 240, +10 %/-15 % |
| Current for connected consumers | | |
| max. | A | 20 |
| Max. motor voltage | V | 60 |
| Nominal frequency | Hz | 50/60 |
| Permissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 483 x 213 x 1/2 19" (19.02 x 8.39 x 1/2 19") |
| Weight, approx. | kg (lbs) | 10 (22) |

Ordering Information

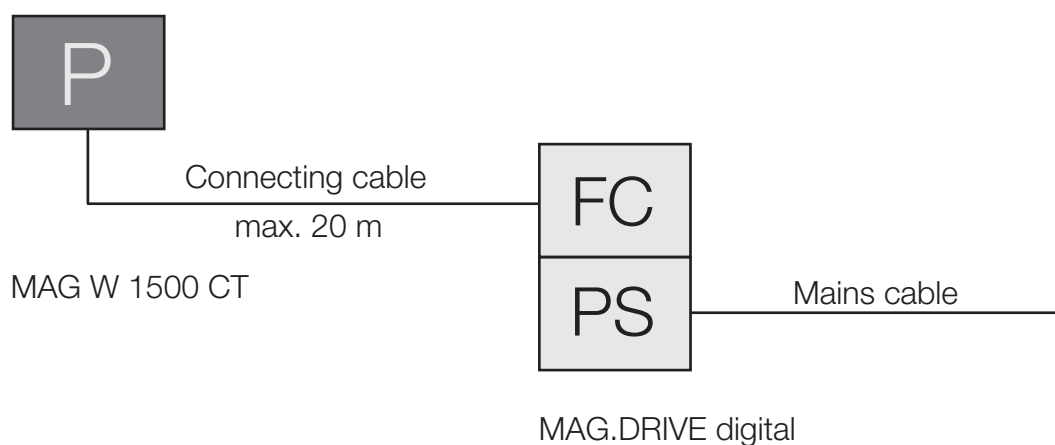
TURBOVAC MAG W 1500 CT

| TURBOVAC MAG W 1500 CT with separate Frequency Converter and Compound Stage | P | Part No. | |
|---|-----|--|---|
| DN 200 ISO-F DN 250 ISO-F DN 200 CF | | 400026V0002 400027V0002 400030V0002 |  |
| Mandatory Accessories | PFC | | |
| Electronic frequency converter ¹⁾ MAG.DRIVE digital MAG.DRIVE digital, Profibus MAG.DRIVE digital, RS 232 C interface | | 400035V0011 400035V0013 400035V0014 |  |
| Connecting cable converter – pump ²⁾ 1.5 m (5.25 ft) DRIVE/BEARING 1.5 m (5.25 ft) TMS 3.0 m (10.5 ft) DRIVE/BEARING 3.0 m (10.5 ft) TMS 5.0 m (17.5 ft) DRIVE/BEARING 5.0 m (17.5 ft) TMS 10.0 m (35.0 ft) DRIVE/BEARING 10.0 m (35.0 ft) TMS 20.0 m (70.0 ft) DRIVE/BEARING 20.0 m (70.0 ft) TMS | | 400036V0001 400037V0001 400036V0008 400037V0008 400036V0004 400037V0004 400036V0002 400037V0002 400036V0003 400037V0003 | |
| Plug-in control | | 121 36 | |
| Forevacuum pump TRIVAC D 65 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 208-23/460 V, 60 Hz / 200-220/380 V, 60 Hz | | 113 98 913 98-2 | |
| For further types, see Catalog Part "Oil Sealed Vacuum Pumps" | | | |

¹⁾ Included are 2 mains cords. One with EURO plug and one with US plug (220 V AC).
Replacement mains cord are Part Numbers 180 097 or 180 096 respectively

²⁾ Further connecting cables can be found under MAG.DRIVE digital in the chapter
"Turbomolecular Pumps with Magnetic Rotor Suspension",
para. "Electronic Frequency Converters"

With separate Frequency Converter

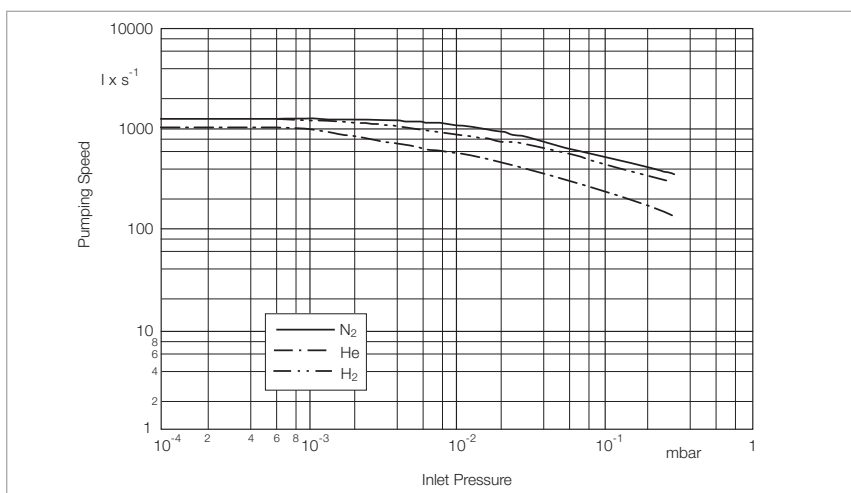


Ordering Information

TURBOVAC MAG W 1500 CT

High Vacuum Pumps

| Accessories, optional | P | Part No. |
|---|----|-------------------|
| Seal kit DN 250 metal | | 200 07 901 |
| Included in the Delivery of the Pump | P | |
| Inlet screen DN 200 ISO-F | | 200 91 470 |
| DN 250 ISO-F | | 200 91 471 |
| DN 250 CF | | 200 91 638 |
| Integrated purge gas system VRC nut 1/4" | | |
| Integrated temperature management system | | |
| Cooling water connection Swagelock 1/4" tube | | |
| Included in the Delivery of the Frequency Converter | FC | |
| Mains cord, 3 m (10.5 ft.) long, approx. with EURO or US plug | | |



Pumping speed of the TURBOVAC MAG W 1500 CT (DN 250) as a function of the inlet pressure

MAG DIGITAL - Magnetic Rotor Suspension with separate Frequency Converter with Compound Stage

TURBOVAC MAG W 2000 C/CT



Typical Applications

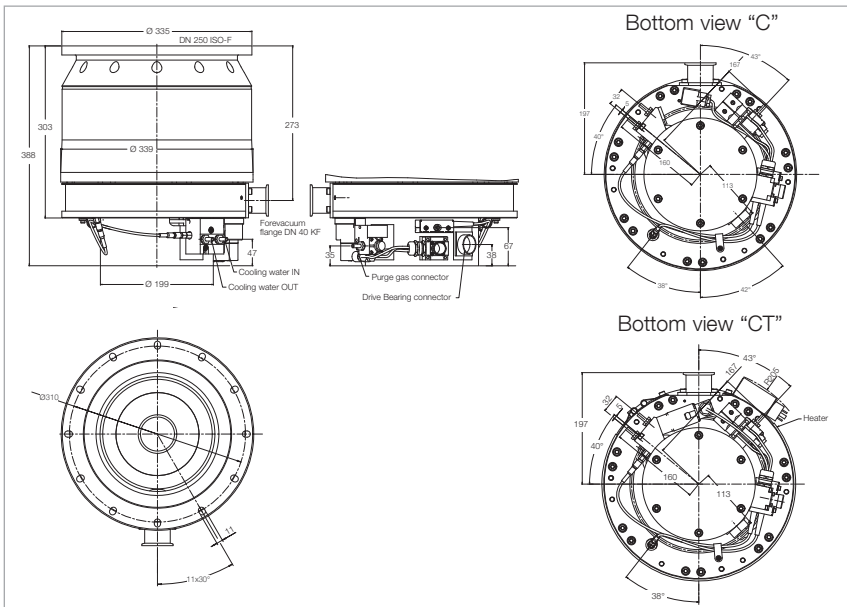
- All major semiconductor processes such as Etch, CVD, PVD and Ion Implantation

Technical Features

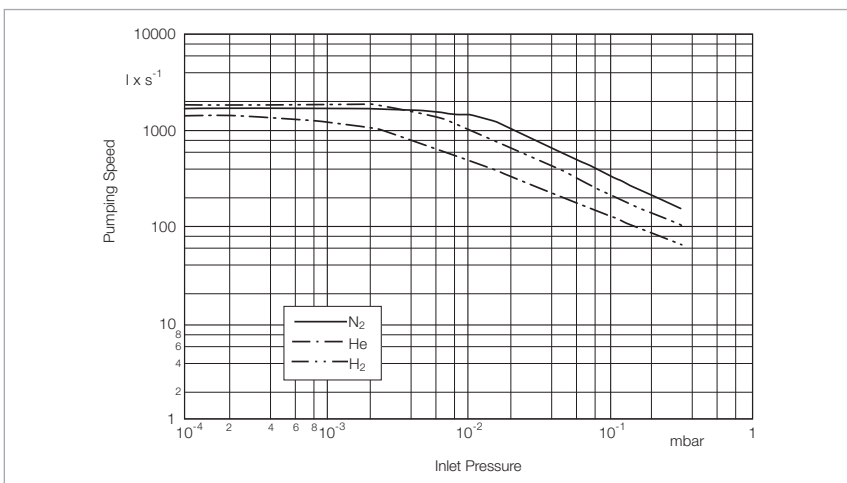
- Active 5-axis magnetic bearing system
- Patented KEPLA-COAT® for rotor and stator to prevent corrosion
- Low noise and vibration levels
- Installation in any orientation
- Advanced rotor design for high pump speeds and forevacuum pressures
- Integrated purge gas system
- CT versions: Integrated temperature management system (TMS)

Advantages to the User

- Maintenance-free
- High throughput for all etch gases
- High pumping speed at low pressure
- High foreline pressure tolerance: up to 5.3 mbar (4 Torr)
- High resistance against corrosive gases
- Robust against particles and deposits
- Temperature management system (TMS) to avoid condensation
- Application specific design



Dimensional drawing for the TURBOVAC MAG W 2000 C/CT



Pumping speed of the TURBOVAC MAG W 2000 CT (DN 250) as a function of the inlet pressure

Technical Data**TURBOVAC MAG****W 2000 C****W 2000 CT**



| | | | |
|---|---------------------|---|---|
| Inlet flange | DN | 250 ISO-F | 250 ISO-F |
| Pumping speed according to PNEUROP | | | |
| N ₂ | l x s ⁻¹ | 1760 | 1760 |
| Ar | l x s ⁻¹ | 1650 | 1650 |
| He | l x s ⁻¹ | 1800 | 1800 |
| H ₂ | l x s ⁻¹ | 1500 | 1500 |
| Operating speed | min ⁻¹ | 28 800 | 28 800 |
| Compression ratio | | | |
| N ₂ | | > 10 ⁸ | > 10 ⁸ |
| Ultimate pressure according to DIN 28 400 | | | |
| mbar (Torr) | | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁹) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁹) |
| Max. foreline pressure for N ₂ | mbar (Torr) | 3.5 (2.63) | 3.5 (2.63) |
| Recommended backing pump | | | |
| Rotary vane pump | | TRIVAC D 65 BCS | TRIVAC D 65 BCS |
| or dry compressing pump | | | |
| offering a pumping speed of 100 m ³ /h | | | |
| Run-up time | min | < 8 | < 8 |
| Foreline flange | DN | 40 ISO-KF | 40 ISO-KF |
| Purge and vent port | VCR | 1/4" | 1/4" |
| Cooling water connection | | | |
| (OD of tube) | mm (in.) | 6.4 (0.25) | 6.4 (0.25) |
| Weight, approx. | kg (lbs) | 68 (150) | 68 (150) |

Technical Data**MAG.DRIVE digital**

| | | |
|---------------------------------|----------|--|
| Mains connection, 50/60 Hz | V | 200 - 240, +10 %/-15 % |
| Current for connected consumers | | |
| max. | A | 20 |
| Max. motor voltage | V | 60 |
| Nominal frequency | Hz | 50/60 |
| Permissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 483 x 213 x 1/2 19" (19.02 x 8.39 x 1/2 19") |
| Weight, approx. | kg (lbs) | 10 (22) |

Ordering Information

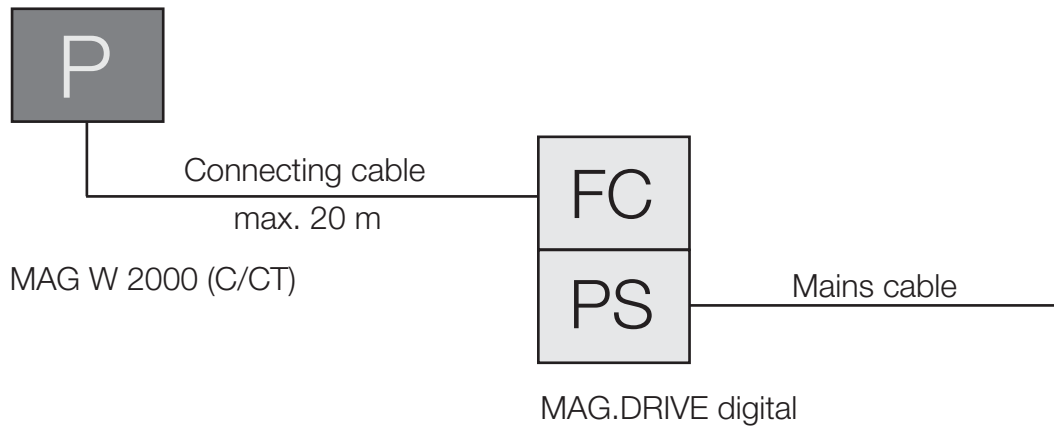
TURBOVAC MAG W 2000 C/CT

| TURBOVAC MAG W 2000 C/CT with separate Frequency Converter and Compound Stage | P | Part No. | |
|---|-----|--|---|
| DN 250 ISO-F (MAG W 2000 C) DN 250 ISO-F (MAG W 2000 CT) | | 400047V0001 400047V0002 |  |
| Mandatory Accessories | PFC | | |
| Electronic frequency converter ¹⁾ MAG.DRIVE digital MAG.DRIVE digital, Profibus MAG.DRIVE digital, RS 232 C interface | | 400035V0011 400035V0013 400035V0014 |  |
| Connecting cable converter – pump ²⁾ 1.5 m (5.25 ft) DRIVE/BEARING 1.5 m (5.25 ft) TMS 3.0 m (10.5 ft) DRIVE/BEARING 3.0 m (10.5 ft) TMS 5.0 m (17.5 ft) DRIVE/BEARING 5.0 m (17.5 ft) TMS 10.0 m (35.0 ft) DRIVE/BEARING 10.0 m (35.0 ft) TMS 20.0 m (70.0 ft) DRIVE/BEARING 20.0 m (70.0 ft) TMS | | 400036V0001 400037V0001 400036V0008 400037V0008 400036V0004 400037V0004 400036V0002 400037V0002 400036V0003 400037V0003 | |
| Plug-in control | | 121 36 | |
| Forevacuum pump TRIVAC D 65 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 208-23/460 V, 60 Hz / 200-220/380 V, 60 Hz | | 113 98 913 98-2 | |
| For further types, see Catalog Part "Oil Sealed Vacuum Pumps" | | | |

¹⁾ Included are 2 mains cords. One with EURO plug and one with US plug (220 V AC).
Replacement mains cord are Part Numbers 180 097 or 180 096 respectively

²⁾ Further connecting cables can be found under MAG.DRIVE digital in the chapter
"Turbomolecular Pumps with Magnetic Rotor Suspension",
para. "Electronic Frequency Converters"

With separate Frequency Converter



Ordering Information

TURBOVAC MAG W 2000 C/CT

| Included in the Delivery of the Pump | P | Part No. |
|---|----|-------------------|
| Inlet screen DN 250 ISO-F | | 200 91 471 |
| Integrated purge gas system VRC nut 1/4" | | |
| Integrated temperature management system (only CT version) | | |
| Cooling water connection Swagelock 1/4" tube | | |
| Included in the Delivery of the Frequency Converter | FC | |
| Mains cord, 3 m (10.5 ft.) long, approx. with EURO or US plug | | |

MAG DIGITAL - Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 2200 C/CT



Typical Applications

- All major semiconductor processes such as Etch, CVD, PVD and Ion Implantation
- Coating systems

Versions with CF high vacuum connection

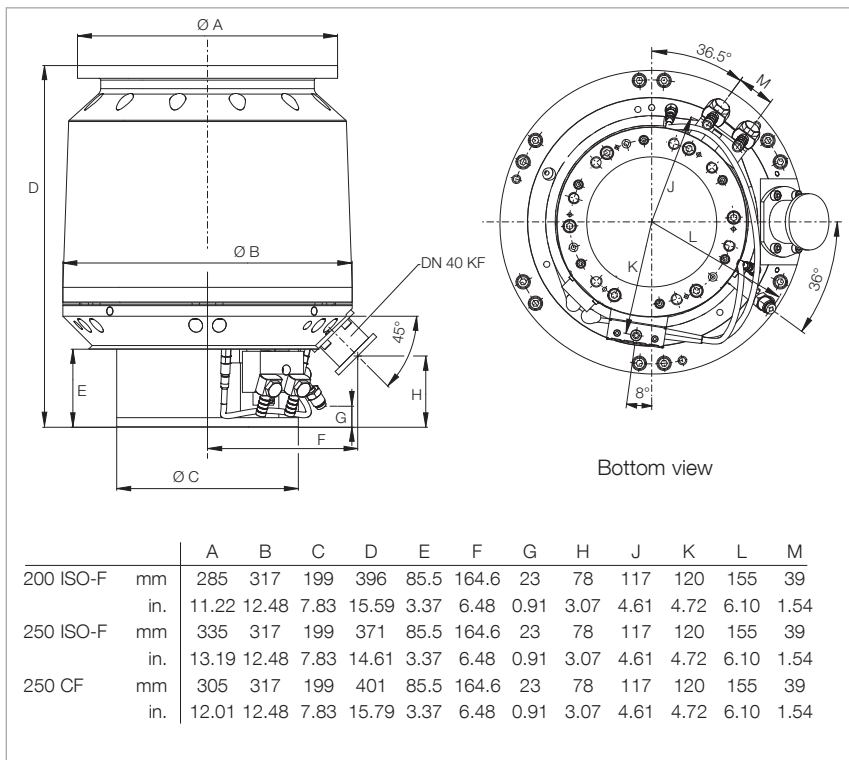
- Particle accelerators
- Research

Technical Features

- Active 5-axis magnetic bearing system
- Digital monitoring of the bearing system
- Low noise and vibration levels
- Installation in any orientation
- Advanced rotor design for high pump speeds and forevacuum pressures
- Purge gas connection
- Intelligent power control system
- Integrated temperature management System (TMS) ("CT" version only)

Advantages to the User

- Maintenance-free
- High throughput for all process gases
- High pumping speed at low pressure
- High foreline pressure tolerance: up to 2 mbar (1.5 Torr)
- Lowest weight and size in its class
- Application specific design



Dimensional drawing for the TURBOVAC MAG W 2200 C

Technical Data

TURBOVAC MAG

W 2200 C/CT

W 2200

| Inlet flange | DN | 200 ISO-F | 250 ISO-F | 250 CF |
|---|---------------------|---|---|---|
| Pumping speed according to PNEUROP | | | | |
| N ₂ | l x s ⁻¹ | 1600 | 2000 | 1800 |
| Ar | l x s ⁻¹ | 1450 | 1900 | 1700 |
| He | l x s ⁻¹ | 1780 | 1980 | 1980 |
| H ₂ | l x s ⁻¹ | 1720 | 1930 | 1930 |
| Operating speed | min ⁻¹ | 29 400 | 29 400 | 29 400 |
| Compression ratio | | | | |
| N ₂ | | > 1 x 10 ⁸ | > 1 x 10 ⁸ | 1 x 10 ⁸ |
| Ultimate pressure according to DIN 28 400 | mbar (Torr) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) | < 1 x 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) |
| Max. foreline pressure for N ₂ | | | | |
| with convection cooling | mbar (Torr) | – | – | 0.1 (0.075) |
| with water cooling | mbar (Torr) | 2 (1.5) | 2 (1.5) | 1 (0.75) |
| Recommended backing pump | | | | |
| Rotary vane pump | | TRIVAC D 65 BCS | TRIVAC D 65 BCS | TRIVAC D 65 BCS |
| or dry compressing pump | | | | |
| offering a pumping speed of 100 m ³ /h | | | | |
| Run-up time | | | | |
| at 95% of nominal speed | min | < 8 | < 8 | < 8 |
| Foreline flange | DN | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| Purge and vent port | | 1/4" VCR | 1/4" VCR | DN 10/16 |
| Cooling water connection | | | | |
| (OD of tube) | | 1/2" | 1/2" | Swagelok tube 1/4" |
| Weight, approx. | kg (lbs) | 48 (106) | 48 (106) | 60 (132) |



Technical Data

MAG.DRIVE digital

| | | |
|---------------------------------|----------|--|
| Mains connection, 50/60 Hz | V | 200 - 240, +10 %/-15 % |
| Current for connected consumers | | |
| max. | A | 20 |
| Max. motor voltage | V | 60 |
| Nominal frequency | Hz | 50/60 |
| Permissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 483 x 213 x 1/2 19" (19.02 x 8.39 x 1/2 19") |
| Weight, approx. | kg (lbs) | 10 (22) |

Ordering Information

TURBOVAC MAG W 2200 C/CT

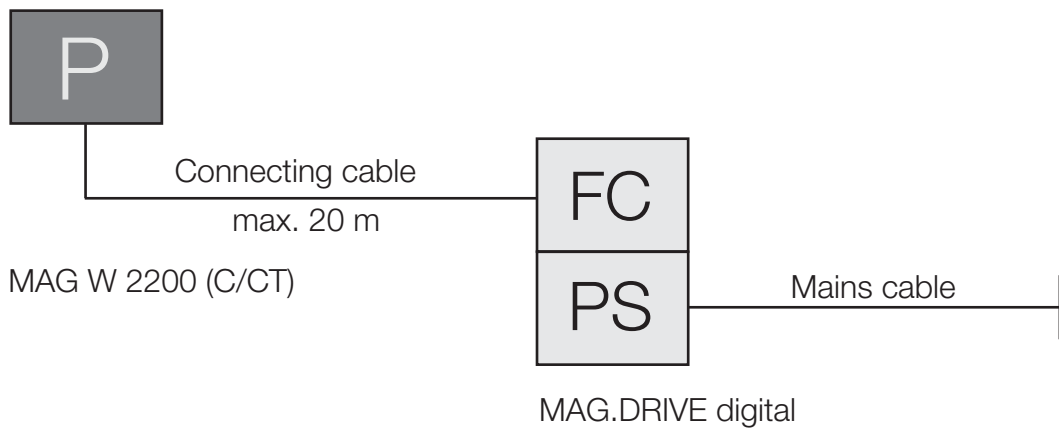
| TURBOVAC MAG W 2200 C/CT with separate Frequency Converter and Compound Stage | P | Part No. | |
|---|------|--|---|
| DN 200 ISO-F (MAG W 2200 C) DN 250 ISO-F (MAG W 2200 C) DN 250 CF (MAG W 2200) DN 200 ISO-F (MAG W 2200 CT) DN 250 ISO-F (MAG W 2200 CT) | | 400081V0011 400081V0021 400081V0061 400081V0013 400081V0023 |  |
| Mandatory Accessories | P FC | | |
| Electronic frequency converter ¹⁾ MAG.DRIVE digital MAG.DRIVE digital, Profibus MAG.DRIVE digital, RS 232 C interface | | 400035V0011 400035V0013 400035V0014 |  |
| Connecting cable converter – pump ²⁾ 1.5 m (5.25 ft) DRIVE/BEARING 1.5 m (5.25 ft) TMS ³⁾ 3.0 m (10.5 ft) DRIVE/BEARING 3.0 m (10.5 ft) TMS ³⁾ 5.0 m (17.5 ft) DRIVE/BEARING 5.0 m (17.5 ft) TMS ³⁾ 10.0 m (35.0 ft) DRIVE/BEARING 10.0 m (35.0 ft) TMS ³⁾ 20.0 m (70.0 ft) DRIVE/BEARING 20.0 m (70.0 ft) TMS ³⁾ | | 400036V0001 400037V0001 400036V0008 400037V0008 400036V0004 400037V0004 400036V0002 400037V0002 400036V0003 400037V0003 | |
| Plug-in control | | 121 36 | |
| Forevacuum pump TRIVAC D 65 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 208-23/460 V, 60 Hz / 200-220/380 V, 60 Hz | | 113 98 913 98-2 | |
| For further types, see Catalog Part “Oil Sealed Vacuum Pumps” | | | |

¹⁾ Included are 2 mains cords. One with EURO plug and one with US plug (220 V AC).
Replacement mains cord are Part Numbers 180 097 or 180 096 respectively

²⁾ Further connecting cables can be found under MAG.DRIVE digital in the chapter
“Turbomolecular Pumps with Magnetic Rotor Suspension”,
para. “Electronic Frequency Converters”

³⁾ TMS connecting cables are only needed for the “CT” version of the TURBOVAC MAG W 2200

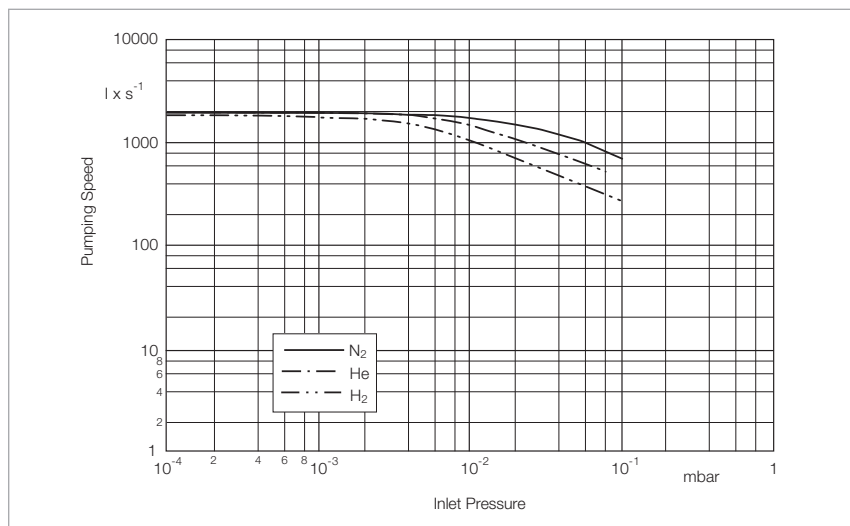
With separate Frequency Converter



Ordering Information

TURBOVAC MAG W 2200 C/CT

| Accessories, optional | P | Part No. |
|---|----|---------------|
| Purge gas and venting valve | | 121 33 |
| Connection cable for optional seal gas valve (pump/converter) | | |
| 1.5 m (5.25 ft) | | 400038V0007 |
| 3.0 m (10.5 ft) | | 400038V0006 |
| 10.0 m (35.0 ft) | | 400038V0002 |
| 20.0 m (70.0 ft) | | 400038V0009 |
| Seal kit | | |
| DN 250 metal | | 200 07 901 |
| Included in the Delivery of the Pump | P | |
| Inlet screen | | |
| DN 200 ISO-F | | E 400 000 096 |
| DN 250 ISO-F | | E 400 000 100 |
| DN 250 CF | | E 200 15 157 |
| Included in the Delivery of the Frequency Converter | FC | |
| Mains cord, 3 m (10.5 ft.) long, approx. with EURO or US plug | | |



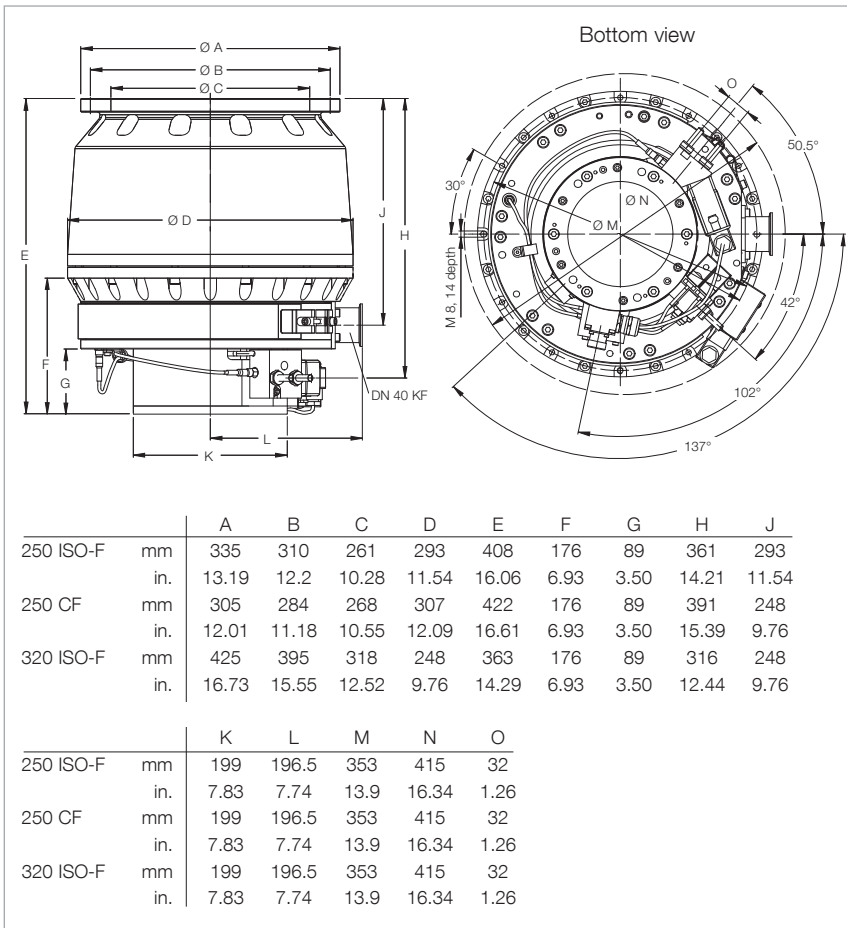
Pumping speed of the TURBOVAC MAG W 2200 C (DN 250) as a function of the inlet pressure

MAG DIGITAL - Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 2800/3200 C/CT



TURBOVAC MAG W 2800 CT (left) and TURBOVAC MAG W 3200 CT (right)



Dimensional drawing for the TURBOVAC MAG W 2800/3200 C/CT

Typical Applications

- All major semiconductor processes such as Etch, CVD, PVD and Ion Implantation

Versions with CF high vacuum connection

- Particle accelerators
- Research

Technical Features

- Active 5-axis magnetic bearing system
- Bearing and temperature system are controlled digitally
- Corrosion resistant
- Low noise and vibration levels
- Installation in any orientation
- Advanced rotor design for high pump speeds and forevacuum pressures
- Integrated purge gas system
- CT versions: Integrated temperature management system (TMS)
- Intelligent power control system

Advantages to the User

- Maintenance-free
- High throughput for all process gases
- High pumping speed at low pressure
- High foreline pressure tolerance: up to 2 mbar (1.5 Torr)
- High resistance against corrosive gases
- Robust against particles and deposits
- Temperature control up to 90 °C (194 °F) to avoid condensation
- Lowest weight and size in its class
- Application specific design

Technical Data**TURBOVAC MAG**




| | | W 2800 C | W 2800 CT | W 2800 | W 3200 CT |
|---|---------------------|--|--|--|--|
| Inlet flange | DN | 250 ISO-F | 250 ISO-F | 250 CF | 320 ISO-F |
| Pumping speed according to PNEUROP | | | | | |
| N ₂ | l x s ⁻¹ | 2650 | 2650 | 2650 | 3200 |
| Ar | l x s ⁻¹ | 2450 | 2450 | 2450 | 3000 |
| He | l x s ⁻¹ | 2650 | 2650 | 2650 | 3000 |
| H ₂ | l x s ⁻¹ | 2100 | 2100 | 2100 | 2250 |
| Operating speed | min ⁻¹ | 28 800 | 28 800 | 28 800 | 28 800 |
| Compression ratio | | | | | |
| N ₂ | | 1 x 10 ⁸ | 1 x 10 ⁸ | 1 x 10 ⁹ | 1 x 10 ⁸ |
| Ultimate pressure according to DIN 28 400 | | | | | |
| | mbar (Torr) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁹) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁹) | < 1 x 10 ⁻¹⁰ (< 0.75 x 10 ⁻¹⁰) | < 10 ⁻⁸ (< 0.75 x 10 ⁻⁹) |
| Max. foreline pressure for N ₂ | | | | | |
| with convection cooling | mbar (Torr) | – | – | 0.3 (0.23) | – |
| with water cooling | mbar (Torr) | 2.0 (1.5) | 2.0 (1.5) | 3.0 (2.3) | 2.0 (1.5) |
| Recommended backing pump | | | | | |
| Rotary vane pump | | TRIVAC D 65 BCS | TRIVAC D 65 BCS | TRIVAC D 65 BCS | TRIVAC D 65 BCS |
| or dry compressing pump | | | | | |
| offering a pumping speed of 100 m ³ /h | | | | | |
| Run-up time | min | < 10 | < 10 | < 10 | < 10 |
| Foreline flange | DN | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| Purge / vent port | | 1/4" VCR | 1/4" VCR | DN 10/16 | 1/4" VCR |
| Cooling water connection | Swagelok tube | 1/4" | 1/4" | 1/4" | 1/4" |
| Weight, approx. | kg (lbs) | 64 (141.3) | 64 (141.3) | 75 (165.6) | 65 (143.5) |

Technical Data**MAG.DRIVE digital**

| | | |
|---------------------------------------|----------|--|
| Mains connection, 50/60 Hz | V | 200 - 240, +10 %/-15 % |
| Current for connected consumers, max. | A | 20 |
| Max. motor voltage | V | 60 |
| Nominal frequency | Hz | 50/60 |
| Permissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 483 x 213 x 1/2 19" (19.02 x 8.39 x 1/2 19") |
| Weight, approx. | kg (lbs) | 10 (22) |

Ordering Information

TURBOVAC MAG W 2800 / 3200 C/CT

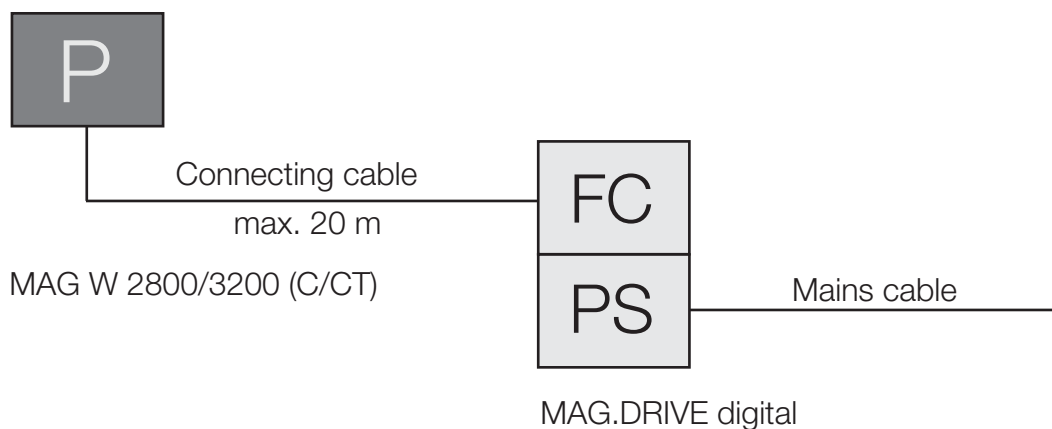
| TURBOVAC MAG W 2800 (C/CT) with separate Frequency Converter and Compound Stage | P | Part No. | |
|---|------|--|---|
| DN 250 CF (MAG W 2800) DN 250 ISO-F (MAG W 2800 C) DN 250 ISO-F (MAG W 2800 CT) | | 400006V0071 400000V0001 400000V0002 |  |
| TURBOVAC MAG W 3200 (C/CT) with separate Frequency Converter and Compound Stage | P | | |
| DN 320 ISO-F (MAG W 3200) DN 320 ISO-F (MAG W 3200 C) DN 320 ISO-F (MAG W 3200 CT) | | 400003V0003 400003V0001 400003V0002 |  |
| Mandatory Accessories | P FC | | |
| Electronic frequency converter ¹⁾ MAG.DRIVE digital MAG.DRIVE digital, Profibus MAG.DRIVE digital, RS 232 C interface | | 400035V0011 400035V0013 400035V0014 |  |
| Plug-in control | | 121 36 | |
| Connecting cable converter – pump ²⁾ 1.5 m (5.25 ft) DRIVE/BEARING 1.5 m (5.25 ft) TMS 3.0 m (10.5 ft) DRIVE/BEARING 3.0 m (10.5 ft) TMS 5.0 m (17.5 ft) DRIVE/BEARING 5.0 m (17.5 ft) TMS 10.0 m (35.0 ft) DRIVE/BEARING 10.0 m (35.0 ft) TMS 20.0 m (70.0 ft) DRIVE/BEARING 20.0 m (70.0 ft) TMS | | 400036V0001 400037V0001 400036V0008 400037V0008 400036V0004 400037V0004 400036V0002 400037V0002 400036V0003 400037V0003 | |
| Forevacuum pump TRIVAC D 65 B 3 phase motor; 230/400 V, 50 Hz / 250/440 V, 60 Hz 3 phase motor; 208-23/460 V, 60 Hz / 200-220/380 V, 60 Hz | | 112 96 912 96-2 | |
| For further types, see Catalog Part "Oil Sealed Vacuum Pumps" | | | |

¹⁾ Included are 2 mains cords. One with EURO plug and one with US plug (220 V AC).

Replacement mains cord are Part Numbers 180 097 or 180 096 respectively

²⁾ Further connecting cables can be found under MAG.DRIVE digital in the chapter "Turbomolecular Pumps with Magnetic Rotor Suspension", para. "Electronic Frequency Converters"

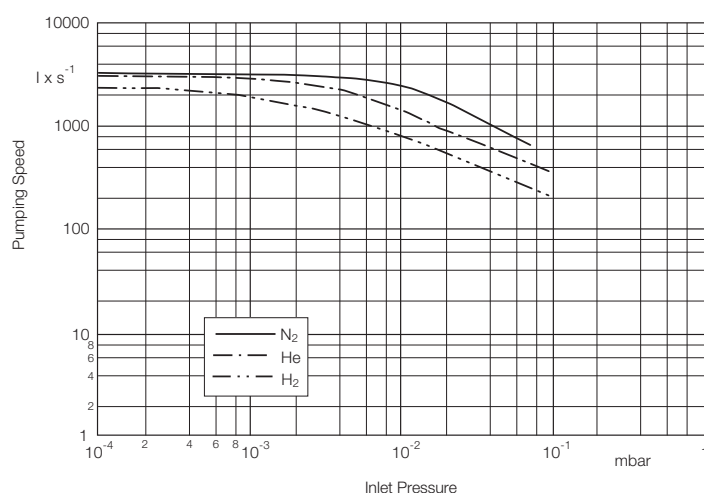
With separate Frequency Converter



Ordering Information

TURBOVAC MAG W 2800 C/CT / 3200 CT

| Accessories, optional | P | Part No. |
|---|----|--|
| Purge gas and venting valve | | 121 33 |
| Seal kit DN 250 metal | | 200 07 901 |
| Included in the Delivery of the Pump | P | |
| Inlet screen DN 250 ISO-F DN 250 CF DN 320 ISO-F | | E 400 000 100 200 15 157 E 400 000 134 |
| Included in the Delivery of the Frequency Converter | FC | |
| Mains cord, 3 m (10.5 ft.) long, approx. with EURO or US plug | | |



Pumping speed of the TURBOVAC MAG W 3200 C (DN 320) as a function of the inlet pressure

Accessories

Electronic Frequency Converters for Pumps with Mechanical Rotor Suspension

TURBO.DRIVE TD 20 *classic*

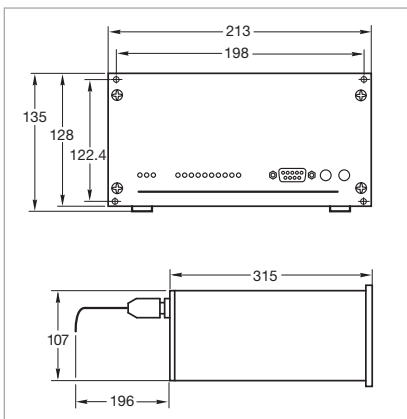


Technical Features

- For operating the TURBOVAC 151 (C), 361 (C), 600 C, 1000 C and 1100 C turbomolecular pump
- Front panel with LED
 - Status, Power, Error, pump run-up, pumping power
- Wide voltage range mains input
- Current interfaces like Profibus, DeviceNet, Ethernet/IP, RS 232 C, RS 485 C and 25-way terminal strip, available as options

Advantages to the User

- Easy integration within a vacuum system owing to the large variety of different modern interfaces as well as for modernising older systems
- Start/stop function through keys on the front panel
- Remote control and process control through analog and PLC compatible inputs and outputs
- Compatible to frequency converter NT 20, NT 151/361 and NT 361



Dimensional drawing for the electronic frequency converter TURBO.DRIVE TD 20 *classic*

Technical Data**TURBO.DRIVE TD 20 *classic***

| | | |
|--------------------------------|----------|--|
| Mains connection | 50/60 Hz | 100 to 240 V (+15 % / -10 %) |
| Max. power consumption | W | 500 |
| Max. output voltage | V | 3 x 47 |
| Max. output current | A | 5 |
| Interface | | Without, RS 232 C, RS 485 C, Profibus or 25-way terminal strip |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 213 x 128 x 315 (8.39 x 5.04 x 12.40) |
| Weight, approx. | kg (lbs) | 4.0 (8.8) |

Ordering Information**TURBO.DRIVE TD 20 *classic***

| | Part No. |
|---|--|
| TURBO.DRIVE TD 20 <i>classic</i> without interface with RS 232 C interface with RS 485 C interface with Profibus with 25-pol I/O | 800075V0001 800075V0002 800075V0004 800075V0003 800075V0005 |
| Mains cable 3 m (10.5 ft) EURO plug UK plug US plug 5-15 P 2 m (7.5 ft) US plug 115 V AC | 800102V0002 800102V0003 800102V1002 992 76 513 |
| Connecting cable TURBOVAC - frequency converter 3 m (10.5 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) 50 m (175.0 ft) 60 m (210.0 ft) 80 m (280.0 ft) 140 m (490.0 ft) | 857 65 857 66 857 67 857 68 800152V0008 800152V0007 800152V0080 800152V0140 |
| 19" rack mounting frame 3 HU | 161 00 |
| Pump adapter cable | 800 000 006 |
| Adapter cable, 0.2 m (0.7 ft) long 25-way PLC interface to 2x Phoenix plugs (required when a NT 20 with connected PLC interface needs to be replaced) | 800152V0020 |
| PC software TURBO.DRIVE Server ¹⁾ | 800110V0102 (see Chapter "Accessories" at the end of the section) |

¹⁾ Software supports only RS 232 C, RS 485 C and Profibus

TURBOTRONIK NT 10



Technical Features

- For operating the TURBOVAC 50 turbomolecular pump
- Bench top unit
- Also for rack mounting (1/4 19", 3 HU)
- Controls and indicators on the front panel
- Inputs for remote control and process controller
- Freely assignable relays (e.g. to control the backing pumps)

Technical Data

TURBOTRONIK NT 10

| | | |
|--------------------------------|----------|--------------------------------------|
| Mains connection | 50/60 Hz | 100-120 or 200-240 V |
| Max. power consumption | W | 45 |
| Max. output voltage | V | 3 x 150 |
| Max. output current | A | 6 |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +40 (+32 to +104) |
| Dimensions (W x H x D) | mm (in.) | 106 x 128 x 233 (4.17 x 5.04 x 9.17) |
| Weight, approx. | kg (lbs) | 1.5 (3.3) |

Ordering Information

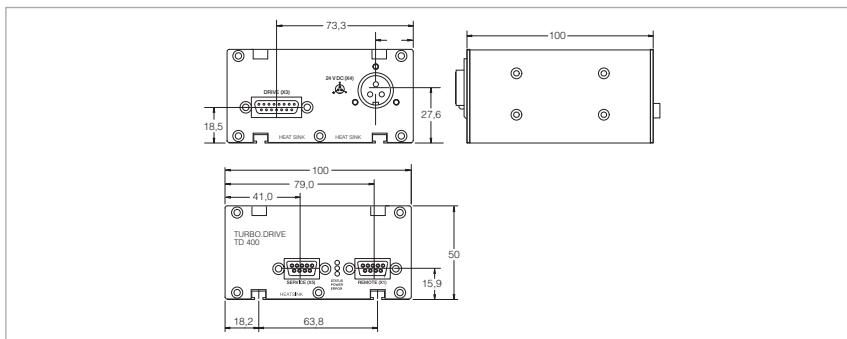
TURBOTRONIK NT 10

| | Part No. |
|-----------------------------------|-------------|
| 100 - 120 V (with US plug) | 859 01 |
| 200 - 240 V (with EURO plug) | 859 00 |
| Connecting cable pump - converter | |
| 1 m (3.5 ft) | 200 11 609 |
| 3 m (10.5 ft) | 121 08 |
| 5 m (17.5 ft) | 121 09 |
| 10 m (35.0 ft) | 161 10 |
| 15 m (52.5 ft) | 119 90 |
| 20 m (70.0 ft) | 800150V2000 |

TURBO.DRIVE TD 400 (TD 400) for TURBOVAC SL 80 and TW 250 S



TURBO.DRIVE TD 400 (Front side)



Dimensional drawing for the TURBO.DRIVE TD 400

Technical Features

- Small footprint
- USB, RS 232 C, RS 485 C, Profibus or Ethernet/IP interface
- Configurations:
 - as a separate frequency converter
 - integrated within the turbomolecular pump
- Remote control via remote interface
- Flexible mounting options
- Cost-effective supply of 24 V DC

Technical Data

TURBO.DRIVE TD 400

| | | |
|--------------------------------|----------|-------------------------------------|
| Mains connection | V DC | 24 |
| Max. current consumption | A | 8 |
| Max. power consumption | W | 190 |
| Max. output voltage | V | 3 x 24 |
| Interface | | USB, RS 232 C, RS 485 C or Profibus |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | +5 to +45 (+41 to +113) |
| Dimensions (W x H x D) | mm (in.) | 100 x 90 x 100 (3.9 x 3.5 x 3.9) |
| Weight, approx. | kg (lbs) | 0.7 (1.6) |

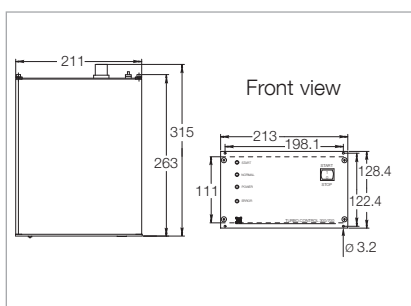
Ordering Information

TURBO.DRIVE TD 400

| | Part No. |
|--|---|
| TURBO.DRIVE TD 400 | |
| with USB interface | 800073V0008 |
| with RS 232 C interface | 800073V0002 |
| with RS 485 C interface | 800073V0003 |
| with Profibus | 800073V0004 |
| Connecting cable TD 400 - Pump | |
| 0.2 m (0.70 ft) | 800152V0021 |
| 0.3 m (1.15 ft) | 800152V0023 |
| 0.4 m (1.40 ft) | 800152V0022 |
| 0.5 m (1.75 ft) | 800152V0050 |
| 1.0 m (3.50 ft) | P152 47 |
| 2.5 m (8.75 ft) | 864 49 |
| 3.0 m (10.5 ft) | 864 40 |
| 5.0 m (17.5 ft) | 864 50 |
| START/STOP switch (for manual operation) | 152 48 |
| Hat rail adaptor as mounting aid | 800110V0003 |
| Accessories for RS 232 C and RS 485 C interfaces | (see Chapter "Accessories" at the end of the section) |

TURBO.CONTROL 300

Power Supply Unit for TURBO.DRIVE TD 400



Dimensional drawing for the power supply
TURBO.CONTROL 300

Technical Features

- Cost-effective supply of 24 V DC power for SL 80, TW 250 S and TURBO.DRIVE TD 400
- Plug & play
- Bench top unit or for cabinet mounting
- Mains switch
- START/STOP switch for the turbo-molecular pump
- Remote control via remote interface
- Status indicating LEDs and status relays

Technical Data

Power Supply TURBO.CONTROL 300

| | | |
|--------------------------------|----------|------------------------------------|
| Mains connection | 50/60 Hz | 85-264 V |
| Max. power consumption | W | 300 |
| Max. output voltage | V DC | 24 |
| Max. current consumption | A | 8.4 |
| Protection rating | IP | 20 |
| Admissible ambient temperature | °C (°F) | 0 to +40 (+32 to +104) |
| Dimensions (W x H x D) | mm (in.) | 213 x 129 x 320 (8.4 x 5.1 x 12.6) |
| Weight, approx. | kg (lbs) | 1.5 (3.3) |

Ordering Information

Power Supply TURBO.CONTROL 300

| | Part No. |
|--|-----------------------|
| Power supply TURBO.CONTROL 300 | 800100V0001 |
| DC cable frequency converter - power supply | 24 V DC control cable |
| 1 m (3.5 ft) | 800091V0100 |
| 3 m (10.5 ft) | 800091V0300 |
| 5 m (17.5 ft) | 800091V0500 |
| 10 m (35.0 ft) | 800091V1000 |
| 20 m (70.0 ft) | 800091V2000 |
| Mains cable | |
| 3 m (10.5 ft) with EURO plug | 800102V0002 |
| with UK plug | 800102V0003 |
| with US plug 5-15 P | 800102V1002 |
| 2 m (7.5 ft) US plug 115 V AC | 992 76 513 |

Electronic Frequency Converters for Pumps with Magnetic Rotor Suspension MAG.DRIVE S



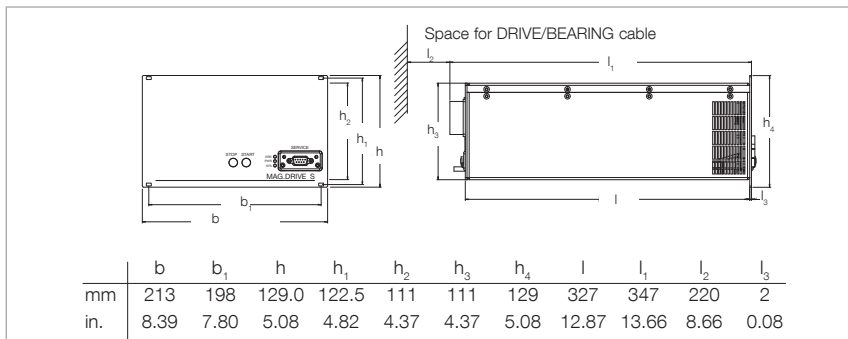
MAG.DRIVE S without display



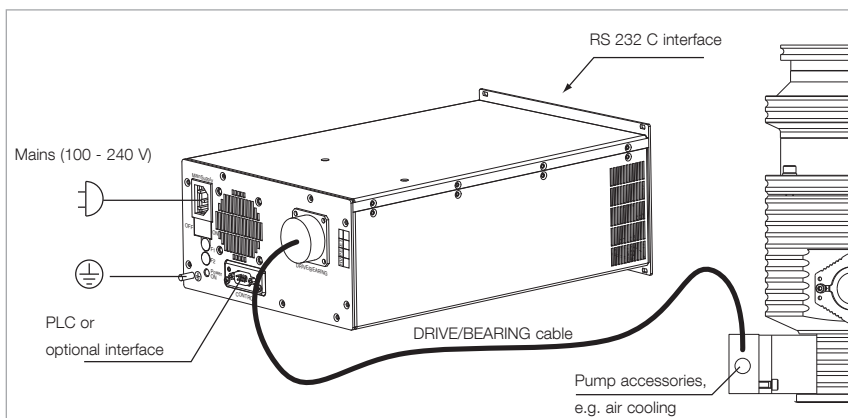
MAG.DRIVE S with display

Advantages to the User

- Operation of turbomolecular pumps with magnetically levitated rotors:
MAG W 300/400 P and
MAG W 600/700 P
- Easy operation through the controls
- Communication to host computer of the customer via serial interface and conventional interface possible
- Setting of speed and other functions
- Warning in case the pump is running out of specification
- Storing of all parameters in the pump's memory
- Small size and low weight
- Integrated fan
- 2 slots for industrial communications modules
- rear side:
Standard 9 pin 24 V SPS
PLC-IO in Control Slot
- front side:
RS 232 C in Service Slot
- further interfaces can be fitted:
Ethernet, Profibus, DeviceNet, RS 485 C



Dimensional drawing for the MAG.DRIVE S



Overview connection lines

Technical Data**MAG.DRIVE S**

| | | |
|----------------------------------|----------|--|
| Voltage range | V | 100 - 240, \pm 10% |
| Nominal frequency | Hz | 50 / 60 |
| Power consumption | | |
| stand-by | W | 100 |
| maximum | W | 400 |
| Max. motor voltage | V | 48 |
| Max. pump current | A | 6 |
| Fuses F1, F2 5 x 20 mm | | 10 A fast blow high breaking capacity 250 V |
| System fuse | | L or G characteristic |
| Max. frequency | Hz | 0 to 2000 |
| Load capability, relay output X1 | V / A | 32 / 0,5 |
| Temperature | | |
| during operation | °C (°F) | 0 to +45 (+32 to +113) |
| during storage | °C (°F) | -10 to +60 (+14 to +140) |
| Relative humidity of the air | % | 95 (non-condensing) |
| Weight, approx. | kg (lbs) | 65 (14.35) |

Ordering Information**MAG.DRIVE S**

| | Part No. |
|--|--------------------|
| Electronic frequency converter | |
| MAG.DRIVE S | 410300V0202 |
| MAG.DRIVE S with display | 410300V0212 |
| Connecting cable DRIVE/BEARING (connection between pump and MAG.DRIVE S) | |
| 3.0 m (10.5 ft) | 410300V4003 |
| 5.0 m (17.5 ft) | 410300V4005 |
| 10.0 m (35.0 ft) ¹⁾ | 410300V4010 |
| 20.0 m (70.0 ft) ¹⁾ | 410300V4020 |
| Mains cable | |
| 3.0 m (10.5 ft) | |
| EURO plug | 800102V0002 |
| US plug 5-15 P | 800102V1002 |
| 2.0 m (7.5 ft) | |
| US plug 115 V AC | 992 76 513 |

¹⁾ Suited for operating the MAG W 300/400 only

MAG.DRIVE digital



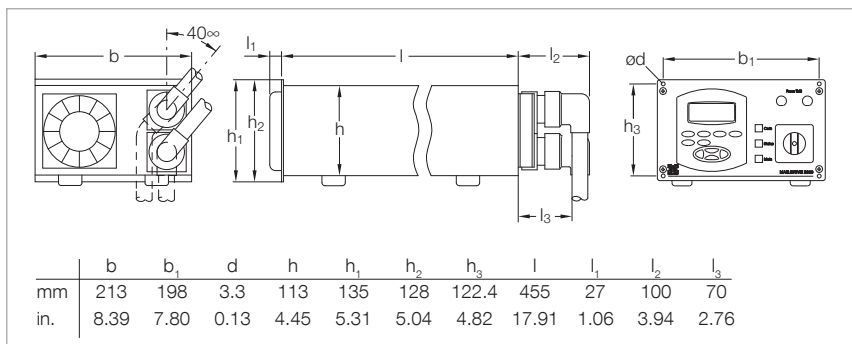
MAG.DRIVE digital without plug-in control



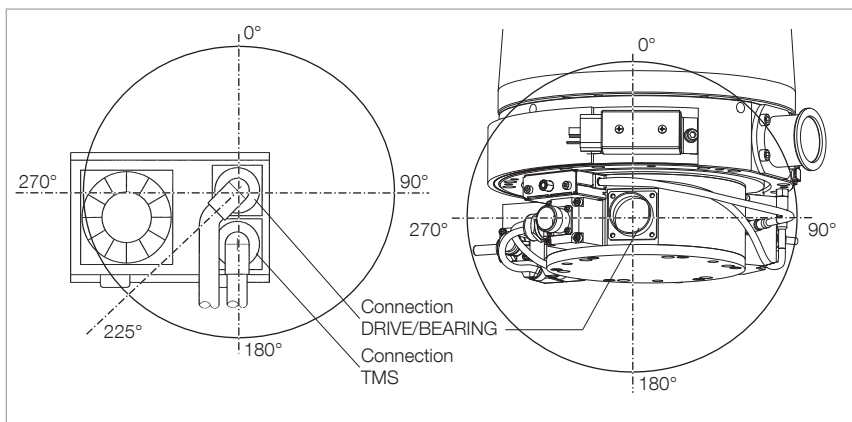
MAG.DRIVE digital with plug-in control

Advantages to the User

- Operation of turbomolecular pumps with magnetically levitated rotors:
MAG W 830/1300 C,
MAG (W) 1500 CT,
MAG W 2000 C/CT,
MAG W 2200 C/CT and
MAG W 2800/3200 C/CT
- Easy operation through the controls or the use of plug-in control unit
- Communication to host computer of the customer via serial interface and conventional interface possible
- Setting of speed, temperature of the basic flange and other functions
- Warning in case the pump is running out of specification
- Storing of all parameters in the pump's memory
- Plug-in control
- Small size and low weight
- Integrated fan
- Integrated temperature management system (TMS)



Dimensional drawing for the MAG.DRIVE digital



Overview connection lines

Technical Data

MAG.DRIVE digital

| | | |
|---------------------------------------|----------|--|
| Mains connection, 50/60 Hz | V | 200 - 240, +10%/-15% |
| Current for connected consumers, max. | A | 20 |
| Max. motor voltage | V | 60 |
| Nominal frequency | Hz | 50/60 |
| Permissible ambient temperature | °C (°F) | 0 to +45 (+32 to +113) |
| Dimensions (W x H x D) | mm (in.) | 483 x 213 x 1/2 19" (19.02 x 8.39 x 1/2 19") |
| Weight, approx. | kg (lbs) | 10 (22) |

Ordering Information

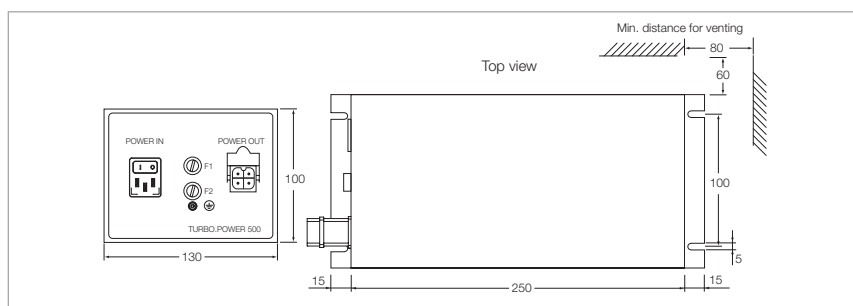
MAG.DRIVE digital

| | | | | Part No. |
|---|-------------------------------------|-------------------|-------------|---------------------|
| Electronic frequency converter ¹⁾ | | | | |
| MAG.DRIVE digital | | | | 400035V0011 |
| with Profibus interface | | | | 400035V0013 |
| with RS 232 C interface | | | | 400035V0014 |
| Plug-in control | | | | 121 36 |
| Connection line leading to the | | | | |
| DRIVE/BEARING of the TURBOVAC MAG ... C/CT | | | | |
| | Cable outlet frequency converter | Cable outlet pump | | |
| | DRIVE/BEARING | DRIVE/BEARING | PK | |
| 1.5 m (5.25 ft) | bended 225° | straight | straight | 400036V0001 |
| 1.5 m (5.25 ft) | bended 40° | bended 180° | straight | 400036V0025 |
| 3.0 m (10.5 ft) | straight | bended 180° | straight | 400036V0006 |
| 3.0 m (10.5 ft) | bended 225° | straight | straight | 400036V0008 |
| 3.0 m (10.5 ft) | straight | bended 270° | straight | 400036V0009 |
| 5.0 m (17.5 ft) | bended 225° | straight | straight | 400036V0004 |
| 5.0 m (17.5 ft) | straight | straight | straight | 400036V0010 |
| 8.0 m (28.0 ft) | bended 225° | straight | straight | 400036V0005 |
| 10.0 m (35.0 ft) | bended 225° | straight | straight | 400036V0002 |
| 20.0 m (70.0 ft) | bended 225° | straight | straight | 400036V0003 |
| 23.0 m (80.5 ft) | bended 225° | straight | straight | 400036V0012 |
| 30.0 m (105 ft) | bended 225° | straight | straight | 400036V0011 |
| TMS | | | | |
| (only for CT versions) | | | | |
| | Cable outlet frequency converter | Cable outlet pump | | |
| | TMS | TMS | Heater | |
| 1.5 m (5.25 ft) | bended 225° | straight | bended 180° | 400037V0001 |
| 1.5 m (5.25 ft) | bended 40° | straight | bended 180° | 400037V0025 |
| 3.0 m (10.5 ft) | bended 225° | straight | bended 180° | 400037V0008 |
| 5.0 m (17.5 ft) | bended 225° | straight | bended 180° | 400037V0004 |
| 8.0 m (28.0 ft) | bended 225° | straight | bended 180° | 400037V0005 |
| 10.0 m (35.0 ft) | bended 225° | straight | bended 180° | 400037V0002 |
| 20.0 m (70.0 ft) | bended 225° | straight | bended 180° | 400037V0003 |
| Purge / Vent (only for optional purge vent valve Part No. 121 33) | | | | |
| | Cable outlet frequency converter | Cable outlet pump | | |
| | TMS | Purge | Vent | |
| 1.5 m (5.25 ft) | straight | bended | bended | 400038V0007 |
| 3.0 m (10.5 ft) | bended 225° | bended | bended | 400038V0006 |
| 10.0 m (35.0 ft) | bended 225° | bended | bended | 400038V0002 |
| 20.0 m (70.0 ft) | straight | bended | bended | 400038V0009 |
| Connector for hardware interface | | | | upon request |
| 19" installation frame | | | | 161 00 |

¹⁾ Included are 2 mains cords. One with EURO plug and one with US plug (220 V AC).
Replacement mains cord are Part Numbers 180 097 or 180 096 respectively

Power Supply TURBO.POWER 500

for TURBOVAC MAG W 300/400/600/700 iP



Dimensional drawing for the power supply TURBO.POWER 500

Technical Features

- For supplying 48 V DC power to the MAG W 300/400/600/700 iP
- Bench top unit or for cabinet mounting

Technical Data**Power Supply**
TURBO.POWER 500

| | | |
|---|----------|--------------------------|
| Power supply (POWER IN) | V | 100 - 240, ± 10% |
| Nominal frequency | Hz | 50 / 60 |
| Power consumption maximum | VA | 650 |
| at ultimate pressure operation of the pump | VA | 450 |
| DC voltage range | | |
| POWER OUT | V DC | 48 |
| max. | A | 10 |
| Length of the DC connection cable, max. | | |
| at 3 x 1.5 mm ² | m (ft) | 5 (17.5) |
| at 3 x 2.5 mm ² | m (ft) | 20 (70.0) |
| Ambient temperature during operation | °C (°F) | +10 to +40 (+50 to +104) |
| during storage | °C (°F) | -10 to -70 (+14 to -94) |
| Relative humidity of the air | % | 5 to 85 (non-condensing) |
| Protection class | IP | 30 |
| Overvoltage category | | II |
| Pollution category | | 2 |
| Weight, approx. | kg (lbs) | 4.0 (8.8) |

Ordering Information**Power Supply**
TURBO.POWER 500

| | Part No. |
|---|--------------------|
| Power supply TURBO.POWER 500 | 410300V0221 |
| DC cable (connection between TURBO.POWER 500 and MAG.DRIVE iS) | |
| 1.0 m (3.5 ft) | 410300V2001 |
| 3.0 m (10.5 ft) | 410300V2003 |
| 5.0 m (17.5 ft) | 410300V2005 |
| 10.0 m (35.0 ft) | 410300V2010 |
| 20.0 m (70.0 ft) | 410300V2020 |
| Mains cable | |
| 3.0 m (10.5 ft) | |
| EURO plug | 800102V0002 |
| US plug 5-15 P | 800102V1002 |
| 2.0 m (7.5 ft) | |
| US plug 115 V AC | 992 76 513 |

Vibration Absorber

Vibration absorbers are used to inhibit the propagation of vibrations from the turbomolecular pump to highly sensitive instruments like electron beam microscopes, micro-balances or analytical instruments.



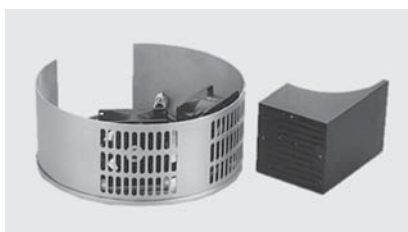
Ordering Information

Vibration Absorber

| | Part No. |
|------------------------------------|--------------------|
| Vibration absorber | |
| DN 63 ISO-K 66 mm (2.60 in.) long | 800131V0063 |
| DN 63 CF 81 mm (3.19 in.) long | 500 070 |
| DN 100 ISO-K 84 mm (3.31 in.) long | 800131V0100 |
| DN 100 CF 100 mm (4.09 in.) long | 500 071 |
| DN 160 ISO-K 84 mm (3.31 in.) long | 500 073 |
| DN 160 CF 104 mm (4.09 in.) long | 500 072 |

Air Cooling Unit for TURBOVAC ClassicLine Pumps

For the purpose of retrofitting the TURBOVAC 50, 151, 361 and 600 pumps for air cooling, an air cooling unit is available by way of a retrofit kit. This kit can be easily fitted to the respective pump using the fitting components included with the accessories.



Technical Data

Air Cooling Unit

| | |
|---|------|
| Rated power consumption of the air cooling unit when connected to | |
| TURBOVAC 50, 151 (C)/361 (C) W | 10.5 |
| TURBOVAC 600 C, 1000 C W | 21.0 |

Ordering Information

Air Cooling Unit

| | Part No. | Part No. |
|---------------------------|---------------|--------------------|
| Air cooling unit for | 230 V | 100-115 V |
| TURBOVAC 50 | 854 05 | 800152V0015 |
| TURBOVAC 1 51 (C)/361 (C) | 855 31 | 800152V0016 |
| TURBOVAC 600 C, 1000 C | 855 41 | 800152V0017 |

Air Cooling Unit for TURBOVAC SL Pump

For fitting to the turbomolecular pump SL 80



Air cooling units for the pump SL 80

Technical Data

| | | Air Cooling Unit |
|-----------------------|----------|--------------------------|
| Power supply voltage | V DC | 24 |
| Current rating | mA | 39 |
| Power | W | 0.9 |
| Operating temperature | °C (°F) | +10 to +40 (+50 to +104) |
| Protection class | IP | 20 |
| Weight, approx. | kg (lbs) | 0.23 (0.51) |
| Volume flow | m³/h | 20 |

Ordering Information

| | Part No. |
|-------------------------------------|--------------------|
| Air cooling unit for TURBOVAC SL 80 | 800136V0001 |

Flange Heater for CF High Vacuum Flanges

Most TURBOVAC pumps can be baked out in order to improve the ultimate pressure attained in the UHV range. Degassing of the turbomolecular pump will only be useful when simultaneously baking out the vacuum chamber.



Technical Data

| | | Flange Heater |
|--|---|---------------|
| Rated power consumption of the flange heater | | |
| DN 63 CF, DN 100 CF | W | 100 |
| DN 160 CF | W | 150 |

Ordering Information

| | Part No. | Part No. |
|---------------|---------------|---------------|
| Flange heater | 230 V | 115 V |
| DN 63 CF | 854 04 | 854 07 |
| DN 100 CF | 854 27 | 854 28 |
| DN 160 CF | 854 37 | 854 38 |

Fine Filter

A fine filter integrated in the centering ring protects the pump against particles and dust on the high vacuum side.



Ordering Information

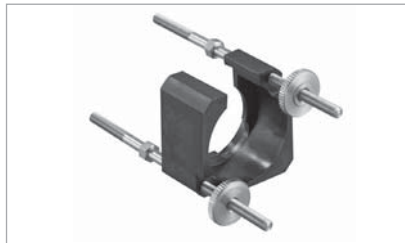
Fine Filter

| | Part No. |
|--------------------------------------|----------|
| Connection flange of the fine filter | |
| DN 40 ISO-KF | 883 98 |
| DN 63 ISO-K | 887 20 |
| DN 100 ISO-K | 887 21 |

Securing Collar for Octal Socket Plugs

for ClassicLine Pumps TURBOVAC 151 (C), 361 (C), 600 C, 1000 C and 1100 C

The securing collar serves the purpose of securing the plug on the ClassicLine pumps TURBOVAC 151 (C), 361 (C), 600 C, 1000 C and 1100 C against being disconnected inadvertently.



Ordering Information

Securing Collar for Octal Socket Plugs

| | Part No. |
|--|-----------|
| Securing collar for octal socket plugs | 800001830 |

Solenoid Venting Valve



Technical Data

Venting Valve

| | | |
|-------------------|----------|------------|
| Drive voltage | V DC | 24 |
| Power consumption | W | 4 |
| Connecting flange | DN | 16 ISO-KF |
| Weight, approx. | kg (lbs) | 0.3 (0.66) |

Ordering Information

Venting Valve

| | Part No. |
|---|-------------|
| Solenoid venting valve, normally closed | 800120V0011 |

Power Failure Venting Valve



Technical Data

Power Failure Venting Valve

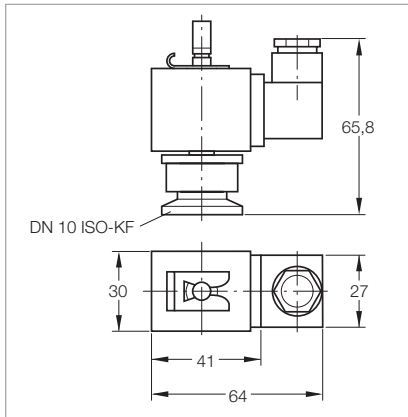
| | | |
|-------------------|----------|------------|
| Drive voltage | V DC | 24 |
| Power consumption | W | 4 |
| Connecting flange | DN | 16 ISO-KF |
| Weight, approx. | kg (lbs) | 0.3 (0.66) |

Ordering Information

Power Failure Venting Valve

| | Part No. |
|--|-------------|
| Power failure venting valve, normally open | 800120V0021 |

Power Failure Venting Valve, Electromagnetically Actuated



Dimensional drawing for the electromagnetically actuated power failure venting valve

Technical Data

Technical data

Power Failure Venting Valve

See Catalog "Valves",
para. "Special Valves"

Ordering Information

Power failure venting valve DN 10 ISO-KF,
electromagnetically actuated
24 V DC
230 V AC / 50/60 Hz

Power Failure Venting Valve

Part No.

174 46
174 26

Purge Gas and Venting Valve



Technical Data

Connecting flange DN
Weight, approx. kg (lbs)

Purge Gas and Venting Valve

10 ISO-KF
0.7 (1.55)

Ordering Information

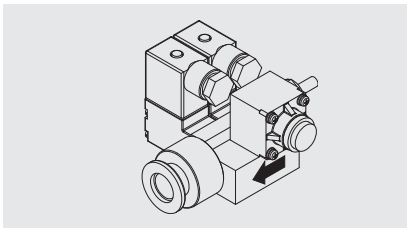
Purge gas and venting valve, 230 V
0.2 mbar x l x s⁻¹ (12 sccm)
0.4 mbar x l x s⁻¹ (24 sccm)

Purge Gas and Venting Valve

Part No.

855 19
855 29

Purge Gas and Venting Valve



Technical Data

Connecting flange
Inlet
Outlet
Purge gas pressure, abs. bar
Weight, approx. kg (lbs)

Purge Gas and Venting Valve

1/4" tube
pump specific or DN 16 ISO-KF

1.5 to 6,0
0.5 (1.1)

Ordering Information

Purge gas and venting valve, 24 V DC
0.6 mbar x l x s⁻¹

Purge Gas and Venting Valve

Part No.

121 33

Further 0.6 mbar x l x s⁻¹ valves upon request

Purge Gas and Venting Valve for ClassicLine and SL Pumps



Technical Data

| | | |
|-------------------------|----------|------------|
| Connecting flange | | |
| Pump side | DN | 10 ISO-KF |
| Gas connection | G | 1/4" |
| Seal gas pressure, abs. | bar | 1 |
| Weight, approx. | kg (lbs) | 0.3 (0.66) |

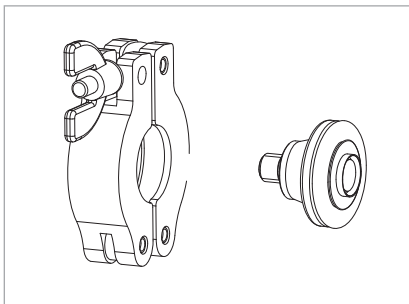
Purge Gas and Venting Valve

Ordering Information

Purge Gas and Venting Valve

| | Part No. |
|--|--------------------|
| Purge gas and venting valve at 1 bar | 113 50 |
| 0.2 mbar x l x s ⁻¹ (12 sccm), 24 V DC | 800152V0041 |
| 0.2 mbar x l x s ⁻¹ (12 sccm), 110 - 115 V AC | 800152V0019 |
| 0.2 mbar x l x s ⁻¹ (12 sccm), 230 V AC | 800152V0013 |
| 0.4 mbar x l x s ⁻¹ (24 sccm), 24 V DC | 800152V0013 |
| 0.4 mbar x l x s ⁻¹ (24 sccm), 110 - 115 V AC | 800152V0042 |
| 0.4 mbar x l x s ⁻¹ (24 sccm), 230 V AC | 800152V0014 |
| 0.6 mbar x l x s ⁻¹ (36 sccm), 24 V DC | 800152V0012 |
| 0.6 mbar x l x s ⁻¹ (36 sccm), 110 - 115 V AC | 800152V0043 |
| 0.6 mbar x l x s ⁻¹ (36 sccm), 230 V AC | 800152V0040 |

Adapter Set for Seal Gas and Venting Valve for the SL pumps



Technical Data

| | |
|--|---|
| Pump flange adapter incl. adapter centering ring with sinter filter insert and clamping ring | M8 / DN 10 ISO-KF DN 10 / DN 16 ISO-KF |
|--|---|

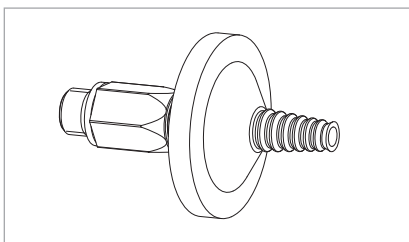
Adapter Set

Ordering Information

Adapter Set

| | Part No. |
|--|--------------------|
| Adapter set for purge gas and venting valve | 800110V0011 |

Gas Filter to G 1/4" for Purge Gas and Venting Valve



Technical Data

| | |
|---|--|
| Gasfilter including fitting G 1/4" and 2 gaskets | |
|---|--|

Gas Filter

Ordering Information

Gas Filter

| | Part No. |
|---|---------------------|
| Gas filter to G 1/4" for seal gas and venting valve | 800110V0012 |
| Replacement filter for gas filter to G 1/4" for seal gas and venting valve | E 200 18 515 |

Accessories for Serial Interfaces RS 232 C and RS 485 C

Through these accessories many control, monitoring and information capabilities can be implemented in

connection with the electronic frequency converters and turbomolecular pumps.

All turbomolecular pumps or electronic frequency converters are supported.

PC Software LEYASSIST



Software for PC-based communication, control and monitoring of turbomolecular pumps via USB, RS 485 or RS 232 interface with automatic pump detection.

Functions

- Display of vacuum system status
- Configuring the accessory functions of the TURBOVAC i / iX
- Reading/writing of parameters
- Data logging
- Alarm/warning message logging

Ordering Information

PC Software LEYASSIST

| | Part No. |
|-----------------------|------------------|
| PC software LEYASSIST | 230439V01 |

Interface Adaptor for Frequency Converter with RS 232 C/RS 485 C Interface

Ordering Information

Interface Adaptor RS 232 C/RS 485 C

| | Part No. |
|---|--------------------|
| Adaptor RS 232 C/RS 485 C mains connection 230 V, 50 Hz, EURO plug | 800110V0101 |
| Adaptor USB/RS 232 C for connection of RS 232 C to USB (PC), including CD with drivers and manual | 800110V0103 |

Services for Mechanically Suspended Turbomolecular Pumps

Complete Refurbishing at the Service Centre

Complete refurbishing at the service centre includes the following:

Complete disassembly, cleaning, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Complete Refurbishing with Decontamination at the Service Centre

Complete refurbishing with decontamination at the service centre includes the following:

Complete disassembly, cleaning and decontamination, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Ordering Information

Complete Refurbishing at the Service Centre

Complete Refurbishing with Decontamination at the Service Centre

| | Part No. | Part No. |
|-----------------------|----------|------------|
| For pump | | |
| TURBOVAC 35 / 50D | AS 2165 | AS 2165 D |
| TURBOVAC 50 | AS 2133 | AS 2133 D |
| TURBOVAC SL 80 | LAS 2368 | LAS 2368 D |
| TURBOVAC TW 70 H | AS 2368 | AS 2368 D |
| TURBOVAC 151 | AS 2134 | AS 2134 D |
| TURBOVAC TW 250 S | AS 2168 | AS 2168 D |
| TURBOVAC SL 300 | LAS 2369 | LAS 2369 D |
| TURBOVAC TW 300 | AS 2369 | AS 2369 D |
| TURBOVAC 361 | AS 2135 | AS 2135 D |
| TURBOVAC 600 / 1000 | AS 2136 | AS 2136 D |
| TURBOVAC TW 701 / 690 | AS 2330 | AS 2330 D |
| TURBOVAC 1100 | AS 2137 | AS 2137 D |

Services for Magnetically Levitated Turbomolecular Pumps

Complete Refurbishing at the Service Centre

Complete refurbishing at the service centre includes the following:

Complete disassembly, cleaning, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Complete Refurbishing with Decontamination at the Service Centre

Complete refurbishing with decontamination at the service centre includes the following:

Complete disassembly, cleaning and decontamination, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Ordering Information

Complete Refurbishing at the Service Centre

Complete Refurbishing with Decontamination at the Service Centre

| | Part No. | Part No. |
|---------------------------|------------------------------|--------------------------------|
| For pump | | |
| TURBOVAC 340 M | AS 2141 | AS 2141 D |
| TURBOVAC 340 MC/MCT | AS 2142 ¹⁾ | AS 2142 D ¹⁾ |
| TURBOVAC MAG 400 C/CT | AS 2143 ¹⁾ | AS 2143 D ¹⁾ |
| MAG (W) 1600 / 2000 | AS 2164 ¹⁾ | AS 2164 D ¹⁾ |
| MAG (W) 830 / 1300 / 1500 | AS 2370 ¹⁾ | AS 2370 D ¹⁾ |
| MAG 900 / 1000 / 1200 | AS 2160 ¹⁾ | AS 2160 D ¹⁾ |
| MAG 2200 | AS 2200 ¹⁾ | AS 2200 D ¹⁾ |
| MAG 2800 / 3200 | AS 2800 ¹⁾ | AS 2800 D ¹⁾ |

Notes

The listed services include the costs for material and working hours for standard pumps. Services for pump variants upon request.

If additional spare parts are needed for repairs, then these are invoiced separately according to a cost estimate.

¹⁾ Including rotor replacement

General

Applications and Accessories for Oil Diffusion Pumps

| Pumps | DIP 3000 | DIP 8000 | DIP 12000 | DIP 20000 | DIP 30000 | DIP 50000 | LEYBOJET 630 | OB 6000 | OB 12000 | OB 18000 |
|--------------------------------------|----------|----------|-----------|-----------|-----------|-----------|--------------|---------|----------|----------|
| Application | | | | | | | | | | |
| Vacuum coating (e.g. Sputtering) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Research and development | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Metallurgy/furnaces | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Mechanical engineering | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Sputtering process | | | | | | | ■ | ■ | ■ | ■ |
| Secondary metallurgy (e.g. VIM, VID) | | | | | | | | ■ | ■ | ■ |
| High vacuum furnaces | | | | | | | | ■ | ■ | ■ |

Accessories

Page

| | | | | | | | | | | | |
|------------------------------------|-----|---|---|---|---|---|---|---|---|---|---|
| Astrotorus baffle | 458 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| Over-temperature protection switch | 460 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| Contact thermometer | 460 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| Resistance thermometer Pt100 | 460 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| Monitoring instruments | 461 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Energieregler | 434 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Adsorption trap | 464 | For generating an oil-free vacuum with oil sealed backing pumps | | | | | | | | | |

Oil for Diffusion Pumps for different fields of application

| Application | Vacuum coating | Research and development | Metallurgy/furnaces | Mechanical engineering | Sputter processes |
|-----------------------|----------------|--------------------------|---------------------|------------------------|-------------------|
| LEYBONOL Oils | | | | | |
| LVO 500 | ■ | ■ | ■ | ■ | ■ |
| LVO 510 | ● | ● | ● | ● | ● |
| LVO 520 | ● | ● | | | |
| LVO 530 | ● | ● | | | |
| LVO 540 ¹⁾ | ■ | ■ | ■ | ■ | ■ |

■ = Standard

● = Possible

¹⁾ Only for OB pumps

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
“Oils / Greases / Lubricants LEYBONOL®”.**

Oil for Diffusion Pumps for different pump types

| Pumps | DIP 3000 | DIP 8000 | DIP 12000 | DIP 20000 | DIP 30000 | DIP 50000 | LEYBOJET 630 | OB 6000 | OB 12000 | OB 18000 |
|----------------------|----------|----------|-----------|-----------|-----------|-----------|--------------|---------|----------|----------|
| LEYBONOL Oils | | | | | | | | | | |
| LVO 500 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| LVO 510 | ● | ● | ● | ● | ● | ● | ● | | | |
| LVO 520 | ● | ● | ● | ● | ● | ● | ● | | | |
| LVO 530 | ● | ● | ● | ● | ● | ● | ● | | | |
| LVO 540 | | | | | | | | ■ | ■ | ■ |

- = Standard
- = Possible

Note

All oils may be used.

The pumps are supplied as standard without oil.

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
"Oils / Greases / Lubricants LEYBONOL®".**

Operating Principle of Fluid Entrainment Vacuum Pumps

The main components of diffusion pumps, the operation of which relies on vapor-phase pump fluids are:

- Cooled pump body with intake and exhaust ports
- System of nozzles
- Pump boiler

In the case of diffusion pumps a pump fluid contained in a boiler is heated to such an extent that it is vaporized. The vapor is then forced through nozzles within the pump. The nozzles are generally designed in such a way, that they accelerate the vapor to a speed exceeding the speed of sound (Laval nozzles), thus creating a high speed vapor jet. The vapor is then deflected by the nozzles at a specific angle onto the pump body. The pump body is

cooled, so that the vaporized pump fluid condenses and is returned back to the boiler as a liquid. The pumping action of diffusion pumps and fluid entrainment pumps in general is based on the transporting capacity of the vapor jet.

The gas which is to be pumped is compressed sufficiently at the fore-vacuum port so that it can be pumped out by a backing pump.

Oil Diffusion Pumps

Compared to other fluid entrainment pumps the density of the vapor in the boiler and in the vapor jet is fairly low so that the gas molecules may almost completely diffuse into the vapor jet. Thus most of the molecules which enter the vapor jet are also pumped out.

For this reason, the pumping speed of diffusion pumps is extremely high with respect to the intake area and constant – starting at an inlet pressure of approx. 10^{-3} mbar (0.75×10^{-3} Torr) down to very low pressures – as within the pressure range the vapor jet is not influenced in any way by the pressure within the vacuum vessel.

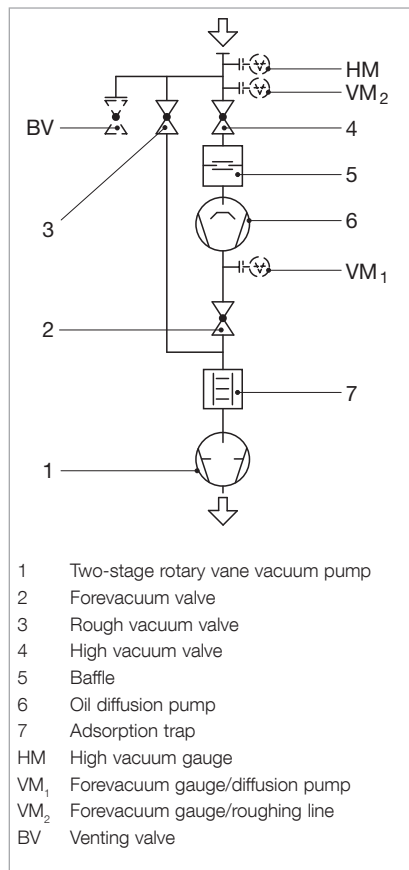


Diagram of a pump system with diffusion pump

Operating Oil Diffusion Pumps

Forevacuum

In all cases diffusion pumps require a sufficiently sized backing pump (see Technical Data). The size and type of forevacuum pump depends on the operating conditions and the quantities of gas which are to be pumped.

1. Continuous operation at operating pressures above 10^{-4} mbar (0.75×10^{-4} Torr) – large quantities of gas.
2. Continuous operation at operating pressures below 10^{-4} mbar (0.75×10^{-4} Torr) – smaller quantities of gas.

In applications which rely on diffusion pumps, the vacuum chamber must be connected via a valve (3) and a roughing line directly to the backing pump. This is done so that the vacuum chamber may be pre-evacuated by the backing pump down to a pressure where the diffusion pump can take over. Until the high vacuum valve (4) opens, both diffusion pump and pump fluid are preserved. Before venting the vacuum chamber the forevacuum valve (2) and the high vacuum valve (4) must be closed, whereby the diffusion pump remains in the ready status.

Pumping Speed

The pumping speed of any pump is equivalent to the volume throughput through the intake opening of a pump. In the case of diffusion pumps the pumping speed for lighter gases is higher compared to heavier gases.

Backstreaming of the Pump Fluid

Undesirable backstreaming of molecules from the pump fluid is caused by the effect that some molecules are able to leave the vapor jet and thus do not arrive at the cooled pump body. Because of collisions between each other and due to reflection at the pump body, these molecules are then able to move in the direction of the vacuum chamber.

For DIP pumps the backstreaming effect amounts only to a few μg per cm^2 of intake area per minute. Backstreaming may be almost completely suppressed by including a cold cap baffle or an additional Astrotorus baffle.

Backstreaming of Oil in the Case of Diffusion Pumps

- Pump without baffle
approx. $1 \times 10^{-2} \text{ mg} \times \text{cm}^{-2} \times \text{min}^{-1}$
- Pump with cold cap baffle
approx. $1 \times 10^{-3} \text{ mg} \times \text{cm}^{-2} \times \text{min}^{-1}$
- Pump with Astrotorus baffle
($T = 10^\circ\text{C}$ (50°F))
approx. $1 \times 10^{-5} \text{ mg} \times \text{cm}^{-2} \times \text{min}^{-1}$

The values stated have been measured at an intake pressure of $< 1 \times 10^{-4}$ mbar and apply to LEYBONOL LVO 500.

Attainable Ultimate Pressure

The attainable ultimate pressure for a particular vacuum system depends not only on the type and pumping speed rating of the diffusion pump, but also on the vapor pressure of the pump fluid, shape and temperature of the baffle, leaks at connecting flanges or welded joints and the condition of the surfaces within the vacuum chamber.

When excluding all effects which contribute to an increase in pressure within

the vacuum chamber due to leaks and contamination of the vacuum chamber walls, it will be possible to attain the ultimate pressures stated in the table "Attainable Ultimate Pressures with Oil Diffusion Pumps (DIP)" given in chapter "General".

In practice the following combination has been found to work very well when needing a low vacuum free of oil vapors.

- Water-cooled cold cap baffle as a integral part of the diffusion pump together with a water-cooled Astrotorus baffle which may be installed as an additional component on the high vacuum flange of the diffusion pump.

Sealing Methods

For ultimate pressures down to 10^{-8} mbar (0.75×10^{-8} Torr) bakeout temperatures of up to 150 °C (302 °F) are sufficient. FPM [FKM (= Fluor caoutchouc), temperature resistant up to 150 °C (302 °F)] sealing rings or ultra sealing rings made of aluminum must be used.

In order to prevent pressure variations, ultra sealing rings must be used in the connections, between diffusion pump and baffle.

Ultimate pressures below 10^{-8} mbar (0.75×10^{-8} Torr) require bakeout temperatures up to 400 °C (752 °F). However, it is only necessary to bake out the vacuum chamber to 400 °C (752 °F) and to maintain a temperature gradient across the baffle or the cold trap so that a temperature of 150 °C (302 °F) is not exceeded at the intake flange of the pump.

In this way, it is still acceptable to use FPM (FKM) sealing rings or ultra sealing rings made of aluminium.

Cooling

The cooling water temperature should not exceed 25 °C (77 °F) at the intake and 30 °C (86 °F) at the discharge, otherwise sufficient condensation of the pump fluid cannot be ensured. When connecting the cooling system of the pump and the baffle in series, the cooling water must always be made to flow through the baffle first and then through the diffusion pump, because the attainable ultimate pressure in the vacuum chamber depends strongly on the condensation temperature of the pump fluid in the baffle.

Attainable Ultimate Pressures with Oil Diffusion Pumps

Attainable Ultimate Pressure ¹⁾

LEYBONOL LVO 500

| | | |
|------------------------|-------------|---|
| Without baffle | mbar (Torr) | 1.5×10^{-6} (1.1×10^{-6}) |
| With cold cap baffle | mbar (Torr) | 5.0×10^{-7} (3.8×10^{-7}) |
| With Astrotorus baffle | mbar (Torr) | 1.5×10^{-7} (1.1×10^{-7}) |

¹⁾ Attained in consideration of the notes given under "Sealing Methods" in the chapter "General" para. "Oil Diffusion Pumps" and after degassing the connected vacuum chamber for several hours at 200 °C (392 °F)

Products

DIP Pumps Water-Cooled



DIP 12 000



DIP 30 000 with Power Controller

The DIP range of pumps was developed for operation in industrial systems. Excellent vacuum performance data combined with the inherent ruggedness of this kind of pump, make our diffusion pumps a reliable component in high and medium vacuum applications.

Advantages to the User

- High pumping speeds in the fine and high vacuum ranges
- Low attainable ultimate pressure
- Integrated, water-cooled cold cap baffle guarantees low oil backstreaming rates into the vacuum chamber
- Low oil losses (even at high gas throughputs) by integrated water-cooled forevacuum baffle
- High forevacuum resistance even at reduced heating power
- The heating cartridges are accessible from the outside via heating inserts which are built into the boiler. This ensures a quick exchange of single heating cartridges (even when the pump is hot)
- A separate automatic circuit breaker for each heating cartridge ensures a high level of electrical safety
- A standard built-in thermostat acts as an thermal overload switch and ensures that the heating cartridges can not overheat
- All pumps are prepared for installation with an over-temperature switch (optional) for checking the cooling water circuit, and a contact thermometer (optional) to monitor the operating temperature of the diffusion pump
- Indication of the oil level by sight-glass permits simple checking of the current oil level
- All DIP pumps are delivered with their inside chamber cleaned in such a manner that it is free of oil. The inside is evacuated. In the condition as delivered, the pumps may be also operated with silicone oil
- Utilisation of the DIP power controller cuts power consumption by up to 30% without impairing pump performance (option)

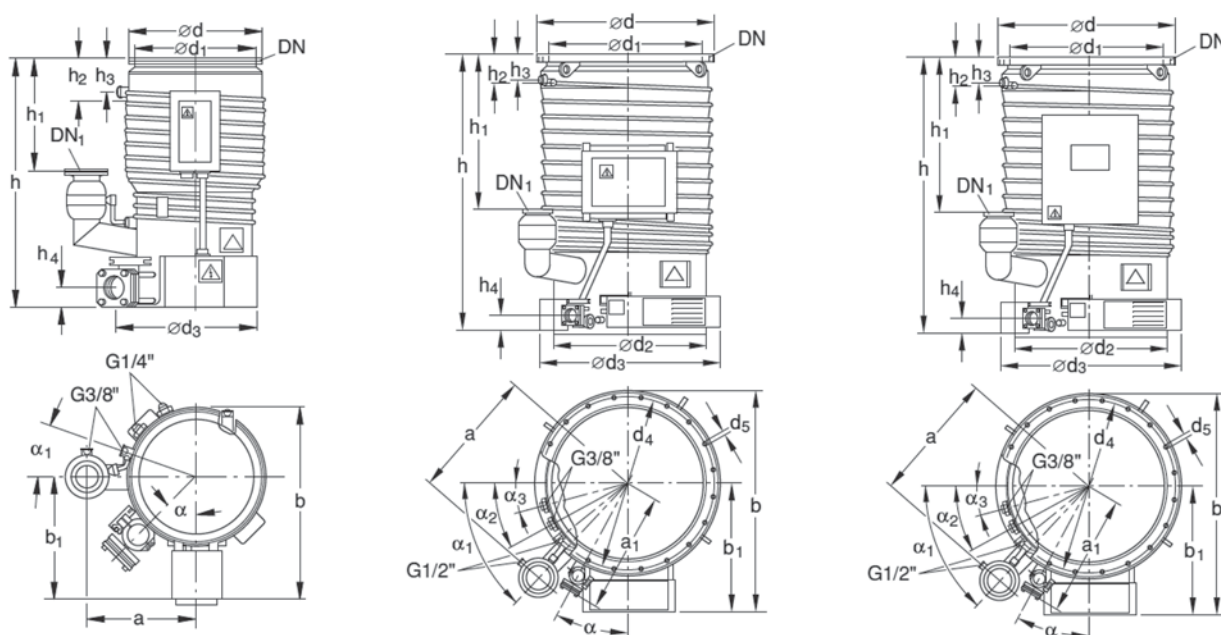
Typical Applications

The diffusion pumps from the DIP range are used in coating systems, vacuum melting and drying systems as well as in vacuum furnaces in the area of metallurgy.

Supplied Equipment

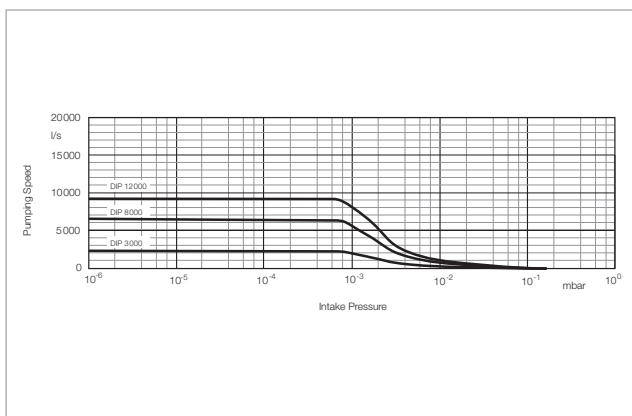
The DIP pumps are supplied ready for connection but without the filling of pump fluid.

The inside of the pump is cleaned before delivery to such an extent that it is free of oil. The inside is evacuated. High and forevacuum flanges are equipped with gaskets and centering rings having shipping flanges and complete with clamping components.

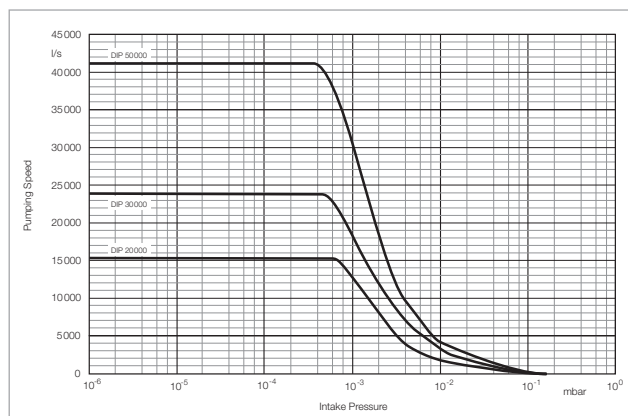


| DIP | 3 000 | 8 000 | 12 000 | 20 000 | 30 000 | 50 000 |
|-------------------|--------------|---------------|-------------|--------------|--------------|--------------|
| DN | 250 ISO-K | 400 ISO-K | 500 ISO-K | 630 ISO-F | 800 ISO-F | 1000 ISO-F |
| DN ₁ | 63 ISO-K | 63 ISO-K | 100 ISO-K | 100 ISO-K | 160 ISO-K | 160 ISO-K |
| a | 240 (9.45) | 350 (13.78) | 420 (16.54) | 540 (21.26) | 600 (23.62) | 800 (31.5) |
| a ₁ | 250.5 (9.86) | 375.5 (14.78) | 432 (17) | 496 (19.53) | 536 (21.10) | 636 (25.04) |
| b | 443 (17.44) | 643 (25.31) | 775 (30.51) | 980 (38.58) | 1150 (45.28) | 1350 (53.15) |
| b ₁ | 276 (10.87) | 373 (14.69) | 460 (18.11) | 600 (23.62) | 690 (27.17) | 790 (31.10) |
| d | 290 (11.42) | 450 (17.72) | 550 (21.65) | 750 (29.53) | 920 (36.22) | 1120 (44.09) |
| d ₁ | 261 (10.28) | 400 (15.75) | 501 (19.72) | 651 (25.63) | 800 (31.5) | 1000 (39.37) |
| d ₂ | — | 405 (15.94) | 506 (19.92) | 636 (25.04) | 716 (28.19) | 916 (36.06) |
| d ₃ | 278 (10.94) | 530 (20.87) | 630 (24.80) | 760 (29.92) | 840 (33.07) | 1040 (40.94) |
| d ₄ | — | — | — | 720 (28.35) | 890 (35.04) | 1090 (42.91) |
| d ₅ | — | — | — | 14 (0.55) | 14 (0.55) | 14 (0.55) |
| Quantity of holes | — | — | — | 20 | 24 | 32 |
| h | 560 (22.05) | 785 (30.91) | 940 (37) | 1130 (44.49) | 1450 (57.09) | 1880 (74.02) |
| h ₁ | 250 (9.84) | 400 (15.75) | 470 (18.5) | 620 (24.41) | 870 (34.25) | 1275 (50.2) |
| h ₂ | 68 (2.68) | 88 (3.46) | 92 (3.62) | 97 (3.82) | 102 (4.02) | 102 (4.02) |
| h ₃ | 75 (2.95) | 102 (4.02) | 106 (4.17) | 110 (4.33) | 116 (4.57) | 116 (4.57) |
| α | 45 ° | 30 ° | 30 ° | 30 ° | 20 ° | 25 ° |
| α ₁ | 20 ° | 45 ° | 45 ° | 45 ° | 45 ° | 45 ° |
| α ₂ | — | 30 ° | 30 ° | 30 ° | 30 ° | 25 ° |
| α ₃ | — | 15 ° | 15 ° | 15 ° | 15 ° | 15 ° |

Dimensional drawing for the DIP 3000 [left], DIP 8000 and DIP 12000 [middle], DIP 20 000 to DIP 50 000 [right]; dimensions in brackets () are in inch



Pumping speed characteristics of the DIP 3000 to 12000 pumps as a function of intake pressure



Pumping speed characteristics of the DIP 20000 to 50000 pumps as a function of intake pressure

Technical Data

DIP 3 000

DIP 8 000

DIP 12 000

| | | | | |
|--|-------------------------------|---|---|---|
| High vacuum / forevacuum connection | DN | 250 ISO-K / 63 ISO-K | 400 ISO-K / 63 ISO-K | 500 ISO-K / 100 ISO-K |
| Pumping speed for air ¹⁾ below 1 x 10 ⁻⁴ mbar | l x s ⁻¹ | 3 000 | 8 000 | 12 000 |
| Operating range | mbar (Torr) | < 10 ⁻² to 10 ⁻⁷ (0.75 x 10 ⁻² to 0.75 x 10 ⁻⁷) | < 10 ⁻² to 10 ⁻⁷ (0.75 x 10 ⁻² to 0.75 x 10 ⁻⁷) | < 10 ⁻² to 10 ⁻⁷ (0.75 x 10 ⁻² to 0.75 x 10 ⁻⁷) |
| Ultimate total pressure ¹⁾ | mbar (Torr) | < 5.0 x 10 ⁻⁷ (3.75 x 10 ⁻⁷) | < 5.0 x 10 ⁻⁷ (3.75 x 10 ⁻⁷) | < 5.0 x 10 ⁻⁷ (3.75 x 10 ⁻⁷) |
| Max. permissible forevacuum pressure | mbar (Torr) | 6.0 x 10 ⁻¹ (4.5 x 10 ⁻¹) | 6.0 x 10 ⁻¹ (4.5 x 10 ⁻¹) | 6.0 x 10 ⁻¹ (4.5 x 10 ⁻¹) |
| Pump fluid filling, min. / max. | l (qts) | 1.0 / 1.4 (1.1 / 1.5) | 1.7 / 3.4 (1.8 / 3.6) | 2.4 / 5.3 (2.5 / 5.6) |
| Mains connection | | | | |
| Standard EURO, 50/60 Hz | V | 230 ~ 1 Ph | 400 ~ 3 Ph Y | 400 ~ 3 Ph Y |
| Standard Americas, 50/60 Hz | V | 230 ~ 1 Ph | 460 ~ 3 Ph Y | 460 ~ 3 Ph Y |
| Special, 50/60 Hz | V | – | 230 ~ 3 Ph Δ | 230 ~ 3 Ph Δ |
| Heating power | kW | 2.4 | 4.8 | 7.2 |
| Number of heating cartridges | | 2 | 6 | 9 |
| Heating up time | min | < 25 | < 25 | < 25 |
| Cooling water (minimum) for pump ²⁾ | l x h ⁻¹ (gal/min) | 160 (0.7) | 290 (1.28) | 500 (2.2) |
| for cold cap baffle | l x h ⁻¹ (gal/min) | 20 (0.09) | 30 (0.13) | 50 (0.22) |
| max. supply pressure | bar (psig) | 6 (87) | 6 (87) | 6 (87) |
| Number of cooling circuits (including cold cap baffle) | | 2 | 2 | 2 |
| Cooling water connection for pump | G (BPS) | 3/8" | 1/2" | 1/2" |
| for cold cap baffle | G (BPS) | 1/4" | 3/8" | 3/8" |
| Weight, approx. | kg (lbs) | 29 (64) | 70 (154) | 102 (225) |
| Recommended backing pump ³⁾ at operating pressures > 10 ⁻⁴ mbar (> 0.75 x 10 ⁻⁴ Torr) at operating pressures < 10 ⁻⁴ mbar (< 0.75 x 10 ⁻⁴ Torr) | | TRIVAC D 65 B + W 251 – | SV 300 + W 251 TRIVAC D 65 B + W 251 | SV 300 + W 501 TRIVAC D 65 B + W 251 |

Ordering Information

DIP 3 000

DIP 8 000

DIP 12 000

| | Part No. | Part No. | Part No. |
|-------------------------------------|---|-------------------|-------------------|
| Oil diffusion pump | | | |
| Standard EURO | 222 10 | 222 20 | 222 25 |
| Standard Americas | 222 10 | 500 670 | 500 591 |
| Special | – | 500 649 | 22225V003 |
| Astrotorus baffle | 227 50 | 227 60 | 227 65 |
| Water flow monitor | 500006623 | 500006623 | 500006623 |
| Over-temperature protection switch | 122 84 | 122 84 | 122 84 |
| Contact thermometer | 218 81 | 218 81 | 218 81 |
| Resistance thermometer Pt100 sensor | 200 02 958 | 200 02 958 | 200 02 958 |
| Pump fluid ⁴⁾ | see Catalog Part "Oils / Greases / Lubricants LEYBONOL" | | |

¹⁾ Measured to DIN 28 427 with LEYBONOL LVO 500 as the pump fluid

²⁾ The required quantity of cooling water refers to ΔT = 10 °C (50 °F). The discharge temperature should not exceed 30 °C (86 °F)

³⁾ Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

⁴⁾ Oil must be purchased separately

Technical Data

DIP 20 000

DIP 30 000

DIP 50 000

| | | | | |
|--|---|--|--|--|
| High vacuum / forevacuum connection | DN | 630 ISO-F / 100 ISO-K | 800 ISO-F / 160 ISO-K | 1000 ISO-F / 160 ISO-K |
| Pumping speed for air ¹⁾ below 1×10^{-4} mbar | $\text{l} \times \text{s}^{-1}$ | 20 000 | 30 000 | 50 000 |
| Operating range | mbar (Torr) | $< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7}) | $< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7}) | $< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7}) |
| Ultimate total pressure ¹⁾ | mbar (Torr) | $< 5.0 \times 10^{-7}$ (3.75×10^{-7}) | $< 5.0 \times 10^{-7}$ (3.75×10^{-7}) | $< 5.0 \times 10^{-7}$ (3.75×10^{-7}) |
| Max. permissible forevacuum pressure | mbar (Torr) | 6.0×10^{-1} (4.5×10^{-1}) | 6.0×10^{-1} (4.5×10^{-1}) | 6.0×10^{-1} (4.5×10^{-1}) |
| Pump fluid filling, min. / max. | l (qts) | 6.0 / 9.0 (6.3 / 9.5) | 7.0 / 15.0 (7.4 / 15.9) | 12.0 / 25.0 (12.7 / 26.4) |
| Mains connection | | | | |
| Standard EURO, 50/60 Hz | V | 400 ~ 3 Ph Y | 400 ~ 3 Ph Y | 400 ~ 3 Ph Y |
| Standard Americas, 50/60 Hz | V | 460 ~ 3 Ph Y | 460 ~ 3 Ph Y | 460 ~ 3 Ph Y |
| Special, 50/60 Hz | V | 230 ~ 3 Ph Δ | 230 ~ 3 Ph Δ | 230 ~ 3 Ph Δ |
| Reduced power consumption through power controller (saves up 30%) | kW | 8.4 | 12.6 | 16.8 |
| Heating power | kW | 12 | 18 | 24 |
| Number of heating cartridges | | 12 | 18 | 24 |
| Heating up time | min | < 25 | < 30 | < 30 |
| Cooling water (minimum) for pump ²⁾ | $\text{l} \times \text{h}^{-1}$ (gal/min) | 600 (2.6) | 900 (4.0) | 1500 (6.6) |
| for cold cap baffle | $\text{l} \times \text{h}^{-1}$ (gal/min) | 60 (0.26) | 80 (0.35) | 150 (0.66) |
| max. supply pressure | bar (psig) | 6 (87) | 6 (87) | 6 (87) |
| Number of cooling circuits (including cold cap baffle) | | 2 | 3 | 3 |
| Cooling water connection for pump | G (BPS) | 1/2" | 1/2" | 1/2" |
| for cold cap baffle | G (BPS) | 3/8" | 3/8" | 3/8" |
| Weight, approx. | kg (lbs) | 172 (379) | 296 (653) | 560 (1235) |
| Recommended backing pump ³⁾ at operating pressures > 10^{-4} mbar (> 0.75×10^{-4} Torr) at operating pressures < 10^{-4} mbar (< 0.75×10^{-4} Torr) | | SV 200 + W 501 TRIVAC D 65 B + W 251 | SV 300 + W 1001 SV 300 + W 251 | SV 630 B + W 2001 SV 300 + W 501 |

Ordering Information

DIP 20 000

DIP 30 000

DIP 50 000

| | Part No. | Part No. | Part No. |
|-------------------------------------|---|--------------------|--------------------|
| Oil diffusion pump | | | |
| Standard EURO with control unit | 222 30V001 | 222 35V001 | 222 40V001 |
| Standard Americas with control unit | 222 30V002 | 222 35V002 | 222 40V002 |
| Standard EURO | 222 30 | 222 35 | 222 40 |
| Standard Americas | 500 882 | 500 665 | 500 728 |
| Special | 22230V004 | 22235V006 | 500 654 |
| Retrofit kit energy control unit | 503 647V001 | 503 648V001 | 503 648V001 |
| Retrofit kit energy control unit US | 503 647V002 | 503 648V002 | 503 648V002 |
| Astrotorus baffle | 227 70 | 227 75 | 227 80 |
| Water flow monitor | 500006623 | 500006623 | 500006623 |
| Over-temperature protection switch | 122 84 | 122 84 | 122 84 |
| Contact thermometer | 218 81 | 218 81 | 218 81 |
| Resistance thermometer Pt100 sensor | 200 02 958 | 200 02 958 | 200 02 958 |
| Pump fluid ⁴⁾ | see Catalog Part "Oils / Greases / Lubricants LEYBONOL" | | |

¹⁾ Measured to DIN 28 427 with LEYBONOL LVO 500 as the pump fluid

²⁾ The required quantity of cooling water refers to $\Delta T = 10^\circ\text{C}$ (50°F). The discharge temperature should not exceed 30°C (86°F)

³⁾ Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

⁴⁾ Oil must be purchased separately

LEYBOJET 630

Water-Cooled



LEYBOJET 630

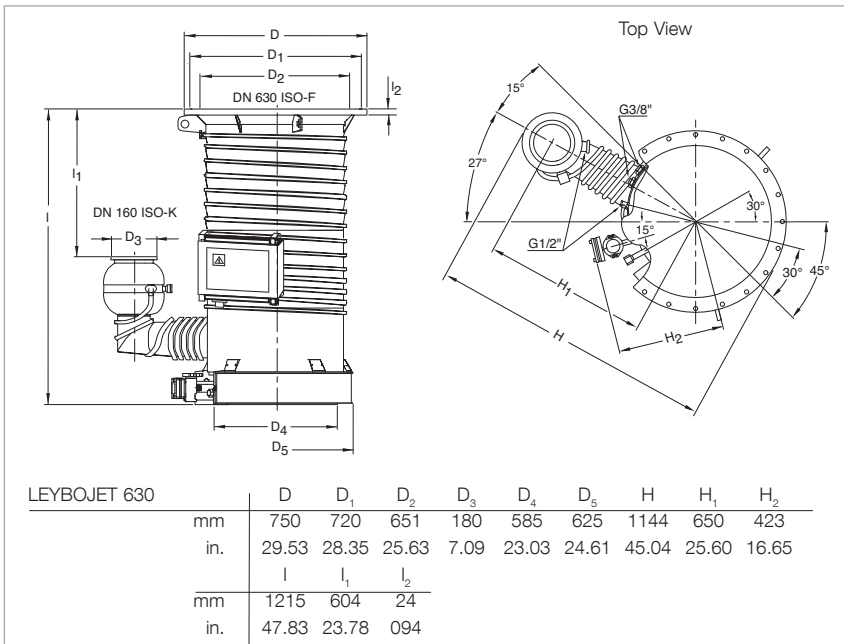
The oil diffusion pumps from Oerlikon Leybold Vacuum are well proven in industrial high vacuum applications.

They excel through their excellent vacuum performance data and owing to their rugged design are a reliable component in many medium and high vacuum systems.

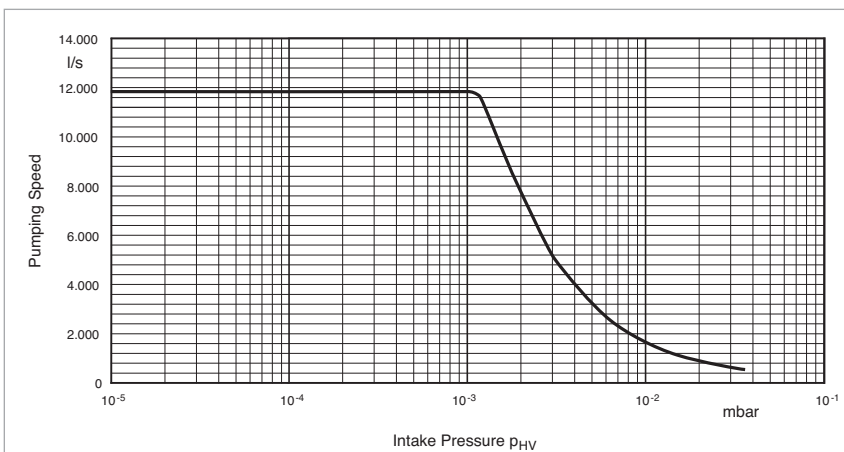
The water-cooled LEYBOJET 630 was developed especially with the medium vacuum in mind.

Advantages for the User

- High and stable pumping speed well into medium vacuum range
- Low ultimate pressure
- Low oil backstreaming due to integrated water-cooled cold cap baffle
- High forevacuum tolerance
- Each heating cartridge is protected by a separate circuit breaker
- In maintaining the well proven heating system - heating insert with thermally conducting panels and heating cartridges - the LEYBOJET 630 is now equipped with an additional ejector nozzle for the purpose of obtaining a stable pumping speed well into the medium vacuum range



Dimensional drawing for the LEYBOJET 630



Pumping speed curve of the LEYBOJET 630 as a function of the intake pressure

Typical Applications

The principal areas of application of the LEYBOJET 630 are modern sputtering processes as well as vacuum melting and drying plants.

Supplied Equipment

The LEYBOJET 630 are supplied ready for connection but without the filling of pump fluid.

The inside of the pump is cleaned before delivery to such an extent that it is free of oil. The inside is evacuated. High and forevacuum flanges are equipped with gaskets, centering rings, shipping flanges, and clamping components.

Technical Data

LEYBOJET 630

| | | |
|---|---|--|
| High vacuum connection | DN | 630 ISO-F |
| Forevacuum connection | DN | 160 ISO-K |
| Pumping speed for air ¹⁾ | | |
| at 1×10^{-2} mbar | $\text{l} \times \text{s}^{-1}$ | 1 700 |
| at 1×10^{-3} mbar | $\text{l} \times \text{s}^{-1}$ | 12 000 |
| < 1×10^{-4} mbar | $\text{l} \times \text{s}^{-1}$ | 12 000 |
| Operating range | mbar (Torr) | $< 10^{-2}$ ($< 0.75 \times 10^{-2}$) |
| Ultimate total pressure ¹⁾ | mbar (Torr) | $< 5 \times 10^{-7}$ ($< 3.75 \times 10^{-7}$) |
| Max. permissible forevacuum pressure | | |
| mbar (Torr) | | 6×10^{-1} (4.5×10^{-1}) |
| Pump fluid filling, min. / max. | l (qts) | 5.0 / 8.0 (5.3 / 8.5) |
| Mains connection 50/60 Hz | V | 400, 3 Ph |
| Heating power | kW | 10.8 |
| Number of heating cartridges | | 9 |
| Heating up time | min | < 30 |
| Cooling water | | |
| min. throughput ²⁾ | $\text{l} \times \text{h}^{-1}$ (gal/min) | 500 (2.2) |
| connection | G | 1/2" |
| Number of cooling circuits (including cold cap baffle) | | 2 |
| Cooling water connection | | |
| for pump | G (BPS) | 1/2" |
| for cold cap baffle | G (BPS) | 3/8" |
| Weight, approx. | kg (lbs) | 145 (320) |
| Recommended backing pump ³⁾ | | |
| at operating pressures | | |
| > 10^{-4} mbar ($> 0.75 \times 10^{-4}$ Torr) | | SV 200 + W 501 |
| at operating pressures | | |
| < 10^{-4} mbar ($< 0.75 \times 10^{-4}$ Torr) | | TRIVAC D 65 B + W 251 |

Ordering Information

LEYBOJET 630

| | Part No. |
|-------------------------------------|---|
| Oil diffusion pump LEYBOJET 630 | 502 180 |
| Astrotorus baffle | 227 70 |
| Water flow monitor | 500006623 |
| Over-temperature protection switch | 122 84 |
| Contact thermometer | 218 81 |
| Resistance thermometer Pt100 sensor | 200 02 958 |
| Pump fluid ⁴⁾ | see Catalog Part "Oils / Greases / Lubricants LEYBONOL" |

¹⁾ Measured to DIN 28 427 with LEYBONOL LVO 500 as the pump fluid

²⁾ The required quantity of cooling water refers to $\Delta T = 10^\circ\text{C}$ (50 °F). The discharge temperature should not exceed 30°C (86 °F)

³⁾ Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

⁴⁾ Oil must be purchased separately

Oil Booster OB 6000 to OB 18000



Oil Booster OB 6000 (left), OB 12000 (middle) and OB 18000 (right)

The design of the oil booster pumps from Oerlikon Leybold Vacuum is well proven in industrial high vacuum applications. They excel above all through excellent vacuum performance data and are, owing to their rugged design a reliable component in many medium and high vacuum units.

The water cooled oil booster pump was developed in particular for applications in the rough and medium vacuum range. The pumps from the OB line from Oerlikon Leybold Vacuum deliver when properly deployed, a maximum pumping speed at high gas throughputs.

Advantages for the User

- Very high pumping speed from a small sized pump
- Pump sizes 6000, 12,000 and 18,000 m³ per hour
- Simple to operate
- Rugged and long life
- Selectable flange connections (OB 12,000 and 18,000 only)
- Small manageable amount of spare parts
- Pump components (e.g. heating elements, diffusion corpus, jet corpus) are similar for all OB sizes and can be exchanged easily
- Modern electronic pump monitoring (PLC controlled)
- High efficiency due to direct heating
- Optimized heating design for long oil change intervals

Typical Applications

- Vacuum Induction Melting (VIM) or Vacuum Induction Degassing (VID) of special alloys are utmost important process steps in the metallurgy.
- Depending on the required steel-quality, the required process pressure in such applications is particularly low.
- Secondary metallurgy processes are becoming more popular thanks to the greater demand for better steels e.g. in the automotive, construction and rail markets.

Supplied Equipment

The OB pumps are plug-and-play but are delivered without pump fluid. The pump chamber is free of oil and has been cleaned. The inside volume is evacuated. The high vacuum and forevacuum flanges are equipped with sealing and centering rings as well as shipping flanges. Moreover, the electric circuit breaker box and the cooling water manifold have been installed for immediate connection. The included Pt100 temperature sensor ensures safe oil temperature monitoring. The installed overtemperature protection switch monitors and ensures safe operation of the pump.

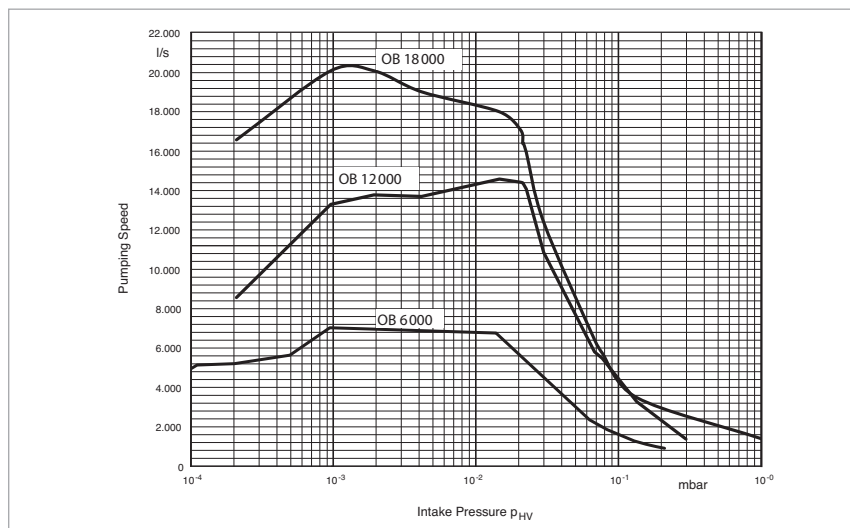
Technical Data

| | | Oil Booster | | |
|---|------------------------------------|--|---|--|
| | | OB 6000 | OB 12000 | OB 18000 |
| Pumping speed for air below 1.0×10^{-3} mbar (7.5×10^{-3} Torr) | mbar x l x s ⁻¹ | 6.000 | 12.000 | 18.000 |
| High vacuum connection standard optional | DN DN | 400 ISO-K 400 ISO-K / ASA 16 / ASA 18 | 630 ISO-F 500 ISO-K / 800 ISO-F / ASA 16 / ASA 20 | 630 ISO-F 800 ISO-F / 1000 ISO-F / ASA 32 / ASA 35 |
| Fore vacuum connection (standard) | DN | 160 ISO-K | 160 ISO-K | 160 ISO-K |
| Operating range | mbar (Torr) | 1 to 10^{-6} (0.75 to 10^{-6}) | 1 to 10^{-6} (0.75 to 10^{-6}) | 1 to 10^{-6} (0.75 to 10^{-6}) |
| Ultimate total pressure | mbar (Torr) | 5×10^{-6} ($< 3.75 \times 10^{-6}$) | 5×10^{-6} ($< 3.75 \times 10^{-6}$) | 5×10^{-6} ($< 3.75 \times 10^{-6}$) |
| Pump fluid filling | l (qts) | 45 (47.6) | 60 (63.4) | 90 (95.1) |
| Mains connection Standard EURO, 50/60 Hz Standard Americas, 50/60 Hz Special, 50/60 Hz | V V V | 400 ~ 3 Ph Y 460 ~ 3 Ph Y 230 ~ 3 Ph Δ | 400 ~ 3 Ph Y 460 ~ 3 Ph Y 230 ~ 3 Ph Δ | 400 ~ 3 Ph Y 460 ~ 3 Ph Y 230 ~ 3 Ph Δ |
| Weight | kg (lbs) | 450 (992) | 850 (1874) | 1400 (3086) |
| Cooling water consumption connection | l x h ⁻¹ (gal/min) G | 700 (3.1) 1" | 800 (3.5) 1" | 1360 (6.0) 1" |

High
Vacuum Pumps

Ordering Information

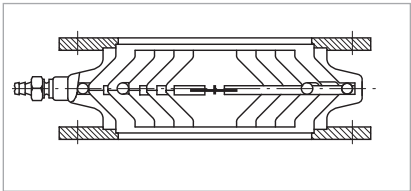
| | | Oil Booster | | |
|--|--|---|-------------------|-------------------|
| | | OB 6000 | OB 12000 | OB 18000 |
| | | Part No. | Part No. | Part No. |
| Oil diffusion pump Standard EURO Standard US with control unit EURO version US version with control unit and waterflow/ -temperature monitoring EURO version (380 V) US version (460 V) | | 503750V001 | 503654V001 | 503508V001 |
| | | 503750V005 | 503654V005 | 503508V005 |
| | | 503750V002 | 503654V002 | 503508V002 |
| | | 503750V006 | 503654V006 | 503508V006 |
| | | 503750V003 | 503654V003 | 503508V003 |
| | | 503750V004 | 503654V004 | 503508V004 |
| Pump fluid | | see Catalog Part "Oils / Greases / Lubricants LEYBONOL" | | |



Pumping speed curves of the Oil Booster OB 6000 to OB 18000 as a function of the intake pressure

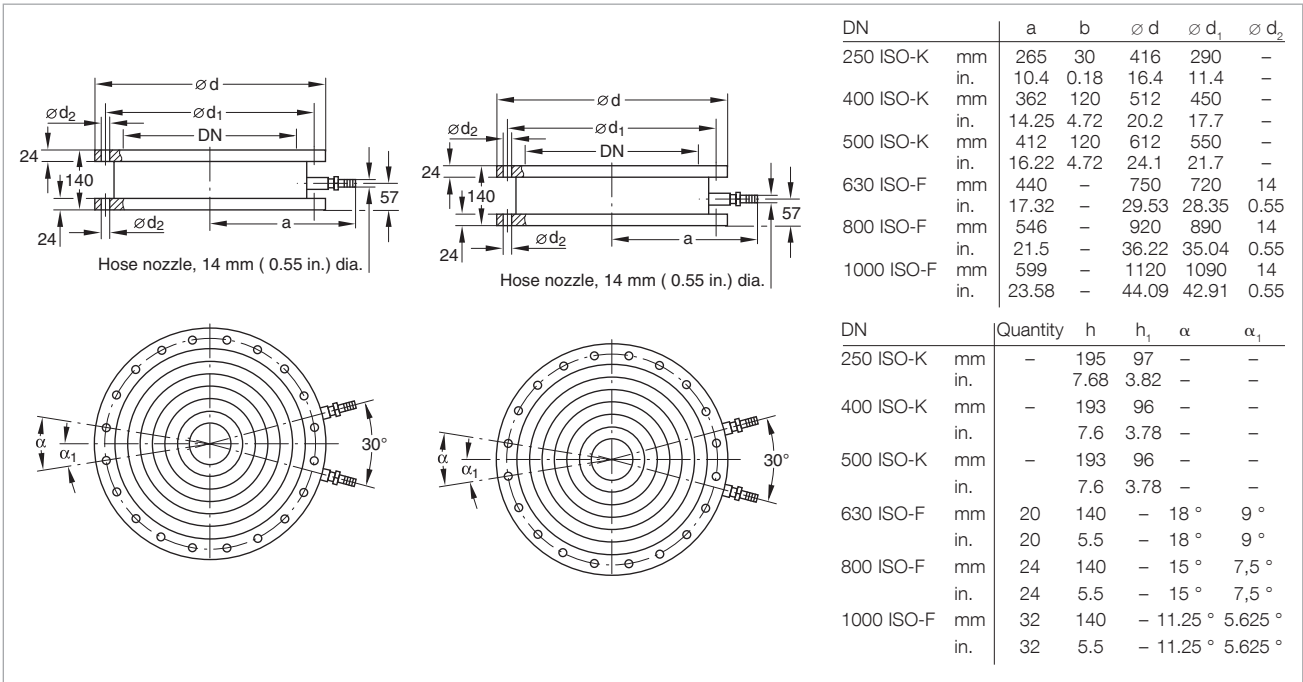
Accessories for Oil Diffusion Pumps

Astrotorus Baffles



Section through an astrotorus baffle

The cooling inserts of the astrotorus baffles are made of copper, whereas the housing and the connection flange are made of standard steel.



Dimensional drawing for the astrotorus baffle ISO-K (left) and ISO-F (right)

Technical Data**Astrotorus Baffles**

| | | | | |
|--|---------------------|-------------|-------------|--------------|
| Connection to pump | DIP | 3 000 | 8 000 | 12 000 |
| HV connection flanges | DN | 250 ISO-K | 400 ISO-K | 500 ISO-K |
| Throttling of the pumping speed, approx. | % | 30 | 30 | 30 |
| Conductance | l x s^{-1} | 3 000 | 9 000 | 12 000 |
| Weight | kg (lbs) | 25.0 (55.2) | 30.0 (66.2) | 65.0 (143.5) |

Ordering Information**Astrotorus Baffles**

| | Part No. | Part No. | Part No. |
|-------------------|---------------|---------------|---------------|
| Astrotorus baffle | | | |
| 250 ISO-K | 227 50 | - | - |
| 400 ISO-K | - | 227 60 | - |
| 500 ISO-K | - | - | 227 65 |

Technical Data**Astrotorus Baffles**

| | | | | |
|--|---------------------|---------------|---------------|---------------|
| Connection to pump | DIP | 20 000 | 30 000 | 50 000 |
| HV connection flanges | DN | 630 ISO-F | 800 ISO-F | 1000 ISO-F |
| Throttling of the pumping speed, approx. | % | 30 | 30 | 30 |
| Conductance | l x s^{-1} | 18 000 | 28 000 | 50 000 |
| Weight | kg (lbs) | 120.0 (264.9) | 170.0 (375.3) | 190.0 (419.4) |

Ordering Information**Astrotorus Baffles**

| | Part No. | Part No. | Part No. |
|-------------------|---------------|---------------|---------------|
| Astrotorus baffle | | | |
| 630 ISO-F | 227 70 | - | - |
| 800 ISO-F | - | 227 75 | - |
| 1000 ISO-F | - | - | 227 80 |

For matching valves, please ask us for a quotation.

Temperature dependant Switching Components for Automatic Pump System Control

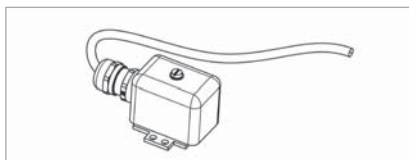
The operational status of the diffusion pump depends on the temperature of the pump fluid in the pump boiler. Through temperature dependent switching components which are inserted into the pump boiler it is possible to monitor the operational status of the diffusion pump and signal its status to a process controller.

For this, the diffusion pump requires two thresholds. Depending on the type of pump, the upper threshold should be between 180 and 200 °C (356 and 392 °F) and the lower threshold between 90 and 100 °C (194 and 212 °F).

The upper threshold indicates that the diffusion pump is ready for operation and thus actuates certain devices, for example opening of the high vacuum valve ahead of the diffusion pump.

The lower threshold indicates that the diffusion pump has cooled down to such an extent that the backing pump and the cooling water supply may be switched off.

Over-temperature protection switches are used to monitor the temperature of the cooling water in the cooling water circuit of the diffusion pumps. When the temperature rises to unacceptably high levels (for example when the cooling water supply fails) the heater in the diffusion pump is switched off (correct electrical connection to the main supply is required). The use of over-temperature protection switches avoids unnecessary alarms that may be triggered by contaminated water when only a water flow monitor is used. The over-temperature protection switch is screwed on to a contact plate which is soldered to the cooling pipe on the



Over-temperature protection switch

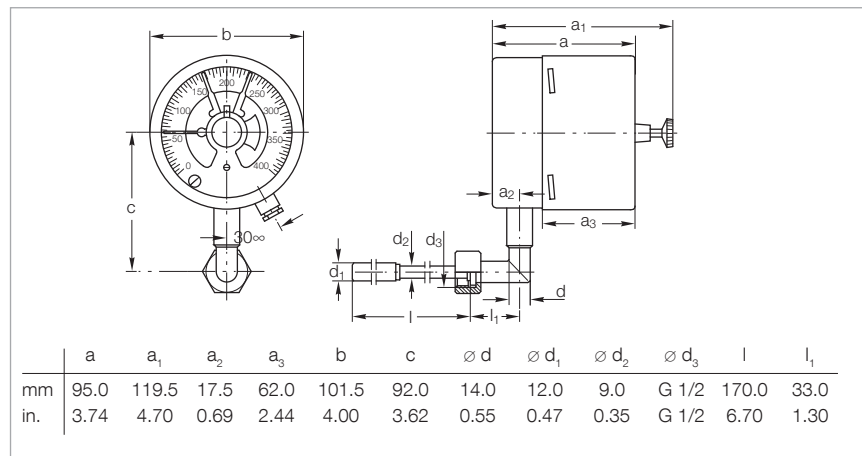
pump's body.

Max. switching current: 5 A (230 V, 50/60 Hz).

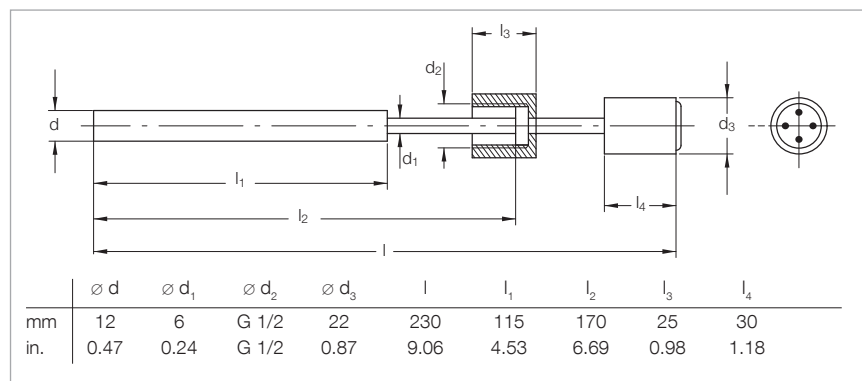
Contact thermometer with a range from 0 to 400 °C (32 to 752 °F). Through a trailing pointer two switching thresholds may be set up independently. The current oil temperature and the thresholds which have been set up can be read off at the

location of the diffusion pump. The contacting thermometer is not suited for remote signaling of temperatures.

Resistance thermometer Pt100 sensor. The measurement range of this sensor depends on the temperature display unit used by the customer where also the required thresholds are set up. The Pt100 sensor is ideal for remote signaling of temperatures.



Dimensional drawing for the contact thermometer



Dimensional drawing for the resistance thermometer Pt100 sensor

Ordering Information

Monitoring Instruments

| | Part No. |
|---|-------------------|
| Over-temperature protection switch | 122 84 |
| Contact thermometer (Measurement range 0 to +400 °C (+32 to +752 °F), Rating at 220 V AC: 250 mA [resistive load], Weight: 1.7 kg (3.7 lbs)) | 218 81 |
| Resistance thermometer Pt100 sensor | 200 02 958 |

Monitoring Instruments

Protection against Overheating

Water flow monitors are installed in the cooling water return section of the diffusion pump. When the cooling water throughput drops below a certain level, either the heater in the diffusion pump is switched off or a warning light or signal is triggered, depending of the type of circuit.

Measurement range: 1 to 40 l · h⁻¹
(0.06 to 2.52 gal/min)

The water throughput may be set within the limits stated with a high degree of reproducibility.

Water flow monitors may be installed in any orientation.

Max. switching capacity:
100 VA (230 V, 50/60 Hz).

Ordering Information

Water Flow Monitor

| | Part No. |
|--------------------|-----------|
| Water flow monitor | 500006623 |

Protection against Power Failure

A SECUVAC valve (see Product Section "Vacuum Valves") must be installed in the forevacuum line in order to prevent damage to the diffusion pump or the pump fluid in the event of a power failure affecting backing pumps which are not equipped with an automatic isolation valve. Rotary vane vacuum pumps from the TRIVAC B series are equipped with an automatic safety valve (intake isolation valve) as standard.

Protection against Pressure Increases in the Forevacuum Line

For protection against a pressure increase in the forevacuum line which is not caused by a power failure you may use our vacuum gauges which offer an adjustable switching threshold (see Product Section "Vacuum measuring - controlling").

Power Controller



Power controller with integrated USB interface



Ethernet interface for PLC data integration

When it comes to the aspect of economic and efficient operation of diffusion pumps, power consumption plays an important role.

Through our DIP power controller, you may now drastically cut your power consumption - and this without impairing pump performance in any way!

Oerlikon Leybold Vacuum Solutions provides an unique energy control unit with less thermal loss to control the heating power to save energy significantly!

Advantages to the User

- Energy saving up to 30% (low costs and ROI in less than three years)
- Further potential savings through temperature decrease in standby-mode
- High quality regulation with customized software
- Increased operation safety and comfort
- Improved service life for oil and heating cartridges
- Easy and exact to operate via PLC or manual directly at the pump
- Uncomplicated integration of generated data into your own process control or export data via USB port
- Strategically process analysis and optimization by interpretation of energy control unit data

Technical Data**Power Controller for**

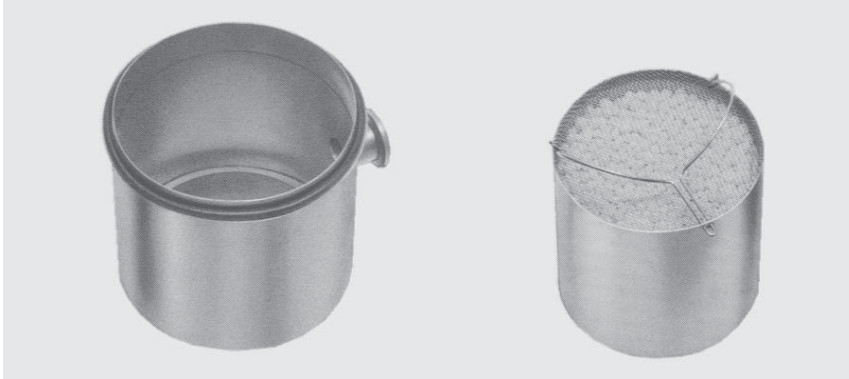
| | | DIP 20 000 | DIP 30 000 | DIP 50 000 |
|--|---------------------|-------------------|-------------------|-------------------|
| Pumping speed for air below 1×10^{-4} mbar | l x s^{-1} | 20 000 | 30 000 | 50 000 |
| Installed heating power | kW | 12 | 18 | 24 |
| Number of heating cartridges | | 2 | 6 | 9 |
| Heating up time | min | < 25 | < 30 | < 30 |
| Cooling water (minimum) for the pump | l x h^{-1} | 600 | 900 | 1500 |
| for the cold cap baffle | l x h^{-1} | 80 | 80 | 150 |

Ordering Information**Power Controller for**

| | DIP 20 000 | DIP 30 000 | DIP 50 000 |
|--|-------------------|-------------------|-------------------|
| | Part No. | Part No. | Part No. |
| Oil diffusion pump with power controller | | | |
| DIP 20 000 | 22230V001 | - | - |
| DIP 30 000 | - | 22235V001 | - |
| DIP 50 000 | - | - | 22240V001 |
| Retrofit kit (DIP power controller) | | | |
| DIP 20 000 | 503647V001 | - | - |
| DIP 30 000 | - | 503648V001 | - |
| DIP 50 000 | - | - | 503649V001 |
| Full-service retrofit kit ¹⁾ | | | |
| DIP 20 000 | AS8100F | - | - |
| DIP 30 000 | - | AS8101F | - |
| DIP 50 000 | - | - | AS8102F |
| Mineral oil LVO 500 | | | |
| 1 l | L50001 | L50001 | L50001 |
| 5 l | L50005 | L50005 | L50005 |
| 20 l | L50020 | L50020 | L50020 |
| Mineral oil LVO 510 | | | |
| 1 l | L51001 | L51001 | L51001 |
| 5 l | L51005 | L51005 | L51005 |
| Silicone oil LVO 520 | | | |
| 1 l | L52001 | L52001 | L52001 |
| 5 l | L52005 | L52005 | L52005 |
| Silicone oil LVO 530 | | | |
| 1 l | L53001 | L53001 | L53001 |

¹⁾ Delivery, installation, commissioning and instruction of the staff is included

Adsorption Traps with Aluminium Oxide Insert



Adsorption trap (left) and insert (right)

Adsorption traps are installed in all those cases where an oil-free vacuum is to be produced with oil-sealed vacuum pumps.

Advantages to the User

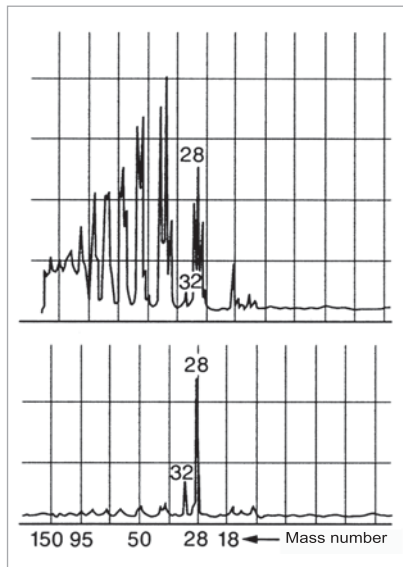
- Backstreaming of oil is reduced by 99%
- Long service life
- High conductance
- Filling can be easily exchanged
- Improvement in the ultimate pressure attained by backing pumps by one order of magnitude
- Stainless steel housing and insert
- NBR gasket

Typical Applications

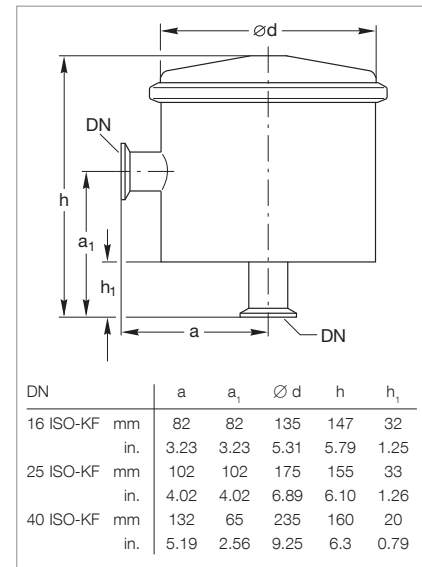
- Product of an oil-free vacuum

Supplied Equipment

- Complete with insert
- Without adsorbent



Residual gas spectrum; top ahead of a rotary vacuum pump, bottom ahead of a rotary vacuum pump with adsorption trap



Dimensional drawing for the adsorption traps

Technical Data

| | | Adsorption Traps | | |
|---|---------------------|------------------|------------|-----------|
| | | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
| Conductance at 10 ⁻² mbar (Torr) | l x s ⁻¹ | 4.0 | 6.0 | 12.0 |
| Service live with Al oxide | Months | 3 | 3 | 3 |
| Al oxide filling | l (qts) | 0.5 (0.53) | 1.0 (1.06) | 2.0 (2.1) |
| Weight, approx. | kg (lbs) | 1.3 (2.9) | 1.3 (2.9) | 4.0 (8.8) |

Ordering Information

| | | Adsorption Traps | | |
|--|---------------|------------------|---------------|-----------|
| | | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
| | Part No. | Part No. | Part No. | |
| Adsorption trap | 854 14 | 854 15 | 854 16 | |
| Activated aluminum oxide in tin 1.6 l (approx. 1.2 kg (2.65 lbs)) | 854 10 | 854 10 | 854 10 | |

Applications and Accessories, Cryo Pumps

| Cryo pumps | | COOLVAC 800 BL | COOLVAC 800 CL | COOLVAC 1500 CL | COOLVAC 2000 CL | COOLVAC 3000 CL | COOLVAC 5000 CL | COOLVAC 10,000 CL | COOLVAC 18,000 CL | COOLVAC 30,000 | COOLVAC 60,000 |
|-------------------------------------|--|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-------------------|----------------|----------------|
| Application | | | | | | | | | | | |
| UHV systems | | ■ | ■ | ■ | ■ | | | | | | |
| Beam tubes in particle accelerators | | ■ | | | | | | | | | |
| Transfer chambers / Loadlock | | ■ | ■ | ■ | ■ | ■ | | | | | |
| General research | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Evaporation coating systems | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Sputtering systems | | | ■ | ■ | ■ | ■ | | | | | |
| Ion implanters | | | ■ | ■ | ■ | ■ | ■ | | | | |
| Metallization systems | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Space simulation chambers | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Electron beam welding systems | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |

Accessories

Page

| | | | | | | | | | | | |
|--|---------|-----|-----|-----|-----|-----|---|---|---|---|---|
| Compressor unit COOLPAK 2000 (A)/2200 (A) | 496/499 | ■ | ■ | ■ | ■ | ■ | | | | | |
| Compressor unit COOLPAK 6000 H/6200 H/6000 HD | 500 | [■] | [■] | [■] | [■] | [■] | ■ | ■ | ■ | ■ | ■ |
| Gas manifold GD 2 | 504 | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| Gas manifold GD 4 | 504 | ■ | ■ | ■ | ■ | | | | | | |
| Low temperature controller MODEL 9700 | 514 | ■ | | | | | | | | | |
| Temperature sensor | 516 | ■ | | | | | | | | | |

[■] = For dual and multiple operation only

Applications and Accessories, Cryogenics

| Cold heads | | | | | | |
|--|--------------|-----------------|----------------|-----------------|-------------------|-----------------|
| | COOLPOWER 50 | COOLPOWER 140 T | COOLPOWER 7/25 | COOLPOWER 5/100 | COOLPOWER 5/100 T | COOLPOWER 10 MD |
| Application | | | | | | |
| Cooling of samples and detectors | ■ | ■ | ■ | ■ | ■ | ■ |
| Cooling of superconductors | (■) | (■) | ■ | ■ | ■ | ■ |
| Cooling of cryopanel | ■ | ■ | ■ | ■ | ■ | ■ |
| Cleaning of gases | ■ | ■ | ■ | ■ | ■ | ■ |
| Calibration of sensors | | | ■ | ■ | ■ | ■ |
| Optical spectroscopy | | | ■ | ■ | ■ | ■ |
| Infrared spectroscopy | | | ■ | ■ | ■ | ■ |
| Matrix spectroscopy | | | ■ | ■ | ■ | ■ |
| Testing of superconductors | | | ■ | | | |
| Cooling of superconducting magnets, coils and components HT _c + LT _c | (■) | (■) | | ■ | ■ | |

Accessories

| | Page | | | | | |
|---|---------|---|---|---|---|---|
| Compressor unit COOLPAK 2000 (A)/2200 (A) | 496/498 | ■ | | ■ | | |
| Compressor unit COOLPAK 6000 H/6200 H | 500 | | ■ | | ■ | ■ |
| Compressor unit COOLPAK 6000 HMD/6200 HMD | 502 | | | | | ■ |
| Low temperature controller MODEL 9700 | 514 | | | ■ | ■ | ■ |
| Low temperature measurement instrument MODEL 211S | 515 | ■ | ■ | ■ | ■ | ■ |
| Temperature sensor | 516 | ■ | ■ | ■ | ■ | ■ |

(■) = Only high T_c superconductors

Conversion of Units

Celsius, Fahrenheit, Kelvin

Kelvin (abbreviated as K) is the unit of temperature.

Temperatures on the Kelvin scale are converted into temperatures on the Celsius scale as follows:

$$n\text{ }^{\circ}\text{C} = (n + 273.15)\text{ K.}$$

Since the following equation applies between Celsius scale and Fahrenheit scale

$$n\text{ }^{\circ}\text{F} = 5/9 (n - 32)\text{ }^{\circ}\text{C}$$

it follows that

$$n\text{ }^{\circ}\text{F} = 5/9 (n + 459.67)\text{ K.}$$

The inverse equations are as follows:

$$m\text{ K} = (m - 273.15)\text{ }^{\circ}\text{C}$$

$$m\text{ }^{\circ}\text{C} = (1.8 m + 32)\text{ }^{\circ}\text{F}$$

$$m\text{ K} = (1.8 m - 459.67)\text{ }^{\circ}\text{F.}$$

The following applies in particular to absolute zero:

$$0\text{ K} = -273.15\text{ }^{\circ}\text{C} ; -459.67\text{ }^{\circ}\text{F.}$$

bar, psi

$$1\text{ bar} = 14.5\text{ psi}$$

$$1\text{ MPa} = 10\text{ bar}$$

Cryo Pumps

Cryo pumps are gas entrapment vacuum pumps for the pressure range from 10^{-3} to $\leq 10^{-11}$ mbar (0.75×10^{-3} to $\leq 0.75 \times 10^{-11}$ Torr). The principle of operation is that gaseous substances are bound to the cold surfaces within the pump by means of cryocondensation, cryosorption or cryotrapping.

In order to be able to produce a high or ultra-high vacuum the cold surfaces (cryopanel) must be cooled to a sufficiently low temperature. Depending on the type of cooling system used a difference is made between refrigerator cryo pumps, bath cryo pumps and evaporator cryo pumps.

Oerlikon Leybold Vacuum manufactures only cryo pumps which are cooled by means of a refrigerator.

Advantages to the User

Advantages offered by the Pumping Principle

- High effective pumping speed for all gases
- Extremely high pumping speed for water vapor

For a given diameter of the high vacuum flange, the cryopump offers the highest pumping speed of all high vacuum pumps.

Advantages offered by Design

In contrast to gas transfer high vacuum pumps (mechanically suspended turbomolecular pumps, for example), cryo pumps do not have any mechanically moving, oil, or grease lubricated parts on the vacuum side.

The following advantages are a direct result of this design characteristic:

- Hydrocarbon-free vacuum in the pressure range from 10^{-3} to $\leq 10^{-11}$ mbar (0.75×10^{-3} to $\leq 0.75 \times 10^{-11}$ Torr).
- Insensitivity to mechanical disturbances from particles coming from the process or external vibrations.

Further Advantages

- Much more compact than comparable pump systems offering a pumping speed of over $1500 \text{ l} \times \text{s}^{-1}$
- Backing pump is only required during start-up and during regeneration
- Easy process control and pump control via computer
- Favorable price-to-performance ratio and low running costs especially at higher pumping speeds

The cryo pumps are cooled by the well-proven two-stage cold heads from Oerlikon Leybold Vacuum's COOLPOWER line (Gifford/McMahon principle).

The design of a refrigerator cryopump from the COOLVAC range is shown schematically in the figure below.

The first stage of the cold head (9) cools the thermal radiation shield (5) and the baffle (6) of the pump.

Depending on the type of pump and the operating conditions operating temperatures of 45 to 80 K are attained. Correspondingly water vapor condensates at this temperature.

The thermal shield and baffle are made of copper which conducts heat very well so as to optimally utilize the refrigerating capacity which is available.

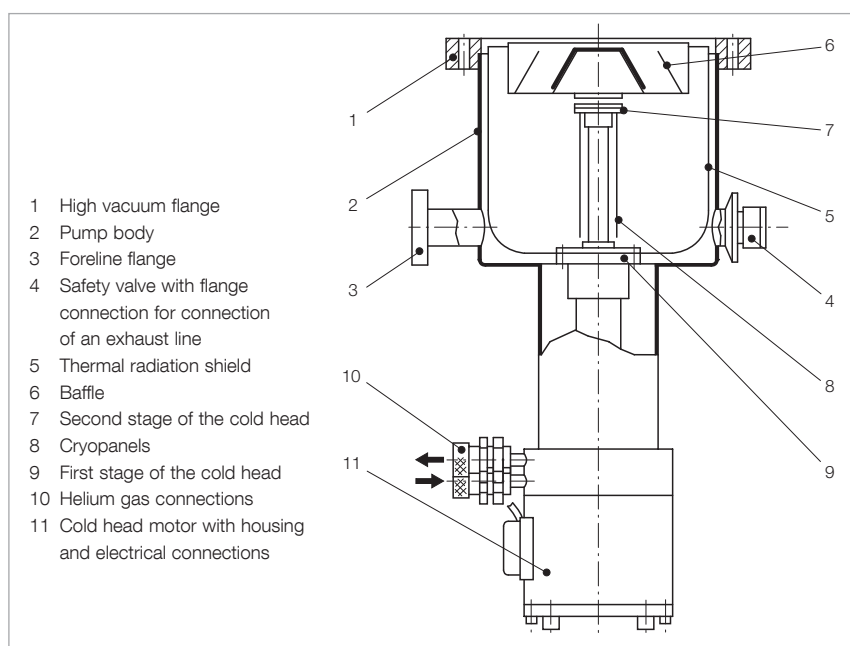
Moreover, the thermal shield is metallized so that reflective losses will be minimal.

The second stage of the cold head (7) is used to cool the cryopanel (8). Depending on the operating conditions, operating temperatures of 10 to 20 K are attained.

Here the process of cryocondensation of N_2 , O_2 and argon will take place.

The active pumping surfaces are made of copper of high thermal conductivity and they are tightly linked thermally to the second stage of the cold head.

H_2 , Ne and He are also adsorbed on to these surfaces which are partly covered with activated charcoal.



COOLVAC refrigerator cryopump

All cryo pumps from the COOLVAC range are equipped with a safety valve (respectively with a bursting disk in the case of the UHV variants) which is set in the factory so that it will open at an overpressure of 150 mbar (113 Torr).

Multiple Operation of Refrigerator Cryo Pumps

The powerful Oerlikon Leybold Vacuum compressor units COOLPAK 6000 HD open up the possibility of operating two cold heads or refrigerator cryo pumps simultaneously.

Regenerating Cryo Pumps

An important aspect in the operation of cryo pumps is that of regeneration. Since a cryopump is a gas entrapment pump, the gasses which have accumulated in the pump during the "pumping" mode must from time to time be removed from the pump. This is done by switching the compressor unit off and by warming up the cryopanel to room temperature or slightly higher so that the released substances can be pumped out by a forevacuum pump.

Cryo Pumps without Electric Regeneration System

The cryopump is warmed up to room temperature by purging the inside of the pump with a dry, pre-warmed inert gas (such as nitrogen). In this case it is not possible to set up defined and controlled temperatures within the cryopump. Thus the simultaneous presence of gases such as hydrogen and oxygen in the pump can not be entirely excluded. The formation of ignitable gas mixtures is only prevented by the diluting effect of the dry inert gas.

Cryo Pumps with Fully Automatic Electric Regeneration System from Oerlikon Leybold Vacuum

The cryopump is warmed up to room temperature by heating the 1st and 2nd stages of the cold head with elec-

tric heaters. In this case, a defined and controlled temperature distribution within the cryopump can be set up. This controlled warming process ensures that the pumped gases are removed sequentially, i.e. the pumped gases are released one after the other in the following sequence:

Advantages to the User

- Significantly reduced investment and operating costs
- Small footprint

tronic heaters. In this case, a defined and controlled temperature distribution within the cryopump can be set up. This controlled warming process ensures that the pumped gases are removed sequentially, i.e. the pumped gases are released one after the other in the following sequence:

- Gases adsorbed at the cryopanel (e.g. hydrogen, helium, neon),
- Gases condensed at the cryopanel (e.g. nitrogen, oxygen, argon),
- Gases and vapors which have condensed on to the baffle and thermal radiation shield (e.g. water vapor).

The electric method of regeneration from Oerlikon Leybold Vacuum prevents gases such as hydrogen and oxygen from being present in the pump at the same time. This excludes the formation of ignitable gas mixtures right from the start.

Cryo pumps without fully automatic control and without electric regeneration system belong to the BasicLine (BL), like the COOLVAC 800 BL, for example.

The warming up process is fully automatic. Pressure and temperature distribution within the pump are set up and controlled by the control system at all times. The sequential regeneration of pumped gases prevents the formation

The pump's body, all flanges and the safety valve are made of high-quality stainless steel.

of ignitable gases right from the start. This ensures the utmost safety during the regeneration of cryo pumps from Oerlikon Leybold Vacuum.

In the case of cryogenic pumps with fully automatic control there exist two cryopump lines.

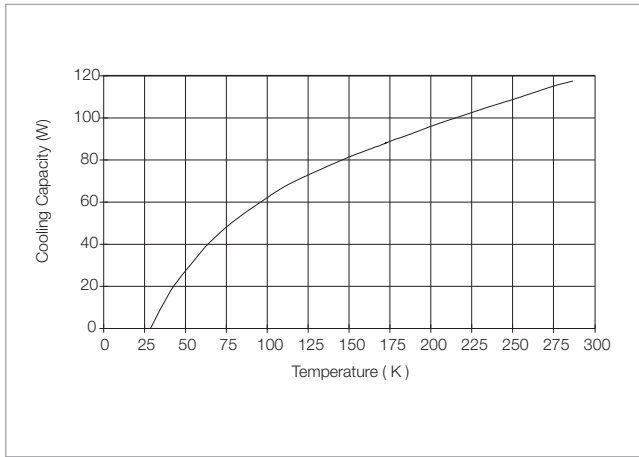
1. The COOLVAC BasicLine (COOLVAC BL) offering the following pumping speed class for Nitrogen in l/s: 800; COOLVAC 800 BL, for example.
Other pumping speed classes from 1 500 to 18 000 l/s are available on request.
For more information please contact your local Oerlikon Leybold Vacuum representative.
2. The COOLVAC ClassicLine (COOLVAC CL) offering the following pumping speed classes for nitrogen in l/s: 800, 1 500, 2 000, 3 000, 5 000, 10 000 and 18 000; COOLVAC 1500 CL, for example.

In the price list the designators "V" appears in connection with the pump designations.

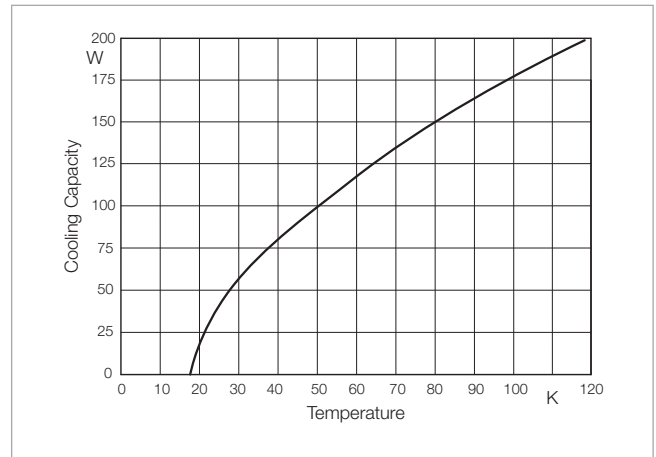
"V":

The high vacuum flange is located at the top and the cold head below, as is the case for the COOLVAC 1500 CL-V, DN 200 CF.

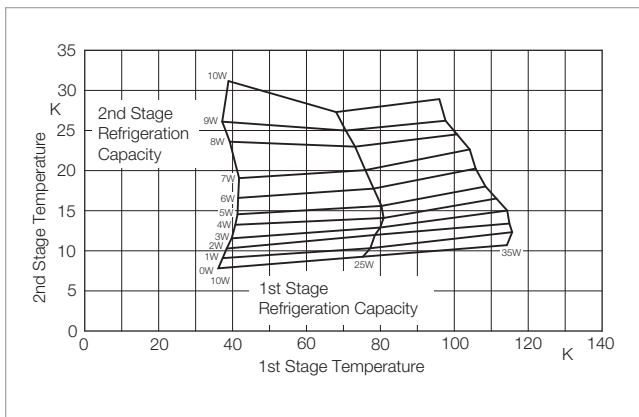
Refrigerating Capacity of Cryogenic Cold Heads



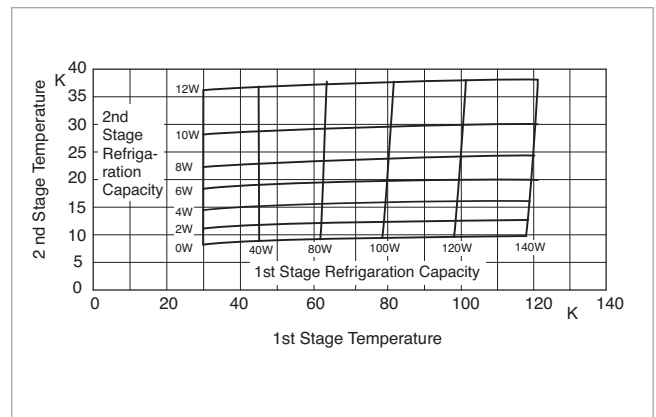
Typical refrigerating capacity of the cold head COOLPOWER 50



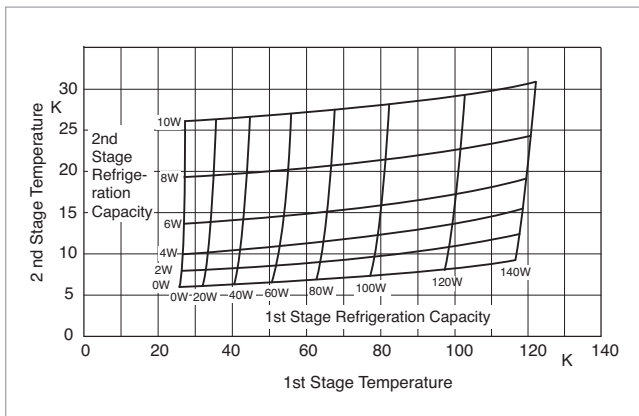
Typical refrigerating capacity of the cold head COOLPOWER 140 T



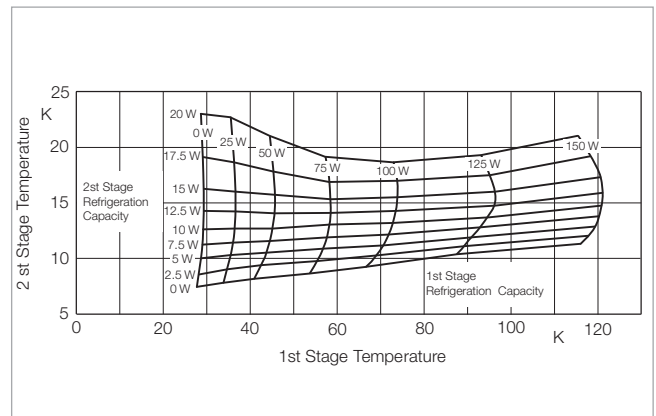
Typical refrigerating capacity of the cold head COOLPOWER 7/25



Typical refrigerating capacity of the cold head COOLPOWER 5/100



Typical refrigerating capacity of the cold head COOLPOWER 5/100 T



Typical refrigerating capacity of the cold head COOLPOWER 10 MD

The refrigerating capacities stated apply to vertical operation with the cold end at the bottom.

Cold Heads

A refrigerator (cold head) is a gas cooling machine which operates on the basis of a thermodynamic cycle to produce cryogenic temperatures ($T \leq 120 \text{ K}$).

Refrigerators operating according to the Gifford/McMahon principle have succeeded over other methods of cooling cryo pumps and cryostats. It is thus employed exclusively by Oerlikon Leybold Vacuum.

In order to account for individual requirements from customers, Oerlikon Leybold Vacuum offers customized cryostats as well.

Gifford/McMahon-Refrigerators

Advantages to the User

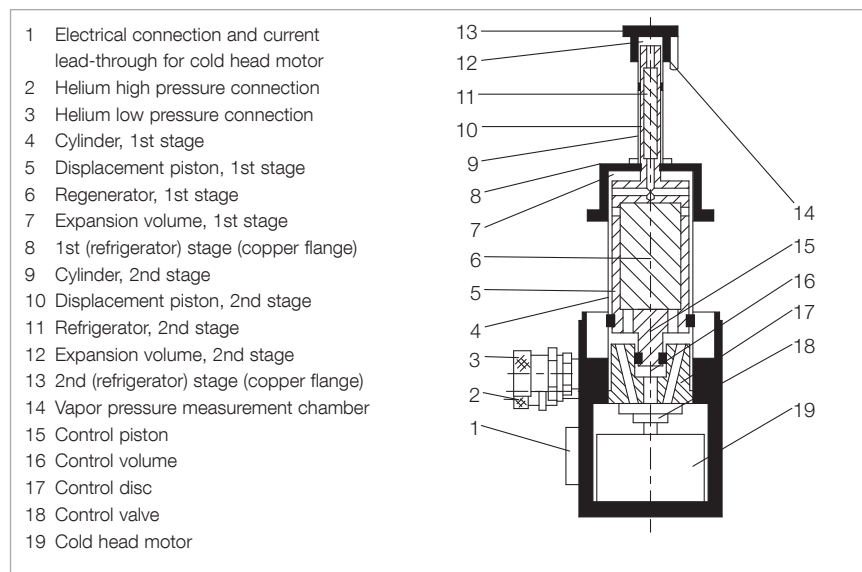
- Low temperatures on a single key press
- No liquid helium and no liquid nitrogen are required
- Very simple to operate
- High refrigerating capacity from a small volume
- Easy process control and temperature control via a computer

Advantages by Design

- No space problems since cold head and compressor unit can be installed and operated apart
- Installation of the cold head basically in any orientation
- High reliability
- Long periods of operation without maintenance
- Cooling of superconducting magnets; in magnetic resonance tomographs, for example
- Cooling of samples and detectors; especially for cooling of
- samples for spectroscopic analysis in the areas of solid state and surface physics
- high temperature superconductors
- superconductors and semiconductors
- infrared and gamma detectors
- Calibration of sensors

Typical Applications

- Cooling of cryopanel in cryo pumps thereby producing high or ultra-high vacuum



Dual-stage Gifford/McMahon cold head (schematic diagram)

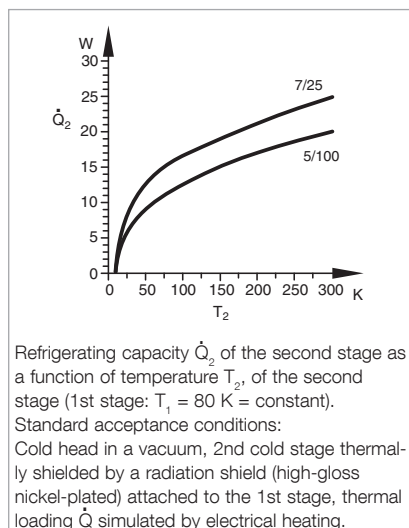
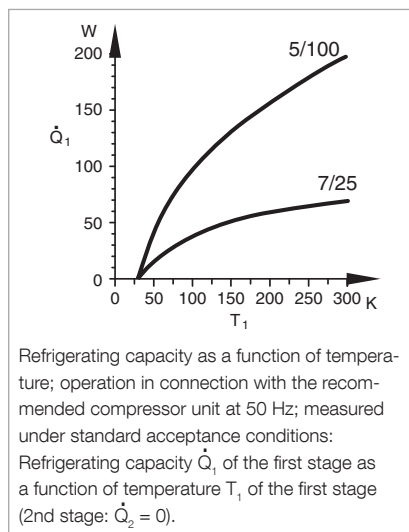
Cold Heads from the COOLPOWER Range

The standard range of single-stage and two-stage cold heads matches a wide range of applications.

Oerlikon Leybold Vacuum is offering refrigerators with usable refrigerating powers of 140 W at 80 K (COOLPOWER 140 T, single-stage) and down to 3.5 W at 10 K (COOLPOWER 5/100 T; dual-stage).

The cold heads basically consist of three subassemblies:

- Drive and control unit for the displacer
- Displacer
- First stage of the cold head (and second stage in the case of two-stage cold heads).



Pneumatically driven Cold Heads

Advantages

- **Simple Design**
The pneumatic drive system for the displacer of these cold heads from Oerlikon Leybold Vacuum consists of only two mechanically moving components: the rotating control valve and the synchronous motor driving the control valve.
- **Easy and quick maintenance**
All Oerlikon Leybold Vacuum cryo pumps from the COOLVAC range are equipped with pneumatically driven Oerlikon Leybold Vacuum cold heads.
Owing to the simple design of the built-in cold heads, maintenance is easy. Maintenance can be performed in place without detaching the cryopump from the vacuum chamber.

Mechanically driven Cold Heads

Advantages

In the case of the mechanically driven Oerlikon Leybold Vacuum cold heads, the displacer is moved through the so-called "Scotch yoke" directly by the drive motor. This elaborate mechanism allows the gas flow and the movement of the displacer to be precisely controlled through which it is possible to attain with two-stage cold heads especially high refrigerating capacities in the range of lowest temperatures (refrigerators of the COOLPOWER 10 MD line).

Advantages Through High Reliability

As to reliability, Oerlikon Leybold Vacuum cold heads are top performers.

Especially high reliability is required for medical instrumentation, specifically in connection with nuclear spin tomographs. In this application cold heads are used to cool superconducting magnets and they are thus exposed to strong magnetic fields.

The leading manufacturers of nuclear spin tomographs have therefore decided to use Oerlikon Leybold Vacuum cold heads to cool the superconducting magnets.

Refrigerator Cryostats (Basic Units)

Advantages to the User

- Can be installed basically in any orientation thereby offering a high degree of flexibility in experimental arrangements
- Can be set to any temperature within 6.5 and 320 K
- High refrigerating capacity, constant temperatures
- No liquid refrigerants are required
- Very simple to operate
- Temperature control without problems through standardized control and connecting components
- Possible high throughput of samples due to short cooldown and warming-up periods

Typical Applications

- Cooling of
 - high temperature superconductors
 - superconductors and semi-conductors
 - infrared and gamma detectors
- Measurement of electric and thermal transport quantities, as a function of the temperature, such as
 - electric and thermal conductance
 - electromotive force

Especially in connection with:

- Spectroscopic investigations in the infrared, visible and ultraviolet spectral ranges
- Matrix spectroscopy
- Moessbauer spectroscopy
- Magneto-optic experiments

Compressor Units

COOLPAK 2000 to 6000 compressors are available for single operation of the remaining cold heads from the COOLPOWER line as well as for multiple operation of cryo pumps and cryostats.

The period during which no maintenance will be required on the Oerlikon Leybold Vacuum compressor units depends on the service life of the adsorber. If the values for the ambient temperature and the cooling water

entry temperature remain within the specified range, Oerlikon Leybold Vacuum guarantees a service life for the adsorber - and thus a period during which no maintenance will be required - of 18 000 operating hours.

The possibilities for single and multiple operation of refrigerator cryo pumps are given in the following table:

| For the operation of | | |
|---------------------------|--|---|
| Compressor Unit | Cold Heads | Cryo Pumps |
| COOLPAK 2000/2200 | 1 x COOLPOWER 50 and 7/25 | 1 x COOLVAC 800/1500/2000/3000 |
| COOLPAK 2000 (A)/2200 (A) | 1 x COOLPOWER 50 and 7/25 | 1 x COOLVAC 800/1500/2000/3000 |
| COOLPAK 6000 HD | 2 x COOLPOWER 50 and 7/25 up to 2 x COOLPOWER 5/100 ¹⁾ | 2 x COOLVAC 800/1500/2000/3000 2 x COOLVAC 5000 ¹⁾ |
| COOLPAK 6000 H/6200 H | 1 x COOLPOWER 140 T 1 x COOLPOWER 5/100 | 3 x COOLVAC 800/1500/2000 2 x COOLVAC 3000 (5000 ¹⁾) 1 x COOLVAC 5000/10000 |
| COOLPAK 6000 HMD/6200 HMD | 1 x COOLPOWER 10 MD | |

¹⁾ At reduced power

Approval

The Oerlikon Leybold Vacuum refrigerators in this catalog part (consisting of compressor unit COOLPAK 6000/6200, flexlines FL and the cold head COOLPOWER ²⁾) meet – as complete systems – the requirements of the NRTL (Nationally Recognized Testing

Laboratory) approval for the North American continent.

Oerlikon Leybold Vacuum refrigerators are listed under the reference number UL 471 : 2006 R3.06.

²⁾ Resp. formerly RGD

CE Approval

The Oerlikon Leybold Vacuum compressor units RW and COOLPAK meet the basic requirements regarding safety and health of the relevant EC directives.

Products Cryo Pumps

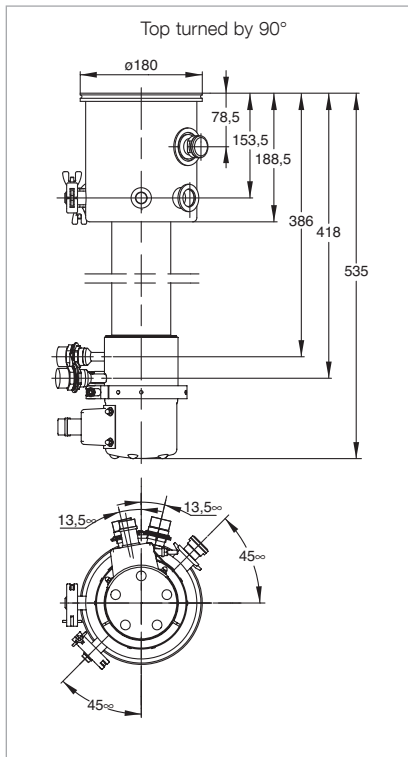
Standard Cryo Pumps, BasicLine COOLVAC 800 BL

Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High pumping speed for water vapor, argon and hydrogen

Typical Applications

- Lamps and tubes manufacture
- Transfer chambers / Loadlock
- General research



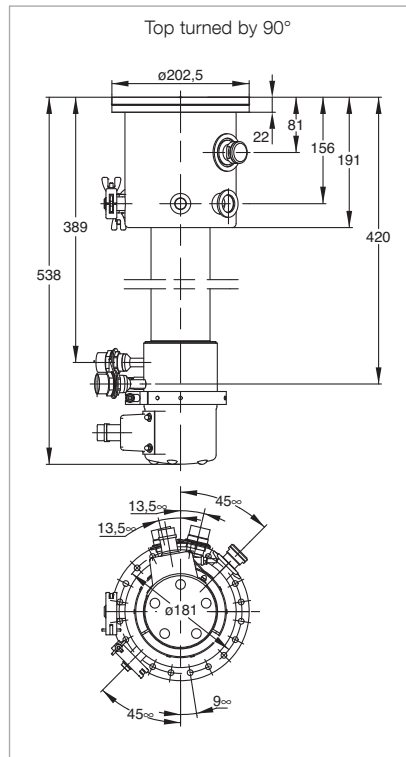
Dimensional drawing for the
COOLVAC 800 BL (160 ISO-K)

Advantages to the User

- Hydrocarbon-free ultra-high vacuum
- High pumping speed for water vapor, nitrogen and hydrogen

Typical Applications

- Beam tubes in particle accelerators
- General research



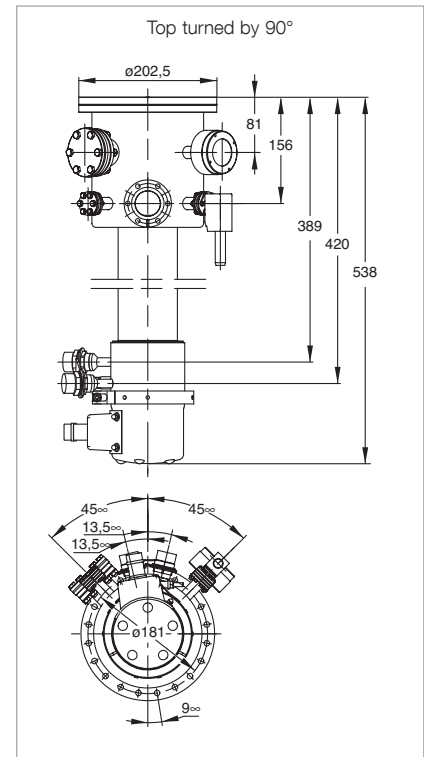
Dimensional drawing for the
COOLVAC 800 BL (160 CF)

Advantages to the User

- Hydrocarbon-free ultra-high vacuum
- High pumping speed for water vapor, nitrogen and hydrogen

Typical Applications

- Beam tubes in particle accelerators
- UHV systems



Dimensional drawing for the
COOLVAC 800 BL UHV (160 CF)

Technical Data

| | | 800 BL (ISO-K) | COOLVAC 800 BL (CF) | 800 BL UHV (CF) |
|---|--|--|--|--|
| High vacuum flange | DN | 160 ISO-K | 160 CF | 160 CF |
| Fore vacuum flange | DN | 25 KF | 25 KF | 40 CF |
| Flange for other purposes | DN | 16 KF (2x) | 16 KF (2x) | 16 CF (1x), 40 CF (1x) |
| Safety valve with DN 40 KF flange connection for gas exhaust line | | welded-in | welded-in | burst disk mounted on DN 16 CF |
| Pumping speed | | | | |
| H ₂ O | l x s ⁻¹ | 2600 | 2600 | 2600 |
| Ar / N ₂ | l x s ⁻¹ | 640 / 800 | 640 / 800 | 640 / 800 |
| H ₂ / He | l x s ⁻¹ | 1000 / 300 | 1000 / 300 | 1000 / 300 |
| Capacity | | | | |
| Ar / N ₂ | bar x l (Torr x l) | 300 (225 000) / 300 (225 000) | 300 (225 000) / 300 (225 000) | 300 (225 000) / 300 (225 000) |
| H ₂ at 10 ⁻⁶ mbar | bar x l (Torr x l) | 4.5 (3375) | 4.5 (3375) | 4.5 (3375) |
| He | bar x l (Torr x l) | 0.5 (375) | 0.5 (375) | 0.5 (375) |
| Built-in cold head | COOLPOWER | 7/25 | 7/25 | 7/25 |
| Max. throughput | | | | |
| Ar / N ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 4 (3) / 4 (3) | 4 (3) / 4 (3) | 4 (3) / 4 (3) |
| H ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 2 (1.5) | 2 (1.5) | 2 (1.5) |
| Crossover value | mbar x l (Torr x l) | 150 (112) | 150 (112) | 150 (112) |
| Cool down time to 20 K | min | 50 | 50 | 50 |
| Overall height | mm (in.) | 535 (21.06) | 538 (21.18) | 538 (21.18) |
| Weight | kg (lbs) | 12 (26.5) | 12 (26.5) | 12 (26.5) |
| Silicon diode for temperature measurements at second stage of the cold head | | built-in to a DN 16 KF with 4-way HV current feedthrough | built-in to a DN 16 KF with 4-way HV current feedthrough | built-in to a DN 16 CF with 4-way with UHV feedthrough |

Ordering Information

| | 800 BL (ISO-K) | COOLVAC 800 BL (CF) | 800 BL UHV (CF) |
|--|-----------------------|--------------------------------|------------------------|
| | Part No. | Part No. | Part No. |
| COOLVAC | 844160V1006 | 844160V1002 | 844160V9002 |
| Compressor unit | | | |
| COOLPAK 2000 | 840000V2000 | 840000V2000 | 840000V2000 |
| COOLPAK 2200 | 840000V2200 | 840000V2200 | 840000V2200 |
| COOLPAK 2000 A | 840000V2010 | 840000V2010 | 840000V2010 |
| COOLPAK 2200 A | 840000V2210 | 840000V2210 | 840000V2210 |
| Connecting cable | | | |
| Compressor – cold head, 4.5 m (15.75 ft) | E 400000323 | E 400000323 | E 400000323 |
| Electric extension cable EL 4.5 | 893 74 | 893 74 | 893 74 |
| Flexlines | | | |
| FL 4.5 (1/2", 1/2") | 892 87 | 892 87 | 892 87 |
| or FL 9.0 (1/2", 1/2") | 892 88 | 892 88 | 892 88 |
| Low temperature measuring instrument | upon request | upon request | upon request |
| Cable for the silicon diode, 10 m (35.0 ft) long | upon request | upon request | upon request |

Cryo Pumps with Fully Automatic Control, ClassicLine

COOLVAC 800 CL

COOLVAC 1.500 CL



COOLVAC 1.500 CL

Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through Cryo Compact Control
- Easy servicing

Typical Applications

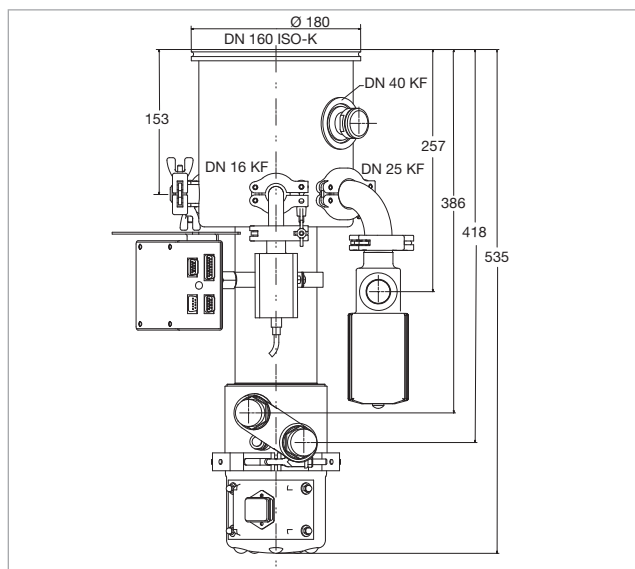
- Evaporators
- Sputtering systems
- Ion implanters
- Optical coating systems
- Metallization systems

Advantages to the User

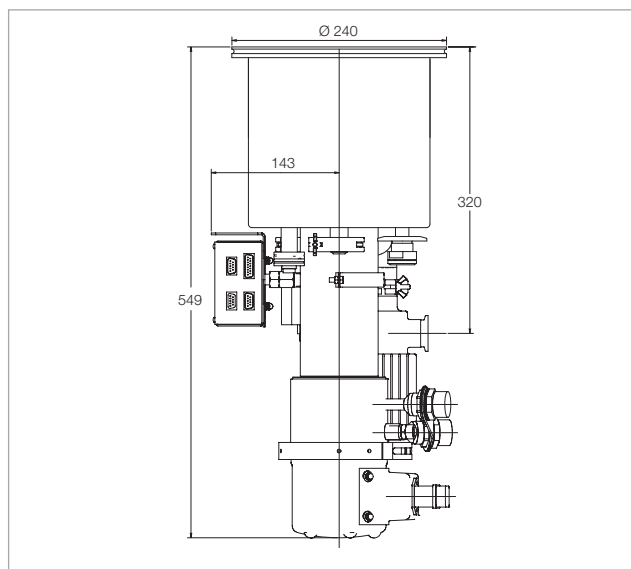
- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through Cryo Compact Control
- Easy servicing

Typical Applications

- Evaporators
- Sputtering systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 800 CL (DN 160 ISO-K)



Dimensional drawing for the COOLVAC 1.500 CL (DN 200 ISO-K)

Technical Data

COOLVAC

800 CL

1.500 CL

| | | | |
|---|--|--------------------|------------------------------|
| High vacuum (HV) flange | DN | 160 ISO-K / 160 CF | 200 ISO-K / 200 CF / 6" ANSI |
| Fore vacuum flange | DN | 25 KF | 25 KF |
| Flange for connection a gauge head | DN | 16 KF | 16 KF |
| Flange for the electrical connection | DN | 16 KF | 16 KF |
| Safety valve with flange connection for gas exhaust line | DN | 40 KF | 40 KF |
| 4-way current feedthrough for Si diode on a flange | DN | 16 KF | 16 KF |
| Heaters | | | |
| 1st stage | W | 160 | 160 |
| | V AC | 42 | 42 |
| 2nd stage | W | 90 | 90 |
| | V AC | 42 | 42 |
| Temperature sensor | | | |
| 1st stage | | Pt100 | Pt100 |
| 2nd stage | | Si diode | Si diode |
| Built-in cold head | COOLPOWER | 7/25 | 7/25 |
| Weight | kg (lbs) | 15 (33.1) | 25 (55.2) |
| Cooldown time to $T_2 = 20\text{ K}$ | min | 50 | 60 |
| Crossover value | mbar x l (Torr x l) | 150 (112) | 210 (157) |
| Pumping speed | | | |
| H ₂ O | l x s ⁻¹ | 2600 | 4600 |
| Ar / N ₂ | l x s ⁻¹ | 640 / 800 | 1200 / 1500 |
| H ₂ | l x s ⁻¹ | 1000 | 2500 |
| Capacity | | | |
| Ar / N ₂ | bar x l | 300 / 300 | 1000 / 1000 |
| H ₂ at 10 ⁻⁶ mbar | bar x l | 4.5 | 12.0 |
| Max. throughput | | | |
| Ar / N ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 4 (3) / 4 (3) | 12 (9) / 12 (9) |
| H ₂ O | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 2 (1.5) | 6 (4.5) |
| Helium connections (Self-sealing couplings: outside thread, type 5400-S2-8) | DN | 1/2" | 1/2" |

Ordering Information

COOLVAC 800 CL

| | Single Operation | | Dual operation | | Multiple Operation | | |
|--|----------------------------|-------------|--------------------------------------|------------------------------|------------------------------|--------------------------------------|-------------|
| | Europe | USA/Japan | Europe | Europe | USA/Japan | Europe | USA/Japan |
| | Part No. | | Part No. | | | Part No. | |
| COOLVAC 800 CL DN 160 CF DN 160 ISO-K | 844160V0002 844160V0006 | | 844160V0002 (2x) 844160V0006 (2x) | | | 844160V0002 (3x) 844160V0006 (3x) | |
| Electronics and Cables | | | | | | | |
| System controller SC | 844 230 | | 844 230 | 844 230 | 844 230 | 844 230 | |
| Power supply PS (50/60 Hz) 230 V, 1-ph. (switchable to 115 V) 200 V, 3-ph. (switchable to 400 V) | 844 135 — | | 844 135 — | — 844 235 | — 844 235 | — 844 235 | |
| Network communication cable – System controller to the pump(s) 10 m (35.0 ft) 20 m (70.0 ft) | 844 261 844 262 | | 844 261 844 262 | 844 261 844 262 | 844 261 844 262 | 844 261 844 262 | |
| Network PM cable for the link between the pumps 3 m (10.5 ft) 10 m (35.0 ft) | — — | | 844 256 844 258 | 844 256 844 258 | 844 256 844 258 | 844 256 (2x) 844 258 (2x) | |
| Power supply cable from power supply to pump 10 m (35.0 ft) 20 m (70.0 ft) | — — | | — — | 844 251 (2x) 844 252 (2x) | 844 251 (2x) 844 252 (2x) | 844 251 (3x) 844 252 (3x) | |
| Remote control cable CP, 1 m (3.5 ft) | — | | — | 844 265 | 844 265 | 844 265 | |
| Cable compressor – Power supply 10 m (35.0 ft) 20 m (70.0 ft) | 844 129 844 139 | | 844 129 844 139 | — — | — — | — — | |
| Cable system controller – Power supply 1 m (3.5 ft) | 844 141 | | 844 141 | — | — | — | |
| Cable pump module PM – Power supply 10 m (35.0 ft) 20 m (70.0 ft) | 844 128 844 138 | | 844 128 (2x) 844 138 (2x) | — — | — — | — — | |
| Connecting cable compressor – pump, 4.5 m (15.75 ft) | E 400000323 | | E 400000323 (2x) | — | — | — | |
| Electric extension cable EL 4.5 | 893 74 | | 893 74 (2x) | — | — | — | |
| Compressors and Flexlines | | | | | | | |
| Compressor | | | | | | | |
| CP 2000 | 840000V2000 | — | — | — | — | — | — |
| CP 2000 A | 840000V2010 | — | — | — | — | — | — |
| CP 2200 | — | 840000V2200 | — | — | — | — | — |
| CP 2200 A | — | 840000V2210 | — | — | — | — | — |
| CP 6000 HD | — | — | 840000V6004 | — | — | — | — |
| CP 6000 H | — | — | — | 840000V6001 | — | 840000V6001 | — |
| CP 6200 H | — | — | — | — | 840000V6201 | — | 840000V6201 |
| Accessories | | | | | | | |
| Water cooling discharge throttle | — | — | E 840000133 | — | — | — | — |
| Power supply cable for compressor | 1) | | 1) | 1) | 1) | 1) | |
| Set of flexlines FL 4.5 (1/2", 1/2") or FL 9.0 (1/2", 1/2") | 892 87 892 88 | | 892 87 (2x) 892 88 (2x) | 892 87 (2x) 892 88 (2x) | 892 87 (2x) 892 88 (2x) | 892 87 (3x) 892 88 (3x) | |
| Gas manifold (1 piece each) GD 2 GD 4 | — — | | 840 253 (2x) — | 840 253 (2x) — | 840 253 (2x) — | — 840 254 (2x) | |

The arrangement of the components is shown in the chapter "Accessories" under the heading "COOLVAC ClassicLine, System Components"

¹⁾ See Ordering Information for the compressor units COOLPAK

Ordering Information

COOLVAC 1.500 CL

| | Single Operation | | Dual operation | | Multiple Operation | | |
|--|------------------|-------------|------------------|--------------|--------------------|------------------|-------------|
| | Europe | USA/Japan | Europe | Europe | USA/Japan | Europe | USA/Japan |
| | Part No. | | Part No. | | | Part No. | |
| COOLVAC 1.500 CL | | | | | | | |
| DN 200 CF | 844200V0002 | | 844200V0002 (2x) | | | 844200V0002 (3x) | |
| DN 6" ANSI | 844200V0004 | | 844200V0004 (2x) | | | 844200V0004 (3x) | |
| DN 200 ISO-K | 844200V0006 | | 844200V0006 (2x) | | | 844200V0006 (3x) | |
| Electronics and Cables | | | | | | | |
| System controller SC | 844 230 | | 844 230 | 844 230 | 844 230 | 844 230 | |
| Power supply PS (50/60 Hz) | | | | | | | |
| 230 V, 1-ph. (switchable to 115 V) | 844 135 | | 844 135 | – | – | – | |
| 200 V, 3-ph. (switchable to 400 V) | – | | – | 844 235 | 844 235 | 844 235 | |
| Network communication cable – | | | | | | | |
| System controller to the pump(s) | | | | | | | |
| 10 m (35.0 ft) | 844 261 | | 844 261 | 844 261 | 844 261 | 844 261 | |
| 20 m (70.0 ft) | 844 262 | | 844 262 | 844 262 | 844 262 | 844 262 | |
| Network PM cable for the link between | | | | | | | |
| the pumps | | | | | | | |
| 3 m (10.5 ft) | – | | 844 256 | 844 256 | 844 256 | 844 256 (2x) | |
| 10 m (35.0 ft) | – | | 844 258 | 844 258 | 844 258 | 844 258 (2x) | |
| Power supply cable from power supply | | | | | | | |
| to pump | | | | | | | |
| 10 m (35.0 ft) | – | | – | 844 251 (2x) | 844 251 (2x) | 844 251 (3x) | |
| 20 m (70.0 ft) | – | | – | 844 252 (2x) | 844 252 (2x) | 844 252 (3x) | |
| Remote control cable CP, 1 m (3.5 ft) | – | | – | 844 265 | 844 265 | 844 265 | |
| Cable compressor – Power supply | | | | | | | |
| 10 m (35.0 ft) | 844 129 | | 844 129 | – | – | – | |
| 20 m (70.0 ft) | 844 139 | | 844 139 | – | – | – | |
| Cable system controller – Power supply | | | | | | | |
| 1 m (3.5 ft) | 844 141 | | 844 141 | – | – | – | |
| Cable pump module PM – Power supply | | | | | | | |
| 10 m (35.0 ft) | 844 128 | | 844 128 (2x) | – | – | – | |
| 20 m (70.0 ft) | 844 138 | | 844 138 (2x) | – | – | – | |
| Connecting cable | E 400000323 | | E 400000323 | | | | |
| compressor – pump, 4.5 m (15.75 ft) | | | (2x) | – | – | – | |
| Electric extension cable EL 4.5 | 893 74 | | 893 74 (2x) | – | – | – | |
| Compressors and Flexlines | | | | | | | |
| Compressor | | | | | | | |
| CP 2000 | 840000V2000 | – | – | – | – | – | – |
| CP 2000 A | 840000V2010 | – | – | – | – | – | – |
| CP 2200 | – | 840000V2200 | – | – | – | – | – |
| CP 2200 A | – | 840000V2210 | – | – | – | – | – |
| CP 6000 HD | – | – | 840000V6004 | – | – | – | – |
| CP 6000 H | – | – | – | 840000V6001 | – | 840000V6001 | – |
| CP 6200 H | – | – | – | – | 840000V6201 | – | 840000V6201 |
| Accessories | | | | | | | |
| Water cooling discharge throttle | – | – | E 840000133 | – | – | – | – |
| Power supply cable for compressor | 1) | | 1) | 1) | 1) | 1) | |
| Set of FLEXLINES | | | | | | | |
| FL 4.5 (1/2", 1/2") | 892 87 | | 892 87 (2x) | 892 87 (2x) | 892 87 (2x) | 892 87 (3x) | |
| or FL 9.0 (1/2", 1/2") | 892 88 | | 892 88 (2x) | 892 88 (2x) | 892 88 (2x) | 892 88 (3x) | |
| Gas manifold (1 piece each) | | | | | | | |
| GD 2 | – | | 840 253 (2x) | 840 253 (2x) | 840 253 (2x) | – | |
| GD 4 | – | | – | – | – | 840 254 (2x) | |

The arrangement of the components is shown in the chapter "Accessories" under the heading "COOLVAC ClassicLine, System Components".

¹⁾ See Ordering Information for the compressor units COOLPAK

COOLVAC 2.000 CL



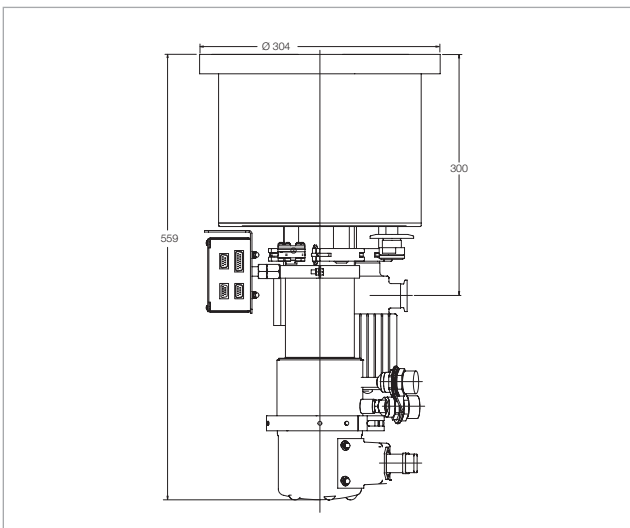
COOLVAC 2.000 CL

Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through Cryo Compact Control
- Easy servicing

Typical Applications

- Evaporators
- Sputtering systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 2.000 CL (DN 250 CF)

COOLVAC 3.000 CL



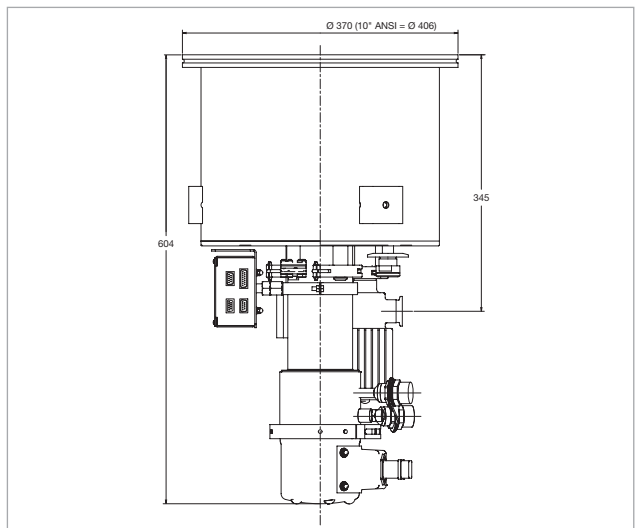
COOLVAC 3.000 CL

Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through Cryo Compact Control
- Easy servicing

Typical Applications

- Evaporators
- Sputtering systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 3.000 CL (DN 320 ISO-K / 10" ANSI)

Technical Data

COOLVAC

2.000 CL

3.000 CL

| | | | |
|---|--|------------------------------|-----------------------|
| High vacuum (HV) flange | DN | 250 ISO-K / 250 CF / 8" ANSI | 320 ISO-K / 10" ANSI |
| Fore vacuum flange | DN | 25 KF | 25 KF |
| Flange for connection a gauge head | DN | 16 KF | 16 KF |
| Flange for the electrical connection | DN | 16 CF | 16 CF |
| Safety valve with flange connection for gas exhaust line | DN | 40 KF | 40 KF |
| 4-way current feedthrough for Si diode on a flange | DN | 16 KF | 16 KF |
| Heaters | | | |
| 1st stage | W | 160 | 160 |
| | V AC | 42 | 42 |
| 2nd stage | W | 90 | 90 |
| | V AC | 42 | 42 |
| Temperature sensor | | | |
| 1st stage | | Pt100 | Pt100 |
| 2nd stage | | Si diode | Si diode |
| Built-in cold head | COOLPOWER | 7/25 | 7/25 |
| Weight | kg (lbs) | 25 (55.2) | 35 (77.3) |
| Cooldown time to $T_2 = 20$ K | min | 70 | 80 |
| Crossover value | mbar x l (Torr x l) | 250 (187) | 500 (375) |
| Pumping speed | | | |
| H ₂ O | l x s ⁻¹ | 7000 | 10500 |
| Ar / N ₂ | l x s ⁻¹ | 1600 / 2100 | 2500 / 3000 |
| H ₂ | l x s ⁻¹ | 3200 | 6000 |
| Capacity | | | |
| Ar / N ₂ | bar x l | 1600 / 1600 | 2500 / 2500 |
| H ₂ at 10 ⁻⁶ mbar | bar x l | 15 | 28 |
| Max. throughput | | | |
| Ar / N ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 12 (9) / 12 (9) | 15 (11.2) / 15 (11.2) |
| H ₂ O | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 6 (4.5) | 10 (7.5) |
| Helium connections (Self-sealing couplings: outside thread, type 5400-S2-8) | DN | 1/2" | 1/2" |

Ordering Information

COOLVAC 2.000 CL

| | Single Operation | | Dual operation | | | Multiple Operation | |
|---|------------------|-------------|---------------------|--------------|--------------|--------------------|-------------|
| | Europe | USA/Japan | Europe | Europe | USA/Japan | Europe | USA/Japan |
| | Part No. | | Part No. | | | Part No. | |
| COOLVAC 2.000 CL | | | | | | | |
| DN 250 CF | 844250V0002 | | 844250V0002 (2x) | | | 844250V0002 (3x) | |
| DN 8" ANSI | 844250V0004 | | 844250V0004 (2x) | | | 844250V0004 (3x) | |
| DN 250 ISO-K | 844250V0006 | | 844250V0006 (2x) | | | 844250V0006 (3x) | |
| Electronics and Cables | | | | | | | |
| System controller SC | 844 230 | | 844 230 | 844 230 | 844 230 | 844 230 | |
| Power supply PS (50/60 Hz) | | | | | | | |
| 230 V, 1-ph. (switchable to 115 V) | 844 135 | | 844 135 | - | - | - | |
| 200 V, 3-ph. (switchable to 400 V) | - | | - | 844 235 | 844 235 | 844 235 | |
| Network communication cable – System controller to the pump(s) | | | | | | | |
| 10 m (35.0 ft) | 844 261 | | 844 261 | 844 261 | 844 261 | 844 261 | |
| 20 m (70.0 ft) | 844 262 | | 844 262 | 844 262 | 844 262 | 844 262 | |
| Network PM cable for the link between the pumps | | | | | | | |
| 3 m (10.5 ft) | - | | 844 256 | 844 256 | 844 256 | 844 256 (2x) | |
| 10 m (35.0 ft) | - | | 844 258 | 844 258 | 844 258 | 844 258 (2x) | |
| Power supply cable from power supply to pump | | | | | | | |
| 10 m (35.0 ft) | - | | - | 844 251 (2x) | 844 251 (2x) | 844 251 (3x) | |
| 20 m (70.0 ft) | - | | - | 844 252 (2x) | 844 252 (2x) | 844 252 (3x) | |
| Remote control cable CP, 1 m (3.5 ft) | - | | - | 844 265 | 844 265 | 844 265 | |
| Cable compressor – Power supply | | | | | | | |
| 10 m (35.0 ft) | 844 129 | | 844 129 | - | - | - | |
| 20 m (70.0 ft) | 844 139 | | 844 139 | - | - | - | |
| Cable System Controller – Power Supply | | | | | | | |
| 1 m (3.5 ft) | 844 141 | | 844 141 | - | - | - | |
| Cable pump module PM – Power supply | | | | | | | |
| 10 m (35.0 ft) | 844 128 | | 844 128 (2x) | - | - | - | |
| 20 m (70.0 ft) | 844 138 | | 844 138 (2x) | - | - | - | |
| Connecting cable compressor – pump, 4.5 m (15.75 ft) | E 400000323 | | E 400000323 (2x) | - | - | - | |
| Electric extension cable EL 4.5 | 893 74 | | 893 74 (2x) | - | - | - | |
| Compressors and Flexlines | | | | | | | |
| Compressor | | | | | | | |
| CP 2000 | 840000V2000 | - | - | - | - | - | - |
| CP 2000 A | 840000V2010 | - | - | - | - | - | - |
| CP 2200 | - | 840000V2200 | - | - | - | - | - |
| CP 2200 A | - | 840000V2210 | - | - | - | - | - |
| CP 6000 HD | - | - | 840000V6004 | - | - | - | - |
| CP 6000 H | - | - | - | 840000V6001 | - | 840000V6001 | - |
| CP 6200 H | - | - | - | - | 840000V6201 | - | 840000V6201 |
| Accessories | | | | | | | |
| Water cooling discharge throttle | - | - | E 840000133 | - | - | - | - |
| Power supply cable for compressor | 1) | | 1) | 1) | 1) | 1) | |
| Set of flexlines | | | | | | | |
| FL 4.5 (1/2", 1/2") | 892 87 | | 892 87 (2x) | 892 87 (2x) | 892 87 (2x) | 892 87 (3x) | |
| or FL 9.0 (1/2", 1/2") | 892 88 | | 892 88 (2x) | 892 88 (2x) | 892 88 (2x) | 892 88 (3x) | |
| Gas manifold (1 piece each) | | | | | | | |
| GD 2 | - | | 840 253 (2x) | 840 253 (2x) | 840 253 (2x) | - | |
| GD 4 | - | | - | - | - | 840 254 (2x) | |

The arrangement of the components is shown in the chapter "Accessories" under the heading "COOLVAC ClassicLine, System Components".

¹⁾ See Ordering Information for the compressor units COOLPAK

Ordering Information

COOLVAC 3.000 CL

| | Single operation | | Dual operation | | |
|--|----------------------------|--------------------|--------------------------------------|------------------------------|------------------------------|
| | Europe | USA/Japan | Europe | Europe | USA/Japan |
| | Part No. | | Part No. | | |
| COOLVAC 3.000 CL DN 10" ANSI DN 320 ISO-K | 844320V0004 844320V0006 | | 844320V0004 (2x) 844320V0006 (2x) | | |
| Electronics and Cables | | | | | |
| System controller SC | 844 230 | 844 230 | 844 230 | 844 230 | 844 230 |
| Power supply PS (50/60 Hz) 230 V, 1-ph. (switchable to 115 V) 200 V, 3-ph. (switchable to 400 V) | 844 135 - - | 844 135 - - | 844 135 - - | - 844 235 | - 844 235 |
| Network communication cable – System controller to the pump(s) 10 m (35.0 ft) 20 m (70.0 ft) | 844 261 844 262 | 844 261 844 262 | 844 261 844 262 | 844 261 844 262 | 844 261 844 262 |
| Network PM cable for the link between the pumps 3 m (10.5 ft) 10 m (35.0 ft) | - - | - - | 844 256 844 258 | 844 256 844 258 | 844 256 844 258 |
| Power supply cable from power supply to pump 10 m (35.0 ft) 20 m (70.0 ft) | - - | - - | - - | 844 251 (2x) 844 252 (2x) | 844 251 (2x) 844 252 (2x) |
| Remote control cable CP, 1 m (3.5 ft) | - | - | - | 844 265 | 844 265 |
| Cable compressor – Power supply 10 m (35.0 ft) 20 m (70.0 ft) | 844 129 844 139 | 844 129 844 139 | 844 129 844 139 | - - | - - |
| Cable system controller – Power supply 1 m (3.5 ft) | 844 141 | 844 141 | 844 141 | - | - |
| Cable pump module PM – Power supply 10 m (35.0 ft) 20 m (70.0 ft) | 844 128 844 138 | 844 128 844 138 | 844 128 (2x) 844 138 (2x) | - - | - - |
| Connecting cable compressor – pump, 4.5 m (15.75 ft) | E 400000323 | E 400000323 | E 400000323 (2x) | - | - |
| Electric extension cable EL 4.5 | 893 74 | 893 74 | 893 74 (2x) | - | - |
| Compressors and Flexlines | | | | | |
| Compressor | | | | | |
| CP 2000 | 840000V2000 | - | - | - | - |
| CP 2000 A | 840000V2010 | - | - | - | - |
| CP 2200 | - | 840000V2200 | - | - | - |
| CP 2200 A | - | 840000V2210 | - | - | - |
| CP 6000 HD | - | - | 840000V6004 | - | - |
| CP 6000 H | - | - | - | 840000V6001 | - |
| CP 6200 H | - | - | - | - | 840000V6201 |
| Accessories | | | | | |
| Water cooling discharge throttle | - | - | E 840000133 | - | - |
| Power supply cable for compressor | 1) | | 1) | 1) | 1) |
| Set of flexlines FL 4.5 (1/2", 1/2") or FL 9.0 (1/2", 1/2") | 892 87 892 88 | 892 87 892 88 | 892 87 (2x) 892 88 (2x) | 892 87 (2x) 892 88 (2x) | 892 87 (2x) 892 88 (2x) |
| Gas manifold (1 piece each) GD 2 | - | - | 840 253 (2x) | 840 253 (2x) | 840 253 (2x) |

The arrangement of the components is shown in the chapter "Accessories" under the heading "COOLVAC ClassicLine, System Components".

¹⁾ See Ordering Information for the compressor units COOLPAK

COOLVAC 5.000 CL



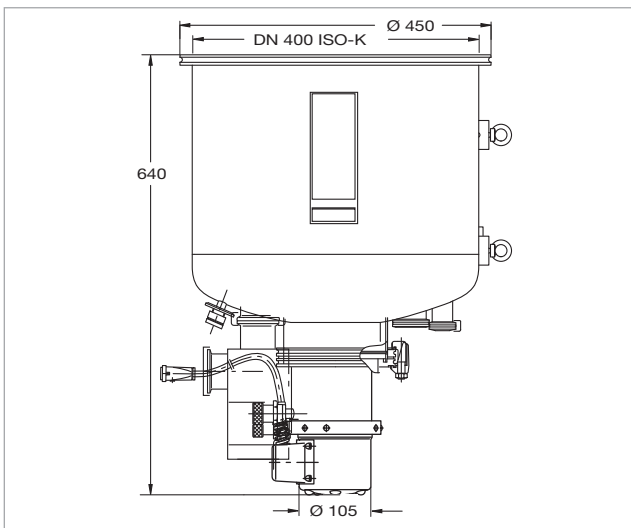
COOLVAC 5.000 CL

Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through Cryo Compact Control
- Easy servicing

Typical Applications

- Evaporators
- Ion implanters
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 5.000 CL

COOLVAC 10.000 CL



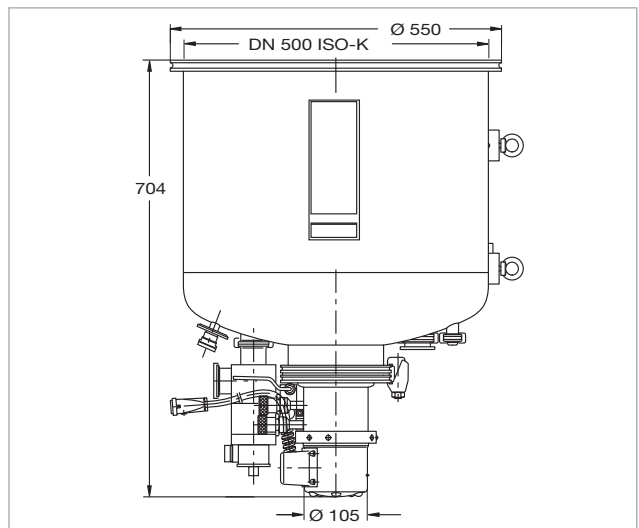
COOLVAC 10.000 CL

Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through Cryo Compact Control
- Easy servicing

Typical Applications

- Evaporators
- Space simulation chambers
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 10.000 CL

Technical Data

COOLVAC

| | | 5.000 CL | 10.000 CL |
|---|--|---------------------|---------------------|
| High vacuum (HV) flange | DN | 400 ISO-K | 500 ISO-K |
| Fore vacuum flange | DN | 40 KF | 40 KF |
| Flange for connection of a gauge head | DN | 16 KF | 16 KF |
| Flange for the electrical connection | DN | 40 KF | 40 KF |
| Safety valve with flange connection for gas exhaust line | DN | 40 KF | 40 KF |
| 4-way current feedthrough for Si diode on a flange | DN | 16 KF | 16 KF |
| Heaters | | | |
| 1st stage | W | 160 | 160 |
| | V AC | 42 | 42 |
| 2nd stage | W | 90 | 90 |
| | V AC | 42 | 42 |
| Temperature sensor | | | |
| 1st stage | | Pt100 | Pt100 |
| 2nd stage | | Si diode | Si diode |
| Built-in cold head | COOLPOWER | 5/100 | 5/100 |
| Weight | kg (lbs) | 42 (92.7) | 50 (110.4) |
| Cooldown time to $T_2 = 20\text{ K}$ | min | 100 | 150 |
| Crossover value | mbar x l (Torr x l) | 700 (525) | 800 (600) |
| Pumping speed | | | |
| H ₂ O | l x s ⁻¹ | 18000 | 30000 |
| Ar / N ₂ | l x s ⁻¹ | 4000 / 5200 | 8400 / 10000 |
| H ₂ | l x s ⁻¹ | 6200 | 12000 |
| Capacity | | | |
| Ar / N ₂ | bar x l | 3000 / 3000 | 5500 / 5500 |
| H ₂ at 10 ⁻⁶ mbar | bar x l | 32 | 45 |
| Max. throughput | | | |
| Ar / N ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 10 (7.5) / 10 (7.5) | 10 (7.5) / 10 (7.5) |
| H ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 7 (5.3) | 7 (5.3) |
| Helium connection | DN | 1/2" | 1/2" |
| (Self-sealing couplings: outside thread, types 5400-S2-8 | | | |

Ordering Information

COOLVAC 5.000 CL

COOLVAC 10.000 CL

Europe

USA/Japan

Europe

USA/Japan

| | Part No. | Part No. | Part No. | Part No. |
|---|--|--|--|--|
| COOLVAC | | | | |
| 5.000 CL, DN 400 ISO-K | 844 410 | 844 410 | – | – |
| 10.000 CL, DN 500 ISO-K | – | – | 844610V0006 | 844610V0006 |
| Electronics and Cables | | | | |
| System controller SC | Part No. 844 230 | Part No. 844 230 | Part No. 844 230 | Part No. 844 230 |
| Power supply PS 230 V, 1-ph. | 844 135 | 844 135 | 844 135 | 844 135 |
| Network communication cable – System controller to the pump(s) | | | | |
| 10 m (35.0 ft) | 844 261 | 844 261 | 844 261 | 844 261 |
| 20 m (70.0 ft) | 844 262 | 844 262 | 844 262 | 844 262 |
| Cable compressor – Power supply PS | | | | |
| 10 m (35.0 ft) | 844 129 | 844 129 | 844 129 | 844 129 |
| 20 m (70.0 ft) | 844 139 | 844 139 | 844 139 | 844 139 |
| Cable system controller – Power supply 1 m (3.5 ft) | 844 141 | 844 141 | 844 141 | 844 141 |
| Cable pump module PM – Power supply | | | | |
| 10 m (35.0 ft) | 844 128 | 844 128 | 844 128 | 844 128 |
| 20 m (70.0 ft) | 844 138 | P844 138 | 844 138 | 844 138 |
| Compressors and Flexlines | | | | |
| Compressor | | | | |
| CP 6000 H | 840000V6001 | – | 840000V6001 | – |
| CP 6200 H | – | 840000V6201 | – | 840000V6201 |
| Power supply cable for compressor | see Ordering Information for the Compressor Units COOLPAK | see Ordering Information for the Compressor Units COOLPAK | see Ordering Information for the Compressor Units COOLPAK | see Ordering Information for the Compressor Units COOLPAK |
| Set of flexlines | | | | |
| FL 4.5 (1/2", 1/2") | 892 87 | 892 87 | 892 87 | 892 87 |
| or FL 9.0 (1/2", 1/2") | 892 88 | 892 88 | 892 88 | 892 88 |
| and EL 4.5 (electric extension cable) | 893 74 | 893 74 | 893 74 | 893 74 |

The arrangement of the components is shown in the chapter "Accessories" under the heading "COOLVAC ClassicLine, System Components"

COOLVAC 18.000 CL



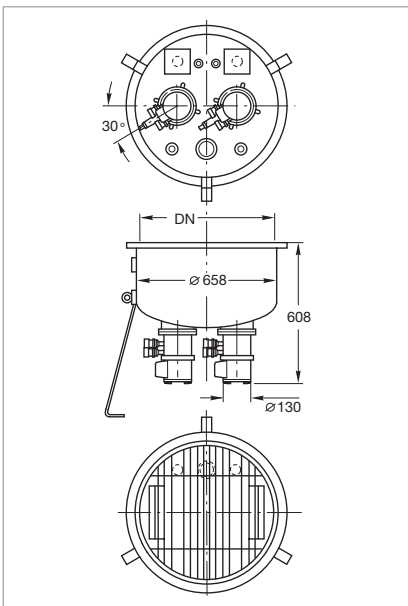
COOLVAC 18.000 CL with special flanges

Advantages to the User

- Hydrocarbon-free high vacuum
- High pumping speed for water vapor and nitrogen
- Fast, safe and efficient regeneration with the electric regeneration system
- Simple operation

Typical Applications

- Space simulation chambers
- Evaporators
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 18.000 CL

COOLVAC 30.000



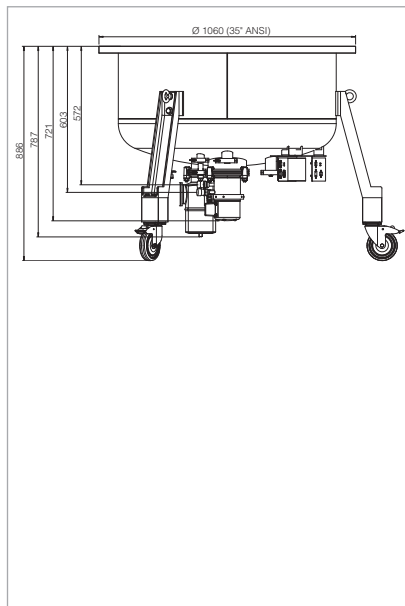
COOLVAC 30.000 with special flanges

Advantages to the User

- Hydrocarbon-free high vacuum
- High pumping speed for water vapor and nitrogen
- Fast, safe and efficient regeneration with the electric regeneration system
- Simple operation

Typical Applications

- Space simulation chambers
- Evaporators
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 30.000

COOLVAC 60.000

COOLVAC 60.000 LN₂ cooled upon request



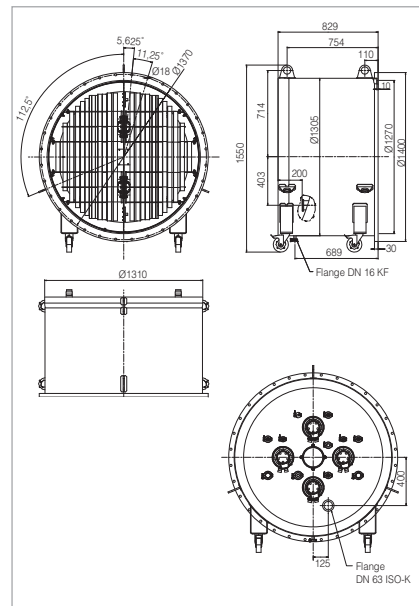
COOLVAC 60.000 with special flanges

Advantages to the User

- Hydrocarbon-free high vacuum
- High pumping speed for water vapor and nitrogen
- Fast, safe and efficient regeneration with the electric regeneration system
- Simple operation

Typical Applications

- Space simulation chambers
- Evaporators
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 60.000

Technical Data

COOLVAC 18.000 CL

COOLVAC 30.000

COOLVAC 60.000

| | | | | |
|--|--|---------------|--------------------------|--------------------------|
| High vacuum flange | DN | 630 ISO-F | 35" ANSI | 1250 ISO-F |
| Fore vacuum flange | DN | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| Flange with current feedthrough for silicon diode | DN | 25 KF (2x) | 16 KF (2x) | 16 KF (2x) |
| Flange for other purposes | DN | 40 KF | 40 KF | 40 KF |
| Safety valve with DN 40 KF flange connection for gas exhaust line (opening pressure) | DN mbar | 40 KF 1100 | 40 KF 1100 | 40 KF 1100 |
| Pumping speed | | | | |
| H ₂ O | l x s ⁻¹ | 46000 | 93000 | 180000 |
| Ar / N ₂ | l x s ⁻¹ | 13500 / 18000 | 25000 / 30000 | 47000 / 57000 |
| H ₂ / He | l x s ⁻¹ | 14000 / 4000 | 30000 / 7000 | 60000 / 15000 |
| Capacity | | | | |
| Ar / N ₂ | bar x l | 5000 / 5000 | 6500 / 6500 | 9000 / 9000 |
| H ₂ at 10 ⁻⁶ mbar | bar x l | 65 | 100 | 150 |
| H ₂ O | bar x l | 945 | | |
| Built-in cold head | COOLPOWER | 5/100 (2x) | 5/100 (2x) and 140T (1x) | 5/100 (2x) and 140T (2x) |
| Max. throughput | | | | |
| Ar / N ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 14 / 14 | 14 / 14 | 25 / 25 |
| H ₂ | mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | 7 | 7 | 12 |
| Crossover value at 20 K | mbar x l (Torr x l) | 850 | 1200 | 1000 |
| Cool down time to 20 K | min | 180 | 260 | 330 |
| Overall height | min | 606 | see drawing | see drawing |
| Weight | kg (lbs) | 65 | 245 | 450 |
| Silicon diode for temperature measurements at the second stage of the cold head | | built-in (2x) | built-in (2x) | built-in (2x) |
| Regeneration heaters at the first and second stage of the cold head | | built-in (2x) | – | – |

Ordering Information

COOLVAC 18.000 CL

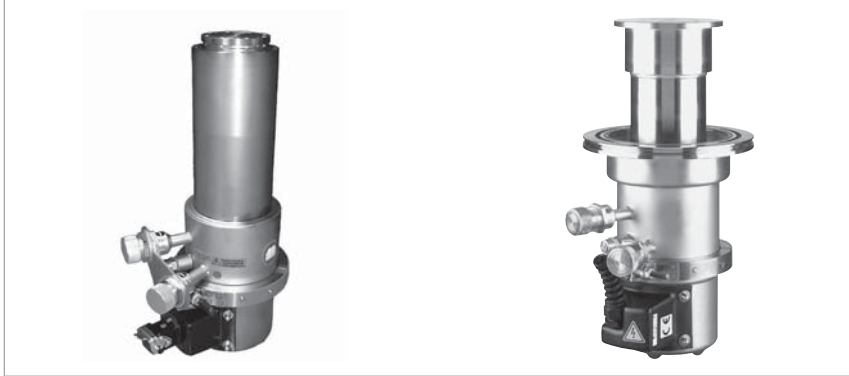
COOLVAC 30.000

COOLVAC 60.000

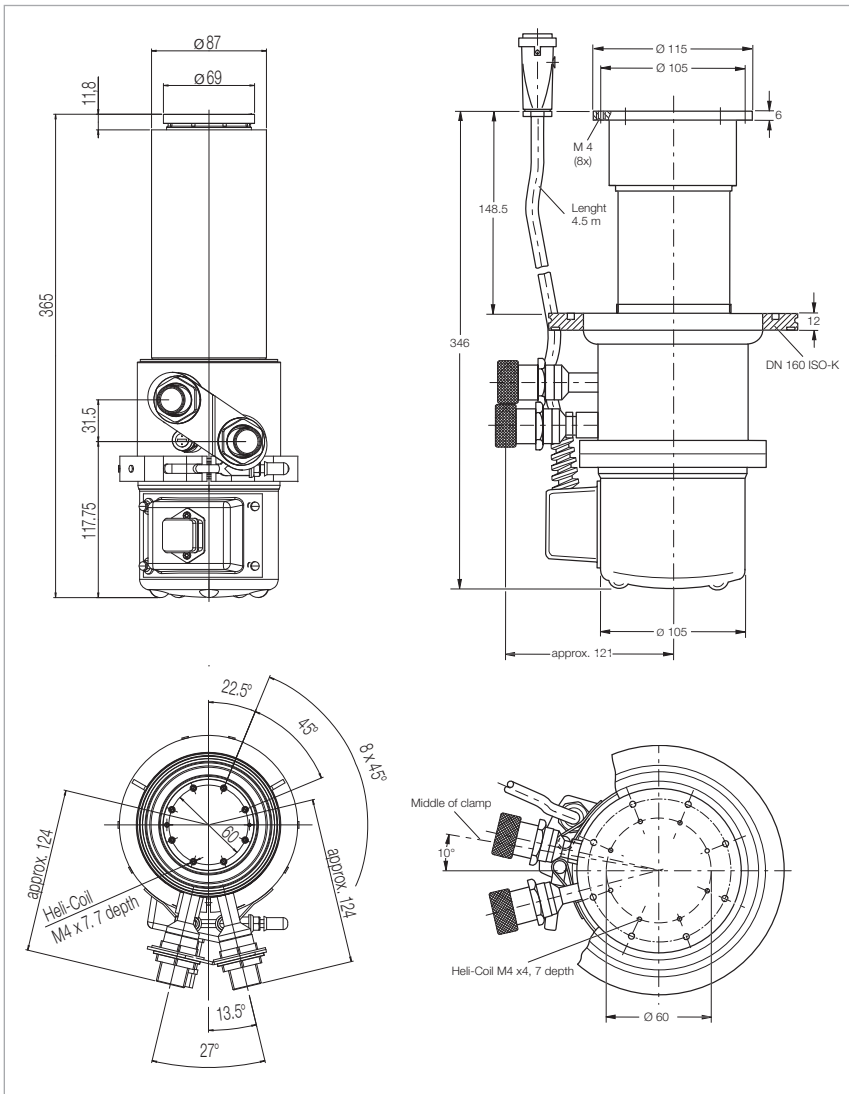
| | Part No. | Part No. | Part No. |
|--|---|---|---|
| Cryopump | | | |
| COOLVAC 18.000 CL, 630 ISO-F | 844630V0006 | – | – |
| COOLVAC 30.000, 35" ANSI | – | upon request | – |
| COOLVAC 60.000, 1250 ISO-F | – | – | upon request |
| Compressor unit | | | |
| COOLPAK 6000 H | upon request (2x) | upon request (3x) | upon request (4x) |
| COOLPAK 6200 H | upon request (2x) | upon request (3x) | upon request (4x) |
| Power supply cable | see Ordering Information for the compressor units COOLPAK | | |
| Set of flexlines | | | |
| FL 4.5 (1/2", 1/2") or FL 9.0 (1/2", 1/2") and EL 4.5 (electric extension cable) | Part No. 892 87 (2x) Part No. 892 88 (2x) Part No. 893 74 (2x) | Part No. 892 87 (3x) Part No. 892 88 (3x) Part No. 893 74 (3x) | Part No. 892 87 (4x) Part No. 892 88 (4x) Part No. 893 74 (4x) |
| Compact controller and cable kit | upon request | upon request | upon request |

Products Cryogenics

Cold Heads, Pneumatically Driven Single-Stage Cold Heads COOLPOWER 50 and 140 T



Single-stage cold head's COOLPOWER 50 (left) and 140 T (right)



Dimensional drawing for the COOLPOWER 50 (left) and COOLPOWER 140 T (right)

Advantages to the User

- For installation mostly in any orientation
- High refrigerating capacity
- No liquid refrigerants are required
- Very simple to operate
- Short cooldown time

Typical Applications

- Cooling of cryopanel in cryo pumps and thus generation of high vacuum and ultra-high vacuum pressures
- Calibration of sensors
- Cooling of samples and detectors; especially for cooling of
 - samples for spectroscopic investigations in solid state and surface physics
 - high temperature superconductor and semiconductor conditions
 - infrared and gamma detectors

Technical Data**COOLPOWER 50****COOLPOWER 140 T**

| | | | |
|--|----------|--------------------------|--------------------------|
| Refrigeration capacity at 50/60 Hz ¹⁾ | | | |
| at 80 K, approx. | W | 50 | 140 |
| at 20 K, approx. | W | – | 20 |
| Lowest attainable temperature ¹⁾ | K | ≤ 26 | ≤ 15 |
| Cooldown time down | | | |
| to 20 K | min | – | ≤ 55 |
| to 20 K, approx. | min | 20 | – |
| Permissible ambient temperature | °C (°F) | +10 to +40 (+50 to +104) | +10 to +40 (+50 to +104) |
| He filling pressure at room temperature | bar | 16 | 16 |
| He connections | | | |
| Self-sealing screwed connections | | | |
| High pressure connection | | 1/2" ²⁾ | 1/2" ³⁾ |
| Low pressure connection | | 1/2" ²⁾ | 1/2" ³⁾ |
| Weight | kg (lbs) | 8 (17.7) | 12 (26.5) |
| Length of the electrical connection line to the compressor unit | m (ft) | – | 4.5 (15.75) |

Ordering Information**COOLPOWER 50****COOLPOWER 140 T**

| | Part No. | Part No. |
|--|--|--|
| Cold head | | |
| with DN 100 CF-R | 842050V0001 | – |
| with DN 160 ISO-K | – | 842 030 |
| with weld-on pipe | 842050V0000 | – |
| other flanges | upon request | upon request |
| Accessories | | |
| Connecting cable compressor – cold head, 4.5 m (15.75 ft) | E 400000323 | included with the cold head |
| Compressor unit (for operation of one cold head) | | |
| COOLPAK 2000 | 840000V2000 | – |
| COOLPAK 2000 A | 840000V2010 | – |
| COOLPAK 2200 | 840000V2200 | – |
| COOLPAK 2200 A | 840000V2210 | – |
| COOLPAK 6000 H | | |
| 400 V/50 Hz; 470 V/60 Hz | – | 840000V6001 |
| COOLPAK 6200 H | | |
| 200 V/50 Hz; 200 V, 230 V/60 Hz | – | 840000V6201 |
| Power supply cable | see Ordering Information for the compressor units COOLPAK | see Ordering Information for the compressor units COOLPAK |
| Set of flexlines | | |
| FL 4.5 (1/2", 1/2") | 892 87 | 892 87 |
| or FL 9.0 (1/2", 1/2") | 892 88 | 892 88 |
| and EL 4.5 (electric extension cable) | 893 74 | 893 74 |
| Options | | |
| Temperature measurement | | |
| Silicon diode | 890 89 | 890 89 |
| Low temperature measuring instrument | upon request | upon request |
| Measuring cable | upon request | upon request |

¹⁾ The refrigerating capacities and temperatures stated apply only to vertical operation with the cold end at the bottom

²⁾ Series 5400 from Aeroquip or compatible types

³⁾ Series 8 from Aeroquip

Dual-Stage Cold Heads

COOLPOWER 7/25, 5/100 and 5/100 T



Dual-stage cold head COOLPOWER 7/25



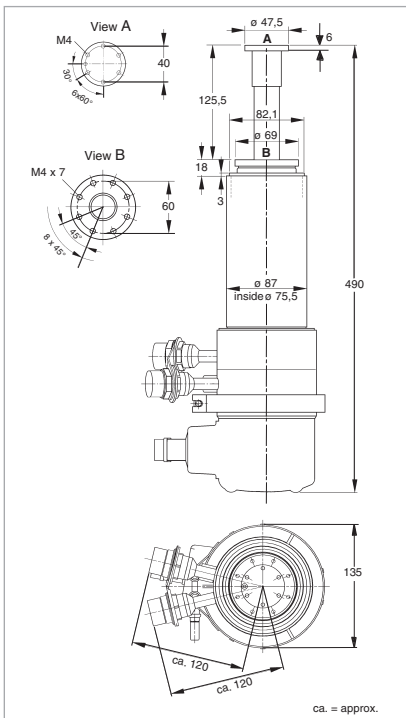
Dual-stage cold heads COOLPOWER 5/100 and COOLPOWER 5/100 T

Advantages to the User

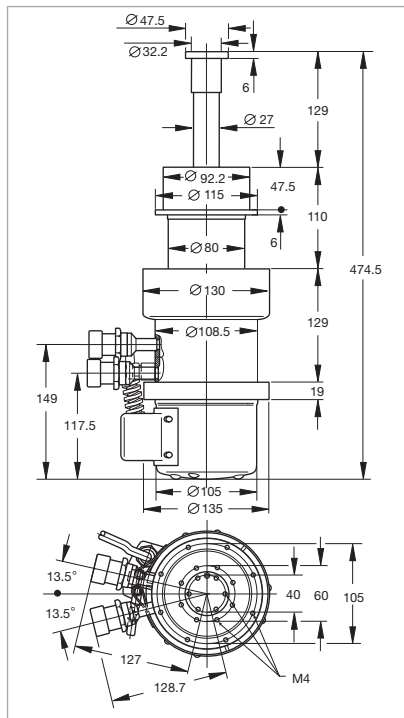
- For installation in any orientation
- High refrigerating capacity
- No liquid refrigerants are required
- Very simple to operate
- Short cooldown time

Typical Applications

- Cooling of cryopanel in cryo pumps and thus generation of high vacuum and ultra-high vacuum pressures
- Cooling of samples and detectors; especially for cooling of
 - samples for spectroscopic investigations in solid state and surface physics
- high temperature superconductors
- superconductors and semi conductors
- infrared and gamma detectors
- Calibration of sensors
- Cooling of accelerator components in the area of high energy physics
- Cooling of superconducting magnets; in nuclear magnetic resonance tomographs, for example (only COOLPOWER 5/100 and 5/100 T)



Dimensional drawing for the COOLPOWER 7/25



Dimensional drawing for the COOLPOWER 5/100 and COOLPOWER 5/100 T

Technical Data

| | | COOLPOWER | | |
|---|----------|--------------------------|--------------------------|--------------------------|
| | | 7/25 | 5/100 | 5/100 T |
| Refrigeration capacity at 50/60 Hz ¹⁾ | | | | |
| 1st stage at 80 K, approx. | W | 25 | 100 | 100 |
| 2st stage at 20 K, approx. | W | 7 | 5 | 7.5 |
| 2st stage at 10 K, approx. | W | – | – | 3.5 |
| 2st stage at 40 K, approx. | W | – | – | 35 |
| Lowest attainable temperature ¹⁾ | | | | |
| 1st stage, approx. | K | ≤ 35 | ≤ 35 | ≤ 35 |
| 2nd stage, approx. | K | ≤ 10 | ≤ 10 | 6 |
| Cooldown time of the | | | | |
| 2nd stage to 20 K, approx. | min | 20 | 20 | 20 |
| 1st stage to 80 K, approx. | min | 20 | 20 | 20 |
| 2nd stage to 10 K, approx. | min | – | – | 35 |
| 1st stage to 40 K, approx. | min | – | – | 30 |
| 2nd stage to 6 K, approx. | min | – | – | 45 |
| 1st stage to 30 K, approx. | min | – | – | 40 |
| Permissible ambient temperature | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| He filling pressure at room temperature | bar | 16 | 16 | 16 |
| He connections | | | | |
| Self-sealing screwed connections | | | | |
| High pressure connection | | 1/2" (#8 ²⁾) | 1/2" (#8 ²⁾) | 1/2" (#8 ²⁾) |
| Low pressure connection | | 1/2" (#8) | 1/2" (#8) | 1/2" (#8) |
| Weight | kg (lbs) | 11 (24.3) | 11 (24.3) | 11 (24.3) |
| Length of the electrical connection line to the compressor unit (included with cold head) | m (ft) | 4.5 (15.75) | 4.5 (15.75) | 4.5 (15.75) |

Ordering Information

| | | COOLPOWER | | |
|---|--|---------------------|-----------------------------|-----------------------------|
| | | 7/25 | 5/100 | 5/100 T |
| | | Part No. | Part No. | Part No. |
| Cold head | | | | |
| COOLPOWER 7/25 | | 842 040 | – | – |
| COOLPOWER 5/100 with weld-on pipe | | – | 893 05 | – |
| COOLPOWER 5/100 T | | – | – | 129 78 |
| Accessories | | | | |
| Connecting cable compressor – cold head, 4.5 m (15.75 ft) | | E 400000323 | included with the cold head | included with the cold head |
| Compressor unit (for operation of one cold head) | | | | |
| COOLPAK 2000 | | 840000V2000 | – | – |
| COOLPAK 2000 A | | 840000V2010 | – | – |
| COOLPAK 2200 | | 840000V2200 | – | – |
| COOLPAK 2200 A | | 840000V2210 | – | – |
| COOLPAK 6000 H | | – | 840000V6001 | 840000V6001 |
| COOLPAK 6200 H | | – | 840000V6201 | 840000V6201 |
| Power supply cable | | ³⁾ | ³⁾ | ³⁾ |
| Set of flexlines | | | | |
| FL 4.5 (1/2", 1/2") | | 892 87 | 892 87 | 892 87 |
| or FL 9.0 (1/2", 1/2") | | 892 88 | 892 88 | 892 88 |
| and EL 4.5 (electric extension cable) | | 893 74 | 893 74 | 893 74 |
| Options | | | | |
| Temperature measurement / control | | | | |
| Silicon diode | | 890 89 | 890 89 | 890 89 |
| Low temperature measuring instrument | | upon request | upon request | upon request |
| Measuring cable | | upon request | upon request | upon request |
| Electrical heaters | | upon request | upon request | upon request |
| Low temperature controller MODEL 9700 | | 842 400 | 842 400 | 842 400 |
| Measuring cable, 3 m (10.5 ft) long | | 842 401 | 842 401 | 842 401 |

¹⁾ The refrigerating capacities and temperatures stated apply to vertical operation with the cold end at the bottom

²⁾ Series 8 from Aeroquip

³⁾ See Ordering Information for the compressor units COOLPAK

Cold Heads, Mechanically Driven

Dual-Stage Cold Head COOLPOWER 10 MD



Dual-stage Cold Head COOLPOWER 10 MD

COOLPOWER 10 MD - the strongest 10 K GM cooler available on the market:

- High 2nd stage cooling capacity of > 18 W at 20 K
- High 1st stage cooling capacity of > 25 W at 40 K and 110 W at 80 K

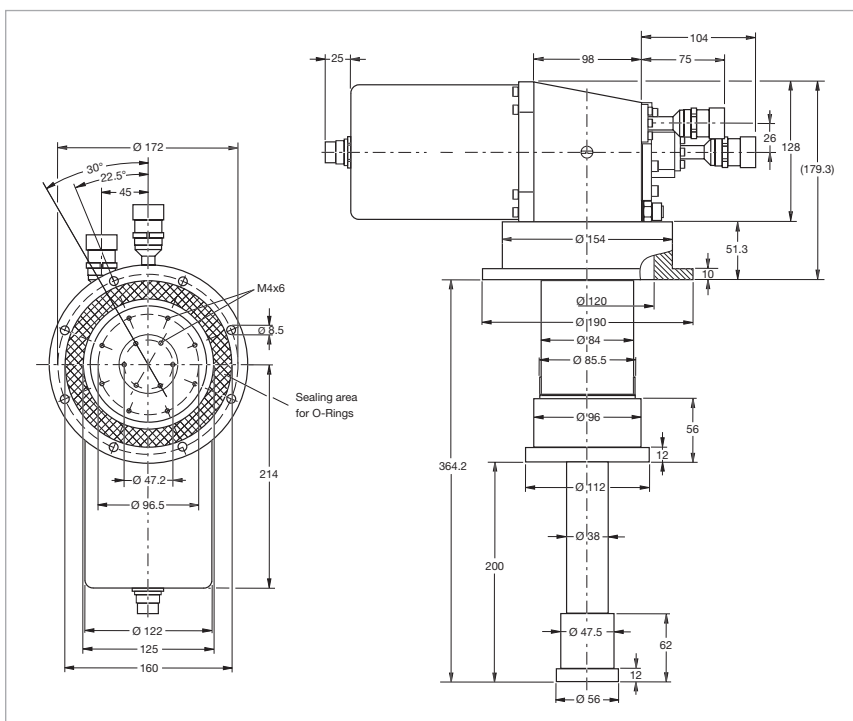
Advantages to the User

- Excellent cooling performance
- 18 W at 20 K by press-button operation
- High reliability
- Design optimized for MTBF 100,000 h
- Long and maintenance-free operation
- Low vibration due to directly driven displacer
- No liquid refrigerants are required
- Very simple to operate
- Short cooldown time
- Easy operation
 - Plug & Cool - as usual for all Oerlikon Leybold Vacuum GM coolers
 - Simple variation of motor speed via the COOLPAK MD compressor unit

Typical Applications

The COOLPOWER 10 MD is a mechanically driven double-stage Gifford McMahon (GM) cryo cooler and ideally suited for

- Cooling of cryo probes in NMR spectrometers
- Shield cooling of superconducting magnets in MRI
- Cooling of cryopanel in special Cryo pumps and thus generation of high vacuum and ultra-high vacuum pressures
- Cooling of larger samples and devices; especially
 - High temperature superconductor coils, wires and bulk materials
 - Recondensation of liquid refrigerants such as H₂, Ne
 - Samples for spectroscopic investigations in solid state and surface physics
 - Infrared and gamma detectors
- Calibration of sensors



Dimensional drawing for the COOLPOWER 10 MD

Technical Data**COOLPOWER 10 MD**

| | | |
|--|----------|--------------------------|
| Refrigeration capacity at 50/60 Hz ¹⁾ | | |
| 1st stage at 80 K, approx. | W | 110 |
| 2nd stage at 20 K, approx. | W | 18 |
| Lowest attainable temperature ¹⁾ | | |
| 1st stage, approx. | K | ≤ 28 |
| 2nd stage, approx. | K | ≤ 8 |
| Cooldown time of the 2nd stage to 20 K, approx. | min | 25 |
| Permissible ambient temperature | °C (°F) | +5 to +40 (+41 to +104) |
| He filling pressure at room temperature | bar | 16 |
| He connections | | |
| Self-sealing screwed connections | | |
| High pressure connection | | 1/2" (#8 ²⁾) |
| Low pressure connection | | 1/2" (#8) |
| Weight | kg (lbs) | 20 (44.15) |

Ordering Information**COOLPOWER 10 MD**

| | Part No. |
|---------------------------|---|
| Cold head COOLPOWER 10 MD | 842 010 |
| Accessories | see Ordering Information for the compressor unit COOLPAK 6000 HMD/6200 HMD, connecting cable and flexline |

¹⁾ The refrigerating capacities and temperatures stated apply to vertical operation with the cold end at the bottom²⁾ Series 8 from Aeroquip

Compressor Units for Pneumatically Driven Cold Heads and Pumps, Air Cooling

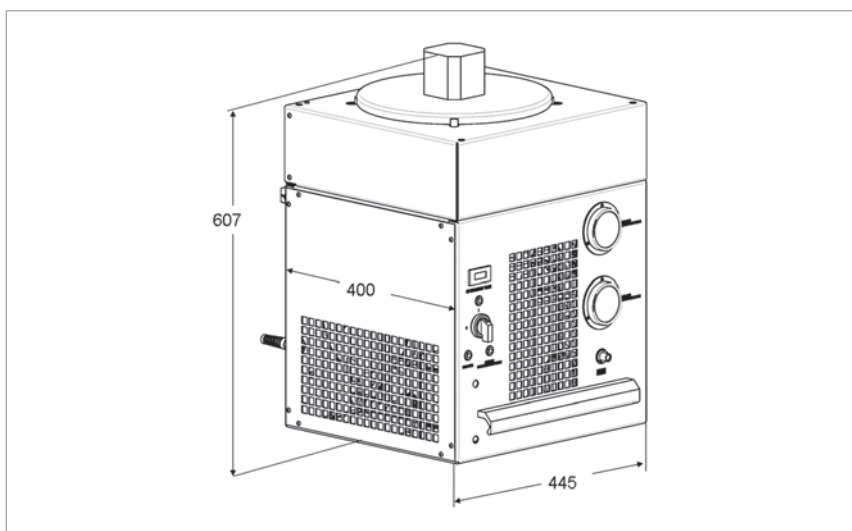
COOLPAK 2000 A/2200 A



Compressor unit COOLPAK 2000 A (2200 A is similar)

Advantages to the User

- High efficiency and increased performance for cryogenic pumps and refrigerators
- High long-term reliability due to long-life and highly efficient components and improved oil management
- Very quiet and low vibration operation through the innovative horizontally suspended scroll compressor
- Simple installation and operation
- Global mains voltage compatibility
- Perfect integration within complex systems due to the 24 V Sub-D interface
- Simple adsorber replacement, otherwise maintenance-free
- Small footprint
- Low cost of ownership



Dimensional drawing of the COOLPAK 2000 A/2200 A

Technical Data**COOLPAK****2000 A (50 Hz)****2200 A (60 Hz)**

| | | | |
|--|----------|---|---|
| Number of electrical connections for cold heads | | 1 | 1 |
| Helium system filling pressure at room temperature | bar | 15 | 14 |
| Ambient temperature | °C (°F) | +5 to +30 (+41 to +86) | +5 to +30 (+41 to +86) |
| Mains voltage (single phase) | V | 230 ± 10% | 208 ± 10% |
| Operating current | | | |
| with cooled down cold head | A | 9.5 to 10.5 | 11.5 to 12.5 |
| with warmed up cold head | A | 12.0 | 13.0 |
| Electric power consumption | | | |
| with cooled down cold head | kW | 2.2 | 2.3 |
| with warmed up cold head | kW | 2.4 | 2.5 |
| Remote control through interface | | 24 V DC | 24 V DC |
| Helium connections | | | |
| self-sealing fittings | | | |
| high-pressure side (outside thread) | | 1/2" | 1/2" |
| low-pressure side (outside thread) | | 1/2" | 1/2" |
| Noise level (at a distance of 1 m (3.5 ft)) | dB(A) | < 55 | < 55 |
| Dimensions (W x H x D) | mm (in.) | 445 x 607 x 400 (17.52 x 23.90 x 15.74) | 445 x 607 x 400 (17.52 x 23.90 x 15.74) |
| Weight | kg (lbs) | 69 (152.32) | 69 (152.32) |

Ordering Information**COOLPAK****2000 A (50 Hz)****2200 A (60 Hz)**

| | Part No. | Part No. |
|--|--------------------|--------------------|
| Compressor unit | 840000V2010 | 840000V2210 |
| Accessories, optional | | |
| 19" installation kit | 840 022 | 840 022 |
| RC adapter box (for operating older cold heads of type RGD, RGS or COOLPOWER 20 / 210 / 30 / 510) | 840 910 | 840 910 |
| Spare parts | | |
| Absorber CPS-V8 | E 840001973 | E 840001973 |

Compressor Units for Pneumatically Driven Cold Heads and Pumps, Water Cooling

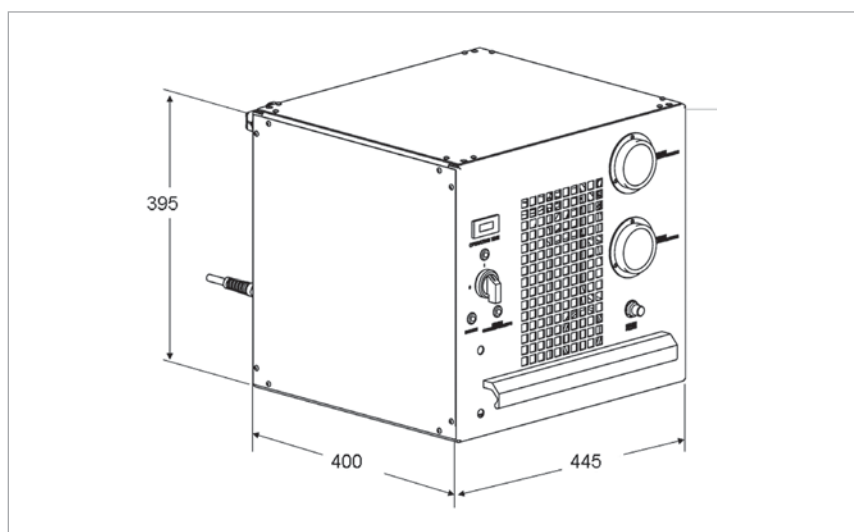
COOLPAK 2000/2200



Compressor unit COOLPAK 2000 (2200 is similar)

Advantages to the User

- High efficiency and increased performance for cryogenic pumps and refrigerators
- High long-term reliability due to long-life and highly efficient components and improved oil management
- Very quiet and low vibration operation through the innovative horizontally suspended scroll compressor
- Simple installation and operation
- Global mains voltage compatibility
- Perfect integration within complex systems due to the 24 V Sub-D interface
- Simple adsorber replacement, otherwise maintenance-free
- Small footprint
- Low cost of ownership



Dimensional drawing of the COOLPAK 2000/2200

Technical Data

COOLPAK

| | | 2000 (50 Hz) | 2200 (60 Hz) |
|--|----------|---|---|
| Number of electrical connections for cold heads | | 1 | 1 |
| Helium system filling pressure at room temperature | bar | 15 | 14 |
| Ambient temperature | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Cooling water consumption | | < 5 | < 5 |
| Cooling water feed temperature | °C (°F) | +5 to +25 (+41 to +77) | +5 to +25 (+41 to +77) |
| Mains voltage (single phase) | V | 230 ± 10% | 208 ± 10% |
| Operating current | | | |
| with cooled down cold head | A | 9.5 to 10.5 | 11.5 to 12.5 |
| with warmed up cold head | A | 12.0 | 13.0 |
| Electric power consumption | | | |
| with cooled down cold head | kW | 2.2 | 2.3 |
| with warmed up cold head | kW | 2.4 | 2.5 |
| Remote control through interface | V DC | 24 | 24 |
| Helium connections | | | |
| self-sealing fittings | | | |
| high-pressure side (outside thread) | | 1/2" | 1/2" |
| low-pressure side (outside thread) | | 1/2" | 1/2" |
| Water connections | DN | 10 | 10 |
| Noise level (at a distance of 1 m (3.5 ft)) | dB(A) | < 55 | < 55 |
| Dimensions (W x H x D) | mm (in.) | 445 x 395 x 400 (17.52 x 15.55 x 15.74) | 445 x 395 x 400 (17.52 x 15.55 x 15.74) |
| Weight | kg (lbs) | 69 (152.32) | 69 (152.32) |

Ordering Information

COOLPAK

| | 2000 (50 Hz) | 2200 (60 Hz) |
|--|--------------------|--------------------|
| | Part No. | Part No. |
| Compressor unit | 840000V2000 | 840000V2200 |
| Accessories, optional | | |
| 19" installation kit | 840 022 | 840 022 |
| RC adapter box (for operating older cold heads of type RGD, RGS or COOLPOWER 20 / 210 / 30 / 510) | 840 910 | 840 910 |
| Spare parts | | |
| Absorber CPS-V8 | E 840001973 | E 840001973 |

Compressor Units for Pneumatically Driven Cold Heads and Pumps, Water Cooling

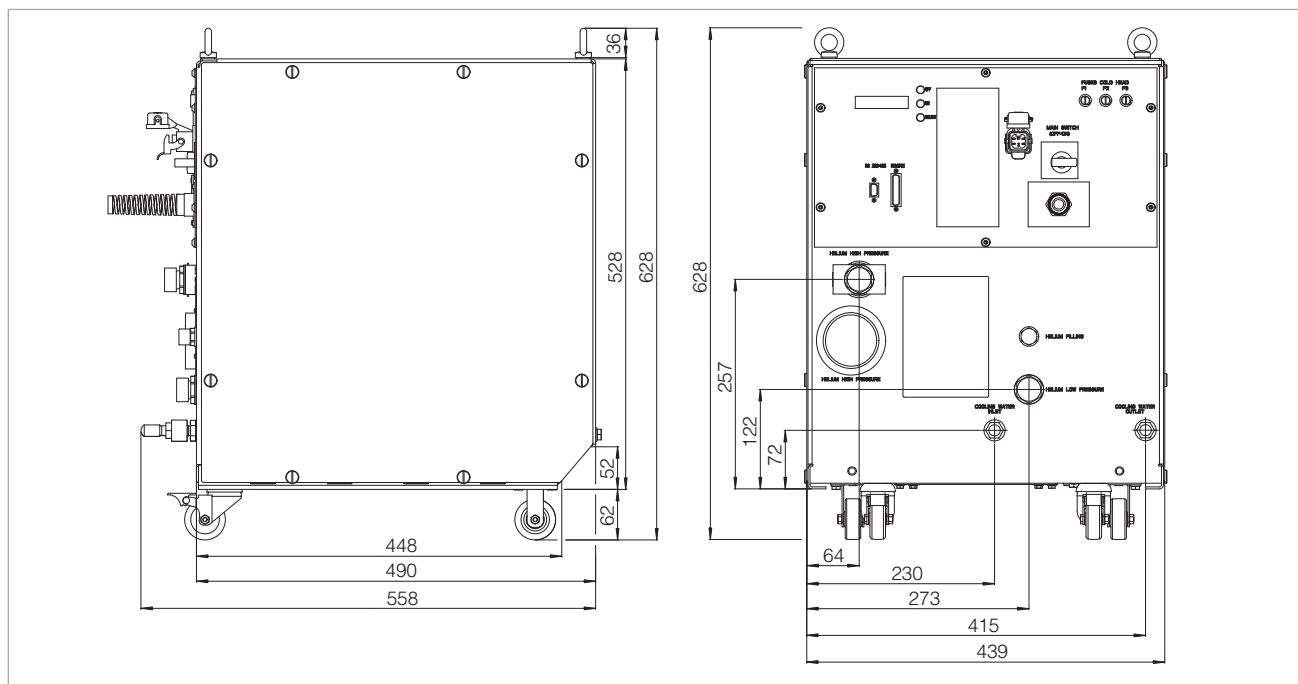
COOLPAK 6000 H/6200 H/6000 HD



Compressor units COOLPAK 6000 H/6200 H/6000 HD

Advantages to the User

- Highly effective and even more powerful when connected with Oerlikon Leybold Vacuum cryo pumps and refrigerators
- Excellent long-term reliability owing to the modular design and the long life components
- Silent and low vibration operation through scroll compressors
- Simple installation and operation
- Global power supply compatibility
- Easy integration in complex systems due to 24 V DC or RS 232 C interfaces
- Almost maintenance-free
- Small footprint
- Low cost of ownership



Dimensional drawing for the COOLPAK 6000 H/6200 H/6000 HD

Technical Data

COOLPAK

| | | 6000 H / 6000 HD | | 6200 H | |
|--|----------|---|---|---|---|
| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
| Number of electrical connections for cold heads | | 1 | 1 | 1 | 1 |
| Helium system filling pressure at room temperature | bar | 17 | 16 | 15 | 14 |
| Ambient temperature | °C (°F) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) | +5 to +40 (+41 to +104) |
| Cooling-water consumption ¹⁾ | l/min | 5.0 | 5.0 | 5.0 | 5.0 |
| Cooling-water entry temperature | °C (°F) | +5 to +25 (+41 to +77) | +5 to +25 (+41 to +77) | +5 to +25 (+41 to +77) | +5 to +25 (+41 to +77) |
| Main voltage (3 phase) upon delivery | V | 380 - 400 ± 10% | – | 230 ²⁾ + 1% / - 10% | 230 ± 10% |
| alternative setting | V | – | 470 ± 10% | 200 ± 10% | 200 ± 10% |
| Operating currents with the cold head cool | A | 10 to 12 | – | 20 to 22 | – |
| with the cold head warm | A | 11 to 13 | – | 22 to 25 | – |
| Electrical power consumption with the cold head cool | kW | 6.5 to 7.5 | 7.0 to 8.0 | 6.5 to 7.5 | 7.0 to 8.0 |
| with the cold head warm | kW | 7.0 to 8.0 | 7.5 to 8.5 | 7.0 to 8.0 | 7.5 to 8.5 |
| Remote control via interface | | 24 V DC or RS 232 C | 24 V DC or RS 232 C | 24 V DC or RS 232 C | 24 V DC or RS 232 C |
| Helium connections | | | | | |
| Self-sealing couplings | | | | | |
| High pressure connection (outside thread) | | 1/2" | 1/2" | 1/2" | 1/2" |
| Low pressure connection (outside thread) | | 1/2" | 1/2" | 1/2" | 1/2" |
| Water connections | | Hose nozzle DN 12 / G 1/2" outside thread | Hose nozzle DN 12 / G 1/2" outside thread | Hose nozzle DN 12 / G 1/2" outside thread | Hose nozzle DN 12 / G 1/2" outside thread |
| Sound level (at 1 m (3.5 ft) distance) | dB(A) | 60 | 60 | 60 | 60 |
| Dimensions (W x H x D) | mm (in.) | 440 x 589 x 558 (17.32 x 23.19 x 21.97) | 440 x 589 x 558 (17.32 x 23.19 x 21.97) | 440 x 589 x 558 (17.32 x 23.19 x 21.97) | 440 x 589 x 558 (17.32 x 23.19 x 21.97) |
| Weight | kg (lbs) | 104 (230) | 104 (230) | 104 (230) | 104 (230) |

High Vacuum Pumps

Ordering Information

COOLPAK

| | | 6000 H / 6000 HD | | 6200 H | |
|--|--|----------------------------------|----------------------------------|------------------------------|------------------------------|
| | | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
| | | Part No. | Part No. | Part No. | Part No. |
| Compressor unit | | | | | |
| without power supply cable | | | | | |
| Connection for 1 cold head (CP ... H) | | 840000V6001 | 840000V6001 | 840000V6201 | 840000V6201 |
| Connection for 2 cold heads (CP ... HD) | | 840000V6004 | 840000V6004 | – | – |
| Power supply cable | | | | | |
| 3.5 m (12.25 ft) | | | | | |
| CEE plug, 32 A/6h, 3-pol +N+PE | | 893 95 | – | – | – |
| NEMA plug, L 16-20 P, 20 A/480 V, 3-pol +PE (AWG 12) | | – | 893 96 | – | – |
| 10 m (35.0 ft) | | | | | |
| with end splice (AWG 10) | | – | – | 840 111 ³⁾ | 840 111 ³⁾ |
| 20 m (70.0 ft) | | | | | |
| with end splice (AWG 10) | | – | – | 840 112 ³⁾ | 840 112 ³⁾ |
| Accessories | | | | | |
| Water cooling discharge throttle | | E 840000133 ⁴⁾ | E 840000133 ⁴⁾ | – | – |
| Spare parts | | | | | |
| Adsorber CACP 4000/6000 | | E 840002863 | E 840002863 | E 840002863 | E 840002863 |

¹⁾ At a cooling water entry temperature of 25 °C (77 °F)

²⁾ At 14 bar filling pressure

³⁾ Also suitable for COOLPAK 6000 H(D)

⁴⁾ Only for COOLPAK 6000 HD

Compressor Units for Mechanically Driven Cold Heads and Pumps, Water Cooling

COOLPAK 6000 HMD/6200 HMD

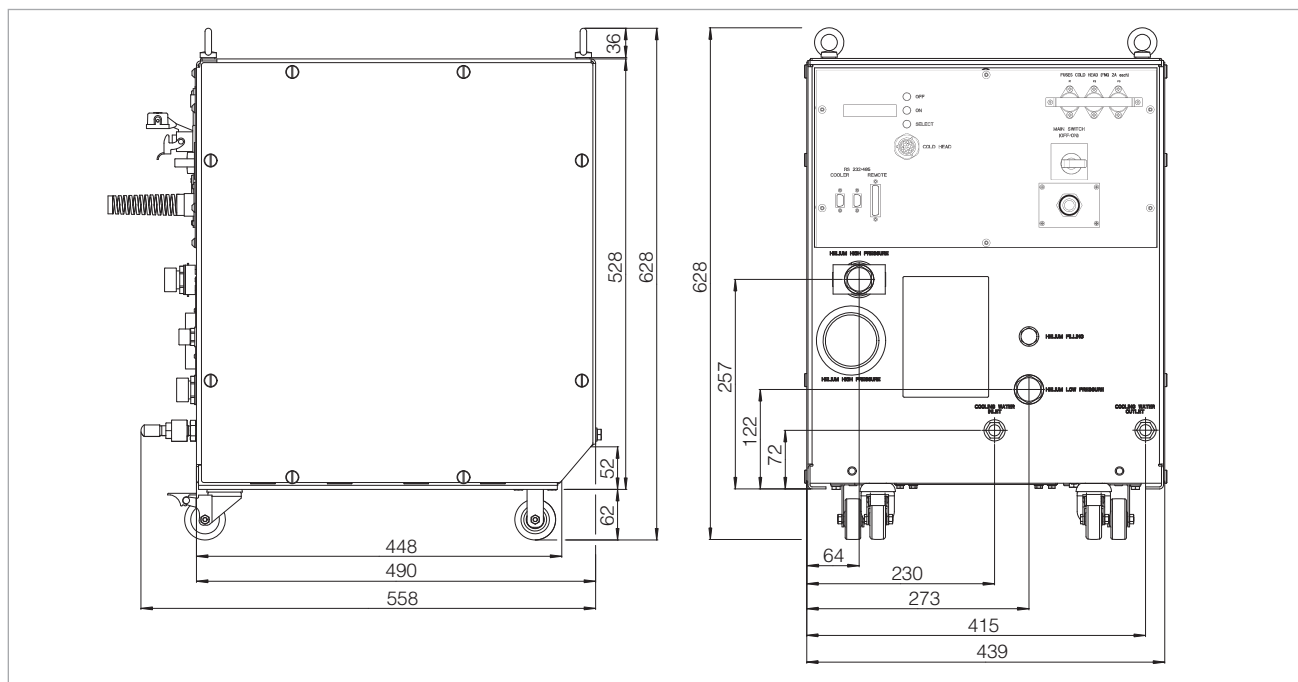


Serves the purpose of individually driving the cold heads with mechanically driven displacers; i.e. COOLPOWER 10 MD, but also older cold heads like COOLPOWER 150, 130, 4.2 GM, 0.5 WATT and 4.2 ONE WATT.

Compressor unit COOLPAK 6000 HMD/6200 HMD

Advantages to the User

- Compact
- Simple to operate
- Can be controlled remotely
- Selectable voltages
- Low noise
- UL approved
- Long maintenance-free period of operation
- Variable cold head motor speed



Dimensional drawing for the COOLPAK 6000 HMD/6200 HMD

Technical Data**COOLPAK****6000 HMD****6200 HMD**

| | | |
|---------------|---|--|
| Mains voltage | 50 Hz, 400 ± 10% 60 Hz, 460 ± 10% | 50 Hz, 200 ± 10% 60 Hz, 200 - 230 ± 10% |
| | For all other Technical Data, see COOLPAK 6000 H and 6200 H | |

Ordering Information**COOLPAK****6000 HMD****6200 HMD**

| | Part No. | Part No. |
|--|--------------------|------------------------------|
| Compressor type | | |
| 400 V/3-ph. 50 Hz or 460 V/3-ph. 60 Hz ± 10% | 840000V6002 | – |
| 200 V/3-ph. 50 Hz or 200-230 V/3-ph. 60 Hz ± 10% | – | 840000V6202 |
| Flexible pressure line (for operating mechanically driven cold heads) | | |
| 6 m (21.0 ft) (High-pressure) FL6 HP-DN 20 (8f/8f) | 840 210 | 840 210 |
| 6 m (21.0 ft) (Low-pressure) FL6 LP-DN 16 (8f/8f) | 840 211 | 840 211 |
| 9 m (31.5 ft) (High-pressure) FL9 HP-DN 20 (8f/8f) | 840 217 | 840 217 |
| 9 m (31.5 ft) (Low-pressure) FL9 LP-DN 16 (8f/8f) | 840 218 | 840 218 |
| 20 m (75.0 ft) (High-pressure) FL20 HP-DN 16 (8f/8f) | 840 230 | 840 230 |
| 20 m (75.0 ft) (Low-pressure) FL20 LP-DN 16 (8f/8f) | 840 231 | 840 231 |
| Connection cable for the cold heads COOLPOWER 10 MD, 150, 130, 4.2 GM, 0.5 WATT and 4.2 ONE WATT | | |
| 9.0 m (31.5 ft) | 842 110 | 842 110 |
| 20.0 m (75.0 ft) | 842 112 | 842 112 |
| 30.0 m (105.0 ft) | 842 114 | 842 114 |
| Power supply cable | | |
| 3.5 m (12.25 ft) CEE plug, 32 A/6h, 3-pol +N+PE | 893 95 | – |
| NEMA plug, L 16-20 P, 20 A/480 V, 3-pol +PE (AWG 12) | 893 96 | – |
| 10 m (35.0 ft) with end splice (AWG 10) | – | 840 111 ¹⁾ |
| 20 m (75.0 ft) with end splice (AWG 10) | – | 840 112 ¹⁾ |
| Accessories | | |
| Water cooling discharge throttle | E 840000133 | E 840000133 |

¹⁾ Also suitable for COOLPAK 4000(D)/6000(D)

General Accessories for Compressor Units COOLPAK

| Technical Data | Length | Connections on both sides (inside thread) | |
|---|--------------------------------------|---|--|
| | | High pressure line (HD) | Low pressure line (ND) |
| Flexlines ^{1), 2)} FL 4.5 (1/2", 1/2") FL 9.0 (1/2", 1/2") | 4.5 m (15.75 ft) 9.0 m (31.50 ft) | 1/2" 1/2" | 1/2" 1/2" |
| | | Adaptor | Adaptor |
| | | Outside thread (m) | Inside thread (f) |
| Accessories for Flexlines Adaptor for flexlines AD (1/2" m, 3/4" f) AD (1/2" f, 3/4" m) | 1/2" 3/4" | | 3/4" 1/2" |
| | | Connections | Connections |
| | | Outside thread (m) | Inside thread (f) |
| Elbow 1/2" for flexlines Isolating piece 1/2" for flexlines | 1/2" 1/2" | | 1/2" 1/2" |
| | | Connections on both sides | |
| | | Outside thread (m) | |
| Coupling 1/2" for interconnecting two 1/2" flexlines | | 1/2" | |
| | | Gas Distributors | Gas Manifold - Connections |
| | | required quantity | At the compressor (inside thread) At the cold head (outside thread) |
| Gas manifold (1 piece each) GD 2 (for dual operation) ²⁾ GD 4 (for up to quad operation) ²⁾ | 2 2 | 1/2" 1/2" | 2 x 1/2" 4 x 1/2" |
| | | Length | |
| EL 4.5 extension cable for linking cold head and compressor unit | 4.5 m (15.75 ft) | | |

Ordering Information

General Accessories

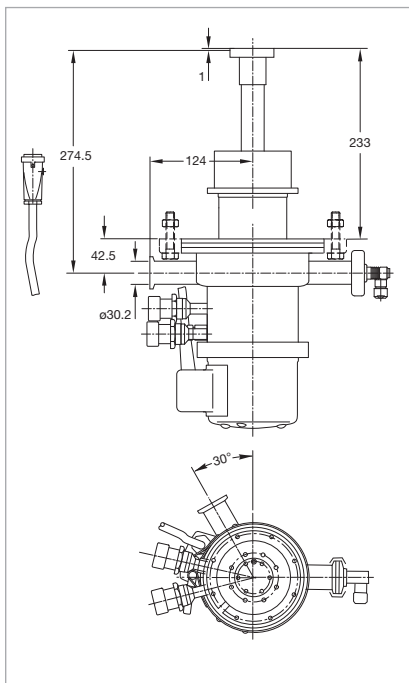
| | Part No. |
|---|--|
| Flexlines ^{1), 2)} FL 4.5 (1/2", 1/2") FL 9.0 (1/2", 1/2") | 892 87 892 88 |
| Adaptor AD (1/2" m, 3/4" f) AD (1/2" f, 3/4" m) | 892 89 892 90 |
| Elbow 1/2" | 891 73 |
| Coupling 1/2" | 891 71 |
| Gas manifold (1 piece each) GD 2 (for dual operation) ²⁾ GD 4 (for up to quad operation) ²⁾ | 840 253 (2x) 840 254 (2x) |
| EL 25 extension cable for linking cold head and compressor unit ²⁾ | 200 20 900 |
| EL 4.5 extension cable for linking cold head and compressor unit ²⁾ | 893 74 |

All flexible pressure lines, adaptor pieces, bends, isolating pieces, line couplings and gas manifolds are equipped with self-sealing Aeroquip fittings and filled in the factory with high-purity helium gas (purity: 99.999%). The filling pressure is 16 bar

¹⁾ Minimum bending radius: 30 cm (11.81 in.)

²⁾ Only suited for pneumatically driven cold heads and cryo pumps

Refrigerator Cryostat based on the RDK 6-320



Basic unit RDK 6-320

The RDK 6-320 basic unit includes the COOLPOWER 5/100 T two-stage cold head. Its high refrigerating capacity at low temperatures permits experiments which previously could not be performed by relying on refrigerators and which required the use of liquid helium.

The RDK 6-320 basic unit is a complete system for measurements in the temperature range between 6 and 320 K.

The COOLPOWER 5/100 T cold head is augmented by:

- Silicon diode for measuring the temperatures at the second stage of the cold head
- Heater at the second stage of the cold head provided with overheating protection
- 11-way current feedthrough with matching external connector
- DN 25 KF pumpdown port
- DN 160 ISO-K vacuum flange

Advantages to the User

- Compact
- Very reliable
- Comprehensive range of accessories from one source
- For installation in any orientation
- Simple to operate
- Short cooldown time
- Cost-effective in long-term experiments since no liquid helium is required
- Simple and rapid servicing through the use of the standard COOLPOWER 5/100 T cold head with pneumatic drive system for the displacer

Typical Applications

- Cooling of samples and detectors
- Material research and testing
- Spectroscopic applications
- Matrix isolation spectroscopy with neon and argon

General Remarks on Refrigerator Cryostats

Isolating Vacuum

A two-stage rotary vacuum pump will normally be adequate to produce an isolating vacuum. However, this pump should be equipped on the suction side with an adsorption trap and a isolation valve.

If the application requires that the cold surfaces remain free of hydrocarbons, we recommend the use of our small turbomolecular pump system PT 50 (see Catalog Part "Vacuum Pump Systems" Section "High Vacuum Pump Systems").

Temperature Measurement

In order to avoid measurement errors due to thermal resistances, the temperature at the sample should preferably be measured by a second optional silicon diode which is installed as close to the sample as possible. If possible it should be maintained at the same temperature level as that of the probe.

Temperature Control

The temperature at the second stage of the cold head (or that of the probe) is controlled by heating against the cooling effect produced by the refrigerator (while the cold head is running).

Optical Refrigerator Cryostat based on the RDK 6-320

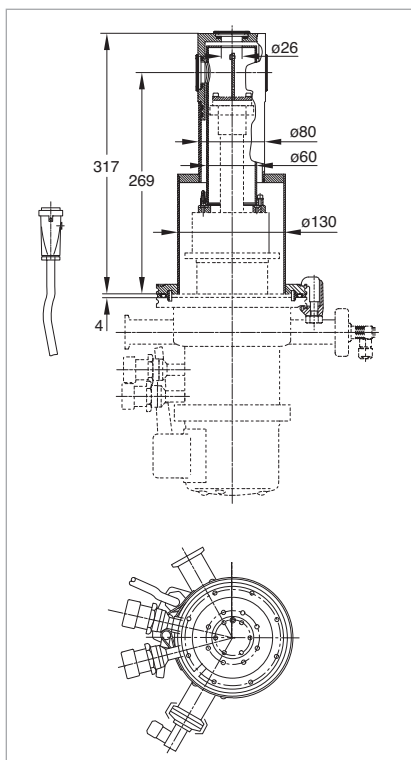


Optical refrigerator cryostat RDK 6-320

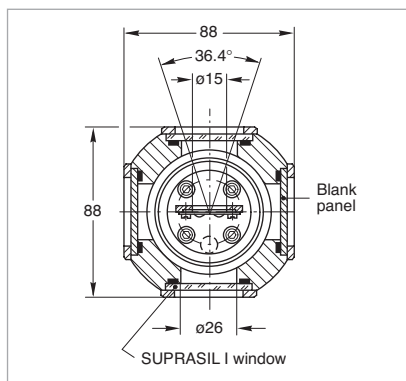
Upgraded as an optical cryostat (option) the RDK 6-320 is tailor-made for experiments involving temperatures down to about 7 K.

Supplied Equipment

- Basic unit RDK 6-320
- Temperature attenuation disk out of Pb Sn
- Sample holder out of Al 99.5
- Thermal radiation shield out of E-Cu
- Vacuum jacket out of aluminum / stainless steel
- Five exchangeable windows (four windows on the sides, one window in the longitudinal axis of the cryostat); two windows on the sides and the window in the longitudinal axis are made of SUPRASIL I, the two other windows are blanked off and are made of brass



Dimensional drawing for the optical refrigerator cryostat



Section through the window area

Technical Data**RDK 6-320**

| | | |
|--|----------|-------------------------|
| Temperature range | | |
| 2nd stage of the cold head | K | 6 to 320 |
| 1st stage of the cold head | K | 28 to 320 |
| Silicon diode for temperature measurements at the 2nd stage of the cold head | | built-in |
| Heater at the 2nd stage of the cold head | | built-in |
| Heating power | W | 50 |
| Heating current | A | 1 |
| Heating voltage | V DC | 50 |
| Permissible ambient temperature | °C (°F) | +5 to +40 (+41 to +104) |
| He filling pressure at room temperature | bar | 16 |
| He connections | | |
| Self-sealing screwed connections | | |
| High pressure connection (outside thread) | | 1/2" |
| Low pressure connection (outside thread) | | 1/2" |
| Length of the connection cable to the compressor unit | m (ft) | 4.5 (15.75) [included]] |
| Weight | kg (lbs) | 13 (28.7) |

Ordering Information**RDK 6-320**

| | Part No. |
|---|---|
| Basic unit RDK 6-320 | 842 403 |
| Optical cryostat consisting of RDK 6-320 and Expansion Kit ROK | 842 404 |
| Compressor unit | |
| COOLPAK 6000 H 400 V/50 Hz; 470 V/60 Hz | 840000V6001 |
| COOLPAK 6200 H 200 V/50 Hz; 200 V, 230 V/60 Hz | 840000V6201 |
| Power supply cable | see Ordering Information for the compressor units COOLPAK |
| Flexlines FL 4.5 (1/2", 1/2") | 892 87 |
| Temperature measurement at 2nd stage with low temperature controller MODEL 9700 | 842 400 |
| Sensor cable, 3 m (10.5 ft) long | 842 401 |

Accessories for Cryo Pumps / Cryogenics

Controllers and Monitoring Units for Cryo Pumps

Advantages to the User

- Interface to external system controller
- For easy integration with external system controllers
- For safe pumping of hydrogen

Typical Applications

- For automated operation of the COOLVAC cryo pumps of the ClassicLine

System Controller COOLVAC SC



System controller COOLVAC SC

The intelligent COOLVAC system controller SC automatically controls and monitors up to 30 COOLVAC pumps. Online monitoring, help functions and a service interface for easy diagnostic are just a few user friendly features. It can be installed as a "stand alone system" or remote controlled via an interface.

Design Features

- 1/4 19" rack module
- 3 height units (HU)
- Dimensions (W x H x D)
106 x 129 x 178 mm
(4.17 x 5.08 x 7.01)
- Operation through pushbuttons

Supplied equipment

- Network terminator
(Part No. 400 000 114)
- Hardware interlock plug
(Part No. 400 000 133)
- O modem adapter for connection to the PC

Technical Data

COOLVAC SC

| | |
|---------------------------------|--|
| Operating voltage | Supply through RS 485 C cable from COOLVAC PM |
| Dimensions (W x H x D) mm (in.) | 106 x 129 x 178 (4.17 x 5.08 x 7.01) [1/4 19", 3 HU] |

Ordering Information

COOLVAC SC

| | Part No. |
|--|-------------|
| System controller COOLVAC SC | 844 230 |
| System controller COOLVAC SC with Profibus interface | 844230V0004 |

Power Supply PS for up to Two Cryo Pumps



Power supply PS

The COOLVAC power supply PS provides the power for the cold head motor, the electrical heaters and the supplies voltage to the electronics for up to 2 COOLVAC pumps. Controlled via the system controller SC the PS turns the compressor unit on and off if required by the connected pumps.

The system controller COOLVAC SC (not included) will fit into the empty space.

Design Features

- 19" rack module
- 3 height units (HU)
- Dimensions (W x H x D)
483 x 135 x 320 mm
(19.02 x 5.31 x 12.60)

Supplied equipment

- Approximately 3 m (10.5 ft) long mains cord

Technical Data

PS

for double connection

| | | |
|--|----------|--|
| Power consumption, approx. | VA | 900 |
| Supply voltage, factory preset (optional 115 V AC is possible ¹⁾) | V AC | 230 ± 10%, 1 phase |
| Output power | W | 2 x 250 |
| Rack mounting | | Through 19" installation frame |
| Dimensions (W x H x D) | mm (in.) | 483 x 135 x 320 (19.02 x 5.31 x 12.60) [3/4 19", 3 HU] |
| Weight | kg (lbs) | 10 (22.1) |

Ordering Information

PS

for double connection

| | Part No. |
|---|----------------|
| Power supply PS for up to 2 cryo pumps | 844 135 |

¹⁾ Please contact Oerlikon Leybold Vacuum

Power supply PS for up to Three Cryo Pumps



Power supply PS

The COOLVAC power supply PS provides the power for the cold head motor, the electrical heaters and the supplies voltage to the electronics for up to 3 COOLVAC pumps. Controlled via the system controller SC the PS turns the compressor unit on and off if required by the connected pumps.

Design Features

- 19" rack module
- 4 height units (HU)
- Dimensions (W x H x D)
483 x 177 x 440 mm
(19.02 x 6.97 x 17.32)
- Single LED indicates correct direction of rotation for the rotating field

Supplied equipment

- 20 m (70 ft) long mains cord, fitted, without plug
- 19" mounting brackets for rack mounting

Technical Data

PS

for multiple connection

| | | |
|---|--------------|---|
| Nominal voltage (3 phase) factory default switchable to | V AC V AC | 3 x 200 + PE 3 x 400 + PE 3 x 460 to 480 + PE |
| Voltage tolerance | | ± 10% |
| Frequency range | Hz | 47 to 63 |
| Fusing | | Power switch |
| Ambient temperature range | °C (°F) | 0 to +40 (+32 to +104) |
| Protection type | IP | 20 |
| Dimensions (W x H x D) [without handles] | mm (in.) | 483 x 177 x 440 (19.02 x 6.97 x 17.32) [19", 4 HU] |
| Weight (including cord) | kg (lbs) | 38.8 (85.65) |

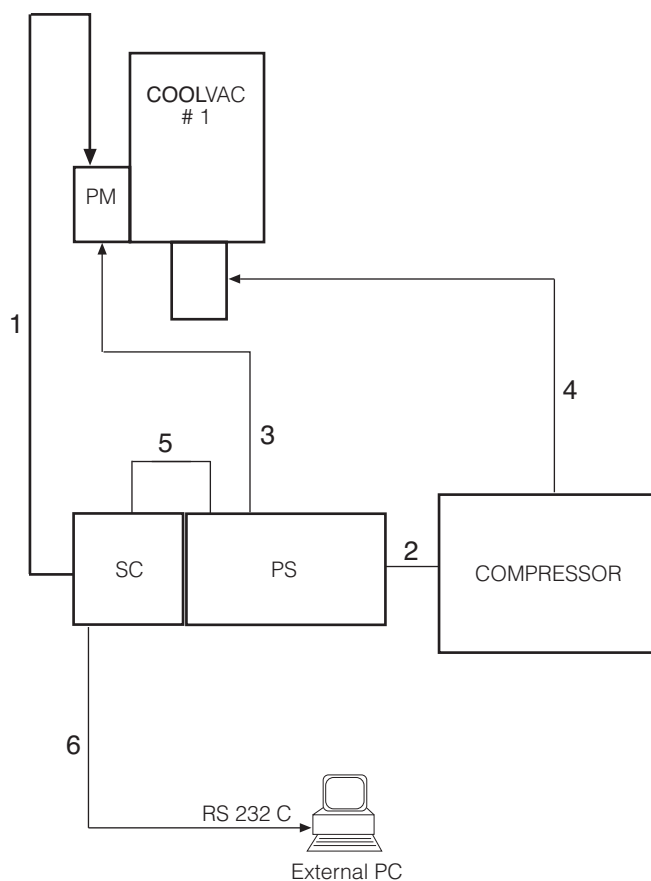
Ordering Information

PS

for multiple connection

| | Part No. |
|---|----------|
| Power supply PS for up to 3 cryo pumps | 844 235 |

COOLVAC ClassicLine, Single System Configuration



PM = Pump module (included with the pump)

SC = System controller

PS = Power supply

1 = e.g. Part No. 844 262

2 = e.g. Part No. 844 139

3 = e.g. Part No. 844 138

4 = Part No. E 400000323 (necessary only for COOLVAC 800 CL, 1500 CL, 2000 CL und 3000 CL)

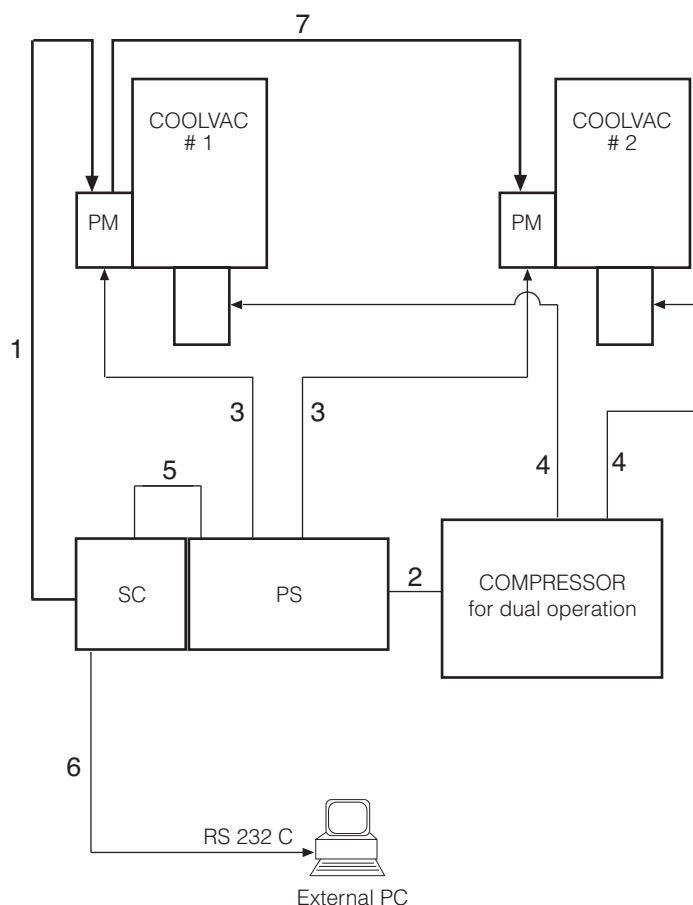
5 = Part No. 844 141

6 = to be provided by the customer

Single System Configuration

COOLVAC ClassicLine, Dual System Configuration

Only for European mains voltages and for compressors suited for dual operation



PM = Pump module (included with the pump)

SC = System controller

PS = Power supply

1 = e.g. Part No. 844 262

2 = e.g. Part No. 844 139

3 = e.g. Part No. 844 138

4 = Part No. E 400000323 (necessary only for COOLVAC 800 CL, 1500 CL, 2000 CL und 3000 CL)

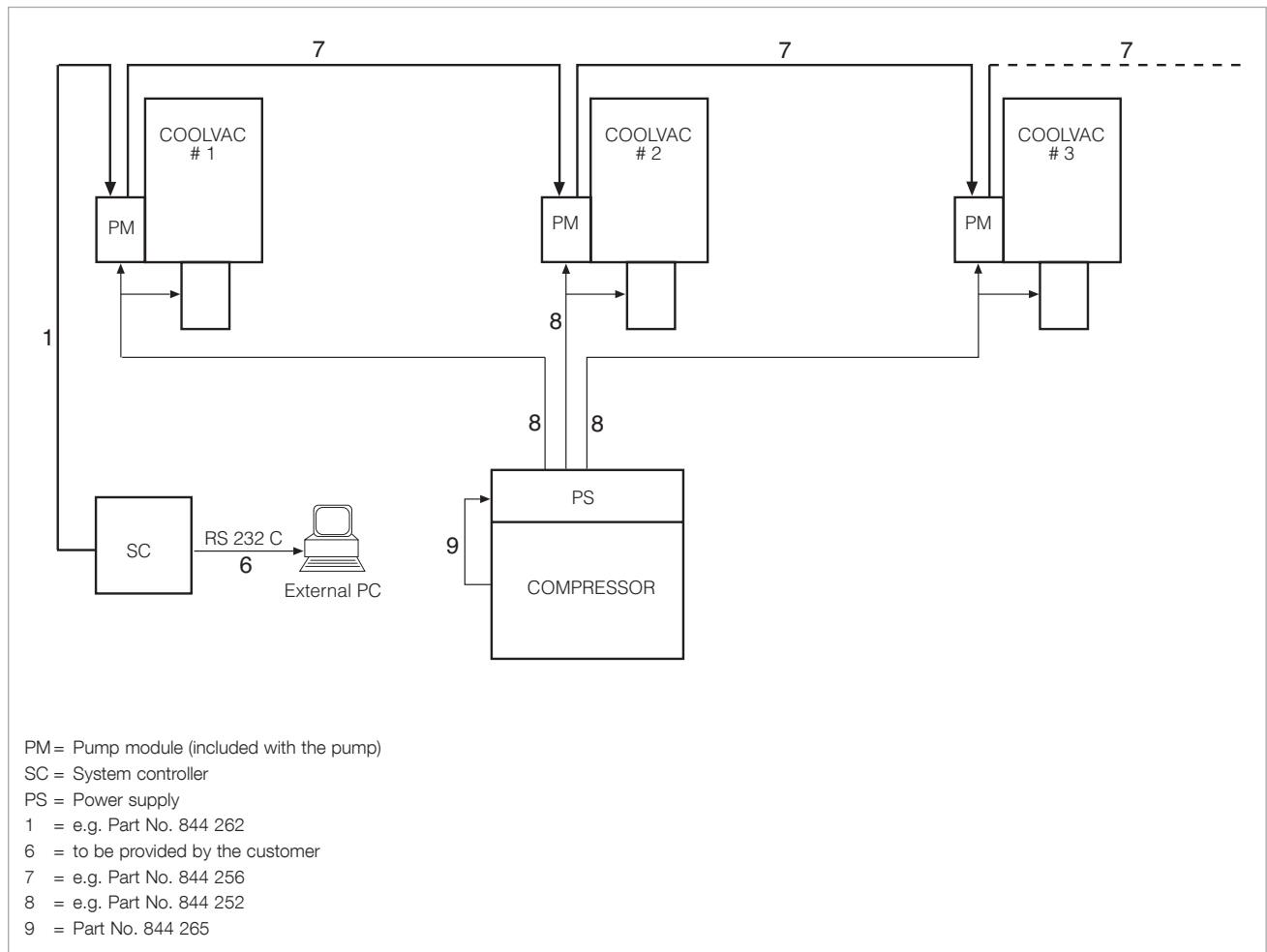
5 = Part No. 844 141

6 = to be provided by the customer

7 = e.g. Part No. 844 256

Dual System Configuration

COOLVAC ClassicLine, Dual and Multiple System Configuration



Dual and Multiple System Configuration

Low Temperature Controller MODEL 9700



Low temperature controller MODEL 9700

Advantages to the User

- Microprocessor controlled PID controller
- Digital temperature readout in Kelvin
- Control by means of counter heating
- High control accuracy over the entire temperature range (1.5 to 450 K)
- Electric heating power up to 50 W
- Programmable heater power limit
- Generation of linear temperature ramps
- Up to 50 program steps are programmable
- Standard interface RS 232 C and IEEE-488
- Data from two sensors can be displayed
- Analogue temperature outputs for both channels
- Can be used in three operating modes
 - Manual
 - Program
 - External computer control

Typical Applications

- Temperature control at refrigerator cryostats

Technical Data

MODEL 9700

| | | |
|---|----------|--|
| Mains connection, 50/60 Hz | V AC | 85 to 240 |
| Power consumption, max. | W | 150 |
| Entry of data | | 3 x 4 membrane key pad |
| Data memory | | EPROM |
| Display | | Two line, 20 digit LED digital display |
| Temperature measurement Sensors | | 2 x silicon diodes type D or 2 x silicon diodes with standard temperature resistance characteristics |
| Measurement current | µA | 10 |
| Measurement range | K | 1.5 to 450 |
| Measurement range of the silicon diode type D | K | 1.4 to 325 K |
| Number of channels | | 2 |
| Resolution | | Simultaneous display of both channels |
| A/D converter resolution | bit | 24 |
| Switching outputs | | 2 relays (n.o. and n.c. contacts) |
| Temperature resolution | K | 0.1 |
| Temperature control | | PID controller |
| Heating power, max. | W | 50 |
| Heating current, max. | A | 1 |
| Heating voltage, max. | V DC | 0 to 50 |
| Computer interface | | RS 232 C and IEEE-488 |
| Permissible ambient temperature °C (°F) | | +10 to +30 (+50 to +86) |
| Mechanical design/cabinet | | Table-top unit (8.5" x 3.5" x 12") |
| Dimensions (W x H x D) [high H without feet] | mm (in.) | 215.9 x 88 x 304.8 (8.5 x 3.5 x 12.0) |
| Weight | kg (lbs) | 2.3 (5) |
| Dimensions of the packaging (W x H x D) | mm (in.) | 360 x 230 x 450 (14.17 x 9.06 x 17.72) |
| Weight (incl. packaging, approx.) | kg (lbs) | 4.2 (9.3) |
| Length of mains cord | m (ft) | 2.5 (8.75) |

Ordering Information

MODEL 9700

| | Part No. |
|--|----------------|
| Low temperature controller MODEL 9700 | 842 400 |
| Sensor cable, 3 m (10.5 ft) long | 842 401 |
| Silicon diode type D with connection cable and miniature plugs | 890 89 |

Low Temperature Measuring Instrument MODEL 211S



Low temperature measuring instrument MODEL 211S

Advantages to the User

- Supports one silicon diode
- 3-digit LED display
- Temperature readout between 1 and 450 Kelvin
- Two trigger thresholds
- RS 232 C interface

Typical Applications

- Temperature measurements on cryostats
- Temperature measurements on cryo pumps for monitoring their operation and to control pump systems

Technical Data

| | | |
|---------------------------------------|----------|---|
| Measurement current | μA | 10 |
| Display | | LED, 5-digits |
| Temperature range | K | 1.4 to 475 |
| Resolution | | 0.001 K from 1.4 to 99.9 K 0.01 K from 100 to 475 K |
| Accuracy | | ±0.05 K from 1.5 to 99.9 K ±0.05 K from 100 to 475 K |
| Power supply voltage | | 5 V DC at 1 A through the supplied 100-240 V AC power adaptor |
| Trigger thresholds | | 2 |
| Switched output | | 2 relays (n.c. and n.o.) 30 V DC at 1 A |
| Analogue output | | |
| Voltage | V | 0 to 10 |
| Current | mA | 4 to 20 |
| RS 232 C interface | | a) Temperature output b) External adjustment of switching thresholds |
| Admissible ambient temperature | °C (°F) | +15 to +35 (+59 to +95) |
| Mechanical design/housing | | Benchtop unit |
| Dimensions (W x H x D) | mm (in.) | 96 x 48 x 166 (3.78 x 1.89 x 6.54) |
| Weight (including packaging), approx. | kg (lbs) | 0.45 (1.0) |

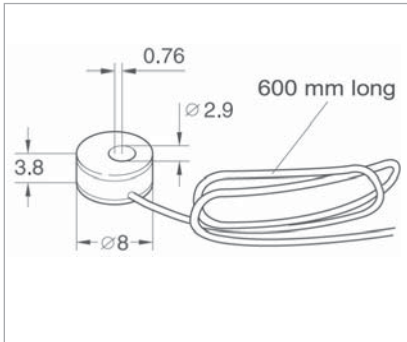
Ordering Information

MODEL 211S

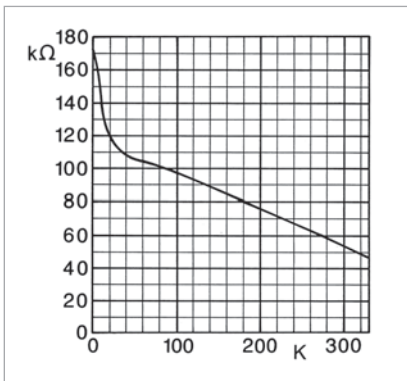
| | Part No. |
|---|-------------------|
| Low temperature measuring instrument MODEL 211S | 844 110 |
| HV cable 2-way with plug, 10 m (35.0 ft) long ¹⁾ | 844 112 |
| HV cable 4-way with plug, 10 m (35.0 ft) long ¹⁾ | 844 113 |
| UHV cable 4-way with plug, 10 m (35.0 ft) long ¹⁾ | 844 114 |
| Silicon diode, type D, with connecting cable and micro plugs - without current feedthrough | 890 89 |
| HV current feedthrough on a flange DN 25 KF, 2-way | 200 19 256 |
| UHV current feedthrough on a flange DN 16 CF, 4-way | 500 217 |

¹⁾ For COOLPOWER and COOLVAC pumps

Temperature Sensor



Dimensional drawing for the silicon diode, type D



Standard characteristic of the silicon diode

In contrast to vapor pressure thermometers, electric temperature sensors can be used for continuous measurements within a wide range of temperatures.

Silicon diodes offer a negative temperature coefficient of resistance, i.e. their resistance drops as the temperature increases. The slope of the temperature/resistance characteristic and the absolute resistance are decisive regarding the suitability of these diodes. The slope determines the sensitivity of the sensor and a high electrical resistance permits accurate measurements while keeping the thermal load small (microwatts).

In systems which are degassed at high temperatures, silicon diodes can only be fitted after degassing has been completed.

The silicon diode type D matches the low temperature display unit and the low temperature control unit MODEL 9700.

Technical Data

Silicon Diode Type D

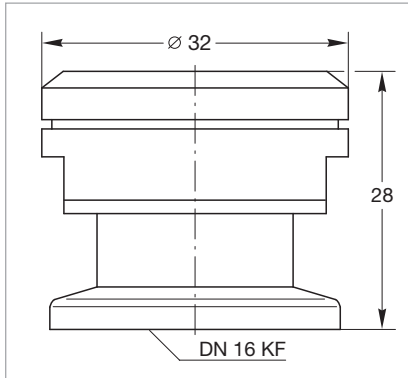
| | | |
|---------------------------------|---------|--|
| Temperature range | K | 1.4 to 325 |
| Temperature coefficient (dR/dT) | | |
| qualitative | | Negative in the entire temperature range |
| quantitative | Ω/K | Non-linear characteristic |
| Measurement current | μA | 10 |
| Bakeable to | °C (°F) | +60 (+140) |

Ordering Information

Silicon Diode Type D

| | Part No. |
|--|-------------------|
| Temperature sensor | 890 89 |
| Silicon diode with 4-way electrical feedthrough | 200 20 694 |
| Flange DN 16 ISO-KF | 200 20 616 |

Safety Valve



Dimensional drawing for the safety valve

Typical Applications

- Protecting sealed vacuum systems like cryo pumps, cryostats, lifting devices, for example against internal overpressures
- Mandatory for systems which are separated when cold, as a means of protection against overpressures

Technical Data

Safety Valve

| | | |
|---|---------------------|---|
| Responding pressure | mbar | 150 ± 40, over-pressure |
| Flow at 140 mbar | l x h ⁻¹ | 500 |
| Valve disk | | Spring loaded, with O-ring seal |
| Leak rate in the closed state mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | | < 1 x 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) |
| Connection | DN | 16 KF |
| Diameter | mm (in.) | 32 (1.26) |
| Material | | Steel 1.4305 |
| Overall height | mm (in.) | 28 (1.10) |
| Weight | kg (lbs) | 0.3 (0.7) |

Ordering Information

Safety Valve

| | Part No. |
|---------------------------------|----------|
| Safety valve on DN 16 KF flange | 890 39 |

Contents

Vacuum Pump Systems

Vacuum Pump Systems – oil sealed (**RUTA**) 523

General

| | |
|--------------------|-----|
| Overview | 523 |
|--------------------|-----|

| | |
|----------------------------------|-----|
| Types of Pumps Systems | 524 |
|----------------------------------|-----|

Products

Pump Systems

Oil Sealed Vacuum Pump Systems RUTA

Three-Stage Pump Systems

with Two-Stage TRIVAC Backing Pumps

| | |
|--------------------------|-----|
| Adaptor Version. | 526 |
|--------------------------|-----|

| | |
|-------------------------|-----|
| Frame Version | 528 |
|-------------------------|-----|

Two-Stage Pump Systems

with Single-Stage SOGEVAC Backing Pumps

| | |
|---------------------------|-----|
| Adaptor Version | 530 |
|---------------------------|-----|

| | |
|-------------------------|-----|
| Frame Version | 532 |
|-------------------------|-----|

RBS - B/BCS Roots Pump Systems (Only available for purchase in North and South America)

| | |
|--|-----|
| with Two-Stage TRIVAC Backing Pumps. | 538 |
|--|-----|

HTS Close-Coupled Pump Systems (Only available for purchase in North and South America)

| | |
|--|-----|
| with Single-Stage SOGEVAC Backing Pumps. | 542 |
|--|-----|

| | |
|--|-----|
| Central Vacuum Supply Systems with SOGEVAC Pumps | 546 |
|--|-----|

| | |
|--|-----|
| Tank Mounted Medical Vacuum Systems (Only available for purchase in North and South America) | 554 |
|--|-----|

Vacuum Pump Systems - dry compressing (**RUTA**) 556

Products

Pump Systems

Dry Compressing Vacuum Pump System RUTA

with SCREWLINE Backing Pump

Adaptor Version

| | |
|---------------------------|-----|
| without palette | 556 |
|---------------------------|-----|

| | |
|------------------------|-----|
| with palette | 558 |
|------------------------|-----|

with SCREWLINE Backing Pump

| | |
|-------------------------|-----|
| Frame Version | 562 |
|-------------------------|-----|

| | |
|---------------------------|-----|
| Adaptor Version | 568 |
|---------------------------|-----|

SP Close-Coupled Pump Systems (Only available for purchase in North and South America)

| | |
|--|-----|
| with SCREWLINE Dry Compressing Backing Pumps | 570 |
|--|-----|

Further Products

Dry Compressing Vacuum Pump System RUTA

Adaptor Version

| | |
|---|-----|
| with DRYVAC DV 650 Backing Pump | 574 |
|---|-----|

Frame Version

| | |
|---|-----|
| with DRYVAC DV 650 Backing Pump | 576 |
|---|-----|

| | |
|--|-----|
| with DRYVAC DV 1200 Backing Pump | 578 |
|--|-----|

| | |
|--|------------|
| DRYVAC Pump Systems | |
| Adaptor Version | |
| Load Lock Pump Systems | 580 |
| Process Pump Systems | 582 |
| with RUVAC WH Backing Pump | 584 |
| enclosed | 586 |
| RUVAC RAV Roots Vacuum Pumps with Pre-Admission Cooling | 588 |
| TVD Pump Systems for Drying, Evaporation and Distillation Applications | 590 |
| Accessories for oil sealed and dry compressing Pump Systems | |
| Sound Proofing | 592 |
| Isolation against Vibrations | 592 |
| Dust Separators | 592 |
| Frequency Converter RUVATRONIC RT 5. | 592 |
| Electric Controller | 593 |
| Pressure Control | 593 |
| Dust Filter F-xxx-C | 594 |
| Bellows with Vibration Absorbers | 596 |
| Bus Interfaces for Monitoring. | 597 |
| Miscellaneous to oil sealed and dry compressing Pump Systems | |
| Checklist for Inquiries (Fax Form) | 598 |
| High Vacuum Pump Systems TMP | 599 |
| General | |
| General | 599 |
| Applications and Accessories | 599 |
| With oil sealed Forevacuum Pumps. | 600 |
| Products | |
| Turbomolecular Pump Systems | |
| PT 50 | 600 |
| PT 151 / PT 361 / PT 50 KIT | 602 |
| PT 151 / PT 361 KIT | 606 |
| With dry compressing Forevacuum Pumps. | 608 |
| Products | |
| Turbomolecular Pump Systems | |
| PT 80 DRY / PT 80 H DRY | 608 |
| TURBOLAB 80 | 610 |
| PT 151 DRY / PT 361 DRY | 614 |
| PT 300 DRY | 618 |
| Turbomolecular Pump Systems (Only available for purchase in North and South America) | |
| PT-Flex DRY | 620 |

Accessories for High Vacuum Pump Systems TMP

| | |
|--|-----|
| Control Unit for Turbomolecular Pump Systems | 624 |
| Adsorption Traps with Aluminium Oxide Insert. | 625 |

UNIVEX High Vacuum Experimentation Systems 627

General

| | |
|--------------------|-----|
| General | 627 |
| Contents | 628 |

Systems

| | |
|------------------------------------|-----|
| Box Coating Systems | 629 |
| Glove Box Systems | 638 |
| Cluster-Tool Systems | 644 |
| Dactyloscopy Systems | 646 |
| Space Simulation Systems | 647 |

Process Accessories 648

General Accessories 660

| | |
|--------------------------------|-----|
| UNIVEX Questionnaire | 662 |
|--------------------------------|-----|

Calibration Systems 664

General

| | |
|----------------------------------|-----|
| CS Calibration Systems | 664 |
|----------------------------------|-----|

Products

| | |
|----------------------------------|-----|
| CS Calibration Systems | 665 |
|----------------------------------|-----|

General to Vacuum Pump Systems

Overview

A continually increasing number of applications in industry and research are relying on vacuum technology. Thus widely differing requirements result regarding the vacuum generating systems.

The comprehensive range of vacuum pumps from Oerlikon Leybold Vacuum offers, in combination with the matching accessories, all options of selecting the optimum pump system for your application in each case.

Based on the longstanding experience in the design and manufacture of vacuum pump systems, Oerlikon Leybold Vacuum offers standardized pump systems which will match most applications – the RUTA pump systems.

RUTA pump systems excel by being compact, reliable and service-friendly.

The pump systems are equipped as standard with 400 V, 50 Hz three-phase motors.

Motors for special supply voltages, special mains frequencies or explosion protected pumps are available.

Standards

Oerlikon Leybold Vacuum pump systems are rated according to CE, ISO, DIN and VDE regulations. Compliance with other standards is possible upon request.

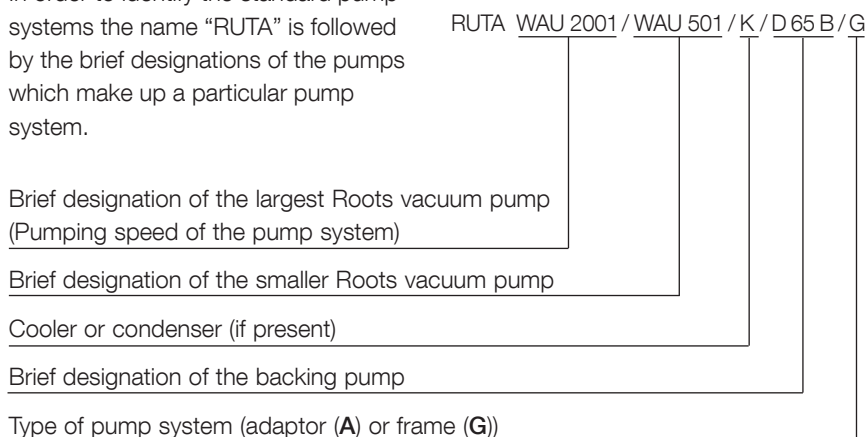
The technical data of the vacuum pump systems given in this catalog part are based on the PNEUROP Acceptance Specifications for Vacuum Pumps, Part 1, and comply with DIN 28 426. The characteristic curves in our pumping speed diagrams are plotted in accordance with DIN 28 426. The curves represent the mean of several measurements. Our warranty refers to the values indicated in the technical data table.

Designation of Roots Vacuum Pump Systems

Oerlikon Leybold Vacuum pump combinations of Roots vacuum pumps with backing pumps are called “RUTA”.

In order to identify the standard pump systems the name “RUTA” is followed by the brief designations of the pumps which make up a particular pump system.

The pump system designation is arranged as follows:



Part Numbers

The part numbers listed refer in each case to the standard version of the respective systems. Minor deviations are indicated by way of variants.

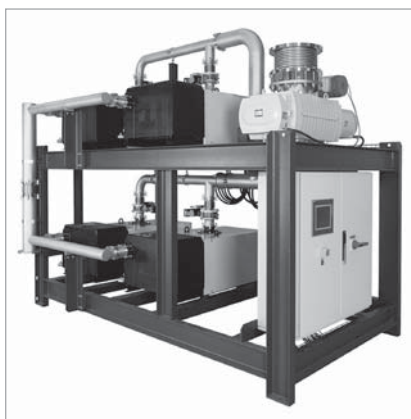
The variant V001 designates in each case the described version of the system.

The pump system RUTA WAU 2001/ SP630 F/G has Part No. 502 511 V001. When using the air-cooled screw pump SCREWLINE SP 630 then the variant will have the Part No. 502 511 V002. Minor deviations are special operating voltage, fitted accessories and custom painting for frame or pumps, for example.

The use of a different type of Roots vacuum pump, use of the WS 2001 instead of the WAU 2001, for example, is also treated as a variant. All variants with the same basic number have the same frame dimensions, the same distance between intake flange of the Roots pump and the exhaust flange of the backing pump.

Types of Pump Systems

Typical areas of application for RUTA pump systems are industry, research and chemistry. Here the focus is on processes for metal production and processing, drying and degassing, thermal treatment, coating in the area of solar components and semiconductor manufacture as well as surface refinement. RUTA pump systems are also used as backing pump sets for high vacuum systems in combination with diffusion pumps, turbomolecular pumps and cryo pumps.



RUTA WH7000/4xSV750BF/G

The RUTA pump systems described here have been designed for rough and medium vacuum operation, i.e. for the pressure range from atmospheric pressure down to 10^{-4} mbar (0.75×10^{-4} Torr). RUTA pump systems consist of a combination of individual pumps whereby Roots vacuum pumps are employed on the intake side. Further compression to atmospheric pressure may be performed either by oil sealed or dry compressing vacuum pumps, liquid ring pumps or Roots vacuum pumps with pre-inlet cooling. All combinations may be equipped at suitable places with condensers.

The selection criteria for a RUTA pump system are as follows:

- Pumping speed
- Operating pressure
- Process conditions
- Characteristics of the media
- Standards and regulations which depend on the area of application and the produced products.

Standard RUTA Pump Systems

Our Roots vacuum pumps WA, WH, WS and RA or WAU and WSU with integrated bypass line are combined with oil sealed backing pumps for conventional generation of the vacuum. Single-stage arrangements are capable of delivering pumping speeds of 250 to 16000 m³/h (147.3 to 9424 cfm). Higher pumping speeds can be attained by paralleling several pumps. The attainable operating pressures depend on the number of pumping stages.

For higher pumping speeds or lower ultimate pressures, also three-stage or multi-stage pump systems are available.

RUTA Pump Systems with Condensers

If vacuum systems must pump larger quantities of vapor or vapor gas mixtures, it is economical to insert condensers which are cooled with water or a different coolant at a suitable place within the pump system. Cooled condensers are themselves effective partial pumps which condense most of the vapors from the pumped media. The downstream mechanical pumps will then only need to pump those gases which have not already condensed.

The quantity of vapor present in each case determines the size of the condenser and the temperature at which it is operated. The size of the downstream pump is determined by the quantity of non-condensable gases, the required pressure and the required pump-down time for the system.

All pump systems of the WA/WAU, WS/WSU, WH and RA series may be equipped with one or several condensers. These are often used in the chemical industry. Here RUTA vacuum pump systems with condensers are not only used to generate a vacuum, but they are also often employed in the recovery of solvents. When installing one or several Roots pumps upstream of a condenser, low operating pressures and high condensation pressures can be attained. Thus the condenser may in many cases be operated with cooling water instead of brine. The vapor components pumped together with inert gases may be separated once more in an emission condenser on the exhaust side so that the quality of the exhaust gas can be maintained within close tolerance regarding its cleanness.

Dry Compressing RUTA Vacuum Pump Systems

Increasing environmental awareness, pumping of condensable vapors or high requirements regarding cleanliness when pumping high quality media which must not be contaminated by other media for recycling, often requires the use of universal pumps where the pump chamber is free of operating agents (dry pumps).

Here Oerlikon Leybold Vacuum offers two solutions:

1. Pump systems with dry compressing vacuum pumps combined with one or several Roots vacuum pumps.
2. Single-stage RUTA RAV vacuum pump systems, consisting of Roots vacuum pumps with pre-admission cooling.

The operating pressure ranges of the pump systems depend on the number of Roots vacuum pumps, but will extend in any case without interruptions to atmospheric pressure.

Already in connection with one Roots pump, pump systems with a screw pump are capable of attaining base pressures of $< 1 \times 10^{-3}$ mbar (7.5×10^{-4} Torr).

Single-stage RAV combinations attain an ultimate pressure of 150 mbar (112.5 Torr).

Multi-stage combinations with Roots vacuum pumps of all systems are capable of attaining pressures below 10^{-4} mbar (7.5×10^{-5} Torr).

RUTA Custom Pump Systems

Most users will be able to select the right pump system for their application from our range of standard pump systems. In special cases a custom design may be required for special processes and high pumping speeds.

We are prepared to design and manufacture custom pump systems according to customers specifications. If required we will use - besides oil-sealed and dry compressing backing pumps - liquid ring and ejector pumps.

RUTA Pump Systems for the Metal Producing and Processing Industry

In common vacuum furnace processes such as hardening, annealing, brazing, melting and casting, preferably oil sealed or dry compressing standard vacuum pump systems are usually used.

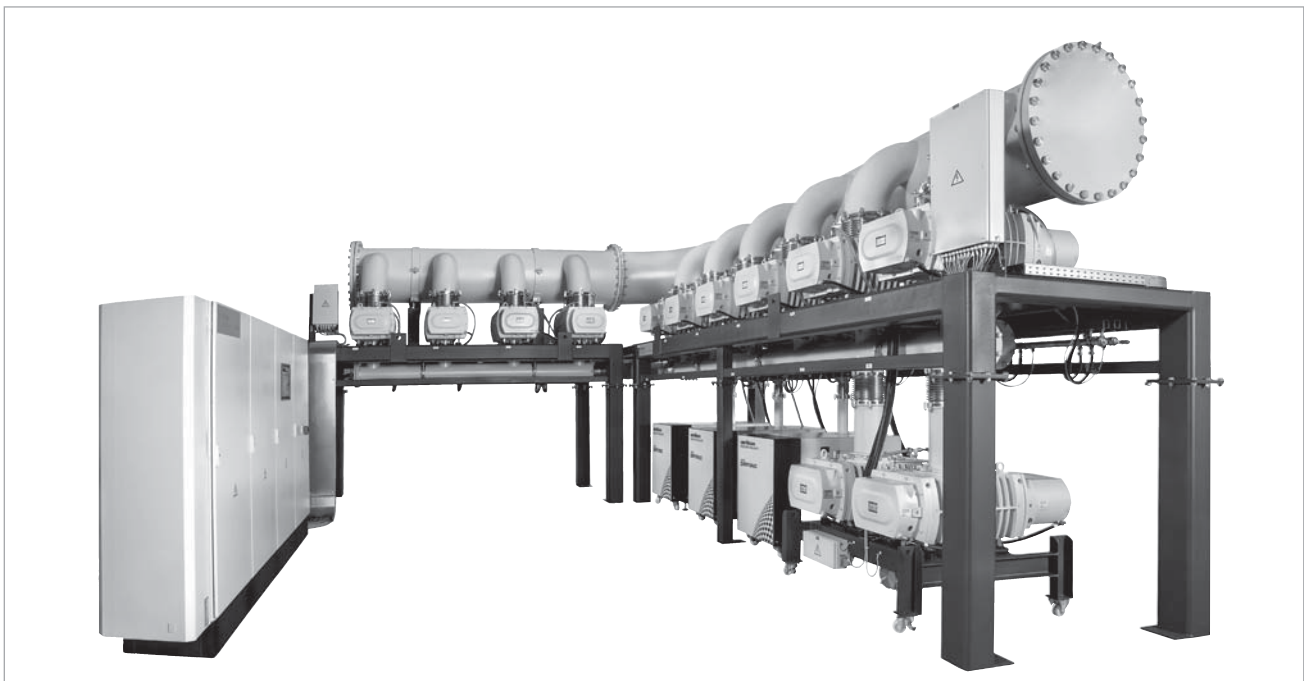
The oil sealed systems consist of a combination of Roots vacuum pumps with a single or two-stage rotary vane or rotary piston pump.

In the dry compressing systems our screw vacuum pump SCREWLINE is used as the backing pump.

The vacuum pumps are mounted in a rugged frame. The design of the pump systems is service-friendly, modular and can be easily upgraded with additional equipment.

On smaller furnaces RUVAC WAU Roots vacuum pumps are the most suitable because these may be cut-in at a higher operating pressure, while on larger furnaces and particularly where short pump-down cycles are required, the use of RUVAC WH Roots vacuum pumps with suitably sized backing pumps is advisable. For special processes, e.g. fusion or degassing of molten masses, due to the high dust contents, the additional use of a dust separator is required as well as equipping the backing pumps with oil filtering units.

These additional units ensure utmost operational reliability of the pump systems even under the toughest operating conditions.



Pump system for the field of steel degassing

RUTA Pump Systems for the Photovoltaic and Coating Industry

In photovoltaic coating processes reactive, toxic and corrosive substances are generally used.

Frequently large quantities of dust for the pump system need to be expected. For such applications, Oerlikon Leybold Vacuum has developed process pump combinations consisting of pumps from the DRYVAC line and Roots pumps from the RUVAC WS/WH line with optionally integrated controller.

The integrated electronics and sensor systems permit easy integration of the pump systems within the plant control system.

(For information on possible applications, see Catalog Part "Dry Compressing Screw Vacuum Pumps DRYVAC").

RUTA Pump Systems for the Chemical Industry

In chemical processes it is often necessary to remove corrosive, condensable and reactive gases and vapors. Oerlikon Leybold Vacuum designs and manufactures custom-built pump systems for specific process applications. Depending on the type of application, either a rotary vane pump, or a dry compressing screw vacuum pump (SCREWLINE, for example), a liquid ring pump or a combination of gas jet pump and liquid ring pump may be used as the backing pump.

To ensure dependable monitoring of the system, the following monitoring devices, among others, may be installed:

- Temperature sensors to monitor the gas temperatures between the pump stages and the pump body temperature,
- Water flow monitors for the cooling water supply to pumps and condensers,
- Differential pressure indicator with control setpoint to monitor the exhaust filters of the rotary vane vacuum pump.

Pump Systems for Drying, Evaporation and Distillation Applications (TVD)

More and more vacuum applications are finding their way into the areas of environmental protection, recycling and waste disposal. "Waste disposal of used oil and aromatic compounds" and "Cleaning processes in metal-processing factories" demonstrate that the combination of vacuum know-how, innovative engineering and applications know-how is in-dispensable for the successful application of vacuum technology in most widely differing applications.



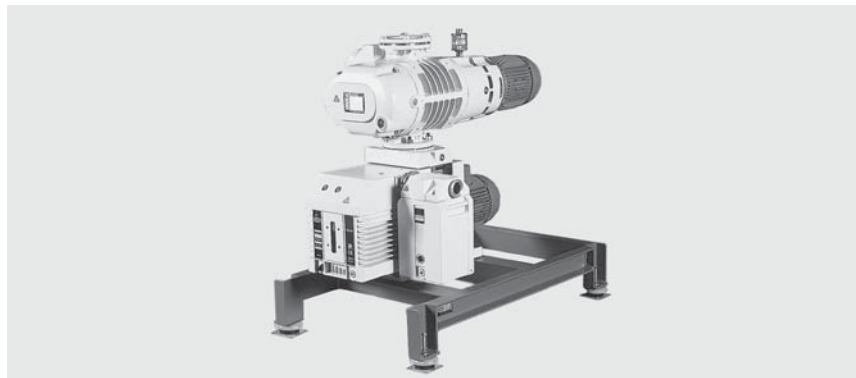
TVD pump system, mobile with control cabinet

The product is no longer in the foreground, solutions to problems are demanded instead.

Oerlikon Leybold Vacuum has developed some continuously operating vacuum pump systems for these applications. These systems basically consist of a rotary vane pump with a condenser unit. Upon request the condenser arrangement may also be equipped with a cold water set. This version will then be independent of any cooling water connections and - being a mobile system - it is well-suited for operation at varying locations.

Products

Oil Sealed RUTA Pump Systems Three-Stage, with Two-Stage TRIVAC Backing Pumps, Adaptor Version



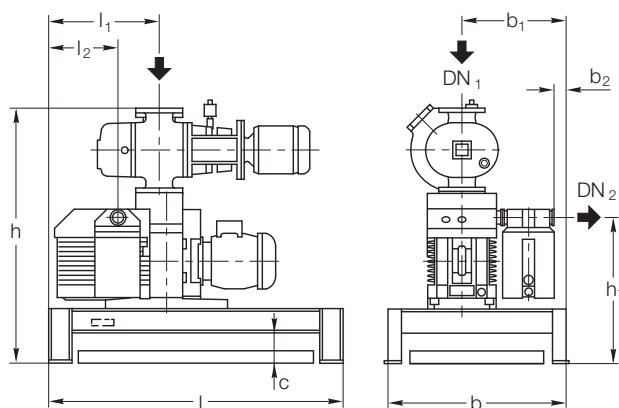
RUTA WAU501/D65B/A

Standard Equipment

- Exhaust filter
- Oil collecting pan
- Manually operated gas ballast
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- Oil filter
- 24 V DC gas ballast valve
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Exhaust filter with oil return line
- Special motors
- Electric control systems



| Type | RUTA | 251/D40B/A | 251/D65B/A | 501/D65B/A |
|---------------------|-----------------|--------------|---------------|--------------|
| RUVAC WA/WAU/WS/WSU | P2 | 251 | 251 | 501 |
| Backing pump TRIVAC | P1 | D 40 B | D 65 B | D 65 B |
| | DN ₁ | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| | DN ₂ | 40 ISO-KF | 40 ISO-ISO-KF | 40 ISO-KF |
| | l | 1000 (39.37) | 1000 (39.37) | 1000 (39.37) |
| | l ₁ | 375 (14.76) | 375 (14.76) | 375 (14.76) |
| | l ₂ | 234 (9.21) | 234 (9.21) | 234 (9.21) |
| | b | 600 (23.62) | 600 (23.62) | 600 (23.62) |
| | b ₁ | 350 (13.78) | 350 (13.78) | 350 (13.78) |
| | b ₂ | 40 (1.57) | 40 (1.57) | 40 (1.57) |
| | h | 854 (33.62) | 854 (33.62) | 894 (35.20) |
| | h ₁ | 488 (19.21) | 488 (19.21) | 488 (19.21) |
| | c | 100 (3.94) | 100 (3.94) | 100 (3.94) |

Dimensional drawing for the pump systems with TRIVAC D40/65 B backing pumps on pallet; dimensions in brackets () are in inch

Technical Data, 50 Hz

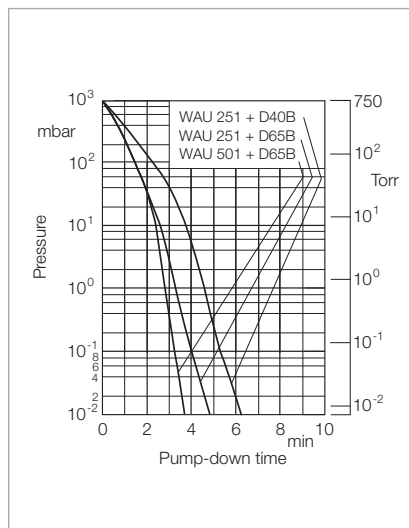
RUTA WAU

| | | 251/D40B/A | 251/D65B/A | 501/D65B/A |
|--|---|---|---|---|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 251 | 251 | 501 |
| Backing pump TRIVAC | P1 | D 40 B | D 65 B | D 65 B |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 200.0 (117.8) | 210.0 (123.7) | 380.0 (223.8) |
| Ultimate partial pressure | mbar (Torr) | $< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$) | $< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$) | $< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$) |
| Ultimate total pressure with gas ballast | mbar (Torr) | $< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$) | $< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$) | $< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 2.6 (3.5) | 3.3 (4.5) | 4.4 (6.0) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 2.0 (2.7) | 2.5 (3.4) | 2.7 (3.7) |
| Noise level | | | | |
| max. | dB(A) | 64 | 65 | 67 |
| without gas ballast | | | | |
| at 1 mbar (0.75 Torr) | dB(A) | 62 | 63 | 63 |
| Oil filling, total, approx. | l (qt) | 3.3 (3.49) | 4.0 (4.23) | 4.3 (4.55) |
| Weight, total, approx. | kg (lbs) | 245.0 (540.2) | 260.0 (573.3) | 305.0 (627.5) |
| Connecting flange | | | | |
| Inlet port | DN ₁ | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| Outlet port | DN ₂ | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |

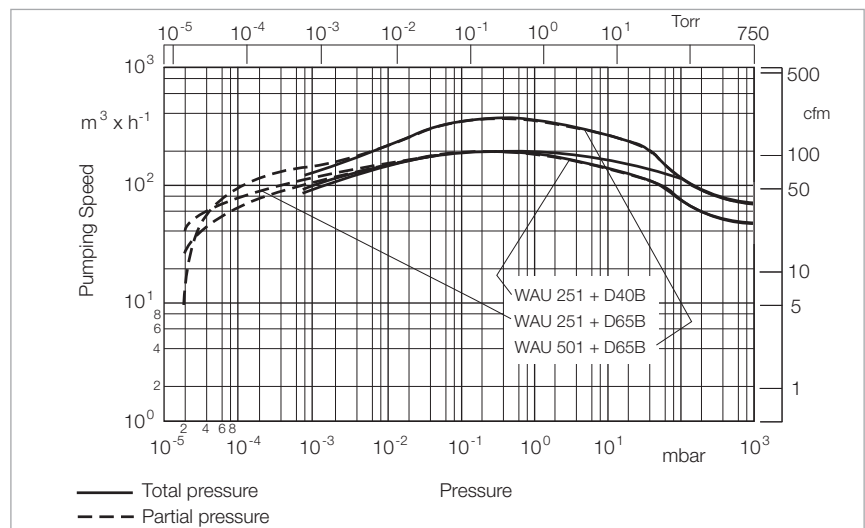
Ordering Information

RUTA WAU

| | | 251/D40B/A | 251/D65B/A | 501/D65B/A |
|---|----|--------------------------------|--------------------------------|--------------------------------|
| | | Part No. | Part No. | Part No. |
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 251 | WAU 251 | WAU 501 |
| Backing pump TRIVAC | P1 | D 40 B | D 65 B | D 65 B |
| Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WAU | | 023 06 | 023 07 | 023 08 |
| Frequency converter RUVATRONIC (see description in Chapter "Accessories") | | RT 5/251 500 001 381 | RT 5/251 500 001 381 | RT 5/501 500 001 382 |



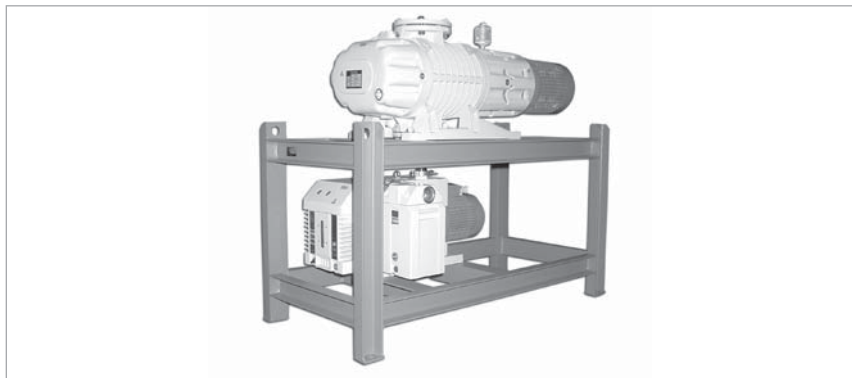
Pump-down time diagram
for a 1000 l tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems

Three-Stage, with Two-Stage TRIVAC Backing Pumps, Frame Version



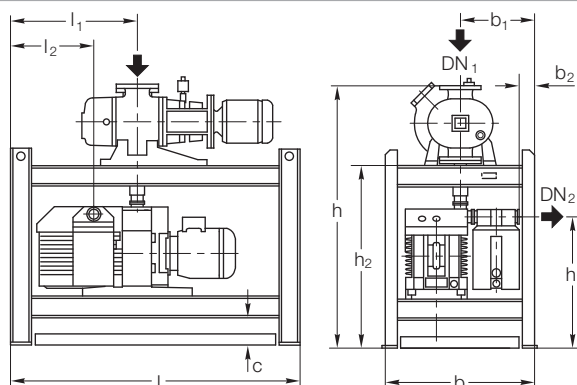
RUTA WAU501/D65B/G

Standard Equipment

- Exhaust filter
- Oil collecting pan
- Manually operated gas ballast
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- Oil filter
- 24 V DC gas ballast valve
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Exhaust filter with oil return line
- Special motors
- Electric control systems



| Type | RUTA | 251/D40B/G | 251/D65B/G | 501/D65B/G | 1001/D65B/G |
|---------------------|-----------------|--------------|--------------|--------------|--------------|
| RUVAC WA/WAU/WS/WSU | P2 | 251 | 251 | 501 | 1001 |
| Backing pump TRIVAC | P1 | D 40 B | D 65 B | D 65 B | D 65 B |
| | DN ₁ | 63 ISO-K | 63 ISO-K | 63 ISO-K | 100 ISO-K |
| | DN ₂ | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| | l | 1000 (39.37) | 1100 (43.31) | 1150 (45.28) | 1300 (51.18) |
| | l ₁ | 400 (15.75) | 480 (18.90) | 480 (18.90) | 480 (18.90) |
| | l ₂ | 234 (9.21) | 314 (12.36) | 314 (12.36) | 314 (12.36) |
| | b | 560 (22.05) | 560 (22.05) | 560 (22.05) | 600 (23.62) |
| | b ₁ | 280 (11.02) | 280 (11.02) | 280 (11.02) | 280 (11.02) |
| | b ₂ | 59 (2.32) | 59 (2.32) | 59 (2.32) | 59 (2.32) |
| | h | 977 (38.46) | 977 (38.46) | 1017 (40.04) | 1067 (42.01) |
| | h ₁ | 488 (19.21) | 488 (19.21) | 488 (19.21) | 488 (19.21) |
| | h ₂ | 677 (26.65) | 677 (26.65) | 677 (26.65) | 671 (26.42) |
| | c | 100 (3.94) | 100 (3.94) | 100 (3.94) | 100 (3.94) |

Dimensional drawing for the pump systems with TRIVAC D40/65 B backing pumps in a frame; dimensions in brackets () are in inch

Technical Data, 50 Hz

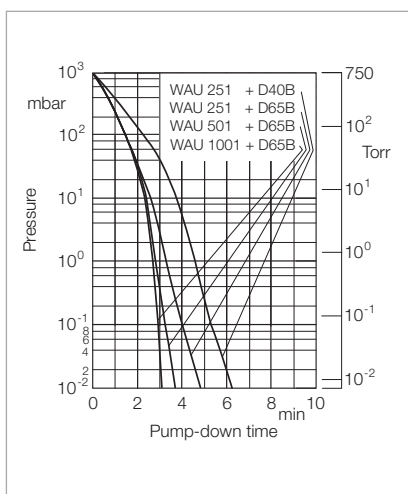
RUTA WAU

| | | 251/D40B/G | 251/D65B/G | 501/D65B/G | 1001/D65B/G |
|--|---|--|--|--|--|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 251 | 251 | 501 | 1001 |
| Backing pump TRIVAC | P1 | D 40 B | D 65 B | D 65 B | D 65 B |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 185.0 (109.0) | 205.0 (120.7) | 340.0 (200.3) | 620.0 (365.2) |
| Ultimate partial pressure | mbar (Torr) | $< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$) | $< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$) | $< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$) | $< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$) |
| Ultimate total pressure with gas ballast | mbar (Torr) | $< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$) | $< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$) | $< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$) | $< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 2.6 (3.5) | 3.3 (4.5) | 4.4 (6.0) | 6.2 (8.4) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 2.0 (2.7) | 2.5 (3.4) | 2.7 (3.7) | 3.0 (4.1) |
| Noise level max. without gas ballast at 1 mbar (0.75 Torr) | dB(A) | 64 | 65 | 67 | 77 |
| | dB(A) | 62 | 63 | 63 | 70 |
| Oil filling, total, approx. | l (qt) | 3.3 (4.5) | 4.0 (4.23) | 4.3 (4.55) | 5.3 (5.60) |
| Weight, total, approx. | kg (lbs) | 280.0 (617.4) | 310.0 (683.6) | 350.0 (771.8) | 460.0 (1014.3) |
| Connecting flange Inlet port Outlet port | DN ₁ DN ₂ | 63 ISO-K 40 ISO-KF | 63 ISO-K 40 ISO-KF | 63 ISO-K 40 ISO-KF | 100 ISO-K 40 ISO-KF |

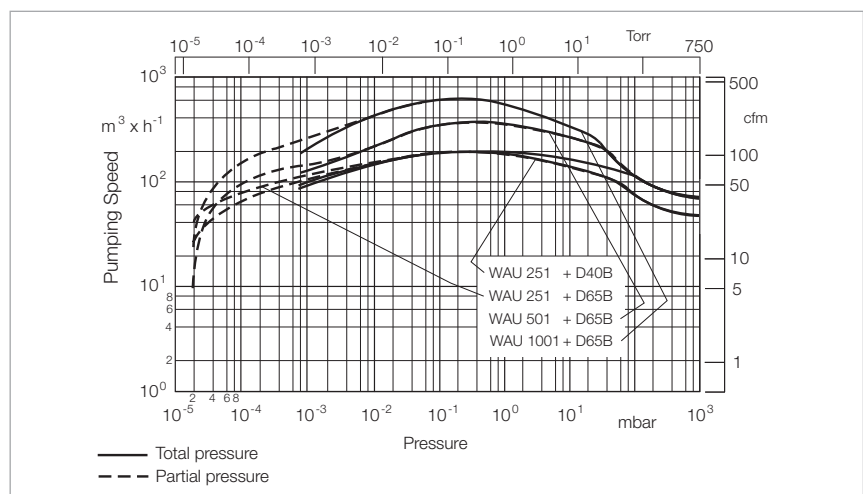
Ordering Information

RUTA WAU

| | | 251/D40B/G | 251/D65B/G | 501/D65B/G | 1001/D65B/G |
|--|----|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| | | Part No. | Part No. | Part No. | Part No. |
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 251 | WAU 251 | WAU 501 | WAU 1001 |
| Backing pump TRIVAC | P1 | D 40 B | D 65 B | D 65 B | D 65 B |
| Pump system, complete (frame version), frame mounted, with Roots vacuum pump RUVAC WAU | | 023 16 | 023 17 | 023 18 | 023 19 |
| Frequency converter RUVATRONIC (see description in Chapter "Accessories") | | RT 5/251 500 001 381 | RT 5/251 500 001 381 | RT 5/501 500 001 382 | RT 5/1001 500 001 383 |



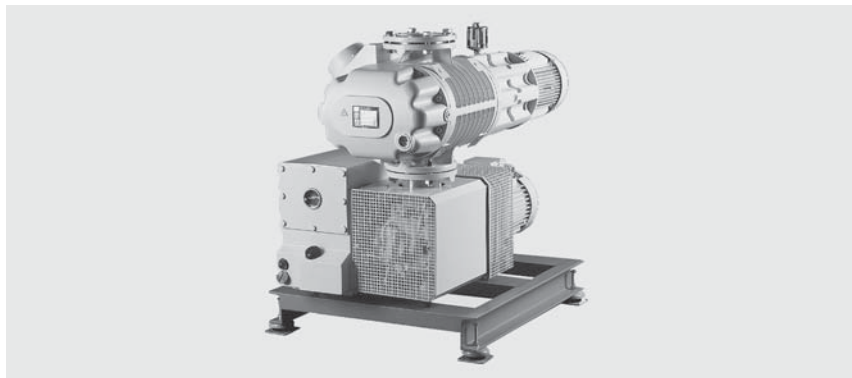
Pump-down time diagram for a 1000 l tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems

Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Adaptor Version



RUTA WAU1001/SV200/A

Standard Equipment

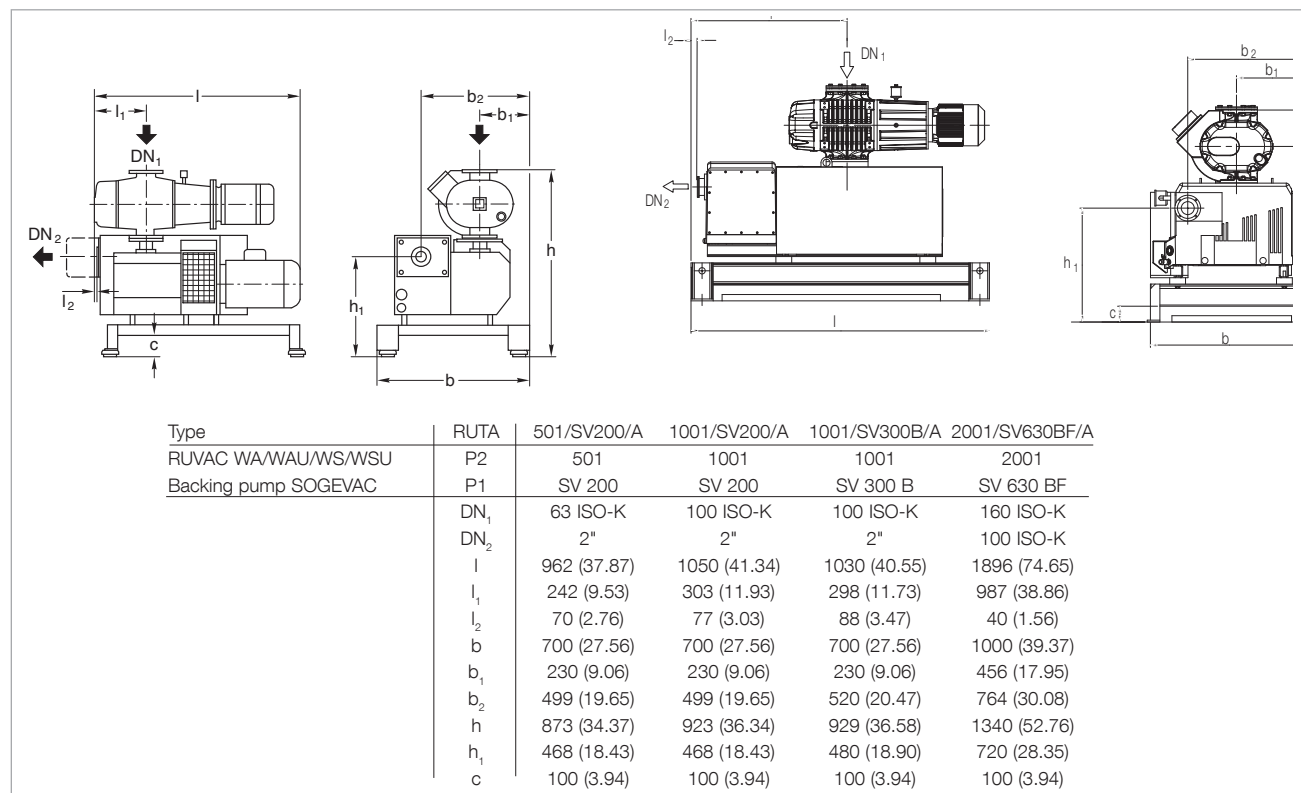
- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve:
SV 200/300 B manually operated
SV 630 BF 24 V DC
- SV 200/300 B with air cooling
- SV 630 BF with water cooling
- Floor mounting

- The oil is supplied with the pump
- CE approval

Options

- Frequency converter
RUVATRONIC RT for controlling the speed of the Roots pump
- 24 V DC gas ballast valve or manually operated

- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



Dimensional drawing for the pump systems with SOGEVAC SV 200 and 300 B backing pumps [left], SOGEVAC SV 630 BF [right]; dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA WAU

501/SV200/A 1001/SV200/A 1001/SV300B/A 2001/SV630BF/A

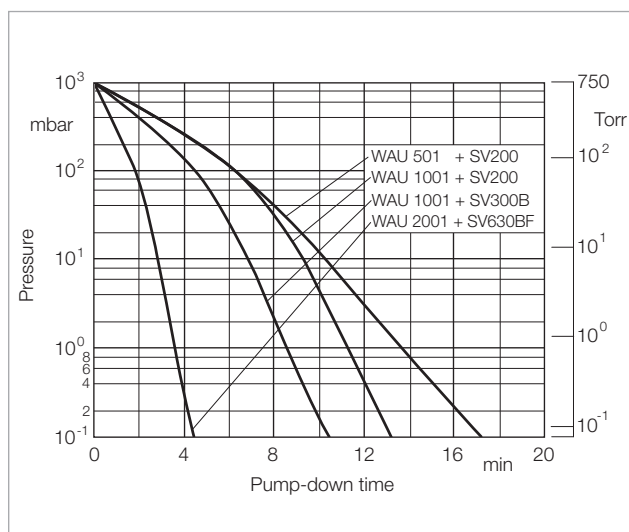
| | | | | | |
|--|---|--|--|--|--|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 501 | 1001 | 1001 | 2001 |
| Backing pump SOGEVAC | P1 | SV 200 | SV 200 | SV 300 B | SV 630 BF |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 365.0 (215.0) | 715.0 (421.0) | 730.0 (430.0) | 1690.0 (995.4) |
| Ultimate partial pressure | mbar (Torr) | $< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$) | $< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$) | $< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$) | $< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$) |
| Ultimate total pressure with gas ballast | mbar (Torr) | $< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$) | $< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$) | $< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$) | $< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 6.2 (8.4) | 8.0 (10.9) | 9.5 (12.9) | 22.5 (30.6) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 3.0 (4.1) | 3.5 (4.8) | 4.0 (5.4) | 16.5 (22.4) |
| Noise level without gas ballast at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 70 | 75 | 76 | 80 |
| Oil filling, total, approx. | l (qt) | 6.0 (6.34) | 7.0 (7.4) | 11.0 (11.63) | 26.0 (27.47) |
| Weight, total, approx. | kg (lbs) | 335.0 (738.7) | 430.0 (948.2) | 480.0 (1058.4) | 1140.0 (2513.7) |
| Connecting flange | | | | | |
| Inlet port | DN ₁ | 63 ISO-K | 100 ISO-K | 100 ISO-K | 160 ISO-K |
| Outlet port | DN ₂ | 2" | 2" | 2" | 100 ISO-K |

Ordering Information

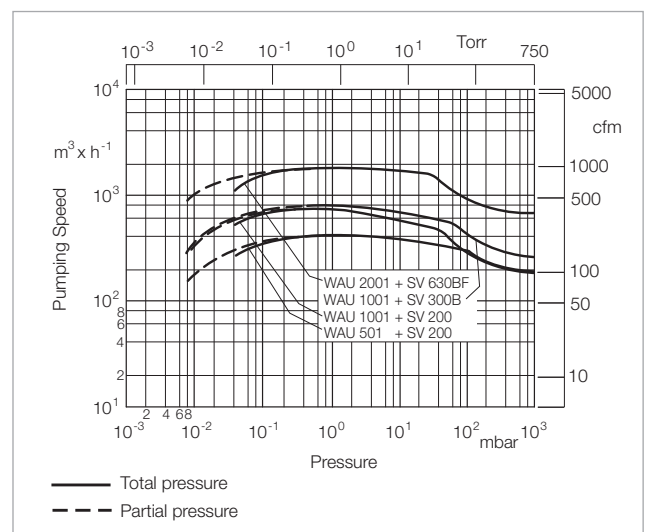
RUTA WAU

501/SV200/A 1001/SV200/A 1001/SV300B/A 2001/SV630BF/A

| | | Part No. | Part No. | Part No. | Part No. |
|---|----|--------------------------------|---------------------------------|---------------------------------|---------------------------------|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 501 | WAU 1001 | WAU 1001 | WAU 2001 |
| Backing pump SOGEVAC | P1 | SV 200 | SV 200 | SV 300 B | SV 630 BF |
| Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WAU | | 022 06 | 022 08 | 502 462 V001 | 502 463 V001 |
| Frequency converter RUVATRONIC (see description in Chapter "Accessories") | | RT 5/501 500 001 382 | RT 5/1001 500 001 383 | RT 5/1001 500 001 383 | RT 5/2001 500 001 384 |



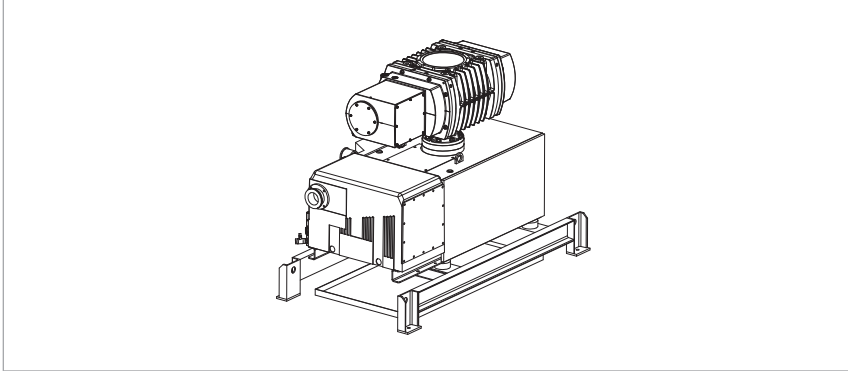
Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems

Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Adaptor Version



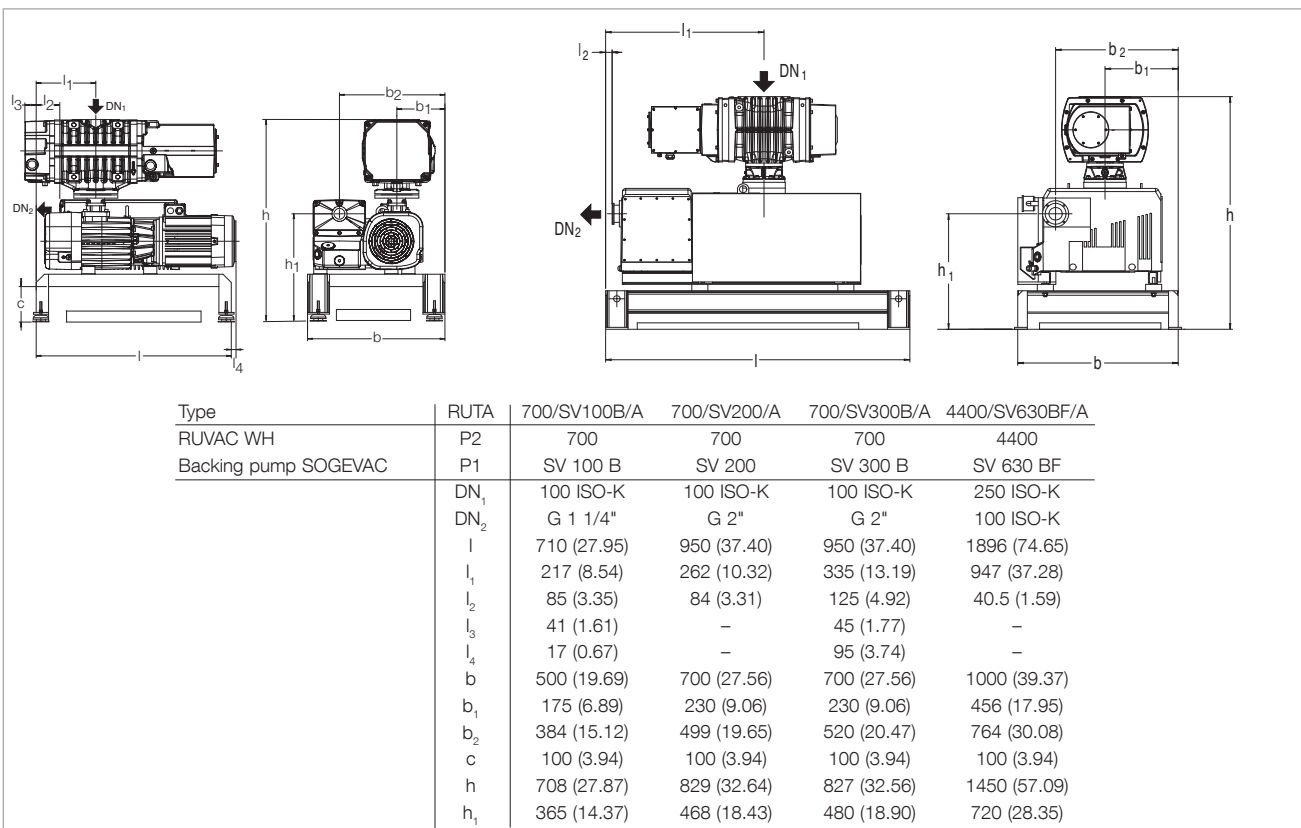
RUTA WH4400/SV630BF/A

Standard Equipment

- RUVAC WH with water cooling
- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve:
SV 100 to 300 manually operated
SV 630 BF 24 V DC
- SV 100 to 300 with air cooling
- SV 630 BF with water cooling
- Floor mounting
- The oil is supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- 24 V DC gas ballast valve or manually operated
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



Dimensional drawing for the pump systems with SOGEVAC SV 100 B, 200 and 300 B backing pumps [left], SOGEVAC SV 630 BF [right]; dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA WH

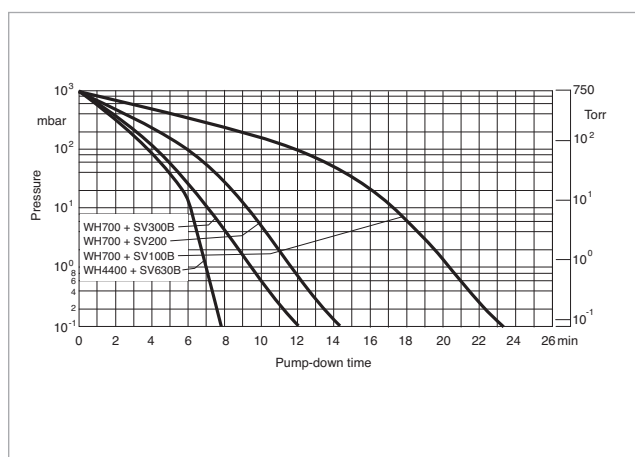
| | | 700/SV100B/A | 700/SV200/A | 700/SV300B/A | 4400/SV630BF/A |
|--|---|---|--|---|---|
| RUVAC WH | P2 | 700 | 700 | 700 | 4400 |
| Backing pump SOGEVAC | P1 | SV 100 B | SV 200 | SV 300 B | SV 630 BF |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 520 (306) | 570 (335) | 600 (353) | 3332 (1961) |
| Ultimate pressure without gas ballast | mbar (Torr) | $< 5 \times 10^{-3}$ ($< 3.75 \times 10^{-3}$) | $< 2 \times 10^{-3}$ ($< 1.5 \times 10^{-3}$) | $< 3 \times 10^{-3}$ ($< 2.25 \times 10^{-3}$) | $< 3 \times 10^{-3}$ ($< 2.25 \times 10^{-3}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 4.4 (5.9) | 6.2 (8.3) | 7.7 (10.3) | 26.0 (34.9) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 1.6 (2.2) | 2.9 (3.9) | 6.0 (8.0) | 9,68 (12.98) |
| Noise level at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 62 | 69 | 70 | 73 |
| Oil filling, total, approx. | l (qt) | 2.9 (2.6) | 9.9 (8.7) | 12.4 (10.9) | 27.0 (23.8) |
| Weight, approx. | kg (lbs) | 350 (722) | 415 (915) | 465 (1025) | 1 330 (2932) |
| Connecting flange | | | | | |
| Inlet port | DN ₁ | 100 ISO-K | 100 ISO-K | 100 ISO-K | 250 ISO-K |
| Outlet port | DN ₂ | G 1 1/4" | G 2" | G 2" | 100 ISO-K |

Ordering Information

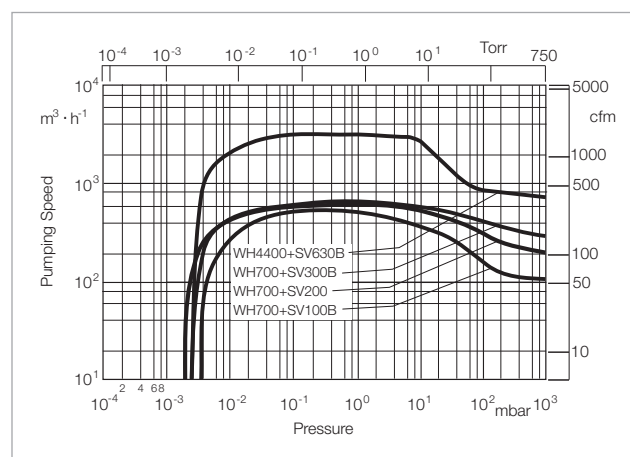
RUTA WH

| | | 700/SV100B/A | 700/SV200/A | 700/SV300B/A | 4400/SV630BF/A |
|--|----|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| | | Part No. | Part No. | Part No. | Part No. |
| RUVAC WH | P2 | 700 | 700 | 700 | 4400 |
| Backing pump SOGEVAC | | | | | |
| air-cooled | P1 | SV 100 B | SV 200 | SV 300 B | – |
| water-cooled | P1 | – | – | – | SV 630 BF |
| Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WH | | 503155V001 ¹⁾ | 503156V001 ¹⁾ | 503157V001 ¹⁾ | 503164V001 ¹⁾ |

¹⁾ Including external frequency converter

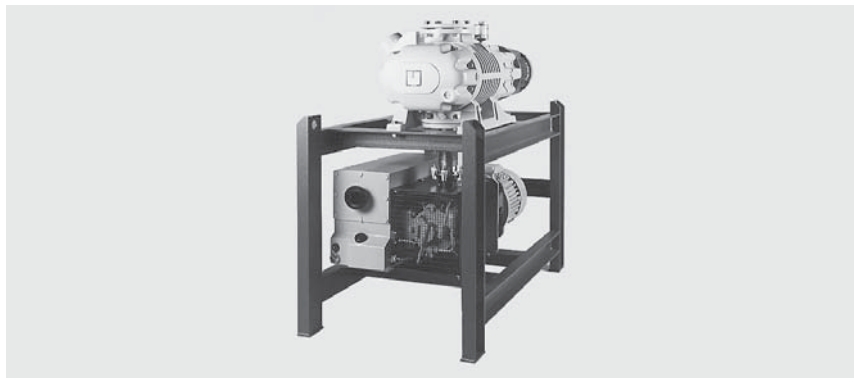


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Frame Version



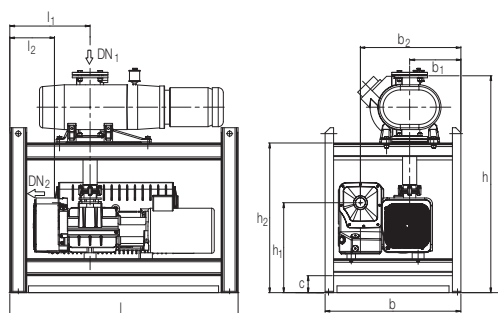
RUTA WAU2001/SV300B/G

Standard Equipment

- RUVAC WAU with air cooling
- SOGEVAC SV 300 B with air cooling
- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve: SV 300 B manually operated
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- 24 V DC gas ballast valve or manually operated
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



| Type | RUTA | 1001/SV300B/G | 2001/SV300B/G |
|----------------------|-----------------|---------------|---------------|
| RUVAC WA/WAU/WS/WSU | P2 | 1001 | 2001 |
| Backing pump SOGEVAC | P1 | SV 300 B | SV 300 B |
| | DN ₁ | 100 ISO-K | 160 ISO-K |
| | DN ₂ | 2" | 2" |
| | l | 1340 (52.76) | 1340 (52.76) |
| | l ₁ | 470 (18.50) | 470 (18.50) |
| | l ₂ | 260 (10.24) | 260 (10.24) |
| | b | 750 (29.53) | 800 (31.50) |
| | b ₁ | 252 (9.92) | 302 (11.89) |
| | b ₂ | 208 (8.19) | 208 (8.19) |
| | h | 1278 (50.32) | 1338 (52.68) |
| | h ₁ | 530 (20.87) | 530 (20.87) |
| | h ₂ | 882 (34.72) | 808 (31.81) |
| | c | 100 (3.94) | 100 (3.94) |

Dimensional drawing for the pump systems with SOGEVAC SV 300 B backing pumps; dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA WAU

1001/SV300B/G

2001/SV300B/G

| | | | |
|--|---|---|---|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 1001 | 2001 |
| Backing pump SOGEVAC | P1 | SV 300 B | SV 300 B |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 730 (430) | 1445 (850) |
| Ultimate partial pressure | mbar (Torr) | $< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$) | $< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$) |
| Ultimate total pressure with gas ballast | mbar (Torr) | $< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$) | $< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 9.5 (12.9) | 13.0 (17.7) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 4.0 (5.4) | 4.5 (6.1) |
| Noise level without gas ballast at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 75 | 79 |
| Oil filling, total, approx. | l (qt) | 11 (11.63) | 13 (13.74) |
| Weight, total, approx. | kg (lbs) | 560.0 (1234.8) | 740.0 (1631.7) |
| Connecting flange | | | |
| Inlet port | DN ₁ | 100 ISO-K | 160 ISO-K |
| Outlet port | DN ₂ | 2" | 2" |

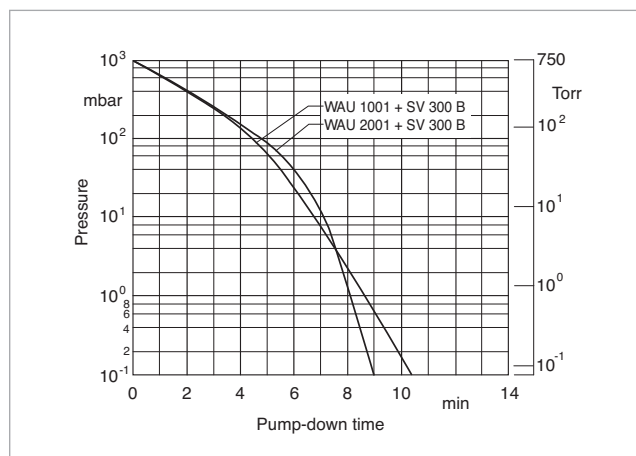
Ordering Information

RUTA WAU

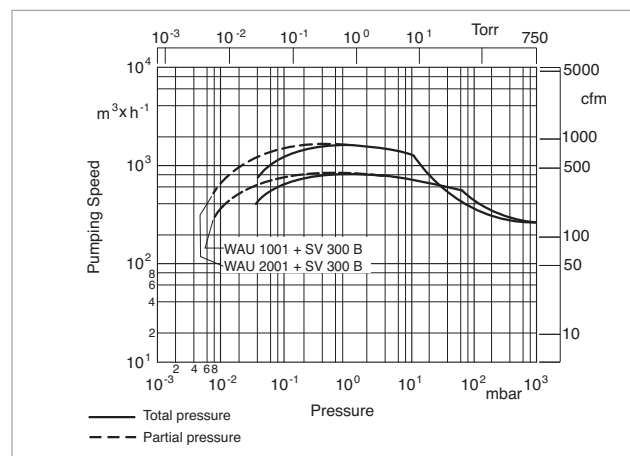
1001/SV300B/G

2001/SV300B/G

| | | Part No. | Part No. |
|--|----|---------------------------------|---------------------------------|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 1001 | WAU 2001 |
| Backing pump SOGEVAC | P1 | SV 300 B | SV 300 B |
| Pump system, complete (frame version), frame mounted, with Roots vacuum pump RUVAC WAU | | 502 452 V001 | 502 453 V001 |
| Frequency converter RUVATRONIC (see description in Chapter "Accessories") | | RT 5/1001 500 001 383 | RT 5/2001 500 001 384 |



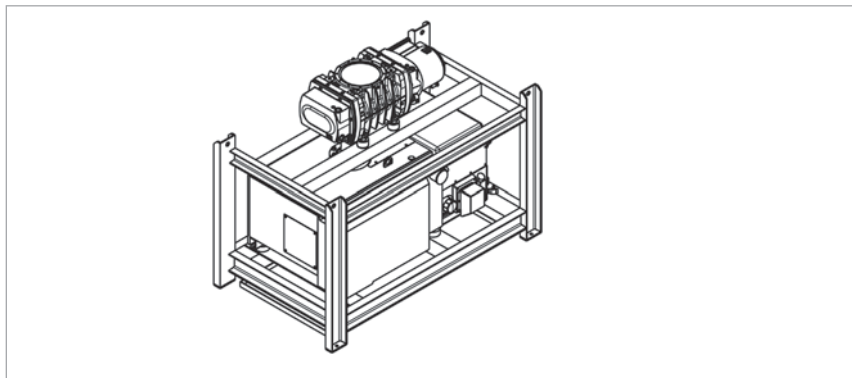
Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems

Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Frame Version



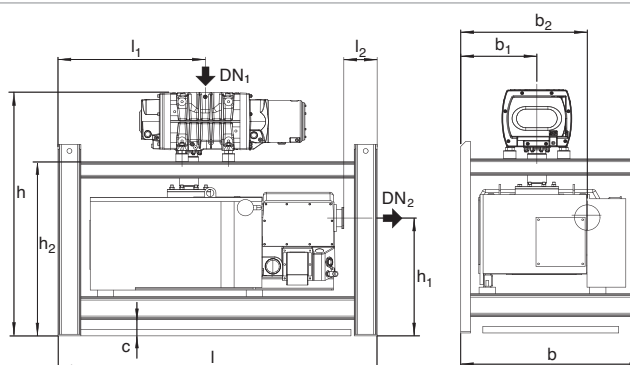
RUTA WH2500/SV630BF/G

Standard Equipment

- RUVAC WH with water cooling
- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve: SOGEVAC SV 630 BF 24 V DC
- SOGEVAC SV 630 BF with water cooling
- SOGEVAC SV 1200 with air cooling
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- Frequency converter for controlling the speed of the Roots pump (only RUVAC WA/WS)
- 24 V DC gas ballast valve or manually operated
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



| Type | RUTA | 2500/SV630BF/G | 4400/SV630BF/G | 7000/SV630BF/G |
|----------------------|-----------------|----------------|----------------|----------------|
| RUVAC WH | P2 | 2500 | 4400 | 7000 |
| Backing pump SOGEVAC | P1 | SV 630 BF | SV 630 BF | SV 630 BF |
| | DN ₁ | 250 ISO-K | 250 ISO-K | 320 ISO-K |
| | DN ₂ | 100 ISO-K | 100 ISO-K | 100 ISO-K |
| | l | 1950 (76.77) | 1950 (76.77) | 1950 (76.77) |
| | l ₁ | 900 (35.43) | 800 (31.50) | 800 (31.50) |
| | l ₂ | 204 (8.03) | 204 (8.03) | 204 (8.03) |
| | b | 1100 (43.31) | 1100 (43.31) | 1100 (43.31) |
| | b ₁ | 465 (18.31) | 465 (18.31) | 465 (18.31) |
| | b ₂ | 773 (30.43) | 773 (30.43) | 773 (30.43) |
| | h | 1064 (41.89) | 1518 (59.76) | 1518 (59.76) |
| | h ₁ | 720 (28.35) | 720 (28.35) | 720 (28.35) |
| | h ₂ | 1064 (41.89) | 1081 (42.56) | 1093 (43.03) |
| | c | 100 (3.94) | 100 (3.94) | 100 (3.94) |

Dimensional drawing for the pump systems with SOGEVAC SV backing pumps

Technical Data, 50 Hz

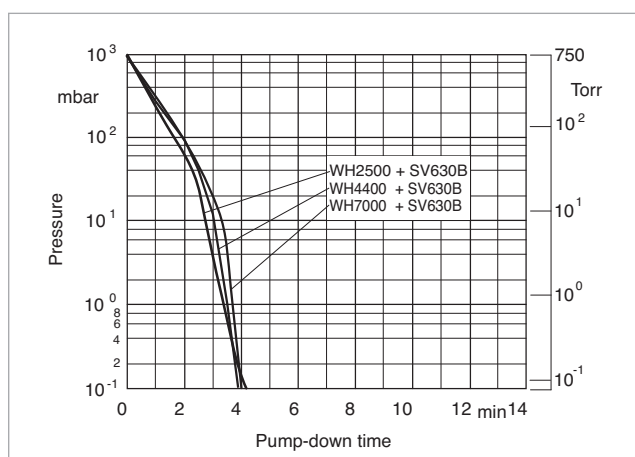
| | | RUTA | | |
|--|--|---|---|---|
| | | WH 2500/ SV630BF/G | WH 4400/ SV630BF/G | WH 7000/ SV630BF/G |
| RUVAC WH ¹⁾ | P2 | 2500 | 4400 | 7000 |
| Backing pump SOGEVAC | P1 | SV 630 BF | SV 630 BF | SV 630 BF |
| Pumping speed, 50 Hz at 10 ⁻¹ mbar (7.5 x 10 ⁻² Torr) | m ³ x h ⁻¹ (cfm) | 1902 (1119) | 3332 (1961) | 4990 (2937) |
| Ultimate total pressure with gas ballast | mbar (Torr) | < 5 x 10 ⁻³ (< 3.7 x 10 ⁻³) | — — | — — |
| without gas ballast | mbar (Torr) | — — | < 5 x 10 ⁻³ (< 3.7 x 10 ⁻³) | < 5 x 10 ⁻³ (< 3.7 x 10 ⁻³) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 21.5 (28.8) | 26.0 (34.9) | 26.0 (34.9) |
| Electrical power consumption at 10 ⁻¹ mbar (7.5 x 10 ⁻² Torr) | kW (hp) | 8.5 (11.4) | 9.68 (12.98) | 9.84 (13.20) |
| Noise level without gas ballast at 10 ⁻¹ mbar (7.5 x 10 ⁻² Torr) | dB(A) | 73 | 73 | 73 |
| Oil filling, total, approx. | l (qt) | 16.2 (17.1) | 27.0 (4.6) | 27.0 (4.6) |
| Weight, total, approx. | kg (lbs) | 1360 (2998) | 1530 (3373) | 1590 (3505) |
| Connecting flange | | | | |
| Inlet port | DN ₁ | 250 ISO-K | 250 ISO-K | 320 ISO-K |
| Outlet port | DN ₂ | 100 ISO-K | 100 ISO-K | 100 ISO-K |

Ordering Information

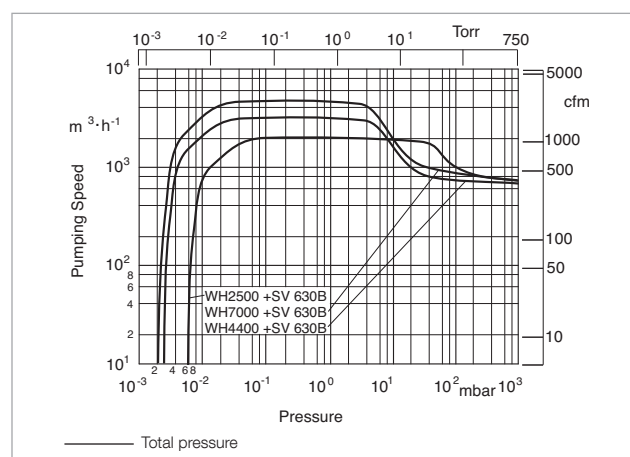
| | | RUTA | | |
|--|----|------------------------------------|------------------------------------|------------------------------------|
| | | WH 2500/ SV630BF/G | WH 4400/ SV630BF/G | WH 7000/ SV630BF/G |
| RUVAC WH ¹⁾ | P2 | 2500 | 4400 | 7000 |
| Backing pump SOGEVAC | P1 | SV 630 BF | SV 630 BF | SV 630 BF |
| Pump system, complete (frame version), frame mounted, with Roots vacuum pump RUVAC WH | | 503161V001 ^{1, 2)} | 503161V001 ^{1, 2)} | 503161V001 ^{1, 2)} |

¹⁾ Including external frequency converter

²⁾ With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure



Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Pump Systems (Only available for purchase in North and South America)

RBS - B/BCS Roots Pump Systems with Two-Stage TRIVAC Backing Pumps



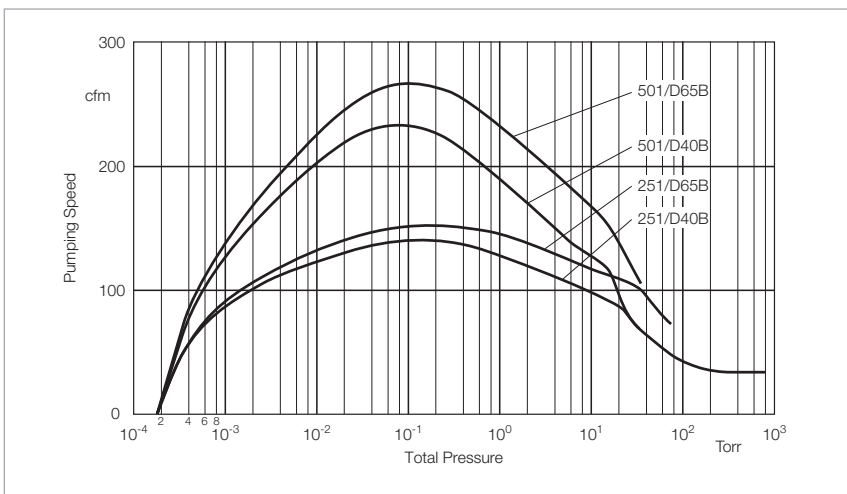
RBS - B/BCS Roots pumping system, shown with optional AF exhaust filter

Standard Equipment

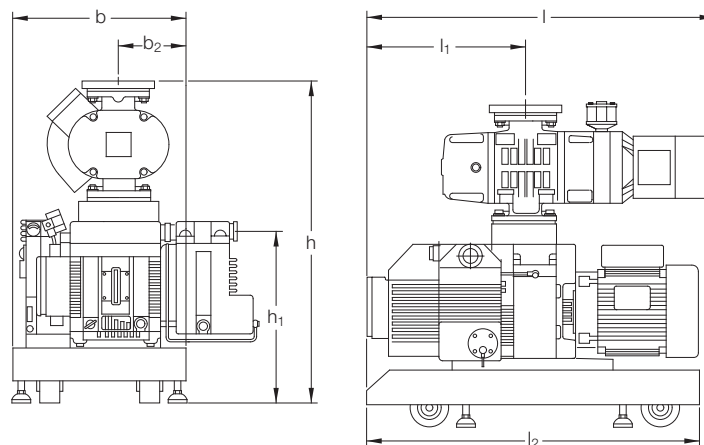
- System consists of TRIVAC dual-stage B or BCS direct drive vane pump and RUVAC blower
- Complete air-cooled system
- 18" wide frame base equipped with caster wheels and leveling pads
- Compact construction with quiet operation
- Manual operation of gas ballast
- Close-coupled RUVAC blower with ANSI inlet lange

Options

- All TRIVAC accessories, Exhaust filter, 24 V DC gas ballast valve, chemical oil filter, and electrical limit switch system
- Full frame drip pan
- Oil drain valves
- Special motor voltages and frequencies
- Special oil for unique applications
- Full electrical controls for control start/stop and monitoring of system



Pumping speed diagram for the RBS systems with WSU series Roots blowers at 60 Hz



| System | b | b ₁ | b ₂ | h | h ₁ | l | l ₁ | l ₂ |
|---------------|----------|----------------|----------------|---------------|----------------|----------------|----------------|----------------|
| Close-coupled | | | | | | | | |
| D 40 B/BCS | | | | | | | | |
| WSU 251 | 18 (457) | 8 (203) | 7 (178) | 33 3/16 (853) | 17 15/16 (456) | 32 3/4 (832) | 14 (356) | 34 (864) |
| WSU 501 | 18 (457) | 8 (203) | 7 (178) | 34 3/4 (883) | 17 15/16 (456) | 33 13/16 (859) | 14 (356) | 34 (864) |
| D 65 B/BCS | | | | | | | | |
| WS/WSU 251 | 18 (457) | 8 (203) | 7 (178) | 33 3/16 (853) | 17 15/16 (456) | 34 3/4 (883) | 16 (406) | 34 (864) |
| WS/WSU 501 | 18 (457) | 8 (203) | 7 (178) | 34 3/4 (883) | 17 15/16 (456) | 35 13/16 (910) | 16 (406) | 34 (864) |

Dimensional drawing for the RBS - B/BCS Roots pumping systems 18" with TRIVAC D 40/65 B backing pumps, close-coupled package;
dimensions in brackets () are in mm

Technical Data

RBS - B/BCS Roots Pump Systems

| | | 251/D40B | 251/D65B | 501/D40B | 501/D65B |
|--|---|--|--|--|--|
| RUVAC (WA/WAU/WS/WSU possible) | | 251 | 251 | 501 | 501 |
| TRIVAC backing pump | | D 40 B/BCS | D 65 B/BCS | D 40 B/BCS | D 65 B/BCS |
| Pumping speed @ 0.1 Torr | cfm (m ³ x h ⁻¹) | 140 (237) | 150 (254) | 232 (394) | 267 (453) |
| Ultimate total pressure | Torr (mbar) | 2 x 10 ⁻⁴ ($< 4 \times 10^{-4}$) | 2 x 10 ⁻⁴ ($< 4 \times 10^{-4}$) | 2 x 10 ⁻⁴ ($< 4 \times 10^{-4}$) | 2 x 10 ⁻⁴ ($< 4 \times 10^{-4}$) |
| Connecting flanges | | | | | |
| Inlet port | | | | | |
| WSU | DN | 3" ANSI | 3" ANSI | 3" ANSI | 3" ANSI |
| Outlet port | DN | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| Operating voltage | V | 208/230/460 | 208/230/460 | 208/230/460 | 208/230/460 |
| Phase / Frequency ¹⁾ | - / Hz | 3 / 60 | 3 / 60 | 3 / 60 | 3 / 60 |
| Full load amps ²⁾ | | | | | |
| RUVAC WSU | | 5.5/5.5/3.2 | 5.5/5.5/3.2 | 9.0/9.0/5.2 | 9.0/9.0/5.2 |
| TRIVAC | | 9.0/8.8/4.5 | 9.0/8.8/4.5 | 9.0/8.8/4.5 | 9.0/8.8/4.5 |
| Displacement | | | | | |
| RUVAC | cfm (m ³ x h ⁻¹) | 179 (304) | 179 (304) | 357 (606) | 357 (606) |
| TRIVAC | cfm (m ³ x h ⁻¹) | 32 (54) | 53 (90) | 32 (54) | 53 (90) |
| Maximum differential pressure | Torr (mbar) | 60 (80) | 60 (80) | 60 (80) | 60 (80) |
| Normal starting pressure ³⁾ | Torr (mbar) | 20 (27) | 30 (40) | 12 (16) | 16 (21) |
| Oil capacity | | | | | |
| RUVAC WSU | qt (l) | 0.75 (0.7) | 0.75 (0.7) | 1.10 (1.0) | 1.10 (1.0) |
| TRIVAC | qt (l) | 2.70 (2.6) | 3.40 (3.2) | 2.70 (2.6) | 3.40 (3.2) |
| Nominal rotation speed | | | | | |
| RUVAC | rpm (min ⁻¹) | 3600 (3600) | 3600 (3600) | 3600 (3600) | 3600 (3600) |
| TRIVAC | rpm (min ⁻¹) | 1800 (1800) | 1800 (1800) | 1800 (1800) | 1800 (1800) |
| Motor power | | | | | |
| RUVAC WSU | hp (kW) | 1.9 (1.4) | 1.9 (1.4) | 3.3 (2.4) | 3.3 (2.4) |
| TRIVAC | hp (kW) | 3.0 (2.2) | 3.0 (2.2) | 3.0 (2.2) | 3.0 (2.2) |

Ordering Information

RBS - B/BCS Roots Pump Systems

| | 251/D40B | 251/D65B | 501/D40B | 501/D65B |
|--|-------------------------------------|----------|----------|----------|
| | Part. No. | | | |
| RBS - B/BCS Roots pump system (supplied with hydrocarbon oil) | Ordering Information see right page | | | |

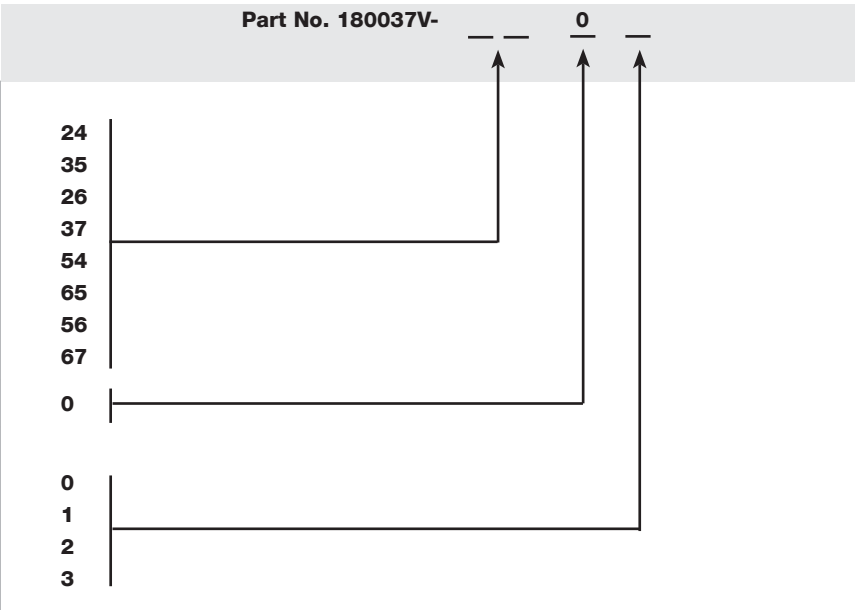
¹⁾ For 50 Hz systems, consult the factory

²⁾ Determined by operating voltage

³⁾ WSU pumps permit start-up at atmospheric pressure (760 Torr)

Ordering Information

| |
|----------------------------|
| Blower / TRIVAC pump |
| WSU 251 / D 40 B |
| WSU 251 / D 40 BCS-LVO 400 |
| WSU 251 / D 65 B |
| WSU 251 / D 65 B-LVO 400 |
| WSU 501 / D 40 B |
| WSU 501 / D 40 BCS-LVO 400 |
| WSU 501 / D 65 B |
| WSU 501 / D 65 BCS-LVO 400 |
| Reserved |
| Electrical Control Panel |
| None |
| 208 V |
| 230 V |
| 460 V |



Pump Systems (Only available for purchase in North and South America)

HTS Close-Coupled Systems with Single-Stage SOGEVAC Backing Pumps



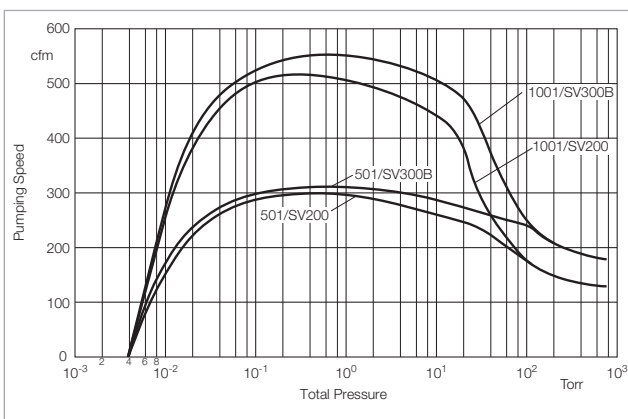
HTS close-coupled system

Standard Equipment

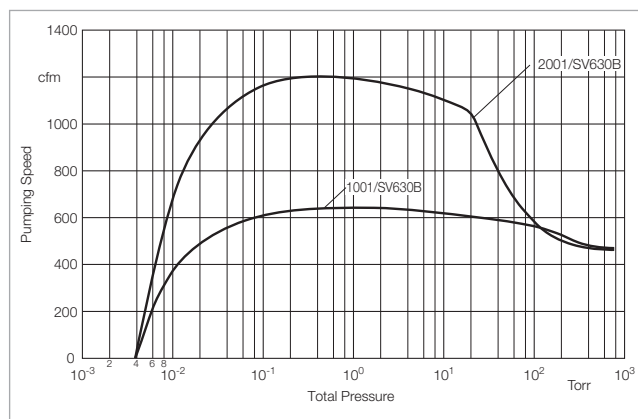
- System consists of single-stage SOGEVAC vane pump
- Complete air-cooled system
- Close-coupled RUVAC blower
- Compact construction with quiet operation
- Manual operation of gas ballast
- Spin-on type oil filter

Options

- SOGEVAC accessories: oil level monitoring, exhaust case gauge, 24 V DC gas ballast purge, water cooling
- Frame base mounted caster wheels
- Frame base mounted leveling pads
- Oil drain valves
- Inlet dust filter
- Special motor voltages and frequencies
- Special oil for unique applications
- Full NEMA12 electrical controls for stand/stop operation and monitoring of system from remote and local locations
- 24 V DC gas ballast valve

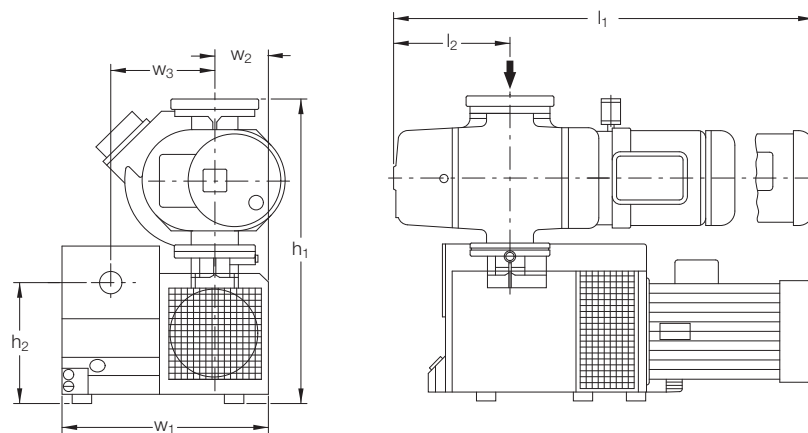


Pumping speed diagram for the HTS close-coupled systems with WSU series Roots blowers and SOGEVAC SV 200/300B at 60 Hz

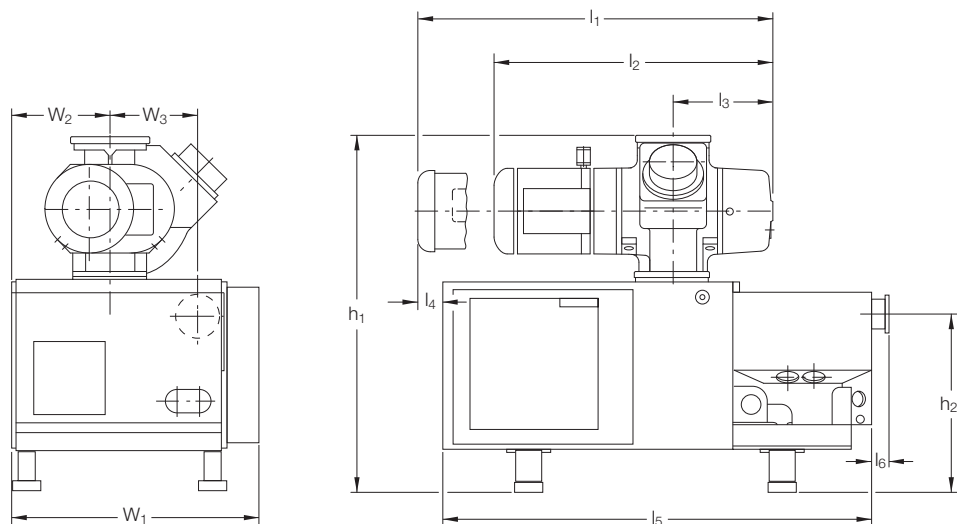


Pumping speed diagram for the HTS close-coupled systems with WSU series Roots blowers and SOGEVAC SV 630B at 60 Hz

Dimensions for SV 200 and SV 300 B only



Dimensions for SV 630 B only



| Roots Pump | Vane Pump | h_1 | h_2 | l_1 | l_2 | l_3 | l_5 | l_6 | w_1 | w_2 | w_3 |
|------------|-----------|----------------|----------------|----------------|----------------|---------------|---------------|------------|----------------|--------------|----------------|
| WSU 501 | SV 200 | 29 7/16 (748) | 12 17/32 (318) | — | 9 17/32 (242) | — | — | — | 21 11/16 (551) | 6 1/8 (156) | 10 19/32 (269) |
| WSU 501 | SV 300 B | 29 7/16 (748) | 12 17/32 (318) | — | 9 17/32 (242) | — | — | — | 21 11/16 (551) | 6 1/8 (156) | 10 19/32 (269) |
| WSU 1001 | SV 200 | 31 7/16 (799) | 12 17/32 (318) | — | 11 15/16 (303) | — | — | — | 21 1/16 (535) | 5 1/2 (140) | 10 19/32 (269) |
| WSU 1001 | SV 300 B | 31 7/16 (799) | 12 17/32 (318) | — | 11 15/16 (303) | — | — | — | 22 13/16 (579) | 7 1/4 (184) | 10 19/32 (269) |
| WSU 2001 | SV 630 B | 48 5/16 (1227) | 23 13/16 (605) | 50 3/16 (1275) | — | 14 9/16 (370) | 60 3/4 (1543) | 2 1/2 (64) | 34 15/16 (887) | 13 7/8 (352) | 12 13/32 (315) |

Dimensional drawing for the HTS close-coupled system with single-stage SOGEVAC backing pumps; dimensions in brackets () are in mm

Technical Data

HTS Close-Coupled Systems

| | | 501/SV200 | 501/SV300B | 1001/SV200 | 1001/SV300B |
|---------------------------------|---|---|---|---|---|
| RUVAC | | WSU 501 | WSU 501 | WSU 1001 | WSU 1001 |
| SOGEVAC | | SV 200 | SV 300 B | SV 200 | SV 300 B |
| Pumping speed @ 0.1 Torr | cfm (m ³ x h ⁻¹) | 277 (470) | 285 (483) | 504 (855) | 545 (925) |
| Ultimate total pressure | Torr (mbar) | < 8 x 10 ⁻³ (< 1 x 10 ⁻²) | < 8 x 10 ⁻³ (< 1 x 10 ⁻²) | < 8 x 10 ⁻³ (< 1 x 10 ⁻²) | < 8 x 10 ⁻³ (< 1 x 10 ⁻²) |
| Connecting flanges | | | | | |
| Inlet port WSU | DN | 3" ANSI | 3" ANSI | 4" ANSI | 4" ANSI |
| Exhaust port SOGEVAC | DN | 2" NPT | 2" NPT | 2" NPT | 2" NPT |
| Operating voltage | V | 208/230/460 | 208/230/460 | 208/230/460 | 208/230/460 |
| Phase / Frequency ¹⁾ | - / Hz | 3 / 60 | 3 / 60 | 3 / 60 | 3 / 60 |
| Full load amps ²⁾ | | | | | |
| RUVAC WSU | | 7.8/10.0/5.8 | 7.8/10.0/5.8 | 13.0/14.7/8.5 | 13.0/14.7/8.5 |
| SOGEVAC | | 21.0/18.0/9.0 | 29.0/25.0/12.5 | 21.0/18.0/9.0 | 29.0/25.0/12.5 |
| Displacement | | | | | |
| RUVAC | cfm (m ³ x h ⁻¹) | 357 (606) | 357 (606) | 707 (1200) | 707 (1200) |
| SOGEVAC | cfm (m ³ x h ⁻¹) | 130 (606) | 200 (340) | 130 (606) | 200 (340) |
| Oil capacity | | | | | |
| RUVAC WSU | qt (l) | 1.10 (1.00) | 1.10 (1.00) | 2.10 (2.00) | 2.10 (2.00) |
| SOGEVAC | qt (l) | 5.30 (5.00) | 9.00 (8.50) | 5.30 (5.00) | 9.00 (8.50) |
| Nominal rotation speed | | | | | |
| RUVAC WAU/WSU | rpm (min ⁻¹) | 3600 (3600) | 3600 (3600) | 3600 (3600) | 3600 (3600) |
| SOGEVAC | rpm (min ⁻¹) | 1800 (1800) | 1800 (1800) | 1800 (1800) | 1800 (1800) |
| Motor power | | | | | |
| RUVAC WSU | hp (kW) | 3.3 (2.4) | 3.3 (2.4) | 6.0 (4.4) | 6.0 (4.4) |
| SOGEVAC | hp (kW) | 7.5 (5.5) | 10.0 (7.4) | 7.5 (5.5) | 10.0 (7.4) |

Ordering Information

HTS Close-Coupled Systems

| | | 501/SV200 | 501/SV300B | 1001/SV200 | 1001/SV300B |
|-----------------------------|--|-------------------------------------|------------|------------|-------------|
| | | Part. No. | | | |
| HTS - close-coupled systems | | Ordering Information see right page | | | |

¹⁾ For 50 Hz systems, consult the factory

²⁾ Determined by operating voltage

Technical Data

HTS Close-Coupled Systems

1001/SV630B

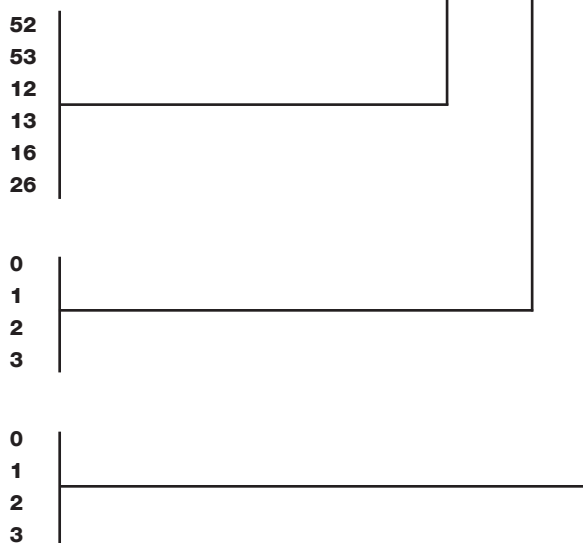
2001/SV630B

| | | | |
|---------------------------------|---|---|---|
| RUVAC | | 1001 | 2001 |
| SOGEVAC | | SV 630 B | SV 630 B |
| Pumping speed @ 0.1 Torr | cfm (m ³ x h ⁻¹) | 610 (1035) | 1186 (2031) |
| Ultimate total pressure | Torr (mbar) | < 8 x 10 ⁻³ (< 1 x 10 ⁻²) | < 8 x 10 ⁻³ (< 1 x 10 ⁻²) |
| Connecting flanges | | | |
| Inlet port WSU | DN | 4" ANSI | 6" ANSI |
| Outlet port | DN | 4" ANSI | 4" ANSI |
| Operating voltage | V | 460 | 460 |
| Phase / Frequency ¹⁾ | - / Hz | 3 / 60 | 3 / 60 |
| Full load amps ²⁾ | | | |
| RUVAC WSU | | 8.5 | 5.0 |
| SOGEVAC | | 29.5 | 29.5 |
| Displacement | | | |
| RUVAC | cfm (m ³ x h ⁻¹) | 707 (1200) | 1449 (2460) |
| SOGEVAC | cfm (m ³ x h ⁻¹) | 495 (840) | 495 (840) |
| Oil capacity | | | |
| RUVAC WSU | qt (l) | 2.10 (2.0) | 4.20 (4.0) |
| SOGEVAC | qt (l) | 37.0 (35.0) | 37.0 (35.0) |
| Nominal rotation speed | | | |
| RUVAC WSU | rpm (min ⁻¹) | 3600 (3600) | 3600 (3600) |
| SOGEVAC | rpm (min ⁻¹) | 1170 (1170) | 1170 (1170) |
| Motor power | | | |
| RUVAC WSU | hp (kW) | 6.1 (4.5) | 11.4 (8.4) |
| SOGEVAC | hp (kW) | 25.0 (13.4) | 25.0 (13.4) |

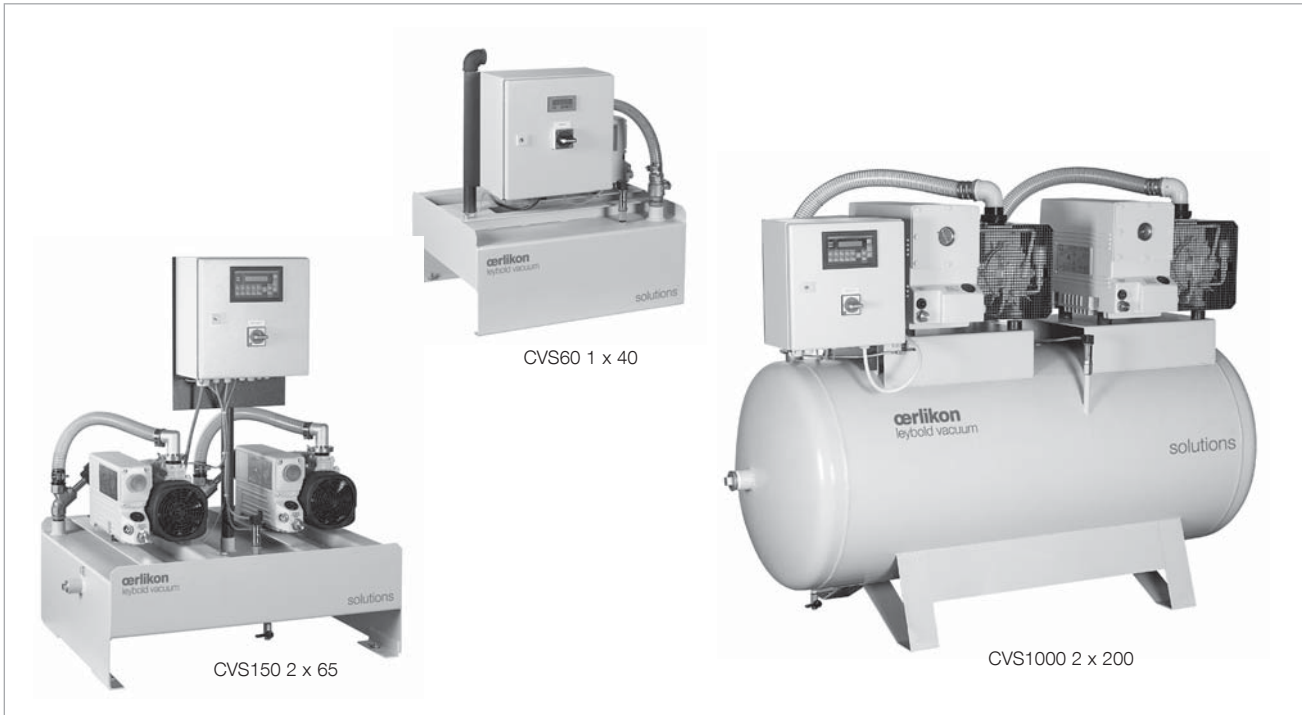
Ordering Information

Part No. 180036V-

| |
|---|
| Blower / TRIVAC pump |
| WSU 501 / SV 200 |
| WSU 501 / SV 300 B |
| WSU 1001 / SV 200 |
| WSU 1001 / SV 300 B |
| WSU 1001 / SV 630 B |
| WSU 2001 / SV 630 B |
| Casters & Levelers (SV 200 & SV 300 only) |
| None |
| Casters & Levelers |
| Casters only |
| Levelers only |
| Electrical Control Panel |
| None |
| 208 V (SV 200 & SV 300 only) |
| 230 V (SV 200 & SV 300 only) |
| 460 V |



Central Vacuum Supply Systems with SOGEVAC Pumps



Pictures of various central vacuum supply systems (the right of technical changes is reserved)

Central vacuum supply systems are frequently used in those cases where a large number of minor requirements for vacuum need to be economically covered. Moreover, the systems serve the purpose of compensating for large variations in the number of vacuum consumers and increase the availability of the vacuum service.

A typical central vacuum supply system from Oerlikon Leybold Vacuum consists chiefly of one or more SOGEVAC rotary vane vacuum pumps, a buffer vessel, an electrical cabinet with controller as well as the corresponding connection components. The systems are supplied by us fully assembled, tested as plug and play units.

Technical Data and Ordering Information

| Designation | Vessel volume (l) | Nominal pumping speed (m ³ x h ⁻¹) | Connection (G or NPT) | Electrical power rating ¹⁾ (kW) | Type of controller | Part No. |
|------------------|-------------------|---|-----------------------|--|--------------------|---------------------|
| CVS60 1 x 25 | 60 | 25 | 1 1/4" | 0.8 | BASIC | 501 792 |
| CVS60 1 x 40 | 60 | 40 | 1 1/4" | 1.1 | BASIC | 501 793 |
| CVS60 1 x 65 | 60 | 65 | 1 1/4" | 1.5 | BASIC | 501 796 |
| CVS150 1 x 40 | 150 | 40 | 1 1/4" | 1.1 | BASIC | 501 800 |
| CVS150 1 x 65 | 150 | 65 | 1 1/4" | 1.5 | BASIC | 501 803 |
| CVS300 1 x 40 | 300 | 40 | 2" | 1.1 | BASIC | 501 820 |
| CVS300 1 x 65 | 300 | 65 | 2" | 1.5 | BASIC | 501 823 |
| CVS300 1 x 100 | 300 | 100 | 2" | 2.5 | BASIC | 501 826 |
| CVS300 2 x 65 | 300 | 130 | 2" | 3.0 | FF | 501 832 |
| CVS300 2 x 100 | 300 | 200 | 2" | 5.0 | FF | 501 835 |
| CVS500 1 x 100 | 500 | 100 | 2" | 2.5 | BASIC | 501 846 |
| CVS500 1 x 200 | 500 | 200 | 2" | 4.0 | FF | 501 849 |
| CVS500 1 x 300B | 500 | 280 | 2" | 5.5 | FF | 503 174 V001 |
| CVS500 2 x 40 | 500 | 80 | 2" | 2.2 | FF | 501 855 |
| CVS500 2 x 65 | 500 | 130 | 2" | 3.0 | FF | 501 858 |
| CVS500 2 x 100 | 500 | 200 | 2" | 5.0 | FF | 501 861 |
| CVS500 2 x 200 | 500 | 360 | 2" | 8.0 | FF | 501 864 |
| CVS1000 2 x 100 | 1000 | 200 | 2" | 5.0 | FF | 501 879 |
| CVS1000 2 x 200 | 1000 | 360 | 2" | 8.0 | FF | 501 882 |
| CVS1000 2 x 300B | 1000 | 560 | 2" | 11.0 | FF | 503 175 V001 |

¹⁾ At a mains voltage of 400 V / 50 Hz, 3-ph.

Beyond the equipment which is supplied as standard (see list), the modular design of the central vacuum supply systems from Oerlikon Leybold Vacuum allows for customization according to your specific requirements.

Optionally available are, for example:

- Higher pumping speeds and larger buffer volumes
- Electropneumatic or solenoid blocking valves
- Mobile construction on castors
- Other mains voltages
- Additional pumps, filters, fittings etc.

Controller Types for the Central Vacuum Supply Systems from Oerlikon Leybold Vacuum

Generally a difference is made between the controller types **BASIC** and **FF** (Full Featured).

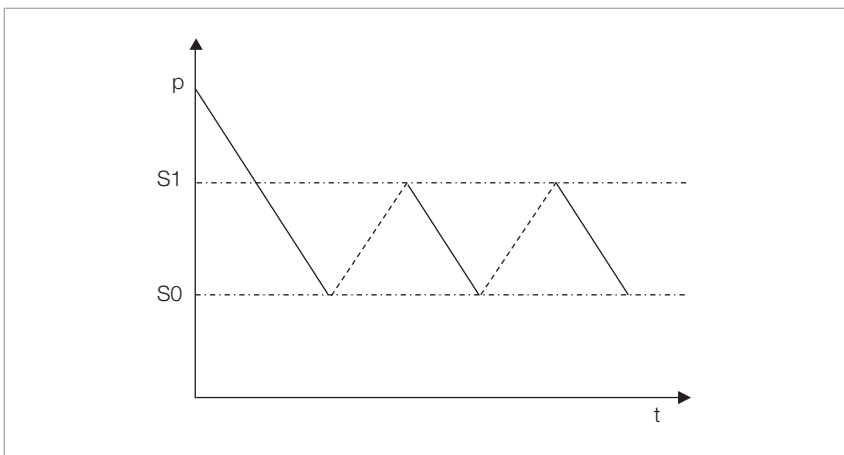
Differing custom solutions are available upon request.

BASIC Controller

The Basic controller provides for two freely selectable switching thresholds, through which an individual vacuum pump or alternatively a blocking valve (optional) can be driven.

Moreover, the controller includes an electronic pressure display and an operating hours counter.

This type of controller is suited for systems equipped with a single pump up to a nominal pumping speed of 100 m³/h (58.9 cfm).



Basic control with one pump

Operating Principle of the BASIC Controller

Starting at atmospheric pressure, the central vacuum supply system is evacuated down to the intended "lower operating pressure" S0. As soon as the pressure has attained the level of S0, the vacuum pump is switched off automatically, respectively the optional blocking valve is closed.

When switching on the consumers, the pressure in the system rises again until the "upper operating pressure" is reached thereby tripping the switch-on threshold S1 of the pump, respectively attaining the opening pressure of the valve.

Provided pumping speed of the pump and vacuum consumption are balanced, the operating pressure will change between S0 and S1. At reduced consumption, the system pressure will reduce until the switching threshold S0 is reached again causing the pump to switch off, respectively the valve to close etc.

FF Controller

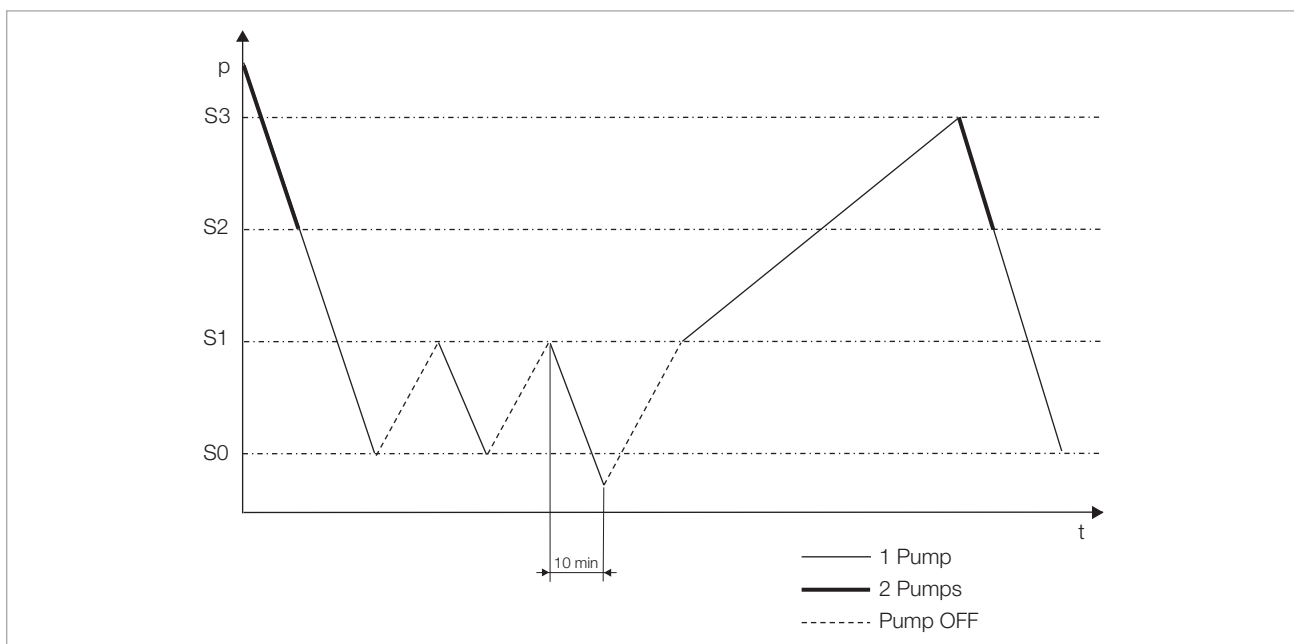
Basically the FF controller provides for four freely selectable switching thresholds and has thus been designed to operate two pumps running in parallel. Depending on the design rating and current demand, the base load or master pump will operate alone or jointly together with the spare pump.

In order to spread the number of operating hours equally between the pumps, master pump and spare pump are interchanged in regular intervals. In case a pump fails, the controller effects an automatic change to the spare pump.

For operating vacuum pumps having a nominal pumping speed of over

100 m³/h (58.9 cfm), a delayed shut-down facility has been integrated which will restrict the number of switching cycles to 6 per hour.

Through the use of a Programmable Logic Controller (PLC), the FF controller permits flexible coverage of quite differing requirements.



FF controller with two pumps and an example for delayed shutdown (pumps over 100 m³/h (58.9 cfm))

Operating Principle of the FF Controller

Just as for the Basic controller, the system is, upon switching on, evacuated down to the lower operating pressure S0. This is effected with both pumps running in parallel (master pump and spare pump) until the shutdown threshold for the spare pump S2 is reached. Thereafter, the master pump alone will ensure that the lower operating pressure is reached and is then also switched off. When the system pressure increases due to the number of consumers or leaks to the level of S1, then the master pump will be switched on automatically etc.

In the case of vacuum pumps having a pumping speed of over 100 m³/h (58.9 cfm) and a running time of the pump of less than 10 minutes, then the standard switch off delay can be responsible for the pressure to drop below S0. This will prevent too frequent switching on and off of the pumps.

If for process reasons the pressure is not allowed to drop below the lower operating pressure, we recommend

the use of electropneumatic or solenoid blocking valves.

If the current vacuum demand cannot be met by the master pump alone, the system pressure will increase to the upper switching pressure S3 upon which the spare pump is automatically started.

With both pumps running in parallel, the system is then again evacuated until the switch off threshold S2 for the spare pump is reached again etc.

Only available for purchase in North and South America

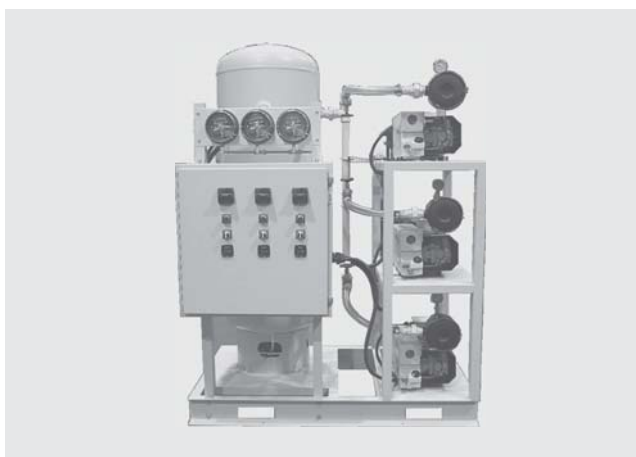
Central Vacuum Supply Systems



Central vacuum supply system, simplex



Central vacuum supply system, duplex



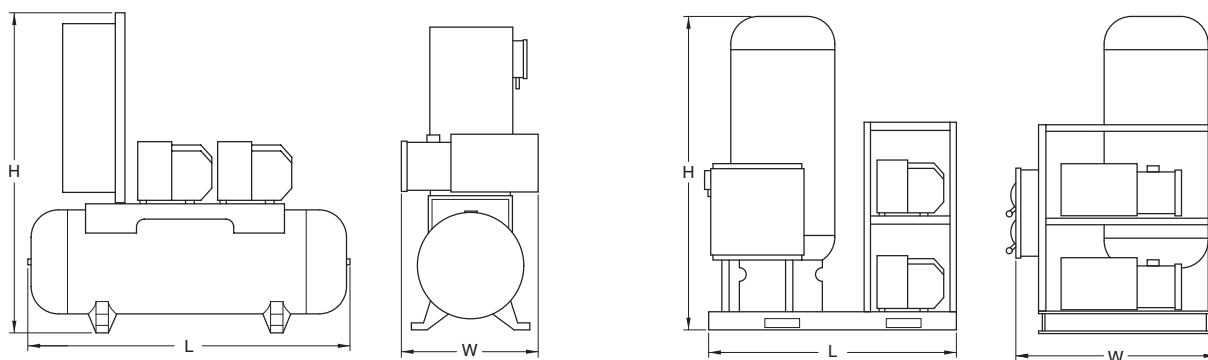
Central vacuum system, triplex

Standard Equipment

- ASME® rated receiver tank
- Flexible configurations for one, two, or three SOGEVAC pumps
- Manual isolation valves
- Simple operation, high reliability, easy maintenance
- Complete package with gauges and NEMA12 controls
- Standard “ON/OFF/AUTO” switch
- Elapsed time meters
- Inlet particulate filters
- Lead/Lag or continuous operation of pumps
- Adjustable pressure switch for control of vacuum level
- Air-cooled SOGEVAC pumps with built-in “anti-suckback” valves

Options

- Tank or stack mounted pumps
- Larger receiver tank
- Special inlet filters
- Automatic isolation valves
- Special design controls per customer specification



| Pump model | Tank size (gal) | L | W | H |
|----------------------------------|-----------------|-----------|-----------|-----------|
| Tank mount - simplex | | | | |
| SV 16, SV 25 | 30 | 42 (1067) | 20 (508) | 51 (1295) |
| SV 40 B, SV 65 B | 60 | 50 (1270) | 25 (635) | 48 (1219) |
| SV 100 B | 80 | 65 (1651) | 25 (635) | 56 (1422) |
| SV 200, SV 300 | 120 | 70 (1778) | 28 (711) | 58 (1473) |
| Tank mount - duplex | | | | |
| SV 16, SV 25 | 60 | 50 (1270) | 27 (686) | 53 (1346) |
| SV 40 B, SV 65 B | 80 | 65 (1651) | 30 (762) | 53 (1346) |
| SV 100 B | 120 | 71 (1803) | 32 (813) | 53 (1346) |
| SV 200 | 240 | 84 (2134) | 38 (965) | 64 (1626) |
| SV 300 | 240 | 84 (2134) | 43 (1092) | 64 (1626) |
| Stack mount - duplex and triplex | | | | |
| SV 16, SV 25 | 60 | 45 (1143) | 38 (965) | 56 (1422) |
| SV 40 B | 80 | 49 (1245) | 42 (1067) | 56 (1422) |
| SV 65 B | 120 | 62 (1575) | 45 (1143) | 88 (2235) |
| SV 100 B | 120 | 68 (1727) | 42 (1067) | 88 (2235) |
| SV 200 | 200 | 68 (1727) | 50 (1270) | 91 (1626) |
| SV 300 | 200 | 68 (1727) | 58 (1473) | 91 (1626) |

Central vacuum supply systems, tank mounted [left] and stack mounted [right]; dimensions in inch, dimensions in brackets () are in mm

Technical Data

Performance Characteristics

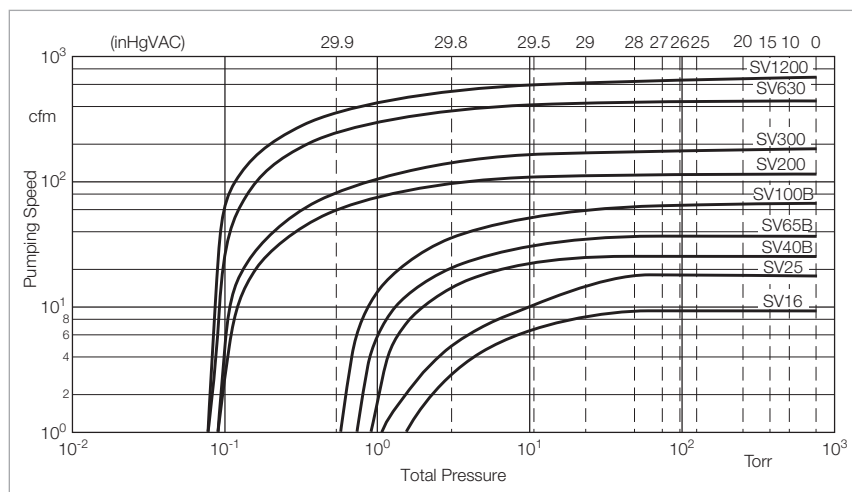
| | | SV 16 | SV 25 | SV 40 B | SV 65 B | SV 100 B | SV 200 | SV 300 |
|---|---|-----------|-------------|---------------|---------------|---------------|---------------|---------------|
| Free air displacement | cfm (m ³ x h ⁻¹) | 11 (18.6) | 17.0 (29.0) | 31.2 (53.0) | 41.8 (71.0) | 68.9 (117.0) | 129.5 (219.8) | 200.3 (340.0) |
| Actual pumping speed | cfm (m ³ x h ⁻¹) | 10 (16.9) | 15 (25.5) | 27.7 (47.0) | 37.7 (64.0) | 61.8 (105.0) | 117.8 (200.0) | 170.8 (289.9) |
| Guaranteed base pressure | Torr | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.06 | 0.06 |
| Base pressure with gas ballast | Torr | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 0.5 | 0.5 |
| Water vapor tolerance | Torr | 30.0 | 30.0 | 22.5 | 22.5 | 22.5 | 30.0 | 30.0 |
| Water vapor pumping with gas ballast | qt/hr | 0.32 | 0.48 | 0.95 | 1.32 | 1.8 | 5.7 | 7.8 |
| Noise level at 3 feet with 1 pump running without gas ballast | dB(A) | 56 | 56 | 63 | 64 | 64 | 73 | 74 |
| Motor | hp | 1.0 | 1.5 | 2.0 | 2.5 | 4.0 | 7.5 | 10.0 |
| Pump rotational speed | rpm | 1750 | 1500 | 1750 | 1750 | 1750 | 1750 | 1750 |
| Oil capacity | qt | 2.0 | 2.0 | 1.05 | 2.1 | 2.1 | 5.5 | 9.0 |
| Inlet / exhaust - NPT | in. | 1/2 / 1/2 | 1/2 / 1/2 | 1-1/4 / 1-1/4 | 1-1/4 / 1-1/4 | 1-1/4 / 1-1/4 | 2 / 2 | 2 / 2 |
| Pump weight | lbs | 50.7 | 52.9 | 99.3 | 114.8 | 194.3 | 341.8 | 430.0 |

Technical Data

| | | Tank Mount Simplex | Tank Mount Duplex | Stack Mount Duplex and Simplex |
|--------------|-----------------|-----------------------|----------------------|-----------------------------------|
| SV 16, SV 25 | Tank size (gal) | 30 | 60 | 60 |
| SV 40 B | Tank size (gal) | 60 | 80 | 80 |
| SV 65 B | Tank size (gal) | 60 | 120 | 120 |
| SV 100 B | Tank size (gal) | 80 | 120 | 120 |
| SV 200 | Tank size (gal) | 120 | 240 | 200 |
| SV 300 | Tank size (gal) | 120 | 240 | 200 |

Ordering Information

| System | Part No. | C | - | | | | | | XX |
|---|----------|---|---|--|--|--|--|--|----|
| Simplex | S | | | | | | | | |
| Duplex | D | | | | | | | | |
| Triplex | T | | | | | | | | |
| Pumps | | | | | | | | | |
| SV 16 (1 hp) | 016 | | | | | | | | |
| SV 25 (1.5 hp) | 025 | | | | | | | | |
| SV 40 B (2.5 hp) | 040 | | | | | | | | |
| SV 65 B (3 hp) | 065 | | | | | | | | |
| SV 100 B (4 hp) | 100 | | | | | | | | |
| SV 200 (7.5 hp) | 200 | | | | | | | | |
| SV 300 (10 hp) | 300 | | | | | | | | |
| Mounting | | | | | | | | | |
| Tank mount | T | | | | | | | | |
| Stack mount | S | | | | | | | | |
| Voltage | | | | | | | | | |
| 460/3/60 | A | | | | | | | | |
| 230/3/60 | B | | | | | | | | |
| 230/1/60 (available for SV 16/SV 25 only) | C | | | | | | | | |
| 208/3/60 (available for SV 25 only) | D | | | | | | | | |
| 115/1/60 (available for SV 16 only) | E | | | | | | | | |
| Duty | | | | | | | | | |
| Continuous | C | | | | | | | | |
| Demand Start/Stop | D | | | | | | | | |



Pumping speed characteristics for the central vacuum supply systems at 60 Hz

Only available for purchase in North and South America

Tank Mounted Medical Vacuum Systems

NFPA 99C compliant and designed for use in medical applications - hospitals, out-patient surgical and other medical facilities



Tank mounted medical vacuum system

Oerlikon Leybold Vacuum tank mounted systems are completely assembled with interconnecting piping, are factory tested and leak-checked prior to shipment.

Some items may be disassembled for protection during shipment.

Required mechanical re-assembly requirements will be clearly noted, as well as needed electrical connections, and are the responsibility of the installer.

System Features

Key features for these duplex systems include two SOGEVAC series oil sealed rotary vane vacuum pumps with displacements up to 69 cfm each, an ultimate vacuum of better than 29.95" Hg, and automatic oil recirculation system with integral coalescing exhaust demisters as standard. ASME rated receiver tanks, NEMA12 / UL listed electrical enclosure and inter-connecting hardware. Each turn-key system is fully assembled and tested at Oerlikon Leybold Vacuum's factory and includes an operation manual and 12 month warranty.

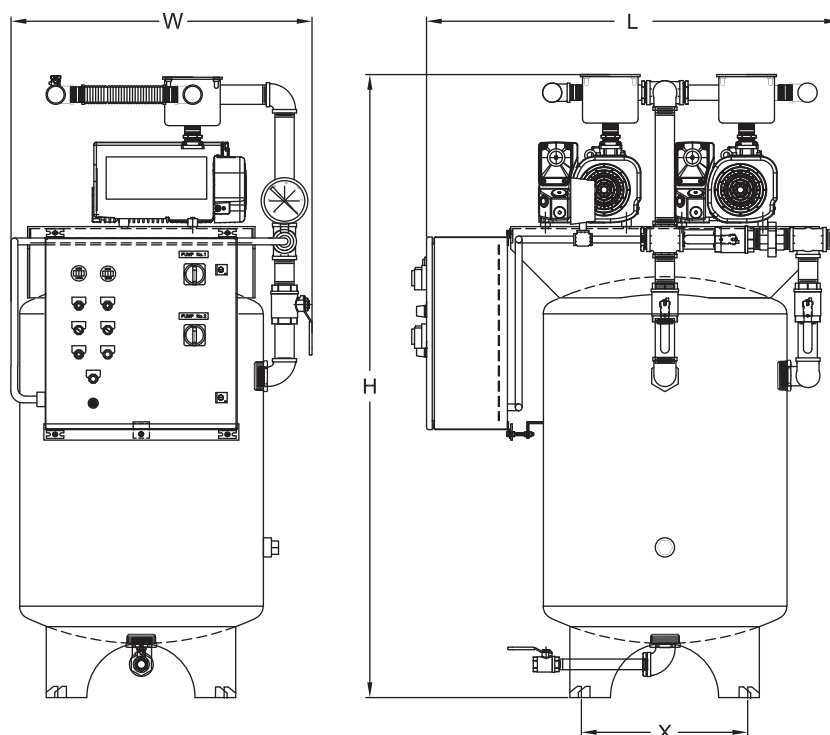
Other System Features

Vacuum pumps and systems:

- Direct-coupled TEFC, IP 55 rated motors
- Integral gas ballast
- Anti suck back valve
- Air-cooled design
- NPT type inlet and exhaust connections
- Inlet protection
 - particulate filters rated for 10 micron retention
 - Isolation ball valves
 - Pump check valves
- Vacuum gauge, 0 - 30" Hg
- Vertical receiver, ASME coded, manual drain valve and tank bypass

Local duplex motor control center:

- 2x magnetic motor starters with overload protection
- Main fused disconnect switch
- 2x through the door disconnect switches
- 2x individual control transformers
- 2x elapsed time meters
- 2x hand-off-auto switches
- Lag pump audible alarm with indicator light
- Automatic alternation
 - Lead / Lag operation
- 2x dual set-point vacuum switches
- Emergency stop
- NEMA12, UL listed enclosure
- System wired for either 208/230/460 V, 3 phase, 60 Hz operation



| Model | Vacuum tank (gal) | Length (L) | Height (H) | Width (W) | Base (X) |
|------------|-------------------|------------|------------|-----------|------------|
| VTMD-25-M | 80 | 42 (1067) | 72 (1829) | 32 (813) | 14.8 (376) |
| VTMD-40-M | 80 | 42 (1067) | 72 (1829) | 32 (813) | 14.8 (376) |
| VTMD-65-M | 120 | 52 (1321) | 76 (1930) | 34 (864) | 19.0 (483) |
| VTMD-100-M | 120 | 52 (1321) | 76 (1930) | 35 (889) | 19.0 (483) |

Tank mounted medical vacuum systems; dimensions in inch, dimensions in brackets () are in mm

Technical Data

VTMD-25-M VTMD-40-M VTMD-65-M VTMD-100-M

| | | | | | |
|-------------------------------------|----------|-----------|-----------|------------|------------|
| Displacement (per pump) | cfm | 18.3 | 31.2 | 41.8 | 69.0 |
| Capacity 19" HG (VAC) (per pump) | scfm | 6.7 | 11.4 | 15.3 | 25.1 |
| Motor (per pump) | hp (W) | 1.5 (2.0) | 2.0 (2.7) | 3.0 (4.1) | 5.0 (6.8) |
| Vacuum tank | gal | 80 | 80 | 120 | 120 |
| Vacuum inlet | NPT | 1.5" | 1.5" | 1.5" | 1.5" |
| Vacuum outlet ¹⁾ | NPT | 1.25" | 1.25" | 1.25" | 1.25" |
| Weight | lbs (kg) | 700 (305) | 750 (340) | 1125 (510) | 1300 (589) |

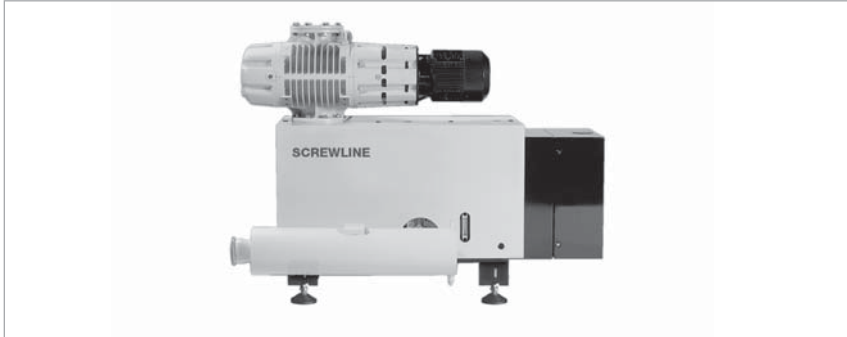
Ordering Information

VTMD-25-M VTMD-40-M VTMD-65-M VTMD-100-M

| | Part. No. | Part. No. | Part. No. | Part. No. |
|------------------------------------|-----------|-----------|-----------|-----------|
| Tank mounted medical vacuum system | | | | |
| 208 V, 3 phase, 60 Hz | S 170 530 | S 170 533 | S 170 499 | S 170 490 |
| 230 V, 3 phase, 60 Hz | S 170 531 | S 170 534 | S 170 536 | S 170 538 |
| 460 V, 3 phase, 60 Hz | S 170 532 | S 170 535 | S 170 537 | S 170 539 |

¹⁾ System consists of two outlet flanges

Dry Compressing Vacuum Pump System RUTA with SCREWLINE Backing Pump, Adaptor Version, without palette



RUTA WAU2001/SP630/A

Standard Equipment

- RUVAC WAU with air cooling
- RUVAC WH with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- Gear oil collecting pan integrated within the screw pump
- Gear oil supplied with the pump
- Screw pump SCREWLINE SP 630 F with water cooling

- Screw pump SCREWLINE SP 250 with air cooling
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- Frequency converter for controlling the speed of the Roots pump (only RUVAC WA/WS)

- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump SCREWLINE SP 630 with air cooling

| Type | RUTA | 501/SP250/A | 1001/SP250/A | 2001/SP630F/A | 700/SP250/A |
|------------------------|-----------------|--------------|--------------|---------------|--------------|
| RUVAC WA/WAU/WS/WSU | P2 | 501 | 1001 | 2001 | — |
| RUVAC WH | P2 | — | — | — | 700 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 630 F | SP 250 |
| | DN ₁ | 63 ISO-K | 100 ISO-K | 160 ISO-K | 100 ISO-K |
| | DN ₂ | 63 ISO-K | 63 ISO-K | 100 ISO-K | 63 ISO-K |
| | l | 1350 (53.15) | 1409 (55.47) | 1804 (71.02) | 1350 (53.15) |
| | l ₁ | 239 (9.41) | 298 (11.73) | 367 (14.45) | 258 (10.16) |
| | l ₂ | 533 (20.98) | 592 (23.31) | 882 (34.72) | 552 (21.73) |
| | l ₃ | 160 (6.30) | 219 (8.62) | 336 (13.23) | 179 (7.05) |
| | l ₄ | 880 (34.65) | 880 (34.65) | 880 (34.65) | 880 (34.65) |
| | b | 761 (29.96) | 828 (32.60) | 1059 (41.69) | 648 (25.51) |
| | b ₁ | 260 (10.24) | 306 (12.05) | 403 (15.87) | 260 (10.24) |
| | b ₂ | 438 (17.24) | 438 (17.24) | 546 (21.50) | 438 (17.24) |
| | b ₄ | 783 (30.83) | 783 (30.83) | 783 (30.83) | 783 (30.83) |
| | b ₅ | 470 (18.50) | 470 (18.50) | 470 (18.50) | 470 (18.50) |
| | h | 1213 (47.76) | 1239 (48.78) | 1342 (52.84) | 1158 (45.59) |
| | h ₁ | 954 (37.56) | 954 (37.56) | 1221 (48.07) | 949 (37.36) |

Dimensional drawing of the pump systems with dry compressing SCREWLINE SP backing pump, adaptor version, without palette.

Left with WAU pumps, right with WH pump. Dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA

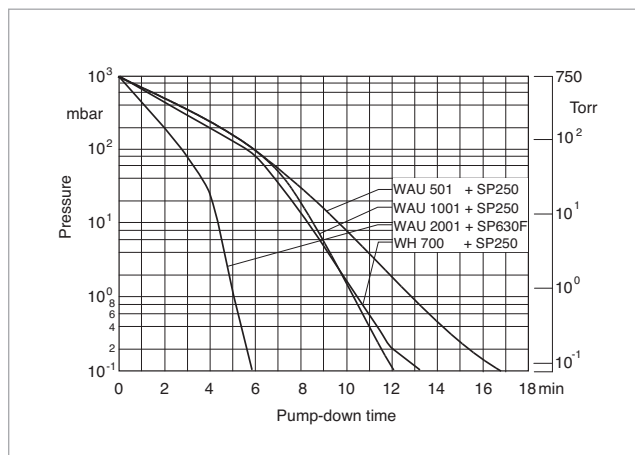
| | | WAU 501/SP250/A | WAU 1001/SP250/A | WAU 2001/SP630(F)/A | WH 700/SP250/A |
|--|---|--|--|--|--|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 501 | 1001 | 2001 | – |
| RUVAC WH | P2 | – | – | – | 700 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 630 (F) | SP 250 |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 445.0 (262.1) | 830.0 (488.9) | 1745.0 (1027.8) | 635 (374) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 9.7 (13.0) | 11.5 (15.6) | 22.5 (30.6) | 9.7 (13.0) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 6.3 (8.6) | 6.7 (9.1) | 12.0 (16.3) | 6.6 (8.9) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 75 | 77 | 79 | 75 |
| Total weight with palette, approx. | kg (lbs) | 720 (1187) | 850 (1876) | 1100 (2428) | 720 (1587) |
| Connecting flange | | | | | |
| Inlet port | DN ₁ | 63 ISO-K | 100 ISO-K | 160 ISO-K | 100 ISO-K |
| Outlet port | DN ₂ | 63 ISO-K | 63 ISO-K | 100 ISO-K | 63 ISO-K |

Ordering Information

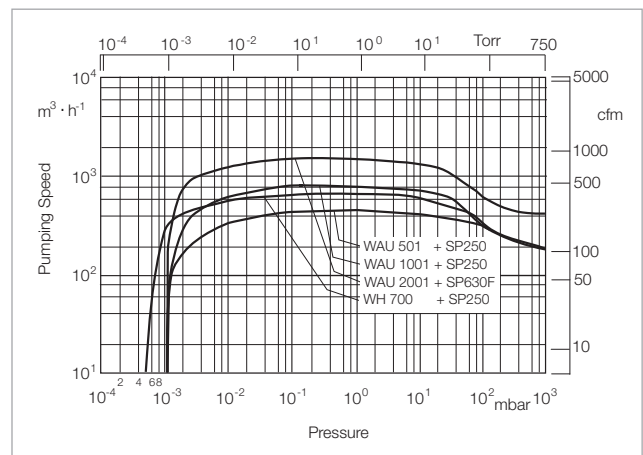
RUTA

| | | WAU 501/SP250/A | WAU 1001/SP250/A | WAU 2001/SP630(F)/A | WH 700/SP250/A |
|---|----|--------------------------------|---------------------------------|---------------------------------|-----------------------------------|
| | | Part No. | Part No. | Part No. | Part No. |
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 501 | WAU 1001 | WAU 2001 | – |
| RUVAC WH | P2 | | – | – | WH 700 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 630 (F) | SP 250 |
| Pump system, complete (adaptor version), Without pallet with water-cooled SCREWLINE | | 502 465 V001 | 502 467 V001 | 502 471 V001 | 503 153 V001 ¹⁾ |
| Frequency converter RUVATRONIC (see description in Chapter “Accessories”) | | RT 5/501 500 001 382 | RT 5/1001 500 001 383 | RT 5/2001 500 001 384 | – – |

¹⁾ Including external frequency converter

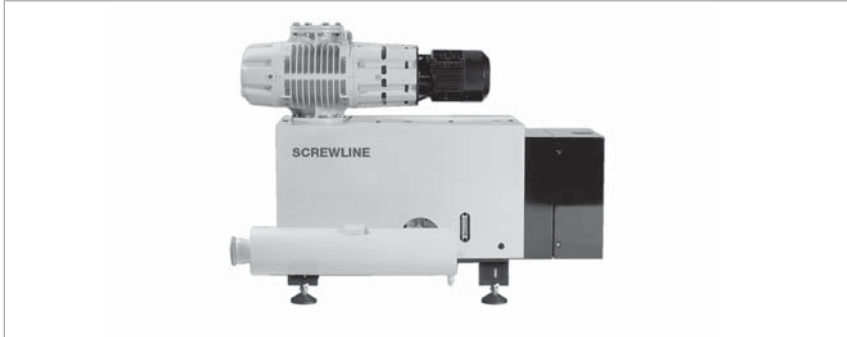


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE Backing Pump, Adaptor Version, with palette



RUTA WAU2001/SP630/A

Standard Equipment

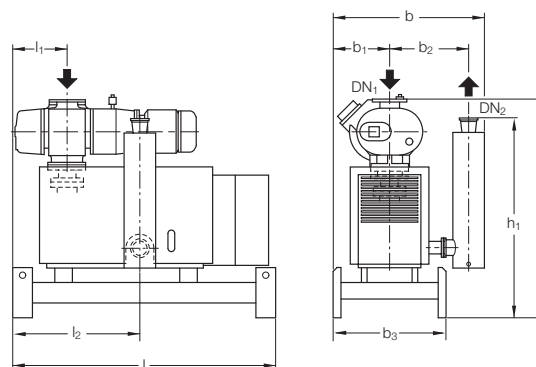
- RUVAC WAU with air cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- Gear oil collecting pan integrated within the screw pump
- Gear oil supplied with the pump
- Screw pump SCREWLINE SP 630 F with water cooling

- Screw pump SCREWLINE SP 250 with air cooling
- CE approval

Options

- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers

- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump SCREWLINE SP 630 with air cooling



| Type | | with palette | | |
|---|-----------------|--------------|--------------|---------------|
| RUVAC WA/WAU/WS/WSU Backing pump SCREWLINE | RUTA | 501/SP250/A | 1001/SP250/A | 2001/SP630F/A |
| | P2 | 501 | 1001 | 2001 |
| | P1 | SP 250 | SP 250 | SP 630 F |
| | DN ₁ | 63 ISO-K | 100 ISO-K | 160 ISO-K |
| | DN ₂ | 63 ISO-K | 63 ISO-K | 100 ISO-K |
| | l | 1448 (57.01) | 1488 (58.58) | 1850 (72.84) |
| | l ₁ | 287 (11.30) | 327 (12.87) | 379 (14.92) |
| | l ₂ | 581 (22.87) | 621 (24.45) | 894 (35.20) |
| | b | 923 (36.34) | 923 (36.34) | 1056 (41.58) |
| | b ₁ | 400 (15.75) | 400 (15.75) | 400 (15.75) |
| | b ₂ | 438 (17.24) | 438 (17.24) | 546 (21.50) |
| | b ₃ | 800 (31.50) | 800 (31.50) | 800 (31.50) |
| | h | 1377 (54.21) | 1403 (55.24) | 1509 (59.41) |
| | h ⁱ | 1121 (44.13) | 1121 (44.13) | 1388 (54.65) |

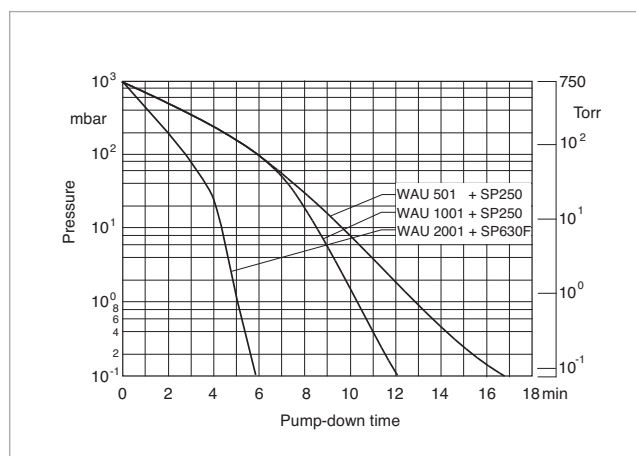
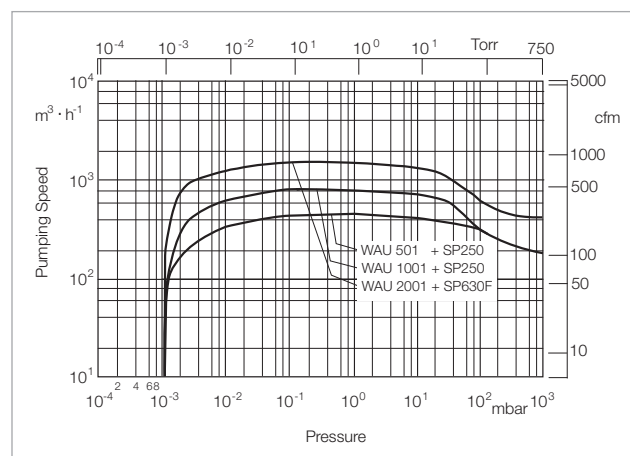
Dimensional drawing of the pump systems with dry compressing SCREWLINE SP backing pump, adaptor version; left and middle with palette, right on castors
Dimensions in brackets () are in inch

Technical Data, 50 Hz

| | | RUTA WAU | | |
|--|---|--|--|--|
| | | 501/SP250/A | 1001/SP250/A | 2001/SP630(F)/A |
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 501 | 1001 | 2001 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 630 (F) |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 445.0 (262.1) | 830.0 (488.9) | 1745.0 (1027.8) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 9.7 (13.2) | 11.5 (15.6) | 22.5 (30.6) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 6.3 (8.6) | 6.7 (9.1) | 12.0 (16.3) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 75 | 77 | 79 |
| Total weight with palette, approx. | kg (lbs) | 720.0 (1589.4) | 850.0 (1876.4) | 1100.0 (2428.3) |
| Connecting flange | | | | |
| Inlet port | DN ₁ | 63 ISO-K | 100 ISO-K | 160 ISO-K |
| Outlet port | DN ₂ | 63 ISO-K | 63 ISO-K | 100 ISO-K |

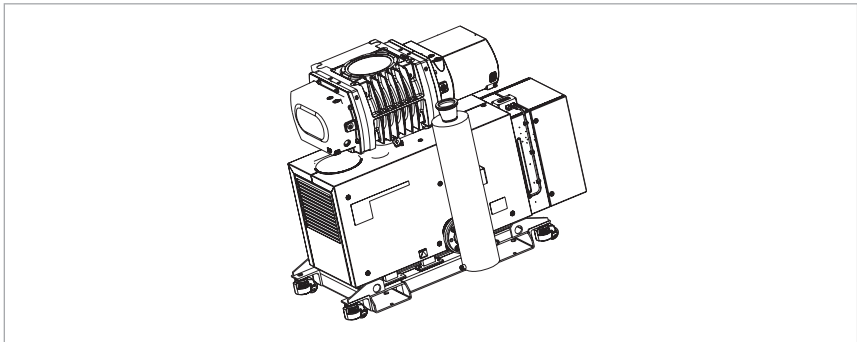
Ordering Information

| | | RUTA WAU | | |
|--|----|--------------------------------|---------------------------------|---------------------------------|
| | | 501/SP250/A | 1001/SP250/A | 2001/SP630(F)/A |
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 501 | WAU 1001 | WAU 2001 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 630 (F) |
| Pump system, complete (adaptor version), pallet mounted, with water-cooled SCREWLINE | | - | - | 502 472 V002 |
| with air-cooled SCREWLINE | | 502 466 V001 | 502 468 V001 | 502 472 V003 |
| Frequency converter RUVATRONIC (see description in Chapter "Accessories") | | RT 5/501 500 001 382 | RT 5/1001 500 001 383 | RT 5/2001 500 001 384 |


Pump-down time diagram for a 10 m³ tank at 50 Hz


Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE Backing Pump, Adaptor Version, with palette



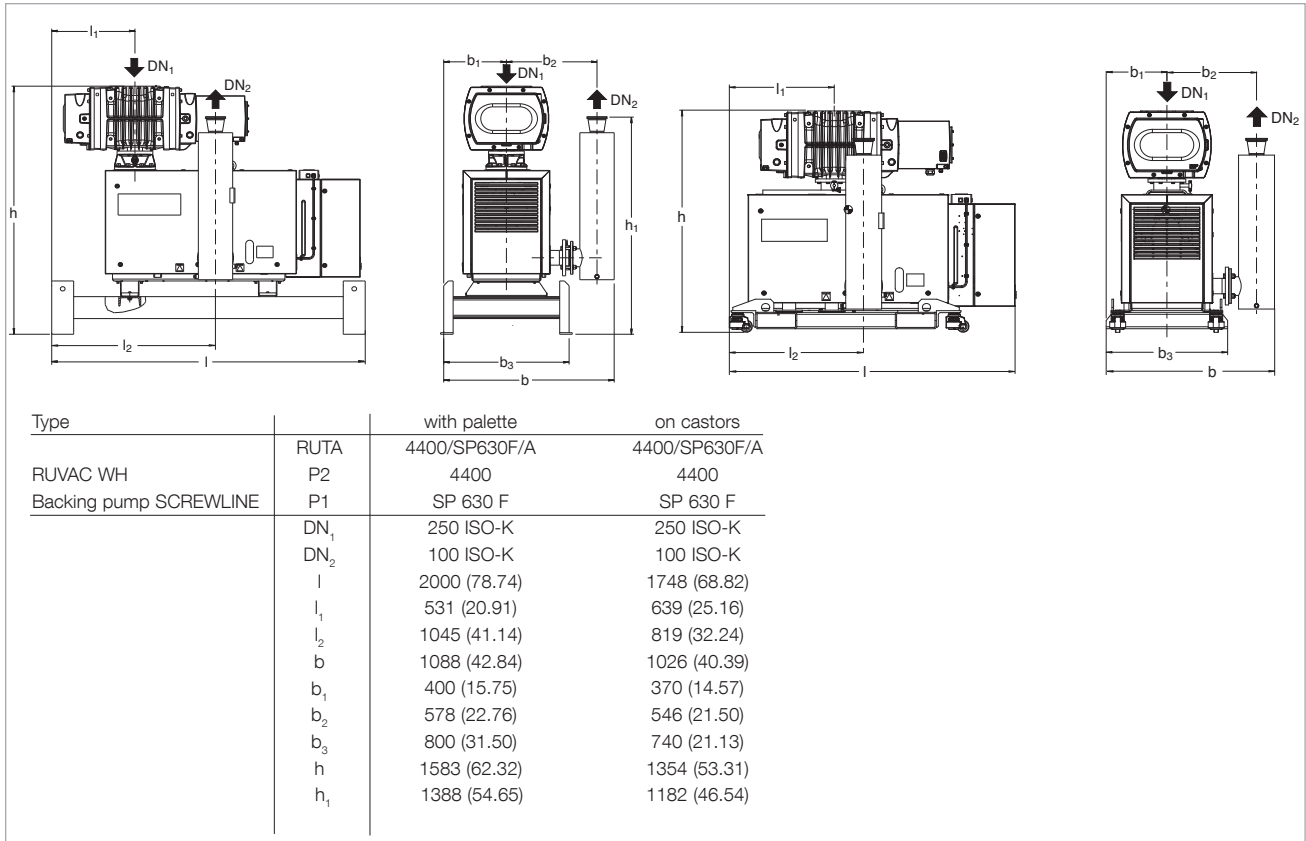
RUTA WH4400/SP630/A on castors

Standard Equipment

- RUVAC WH with water cooling
 - Silencer
 - SP-GUARD
 - Manually operated gas ballast
 - Gear oil collecting pan integrated within the screw pump
 - Gear oil supplied with the pump
 - Screw pump SCREWLINE SP 630 F with water cooling
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
 - CE approval
- Sound proofing box
 - Vibration absorbers
 - Castors
 - Different types of floor mounts
 - Oil drain valve on each pump
 - Electric control systems
 - Non-return valve
 - Screw pump SCREWLINE SP 630 with air cooling

Options

- Condensate drain valve at the silencer



Dimensional drawing of the pump systems with dry compressing SCREWLINE SP backing pump, adaptor version; left with palette, right on castors. Dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA WH 4400/SP630F/A

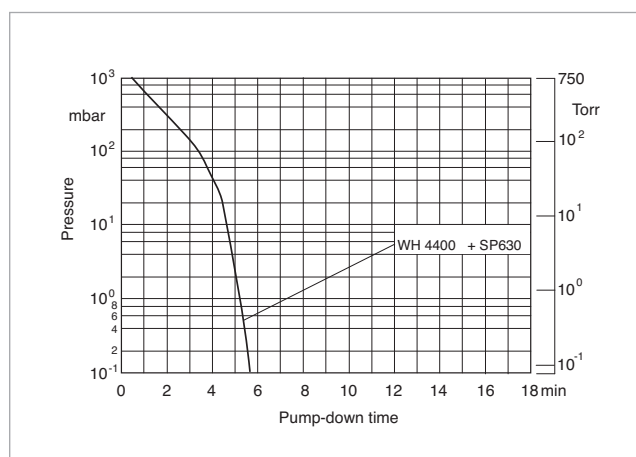
| | | |
|--|----|---|
| RUVAC WH | P2 | 4400 |
| Backing pump SCREWLINE | P1 | SP 630 F |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $\text{m}^3 \times \text{h}^{-1}$ (cfm) | | 3380 (1990) |
| Ultimate total pressure without gas ballast mbar (Torr) | | $< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$) |
| Installed motor power 400 V, 50 Hz kW (hp) | | 26.0 (34.9) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp) | | 12.93 (17.34) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A) | | 73 |
| Total weight with palette, approx. kg (lbs) on castors, approx. kg (lbs) | | 1350 (2932) 1980 (4365) |
| Connecting flange Inlet port DN ₁ Outlet port DN ₂ | | 250 ISO-K 100 ISO-K |

Ordering Information

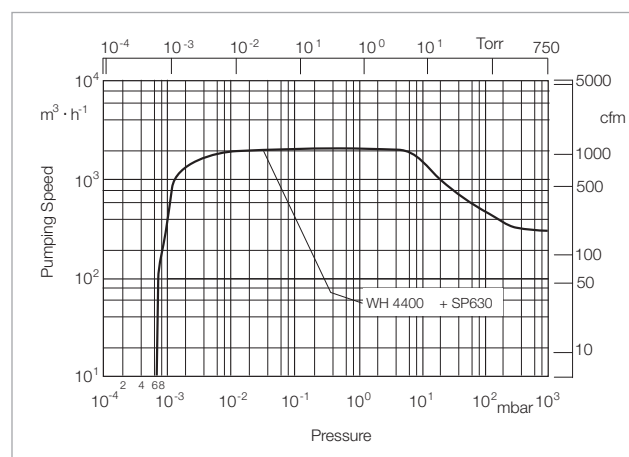
RUTA WH 4400/SP630F/A

| | | Part No. |
|---|----|--|
| RUVAC WH | P2 | 4400 |
| Backing pump SCREWLINE | P1 | SP 630 F |
| Pump system, complete (adaptor version), with water-cooled SCREWLINE pallet mounted castor mounted | | 503 162 V001 ¹⁾ 502 873 V001 ¹⁾ |

¹⁾ Including external frequency converter

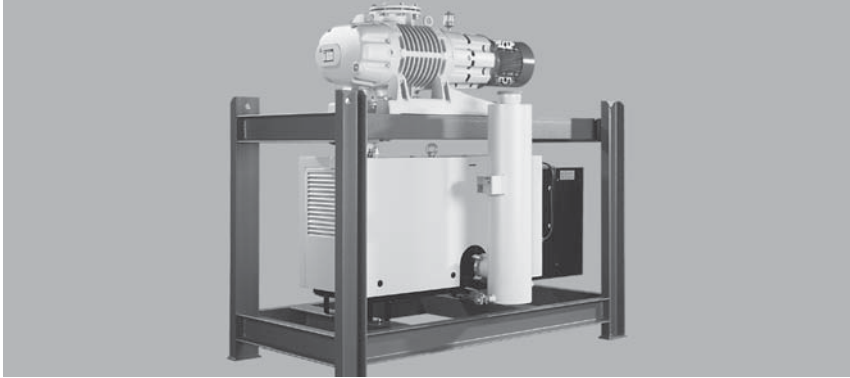


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 250 Backing Pump, Frame Version



RUTA WAU2001/SP630/G

Standard Equipment

- RUVAC WH with water cooling
- RUVAC WAU with air cooling
- SCREWLINE SP 250 with air cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump

- Crane eyes on the frame
- Floor mounting
- Gear oil supplied with the pump
- Screw pump with air cooling
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve

| Type | RUTA | 501/SP250/G | 1001/SP250/G | 2001/SP250/G | 700/SP250/G | 2500/SP250/G |
|------------------------|-----------------|--------------|--------------|--------------|--------------|--------------|
| RUVAC WA/WAU/WS/WSU | P2 | 501 | 1001 | 2001 | — | — |
| RUVAC WH | P2 | — | — | — | 700 | 2500 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 250 | SP 250 | SP 250 |
| | DN ₁ | 63 ISO-K | 100 ISO-K | 160 ISO-K | 100 ISO-K | 250 ISO-K |
| | DN ₂ | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K |
| | l | 1650 (64.96) | 1650 (64.96) | 1650 (64.96) | 1650 (64.96) | 1650 (64.96) |
| | l ₁ | 565 (22.24) | 565 (22.24) | 565 (22.24) | 564 (22.21) | 664 (26.14) |
| | l ₂ | 678 (26.69) | 678 (26.69) | 678 (26.69) | 678 (26.69) | 678 (26.69) |
| | b | 863 (33.98) | 863 (33.98) | 863 (33.98) | 863 (33.98) | 863 (33.98) |
| | b ₁ | 340 (13.39) | 340 (13.39) | 340 (13.39) | 340 (13.39) | 340 (13.39) |
| | b ₂ | 438 (17.24) | 438 (17.24) | 438 (17.24) | 438 (17.24) | 438 (17.24) |
| | b ₃ | 680 (26.77) | 680 (26.77) | 680 (26.77) | 680 (26.77) | 680 (26.77) |
| | h | 1670 (65.75) | 1771 (69.72) | 1947 (76.65) | 1580 (62.21) | 1739 (68.47) |
| | h ₁ | 1101 (43.35) | 1101 (43.35) | 1101 (43.35) | 1101 (43.35) | 1081 (42.56) |
| | h ₂ | 1330 (52.36) | 1375 (54.13) | 1417 (55.79) | 1290 (50.79) | 1315 (51.77) |

Dimensional drawing of the pump systems with dry compressing SCREWLINE SP 250 backing pump, frame version; dimensions in brackets () are in inch

Technical Data, 50 Hz

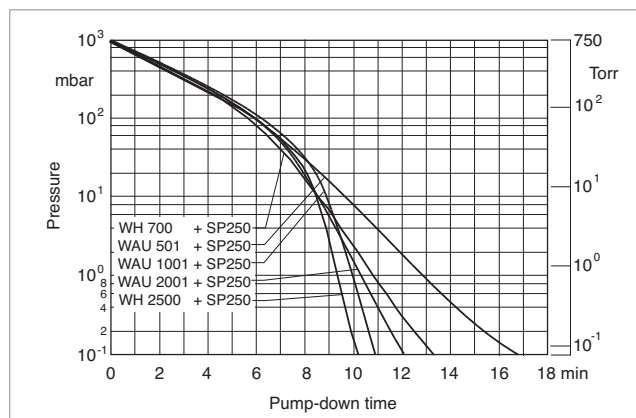
| | | WAU 501/ SP250/G | WAU 1001/ SP250/G | RUTA WAU 2001/ SP250/G | WH 700/ SP250/G | WH 2500/ SP250/G |
|--|---|---|---|---|---|--|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 501 | 1001 | 2001 | – | – |
| RUVAC WH | P2 | – | – | – | 700 | 2500 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 250 | SP 250 | SP 250 |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 445 (262) | 830.0 (489) | 1530 (901) | 635 (374) | 1680 (988) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 3 \times 10^{-3}$ ($< 2.2 \times 10^{-3}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 9.7 (13.2) | 11.5 (15.6) | 15.0 (20.4) | 9.7 (13.2) | 13.5 (18.1) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 6.3 (8.6) | 6.7 (9.1) | 7.6 (10.3) | 6.6 (8.9) | 7.3 (9.8) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 74 | 77 | 80 | 75 | 70 |
| Weight, total, approx. | kg (lbs) | 860 (1896) | 950 (2097) | 1140 (2517) | 860 (1896) | 1000 (2205) |
| Connecting flange | | | | | | |
| Inlet port | DN ₁ | 63 ISO-K | 100 ISO-K | 160 ISO-K | 100 ISO-K | 250 ISO-K |
| Outlet port | DN ₂ | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K | 63 ISO-K |

Ordering Information

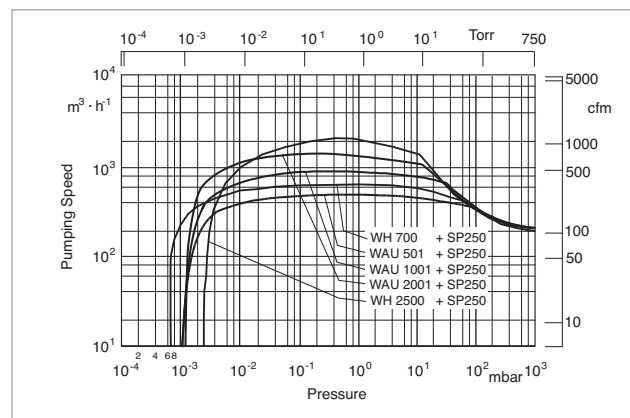
| | | WAU 501/ SP250/G | WAU 1001/ SP250/G | RUTA WAU 2001/ SP250/G | WH 700/ SP250/G | WH 2500/ SP250/G |
|--|---------------------|----------------------------------|----------------------------------|-----------------------------------|--------------------------------------|---------------------|
| | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 501 | WAU 1001 | WAU 2001 | – | – |
| RUVAC WH | P2 | – | – | – | 700 | 2500 |
| Backing pump SCREWLINE | P1 | SP 250 | SP 250 | SP 250 | SP 250 | SP 250 |
| Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump | | | | | | |
| RUVAC WAU | 502 531 V001 | 502 532 V001 | 502 533 V001 | – | – | – |
| RUVAC WH | – | – | – | 503 154 V001 ¹⁾ | 503 158 V001 ^{1, 2)} | |
| Frequency converter RUVATRONIC (see description in Chapter “Accessories”) | RT 5/501 | RT 5/1001 | RT 5/2001 | – | – | – |
| | 500 001 382 | 500 001 383 ²⁾ | 500 001 384 ²⁾ | – | – | – |

¹⁾ Including external frequency converter

²⁾ With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure

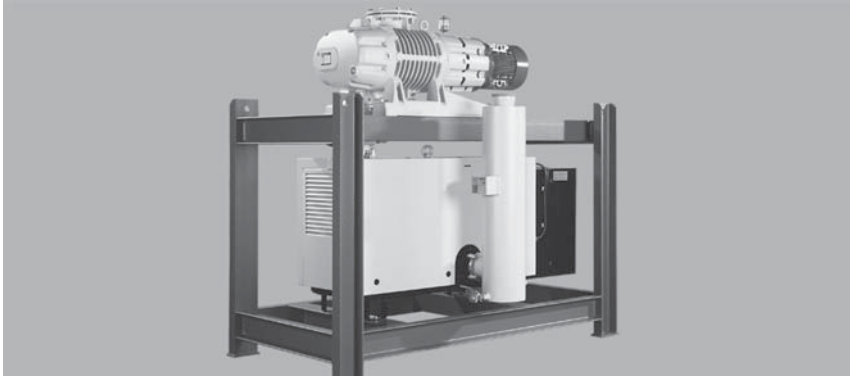


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 630 F Backing Pump, Frame Version



RUTA WAU2001/SP630F/G

Standard Equipment

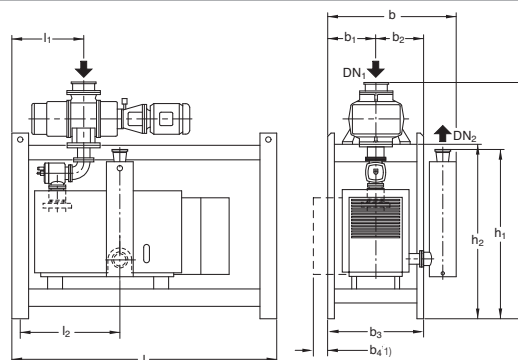
- RUVAC RA with water cooling
- SCREWLINE SP 630 F with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump
- Crane eyes on the frame

- Floor mounting
- Gear oil supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- Condensate drain valve at the silencer

- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump with air cooling



| Type | RUTA | 3001/SP630F/G | 5001/SP630F/G | 7001/SP630F/G | 9001/SP630F/G |
|------------------------|-----------------|---------------|---------------|---------------|---------------|
| RUVAC RA | P2 | 3001 | 5001 | 7001 | 9001 |
| Backing pump SCREWLINE | P1 | SP 630 F | SP 630 F | SP 630 F | SP 630 F |
| | DN ₁ | 250 ISO-K | 250 ISO-K | 250 ISO-K | 320 ISO-K |
| | DN ₂ | 100 ISO-K | 100 ISO-K | 100 ISO-K | 100 ISO-K |
| | l | 1960 (77.17) | 2400 (94.49) | 1960 (77.17) | 2340 (92.13) |
| | l ₁ | 600 (23.62) | 701 (27.60) | 600 (23.62) | 727 (28.62) |
| | l ₂ | 895 (35.24) | 995 (39.17) | 895 (35.24) | 1021 (40.20) |
| | b | 1056 (41.58) | 1116 (43.94) | 1116 (43.94) | 1171 (46.10) |
| | b ₁ | 400 (15.75) | 460 (18.11) | 460 (18.11) | 515 (20.28) |
| | b ₂ | 546 (21.50) | 546 (21.50) | 546 (21.50) | 546 (21.50) |
| | b ₃ | 800 (31.50) | 930 (36.61) | 920 (36.22) | 1030 (40.55) |
| | h | 2025 (79.72) | 2215 (87.21) | 2156 (84.88) | 2235 (87.99) |
| | h ₁ | 1388 (54.65) | 1388 (54.65) | 1388 (54.65) | 1388 (54.65) |
| | h ₂ | 1411 (55.55) | 1411 (55.55) | 1411 (55.55) | 1411 (55.55) |

Dimensional drawing of the pump systems RUTA with dry compressing SCREWLINE SP 630 F backing pump, frame version;
dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA RA

3001/SP630F/G 5001/SP630F/G 7001/SP630F/G 9001/SP630F/G

| | | | | | |
|--|---|---|---|---|---|
| RUVAC RA | P2 | 3001 | 5001 | 7001 | 9001 |
| Backing pump SCREWLINE | P1 | SP 630 F | SP 630 F | SP 630 F | SP 630 F |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 3050 (1797) | 4040.0 (2379.6) | 5030 (2963) | 6000 (3534) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 26.0 (35.0) | 30.0 (40.0) | 33.5 (45.0) | 37.0 (50.0) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 13.4 (18.2) | 13.5 (18.4) | 13.6 (18.5) | 13.2 (18.0) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 82 | 79 | 82 | 80 |
| Weight, total, approx. | kg (lbs) | 1550 (3420) | 1900 (4190) | 2000 (4410) | 2630 (5800) |
| Connecting flange | | | | | |
| Inlet port | DN ₁ | 250 ISO-K | 250 ISO-K | 250 ISO-K | 320 ISO-K |
| Outlet port | DN ₂ | 100 ISO-K | 100 ISO-K | 100 ISO-K | 100 ISO-K |

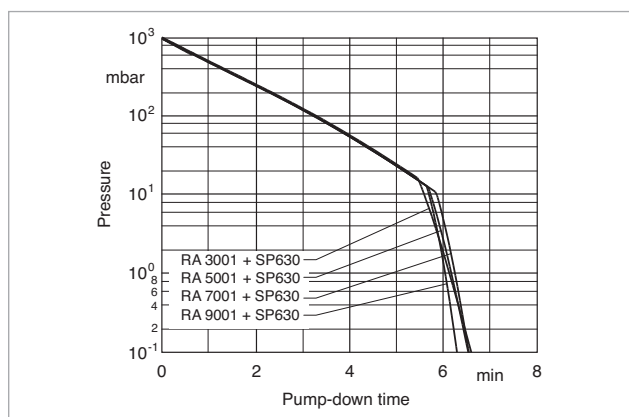
Ordering Information

RUTA RA

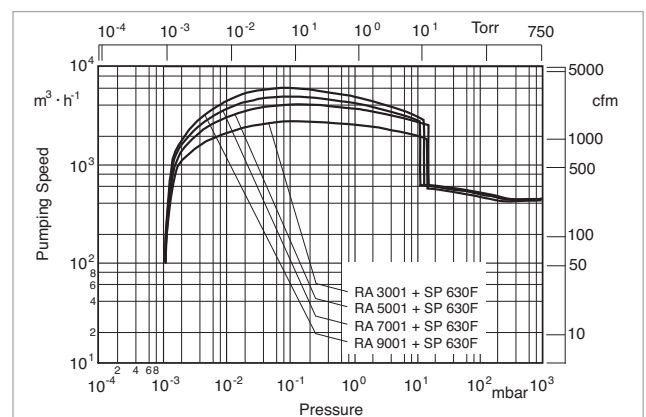
3001/SP630F/G 5001/SP630F/G 7001/SP630F/G 9001/SP630F/G

| | | Part No. | Part No. | Part No. | Part No. |
|---|----|---|---|---|---|
| RUVAC | P2 | RA 3001 | RA 5001 | RA 7001 | RA 9001 |
| Backing pump SCREWLINE | P1 | SP 630 F | SP 630 F | SP 630 F | SP 630 F |
| Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC RA with air-cooled vacuum pump Screw pump SCREWLINE SP 630 | | 502 512 V001 | 502 513 V001 | 502 514 V001 | 502 515 V001 |
| Frequency converter RUVATRONIC (see description in Chapter "Accessories") | | RT 5/3001 500 001 385 ¹⁾ | RT 5/5001 500 001 386 ¹⁾ | RT 5/7001 500 001 387 ¹⁾ | RT 5/9001 500 001 388 ¹⁾ |

¹⁾ With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure

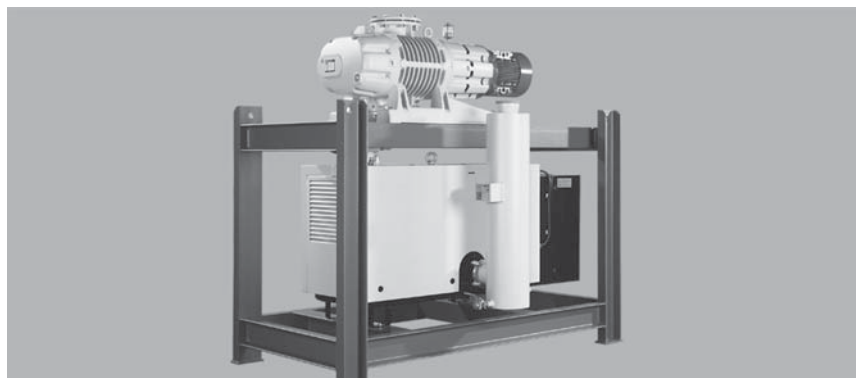


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 630 F Backing Pump, Frame Version



RUTA WAU2001/SP630F/G

Standard Equipment

- RUVAC WH with water cooling
- RUVAC WAU with air cooling
- SCREWLINE SP 630 F with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump
- Crane eyes on the frame
- Floor mounting
- Gear oil supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval
- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump with air cooling

Options

- Frequency converter for controlling the speed of the Roots pump (only RUVAC RA/WA/WS)

| Type | RUTA | 2001/SP630F/G | 2500/SP630F/G | 4400/SP630F/G | 7000/SP630F/G |
|------------------------|-----------------|---------------|---------------|---------------|---------------|
| RUVAC WA/WAU/WS/WSU | P2 | 2001 | — | 4400 | — |
| RUVAC WH | P2 | — | 2500 | — | 7000 |
| Backing pump SCREWLINE | P1 | SP 630 F | SP 630 F | SP 630 F | SP 630 F |
| | DN ₁ | 160 ISO-K | 250 ISO-K | 250 ISO-K | 320 ISO-K |
| | DN ₂ | 100 ISO-K | 63 ISO-K | 100 ISO-K | 100 ISO-K |
| | l | 1960 (77.17) | 2100 (82.68) | 2100 (82.68) | 2100 (82.68) |
| | l ₁ | 600 (23.62) | 819 (32.24) | 719 (28.31) | 719 (28.31) |
| | l ₂ | 895 (35.24) | 1012 (39.84) | 1012 (39.84) | 1012 (39.84) |
| | b | 1056 (41.58) | 1068 (42.05) | 1068 (42.05) | 1068 (42.05) |
| | b ₁ | 400 (15.75) | 400 (15.75) | 400 (15.75) | 400 (15.75) |
| | b ₂ | 546 (21.50) | 548 (21.58) | 548 (21.58) | 548 (21.58) |
| | b ₃ | 800 (31.50) | 800 (31.50) | 800 (31.50) | 800 (31.50) |
| | h | 1784 (70.24) | 1834 (72.21) | 1915 (75.39) | 1923 (75.71) |
| | h ₁ | 1388 (54.65) | 1388 (54.65) | 1388 (54.65) | 1388 (54.65) |
| | h ₂ | 1254 (49.37) | 1410 (55.51) | 1410 (55.51) | 1410 (55.51) |

Dimensional drawing of the pump systems RUTA with dry compressing SCREWLINE SP 630 F backing pump, frame version; dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA

| | | WAU 2001/SP630F/G | WH 2500/SP630F/G | WH 4400/SP630F/G | WH 7000/SP630F/G |
|--|---|---|---|---|---|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | 2001 | – | – | – |
| RUVAC WH | P2 | – | 2500 | 4400 | 7000 |
| Backing pump SCREWLINE | P1 | SP 630 F | SP 630 F | SP 630 F | SP 630 F |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 1745 (1028) | 1956 (1151) | 3380 (1990) | 5093 (2998) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 5 \cdot 10^{-3}$ ($< 3.7 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) | $< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 22.5 (30.0) | 21.5 (28.8) | 26.0 (34.9) | 26.0 (34.9) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 12.0 (16.3) | 11.7 (16.7) | 12.93 (17.34) | 13.11 (17.58) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 79 | 73 | 73 | 73 |
| Weight, total, approx. | kg (lbs) | 1300 (2866) | 1300 (2866) | 1550 (3417) | 1600 (3527) |
| Connecting flange | | | | | |
| Inlet port | DN ₁ | 160 ISO-K | 250 ISO-K | 250 ISO-K | 320 ISO-K |
| Outlet port | DN ₂ | 100 ISO-K | 63 ISO-K | 100 ISO-K | 100 ISO-K |

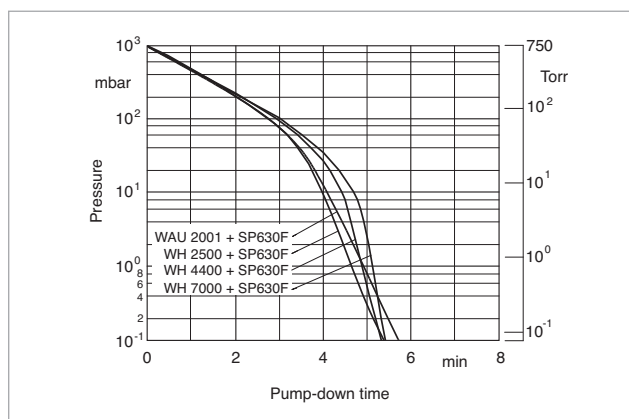
Ordering Information

RUTA

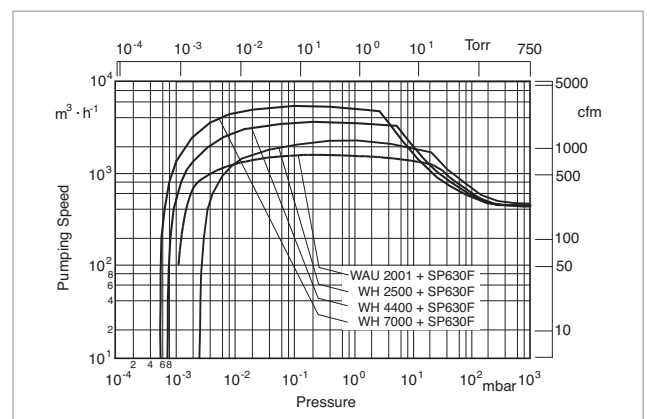
| | | WAU 2001/SP630F/G | WH 2500/SP630F/G | WH 4400/SP630F/G | WH 7000/SP630F/G |
|--|---------------------|---------------------------------------|---------------------------------------|---------------------------------------|------------------|
| | Part No. | Part No. | Part No. | Part No. | Part No. |
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WAU 2001 | – | – | – |
| RUVAC WH | P2 | – | 2500 | 4400 | 7000 |
| Backing pump SCREWLINE | P1 | SP 630 F | SP 630 F | SP 630 F | SP 630 F |
| Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC WAU | 502 511 V001 | – | – | – | – |
| with Roots vacuum pump RUVAC WH | – | 503 159 V001 ^{1), 2)} | 503 163 V001 ^{1), 2)} | 503 168 V001 ^{1), 2)} | |
| Frequency converter RUVATRONIC (see description in Chapter “Accessories”) | RT 5/2001 | – | – | – | – |
| | 500 001 384 | – | – | – | – |

¹⁾ Including external frequency converter

²⁾ With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure

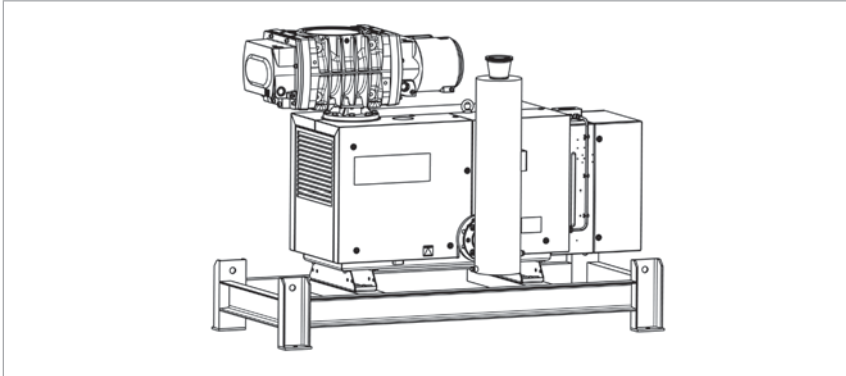


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 630 F Backing Pump, Adaptor Version



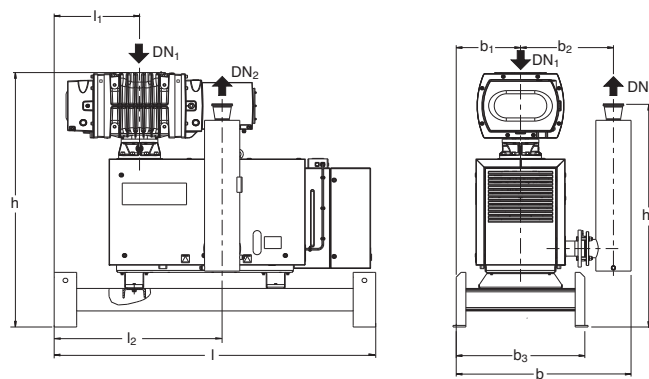
RUTA WH2500/SP630F/A

Standard Equipment

- RUVAC WH with water cooling
- SCREWLINE SP 630 F with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump
- Crane eyes on the frame
- Floor mounting
- Gear oil supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- Sound proofing box
- Vibration absorbers
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump with air cooling

Options

- Condensate drain valve at the silencer



| Type | RUTA | 2001/SP630F/A |
|------------------------|-----------------|---------------|
| RUVAC WH | P2 | 2500 |
| Backing pump SCREWLINE | P1 | SP 630 F |
| | DN ₁ | 250 ISO-K |
| | DN ₂ | 100 ISO-K |
| | l | 431 (16.97) |
| | l ₁ | 1045 (41.14) |
| | l ₂ | 2000 (78.74) |
| | b | 1088 (42.84) |
| | b ₁ | 400 (15.75) |
| | b ₂ | 578 (22.76) |
| | b ₃ | 800 (31.50) |
| | h | 1473 (57.99) |
| | h ₁ | 1388 (54.65) |

Dimensional drawing of the pump system with dry compressing SCREWLINE SP 630 F backing pump, adaptor version; dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA WH

2500/SP630F/A

| | | |
|--|---|---|
| RUVAC WH | P2 | 2500 |
| Backing pump SCREWLINE | P1 | SP 630 F |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 1956 (1151) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 5 \times 10^{-3}$ ($< 3.7 \times 10^{-3}$) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 21.5 (28.8) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 11.7(16.7) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | 73 |
| Weight, total, approx. | kg (lbs) | 1200 (2645) |
| Connecting flange | | |
| Inlet port | DN ₁ | 250 ISO-K |
| Outlet port | DN ₂ | 100 ISO-K |

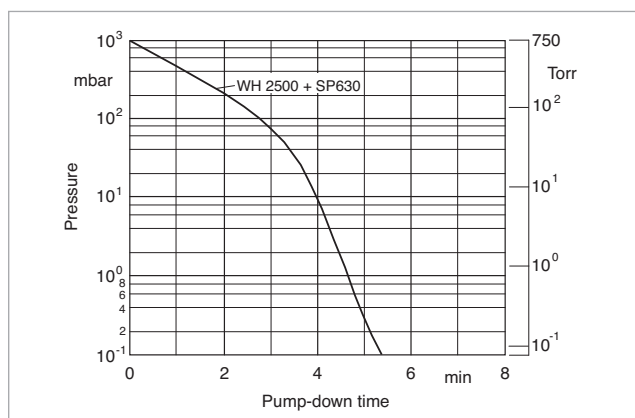
Ordering Information

RUTA WH

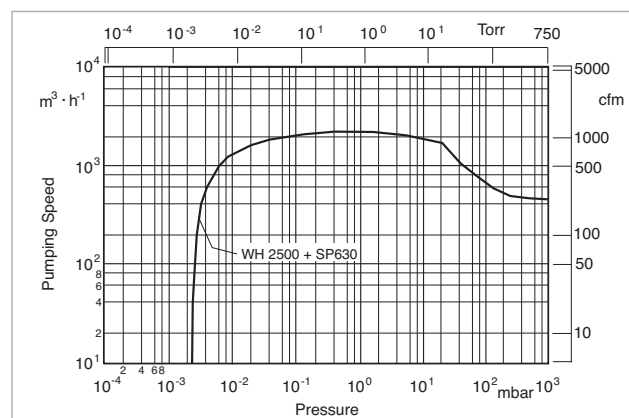
2500/SP630F/A

| | | Part No. |
|--|----|----------------------------|
| RUVAC WH | P2 | 2500 |
| Backing pump SCREWLINE | P1 | SP 630 F |
| Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WH | | 503 160 V001 ¹⁾ |

¹⁾ Including external frequency converter



Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Pump Systems (Only available for purchase in North and South America)

SP Close-Coupled Systems with SP Dry Compressing Backing Pumps



SP close-coupled system

Advantages to the User

- Reduced maintenance and lower operating costs
- Compact close-coupled design without frame
- Oil-free compression in multiple pump stages
- Optimum leak tightness with WSU boosters
- Air-cooled
- Assembled and tested

Standard Equipment

- SCREWLINE SP 630 / WSU 1001 close-coupled pump system offering 645 ACFM at 0.3 Torr vacuum
- SCREWLINE SP 630 / WSU2001 close-coupled pump system offering 1235 ACFM at 0.3 Torr vacuum

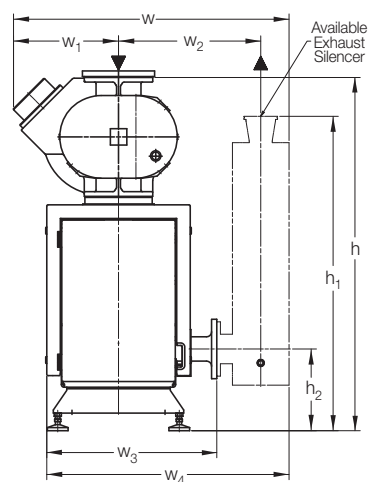
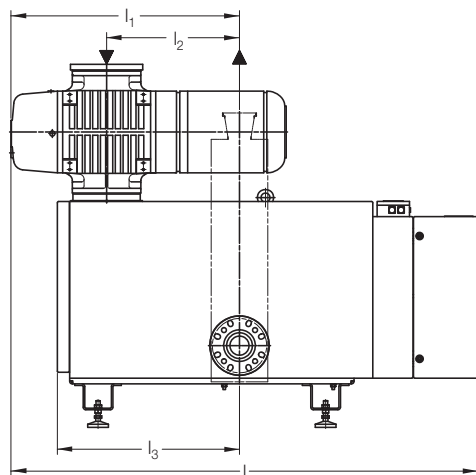
Options

- Electrical controls
- Exhaust silencer (loose)
- Inlet filter (loose)

The screw pump SCREWLINE SP 630 dry compressing screw-type vacuum pump is an environmentally friendly alternative to traditional oil sealed rotary piston and vane vacuum pumps. This innovative and robust vacuum pump produces a pumping speed of 371 cfm and better than 0.0075 Torr vacuum. SP 630 major advantages include improved environment, reduced maintenance, lower operating costs through less disposal and the elimination of expensive water cooling all with no oil contamination as the need for lubricating oil in the pumps' compression stage has been eliminated.

When used in conjunction with the Oerlikon Leybold Vacuum WSU booster pumps, pumping speeds can be significantly increased while achieving oil-free compression in multiple vacuum pump stages.

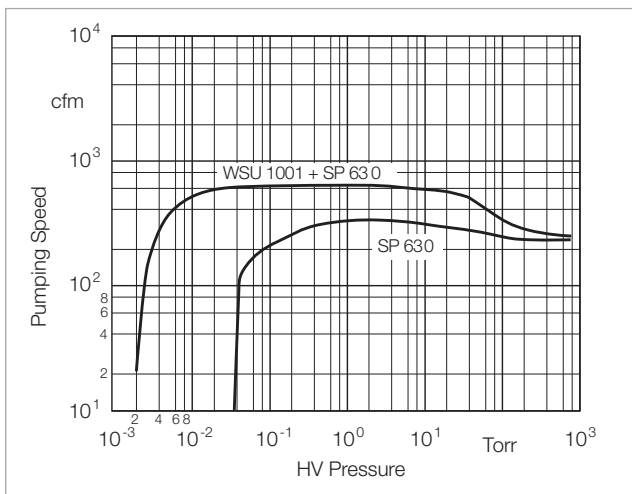
Oerlikon Leybold Vacuum WSU boosters offer a canned motor design, which eliminates the need for shaft seals and flanged-on motors. A vacuum tight can separates the motor rotor and stator coils. This unique Oerlikon Leybold Vacuum design provides the advantage of a more leak tight vacuum system. The WSU version booster incorporates a by-pass valve feature, which allows for automatic adjustment to varying pressure differentials between the inlet and outlet of the pump. The result is elimination of costly pressure switches/ amplifiers and faster pump down while starting at atmospheric pressure with the aforementioned SP 630 vacuum pump.



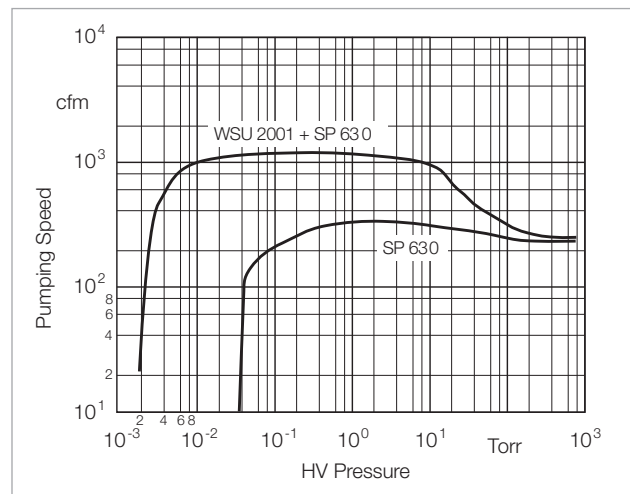
| Roots Pump | Vane Pump | h | h ₁ | h ₂ | l | l ₁ | l ₂ |
|------------|-----------|-----------------|----------------|----------------|----------------|----------------|----------------|
| WSU 1001 | SP 630 | 50 1/4 (1276) | 47 7/8 (1216) | 12 7/16 (316) | 68 1/2 (1740) | 32 3/16 (818) | 20 1/4 (514) |
| WSU 2001 | SP 630 | 53 25/32 (1366) | 47 7/8 (1216) | 12 7/16 (316) | 71 5/32 (1807) | 34 13/16 (884) | 20 1/4 (514) |

| Roots Pump | Vane Pump | l ₃ | w | w ₁ | w ₂ | w ₃ | w ₄ |
|------------|-----------|----------------|-----------------|----------------|----------------|----------------|----------------|
| WSU 1001 | SP 630 | 27 3/4 (705) | 37 31/32 (964) | 12 (305) | 21 21/32 (550) | 25 7/8 (657) | 36 29/32 (937) |
| WSU 2001 | SP 630 | 27 3/4 (705) | 41 31/32 (1066) | 16 (406) | 21 21/32 (550) | 25 7/8 (657) | 36 29/32 (937) |

Dimensional drawing for the SP close-coupled system with SCREWLINE SP 630 dry compressing backing pumps; dimensions in brackets () are in mm



Pumping speed diagram for the SP close-coupled system with WSU 1001 Roots blower and SCREWLINE SP 630 at 60 Hz



Pumping speed diagram for the SP close-coupled system with WSU 2001 Roots blower and SCREWLINE SP 630 at 60 Hz

Technical Data, 60 Hz

SP Close-Coupled Systems

1001/SP630

2001/SP630

| | | | |
|---|--|--|--|
| RUVAC (WSU possible) | P2 | 1001 | 2001 |
| Backing pump SCREWLINE | P1 | SP 630 | SP 630 |
| Pumping speed 60 Hz at 0.3 Torr | m ³ x h ⁻¹ (cfm) | 1.092 (643) | 2.085 (1,227) |
| Ultimate total pressure without gas ballast | mbar (Torr) | < 1 x 10 ⁻³ (< 7.5 x 10 ⁻⁴) | < 1 x 10 ⁻³ (< 7.5 x 10 ⁻⁴) |
| Installed motor power | kW (hp) | 16.2 (21.6) | 22.5 (30.0) |
| Noise level with silencer at 10 ⁻¹ mbar (7.5 x 10 ⁻² Torr) | dB(A) | 78 | 79 |
| Weight, total, approx. | kg (lbs) | 870 (1922) | 1100 (2430) |
| Connecting flange | | | |
| Inlet port | DN ₁ | 160 ISO-K | 160 ISO-K |
| Outlet port | DN ₂ | 100 ISO-K | 100 ISO-K |

Ordering Information

SP Close-Coupled Systems

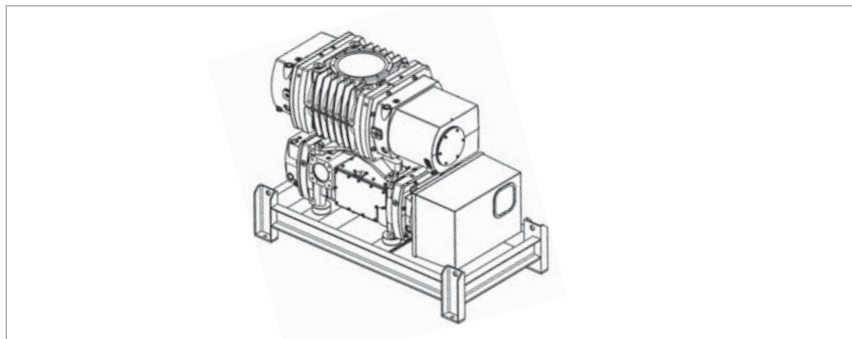
1001/SP630

2001/SP630

| | | Part No. | Part No. |
|--|----|----------------------|----------------------|
| RUVAC (WA/WAU/WS/WSU possible) | P2 | WSU 1001 | WSU 2001 |
| Backing pump SCREWLINE | P1 | SP 630 | SP 630 |
| Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WAU | | 180 038 V1600 | 180 038 V2600 |

Further Products

Dry Compressing Vacuum Pump System RUTA with DRYVAC DV 650 Backing Pump, Adaptor Version



RUTA WH4400/DV650/A

Standard Equipment

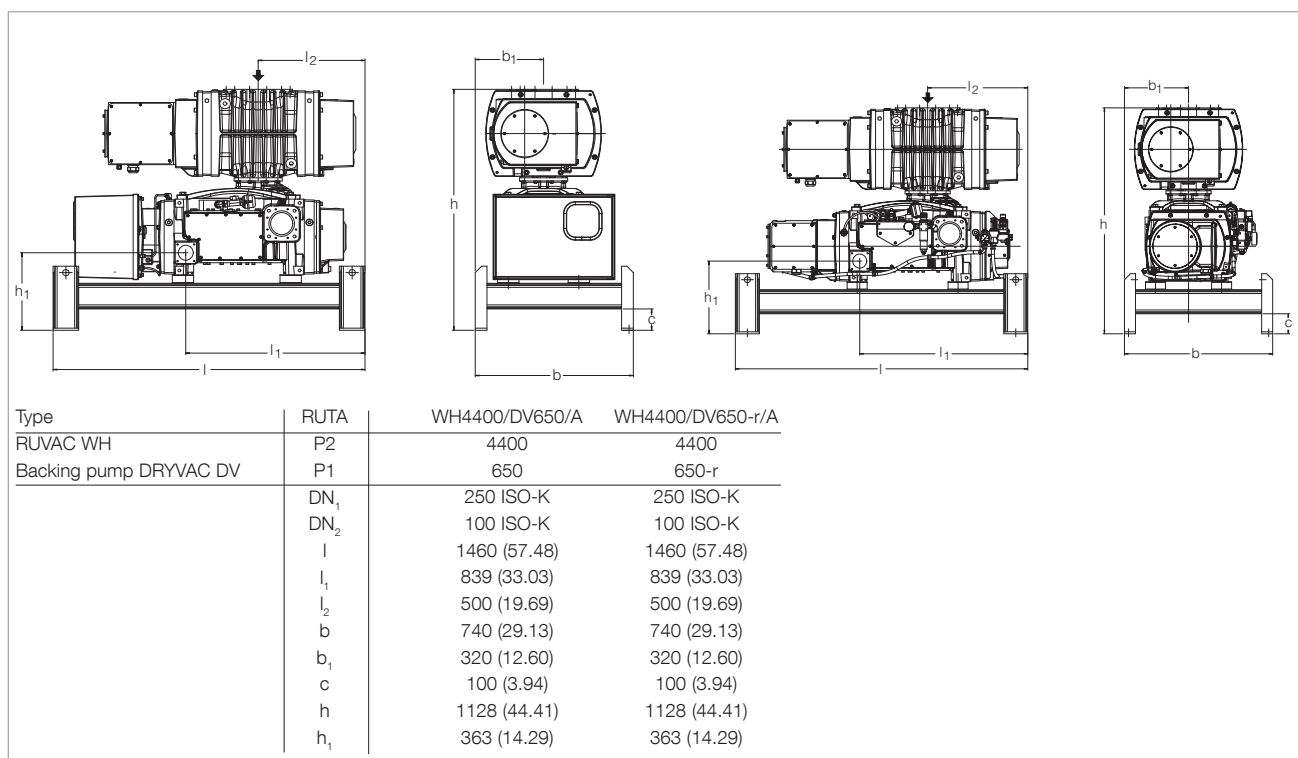
- RUVAC WH and DRYVAC with water cooling
- DRYVAC DV with built-in frequency converter
- DRYVAC DV-r including external frequency converter
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)

- Innovative motor design with efficiency class IE2
- Gas ballast with manual valve
- Leak detection port
- Lubricant: synthetic oil (LVO 210)

Options

- Exhaust silencer
- Bus interface
- Non-return valve for DRYVAC

- Seal gas connection
- Gear chamber evacuation RUVAC WH
- Frequency converter for RUVAC pump
- Electrical controller
- Oil drain tap
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Dimensional drawing of the pump system with dry compressing DRYVAC DV 650 (left) and DV 650-r (right) backing pump, adaptor version; dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA WH

4400/DV650/A

4400/DV650-r/A

| | | | |
|--|---|--|--|
| RUVAC WH | P2 | 4400 | 4400 |
| Backing pump DRYVAC DV | P1 | 650 | 650-r |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 3400 (2000) | 3400 (2000) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 5.0 \cdot 10^{-4}$ (3.8×10^{-4}) | $< 5.0 \cdot 10^{-4}$ (3.8×10^{-4}) |
| Installed motor power 400 V, 50 Hz | kW (hp) | 26.0 (34.9) | 26.0 (34.9) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 9.3 (12.5) | 9.3 (12.5) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) | dB(A) | < 68 | < 68 |
| Weight, total, approx. | kg (lbs) | 1550 (3417) | 1550 (3417) |
| Connecting flange | | | |
| Inlet port | DN ₁ | 250 ISO-K | 250 ISO-K |
| Outlet port | DN ₂ | 100 ISO-K | 100 ISO-K |

Ordering Information

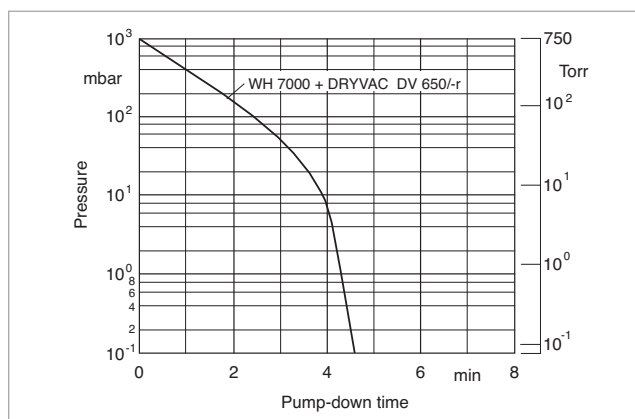
RUTA WH

4400/DV650/A

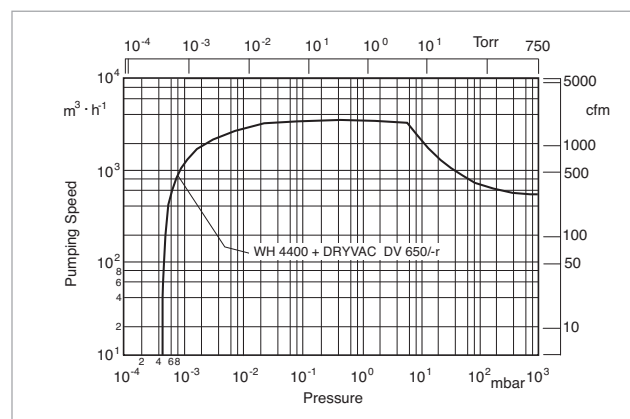
4400/DV650-r/A

| | | Part No. | Part No. |
|--|----|-----------------------------------|-----------------------------------|
| RUVAC WH | P2 | 4400 | 4400 |
| Backing pump DRYVAC DV | P1 | 650 | 650-r |
| Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WH | | 503 166 V001 ¹⁾ | 503 167 V001 ¹⁾ |

¹⁾ Including external frequency converter

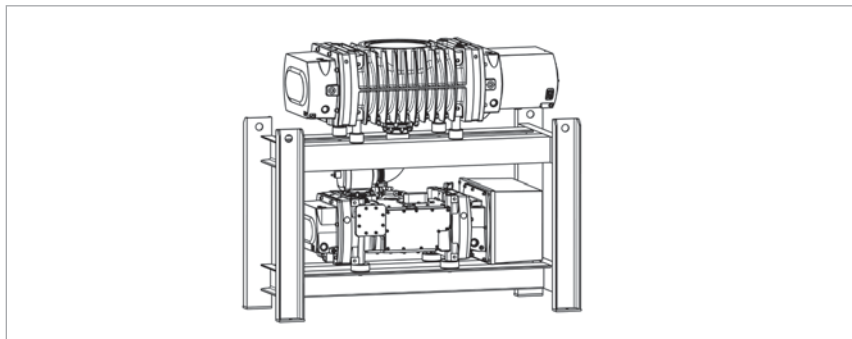


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with DRYVAC DV 650 Backing Pump, Frame Version



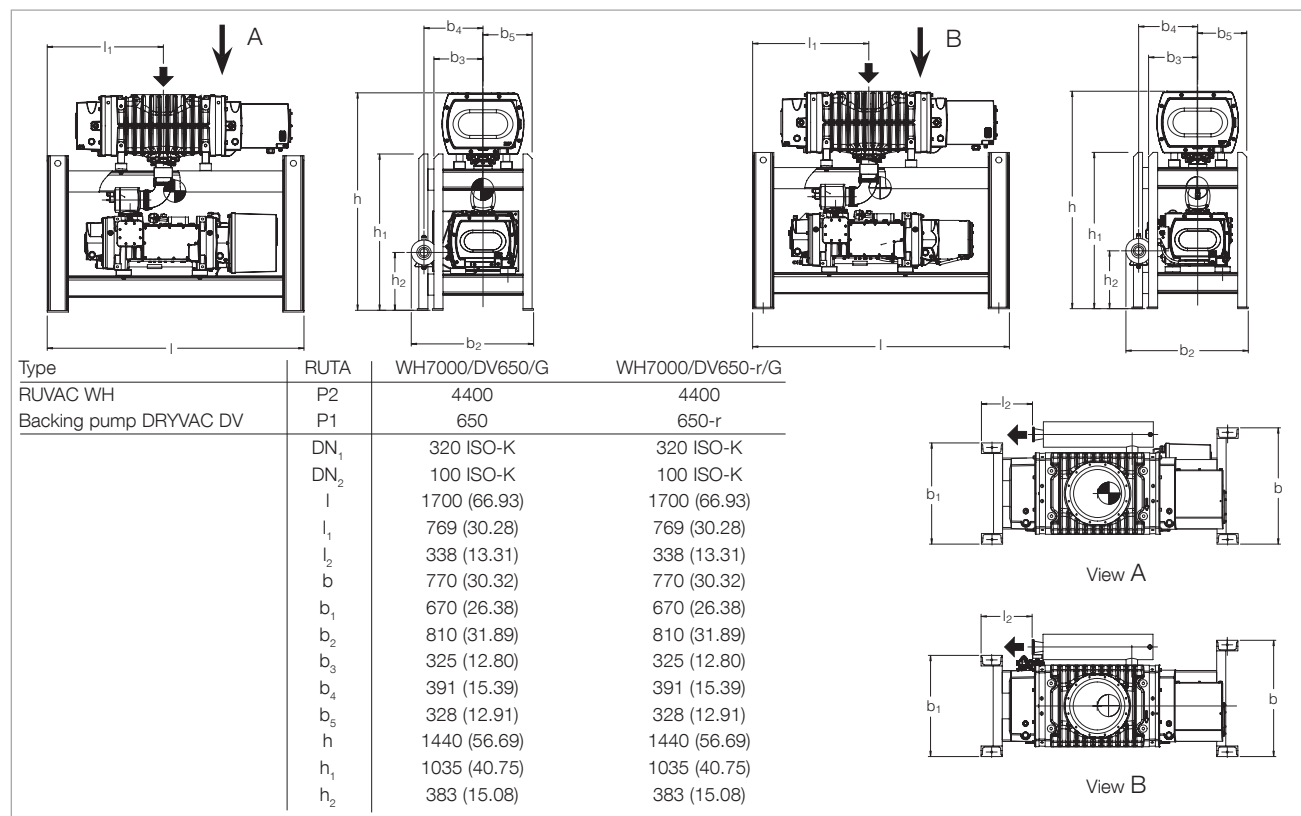
RUTA WH7000/DV650/G

Standard Equipment

- RUVAC WH and DRYVAC with water cooling
- DRYVAC DV with built-in frequency converter
- DRYVAC DV-r including external frequency converter
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Innovative motor design with efficiency class IE2
- Gas ballast with manual valve
- Leak detection port
- Lubricant: synthetic oil (LVO 210)
- SECUVAC valve 24 V DC
- Gear chamber evacuation RUVAC WH
- Electrical controller
- Oil drain tap
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides

Options

- Exhaust silencer
- Bus interface
- Non-return valve for DRYVAC
- Seal gas connection



Dimensional drawing of the pump system with dry compressing DRYVAC DV 650 (left) and DV 650-r (right) backing pump, frame version; dimensions in brackets () are in inch; (shown with optional silencer)

Technical Data, 50 Hz

RUTA WH

7000/DV650/G

7000/DV650-r/G

| | | | |
|--|----|--|--|
| RUVAC WH | P2 | 7000 | 7000 |
| Backing pump DRYVAC DV | P1 | 650 | 650-r |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $\text{m}^3 \times \text{h}^{-1}$ (cfm) | | 5100 (3001) | 5100 (3001) |
| Ultimate total pressure without gas ballast mbar (Torr) | | $< 5.0 \cdot 10^{-4}$ (3.8×10^{-4}) | $< 5.0 \cdot 10^{-4}$ (3.8×10^{-4}) |
| Installed motor power 400 V, 50 Hz kW (hp) | | 26.0 (34.9) | 26.0 (34.9) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp) | | 9.36 (12.56) | 9.36 (12.56) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A) | | < 68 | < 68 |
| Weight, total, approx. kg (lbs) | | 1600 (3527) | 1600 (3527) |
| Connecting flange | | | |
| Inlet port DN ₁ | | 320 ISO-K | 320 ISO-K |
| Outlet port DN ₂ | | 100 ISO-K | 100 ISO-K |

Ordering Information

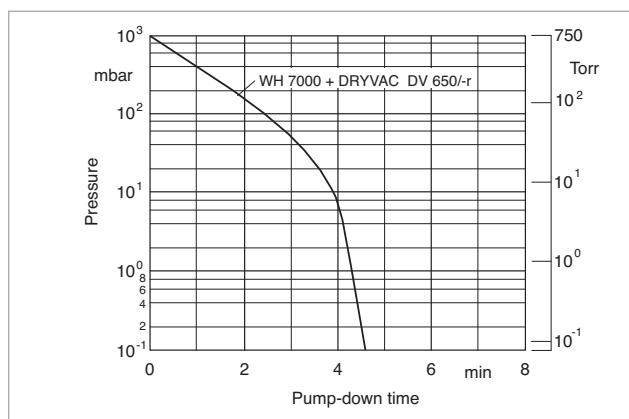
RUTA WH

7000/DV650/G

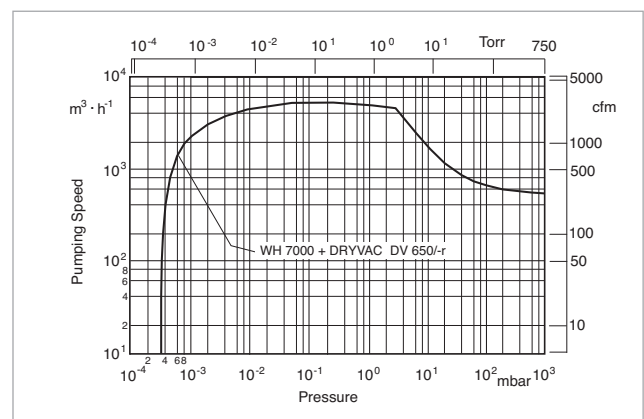
7000/DV650-r/G

| | | Part No. | Part No. |
|---|----|-----------------------------------|-----------------------------------|
| RUVAC WH | P2 | 7000 | 7000 |
| Backing pump DRYVAC DV | P1 | 650 | 650-r |
| Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC WH | | 503 170 V001 ¹⁾ | 503 171 V001 ¹⁾ |

¹⁾ Including external frequency converter

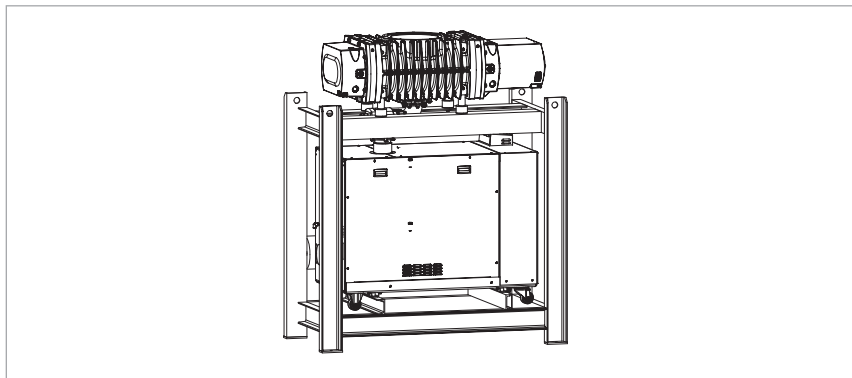


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with DRYVAC DV 1200 Backing Pump, Frame Version



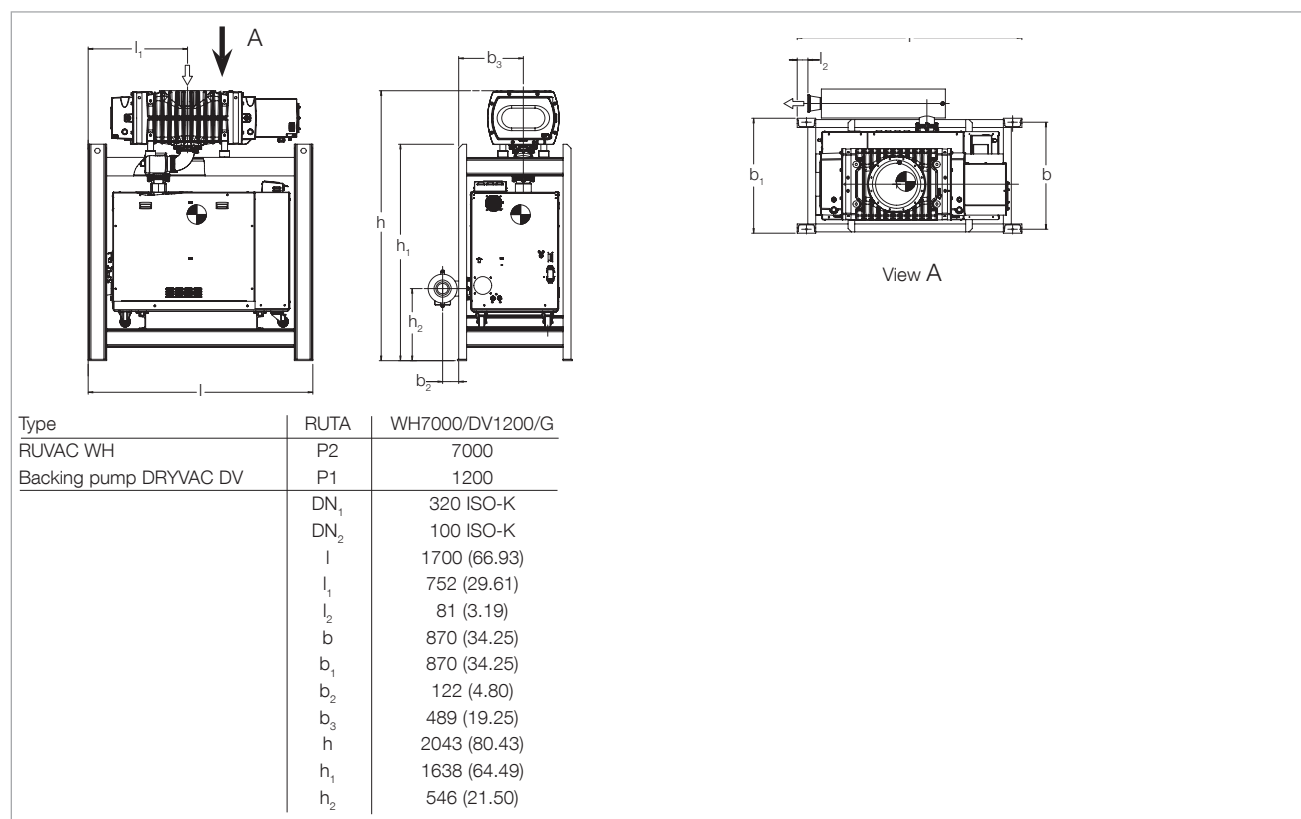
RUTA WH7000/DV1200/G

Standard Equipment

- RUVAC WH and DRYVAC with water cooling
- DRYVAC DV 1200 with built-in frequency converter
- RUVAC WH with water cooling and external frequency converter
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Innovative motor design with efficiency class IE2
- Gas ballast with electropneumatic valve 24 V DC
- Integrated valve 24 V DC for seal gas supply
- Leak detection port
- Control via Profibus (DRYVAC)
- Lubricant: synthetic oil (LVO 210)

Options

- Exhaust silencer
- Bus interface
- Non-return valve for DRYVAC
- Seal gas connection
- Gear chamber evacuation
- Electrical controller
- Oil drain tap
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides



Dimensional drawing of the pump system with dry compressing DRYVAC DV 1200, frame version; dimensions in brackets () are in inch

Technical Data, 50 Hz

RUTA WH

7000/DV1200/G

| | | |
|--|----|---|
| RUVAC WH | P2 | 7000 |
| Backing pump DRYVAC DV | P1 | 1200 |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $\text{m}^3 \times \text{h}^{-1}$ (cfm) | | 5537 (3259) |
| Ultimate total pressure without gas ballast mbar (Torr) | | $< 6.0 \times 10^{-4}$ (4.5×10^{-4}) |
| Installed motor power 400 V, 50 Hz kW (hp) | | 41.0 (55) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp) | | 16.2 (21.7) |
| Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A) | | < 68 |
| Weight, total, approx. kg (lbs) | | 2450 (5410) |
| Connecting flange | | |
| Inlet port DN ₁ | | 320 ISO-K |
| Outlet port DN ₂ | | 100 ISO-K |

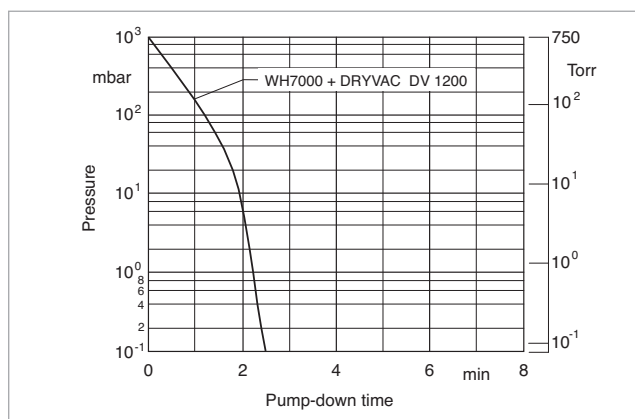
Ordering Information

RUTA WH

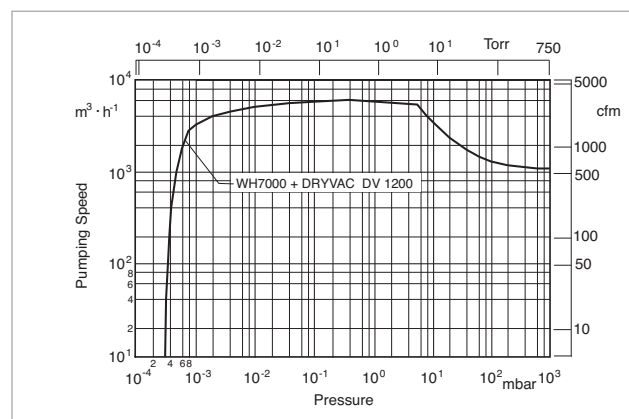
7000/DV1200/G

| | | Part No. |
|---|----|-----------------------------------|
| RUVAC WH | P2 | 7000 |
| Backing pump DRYVAC DV | P1 | 1200 |
| Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC WH | | 503 172 V001 ¹⁾ |

¹⁾ Including external frequency converter

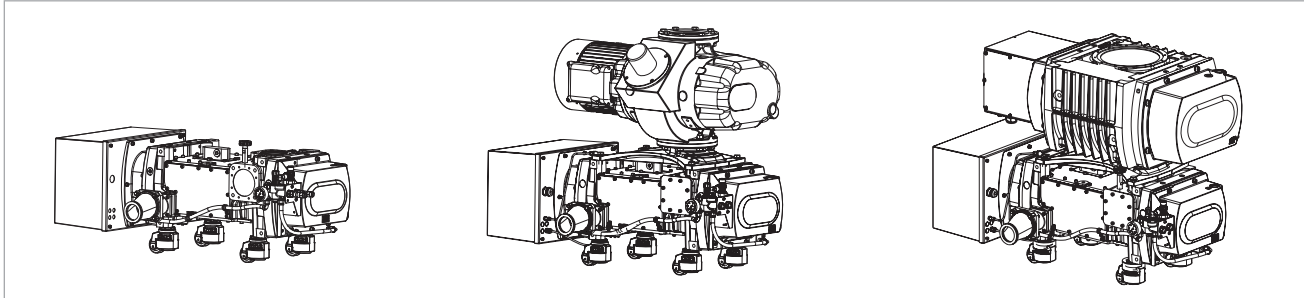


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

DRYVAC Load Lock Pump Systems Adaptor Version



DRYVAC load lock pump system RUTA DV650S (left), RUTA WSU2001/DV650S/A (middle) and RUTA WHU4400/DV650S/A (right)

Standard Equipment

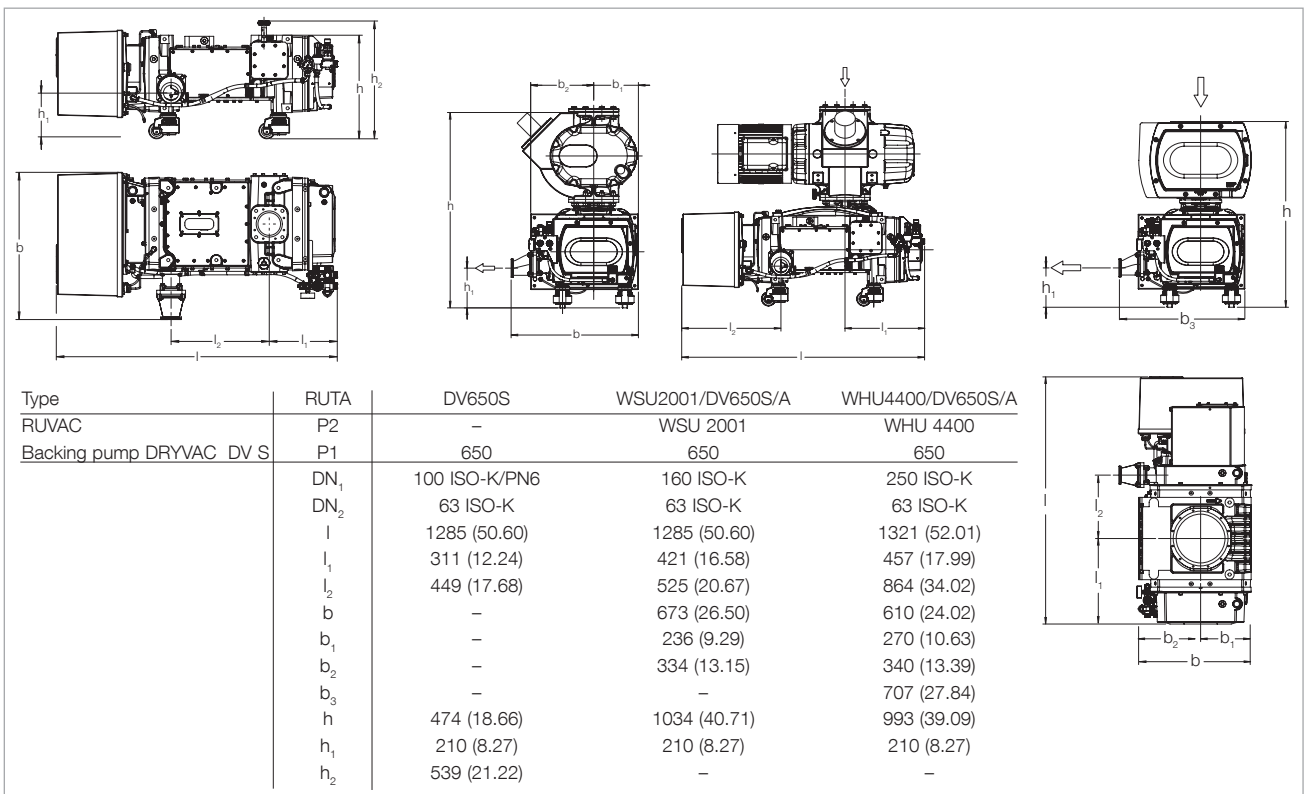
- DRYVAC DV S and RUVAC WHU with water cooling
- RUVAC WSU with air cooling
- Rollable pump system with locking foot
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Relay module (digital I/O)
- Non-return valve

- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- Exhaust silencer
- Bus interface
- Seal gas connection
- Gear chamber evacuation

- RUVAC WAU
- Frequency converter for RUVAC pump
- Electrical controller
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Dimensional drawing of the load lock pump systems with dry compressing DRYVAC backing pump, adaptor version:

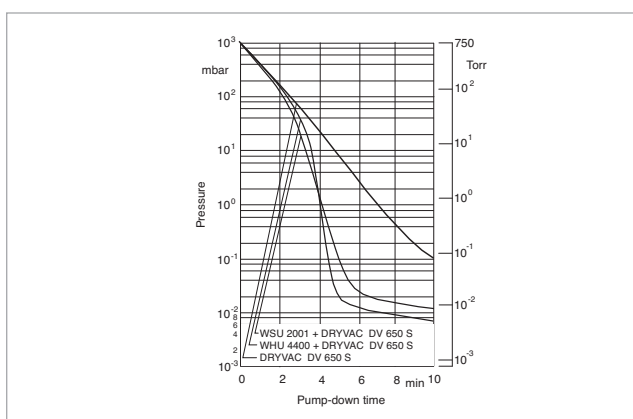
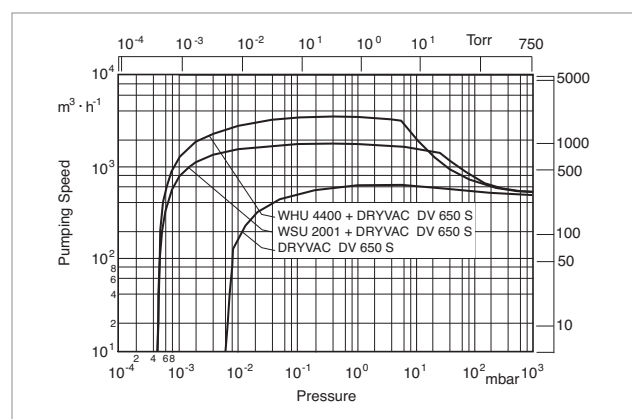
RUTA DV650S (left), RUTA WSU2001/DV650S/A (middle) and RUTA WHU4400/DV650S/A (right); dimensions in brackets () are in inch

Technical Data

| | | RUTA | | |
|---|---|--|--|--|
| | | DV650S | WSU2001/DV650S/A | WHU4400/DV650S/A |
| RUVAC WSU/WHU (WAU possible) | P2 | – | WSU 2001 | WHU 4400 |
| Backing pump DRYVAC DV S on castors | P1 | 650 | 650 | 650 |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 520 (306) | 1760 (1036) | 3400 (2000) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 5.0 \times 10^{-3}$ (3.75×10^{-4}) | $< 5.0 \times 10^{-3}$ (3.75×10^{-4}) | $< 5.0 \times 10^{-3}$ (3.75×10^{-4}) |
| Installed motor power, 3-ph. 380-480 V, 50/60 Hz | kW (hp) | 15.0 (20.4) | – | – |
| 400-460 V, 50/60 Hz | kW (hp) | – | 22.5 (30.6) | 33.5 (45.6) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 6.9 (9.4) | 8.4 (11.4) | 9.3 (12.6) |
| Noise level with permanently attached exhaust line at ultimate total pressure | dB(A) | 65 | 70 | 70 |
| Operating agent | LVO | 410 | 400 / 410 | 400 / 410 |
| Total oil filling, approx. | l (imp qt) | 1.2 (1.05) | 4.2 (3.0 / 1.2) 3.65 (2.6 / 1.05) | 5.95 (4.75 / 1.2) 5.25 (4.2 / 1.05) |
| Total weight, approx. | kg (lbs) | 590 (1300) | 1100 (2425) | 1350 (2976) |
| Permissible ambient temperature | °C | +5 to +50 | +12 to +40 | +10 to +40 |
| Connecting flange Inlet port top side Outlet port | 1 x DN ₁ 2 x DN ₁ DN ₂ | 100 ISO-K PN6 63 ISO-K | 160 ISO-K – 63 ISO-K | 250 ISO-K – 63 ISO-K |

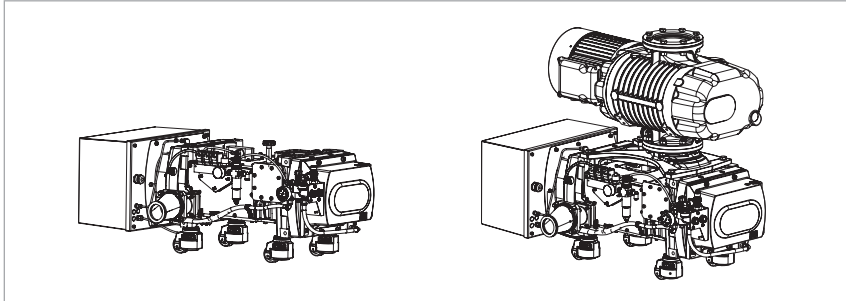
Ordering Information

| | | RUTA | | |
|--|----|---------------------|---------------------|---------------------|
| | | DV650S | WSU2001/DV650S/A | WHU4400/DV650S/A |
| RUVAC WSU/WHU | P2 | – | WSU 2001 | WHU 4400 |
| Backing pump DRYVAC DV S on castors | P1 | 650 | 650 | 650 |
| Load lock pump system, complete (adaptor version) with Roots vacuum pump RUVAC | | 503 261 V001 | 503 255 V001 | 503 256 V001 |


Pump-down time diagram for a 10 m³ tank at 50 Hz


Pumping speed diagram at 50 Hz

DRYVAC Process Pump Systems Adaptor Version



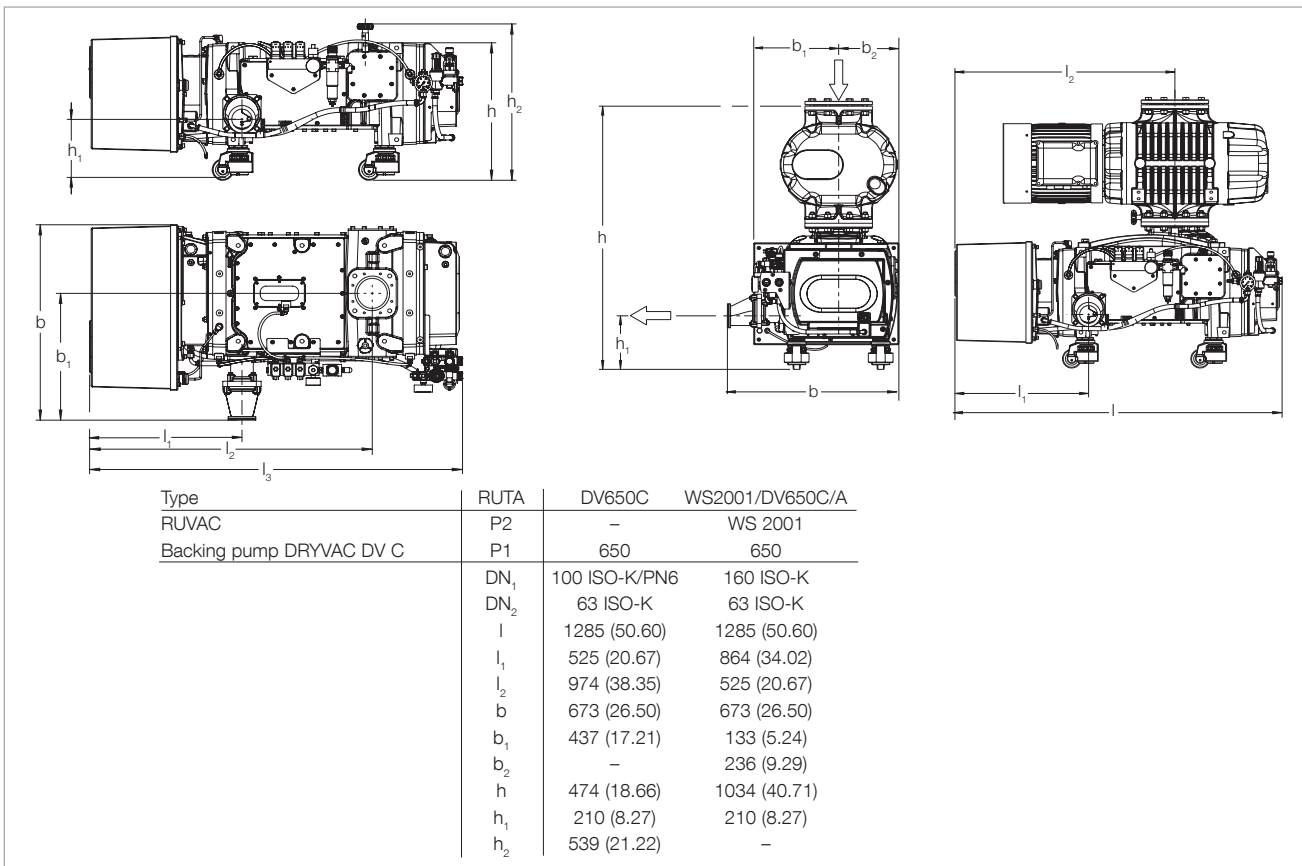
DRYVAC process pump system RUTA DV650C (left) and RUTA WS2001/DV650C/A (right)

Standard Equipment

- DRYVAC DV C with water cooling
- RUVAC WS with air cooling
- Rollable pump system with locking foot
- Hermetically sealed
- Seal gas module, threefold
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Relay module (digital I/O)
- Non-return valve
- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- Exhaust silencer
- Bus interface
- Gear chamber evacuation
- Electrical controller
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Dimensional drawing of the process pump systems with dry compressing DRYVAC backing pump, adaptor version:
RUTA DV650C (left) and RUTA WS2001/DV650C/A (right); dimensions in brackets () are in inch

Technical Data

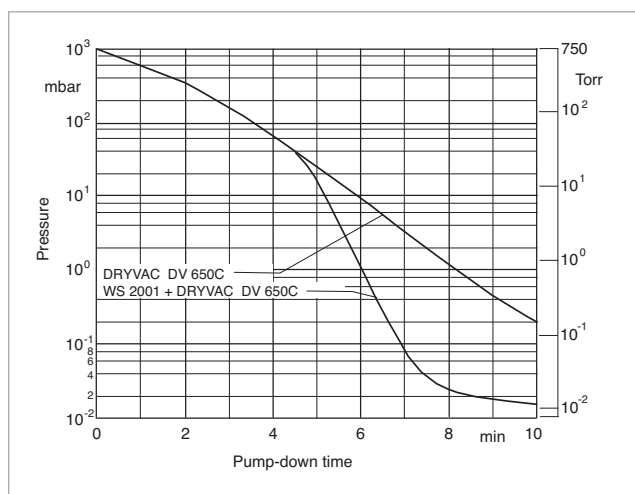
RUTA

| | | DV650C | WS2001/DV650C/A |
|---|---|--|--|
| RUVAC WS | P2 | – | 2001 |
| Backing pump DRYVAC DV C on castors | P1 | 650 | 650 |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) | $\text{m}^3 \times \text{h}^{-1}$ (cfm) | 520 (306) | 1760 (1036) |
| Ultimate total pressure without gas ballast | mbar (Torr) | $< 5 \times 10^{-3}$ (3.75×10^{-3}) | $< 5 \times 10^{-4}$ (3.75×10^{-4}) |
| Installed motor power, 3-ph. 380-480 V, 50/60 Hz | kW (hp) | 15.0 (20.4) | – |
| 400-460 V, 50/60 Hz | kW (hp) | – | 22.5 (30.6) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) | kW (hp) | 6.9 (9.4) | 8.4 (11.4) |
| Noise level with permanently attached exhaust line at ultimate total pressure | dB(A) | 65 | 70 |
| Operating agent | LVO | 410 | 400/410 |
| Total oil filling, approx. | l (imp qt) | 1.2 (1.05) | 4.2 (3.0/1.2) 3.65 (2.6 / 1.05) |
| Total weight, approx. | kg (lbs) | 590 (1300) | 1100 (2425) |
| Permissible ambient temperature | °C | +5 to +50 | +12 to +40 |
| Connecting flange | | | |
| Inlet port | | | |
| top | 1 x DN ₁ | 100 ISO-K | 160 ISO-K |
| side | 2 x DN ₁ | PN6 | – |
| Outlet port | DN ₂ | 63 ISO-K | 63 ISO-K |

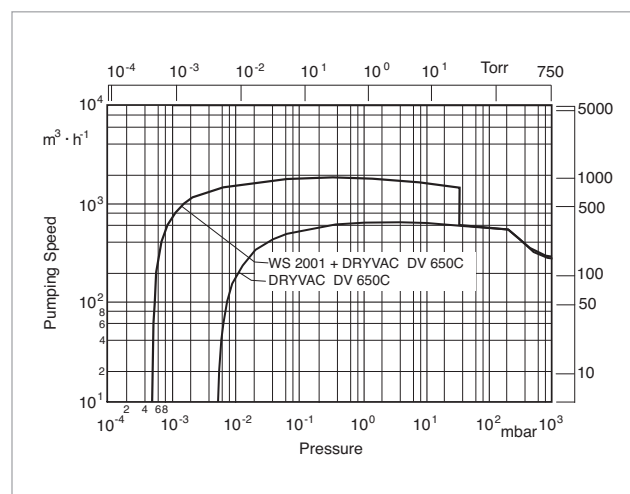
Ordering Information

RUTA

| | | DV650C | WS2001/DV650C/A |
|--|----|---------------------|---------------------|
| | | Part No. | Part No. |
| RUVAC WS | P2 | – | 2001 |
| Backing pump DRYVAC DV C on castors | P1 | 650 | 650 |
| Process pump system, complete (adaptor version) with Roots vacuum pump RUVAC | | 503 262 V001 | 503 263 V001 |

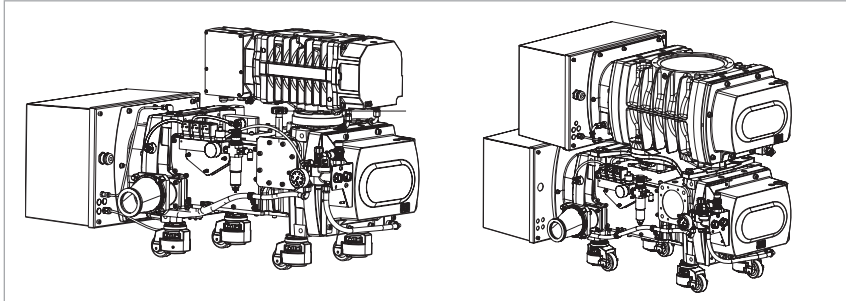


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

DRYVAC Process Pump Systems with RUVAC WH Backing Pump Adaptor Version



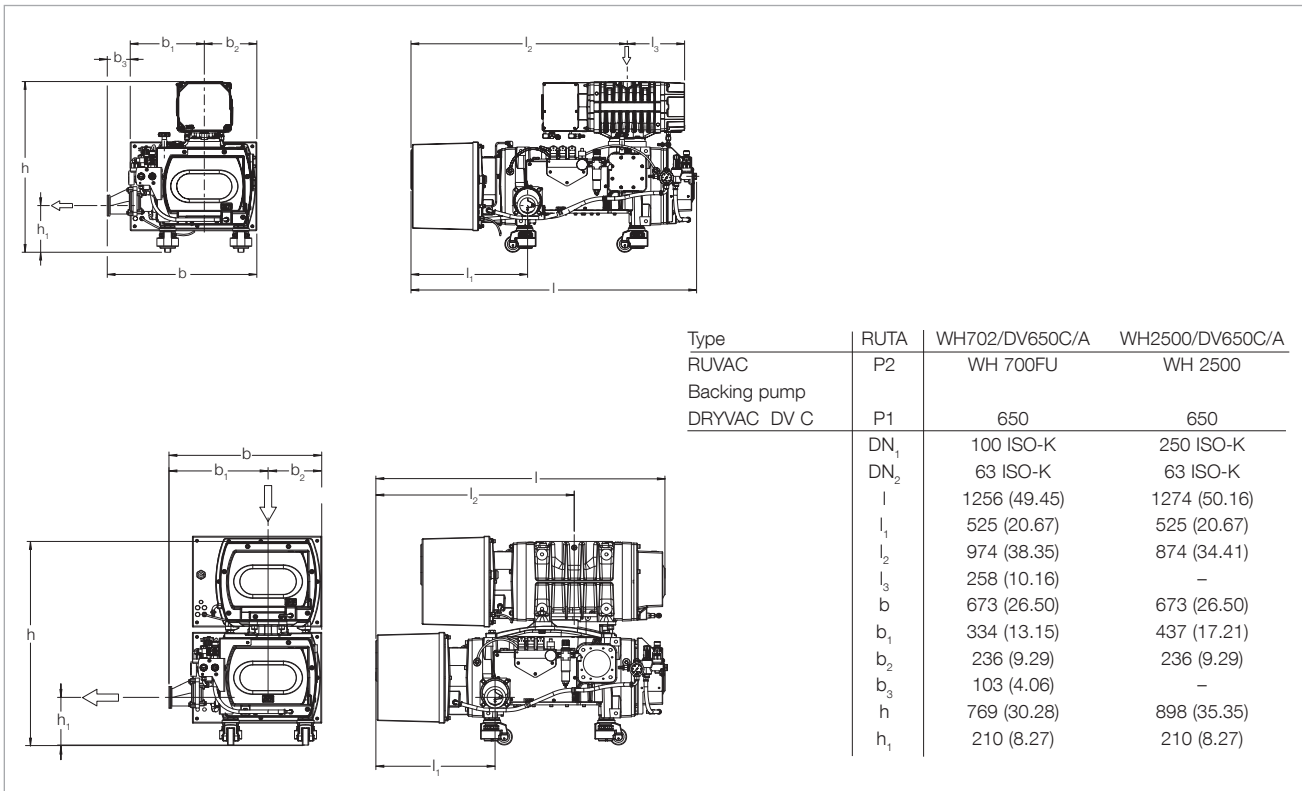
DRYVAC process pump system RUTA WH700FU/DV650C/A (left) and RUTA WH2500/DV650C/A (right)

Standard Equipment

- DRYVAC DV C and RUVAC WH with water cooling
- Rollable pump system with locking foot
- Hermetically sealed
- Seal gas module, threefold
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Relay module (digital I/O)
- Non-return valve
- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- Exhaust silencer
- Bus interface
- Gear chamber evacuation
- Electrical controller
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Dimensional drawing of the process pump systems with dry compressing DRYVAC backing pump, adaptor version: RUTA WH700FU/DV650C/A (top) and RUTA WH2500/DV650C/A (below); dimensions in brackets () are in inch

Technical Data

RUTA WH

700FU/DV650C/A

2500/DV650C/A

| | | | |
|--|---|---|--|
| RUVAC WH | P2 | 700FU | 2500 |
| Backing pump DRYVAC DV C on castors | P1 | 650 | 650 |
| Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $\text{m}^3 \times \text{h}^{-1}$ (cfm) | | 1220 (718) | 3115 (1834) |
| Ultimate total pressure without gas ballast mbar (Torr) | | $< 6 \times 10^{-4}$ (4.5×10^{-4}) | $< 5 \times 10^{-4}$ (3.75×10^{-4}) |
| Installed motor power, 3-ph. 380-480 V, 50/60 Hz kW (hp) | | 17.2 (23.4) | – |
| 400-460 V, 50/60 Hz kW (hp) | | – | 21.2 (28.8) |
| Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp) | | 7.4 (10.1) | 8.6 (11.7) |
| Noise level with permanently attached exhaust line at ultimate total pressure dB(A) | | 70 | 70 |
| Operating agent | LVO | 400/410 | 410 |
| Total oil filling, approx. | l (imp qt) | 2.1 (0.9/1.2) 1.9 (0.8/11) | 2.4 (1.2/1.2) 2.1 (1.05/1.05) |
| Total weight, approx. | kg (lbs) | 800 (1764) | 1100 (2425) |
| Permissible ambient temperature | °C | +12 to +50 | +10 to +50 |
| Connecting flange Inlet port top side Outlet port | 1 x DN ₁ 2 x DN ₁ DN ₂ | 100 ISO-K – 63 ISO-K | 250 ISO-K – 63 ISO-K |

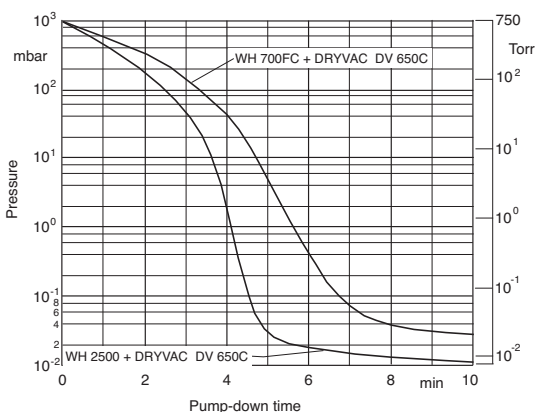
Ordering Information

RUTA WH

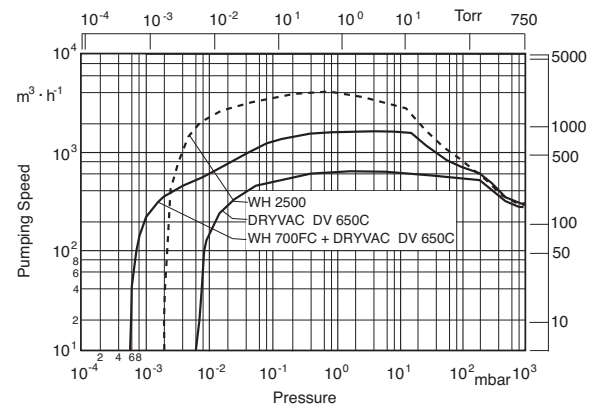
700FU/DV650C/A

2500/DV650C/A

| | | Part No. | Part No. |
|--|----|---------------------|---------------------|
| RUVAC WH | P2 | 700FU | 2500 |
| Backing pump DRYVAC DV C on castors | P1 | 650 | 650 |
| Process pump system, complete (adaptor version) with Roots vacuum pump RUVAC | | 503 257 V001 | 503 258 V001 |

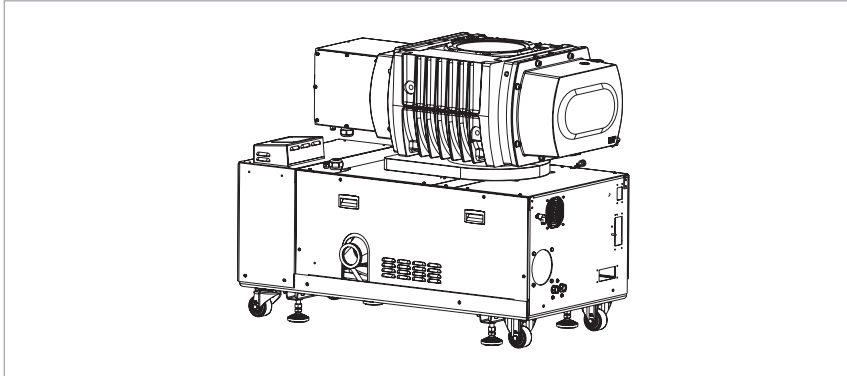


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

DRYVAC Pump Systems, enclosed Adaptor Version



RUTA WHU4400/DV650S-i/A/E

Standard Equipment

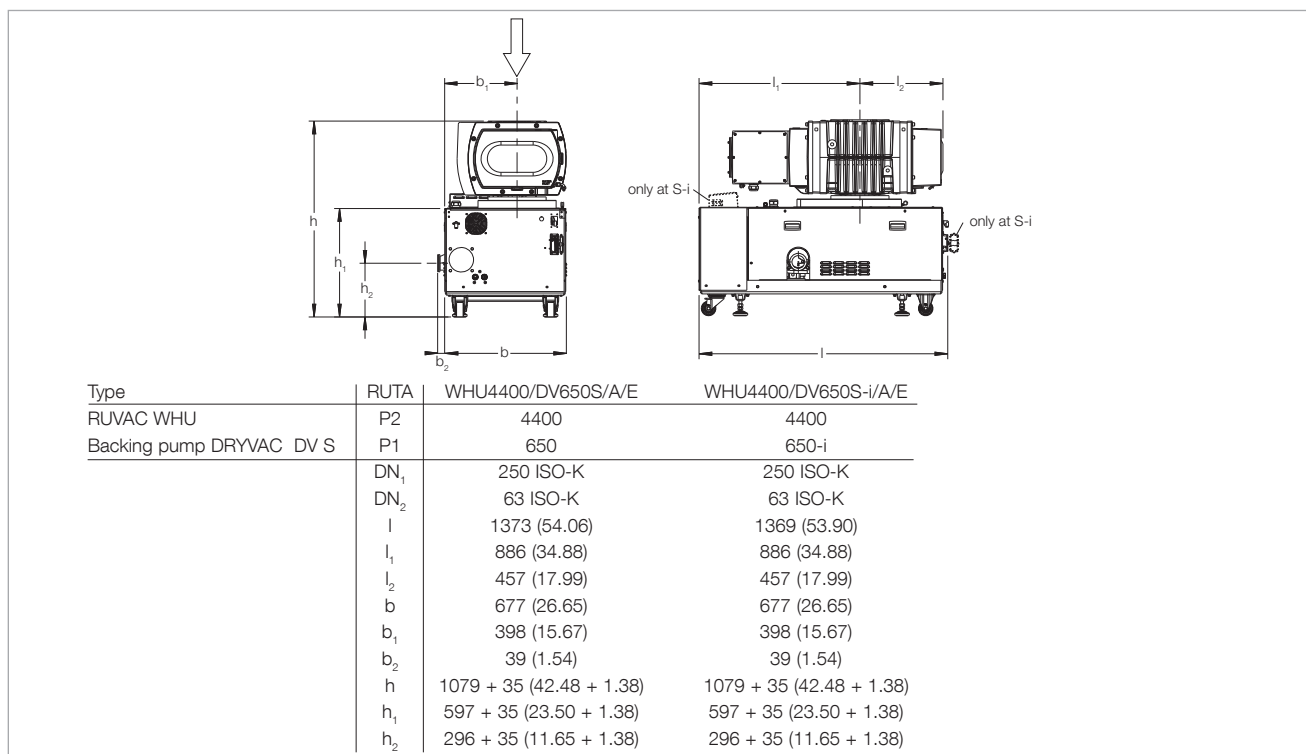
- DRYVAC DV S and RUVAC WHU with water cooling
- Pump system partly enclosed and electrically prewired
- With integrated PLC (Part No. 503259V001)
- Pumps independently electrically controllable (Part No. 503260V001)
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)

- Relay module (digital I/O)
- Non-return valve
- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- RUVAC WS / WSU / WH
- Exhaust silencer
- Bus interface

- Seal gas connection
- Gear chamber evacuation
- Frequency converter for RUVAC pump
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Housing suction facility



Dimensional drawing of the enclosed pump systems with DRYVAC DV650S(-i) backing pumps;
dimensions in brackets () are in inch

Technical Data

RUTA WHU

4400/DV650S/A/E

4400/DV650S-i/A/E

| | | | |
|---|----------|--|--|
| RUVAC WHU (WH possible) | P2 | 4400 | 4400 |
| Backing pump DRYVAC DV S with enclosure, silencer, castors and additional PLC | P1 P1 | 650 – | – 650-i |
| Pumping speed, 50 Hz at 1×10^{-1} mbar (7.5×10^{-2} Torr) $\text{m}^3 \times \text{h}^{-1}$ (cfm) | | 3400 (2000) | 3400 (2000) |
| Ultimate total pressure without gas ballast mbar (Torr) | | $< 5.0 \times 10^{-3}$ (3.75×10^{-3}) | $< 5.0 \times 10^{-3}$ (3.75×10^{-3}) |
| Installed motor power, 3-ph. 400-460 V, 50/60 Hz kW (hp) | | 33.5 (45.6) | 33.5 (45.6) |
| Electrical power consumption at 1×10^{-1} mbar (7.5×10^{-2} Torr) kW (hp) | | 9.3 (12.6) | 9.3 (12.6) |
| Noise level with permanently attached exhaust line at ultimate total pressure dB(A) | | 70 | 70 |
| Operating agent | LVO | 400/410 | 400/410 |
| Total oil filling, approx. I (imp qt) | | 5.95 (4.75/1.2) 5.25 (4.2/1.05) | 5.95 (4.75/1.2) 5.25 (4.2/1.05) |
| Total weight, approx. kg (lbs) | | 1350 (2976) | 1350 (2976) |
| Permissible ambient temperature °C | | +10 to +40 | +10 to +40 |
| Connecting flange Inlet port DN ₁ Outlet port DN ₂ | | 250 ISO-K 63 ISO-K | 250 ISO-K 63 ISO-K |

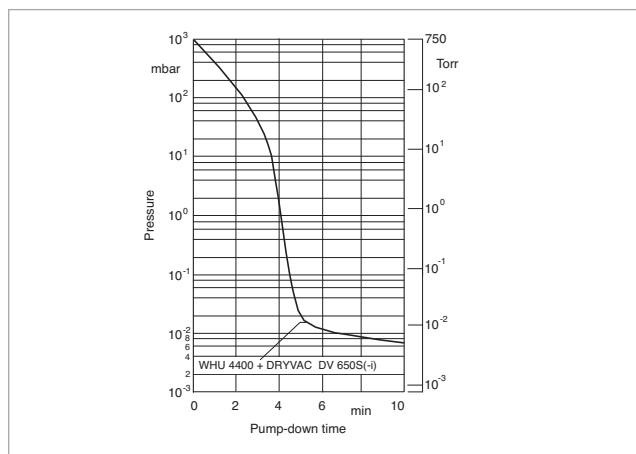
Ordering Information

RUTA WHU

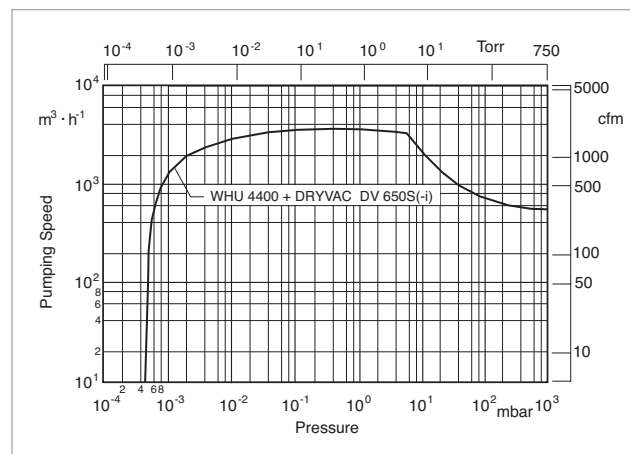
4400/DV650S/A/E

4400/DV650S-i/A/E

| | | Part No. | Part No. |
|---|----|---------------------|---------------------|
| RUVAC WHU (WH possible) | P2 | 4400 | 4400 |
| Backing pump DRYVAC DV S | P1 | 650 | 650-i |
| Enclosed pump system, complete (adaptor version) with Roots vacuum pump RUVAC | | 503 260 V001 | 503 259 V001 |

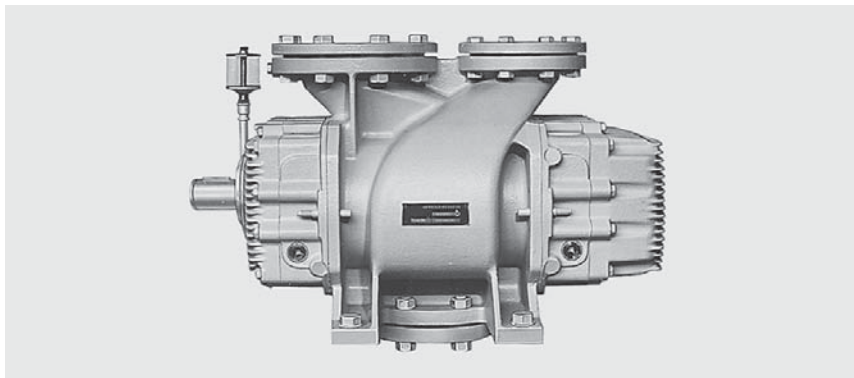


Pump-down time diagram for a 10 m³ tank at 50 Hz



Pumping speed diagram at 50 Hz

RUVAC RAV Roots Vacuum Pumps with Pre-Admission Cooling

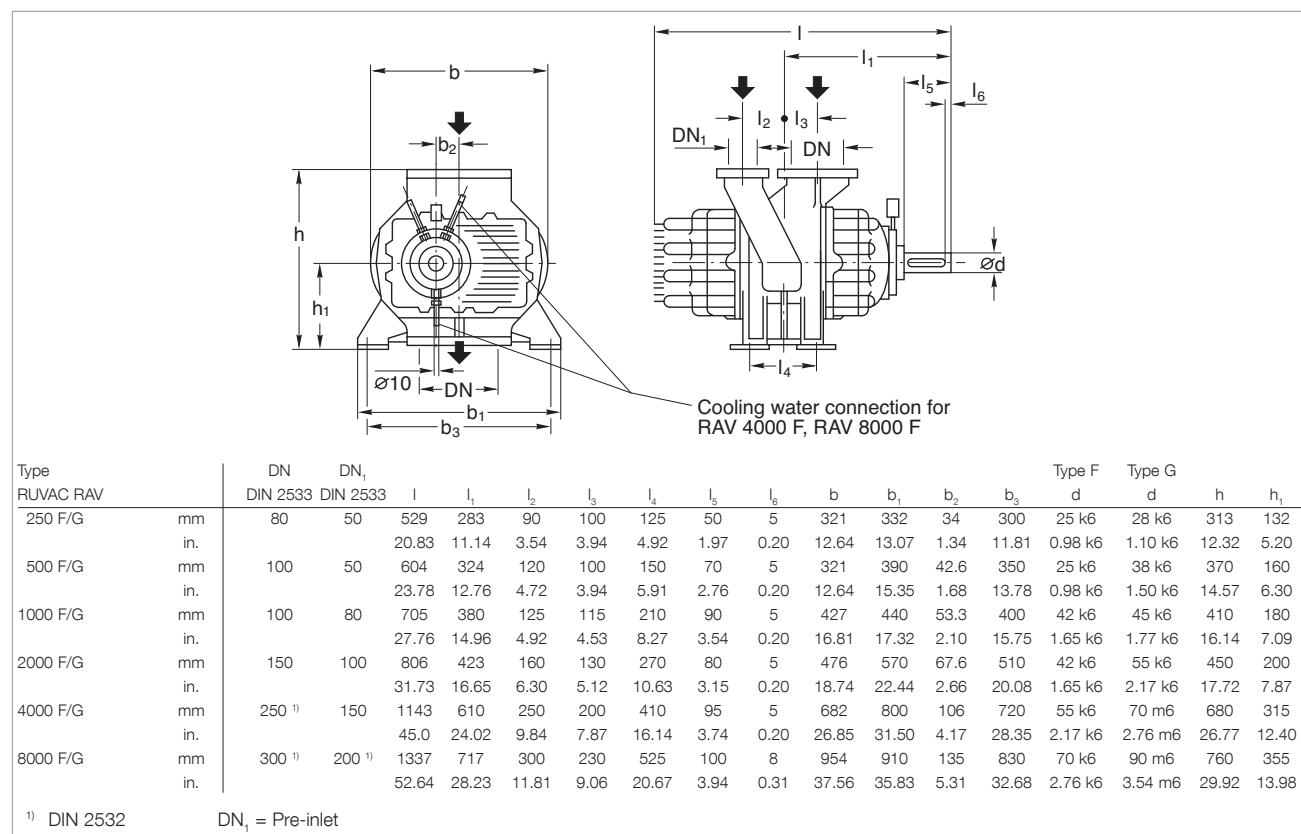


Typical Applications

- Short pump-down cycles on large volumes
- Oil-free compression of high volume flows of gases and vapors against atmospheric pressure
- Single-stage (G) or in combination with RAV F as backing pump
- Operating pressures in the rough vacuum range
- CE approval

Advantages to the User

- **RUVAC RAV G**
Operating pressure range of 150 mbar (112.5 Torr) against atmospheric pressure;
total leak rate $< 10^{-1} \text{ mbar} \times \text{l} \times \text{s}^{-1}$
($7.5 \times 10^{-2} \text{ Torr} \times \text{l} \times \text{s}^{-1}$)
- **RUVAC RAV F**
In combination with backing pumps the attainable operating pressures extend down into the medium vacuum range;
- leak rate $< 10^{-2} \text{ mbar} \times \text{l} \times \text{s}^{-1}$
($7.5 \times 10^{-3} \text{ Torr} \times \text{l} \times \text{s}^{-1}$)
- When series-connected the operating pressures extend down into the medium vacuum range:
 - two-stages to 25 mbar (18.75 Torr)
 - multiple stage to 10^{-3} mbar ($7.5 \times 10^{-4} \text{ Torr}$)
- Motors for special supply voltages and frequencies or protected types are available
- Pre-admission silencer and filter for the cooling gas inlet as well as silencers for the exhaust side (option/single-stage)
- Downstream gas cooler (option/multistage)
- C version (chemical version/option)
- Special materials (option)
- Pressure burst resistant version (option)



Dimensional drawing for the RUVAC RAV pumps

Technical Data, 50 Hz

| | | RUVAC RAV | | | | | |
|--|--|-------------|-------------|-------------|-------------|--------------|---------------|
| | | 250 G | 500 G | 1000 G | 2000 G | 4000 G | 8000 G |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 250 (147) | 500 (295) | 1000 (589) | 2000 (1178) | 3700 (2179) | 8100 (4771) |
| Nominal speed | min ⁻¹ (rpm) | 3000 (3000) | 3000 (3000) | 3000 (3000) | 3000 (3000) | 1500 (1500) | 1500 (1500) |
| Max. permissible pressure difference ²⁾ | mbar (Torr) | 850 (637) | 850 (637) | 850 (637) | 850 (637) | 850 (637) | 850 (637) |
| Connecting flange | DN | 80 | 100 | 100 | 150 | 250 | 300 |
| Max. permissible motor power | | | | | | | |
| for direct drive | kW (hp) | 11.0 (15.0) | 18.5 (25.2) | 30.0 (40.8) | 55.0 (74.8) | 95.0 (129.3) | 200.0 (272.1) |
| for belt drive | kW (hp) | 11.0 (15.0) | 18.5 (25.2) | 30.0 (40.8) | 55.0 (74.8) | 95.0 (129.3) | 200.0 (272.1) |
| Weight | kg (lbs) | 95 (210) | 160 (353) | 225 (496) | 310 (684) | 720 (1588) | 1230 (2712) |

Ordering Information

| | | RUVAC RAV | | | | | |
|-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | 250 G | 500 G | 1000 G | 2000 G | 4000 G | 8000 G |
| | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
| Roots vacuum pump RUVAC RAV G | upon request | upon request | upon request | upon request | upon request | upon request | upon request |

Technical Data, 50 Hz

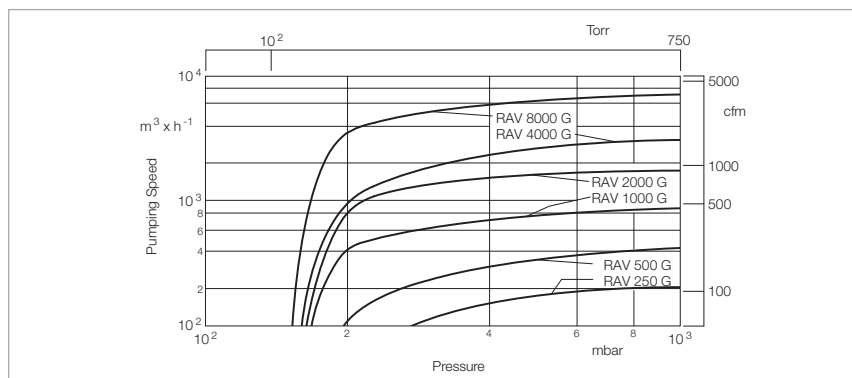
| | | RUVAC RAV | | | | | |
|--|--|-------------|-------------|-------------|-------------|--------------|---------------|
| | | 250 F | 500 F | 1000 F | 2000 F | 4000 F | 8000 F |
| Pumping speed ¹⁾ | m ³ x h ⁻¹ (cfm) | 250 (147) | 500 (295) | 1000 (589) | 2000 (1178) | 3700 (2179) | 8100 (4771) |
| Nominal speed | min ⁻¹ (rpm) | 3000 (3000) | 3000 (3000) | 3000 (3000) | 3000 (3000) | 1500 (1500) | 1500 (1500) |
| Max. permissible pressure difference ²⁾ | mbar (Torr) | 850 (637) | 850 (637) | 850 (637) | 850 (637) | 850 (637) | 850 (637) |
| Connecting flange | DN | 80 | 100 | 100 | 150 | 250 | 300 |
| Max. permissible motor power | | | | | | | |
| for direct drive | kW (hp) | 11.0 (15.0) | 18.5 (25.2) | 30.0 (40.8) | 55.0 (74.8) | 95.0 (129.3) | 200.0 (272.1) |
| for belt drive | kW (hp) | 4.0 (5.4) | 4.0 (5.4) | 7.5 (10.2) | 15.0 (20.4) | 37.0 (50.3) | 75 (102.0) |
| Gear oil, approx. | l (qt) | 0.9 (0.95) | 1.1 (1.6) | 1.5 (1.59) | 2.5 (2.64) | 12.0 (12.68) | 11.0 (11.63) |
| Weight, approx. | kg (lbs) | 95 (210) | 160 (353) | 225 (496) | 310 (684) | 720 (1588) | 1230 (2712) |
| Cooling water connection, fitting for tube | | – | – | – | – | 10 x 1 | 10 x 1 |
| Cooling water requirement, approx. | l x h ⁻¹ | – | – | – | – | 60 | 60 |

Ordering Information

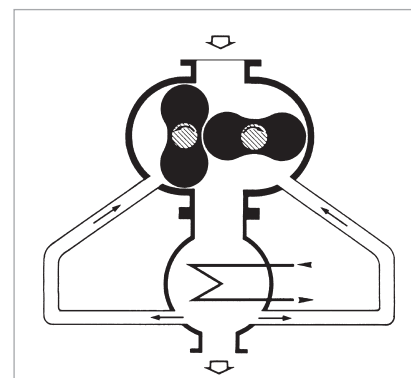
| | | RUVAC RAV | | | | | |
|-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | 250 F | 500 F | 1000 F | 2000 F | 4000 F | 8000 F |
| | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
| Roots vacuum pump RUVAC RAV F | upon request | upon request | upon request | upon request | upon request | upon request | upon request |

¹⁾ To DIN 28 400 and following numbers

²⁾ RUVAC RAV G and RAV F with direct drive

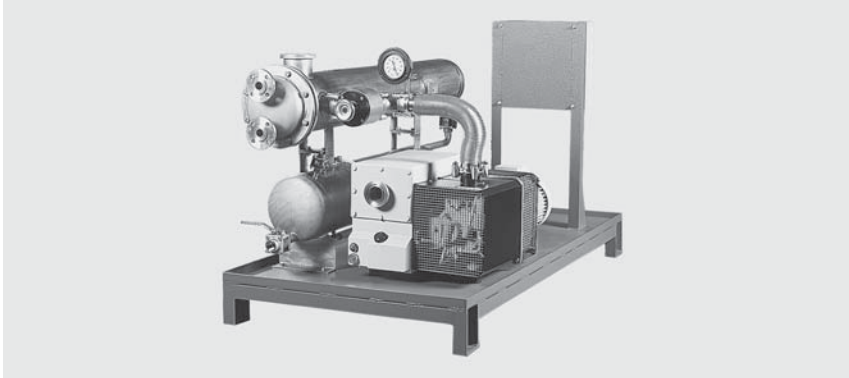


Pumping speed diagram of RUVAC RAV at 50 Hz



Operating diagram of RUVAC RAV vacuum pumps with pre-admission cooling

TVD Pump Systems for Drying, Evaporation and Distillation Applications



TVD 200

Advantages to the User

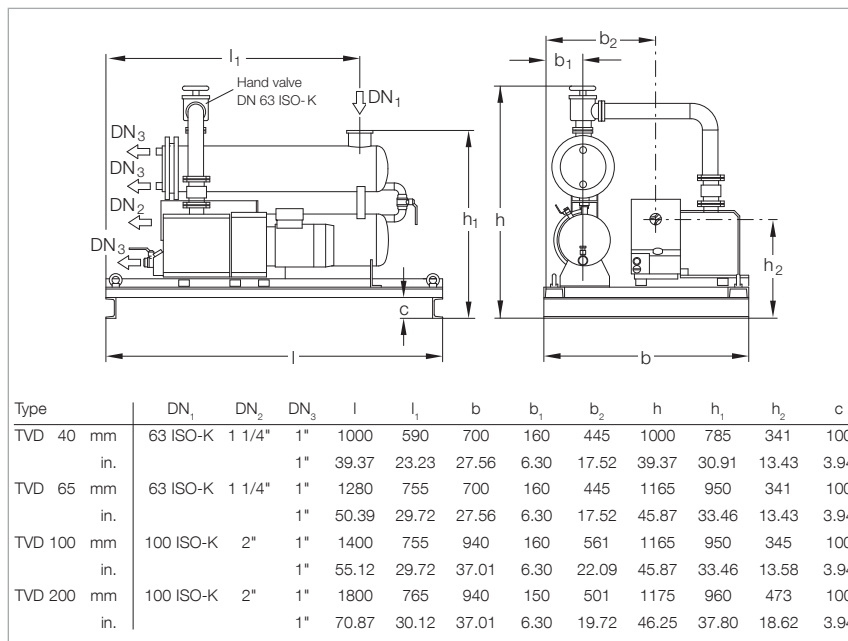
- Operating agent may be reused, for example by returning cleaned water to the process
- Reduction of the quantities which need to be disposed of by 80%
- Low temperature distillation/drying
- Condensate may be drained during vacuum operation
- CE approval

Typical Applications

- Drying of powders and solids, for example
- Cleaning of waste water
- Vacuum distillation

Standard Equipment

- Condenser at the intake side
- Receiver with condensate level indicator
- Manually operated valves on the receiver
- SOGEVAC rotary vane vacuum pump with integrated exhaust filters, anti-suckback valve and gas ballast valve



Dimensional drawing for the TVD pump systems

Options

- Valve between condenser and rotary vane vacuum pump
- Pressure gauge for checking the condensate pressure
- Solenoid valves at the receiver
- Receiver with proximity switch for monitoring the condensate level
- Electric control for automatic operation of the pump system
- Mobile pallet with castors
- Cold water replacement for mobile applications

Technical Data, 50 Hz**TVD 40****TVD 65****TVD 100****TVD 200**

| | | | | | |
|--|--|---------------|---------------|---------------|----------------|
| Condenser, effective surface area, approx. | m ² | 1 | 2 | 3 | 5 |
| Receiver, usable volume | l (qt) | 30.0 (31.71) | 50.0 (52.85) | 50.0 (52.85) | 50.0 (52.85) |
| Rotary vane vacuum pump | SOGEVAC | SV 40 | SV 65 | SV 100 | SV 200 |
| Nominal pumping speed | m ³ x h ⁻¹ (cfm) | 46.0 (27.1) | 65.0 (38.3) | 100.0 (58.9) | 180.0 (106.0) |
| Pumping speed at 50 Hz for air | m ³ x h ⁻¹ (cfm) | 46.0 (27.1) | 53.0 (31.2) | 94.0 (55.4) | 170.0 (100.1) |
| for water vapor at 50 mbar (37.5 Torr) | m ³ x h ⁻¹ (cfm) | 280.0 (165.0) | 560.0 (330.0) | 840.0 (495.0) | 1400.0 (825.0) |
| Ultimate total pressure with standard gas ballast | mbar (Torr) | < 1.5 (< 1.1) | < 1.5 (< 1.1) | < 1.5 (< 1.1) | < 0.7 (< 0.53) |
| Noise level ¹⁾ | dB(A) | 63 | 64 | 70 | 69 |
| Condensing capacity for water | l x h ⁻¹ | 10 | 20 | 30 | 50 |
| Installed motor power 400 V, 50 Hz | kW (hp) | 1.1 (1.5) | 1.5 (2.0) | 2.2 (3.0) | 4.0 (4.2) |

¹⁾ Operating at ultimate pressure with gas ballast

Technical Data, 50 Hz**SV 40****SV 65****SV 100****SV 200**

| | | | | | |
|------------------------------------|-----------------|------------|------------|------------|------------|
| Weight (with oil filling), approx. | kg (lbs) | 125 (276) | 150 (331) | 200 (441) | 300 (662) |
| Oil filling | l (qt) | 2.0 (2.11) | 2.0 (2.11) | 3.5 (3.70) | 5.0 (5.29) |
| Connecting flanges | | | | | |
| Inlet port | DN ₁ | 63 ISO-K | 63 ISO-K | 100 ISO-K | 100 ISO-K |
| Outlet port | DN ₂ | 1 1/4" | 1 1/4" | 2" | 2" |

Ordering Information**TVD 40****TVD 65****TVD 100****TVD 200**

| | Part No. | Part No. | Part No. | Part No. |
|-------------|---------------|---------------|---------------|---------------|
| Pump system | 021 01 | 021 02 | 021 03 | 021 04 |

Accessories for oil sealed and dry compressing Pump Systems

Sound Proofing

A sound proofing box is available as an optional extra so as to reduce the noise down to the permissible level.

Depending on the size of the pumping system, noise reductions between 15 and 20 dB(A) are obtained using our standard sound proofing arrangements.

Custom designs of the sound proofing box allow the noise level to be reduced by up to 35 dB(A).



RUTA RA 3001/S630F/G with sound proofing box

The maintenance side is designed as a door component. A window insert may be provided in the door or in the side walls to facilitate checking of the oil levels.

Ventilation is performed by means of an electric fan, the fresh air and exhaust ducts are located within the sound proofing box. Further optional extras which may be fitted include closed air circulation with integrated, water-cooled heat exchanger and a connection port for a central exhaust system.

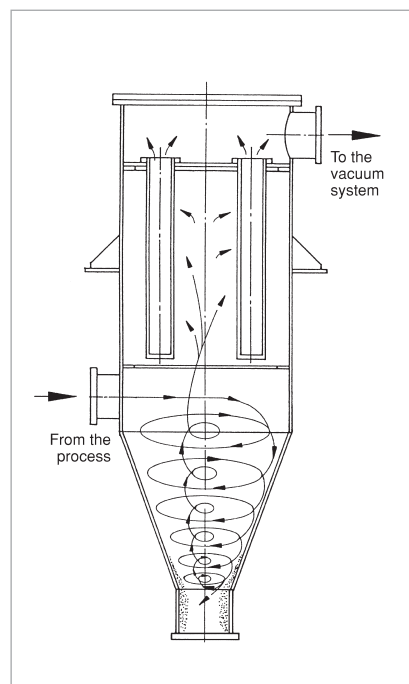
Isolation against Vibrations

RUTA vacuum pump systems produce only slight vibrations. To reduce these vibrations even further, vibration absorbers can be fitted under the pump system.

Dust Separators

Vacuum processes where large amounts of particles or dusts are contributed by the process require special devices to protect the vacuum pumps.

Oerlikon Leybold Vacuum has developed – even for high flow rate applications – special dust separators, which can be installed ahead of the intake of the RUTA vacuum pump systems. The dust separators have two stages. The first stage is a cyclone that collects dust particles of coarse and medium size, the fine dust are trapped in filter elements. Dust separators are custom-designed for the specific process and the required pumping speed.



Diagrammatic section through a dust separator

Dust Filter without Cyclone

See further down in this chapter.

| Filtering surface suitable for pumping speeds | m ² | 0.2 | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 |
|--|--|-------------|-------------|--------------|-------------|--------------|-------------|
| min. | m ³ x h ⁻¹ (cfm) | 100 (58.9) | 300 (176.7) | 600 (353.4) | 1000 (589) | 1500 (883.5) | 3000 (1767) |
| max. | m ³ x h ⁻¹ (cfm) | 300 (176.7) | 800 (471.2) | 1500 (883.5) | 3000 (1767) | 4000 (2356) | 8000 (4712) |
| Reduction of pumping speed at | | | | | | | |
| ≤ 1 mbar (< 0.75 Torr) | % | 11 | 11 | 11 | 11 | 11 | 11 |
| ≤ 6 mbar (< 4.5 Torr) | % | 9 | 9 | 9 | 9 | 9 | 9 |
| ≤ 20 mbar (< 15 Torr) | % | 5 | 5 | 5 | 5 | 5 | 5 |
| without dust load | | | | | | | |

Frequency converter RUVATRONIC RT 5

The electronic frequency inverters RUVATRONIC RT 5/251 to 5/16000 have been designed specially for use in connection with Oerlikon Leybold Vacuum Roots pumps of the RUVAC type.

For each Roots vacuum pump size, a matching frequency converter is available.

The main characteristics of the RUVATRONIC RT 5 are:

Simulation of a pressure equalization line

The software of the frequency inverters is adapted to each pump and ensures that the risk of mechanically overloading the pump can be excluded. In the case of too high pressure differences, the rotational speed will be decreased

automatically until the load is reduced to within the pump's limits.

RUVAC Roots vacuum pumps of the types WA, WS and RA (without pressure equalization line) can be switched on together with the forepump at atmospheric pressure. Through this, the pumpdown time can be reduced drastically. The minimum pumping speed of the backing pump needs to be considered in this case.

| Pump | Required pumping speed for the backing pump |
|------------|--|
| WA/WS 251 | 50 m ³ /h (29 cfm) |
| WA/WS 501 | 100 m ³ /h (59 cfm) |
| WA/WS 1001 | 200 m ³ /h (118 cfm) |
| WA/WS 2001 | 410 m ³ /h (241 cfm) |
| RA 3001 | 650 m ³ /h (383 cfm) |
| RA 5001 | 930 m ³ /h (547 cfm) |
| RA 7001 | 1250 m ³ /h (736 cfm) |
| RA 9001 | 3240 m ³ /h (1907 cfm) |

Operation at up to 3 predefined speeds

Via floating contacts, the pump can be operated at one of the 3 predefined speeds. Switching over to another pre-defined speed is possible during operation.

Operation at any rotational speed

With a 0 to 10 V signal, any speed can be pre-defined to operate the pump between the minimum and maximum rotational speed. The software reliably ensures that the rotational speed cannot drop below the minimum speed or exceed the maximum speed.

Increase in the pumping speed

By operating the Roots vacuum pumps at frequencies over 50 Hz, the nominal pumping speed of the pumps can be increased. Depending on the type of pump, an increase between 20 and 100% is possible.

Note

Please enquire about possible application limitations (process dependent).

Electric Controller

In order to drive all electrical appliances within the pump systems, the pump systems may be equipped with standard control cabinets which contain:

- Motor protection switch (rated for the pumps used in each case)
- Contactors
- Main switch interlocked in accordance with VDE 0113
- Relays for necessary control/sub-systems
- ON/OFF push-button for each pump
- Power supply for the installed monitoring facilities
- Fault indicators arranged on a lamp panel
- Switch-over (through an external contact) from local to remote operation.

The control cabinet may be fitted either to the frame of the pump system or it may be wallmounted.

Beside the standard systems, we manufacture control systems for much more complex systems:

- Remote control module as a 19" rack module (1/4 width, 3 HU). The start/stop push-buttons and the related indicators for operation and fault are located on the front panel
- Pre- and post-operation control
- Pressure dependant control
- Time-dependant control
- Program control
- Control for explosion hazard areas
- Combinations of the aforementioned versions
- Programmable control (PC)
- Vacuum gauge with pressure read-out in the control cabinet.

Pressure Control

Basically there are several ways in which to control the pressure.

The equipment which is supplied as standard for the **DOWNSTREAM** or **BYPASS** control systems selected by Oerlikon Leybold Vacuum consists of:

- Pressure measurement
- Controller with control unit
- Control valve with position indicator
- Engineering.

The **Downstream Control System** throttles the pumping speed of the vacuum pump by changing the conductance of the valve.

The advantages offered by this arrangement are:

- No supply of other gases
- Closed system
- The intake pressure of the pump system is lower than its operating pressure (thus saving energy, among other things).

The second method is the **Bypass Control System**. Here the pressure is maintained at a constant level by admitting an additional quantity of gas.

The advantages offered by this arrangement are:

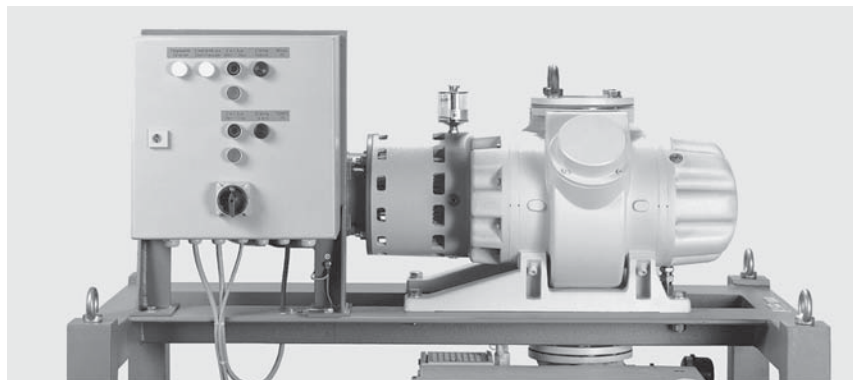
- Simple design
- Much smaller valve
- No reduction of the intermediate pressure within the pump.

In order to design a pressure control system we need the following information:

- Amount of gas
- Type of gas
- Pressure
- Length of the piping
- Type of auxiliary energy (electric/pneumatic)
- Explosion protection required yes/no.

Additional complex control arrangements are available, for example with:

- Adjustable pressure characteristic
- Adjustable timing
- Speed control
- Combination with other control facilities.



Control panel on RUTA WAU1001/SV200/G

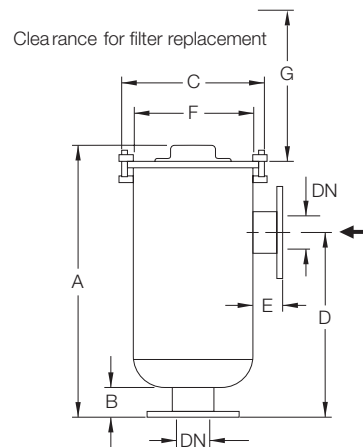
Dust Filter F-xxx-C

The highly efficient dust filters F-xxx-C are fitted to the inlet of the RUVAC pumps. The filter protects the Roots vacuum pumps against the intake of dust.

The dust filters are equipped with an easy to replace filter element. In the case of the filters F-1001-C or larger, the gas enters into the housing above the filter element. Thus the likelihood of puncturing the filter is reduced.

In the case of the dust filter F-501-C, the filter element is protected by a baffle.

All vacuum dust filters are rated for pressures up to 1200 mbar (900 Torr) abs. max.



| Type | | DN | A | B | Ø C | D | E | F | G |
|---------------|-----|-------------------|-------|------|-------|-------|------|-------|-------|
| F-501-C | mm | 65 ¹⁾ | 312 | 76 | 222 | 185 | 76 | 195 | 235 |
| | in. | | 12.28 | 2.99 | 8.74 | 7.28 | 2.99 | 7.68 | 9.25 |
| F-1001-C | mm | 100 ¹⁾ | 692 | 76 | 356 | 470 | 74 | 310 | 381 |
| | in. | | 27.24 | 2.99 | 14.02 | 18.50 | 2.91 | 12.20 | 15.00 |
| F-2001-C | mm | 150 ¹⁾ | 740 | 102 | 470 | 521 | 102 | 406 | 254 |
| | in. | | 29.13 | 4.02 | 18.50 | 20.51 | 4.02 | 15.98 | 10.00 |
| F-2001-C plus | mm | 150 ¹⁾ | 740 | 102 | 470 | 521 | 99 | 413 | 508 |
| | in. | | 29.13 | 4.02 | 18.50 | 20.51 | 3.90 | 16.26 | 20.00 |
| F-5001-C | mm | 200 ²⁾ | 1031 | 102 | 572 | 648 | 103 | 505 | 508 |
| | in. | | 40.59 | 4.02 | 22.52 | 25.51 | 4.02 | 19.88 | 20.00 |
| F-7001-C | mm | 250 ²⁾ | 1454 | 102 | 686 | 1143 | 99 | 616 | 838 |
| | in. | | 57.24 | 4.02 | 27.01 | 45.00 | 3.90 | 24.33 | 32.99 |
| F-9001-C | mm | 300 ²⁾ | 1454 | 102 | 686 | 1143 | 99 | 616 | 838 |
| | in. | | 57.24 | 4.02 | 27.01 | 45.00 | 3.90 | 24.33 | 32.99 |
| F-13001-C | mm | 300 ²⁾ | 1784 | 102 | 686 | 1448 | 99 | 616 | 635 |
| | in. | | 70.24 | 4.02 | 27.01 | 57.01 | 3.90 | 24.33 | 25.00 |

¹⁾ The hole pattern corresponds to PN 6 and may be connected by using collar flanges to ISO-K components

²⁾ The hole pattern corresponds to PN 10

Dimensional drawing for the dust filters F-xxx-C

Technical Data

Dust Filter F-xxx-C

| | | Polyester filter cartridge | Paper filter cartridge |
|---|---------|--|--|
| Separation at 10 µm | % | > 99.9 | – |
| Separation at 5 µm | % | > 99 | > 99.9 |
| Separation at 2 µm | % | – | > 99 |
| Temperature | °C (°F) | -25 to +100 (-13 to +212) | -25 to +100 (-13 to +212) |
| Dust filter for WA/WS/WAU/WSU 501 WA/WS/WAU/WSU 1001, WH 700 WA/WS/WAU/WSU 2001, WH 2500 RA 3001, RA 5001, WH 4400, WH 7000 RA 7001 RA 9001 RA 13000 | | F-501-C F-1001-C F-2001-C / F-2001-C plus F-5001-C F-7001-C F-9001-C F-13001-C | F-501-C F-1001-C F-2001-C / F-2001-C plus F-5001-C F-7001-C F-9001-C F-13001-C |

Technical Data

Dust Filter

| | | F-501-C | F-1001-C | F-2001-C | F-2001-C plus |
|-----------------------|----------|-------------|--------------|---------------|---------------|
| Surface area, approx. | | | | | |
| Polyester | m² | 0.4 | 1.0 | 1.5 | 2.6 |
| Paper | m² | 1.3 | 3.0 | 4.0 | 6.3 |
| Weight, approx. | kg (lbs) | 7.0 (15.45) | 29.0 (64.02) | 50.0 (110.38) | 51.0 (112.58) |

Technical Data

Dust Filter

| | | F-5001-C | F-7001-C | F-9001-C | F-13001-C |
|-----------------------|----------|---------------|----------------|----------------|----------------|
| Surface area, approx. | | | | | |
| Polyester | m² | 4.5 | 9.0 | 9.0 | 14.0 |
| Paper | m² | 11.5 | 26.0 | 26.0 | 37.0 |
| Weight, approx. | kg (lbs) | 83.0 (138.22) | 171.0 (377.48) | 171.0 (377.48) | 209.0 (461.37) |

Ordering Information

Dust Filter F-xxx-C

| | Part No. | Part No. |
|---|---|---|
| Dust Filter | Polyester filter element | Paper filter element |
| F-501-C | 500 001 403 | 500 001 404 |
| Replacement filter element FE-501-C | 500 005 629 | 500 005 630 |
| F-1001-C | 500 000 301 | 500 000 302 |
| Replacement filter element FE-1001-C | 500 000 313 | 500 000 314 |
| F-2001-C | 500 000 303 | 500 000 304 |
| Replacement filter element FE-2001-C | 500 000 315 | 500 000 316 |
| F-2001-C plus ¹⁾ | 500 001 367 | 500 001 368 |
| Replacement filter element FE-2001-C plus | 500 005 631 | 500 005 632 |
| F-5001-C | 500 000 305 | 500 000 306 |
| Replacement filter element FE-5001-C | 500 000 317 | 500 000 318 |
| F-7001-C | 500 000 307 | 500 000 308 |
| Replacement filter element FE-7001/9001-C | 500 000 319 | 500 000 320 (2 pieces are required) |
| F-9001-C | 500 000 309 | 500 000 310 |
| Replacement filter element FE-7001/9001-C | 500 000 319 | 500 000 320 (2 pieces are required) |
| F-13001-C | 500 000 311 | 500 000 312 |
| Replacement filter element FE-13001-C | 500 000 321 (2 pieces are required) | 500 000 322 (2 pieces are required) |

¹⁾ For increased quantities of dust

Bellows with Vibration Absorbers



Bellows with vibration absorbers

The bellows serve the purpose of connecting pipes to vacuum pumps without introducing any mechanical tensions.

Technical Data

Bellows with Vibration Absorbers

KIT DN 63 ISO-K KIT DN 100 ISO-K KIT DN 160 ISO-K

| | | | | |
|------------------------|----------|------------|------------|------------|
| Length | mm (in.) | 132 (5.20) | 132 (5.20) | 150 (5.91) |
| Lateral movement, max. | mm (in.) | 7.5 (0.30) | 9.5 (0.37) | 3.5 (0.14) |
| Axial movement, max. | mm (in.) | 20 (0.79) | 28 (1.10) | 22 (0.87) |

Ordering Information

Bellows with Vibration Absorbers

KIT DN 63 ISO-K KIT DN 100 ISO-K KIT DN 160 ISO-K

| | | Part No. | Part No. | Part No. |
|--|----------|---------------------|---------------------|---------------------|
| Bellows with vibration absorbers consisting of | | 503 189 V001 | 503 189 V002 | 503 189 V003 |
| Bellows | Quantity | 1 | 1 | 1 |
| Centering ring | Quantity | 2 | 2 | 2 |
| Clamp (set of 4 pieces) | Quantity | 2 | 2 | 2 |
| Support bracket | Quantity | 4 | 8 | 8 |
| Rubber/metal absorber | Quantity | 2 | 4 | 4 |
| Hexagon nut M 12 | Quantity | 12 | 24 | 24 |
| Threaded rod M 12 | | | | |
| 105 mm long | Quantity | 4 | 8 | 8 |
| Washer | Quantity | 12 | 24 | 24 |

Technical Data

Bellows with Vibration Absorbers

KIT DN 200 ISO-K KIT DN 250 ISO-K KIT DN 320 ISO-K

| | | | | |
|------------------------|----------|------------|------------|------------|
| Length | mm (in.) | 150 (5.91) | 200 (7.87) | 250 (9.84) |
| Lateral movement, max. | mm (in.) | 3.5 (0.14) | 4.5 (0.18) | 4.5 (0.18) |
| Axial movement, max. | mm (in.) | 20 (0.79) | 30 | 50 |

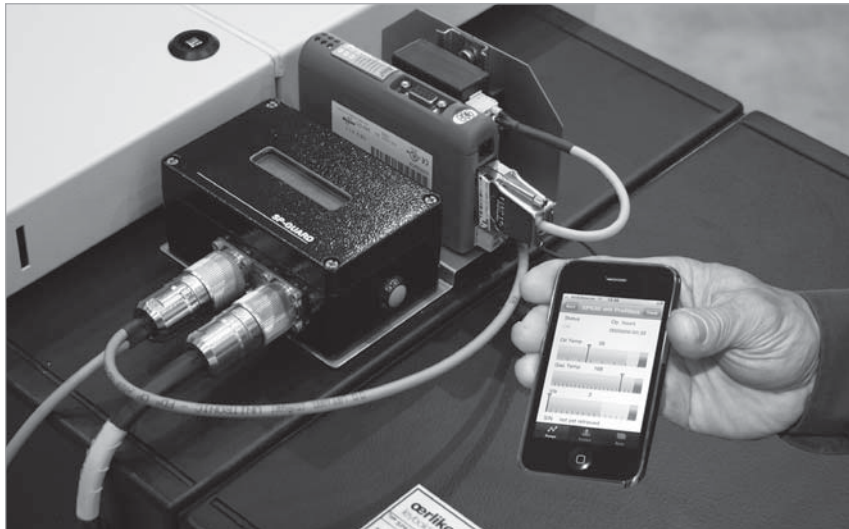
Ordering Information

Bellows with Vibration Absorbers

KIT DN 200 ISO-K KIT DN 250 ISO-K KIT DN 320 ISO-K

| | | Part No. | Part No. | Part No. |
|--|----------|---------------------|---------------------|---------------------|
| Bellows with vibration absorbers consisting of | | 503 189 V004 | 503 189 V005 | 503 189 V006 |
| Bellows | Quantity | 1 | 1 | 1 |
| Centering ring | Quantity | 2 | 2 | 2 |
| Clamp (set of 4 pieces) | Quantity | 3 | 3 | 4 |
| Support bracket | Quantity | 12 | 12 | 16 |
| Rubber/metal absorber | Quantity | 6 | 6 | 8 |
| Hexagon nut M 12 | Quantity | 36 | 36 | 48 |
| Threaded rod M 12 | | | | |
| 90 mm long | Quantity | 12 | 12 | – |
| 105 mm long | Quantity | – | – | 16 |
| Washer | Quantity | 36 | 36 | 48 |

Bus Interfaces for Monitoring



Wi-Fi and Profibus interface kit for SP-GUARD

Bus interfaces for remote reading of the SP-GUARD monitoring system for the screw pumps SCREWLINE SP 250 and SP 630. Item can be ordered as retrofit kit or together with the pump unit.

Advantages to the User

- Interface box for assembly on screw pump SCREWLINE SP 250 and SP 630
- Read out of vibration levels, oil temperatures, warning and failure functions
- The interface box is mounted next to the SP-GUARD
- Interface box needs a 24 V DC supply on-site (24 V DC supply of the SP-GUARD can be used)

Available Interfaces

- Profibus
- Wi-Fi

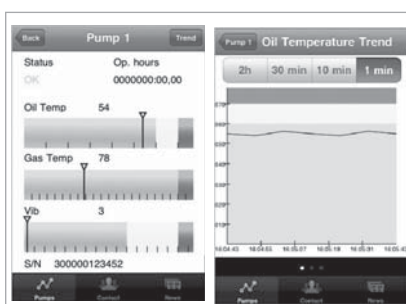
Further interfaces upon request:

- Profinet
- DeviceNet
- Ethernet
- CAN bus
- Interbus
- etc.

Ordering Information

Interface Kit SP-GUARD

| | Part No. |
|---|--------------|
| Interface kit SP-GUARD Profibus | 502 898 V001 |
| Profibus kit and Wi-Fi with iPhone for SP-GUARD | 503 264 V901 |
| Profibus interface kit and Wi-Fi for SP-GUARD | 503 183 V901 |
| SCREWLINE SP 630 screw pump with Profibus interface | 502 899 V001 |
| Further combinations | upon request |



Various indications on the mobile equipment



Profibus interface kit for SP-GUARD



Smart phone / tablet PC for readout (Wi-Fi)

Miscellaneous to oil sealed and dry compressing Pump Systems

Checklist for Inquiries

To Oerlikon Leybold Vacuum GmbH

Dept. Systems

Fax: +49 (0)221/347 - 31206

e-Mail: vacuum.solutions@oerlikon.com

From company: _____

Name/Department: _____

Phone: _____ Date: _____

Fax: _____ First page of: _____

MAKE USE OF OUR KNOW-HOW !

Simply fax the completed checklist to us. Our engineers will design a pump system which exactly matches your requirements. You will receive an offer shortly.

1. In what kind of application will the pump system be used (e.g. drying, distillation)?

2. Is the process run
☐ continuously ☐ in batches:

3. What is the volume of the vacuum chamber?

_____ m³

4. What pump-down times are required/desired?

_____ min³ x h⁻¹

5. What operating pressures are planned?

_____ mbar

6. How high is the ambient temperature?

- when installed in the building:

min. _____ °C / max. _____ °C

- when installed out in the open

min. _____ °C / max. _____ °C

7. How high is the intake temperature?

_____ °C

8. What is the composition of the gas which is to be pumped.

Designation:

a) _____ b) _____

c) _____ d) _____

e) _____ f) _____

9. Quantity (kg/h or Nm³/h), traces (%):

a) _____ b) _____

c) _____ d) _____

e) _____ f) _____

10. In case of materials not commonly listed in the tables please state:

a) Molecular mass _____

b) Thermal capacity _____

c) Vapor pressure _____

d) Viscosity _____

e) Melting point _____

f) Special characteristics _____

11. Must explosion hazard regulations be observed?

☐ yes ☐ no

if yes, which? _____

12. What kind of electrical supplies are available?

a) Voltage _____

b) Frequency _____

13. What kind of mechanical connection specifications are planned?

a) Length of the intake line

b) Diameter of the intake line

14. Which cooling media are available (water, brine, etc.)? Which temperature?

_____ min. _____ °C

_____ max. _____ °C

General to High Vacuum Pump Systems TMP

The requirements of production or research engineers concerning the vacuum technology they have to employ are usually widely different. In most cases pumping speed and operating pressure must be accurately matched to suit a particular process. The wide range of vacuum pumps and standard accessories available offers many options.

Sometimes it is just this flexibility which causes difficulties when having to decide between the various configurations of a particular pump system. Based on our experience and by listening to our customers' demands, we have therefore compiled a range of turn-key vacuum systems based on standard components.

Before leaving the factory they are subjected to both functional tests and leak tests. By adding components from our standard range or special accessories they may be easily adapted to meet specific requirements.

Application and Accessories

| Pump systems | PT 50 | PT 151 / PT 361 | PT 50 KIT | PT 151 KIT | PT 361 KIT | PT 80 DRY | PT 80 H DRY | TURBOLAB 80 | PT 151 DRY | PT 361 DRY | PT 300 DRY | PT-Flex |
|--|-------|-----------------|-----------|------------|------------|-----------|-------------|-------------|------------|------------|------------|---------|
| Application | | | | | | | | | | | | |
| Microbalances | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Sputtering | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Spectroscopy | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Production of TV and monitor picture tubes | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Surface refining | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Evaporation coating systems | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Beam guidance systems | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Laboratory pump systems | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Accessories | | | | | | | | | | | | |
| Control unit for turbomolecular pump systems | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | ■ |
| Air cooling unit | ■ | ■ | ■ | ■ | ■ | ▲ | ▲ | ▲ | ■ | ■ | ▲ | ■ |
| Flange heater | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ |
| Venting valve | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Power failure venting valve | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Purge gas and venting valve | | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ |
| Adsorption traps with aluminium oxide insert | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| Exhaust filter | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| Water cooling unit | ■ | ▲ | ■ | ▲ | ▲ | ■ | ■ | | ▲ | ▲ | ■ | ■ |

■ Possible

▲ Included in standard scope of delivery

Products

Oil Sealed Pump Systems PT 50 Turbomolecular Pump System



Example: PT 50 with options
(switch box, gauge)

The turbomolecular pump system PT 50 is a fully assembled and ready-to-operate high vacuum pump system benchtop unit for producing a high and ultra-high vacuum.

Advantages to the User

- Low ultimate pressure ($< 10^{-8}$ mbar ($< 0.75 \times 10^{-8}$ Torr))
- High pumping speed of the backing pump
- High effective pumping speed
- Compact, small, rugged unit
- Simple to operate
- High level of reliability
- Maintenance-friendly design
- Air cooling
- For use worldwide
- Installation of standard vacuum components in an open frame
- Rugged table top unit which may also carry heavy assemblies
- Service friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- The high vacuum pump can be removed from the pump system (any installation orientation)
- CE approval

The turbomolecular pump system consists of the following principal components:

- Grease lubricated turbomolecular pump TURBOVAC 50 with ceramic ball bearings, convection cooling and splinter guard
- Electronic frequency converter NT 10
- Dual-stage, oil sealed rotary vane vacuum pump TRIVAC D 2,5 E as backing pump
- All required connecting and sealing components are located within the pump system assembly

- Either with or without switchbox

- With switchbox

The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (one measuring instrument and one power failure venting valve) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting (see Ordering Information)

- Without switchbox

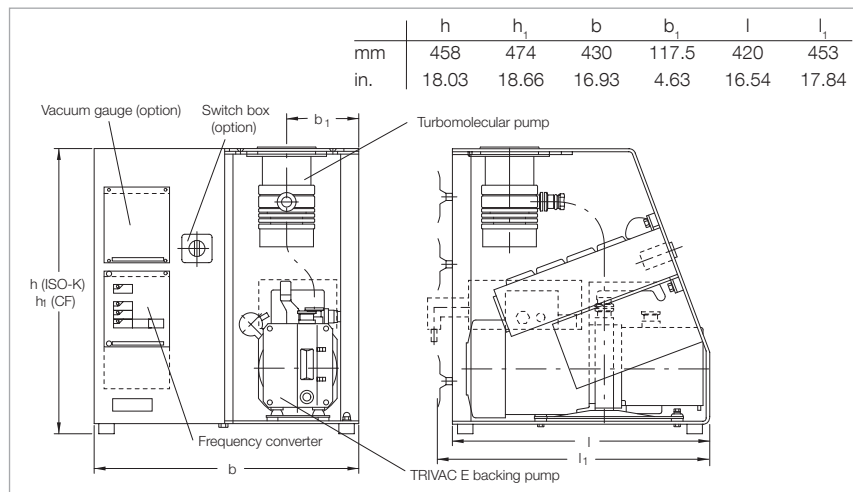
The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

The pump system can be upgraded with further components, for example:

- Switchbox
- Vacuum gauge
- Power failure venting valve
- Air cooling unit
- Adsorption trap
- Exhaust filter
- Rotatable castors
- Venting valve
- Assembly on the intake side with manifold, valves, gauge heads etc.

Typical Applications

- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems
- Production of gas Lasers



Dimensional drawing for the PT 50 turbomolecular pump system

Technical Data

PT 50

| | | | | |
|---|--|---|---|---|
| Turbomolecular pump | | TURBOVAC 50 | TURBOVAC 50 | TURBOVAC 50 |
| High vacuum connection | DN | 40 ISO-KF | 63 ISO-K | 63 CF |
| Pumping speed for N ₂ | l x s ⁻¹ | 33 | 55 | 55 |
| Compression for N ₂ / H ₂ | | 2 x 10 ⁷ / 10 ² | 2 x 10 ⁷ / 10 ² | 2 x 10 ⁷ / 10 ² |
| Speed of the TURBOVAC | rpm | 72 000 | 72 000 | 72 000 |
| Dual-stage rotary vane vacuum pump | | TRIVAC D 2,5 E | TRIVAC D 2,5 E | TRIVAC D 2,5 E |
| Nominal pumping speed | | | | |
| acc. to PNEUROP | m ³ x h ⁻¹ (cfm) | 2.7 (1.6) | 2.7 (1.6) | 2.7 (1.6) |
| Ultimate total pressure | mbar (Torr) | 10 ⁻³ (0.75 x 10 ⁻³) | 10 ⁻³ (0.75 x 10 ⁻³) | 10 ⁻³ (0.75 x 10 ⁻³) |
| Attainable ultimate pressure | | | | |
| with FPM (FKM) gasket | mbar (Torr) | 10 ⁻⁷ (0.75 x 10 ⁻⁷) | 10 ⁻⁷ (0.75 x 10 ⁻⁷) | 10 ⁻⁷ (0.75 x 10 ⁻⁷) |
| CF version with aluminum | | | | |
| or Cu gasket | mbar (Torr) | – | – | 10 ⁻⁸ (0.75 x 10 ⁻⁸) |
| Main supply, 50/60 Hz | V | 200-240 ¹⁾ | 200-240 ¹⁾ | 200-240 ¹⁾ |
| Power consumption, max. | VA | 315 | 315 | 315 |
| Dimensions (W x H x D) | mm (in.) | see dimensional drawing | see dimensional drawing | see dimensional drawing |
| Weight, approx. | kg (lbs) | 27 (59.4) | 27 (59.4) | 27 (59.4) |

Ordering Information

PT 50

| | Part No. | Part No. | Part No. |
|---|-------------------|-------------------|-------------------|
| PT 50 turbomolecular pump system, 230 V, 50 Hz ¹⁾ | | | |
| without switchbox, connection via 2 Schuko plugs | | | |
| DN 40 ISO-KF | 503265V001 | – | – |
| DN 63 ISO-K | – | 503266V001 | – |
| DN 63 CF | – | – | 503267V001 |
| with switchbox and mains cord with 1 Schuko plug | | | |
| DN 40 ISO-KF | 503265V002 | – | – |
| DN 63 ISO-K | – | 503266V002 | – |
| DN 63 CF | – | – | 503267V002 |

Accessories

| | | | |
|--|-----------------------------|-----------------------------|-----------------------------|
| Air cooling unit | | | |
| 100 V | 800152V0015 | 800152V0015 | 800152V0015 |
| 115 V | 854 06 | 854 06 | 854 06 |
| 230 V | 854 05 | 854 05 | 854 05 |
| Water cooling unit (10 mm dia. hose nozzle) | 800135V003 | 800135V003 | 800135V003 |
| Flange heater | | | |
| DN 63 CF, 115 V | – | – | 854 07 |
| DN 63 CF, 230 V | – | – | 854 04 |
| Venting valve, DN 10 ISO-KF manually operated | 173 24 | 173 24 | 173 24 |
| Power failure venting valve, DN 10 ISO-KF 230 V, 50/60 Hz | 174 26 ²⁾ | 174 26 ²⁾ | 174 26 ²⁾ |
| Adsorption trap, DN 16 ISO-KF | 854 14 ³⁾ | 854 14 ³⁾ | 854 14 ³⁾ |
| Adsorbent 1.6 l | 854 10 | 854 10 | 854 10 |
| Exhaust filter AF 8 | 190 50 | 190 50 | 190 50 |
| Mains cord for PT with switchbox | | | |
| US/Japan 230 V, 50/60 Hz | 200 81 141 | 200 81 141 | 200 81 141 |
| CH 230 V, 50/60 Hz | 200 81 099 | 200 81 099 | 200 81 099 |
| UK 230 V, 50/60 Hz | 200 81 097 | 200 81 097 | 200 81 097 |
| Connecting cable for operating the TURBOVAC outside the pump system | | | |
| 3 m (7.0 ft) | 121 08 | 121 08 | 121 08 |
| 5 m (17.5 ft) | 121 09 | 121 09 | 121 09 |
| 10 m (35.0 ft) | 161 10 | 161 10 | 161 10 |
| 20 m (70.0 ft) | 800150V2000 | 800150V2000 | 800150V2000 |
| Rotatable castors PT 50/80 | 503227V901 | 503227V901 | 503227V901 |

¹⁾ Other voltages upon request

²⁾ Deliveries in the case of reorders are without connection cable

³⁾ Delivery without adsorbent, please order separately

PT 151/PT 361 Turbomolecular Pump Systems



Example: PT 151 with switch box

These turbomolecular pump systems are ready-to-operate vacuum units for generating a vacuum in the high and ultra-high vacuum range.

When pumping aggressive or abrasive process gases, a purge gas facility must be used for the pumps.

Advantages to the User

- Low ultimate pressure ($< 10^{-10}$ mbar/Torr)
- High backing pump pumping speed
- High effective pumping speed
- Compact, mobile unit
- Simple to operate
- High level of reliability
- Venting port
- Purge gas port (only at C version)
- Service friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- Pump systems prepared for installation of larger backing pumps (for barrier gas operation, for example)
- CE approval

The turbomolecular pump systems consists of the following principal components:

- Grease lubricated turbomolecular pump TURBOVAC 151 or 361 with splinter guard
- Electronic frequency converter TD 20^{classic}
- Dual-stage, oil sealed TRIVAC D 4 B or D 16 B rotary vane vacuum pump as backing pump (further sizes upon request)
- All necessary connection and sealing components within the pump system

Either with or without switchbox

- With switchbox

The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (Gauge, power failure venting valve, air cooler and flange heater) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting (see Ordering Information)

- Without switchbox

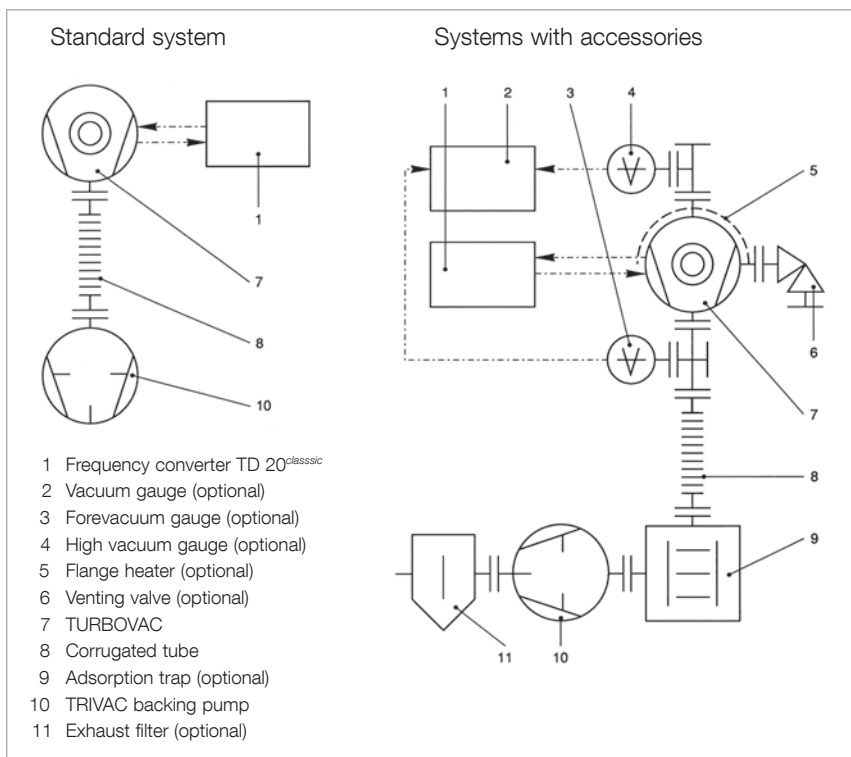
The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

Typical Applications

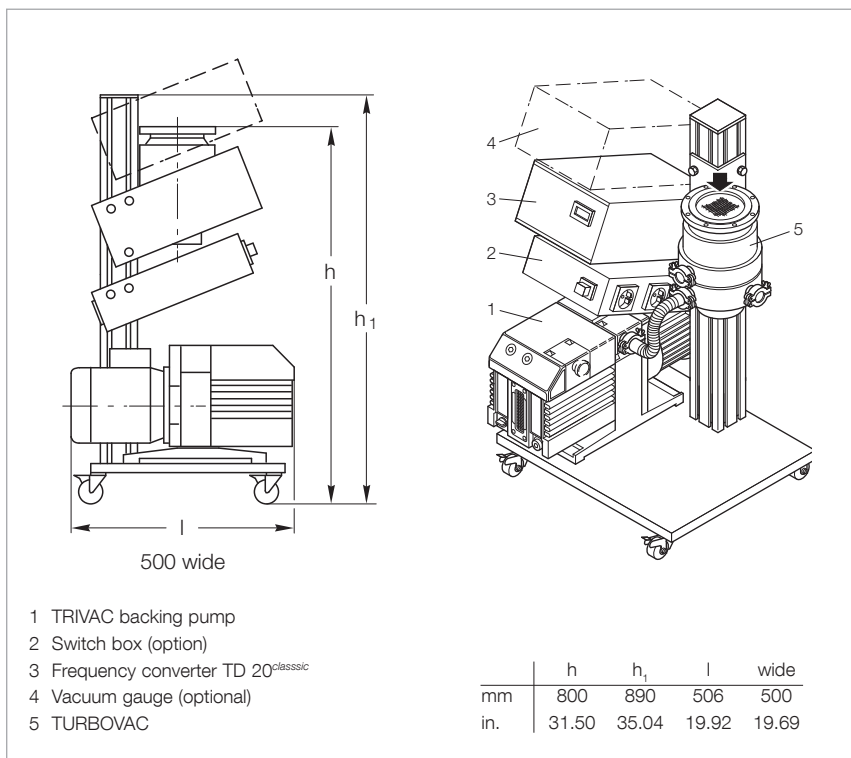
- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Microbalances
- Sputtering and evaporation systems
- Surface physics

Further components can be added to the pump systems, for example:

- Switch box
- Vacuum gauges (up to two)
- Adsorption trap
- Exhaust filter
- Air cooling unit
- Flange heater
- Power failure venting valve
- Venting valve
- Purge gas valve (only at C version)
- Intake arrangement with manifold, valves and vacuum gauges etc.



Vacuum diagram of the PT 151/PT 361 turbomolecular pump systems
with rotary vane vacuum pump TRIVAC



PT 151/PT 361 turbomolecular pump system with rotary vane vacuum pump TRIVAC

Technical Data

PT 151

PT 361

| | | | | | |
|--|--|---|---|---|---|
| Turbomolecular pump | | TURBOVAC 151 | TURBOVAC 151 | TURBOVAC 361 | TURBOVAC 361 |
| High vacuum connection | DN | 100 ISO-K | 100 CF | 100 ISO-K | 100 CF |
| Pumping speed for N ₂ | l x s ⁻¹ | 145 | 145 | 345 | 345 |
| Compression for N ₂ /H ₂ | | 1 x 10 ⁹ / 8 x 10 ² | 1 x 10 ⁹ / 8 x 10 ² | 1 x 10 ⁹ / 3 x 10 ³ | 1 x 10 ⁹ / 3 x 10 ³ |
| Speed of the TURBOVAC | rpm | 50 000 | 50 000 | 50 000 | 50 000 |
| Dual-stage rotary vane vacuum pump | | TRIVAC D 4 B | TRIVAC D 4 B | TRIVAC D 16 B | TRIVAC D 16 B |
| Nominal pumping speed (DIN 28 400) | m ³ x h ⁻¹ (cfm) | 4.8 (2.83) | 4.8 (2.83) | 18.9 (11.13) | 18.9 (11.13) |
| Exhaust connection | DN | 16 ISO-KF | 16 ISO-KF | 25 ISO-KF | 25 ISO-KF |
| Attainable ultimate pressure | | | | | |
| with FPM (FKM) gasket | mbar (Torr) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) |
| with Cu seal | mbar (Torr) | – | 10 ⁻¹⁰ (0.75 x 10 ⁻¹⁰) | – | 10 ⁻¹⁰ (0.75 x 10 ⁻¹⁰) |
| Cooling water consumption | l/h | 15-35 | 15-35 | 15-35 | 15-35 |
| Cooling water connection, hose nozzle | mm (in.) | 10 (0.39) | 10 (0.39) | 10 (0.39) | 10 (0.39) |
| Power consumption, max. | VA | 770 | 770 | 1150 | 1150 |
| Mains supply 50/60 Hz | V | 210-230 ¹⁾ | 210-230 ¹⁾ | 218-240 ¹⁾ | 218-240 ¹⁾ |
| Dimensions (W x H x D) | mm (in.) | see dimensional drawing | see dimensional drawing | see dimensional drawing | see dimensional drawing |
| Weight, approx. | kg (lbs) | 45 (99.2) | 45 (99.2) | 62 (136.7) | 62 (136.7) |

¹⁾ Other voltages upon request

Ordering Information

PT 151

PT 361

| | Part No. | Part No. | Part No. | Part No. |
|---|--|--|--|--|
| Turbomolecular pump system 230 V / 50 Hz ¹⁾ , without switch box, Connection via 2 Schuko plugs with TRIVAC D 4 B with TRIVAC D 16 B | 100 ISO-K 503268V001 – | 100 CF 503269V001 – | 100 ISO-K – 503270V001 | 100 CF – 503271V001 |
| 230 V, 50 Hz ¹⁾ , with switch box and mains cord with 1 Schuko plug with TRIVAC D 4 B with TRIVAC D 16 B | 503268V002 – | 503269V002 – | – 503270V002 | – 503271V002 |
| Accessories | | | | |
| Air cooling unit 100 V 115 V 230 V | 800152V0016 894 08 855 31 | 800152V0016 894 08 855 31 | 800152V0016 894 08 855 31 | 800152V0016 894 08 855 31 |
| Flange heater, DN 100 CF 115 V 230 V | – – | 854 28 854 27 | – – | 854 28 854 27 |
| Venting valve, DN 10 ISO-KF manually operated | 173 24 | 173 24 | 173 24 | 173 24 |
| Power failure venting valve normally open 24 V DC, DN 16 ISO-KF 230 V, 50/60 Hz, DN 10 ISO-KF | 800120V0021 ²⁾ 174 26 ²⁾ | 800120V0021 ²⁾ 174 26 ²⁾ | 800120V0021 ²⁾ 174 26 ²⁾ | 800120V0021 ²⁾ 174 26 ²⁾ |
| Purge gas and venting valve, 100-230 V 0.4 mbar x l x s ⁻¹ | 800152V0014 ²⁾ | 800152V0014 ²⁾ | 800152V0014 ²⁾ | 800152V0014 ²⁾ |
| Filter adapter for gas connection G 1/4" | 800110V0012 | 800110V0012 | 800110V0012 | 800110V0012 |
| Replacement filter | 200 18 515 | 200 18 515 | 200 18 515 | 200 18 515 |
| Adsorption trap DN 16 ISO-KF DN 25 ISO-KF Adsorbent 1.6 l | 854 14 ³⁾ – 854 10 | 854 14 ³⁾ – 854 10 | – 854 15 ³⁾ 854 10 | – 854 15 ³⁾ 854 10 |
| Exhaust filter AF 4-8 AF 16-25 | 189 06 – | 189 06 – | – 189 11 | – 189 11 |
| Mains cord for PT with switch box EURO 230 V, 50 Hz CH 230 V, 50/60 Hz UK 230 V, 50/60 Hz US/Japan 230 V, 50/60 Hz | 200 81 091 200 81 099 200 81 097 200 81 141 | 200 81 091 200 81 099 200 81 097 200 81 141 | 200 81 091 200 81 099 200 81 097 200 81 141 | 200 81 091 200 81 099 200 81 097 200 81 141 |
| Control unit for turbomolecular pump systems (see Chapter "Accessories") | upon request | upon request | upon request | upon request |

¹⁾ Other voltages upon request

²⁾ Deliveries in the case of reorders are without connection cable, purge gas only at C-versions

³⁾ Delivery without adsorbent, please order separately

Turbomolecular Pump Systems

PT 50 KIT, PT 151 KIT, PT 361 KIT

Under the motto “Do-it-yourself and save money” you may assemble the turbomolecular pump systems PT 50 KIT, PT 151 KIT and PT 361 KIT yourself.

The turbomolecular pump systems PT 50 KIT, PT 151 KIT and PT 361 KIT are made of the same components as used for the turn-key systems:

- Base panel with column
- Turbomolecular pump TURBOVAC 50 (PT 50 KIT) or 151 or 361 (PT 151 KIT or PT 361 KIT)
- Rotary vane vacuum pump TRIVAC D 2,5 E (PT 50 KIT) or D 4 B or D 16 B (PT 151 KIT or PT 361 KIT)
- TURBOTRONIK NT 10 electronic frequency converter (PT 50 KIT) or NT 20 (PT 151 KIT and PT 361 KIT)
- All necessary mounting parts, connection parts and gaskets are supplied
- Switch box
- Simple and accurate assembly instructions
- Detailed exploded view
- Description which is easy to understand
- Additional detailed knowledge is gained about the product by assembling it yourself
- CE approval

The technical data, the areas of application and the design characteristics correspond to the turbomolecular pump systems PT 50, PT 151 and PT 361 described on the preceding pages.

Typical Applications

- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Microbalances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems
- Production of gas lasers

PT 50 KIT



Unpacking, 15 minutes, approx.



After further 20 minutes

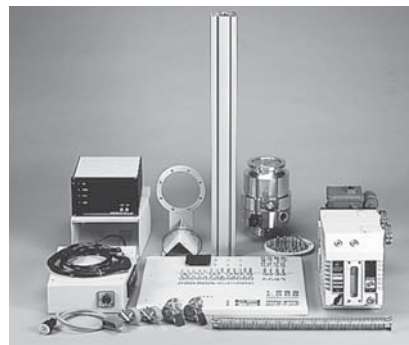


After further 20 minutes

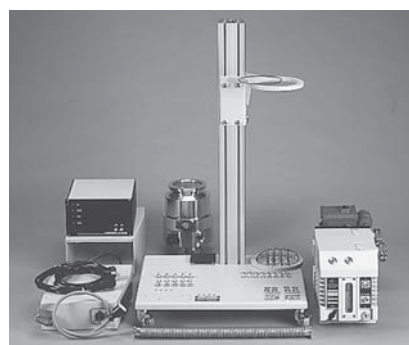


After further 30 minutes

PT 151 KIT/PT 361 KIT



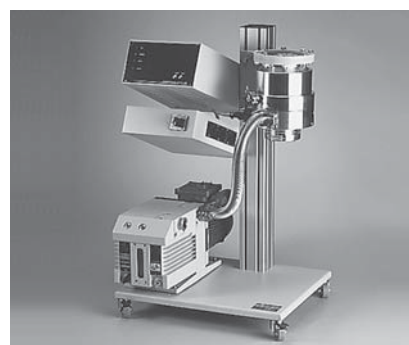
Unpacking, 15 minutes, approx.



After further 30 minutes



After further 30 minutes



After further 50 minutes

Ordering Information

PT 50 KIT

PT 151 KIT

PT 361 KIT

| | Part No. | Part No. | Part No. |
|--|----------------------------------|----------------------------------|----------------------------------|
| PT 50 KIT turbomolecular pump system | | | |
| Air convection cooling | | | |
| 200-240 V, 50/60 Hz | | | |
| DN 40 ISO-KF | 128 70 | - | - |
| DN 63 ISO-K | 128 71 | - | - |
| DN 63 CF | 128 73 | - | - |
| PT 151 KIT turbomolecular pump system, | | | |
| water-cooled | | | |
| 210-230 V, 50/60 Hz | | | |
| DN 100 ISO-K | - | 128 74 | - |
| DN 100 CF | - | 128 75 | - |
| PT 361 KIT turbomolecular pump system, | | | |
| water-cooled | | | |
| 218-240 V, 50/60 Hz | | | |
| DN 100 ISO-K | - | - | 128 76 |
| DN 100 CF | - | - | 128 78 |
| DN 160 ISO-K | - | - | upon request |
| DN 160 CF | - | - | upon request |
| Accessories | | | |
| Air cooling unit | | | |
| 230 V | 854 05 | 855 31 | 855 31 |
| 115 V | 854 06 | 894 08 | 894 08 |
| 100 V | 800152V0015 | 800152V0016 | 800152V0016 |
| Water cooling unit for the TURBOVAC | 800135V0003 | - | - |
| Flange heater | | | |
| DN 63 CF, 230 V | 854 04 | - | - |
| DN 63 CF, 115 V | 854 07 | - | - |
| DN 100 CF, 230 V | - | 854 27 | 854 27 |
| DN 100 CF, 115 V | - | - | 854 28 |
| Adsorption trap | | | |
| DN 16 ISO-KF | 854 14 | 854 14 | - |
| DN 25 ISO-KF | - | - | 854 15 |
| Adsorbent 1.6 l | 854 10 | 854 10 | 854 10 |
| Exhaust filter | | | |
| AF 4-8 | - | 189 06 | - |
| AF 8 | 190 50 | - | - |
| AF 16-25 | - | - | 189 11 |
| Venting valve, DN 10 ISO-KF | | | |
| manually operated | 173 24 | 173 24 | 173 24 |
| Purge gas and venting valve, 230 V | | | |
| 0.2 mbar x l x s ⁻¹ | - | 855 19 ¹⁾ | 855 19 ¹⁾ |
| Power failure venting valve | | | |
| 24 V DC, DN 16 ISO-KF | 800120V0021 ¹⁾ | 800120V0021 ¹⁾ | 800120V0021 ¹⁾ |
| 230 V, 50/60 Hz, DN ISO 10 KF | 174 26 ¹⁾ | 174 26 ¹⁾ | 174 26 ¹⁾ |
| Mains cord | | | |
| US/Japan 230 V, 50/60 Hz | 200 81 141 | 200 81 141 | 200 81 141 |
| CH 230 V, 50/60 Hz | 200 81 099 | 200 81 099 | 200 81 099 |
| UK 230 V, 50/60 Hz | 200 81 097 | 200 81 097 | 200 81 097 |
| Connecting cable for operating | | | |
| the TURBOVAC outside the pump system | | | |
| 3 m (7.0 ft) | 121 08 | - | - |
| 5 m (17.5 ft) | 121 09 | 857 66 | 857 66 |
| 10 m (35.0 ft) | - | 857 67 | 857 67 |

¹⁾ Delivery without connection cable, only with venting function

Dry Pump Systems

PT 80 DRY / PT 80 H DRY Turbomolecular Pump System



The PT 80 DRY turbomolecular pump system is a fully assembled and ready-to-operate high vacuum system designed as a table top unit for producing a high and ultra-high vacuum free of hydrocarbons.

Example: PT 80 DRY with scroll pump and options (switchbox, measuring instrument, power failure venting valves and intake section)

Advantages to the User

- Absolutely oil-free
- Low ultimate pressure free of hydrocarbons (10^{-8} mbar/Torr)
- High effective pumping speed
- Compact, small, rugged unit
- Simple operation
- High level of reliability
- Maintenance-friendly design
- Air cooling
- Installation of standard vacuum components in an open frame
- Service-friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- The high vacuum pump can be removed (installation in any orientation)

The turbomolecular pump system consists of the following principal components:

- SL 80/SL 80 H wide range turbomolecular pump system featuring
 - Integrated air cooling
 - Ceramic ball bearings
 - Grease lubrication
 - High vacuum connection: DN 63 ISO-K or DN 63 CF
 - Splinter guard at the intake flange
- Frequency converter with start/stop switch
- TURBO.POWER 300 power supply. The power supply supplies the frequency converter with 24 V DC
- Three-stage, absolutely oil-free DIVAC 1.4 HV3 diaphragm vacuum pump used as the backing pump respectively scroll pump SCROLLVAC SC 5D as the backing pump
- All required connection and sealing components are located within the pump system assembly

- Either with or without switchbox

- With switchbox

The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (one measuring instrument and one power failure venting valve) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting (see Ordering Information)

- Without switchbox

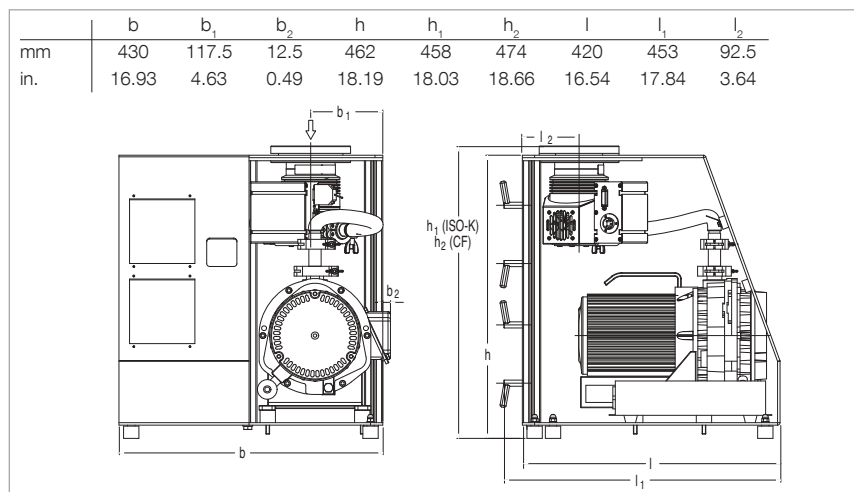
The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

The pump system can be upgraded with further components, for example:

- Switchbox
- Vacuum gauge
- Power failure venting valve
- Rotatable castors
- Venting valve
- Seal gas valve
- Intake assembly with pipe manifold, valves, vacuum gauges etc.

Typical Applications

- Spectroscopy
- Valve manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems



Dimensional drawing for the PT 80 DRY/ PT 80 H DRY turbomolecular pump system

Technical Data

PT 80 H DRY

PT 80 DRY

| Wide range turbomolecular pump | | TURBOVAC SL 80 H | TURBOVAC SL 80 H | TURBOVAC SL 80 | TURBOVAC SL 80 |
|---|--|---|---|---|---|
| High vacuum connection | DN | 63 ISO-K | 63 CF | 63 ISO-K | 63 CF |
| Pumping speed for N ₂ | l x s ⁻¹ | 65 | 65 | 65 | 65 |
| Diaphragm pump | | DIVAC 1.4 HV3 | DIVAC 1.4 HV3 | – | – |
| Pumping speed, approx. | m ³ x h ⁻¹ (cfm) | 1.3 (0.77) | 1.3 (0.77) | – | – |
| Ultimate pressure | mbar (Torr) | < 1.5 (1.13) | < 1.5 (1.13) | – | – |
| Scroll vacuum pump | | – | – | SCROLLVAC SC 5 D | SCROLLVAC SC 5 D |
| Pumping speed, approx. | m ³ x h ⁻¹ (cfm) | – | – | 5.4 (3.18) | 5.4 (3.18) |
| Ultimate pressure | mbar (Torr) | – | – | < 0.05 (0.03) | < 0.05 (0.03) |
| Attainable ultimate pressure of the system | mbar (Torr) | 10 ⁻⁷ (0.75 x 10 ⁻⁷) | 10 ⁻⁸ (0.75 x 10 ⁻⁸) | 10 ⁻⁷ (0.75 x 10 ⁻⁷) | 10 ⁻⁸ (0.75 x 10 ⁻⁸) |
| Main supply, 50/60 Hz | V | 100 - 230 | 100 - 230 | 200 - 230 ¹⁾ | 200 - 230 ¹⁾ |
| Power consumption, max. with diaphragm vacuum pump | VA | 420 | 420 | – | – |
| with scroll vacuum pump | VA | – | – | 450 | 450 |
| Dimensions (W x H x D) | mm (in.) | see dimensional drawing | see dimensional drawing | see dimensional drawing | see dimensional drawing |
| Weight, approx. with diaphragm vacuum pump | kg (lbs) | 20 (44.15) | 20 (44.15) | – | – |
| with scroll vacuum pump | kg (lbs) | – | – | 28 (61.6) | 28 (61.6) |

Ordering Information

PT 80 H DRY

PT 80 DRY

| | Part No. | Part No. | Part No. | Part No. |
|--|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| PT 80 (H) DRY turbomolecular pump system 230 V, 50 Hz, without switch box, Connection via 2 Schuko plugs with diaphragm vacuum pump with scroll pump | 503272V001 – | 503273V001 – | – 503225V001 | – 503226V001 |
| with switch box and mains cord with 1 Schuko plug with diaphragm vacuum pump with scroll vacuum pump | 503272V002 – | 503273V002 – | – 503225V002 | – 503226V002 |
| Accessories | | | | |
| Mains adapter Schuko/US | 200 11 119 | 200 11 119 | – | – |
| Mains cord for PT with switch box | | | | |
| EURO 230 V, 50 Hz | 200 81 091 | 200 81 091 | 200 81 091 | 200 81 091 |
| CH 230 V, 50/60 Hz | 200 81 099 | 200 81 099 | 200 81 099 | 200 81 099 |
| UK 230 V, 50/60 Hz | 200 81 097 | 200 81 097 | 200 81 097 | 200 81 097 |
| US/Japan 230 V, 50/60 Hz | 200 81 141 | 200 81 141 | 200 81 141 | 200 81 141 |
| US/Japan 115 V, 60 Hz | 200 81 090 | 200 81 090 | – ¹⁾ | – ¹⁾ |
| Connection adapter M8 / DN 10 ISO-KF | 800110V0011 | 800110V0011 | 800110V0011 | 800110V0011 |
| Power failure venting valve DN 10 ISO-KF 230 V, 50/60 Hz | 174 26 ²⁾ | 174 26 ²⁾ | 174 26 ²⁾ | 174 26 ²⁾ |
| Venting valve DN 10 ISO-KF manually operated | 173 24 | 173 24 | 173 24 | 173 24 |
| Purge gas and venting valve 100-230 V | 800152V0014 ²⁾ | 800152V0014 ²⁾ | 800152V0014 ²⁾ | 800152V0014 ²⁾ |
| Connecting cable for operating the TURBOVAC outside the pump system | | | | |
| 2.5 m (8.75 ft) | 864 49 | 864 49 | 864 49 | 864 49 |
| 3.0 m (10.50 ft) | 864 40 | 864 40 | 864 40 | 864 40 |
| 5.0 m (17.50 ft) | 864 50 | 864 50 | 864 50 | 864 50 |
| Rotatable castors PT 50/80 | 503227V901 | 503227V901 | 503227V901 | 503227V901 |

¹⁾ Other voltages upon request

²⁾ Deliveries in the case of reorders are without connection cable

Turbomolecular Pump System

TURBOLAB 80



Turbomolecular pump system TURBOLAB 80 Basic (left) and TURBOLAB 80 Full Featured (right)

The TURBOLAB 80 turbomolecular pump system is a fully assembled and ready-to-operate high vacuum system designed as a table top unit.

Advantages to the User

- Absolutely oil-free
- Low ultimate pressure free of hydrocarbons (10^{-7} mbar/Torr)
- High effective pumping speed
- Compact and small unit
- Simple operation
- High level of reliability
- Maintenance-friendly design
- Air cooling
- Installation of standard vacuum components in a portable sheet metal enclosure

Only TURBOLAB 80 Basic:

- Manual operation
- Pressure measurement as an option via ITR 90 with display

Only TURBOLAB 80 Full Featured:

- Graphic display of pressure curves
- Menu navigation in different languages
- Parameters of the turbomolecular pump and pressures can be saved to a computer
- ITR 90, PTR 90 or TTR 91 gauge heads can be connected
- Pressure readout through display
- Manual or automatic operation

- Operation parameter indication
- Forevacuum pressure measurement optional (possible)
- Venting is possible (optional)

The turbomolecular pump system consists of the following principal components:

- SL 80 H wide range turbomolecular pump system featuring:
 - Integrated frequency converter
 - Integrated air cooling
 - Ceramic ball bearings
 - Grease lubrication
- Pumping speed for nitrogen: 65 l x s^{-1}
- High vacuum connection: DN 63 ISO-K or DN 63 CF
- Integrated splinter guard
- Frequency converter TURBO.DRIVE TD 400 with interface RS 232 C
- Dual-stage, absolutely oil-free DIVAC 0.8 T diaphragm vacuum pump used as the backing pump with the following specifications:
 - Pumping speed: $0.7 \text{ m}^3 \text{ x h}^{-1}$ (0.41 cfm)
 - Ultimate pressure: $\leq 3 \text{ mbar}$ ($\leq 2.25 \text{ Torr}$)

- All required connection and sealing components are located within the pump system assembly

The pump system is prepared for installation of further components:

- Vacuum gauges
- Venting valve

Automatic operation of the TURBOLAB 80 Full Featured version requires a high vacuum gauge ITR 90 (with or without display), for example and a sensor cable.

The pressure is read out through the display of the pump system. The 24 V DC power supply for operating an ITR 90, respectively PTR 90 gauge is supplied by the pump system.

Typical Applications

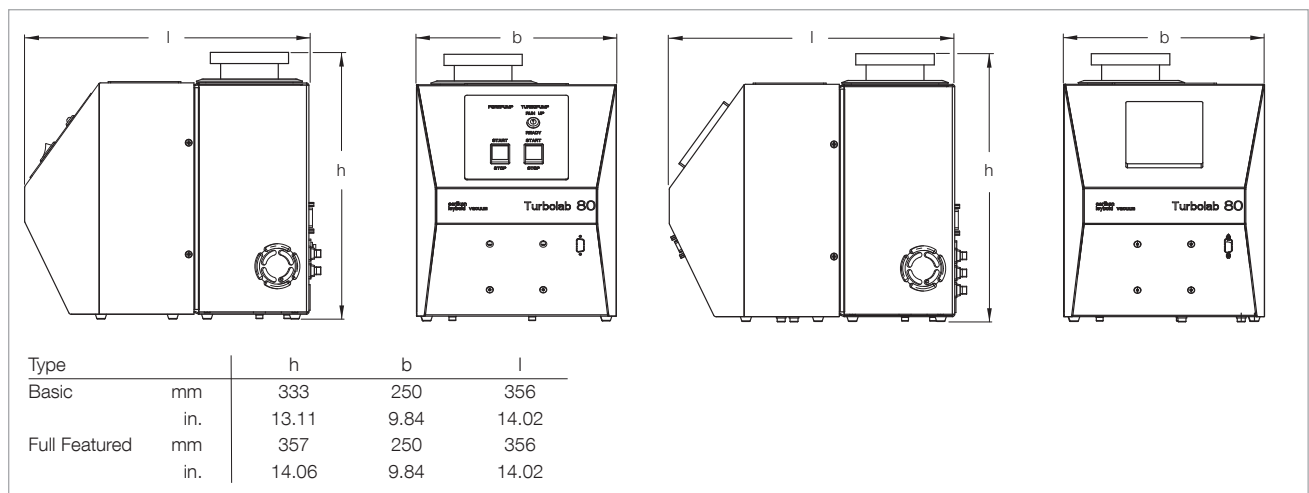
- Spectroscopy
- Valve manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems

Technical Data

TURBOLAB 80 Basic

TURBOLAB 80 Full Featured

| | | | |
|----------------------------------|--|---|---|
| Hybrid turbomolecular pump | | TURBOVAC SL 80 H | TURBOVAC SL 80 H |
| High vacuum connection | DN | 63 ISO-K / 63 CF | 63 ISO-K / 63 CF |
| Pumping speed for N ₂ | l x s ⁻¹ | 65 | 65 |
| Diaphragm pump | | DIVAC 0.8 T | DIVAC 0.8 T |
| Pumping speed, approx. | m ³ x h ⁻¹ (cfm) | 0.7 (0.41) | 0.7 (0.41) |
| Ultimate pressure, approx. | mbar (Torr) | 3 (2.25) | 3 (2.25) |
| Attainable ultimate pressure | mbar (Torr) | 10 ⁻⁷ (0.75 x 10 ⁻⁷) | 10 ⁻⁷ (0.75 x 10 ⁻⁷) |
| Run-up time, approx. | min | 1.5 | 1.5 |
| Main supply, 50/60 Hz | V | 88 to 264 | 88 to 264 |
| Power consumption, max. | VA | 350 | 350 |
| Dimensions (W x H x D) | mm (in.) | see dimensional drawing | see dimensional drawing |
| Weight, approx. | kg (lbs) | 14.5 (32.01) | 14.5 (32.01) |

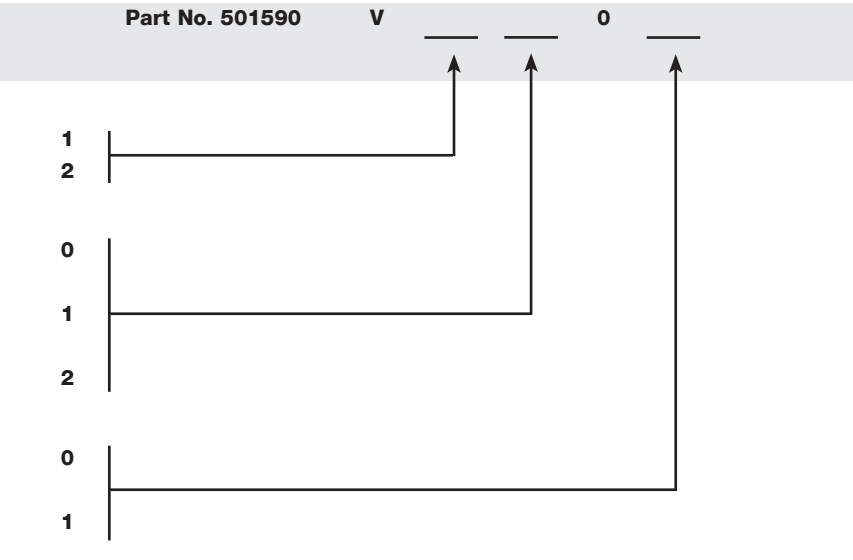


Dimensional drawing for the turbomolecular pump system TURBOLAB 80 Basic (left) and TURBOLAB 80 Full Featured (right)

Ordering Information

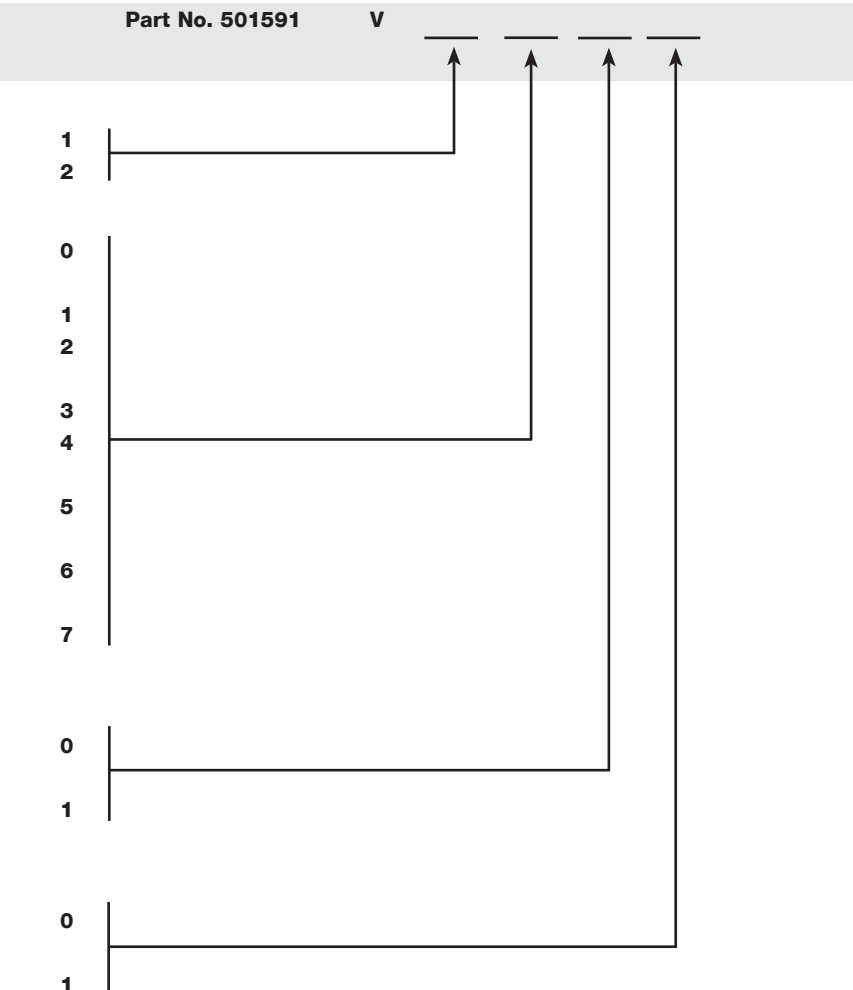
TURBOLAB 80 Basic

| |
|--------------------------------------|
| High vacuum connection |
| DN 63 ISO-K |
| DN 63 CF |
| Sensor |
| without sensor, without cable |
| ITR 90/DN 25 ISO-KF |
| with display and 5 m (17.5 ft) cable |
| ITR 90/DN 40 CF |
| with display and 5 m (17.5 ft) cable |
| Venting valve |
| without venting valve |
| in the forevacuum line |
| with venting valve |
| in the forevacuum line |



TURBOLAB 80 Full Featured

| |
|---|
| High vacuum connection |
| DN 63 ISO-K |
| DN 63 CF |
| Sensor |
| without sensor, without cable |
| ITR 90/DN 25 ISO-KF |
| with display and 5 m (17.5 ft) cable |
| without display and 5 m (17.5 ft) cable |
| ITR 90/DN 40 CF |
| with display and 5 m (17.5 ft) cable |
| without display and 5 m (17.5 ft) cable |
| PTR 90/DN 25 ISO-KF |
| with cable and adapter |
| PTR 90/DN 40 ISO-KF |
| with cable and adapter |
| PTR 90/DN 40 CF |
| with cable and adapter |
| Forevacuum sensor |
| without sensor |
| in the forevacuum line |
| with sensor TTR 91 |
| in the forevacuum line |
| Venting valve |
| without venting valve |
| in the forevacuum line |
| with venting valve |
| in the forevacuum line |



Parts for Converting/Expanding Existing Systems

Ordering Information

TURBOLAB 80 Basic

TURBOLAB 80 Full Featured

| | Part No. | Part No. |
|--|--------------------|--------------------|
| Venting valve (retrofit kit) | | |
| 24 V DC, normally open | 650 49 11 | - |
| 24 V DC, normally closed | - | 650 48 99 |
| Sensor ITR 90 | | |
| DN 25 ISO-KF | | |
| without display | - | 120 90 |
| with display | 120 91 | 120 91 |
| DN 40 CF | | |
| without display | - | 120 92 |
| with display | 120 94 | 120 94 |
| ITR sensor cable, 5 m (17.5 ft) | 124 55 | 124 55 |
| Sensor PTR 90 | | |
| DN 25 ISO-KF | - | 230 070 |
| DN 40 ISO-KF | - | 230 071 |
| DN 40 CF | - | 230 072 |
| PTR sensor cable, 5 m (17.5 ft) ¹⁾ | - | 124 26 |
| Adapter cable TURBOLAB 80/PTR sensor ¹⁾ | - | 650 41 12 |
| Forevacuum sensor TTR 91 | | |
| 1/2" tube | - | 230 039 |
| Mains cable, 3 m (10.5 ft) | | |
| with EURO plug ²⁾ | 800102V0002 | 800102V0002 |
| with UK plug | 800102V0003 | 800102V0003 |
| with US plug 5-15P | 800102V1002 | 800102V1002 |

¹⁾ Required for fitting a PTR 90

²⁾ Included in the delivery

PT 151 DRY / PT 361 DRY Turbomolecular Pump Systems



Example: PT 361 DRY with scroll pump and options (measuring instrument, forevacuum valve)

These turbomolecular pump systems are ready-to-operate vacuum units for generating a vacuum in the high and ultra-high vacuum range which is free of hydrocarbons.

When pumping aggressive or abrasive process gases, a purge gas facility must be used for the pumps.

Advantages to the User

- Low ultimate pressure free of hydrocarbons ($< 10^{-10}$ mbar/Torr)
- High backing pump pumping speed
- High effective pumping speed
- Compact, mobile unit
- Simple to operate
- High level of reliability
- Venting port
- Purge gas port (only at C version)
- Service friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- Pump systems prepared for installation of larger backing pumps (for barrier gas operation, for example)
- CE approval
- Dry compressing scroll pump SCROLLVAC SC 15 D or SC 30 D (further sizes upon request)
- All necessary connection and sealing components within the pump system
- **Either with or without switchbox**
 - *With switchbox*
The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (Gauge, power failure venting valve, air cooler and flange heater) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting
 - *Without switchbox*
The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

The turbomolecular pump systems consists of the following principal components:

- Grease lubricated turbomolecular pump TURBOVAC 151 or 361 with splinter guard
- Electronic frequency converter TD 20^{classic}

The pump systems can be upgraded with further components,- for example:

- Switch box
- Vacuum gauges (up to two)
- Exhaust filter
- Air cooling unit
- Flange heater
- Power failure venting valve
- Venting valve
- Purge gas valve (only at C version)
- Intake arrangement with manifold, valves, vacuum gauges etc.

Typical Applications

- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Microbalances
- Sputtering and evaporation systems
- Surface physics

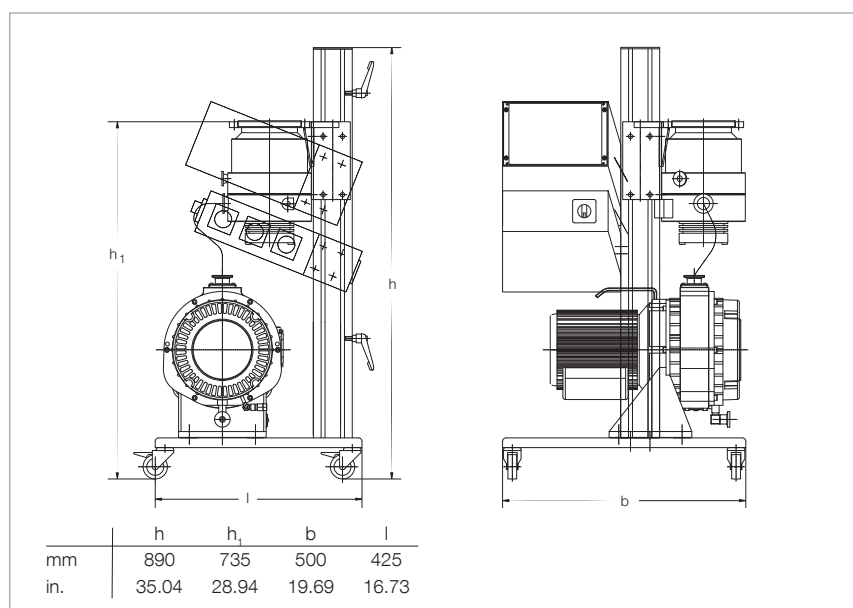
Technical Data

PT 151 DRY

PT 361 DRY

| | | | | | |
|--|--|---|---|---|---|
| Turbomolecular pump | TURBOVAC | 151 | 151 | 361 | 361 |
| High vacuum connection | DN | 100 ISO-K | 100 CF | 100 ISO-K | 100 CF |
| Pumping speed for N ₂ | l x s ⁻¹ | 145 | 145 | 345 | 345 |
| Compression for N ₂ /H ₂ | | > 10 ⁹ | 8.5 x 10 ² | > 10 ⁹ | 3.5 x 10 ³ |
| Speed of the TURBOVAC | rpm | 50 000 | 50 000 | 50 000 | 50 000 |
| Scroll vacuum pump | SCROLLVAC | SC 5 D | SC 5 D | SC 15 D | SC 15 D |
| Nominal pumping speed (DIN 28 400) | m ³ x h ⁻¹ (cfm) | 5.4 (3.18) | 5.4 (3.18) | 15.0 (8.83) | 15.0 (8.83) |
| Exhaust connection | DN | 16 ISO-KF | 16 ISO-KF | 25 ISO-KF | 25 ISO-KF |
| Attainable ultimate pressure with FPM (FKM) gasket | mbar (Torr) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) | 10 ⁻⁸ (0.75 x 10 ⁻⁹) |
| with Cu seal | mbar (Torr) | – | 10 ⁻¹⁰ (0.75 x 10 ⁻¹⁰) | – | 10 ⁻¹⁰ (0.75 x 10 ⁻¹⁰) |
| Cooling water consumption | l/h | 15-35 | 15-35 | 15-35 | 15-35 |
| Cooling water connection, hose nozzle, outside dia. | mm (in.) | 10 (0.39) | 10 (0.39) | 10 (0.39) | 10 (0.39) |
| Power consumption, max. | VA | 550 | 550 | 800 | 800 |
| Mains supply 50/60 Hz | V | 200-230 ¹⁾ | 200-230 ¹⁾ | 200-230 ¹⁾ | 200-230 ¹⁾ |
| Dimensions (W x H x D) | mm (in.) | see dimensional drawing | see dimensional drawing | see dimensional drawing | see dimensional drawing |
| Weight, approx. | kg (lbs) | 51 (112.6) | 51 (112.6) | 80 (176.6) | 80 (176.6) |

¹⁾ Other voltages upon request



Dimensional drawing for the PT 151 DRY / PT 361 DRY turbomolecular pump systems with scroll vacuum pump SCROLLVAC and optional switch box

Technical Data

PT 151 DRY

PT 361 DRY

| | Part No. | Part No. | Part No. | Part No. |
|--|--|--|--|--|
| Turbomolecular pump system 230 V, 50 Hz ¹⁾ , without switch box, connection via 2 Schuko plugs with SC 5 D | 100 ISO-K 503274V001 | 100 CF 503275V001 | 100 ISO-K – | 100 CF – |
| 230 V, 50 Hz ¹⁾ , with switch box and mains cord with 1 Schuko plug with SC 5 D with SC 15 D | 503274V002 – | 503275V002 – | – 503276V001 | – 503277V001 |
| Accessories | | | | |
| Air cooling unit 100 V 115 V 230 V | 800152V0016 894 08 855 31 | 800152V0016 894 08 855 31 | 800152V0016 894 08 855 31 | 800152V0016 894 08 855 31 |
| Flange heater, DN 100 CF 115 V 230 V | – – | 854 28 854 27 | – – | 854 28 854 27 |
| Venting valve, DN 10 ISO-KF manually operated | 173 24 | 173 24 | 173 24 | 173 24 |
| Power failure venting valve normally open 24 V DC, DN 16 ISO-KF 230 V, 50/60 Hz, DN 10 ISO-KF | 800120V0021 ²⁾ 174 26 ²⁾ | 800120V0021 ²⁾ 174 26 ²⁾ | 800120V0021 ²⁾ 174 26 ²⁾ | 800120V0021 ²⁾ 174 26 ²⁾ |
| Purge gas and venting valve, 100-230 V 0.4 mbar x l x s ⁻¹ | 800152V0014 ²⁾ | 800152V0014 ²⁾ | 800152V0014 ²⁾ | 800152V0014 ²⁾ |
| Filter adapter for gas connection G 1/4" | 800110V0012 | 800110V0012 | 800110V0012 | 800110V0012 |
| Replacement filter | 200 18 515 | 200 18 515 | 200 18 515 | 200 18 515 |
| Mains cord for PT with switch box EURO 230 V, 50 Hz CH 230 V, 50/60 Hz UK 230 V, 50/60 Hz US/Japan 230 V, 50/60 Hz | 200 81 091 200 81 099 200 81 097 200 81 141 | 200 81 091 200 81 099 200 81 097 200 81 141 | 200 81 091 200 81 099 200 81 097 200 81 141 | 200 81 091 200 81 099 200 81 097 200 81 141 |
| Control unit for turbomolecular pump systems (see Chapter "Accessories") | upon request | upon request | upon request | upon request |

¹⁾ Other voltages upon request

²⁾ Deliveries in the case of reorders are without connection cable, purge gas only at C-versions

PT 300 DRY Turbomolecular Pump System



Example: PT 300 DRY with switch box

The PT 300 DRY turbomolecular pump system is a fully assembled, ready-to-operate and mobile vacuum pump system which is based on a column design for processes which require hydrocarbon-free high and ultra-high vacuum.

Advantages to the User

- Absolutely oil-free
- Low ultimate pressure free of hydrocarbons (10^{-9} mbar/Torr)
- High effective pumping speed
- Compact, mobile unit
- Simple operation
- High level of reliability
- Maintenance-friendly design
- Installation in any orientation for SL 300
- Air cooling
- Installation of standard vacuum components in an open frame with installation column and castors
- Service-friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- Pump systems prepared for installation of larger backing pumps

The turbomolecular pump system consists of the following principal components:

- SL 300 wide range turbomolecular pump
- Air cooling unit
- Frequency converter TD 400 with Start/Stop switch
- TURBO.POWER 300 power supply unit
- Absolutely oil-free scroll pump SCROLLVAC SC 5D as the backing pump (other sizes upon request)
- Mobile base plate with column
- All required connection and sealing components are located within the pump system assembly

- Either with or without switchbox

- With switchbox

The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (measuring instrument, power failure venting valve and flange heater) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting

- Without switchbox

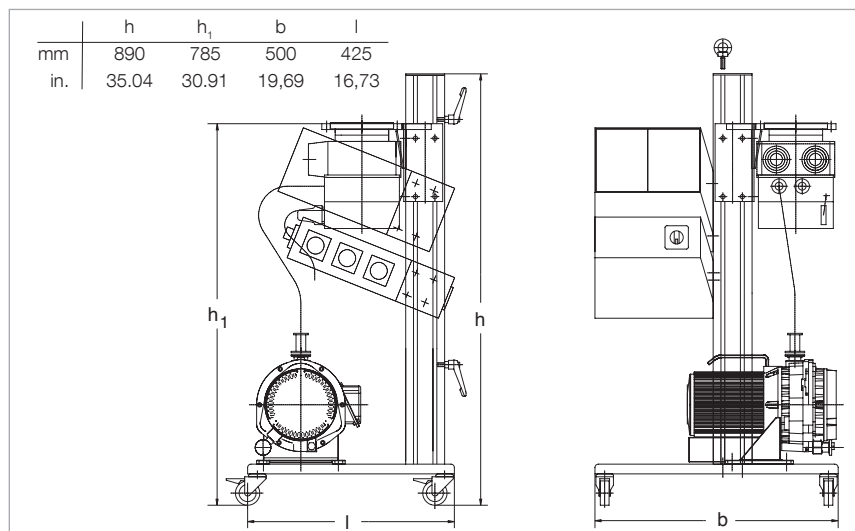
The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

The pump system can be upgraded with further components, for example:

- Switch box
- Vacuum gauges (up to two)
- Exhaust filter
- Flange heater
- Power failure venting valve
- Venting valve
- Purge gas valve

Typical Applications

- Spectroscopy
- Valve manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems



Dimensional drawing for the PT 300 DRY turbo molecular pump system with switch box

Technical Data

PT 300 DRY

| | | | |
|--|---|--|--|
| Wide range turbomolecular pump High vacuum connection Pumping speed for N ₂ | DN l x s ⁻¹ | TURBOVAC SL 300 100 ISO-K 270 | TURBOVAC SL 300 100 CF 270 |
| Scroll vacuum pump Pumping speed, approx. Ultimate pressure, approx. | m ³ x h ⁻¹ (cfm) mbar (Torr) | SCROLLVAC SC 5 D 5.4 (3.18) < 0.05 (0.03) | SCROLLVAC SC 5 D 5.4 (3.18) < 0.05 (0.03) |
| Attainable ultimate pressure with FPM (FKM) gasket with Cu seal | mbar (Torr) mbar (Torr) | 10 ⁻⁸ (0.75 x 10 ⁻⁸) – | 10 ⁻⁸ (0.75 x 10 ⁻⁸) 10 ⁻⁹ (0.75 x 10 ⁻⁹) |
| Main supply, 50/60 Hz | V | 230 / 115 | 230 / 115 |
| Power consumption, max. | VA | 450 | 450 |
| Dimensions (W x H x D) | mm (in.) | see dimensional drawing | see dimensional drawing |
| Weight, approx. | kg (lbs) | 45 (99.21) | 45 (99.21) |

Ordering Information

PT 300 DRY

| | Part No. | Part No. |
|--|------------------------|------------------------|
| PT 300 DRY turbomolecular pump system 230 V, 50/60 Hz ¹⁾ , without switch box, connection via 2 Schuko plugs DN 100 ISO-K DN 100 CF | 503278V001 – | – 503279V001 |
| 230 V, 50/60 Hz ¹⁾ , with switch box and mains cord with 1 Schuko plug DN 100 ISO-K DN 100 CF | 503278V002 – | – 503279V002 |

Accessories

| | | |
|--|--|--|
| Water cooling unit | 800135V0002 | 800135V0002 |
| Flange heater for flange DN 100 CF 115 V 230 V | – – | 854 28 854 27 |
| Power failure venting valve 24 V DC, DN 16 ISO-KF 230 V, 50/60 Hz, DN 10 ISO-KF | 800120V0021 ²⁾ 174 26 ²⁾ | 800120V0021 ²⁾ 174 26 ²⁾ |
| Connection adapter M8 / DN 10 ISO-KF | 800110V0011 | 800110V0011 |
| Purge gas and venting valve, 0.2 mbar x l x s ⁻¹ at 1 bar 24 V DC 100-230 VAC | 113 50 ² 800152V0019 ²⁾ | 113 50 ² 800152V0019 ²⁾ |
| Copper sealing rings for CF flanges (set of 10 pieces) | – | 839 45 |
| Mains cord for PT with switch box EURO 230 V, 50 Hz CH 230 V, 50/60 Hz UK 230 V, 50/60 Hz US/Japan 230 V, 50/60 Hz | 200 81 091 200 81 099 200 81 097 200 81 141 | 200 81 091 200 81 099 200 81 097 200 81 141 |
| 24 V DC mains cord 3 m (7.0 ft) 5 m (17.5 ft) 10 m (35.0 ft) 20 m (70.0 ft) | 800094V0300 800094V0500 800094V1000 800094V2000 | 800094V0300 800094V0500 800094V1000 800094V2000 |
| Control unit for turbomolecular pump systems (see Chapter "Accessories") | upon request | upon request |

¹⁾ Other voltages upon request

²⁾ Deliveries in the case of reorders are without connection cable

Only available for purchase in North and South America

PT-FLEX DRY Turbomolecular Pump System



PT-FLEX pumping systems provide unique flexibility, allowing the user to define the optimum combination of performance and price.

PT-FLEX pump systems are offered with three sizes Compound Turbo-molecular pumps, three sizes dry scroll backing pumps, a basic or full-featured system controller and the ability to incorporate and control multiple valves, vacuum gauges, flange heaters and other peripheral equipment.

PT-FLEX systems can be specially configured with classic turbo pumps and rotary vane forevacuum pumps. Please consult Oerlikon Leybold Vacuum for details.

Advantages to the User

- Oil-free high vacuum
- Compact, mobile
- Air-cooled
- Adjustable height
- Fully assembled and tested

Configuration and Capabilities

- Three sizes turbo pump
- Three sizes dry scroll forevacuum pump
- Manual or powered height adjustment
- Ability to power and control multiple peripheral devices (sold separately)
- Basic or full-featured TSC system controller
- Allows mounting of one or two rack gauge controllers

PT-FLEX with BASIC Controller

- Mains ON/OFF
- Mains switch activated 115 V AC output for use with vent valve or gauge controller
- Start / Stop switch for both pumps
- Manual control and power for
 - Pumps
 - Vent valves
 - Vacuum isolation valves
 - Flange heater
- Provides additional 115 V AC and 24 V DC outputs to power additional peripheral devices
- Vacuum Ion Gauge degas function for gauge model ITR 90
- Turbo operation indicator

PT-FLEX with TSC Controller

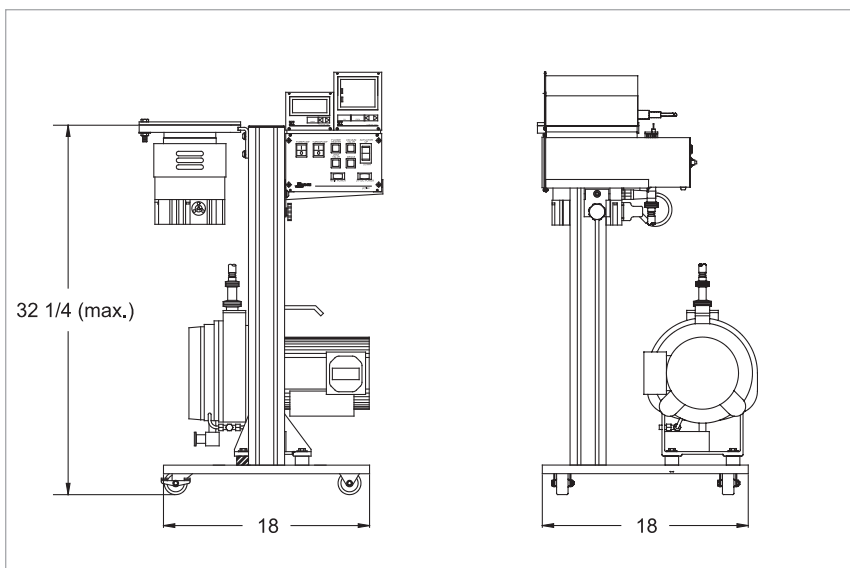
(see separate catalog page for in-depth description of features and capabilities)

- One button auto system control
- Monitors and displays all turbo pump operating and diagnostic parameters
- Acts as display for up to 3 "smart" vacuum gauge sensors
- All features of PT-Flex BASIC controller
- Additional power and control capabilities for peripheral equipment

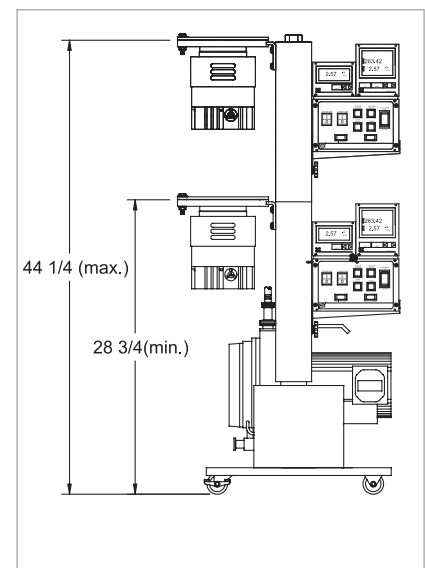
Technical Data

PT-FLEX

| | | | |
|--|-------|--|---|
| Turbomolecular pump High vacuum connection | DN | TURBOVAC SL 80 63 ISO-K 63 CF | TURBOVAC SL 300 100 ISO-K 100 CF |
| | | | |
| Backing pumps | | SCROLLVAC SC 5 D | SCROLLVAC SC 5 D SCROLLVAC SC 15 D |
| Cooling | | Air | Air (water option) |
| Max. current requirements (dependent on forepump) | V AC | 115 | 115 |
| | Phase | 1 | 1 |
| | Hz | 50/60 | 50/60 |
| | A | 15 | 15 |
| Controller | | TSC Turbo System Controller AUTO operation with gauge selection or Manual TW monitoring status Gauge sensor display with smart gauge selection Accessory Control Inlet, foreline and roughing valve Vent/purge valve Flange heater (CF flange only) Ion sensor degas Basic System Controller Manual Start/Stop operation Accessory Control Vacuum valve Vent valve Flange heater (CF flange only) Ion sensor degas Column height adjustment (option) | |



Dimensional drawing for the PT-Flex (manual post)



Dimensional drawing (front view) for the PT-Flex (powered support)

Ordering Information

| | | Part No. 1800 | | | V | | | 01 |
|---------------------------------|--|---------------|--|--|---|--|--|----|
| PT-Flex | | | | | | | | |
| Base number | | | | | | | | |
| Manual controls | | | | | | | | |
| - manual height adjustment | | 16 | | | | | | |
| - electric height adjustment | | 17 | | | | | | |
| Automated controls | | | | | | | | |
| - manual height adjustment | | 18 | | | | | | |
| Turbomolecular pump | | | | | | | | |
| SL 80 with DN 63 ISO-K inlet | | 1 | | | | | | |
| SL 80 with DN 63 CF inlet | | 2 | | | | | | |
| SL 300 with DN 100 ISO-K inlet | | 3 | | | | | | |
| SL 300 with DN 100 CF inlet | | 5 | | | | | | |
| TW 250S with DN 100 ISO-K inlet | | 6 | | | | | | |
| TW 250S with DN 100 CF inlet | | 7 | | | | | | |
| DRY scroll pump | | | | | | | | |
| Not used | | 0 | | | | | | |
| SC 5 D | | 1 | | | | | | |
| Reserved for future use | | 2 | | | | | | |
| SC 15 D (SL 300 only) | | 3 | | | | | | |

Accessories

for High Vacuum Pump Systems TMP

Control Unit for Turbomolecular Pump Systems



Control unit for turbomolecular pump systems

The control unit is suited for operation in connection with turbomolecular pump systems PT 50, PT 80 DRY, PT 151/361, PT 151/361 DRY, PT 300 DRY; as well as custom pump systems.

The graphic monochrome display with its blue LED backlight offers excellent visibility also under difficult conditions.



Control unit installed in the PT 80 DRY pump system

Advantages to the User

- Either automatic/manual operation
- Pressure readout for forevacuum and high vacuum is possible
- Selectable pressure units: mbar, torr, Pa
- Graphic display of the pressure curve
- Connectable high vacuum sensors: PTR and ITR
- Setting up the cut-in pressure for the turbomolecular pump is possible
- Venting of the pump system through a delayed venting function
- Memory card for recording data is connectable
- Data recording through a PC is possible
- Menu navigation in different languages

Ordering Information

Control Unit for Turbomolecular Pump Systems

| | Part No. |
|--|--------------|
| Control unit for turbomolecular pump systems | upon request |

Adsorption Traps with Aluminium Oxide Insert



Adsorption trap (left) and insert (right)

Adsorption traps are installed in all those cases where an oil-free vacuum is to be produced with oil-sealed vacuum pumps.

Advantages to the User

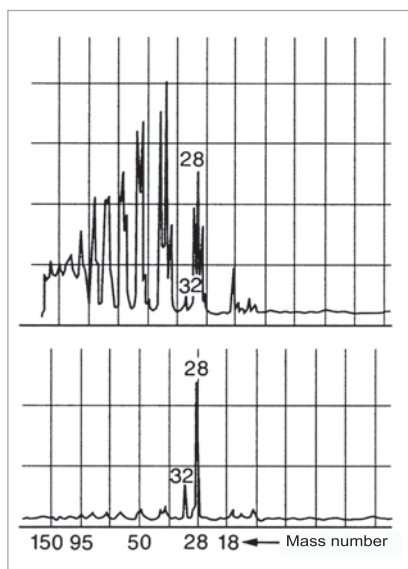
- Backstreaming of oil is reduced by 99%
- Long service life
- High conductance
- Filling can be easily exchanged
- Improvement in the ultimate pressure attained by backing pumps by one order of magnitude
- Stainless steel housing and insert
- NBR gasket

Typical Applications

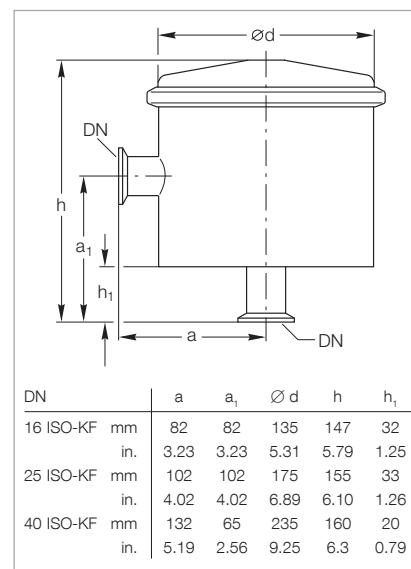
- Product of an oil-free vacuum

Supplied Equipment

- Complete with insert
- Without adsorbent



Residual gas spectrum; top ahead of a rotary vacuum pump, bottom ahead of a rotary vacuum pump with adsorption trap



Dimensional drawing for the adsorption traps

Technical Data

| | | Adsorption Traps | | |
|---|---------------------|------------------|------------|-----------|
| | | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
| Conductance at 10 ⁻² mbar (Torr) | l x s ⁻¹ | 4.0 | 6.0 | 12.0 |
| Service live with Al oxide | Months | 3 | 3 | 3 |
| Al oxide filling | l (qts) | 0.5 (0.53) | 1.0 (1.06) | 2.0 (2.1) |
| Weight, approx. | kg (lbs) | 1.3 (2.9) | 1.3 (2.9) | 4.0 (8.8) |

Ordering Information

| | | Adsorption Traps | | |
|--|---------------|------------------|---------------|-----------|
| | | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
| | Part No. | Part No. | Part No. | |
| Adsorption trap | 854 14 | 854 15 | 854 16 | |
| Activated aluminum oxide in tin 1.6 l (approx. 1.2 kg (2.65 lbs)) | 854 10 | 854 10 | 854 10 | |

UNIVEX High Vacuum Experimentation Systems

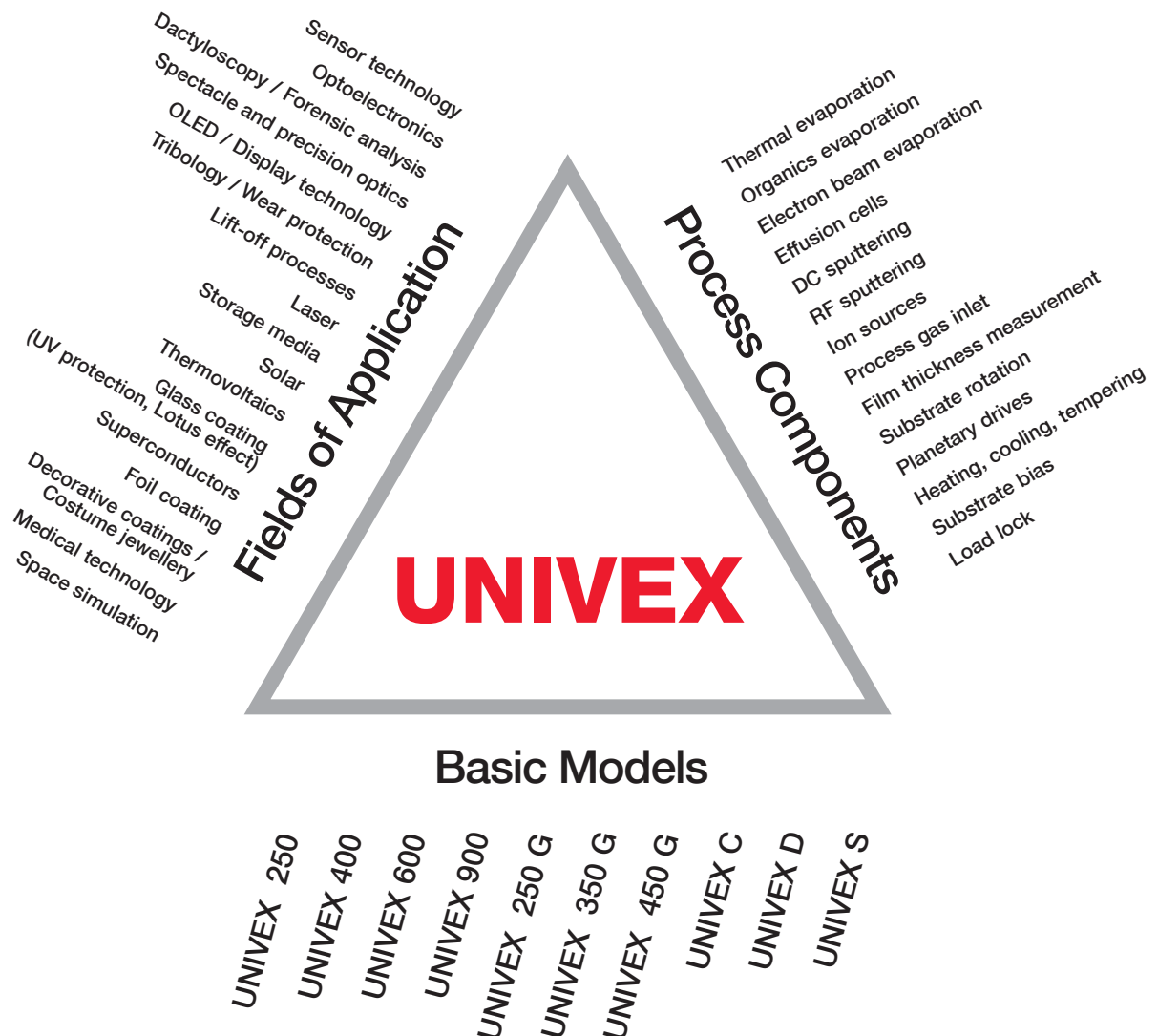
General

The UNIVEX system family was developed by Oerlikon Leybold Vacuum for applications in research and development as well as for setting up pilot production units.

Their range of applications focuses chiefly on vacuum coating technology as well as vacuum process engineering experiments.

The multi-purpose experimentation systems from Oerlikon Leybold

Vacuum are modular and can be specified according to specific customer requirements. For this purpose, a corresponding questionnaire is provided on the last pages of this chapter.



Contents

General

| | |
|--------------------|-----|
| General | 627 |
| Contents | 628 |

Systems

| | |
|------------------------------------|-----|
| Box Coating Systems | 629 |
| Glove Box Systems | 638 |
| Cluster-Tool Systems | 644 |
| Dactyloscopy Systems | 646 |
| Space Simulation Systems | 647 |

Process Accessories

| | |
|--|-----|
| Thermal Evaporation of High Melting Point Materials (metals) | 648 |
| Thermal Evaporation of Low Melting Point Materials (organic) | 650 |
| Electron Beam Evaporation | 651 |
| Sputtering | 652 |
| Ion Sources | 653 |
| Process Gas Inlet | 654 |
| Film Thickness Measurement | 655 |
| Substrate Rotation | 656 |
| Planetary Drives | 656 |
| Heating, Cooling, Tempering, Bias | 657 |
| Load Lock Systems | 659 |

General Accessories

| | |
|---|-----|
| Blank-Off Screw Fitting | 660 |
| Low Pressure Safety Switch | 660 |
| Overpressure Safety Valve | 660 |
| Vacuum Feedthrough | 661 |
| Pneumatically Actuated Swivelling Shutter | 661 |
| UNIVEX Questionnaire | 662 |

Box Coating Systems

Multi-purpose Vacuum Coating System for the Laboratory

Design

- Compact unit with direct access to the process chamber
- The UNIVEX box coaters systems consist of a process and a control module
- The process module includes the vacuum chamber, the coating components and the pump system
- The control module includes the PLC, respectively PC controller including the visualisation as well as the power supplies for the process components

Vacuum Chamber

- Box-shaped stainless steel vacuum chambers UNIVEX 250-600
- Octagonal stainless steel vacuum chamber UNIVEX 900
- Swivelling front door for simple chamber access
- Viewing window with coating protection
- Removable stainless steel coating protection panels
- Flexible connections for chamber bottom and chamber top
- Connecting flanges for pump system and process components
- Coolable and heatable chamber walls optional

Vacuum System

- Mechanical forevacuum pump (dry compressing or oil sealed)
- High vacuum pump (turbomolecular or cryo pump)
- Vacuum valves
- Pressure measurement devices

Advantages to the User

- Modular system design
- Application-wise optimised pump system
- Multi-purpose vacuum chamber
- Convenient access to the chamber installations
- Very simple to operate and use via programmable control
- Suited for retrofitting of process components (configuration dependent)
- For installation into clean-room walls

Basic Models

UNIVEX 250



UNIVEX 400



UNIVEX 600



UNIVEX 900



UNIVEX 250



Design example UNIVEX 250

The UNIVEX 250 is a cost-effective and compact entry-level coating system for the laboratory.

Owing to its low height of only approximately 1.2 meters it is ideally placed on a benchtop or installed in a frame.

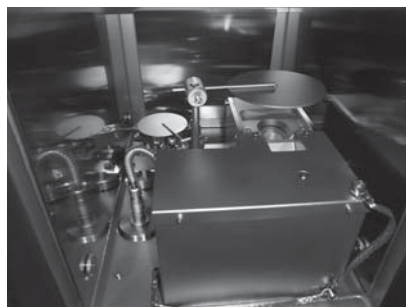
In the vacuum chamber which is 250 mm wide, substrates up to an overall diameter of 220 mm max. can be rotated and coated.

The integrated PLC controller allows you to run manual, respectively semi-automatic coating processes.

Examples of Equipped Vacuum Chambers



Chamber bottom:
double thermal evaporator with source shutter
Chamber top:
rotating substrate table with substrate shutter



Electron beam evaporator with fourfold rotating crucible as well as additional double thermal evaporator, each with source shutter



Effusion cell as well as spare blank flanges for subsequent retrofits

Technical Data

UNIVEX 250

| | | |
|--|----------------------------------|---|
| Vacuum chamber | | |
| Material | | |
| Chamber body | | Stainless steel |
| Chamber door | | Aluminum |
| Dimensions | | |
| Inside width | mm | 270 |
| Inside depth | mm | 370 |
| Inside height | mm | 400 |
| Connections ¹⁾ | | |
| Front side | | Door with window |
| Rear side | DN | 1 x 160 ISO-K (pump system connection), 2 x 16 ISO-KF, 1 x 25 ISO-KF, 2 x 40 ISO-KF |
| Bottom plate | | Variable connections |
| Cover plate | | 1 x 200 ISO-K, 4x installation bore ø 34,5 mm |
| High vacuum pump | | TURBOVAC 350 i |
| Nominal pumping speed for N ₂ | l x s ⁻¹ | 290 |
| Backing pump | | SOGEVAC SV 10 B |
| Nominal pumping speed | m ³ x h ⁻¹ | 11 |
| Controller | | PLC with graphic touchscreen |
| Required supplies | | |
| Voltage | | 400 V, 3 phases / N / 50 Hz ²⁾ |
| Cooling water | | |
| Inlet pressure | bar (abs.) | 4 to 6 |
| Consumption, approx. | l x min ⁻¹ | Dependent on chamber installations |
| Feed temperature | °C | +18 to +25 |
| Compressed air | bar (abs.) | 4 to 6 |
| Weight, approx. | kg | 300 ³⁾ |

¹⁾ Standard configuration, other hole patterns / flanges / viewing windows upon request

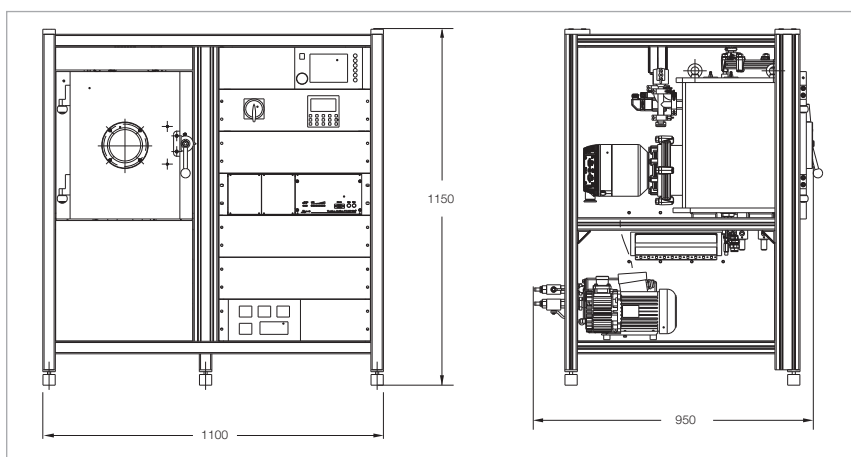
²⁾ Other voltages and frequencies upon request

³⁾ Total weight without chamber installations/process components

Ordering Information

UNIVEX 250

| | Part No. |
|------------|--------------|
| UNIVEX 250 | upon request |



Dimensional drawing for the UNIVEX 250

UNIVEX 400



Design example UNIVEX 400

The UNIVEX 400 is a compact coating system for laboratory tasks, respectively pilot production runs.

Due to its chamber dimensions, it is ideal for coating of small to medium-sized substrates.

In the vacuum chamber which is 420 mm wide, substrates respectively substrate holders up to an overall diameter of 350 mm max. can be rotated and coated.

The integrated PC/PLC controller allows you to run manual, semiautomatic and fully automatic coating processes.

Examples of Equipped Vacuum Chambers



Two magnetron sputter sources, confocal aligned to the substrate holder rotating at the chamber top. Spare flanges for two further sputter sources



At the foreground: two double thermal evaporators with source shutters
In the background: two organics evaporators with source shutters and two film thickness gauge heads



Rotating, resistively heated substrate table with shutters and thin film gauge head

Technical Data

UNIVEX 400

| | | |
|--|----------------------------------|--|
| Vacuum chamber | | Water-cooled |
| Material | | |
| Chamber body | | Stainless steel |
| Chamber door | | Stainless steel |
| Dimensions | | |
| Inside width | mm | 420 |
| Inside depth | mm | 420 |
| Inside height | mm | 550 |
| Connections ¹⁾ | | |
| Front side | | Door with window |
| Rear side | DN | 1x 160 ISO-K (pump system connection), 2 x 16 ISO-KF, 2 x 40 ISO-KF, 2 x 40 ISO-KF |
| Bottom plate | | Variable connections |
| Cover plate | | 1 x 250 ISO-K, 4x installation bore ø 34,5 mm |
| High vacuum pump | | TURBOVAC 450 i |
| Nominal pumping speed for N ₂ | l x s ⁻¹ | 430 |
| Backing pump | | SOGEVAC SV 25 B |
| Nominal pumping speed | m ³ x h ⁻¹ | 26 |
| Controller | | PLC with graphic touchscreen |
| Required supplies | | |
| Voltage | | 400 V, 3 phases / N / PE / 50 Hz ²⁾ |
| Cooling water | | |
| Inlet pressure | bar (abs.) | 4 to 6 |
| Consumption, approx. | l x min ⁻¹ | Dependent on chamber installations |
| Feed temperature | °C | +18 to +25 |
| Compressed air | bar (abs.) | 4 to 6 |
| Weight, approx. | kg | 500 ³⁾ |

¹⁾ Standard configuration, other hole patterns / flanges / viewing windows upon request

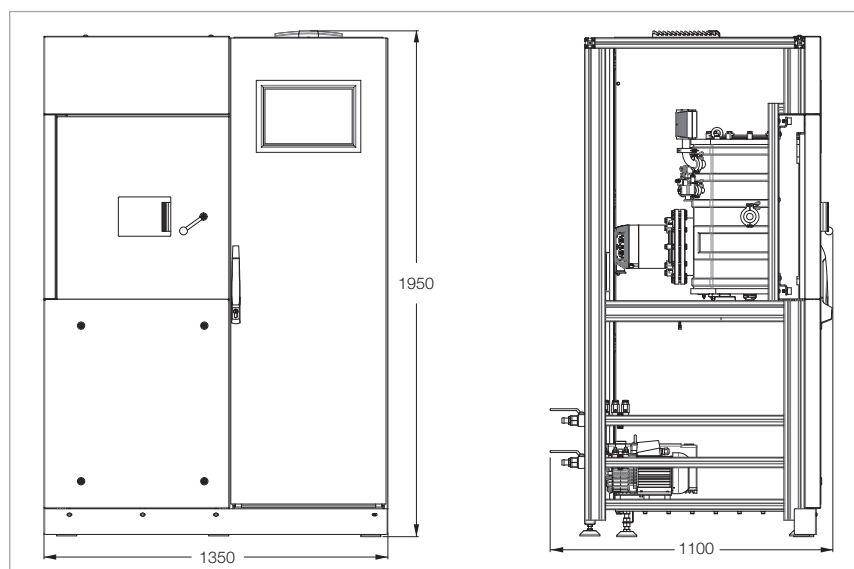
²⁾ Other voltages and frequencies upon request

³⁾ Total weight without chamber installations/process components

Ordering Information

UNIVEX 400

| | Part No. |
|------------|--------------|
| UNIVEX 400 | upon request |



Dimensional drawing for the UNIVEX 400

UNIVEX 600



Design example UNIVEX 600

The UNIVEX 600 is a compact coating system for the laboratory, respectively pilot production runs.

Because of its chamber size it is suited for medium to large substrate sizes.

The attainable substrate throughput meets the general requirements for small series production runs.

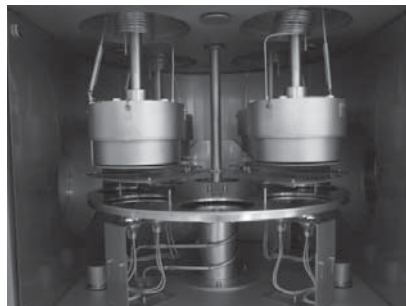
In the vacuum chamber which is 600 mm wide, substrates respectively substrate holders up to an overall diameter of 550 mm max. can be rotated and coated.

The integrated PC/PLC controller allows you to run manual, semiautomatic and fully automatic coating processes.

Examples of Equipped Vacuum Chambers



Chamber bottom: electron beam evaporator with sixfold rotating crucible
Chamber top: planetary drive for substrate rotation



Chamber bottom: rotating substrate table with four heating stations
Chamber top: four magnetron sputter sources



Multiple targets for ion sputtering

Technical Data

UNIVEX 600

| | | |
|--|----------------------------------|---|
| Vacuum chamber | | Water-cooled |
| Material | | |
| Chamber body | | Stainless steel |
| Chamber door | | Stainless steel |
| Dimensions | | |
| Inside width | mm | 600 |
| Inside depth | mm | 600 |
| Inside height | mm | 800 |
| Connections ¹⁾ | | |
| Front side | | Door with window |
| Rear side | DN | 1 x 250 ISO-K (pump system connection), 2 x 16 ISO-KF, 2 x 25 ISO-KF, 2 x 40 ISO-KF |
| Bottom plate | | Variable connections |
| Cover plate | | 1 x 250 ISO-K, 4x installation bore ø 34,5 mm |
| High vacuum pump | | TURBOVAC MAG W 1300 iP |
| Nominal pumping speed for N ₂ | l x s ⁻¹ | 1100 |
| Backing pump | | SOGEVAC SV 65 B |
| Nominal pumping speed | m ³ x h ⁻¹ | 59 |
| Controller | | PLC with graphic touchscreen |
| Required supplies | | |
| Voltage | | 400 V, 3 phases / N / PE / 50 Hz ²⁾ |
| Cooling water | | |
| Inlet pressure | bar (abs.) | 4 to 6 |
| Consumption, approx. | l x min ⁻¹ | Dependent on chamber installations |
| Feed temperature | °C | +18 to +25 |
| Compressed air | bar (abs.) | 4 to 6 |
| Weight, approx. | kg | 1000 ³⁾ |

¹⁾ Standard configuration, other hole patterns / flanges / viewing windows upon request

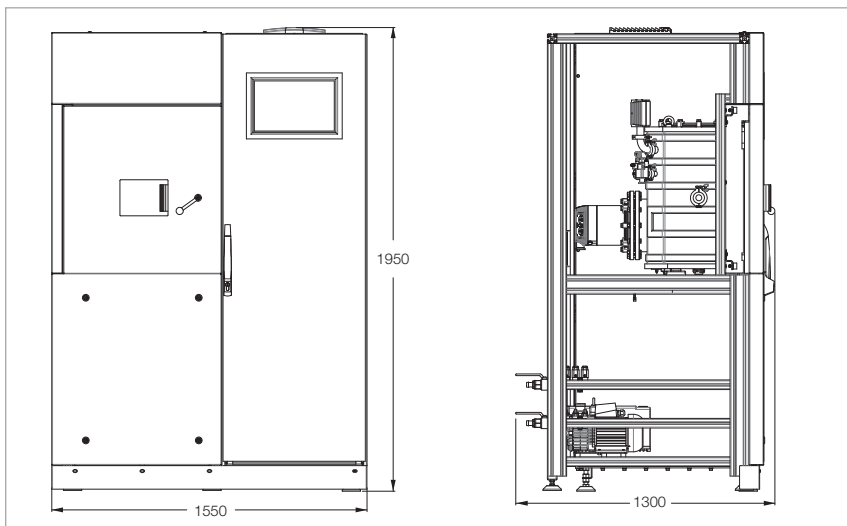
²⁾ Other voltages and frequencies upon request

³⁾ Total weight without chamber installations/process components

Ordering Information

UNIVEX 600

| | Part No. |
|------------|--------------|
| UNIVEX 600 | upon request |



Dimensional drawing for the UNIVEX 600

UNIVEX 900



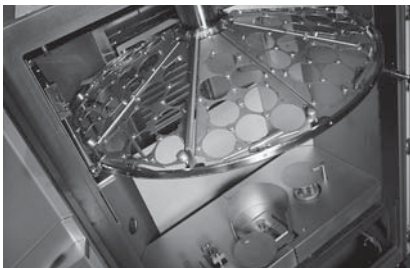
Design example UNIVEX 900

The UNIVEX 900 is the sophisticated solution for medium to large substrate sizes, respectively for higher substrate throughputs.

In the octagonal vacuum chamber which is 900 mm wide, substrates respectively substrate holders up to an overall diameter of 800 mm max. can be rotated and coated.

The integrated PC/PLC controller allows you to run manual, semiautomatic and fully automatic coating processes

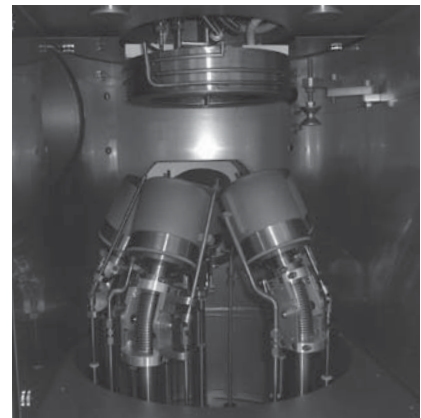
Examples of Equipped Vacuum Chambers



Chamber bottom: electron beam evaporator, thermal evaporator, ion source
Chamber top: rotating substrate dome with turnover device



Rotating substrate table at the chamber top for 10 substrates (in situ combinable with five masks) + 4 high-temperature thermal radiation heaters on the rear



Confocal sputter-up arrangement with rotating high-temperature substrate heater

Technical Data

UNIVEX 900

| | | |
|--|----------------------------------|--|
| Vacuum chamber | | Water-cooled |
| Material | | |
| Chamber body | | Stainless steel |
| Chamber door | | Stainless steel |
| Dimensions | | |
| Inside width | mm | 900 (octagonal) |
| Inside depth | mm | 900 (octagonal) |
| Inside height | mm | 1100 |
| Connections ¹⁾ | | |
| Front side | | Door with window |
| Rear side | DN | 2x 250 ISO-K (pump system connection), 2 x 16 ISO-KF, 2 x 25 ISO-KF, 2 x 40 ISO-KF |
| Bottom plate | | Variable connections |
| Cover plate | | 1 x 250 ISO-K, 4x installation bore ø 34,5 mm |
| High vacuum pump | | TURBOVAC W 2200 iP |
| Nominal pumping speed for N ₂ | l x s ⁻¹ | 2100 |
| Backing pump | | SOGEVAC SV 100 B |
| Nominal pumping speed | m ³ x h ⁻¹ | 97.5 |
| Controller | | PLC with graphic touchscreen |
| Required supplies | | |
| Voltage | | 400 V, 3 phases / N / PE / 50 Hz ²⁾ |
| Cooling water | | |
| Inlet pressure | bar (abs.) | 4 to 6 |
| Consumption, approx. | l x min ⁻¹ | Dependent on chamber installations |
| Feed temperature | °C | +18 to +25 |
| Compressed air | bar (abs.) | 4 to 6 |
| Weight, approx. | kg | 1500 ³⁾ |

¹⁾ Standard configuration, other hole patterns / flanges / viewing windows upon request

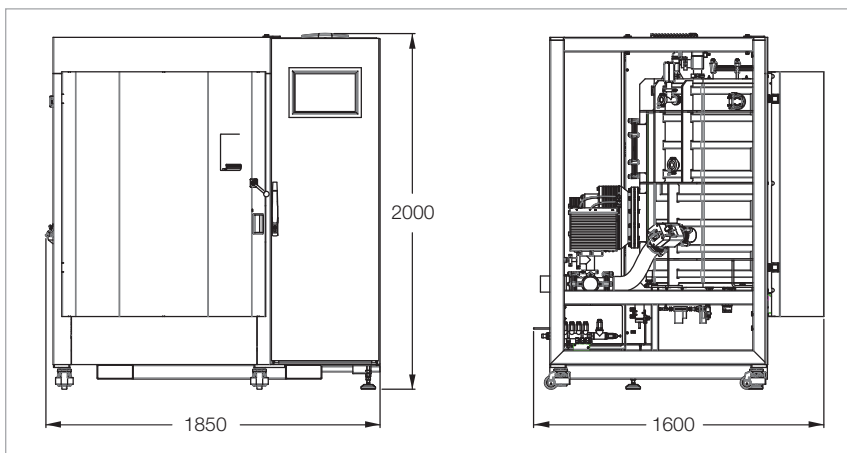
²⁾ Other voltages and frequencies upon request

³⁾ Total weight without chamber installations/process components

Ordering Information

UNIVEX 900

| | Part No. |
|------------|--------------|
| UNIVEX 900 | upon request |



Dimensional drawing for the UNIVEX 900

Glove Box Systems

Multi-purpose Vacuum Coating System for Fitting to a Glove Box

The UNIVEX glove box systems were developed to coat materials which are sensitive with respect to the environmental conditions like oxygen or humidity, for example

Design

- The UNIVEX glove box systems consist of a process module and a separate electrical cabinet
- The process module includes the vacuum chamber, the coating components and the pump system
- The control module includes the PLC, respectively PC controller including the visualisation as well as the power supplies for the process components

Vacuum Chamber

- Box-shaped stainless steel vacuum chambers UNIVEX 250 G - 450 G
- Sliding front door for easy chamber access through the glove box
- Swivelling front door for simple chamber access
- Viewing window with coating protection
- Removable stainless steel coating protection panels
- Flexible connections for chamber bottom and chamber top
- Connecting flanges for pump system and process components

Vacuum System

- Mechanical forevacuum pump (dry compressing or oil sealed)
- High vacuum pump (turbomolecular or cryo pump)
- Vacuum valves
- Pressure measurement devices

Advantages to the User

- Modular system design
- Application-wise optimised system
- Flexible utilisation of the vacuum chamber
- Space saving installation to the rear of the glove box
- Convenient process access through

the glove box by means of a front sliding door

- Easy access to the chamber unit through the rear service door
- Very simple to operate and use
- Suited for retrofitting of process

components (configuration dependent)

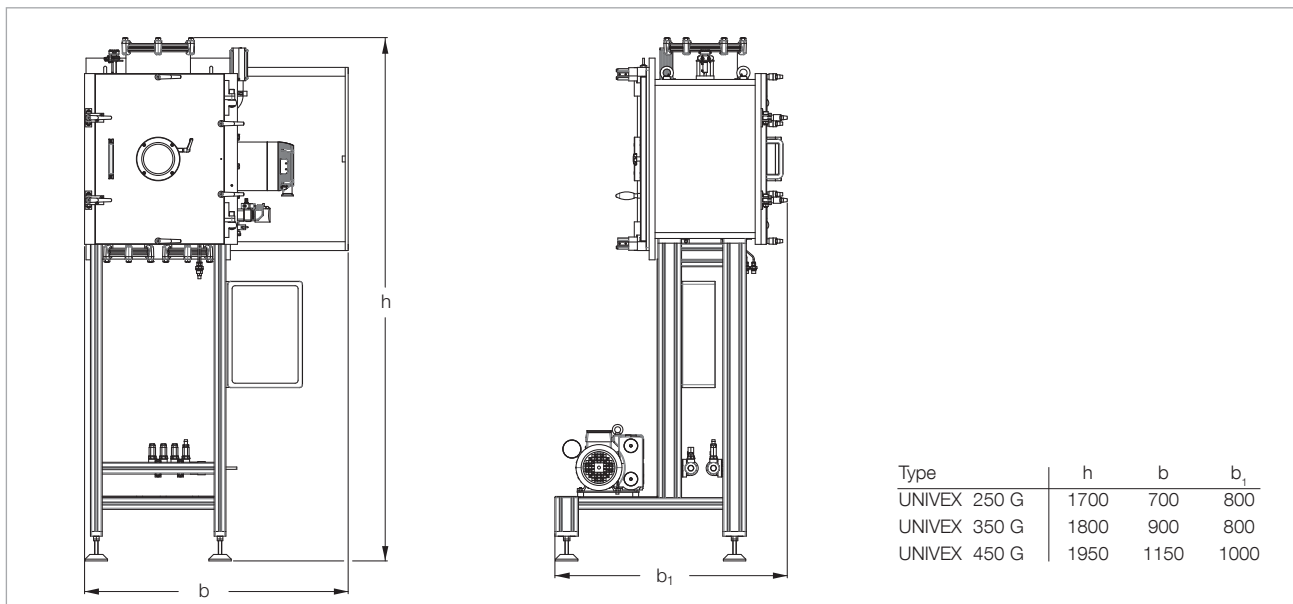
- All system components with exception of the sliding door are accessible from outside the glove box



Design example
UNIVEX 350 G, consisting of electrical cabinet (left) and coating module (right)



View through the vacuum chamber: front sliding door and rear swivelling door open
Design example with sputter source (right) and heated substrate table (top)

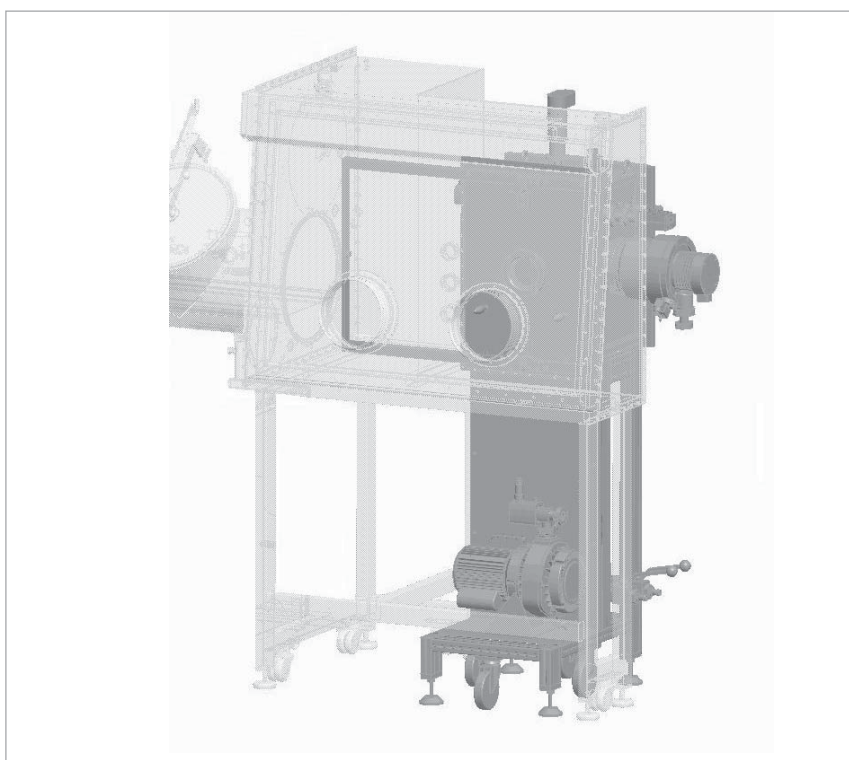


Dimensional drawing of the glove box units, shown without process installations

Complete Solutions, including Glove Box

Upon request Oerlikon Leybold Vacuum will also arrange the delivery of turnkey solutions consisting of the UNIVEX 350 G coating system and a glove box from a single source.

For this, please ask us for a quotation.



3D view of a glove box with the UNIVEX 350 G coating module fitted to the rear

UNIVEX 250 G

The UNIVEX 250 G is a convenient and cost-effective solution for coating tasks requiring not much space.

Substrates, respectively substrate holders up to an overall diameter of

approximately 220 mm can be processed.

Technical Data

UNIVEX 250 G

| | | |
|--|----------------------------------|--|
| Vacuum chamber | | |
| Material | | |
| Chamber body | | Stainless steel |
| Front sliding door | | Stainless steel |
| Rear swivelling door | | Aluminum |
| Dimensions | | |
| Inside width | mm | 270 |
| Inside depth | mm | 370 |
| Inside height | mm | 400 |
| Connections ¹⁾ | | |
| Front side | | Sliding door for glove box access; manually operated and pneumatically closing |
| rear side | | turning door for service access; manually locked |
| Bottom plate | | Variable connections |
| Cover plate | | 1x 200 ISO-K, 2x installation bore ø 34,5 mm |
| Left side | DN | 1x 160 ISO-K (pump system connection), 2 x 16 ISO-KF, 1 x 25 ISO-KF |
| High vacuum pump | | TURBOVAC 350 i |
| Nominal pumping speed for N ₂ | l x s ⁻¹ | 290 |
| Backing pump | | SOGEVAC SV 10 B |
| Nominal pumping speed | m ³ x h ⁻¹ | 11 |
| Controller | | PLC with graphic touchscreen |
| Required supplies | | |
| Voltage | | 400 V, 3 phases / N / PE / 50 Hz ²⁾ |
| Cooling water | | |
| Inlet pressure | bar (abs.) | 4 to 6 |
| Consumption, approx. | l x min ⁻¹ | Dependent on chamber installations |
| Feed temperature | °C | +18 to +25 |
| Compressed air | bar (abs.) | 4 to 6 |
| Weight, approx. | kg | 350 ³⁾ |

¹⁾ Standard configuration, other hole patterns / flanges / viewing windows upon request

²⁾ Other voltages and frequencies upon request

³⁾ Total weight without chamber installations/process components

Ordering Information

UNIVEX 250 G

| | Part No. |
|--------------|--------------|
| UNIVEX 250 G | upon request |

UNIVEX 350 G

The UNIVEX 350 G combines a compact design with plenty of chamber space.
For many coating tasks the UNIVEX

350 G offers optimum space conditions and operator convenience as to process components and substrate processing.

Substrates, respectively substrate holders up to an overall diameter of approximately 300 mm can be processed.

Technical Data

UNIVEX 350 G

| | | |
|--|----------------------------------|--|
| Vacuum chamber | | |
| Material | | |
| Chamber body | | Stainless steel |
| Front sliding door | | Stainless steel |
| Rear swivelling door | | Aluminum |
| Dimensions | | |
| Inside width | mm | 370 |
| Inside depth | mm | 380 |
| Inside height | mm | 500 |
| Connections ¹⁾ | | |
| Front side | | Sliding door for glove box access; manually operated and pneumatically closing |
| rear side | | |
| Bottom plate | | turning door for service access; manually locked |
| Cover plate | | Variable connections |
| Left side | DN | 1x 200 ISO-K, 4 x installation bore ø 34,5 mm |
| High vacuum pump | | TURBOVAC 450 i |
| Nominal pumping speed for N ₂ | l x s ⁻¹ | 430 |
| Backing pump | | SOGEVAC SV 25 B |
| Nominal pumping speed | m ³ x h ⁻¹ | 26 |
| Controller | | PLC with graphic touchscreen |
| Required supplies | | |
| Voltage | | 400 V, 3 phases / N / PE / 50/60 Hz ²⁾ |
| Cooling water | | |
| Inlet pressure | bar (abs.) | 4 to 6 |
| Consumption, approx. | l x min ⁻¹ | Dependent on chamber installations |
| Feed temperature | °C | +18 to +25 |
| Compressed air | bar (abs.) | 4 to 6 |
| Weight, approx. | kg | 400 ³⁾ |

¹⁾ Standard configuration, other hole patterns / flanges / viewing windows upon request

²⁾ Other voltages and frequencies upon request

³⁾ Total weight without chamber installations/process components

Ordering Information

UNIVEX 350 G

| | Part No. |
|--------------|--------------|
| UNIVEX 350 G | upon request |

UNIVEX 450 G

Owing to its chamber dimensions, the UNIVEX 450 G is suited for all coating tasks requiring much space

Substrates, respectively substrate holders up to an overall diameter of over 400 mm can be processed.

With a height of 650 mm, the vacuum chamber is also suited for lift-off applications.

Technical Data

UNIVEX 450 G

| | | |
|--|----------------------------------|---|
| Vacuum chamber | | |
| Material | | |
| Chamber body | | Stainless steel |
| Front sliding door | | Stainless steel |
| Rear swivelling door | | Aluminum |
| Dimensions | | |
| Inside width | mm | 500 |
| Inside depth | mm | 500 |
| Inside height | mm | 650 |
| Connections ¹⁾ | | |
| Front side | | Sliding door for glove box access; manually operated and pneumatically closing |
| rear side | | turning door for service access; manually locked |
| Bottom plate | | Variable connections |
| Cover plate | | 1 x 250 ISO-K, 4 x installation bore ø 34,5 mm |
| Left side | DN | 1 x 250 ISO-K (pump system connection), 2 x 16 ISO-KF, 1 x 25 ISO-KF, 1 x 40 ISO-KF |
| High vacuum pump | | TURBOVAC MAG W 700 iP |
| Nominal pumping speed for N ₂ | l x s ⁻¹ | 590 |
| Backing pump | | SOGEVAC SV 40 B |
| Nominal pumping speed | m ³ x h ⁻¹ | 44 |
| Controller | | PLC with graphic touchscreen |
| Required supplies | | |
| Voltage | | 400 V, 3 phases / N / PE / 50/60 Hz ²⁾ |
| Cooling water | | |
| Inlet pressure | bar (abs.) | 4 to 6 |
| Consumption, approx. | l x min ⁻¹ | Dependent on chamber installations |
| Feed temperature | °C | +18 to +25 |
| Compressed air | bar (abs.) | 4 to 6 |
| Weight, approx. | kg | 500 ³⁾ |

¹⁾ Standard configuration, other hole patterns / flanges / viewing windows upon request

²⁾ Other voltages and frequencies upon request

³⁾ Total weight without chamber installations/process components

Ordering Information

UNIVEX 450 G

| | Part No. |
|--------------|--------------|
| UNIVEX 450 G | upon request |

Cluster-Tool Systems UNIVEX C

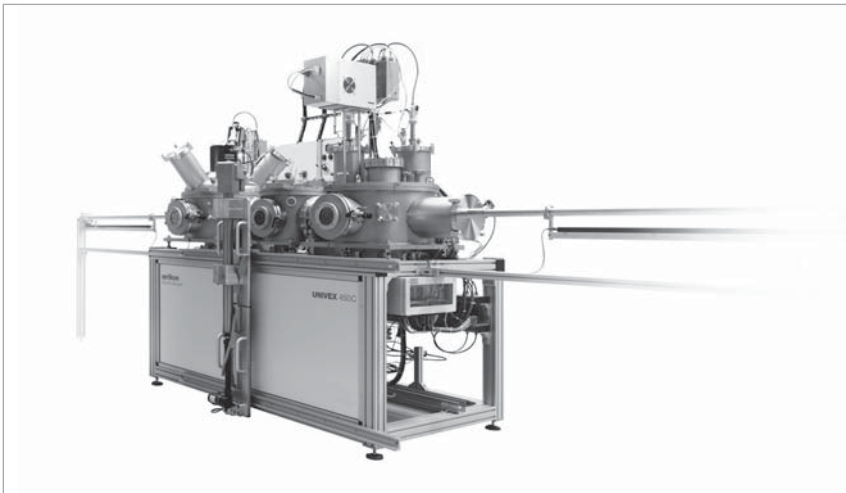


Design example:
UNIVEX 450 C with coating module and electrical cabinet (example photograph).
The coating module consists of two process chambers (left and right) as well as the loadlock and transfer chamber in between
The substrate transfer between the chambers is effected with the aid of a vacuum robot

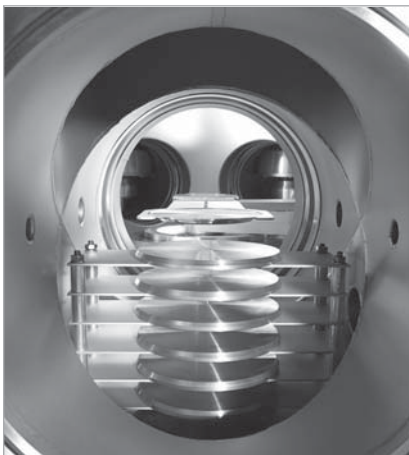
For special applications we can also supply cluster systems based on the UNIVEX concept. These clusters are equipped according to customer requirements and incorporate separate processing, load lock and transfer chambers.

Frequently sputter applications are involved since sputter targets remain in place for a long time and because of this, the process chambers need to be vented rarely.

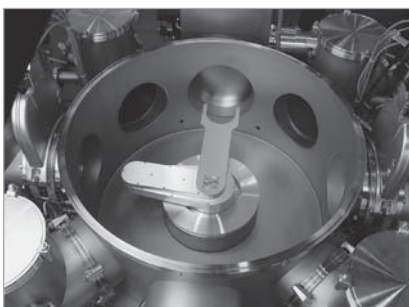
Generally, each vacuum chamber will have its own high vacuum system. The load lock chamber is in the simplest case loaded manually with individual substrates. In addition, magazine processing of several substrates per batch is possible.



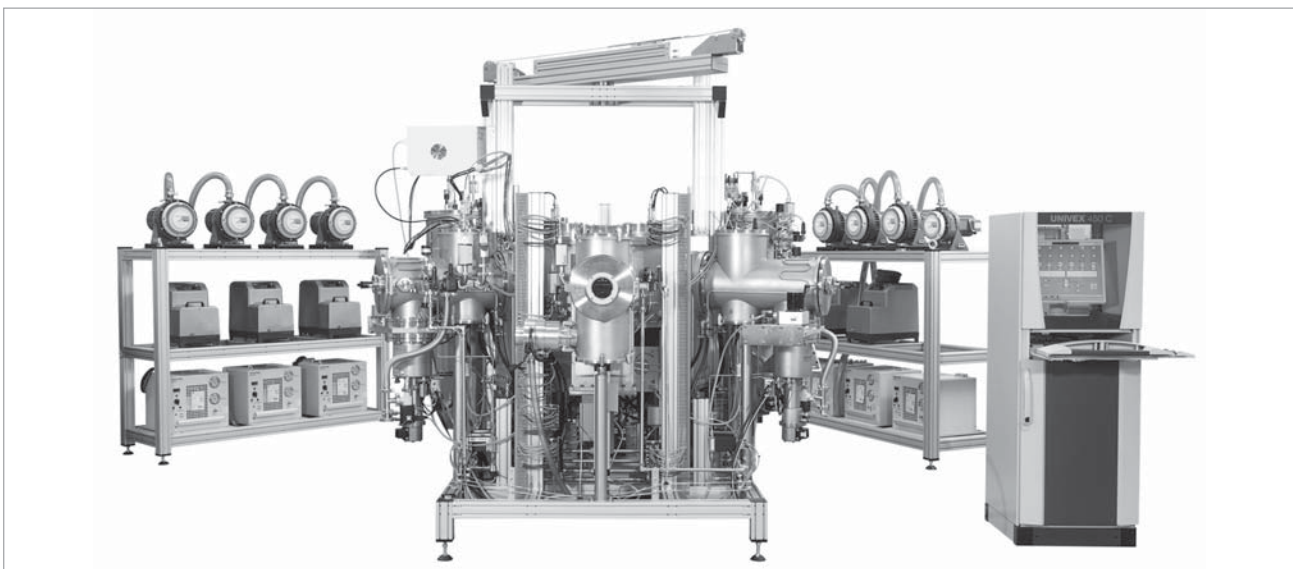
Design example:
UNIVEX 450 C with two process chambers as well as load lock chamber arranged at the centre. The substrates are moved using linear transfer rods (left and right)



Design example:
Automatically controlled substrate magazine with
robot arm access



Design example:
Load lock chamber with central vacuum robot for
substrate transportation into radially arranged pro-
cess chambers



Design example:
Coating module (centre) with decentralised pump systems (left and right) and control console

For transporting the substrates between the individual vacuum chambers, commonly motor driven robot arms or linear transfer drive units are used.

The UNIVEX control software is customised according to the specific appli-

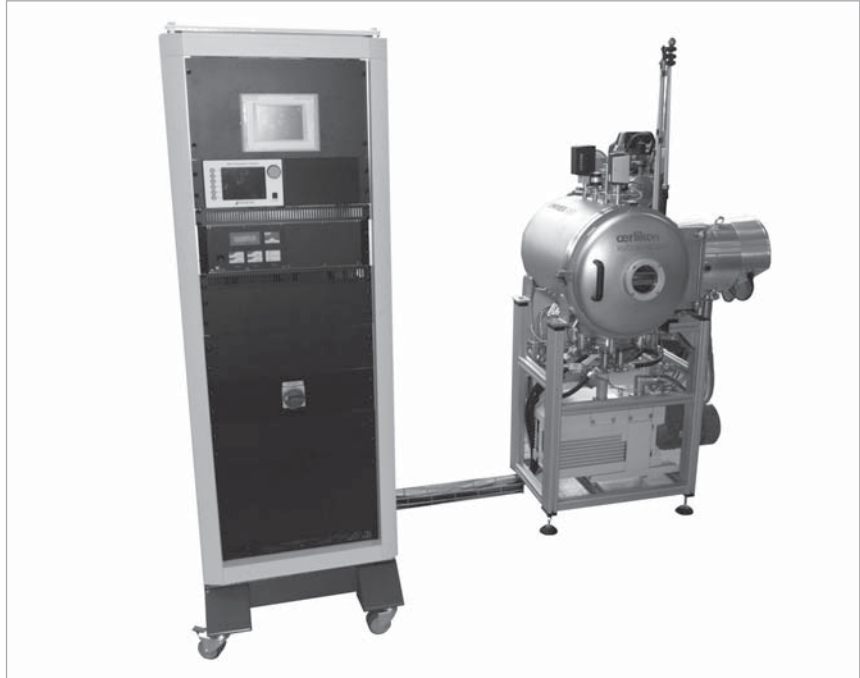
cation requirements and will generally allow fully automatic running of the process including recipe processing. Additional features like data logging, password protected and priority dependent user access as well as remote access for servicing can be optionally integrated.

Dactyloscopy Systems UNIVEX D

Oerlikon Leybold Vacuum has developed a coating system, which relies on a recognized metal evaporation process to reveal fingerprints on items containing fingerprint evidence.

Benefits of this method

- Easily controllable thermal coating process
- Coating of large areas is possible up to 800 x 400 mm
- Short cycle times are possible (depending on the material with the fingerprint evidence)
- Good contrast on multicolour surfaces
- The material containing the fingerprint evidence remains undamaged

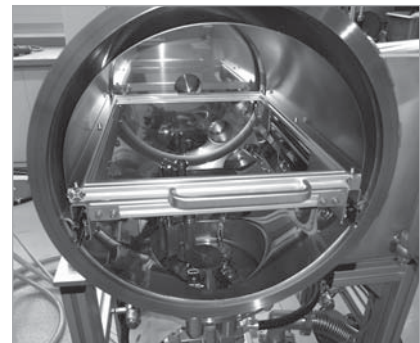


Design example:

UNIVEX 450 D, consisting of vacuum coating module (right) and separate electrical cabinet (left)



Opened coating chamber with retracted substrate receiver



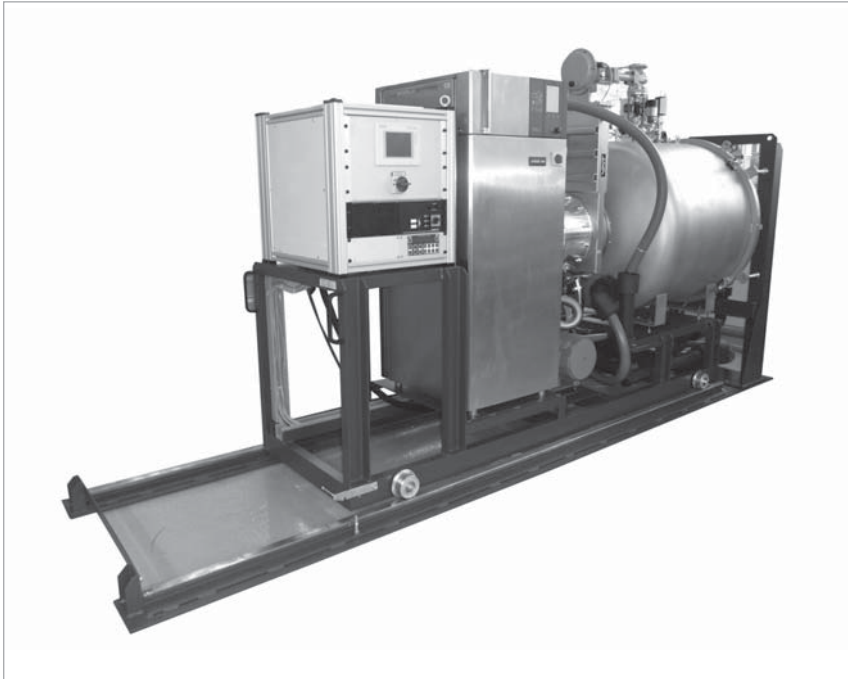
View into the chamber with thermal evaporator and positioned substrate receiver

Space Simulation Systems UNIVEX S

We are offering the UNIVEX S line for simulation of space conditions as well as other thermal vacuum experiments. It generally consists of a cylindrical vacuum chamber with high vacuum sys-

tem and supply module with process controller. The simulation chamber is typically equipped with temperature controllable trays and shrouds, which may be both

heated and cooled, in a vacuum. The process module is moved manually along rails so that the simulation chamber can be opened for loading

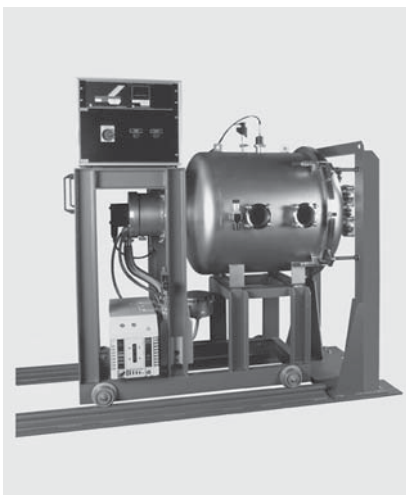


Design example:
UNIVEX 1000 S with closed simulation chamber



Opened chamber of the UNIVEX 1000 S with temperature controllable shrouds and substrate tray

Vacuum Pump
Systems



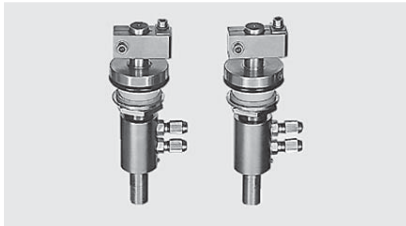
Design example:
UNIVEX 700 S

Process Accessories

Thermal Evaporation of High Melting Point Materials (metals)

Single Thermal Evaporator

Consisting of two water-cooled high voltage feedthroughs with terminal blocks for 34.5 mm dia. holes.



Single thermal evaporator

Technical Data

| | | |
|----------------------|--------|-----------------|
| Rating per conductor | V A | max. 100 500 |
| Seals | | FPM (FKM) |
| Water connection | mm | Hose 4/6 dia. |
| Weight | kg | 2.5 |

Single Thermal Evaporator

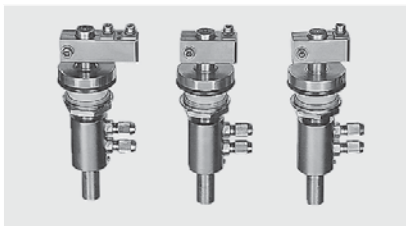
Ordering Information

Single Thermal Evaporator

| | Part No. |
|---------------------------|--------------|
| Single thermal evaporator | upon request |

Dual Thermal Evaporator

Consisting of three water-cooled high voltage feedthroughs with terminal blocks for 34.5 mm dia. holes.



Dual thermal evaporator

Technical Data

| | | |
|----------------------|--------|-----------------|
| Rating per conductor | V A | max. 100 500 |
| Seals | | FPM (FKM) |
| Water connection | mm | Hose 4/6 dia. |
| Weight | kg | 3.9 |

Dual Thermal Evaporator

Ordering Information

Dual Thermal Evaporator

| | Part No. |
|-------------------------|--------------|
| Dual thermal evaporator | upon request |

High Current Cable

For single and dual thermal evaporators, equipped with terminals and clamping pieces.

Technical Data

| | | |
|---------------|-----------------|-----------------|
| Length | m | 2 ¹⁾ |
| Rating | V A | max. 100 500 |
| Cross section | mm ² | 120 |
| Weight | kg | 3.5 |

High Current Cable

Ordering Information

High Current Cable

| | Part No. |
|--------------------|----------------------------|
| Power supply cable | upon request ²⁾ |

¹⁾ Standard length. Other lengths can be specified

²⁾ For the single thermal evaporator, two high current cables are required
For the dual thermal evaporator, three high current cables are required

AS 153 High current power supply unit

For supplying thermal evaporators.



AS 153 high current power supply unit

Technical Data

| | |
|------------------------------|---|
| Cabinet | 19" rack module, 2 HU Installation depth 520 mm |
| Output voltage/current, max. | 8 V, 400 A |
| Inputs | Remote control unit for controlling the evaporation power (0 to 10 V) |
| Main power supply | 230 V, 50/60 Hz, 10 A |
| Weight, approx. kg | 10 |

Power Supply Unit

Ordering Information

| | Part No. |
|---------------------------------------|--------------|
| AS 153 high current power supply unit | upon request |

Power Supply Unit

Thermal Evaporation of Low Melting Point Materials (organics)

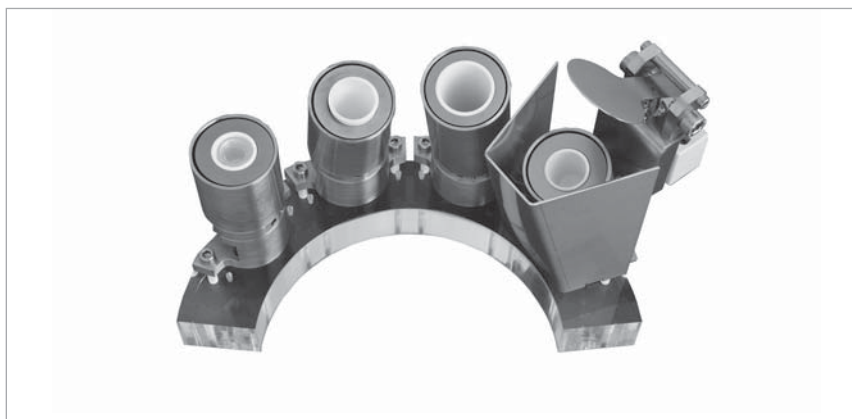
Organic material evaporators are special instruments based on the thermal principle developed to evaporate mostly temperature sensitive organic materials.

Such instrumentation ensures a coating

process at precisely controlled heating temperatures in the range between 50 °C and 600 °C.

For installation within the UNIVEX systems, Oerlikon Leybold Vacuum

supplies organic material evaporators as a complete package, consisting of evaporator source, automatic evaporator shutter and 19" rack mount controller.



Four organic material evaporators, arranged in a semicircle



Single organic material evaporator with shutter, fitted to a DN 40 CF flange



Power supply unit for two organic material evaporators

Upon request we shall be pleased to provide an offer which specifically matches the requirements of your application.

Electron Beam Evaporation

Various models of electron beam evaporators and power supplies are available for installation in the UNIVEX systems.

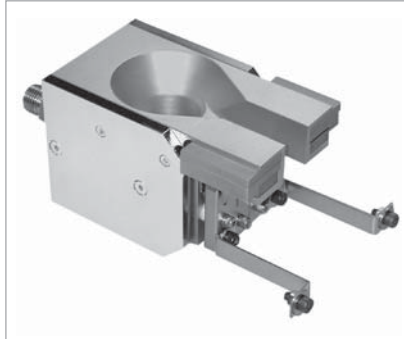
Electron Beam Evaporator

The selection of a suitable electron beam evaporator will primarily depend on the amount of available space, the desired evaporation rate and the film thickness as well as the number and type of materials which need to be evaporated. Single crucible as well as rotatable multi-crucible evaporators are available.

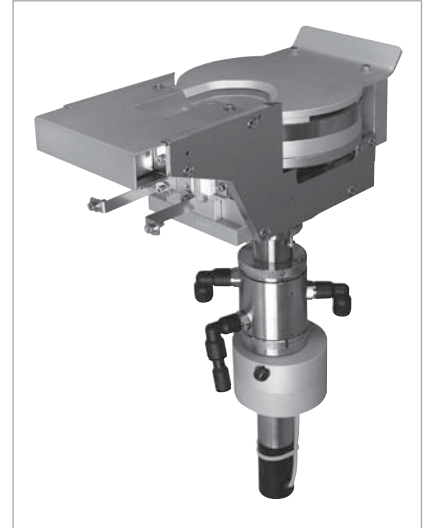
Power Supplies

The power supply unit for the individual electron beam evaporators is selected depending on the maximum evaporation power which is required, as well as the demanded properties for X/Y beam deflection. Models with output power ratings ranging from 3 kW to 10 kW are available.

Upon request we shall be pleased to provide an offer which specifically matches the requirements of your application.



Electron beam evaporator with single crucible



Electron beam evaporator with rotatable six-pocket crucible

Sputtering

Magnetron Sputter Sources

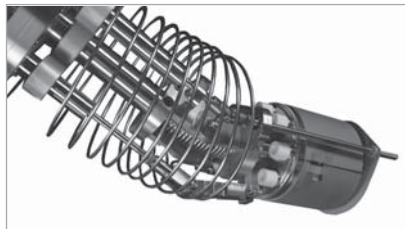
The magnetron sputter sources, which can be built into the UNIVEX systems, are DC/RF compatible. This means, they may be operated either with a DC or also with a RF power supply. In addition, pulsed DC power supplies are possible.

Here as standard round planar sputter sources with target diameters ranging from 2-in. to 6-in. are available. Selection and equipping here depends on the substrate size to be coated, the specified sputtering process and the target material as well as the available installation space.

Other target sizes and magnetron types (rectangular sources, for example) are available upon request.



2-in. magnetron with in-situ tiltable sputter head, pneumatically actuated target shutter and gas feed



4-in. magnetron with in-situ tiltable sputter head, pneumatically actuated target shutter and gas feed



Confocal arrangement of 3-in. sputter sources, aligned for sputter-up

DC Power Supplies

For DC sputtering, power supply units with a rated output power ranging between 500 W and 3 kW are available. These are 19-in. rack mount units which can be installed in the UNIVEX cabinets.

RF Power Supplies

For RF sputtering, power supply units with a rated output power ranging between 300 W and 2 kW are available. These are 19-in. rack mount units which can be installed in the UNIVEX cabinets.

Moreover, automatically controlled RF matchboxes are supplied for impedance matching between the RF power supply and the magnetron.

Gas Inlet

Sputtering sources can only be operated with a process gas present. For this, manually operated variable leak valves or automatically controlled mass flow controllers are available options.

Throttling the Pumping Speed and Process Pressure Control

In order to protect the high vacuum pump against the high pressures present during plasma operation and to control the process pressure, the UNIVEX systems are fitted with suitable components for throttling the high vacuum pumping speed. These may be butterfly valves, control gate valves or also speed controlled turbomolecular pumps.

Upon request we shall be pleased to provide an offer which specifically matches the requirements of your application.

Ion Sources

Ion sources are frequently used to either clean or etch the substrates before running the actual coating process, or to optimise the thin film properties during deposition. In the case of the latter process, the ion source serves to support the coating process (IBAD – Ion Beam Assisted Deposition). However, there are also some PVD processes, during which the ion source is directly needed to produce the thin films, for example during ion beam sputtering

As to design and operating principle, different types of ion sources are available, for example

- Gridded and gridless ion sources
- DC ion sources and RF ion sources
- Flange mounted ion sources and ion sources built in/aligned in the vacuum



Gridless DC ion source with filament for plasma neutralisation



Filamentless RF grid type ion source

**We shall be pleased to assist you in connection with your UNIVEX application.
For this, please ask us for a quotation.**

Process Gas Inlet

In plasma supported processes (sputtering, etching, glow discharge, bias) or reactive deposition methods, generally a gas supply from the outside is necessary. The gas may be supplied either manually with a gas-dosing valve or program-controlled by way of a gas

flow controller (MFC - Mass Flow Controller). The MFC control range is depending on the requirements between approximately 0 to 10 sccm and 0 to 500 sccm.

The available MFC models are equipped either with a 0 to 5 V ana-

logue interface or a EtherCAT interface. The possible gases respectively gas mixtures within a UNIVEX system depend on the type of required application and the installed system hardware (in particular the pump system).

Mass Flow Controller (MFC)

For controlled inlet of gas in connection with automated plasma processes (sputtering, etching, glow discharge). The MFC is controlled by a PC or a PLC provided from the side of the customer.



Technical Data

| | | |
|-------------------|------|-------------------------------|
| Gas flow, max. | sccm | selectable between 10 and 500 |
| Supply voltage | V DC | 24 |
| Control interface | | analog 0 - 5 V or EtherCAT |

Mass Flow Controller (MFC)

Ordering Information

| | Part No. |
|----------------------|--------------|
| Mass flow controller | upon request |

Mass Flow Controller (MFC)

Variable Leak Valve with Isolation Valve

For manually controlled inlet of gas in connection with plasma processes (sputtering, etching and glow discharge).

Technical Data

| | | |
|----------------------|----------------------------|---------------------------------------|
| Gas inlet rate q_L | mbar x l x s ⁻¹ | 5×10^{-6} to 1×10^3 |
| Connection flange | DN | 16 ISO-KF |

Variable Leak Valve with Isolation Valve

Ordering Information

| | Part No. |
|--|----------|
| Variable leak valve with isolation valve | 215 010 |

Variable Leak Valve with Isolation Valve

see also Catalog Part "Valves"

Please ask us for detailed information.

Film Thickness Measurement

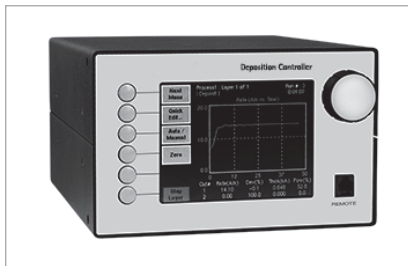
Various thin film thickness measuring instruments may be installed in the UNIVEX units.

The selection depends on the measurements needed and the required degree of automation.

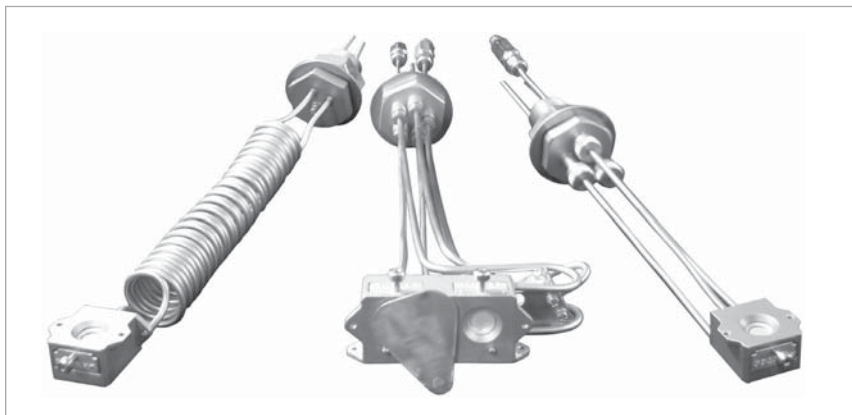
As standard, oscillating crystal systems are used. These may consist of one or several sensing heads with or without shutter, and upon request are available for UHV operation (i.e. are suitable for degassing).

The sensor head is driven either by a monitor (allowing only the measurement of deposition rate and film thickness) or by a controller (allowing measurement of the film parameters and control of the deposition rate).

Upon request we can provide an offer which specifically matches the requirements of your application.



Example of a thin film controller



Examples of thin film measurement gauge heads

Substrate Rotation

To attain the desired film properties, a rotary movement of the substrates is very often necessary in deposition processes.

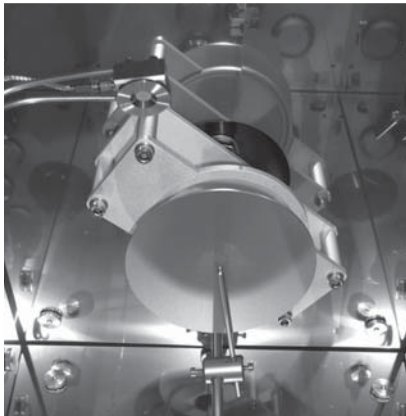
The Oerlikon Leybold Vacuum UNIVEX

system is available with a wide range of substrate rotation accessories.

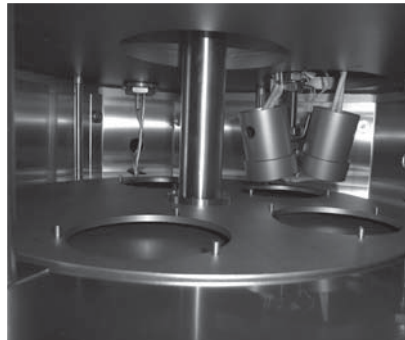
A simple, manually operated rotation axis can be implemented just as a continuously revolving motor shaft or an

angle positionable solution (for placement or transfer tasks).

In addition, coaxial drives with two independently operated rotating tables can be offered.



Motor driven rotary drive with a detachable substrate holder (bayonet coupling).
View from the bottom onto the closed substrate shutter



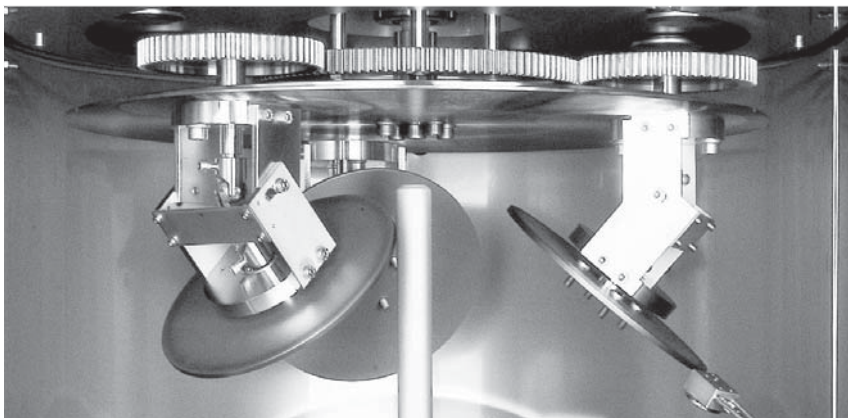
Coaxial hollow shaft drive for eccentric rotation and positioning of several substrates, with separate shutter table

Planetary Drives

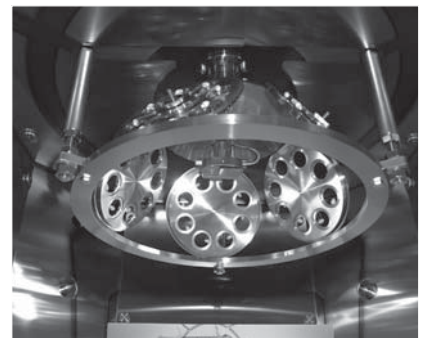
For high demands regarding thickness uniformity of the deposited film, planetary drives are suitable. Here the substrates, which are to be coated, are

placed on so-called planets. The planets revolve eccentrically about a central axis but they additionally rotate about their own centre point.

Different types of planetary drives are possible depending on the specific kind of task (size and number of substrates, angle of inclination, throughput times).



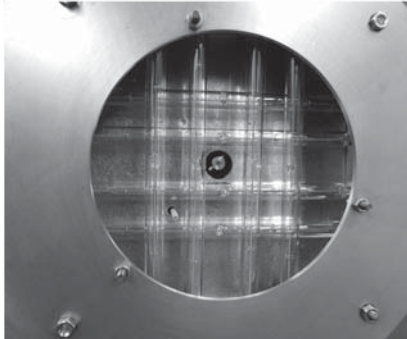
Planetary drive with gear drive and three planets, firmly installed, but where the angle is adjustable



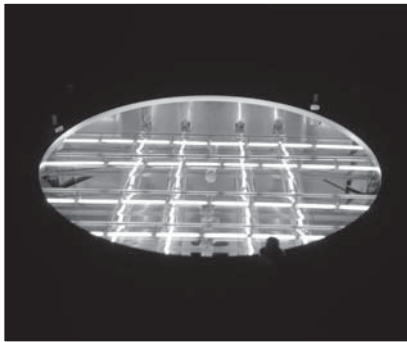
Planetary drive with central friction disc and five free-running planets

**Our consulting experts are available to inform you about substrate movement options.
For these please ask us for a quotation.**

Heating, Cooling, Tempering, Bias



Rotatable thermal radiation heater with quartz lamps

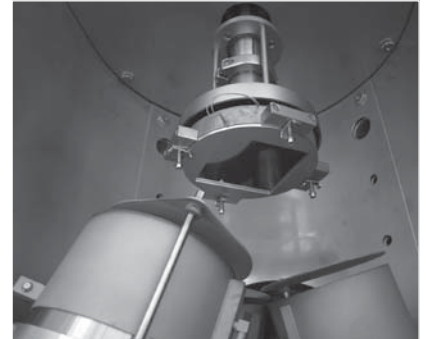


Rotatable thermal radiation heater with quartz lamps during heating operation

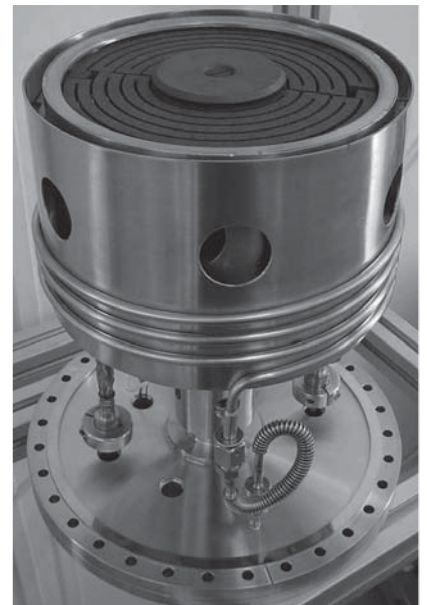
The thermal manipulation of substrates is an important method to optimise coating results. For this, Oerlikon Leybold Vacuum offers within the scope of its UNIVEX systems numerous solutions. Depending on requirements and technical feasibility, thermal solutions may also be combined with other properties for example rotation or substrate bias.

Substrate Heating

For temperature-controlled heating, different contact and thermal radiation heaters are available. The selection of the optimal solution depends above all on the desired temperature range, the substrate size and the substrate material.



Rotating contact heater based on the resistance heating principle



Rotating high temperature thermal radiation heater with SiC heating element

Substrate Cooling

Heat sensitive substrates or substrate coatings necessitate during the deposition process some kind of cooling. Oerlikon Leybold Vacuum offers both inactively as well as actively cooled substrate holders. As cooling media, water, liquid nitrogen (LN_2) or special cooling liquids can be used.



Rotating and water-cooled substrate table

Substrate Tempering

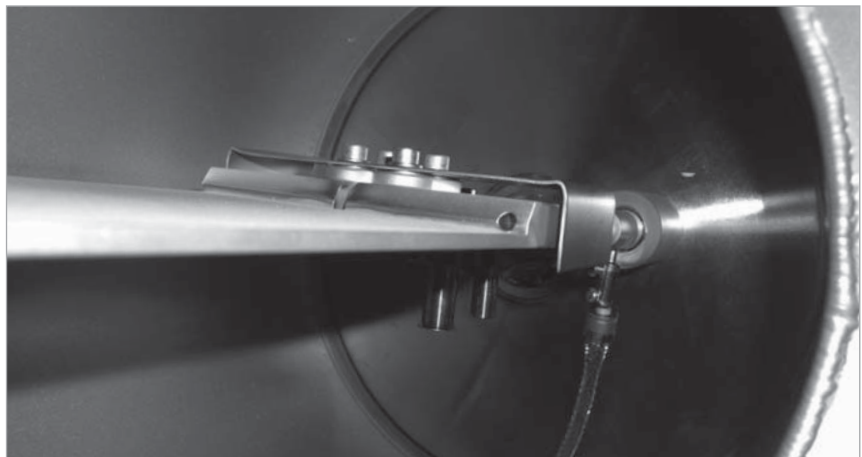
Through the utilisation of a special temperature control liquid, it is possible to heat or also cool a substrate. The possible temperature range lies between approximately $-50\text{ }^{\circ}\text{C}$ and $+150\text{ }^{\circ}\text{C}$ for static substrate holders, respectively $-20\text{ }^{\circ}\text{C}$ and $+100\text{ }^{\circ}\text{C}$ for rotating substrate holders.



Rotatable and temperature controllable substrate holder with substrate shutter

Substrate Bias

Pre-cleaning of the substrate with RF or DC biasing prior to deposition can improve the adhesive properties of the film. Oerlikon Leybold Vacuum offers insulated substrate holders and upon request matching power supplies.



Insulated substrate fork with RF bias connection

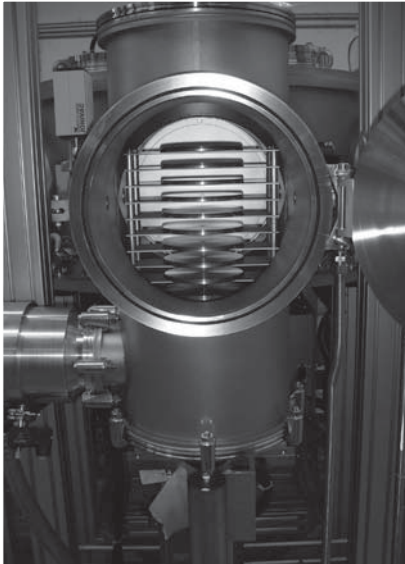
Load Lock Systems

To improve the process conditions and to increase coating throughput, frequently additional load lock chambers are used. These are connected to the process chamber and are vacuum-wise separated by a gate valve. By means of a transport facility (linear transfer rod, vacuum robot or alike) the substrate is transported between the chambers. The load lock system offers the advan-

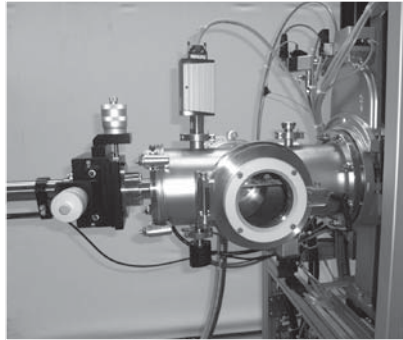
tage to save time during pumpdown and the ability to attain significantly better vacuum pressures in the process chamber, since it will not have to be vented when changing the substrates. Usually the load lock chamber will be significantly smaller compared to the process chamber. Selection of the load lock chamber and

the pump system as well as the design for the substrate transport facility depend on the specific kind of application.

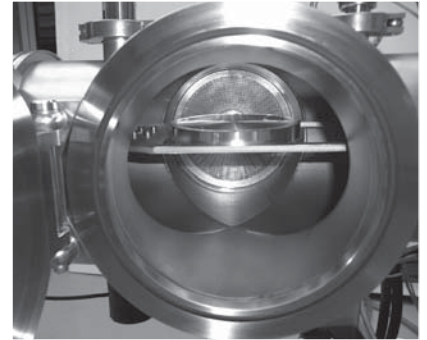
We shall be pleased to assist you as to the possibilities offered by a load lock system in your UNIVEX application.



Manually operated load lock chamber with substrate magazine



Load lock chamber for a single substrate with automatically operated linear transfer unit



View into the opened load lock chamber onto the substrate end effector

General Accessories

Blank-Off Screw Fitting

For 34.5 mm dia. hole.



Blank-off screw fitting

Technical Data

| | |
|----------|-----------------|
| Material | Stainless steel |
| Seal | FPM (FKM) |
| Weight | kg 0.1 |

Blank-Off Screw Fitting

Ordering Information

| | Part No. |
|-------------------------|----------|
| Blank-off screw fitting | 030 40 |

Blank-Off Screw Fitting

PS 113 A Low Pressure Safety Switch

Safety interlock arrangements in connection with the UNIVEX system controller, respectively optionally connected power supply equipment (for sputtering or electron beam evaporation, for example).



PS 113 A Safety Switch

Technical Data

| | | |
|---------------------------|------------------------|--|
| Switching pressure | mbar | approx. 6 below atmospheric pressure |
| Return switching pressure | mbar | 3 below atmospheric pressure |
| Switching inaccuracy | mbar | 2 |
| Switching contact | | Changeover contacts, gold-plated, for prog. controls |
| Switching capacity | mA / V AC mA / V AC | 100 / 24 30 / 24 |
| Vacuum connection | DN | 16 ISO-KF |

Low Pressure Safety Switch

Ordering Information

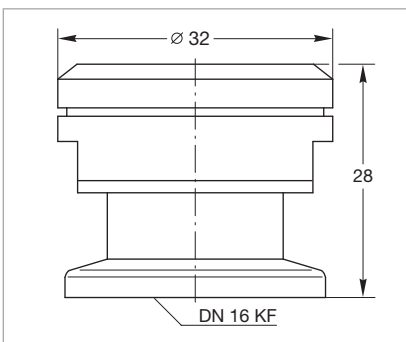
| | Part No. |
|---|----------|
| Low pressure safety switch PS 113 A, DN 16 ISO-KF; complete with 3 m long cable | 230 011 |

Low Pressure Safety Switch

see also Catalog Part "Measuring, controlling"

Overpressure Safety Valve

For protecting the vacuum chamber against atmospheric overpressure during gas inlet



Dimensional drawing for overpressure safety valve

Technical Data

| | | |
|---|---------------------|---|
| Responding pressure | mbar | 1150 ± 40, over-pressure |
| Flow at 140 mbar | l x h ⁻¹ | 500 |
| Valve disk | | Spring loaded, with O-ring seal |
| Leak rate in the closed state mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | | < 1 x 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) |
| Connection | DN | 16 KF |

Overpressure Safety Valve

Ordering Information

| | Part No. |
|---------------------------|----------|
| Overpressure Safety Valve | 890 39 |

Overpressure Safety Valve

see also Catalog Part "High Vacuum Pumps"

Vacuum Feedthrough for the Transfer of Electrical Signals

For installation in a 34.5 mm diameter installation bore.

Connection on the side of the atmosphere through a six-way plug (included in the delivery).

Connection on the vacuum side through a plug with soldered contacts (included in the delivery).



Vacuum feedthrough

Pneumatically Actuated Swivelling Shutter

For covering substrates or coating sources like thermal, respectively electron beam evaporators.

With pneumatic drive unit and shutter panel; for installation within installation bores having a diameter of 34.5 mm.

Technical Data

| | | |
|----------------------|--------|----------------|
| Rating per conductor | V A | max. 700 16 |
| Seal | | FPM (FKM) |
| Weight | kg | 0.3 |

Ordering Information

| | Part No. |
|--------------------|--------------|
| Vacuum feedthrough | upon request |

Vacuum Feedthrough

Vacuum Feedthrough

Technical Data

| | | |
|---------------------------------|------|-------------------|
| Control voltage | V DC | 24 |
| Dimensions of the shutter panel | mm | upon consultation |

Ordering Information

| | Part No. |
|---|--------------|
| Pneumatically actuated swivelling shutter | upon request |

Pneumatically Actuated Swivelling Shutter

Pneumatically Actuated Swivelling Shutter

Questionnaire

page 1

Customer

Substrate

| | |
|---------------------------|---------------------------|
| Max. substrate dimensions | <input type="text"/> |
| Substrate material(s) | <input type="text"/> |
| Substrate per batch | <input type="text"/> pcs. |

| | | | | |
|--------------------|--|--------------------------------------|---------------------------------------|--------------------------|
| Substrate heating | <input type="checkbox"/> yes, max. temp. | <input type="text"/> °C at Substrate | <input type="checkbox"/> or at heater | <input type="checkbox"/> |
| Substrate cooling | <input type="checkbox"/> yes, min. temp. | <input type="text"/> °C at Substrate | <input type="checkbox"/> or at cooler | <input type="checkbox"/> |
| Substrate rotation | <input type="checkbox"/> yes | | | |
| Substrate shutter | <input type="checkbox"/> yes | | | |

Substrate pre-treatment (cleaning)

| | | |
|-----------------|------------------------------|-----------------------------|
| Substrate bias | <input type="checkbox"/> RF | <input type="checkbox"/> DC |
| Ion beam | <input type="checkbox"/> yes | |
| Sputter etching | <input type="checkbox"/> yes | |

Deposited film

| | |
|----------------------|---------------------------|
| Coating material(s) | <input type="text"/> |
| Layers per substrate | <input type="text"/> pcs. |

Any materials incompatible with your coating process (i.e. aluminum, copper, viton, etc.)

☐ yes, these materials are

Deposition process

| | |
|----------------------------|-------------------------------|
| Thermal evaporation | <input type="checkbox"/> yes |
| Number of sources | <input type="checkbox"/> pcs. |
| Number of power supplies | <input type="checkbox"/> pcs. |
| Source shutter(s) | <input type="checkbox"/> yes |

| | |
|----------------------------------|--|
| Electron beam evaporation | <input type="checkbox"/> yes |
| Number of guns | <input type="checkbox"/> pcs. |
| Number and size of pockets | <input type="text"/> (e.g. 1 x 8cc, 4 x 8cc, 6 x 20cc ...) |
| Evaporating power | <input type="checkbox"/> 3 kW <input type="checkbox"/> 5 kW <input type="checkbox"/> 6 kW <input type="checkbox"/> 10 kW |
| Source shutter(s) | <input type="checkbox"/> yes |

| | |
|------------------------------|--|
| Thickness measurement | <input type="checkbox"/> monitor <input type="checkbox"/> controller |
|------------------------------|--|

| | |
|-------------------------------|---|
| Magnetron sputtering | <input type="checkbox"/> yes |
| Target to substrate alignment | <input type="checkbox"/> confocal <input type="checkbox"/> face to face |
| Source shutter(s) | <input type="checkbox"/> yes |

| | |
|------------------------------|---|
| Number of DC sputter sources | <input type="checkbox"/> pcs. |
| Target diameter | <input type="checkbox"/> 2" <input type="checkbox"/> 3" <input type="checkbox"/> 4" <input type="checkbox"/> 6" |
| Targets with special size | <input type="text"/> |
| Number of DC power supplies | <input type="checkbox"/> pcs. |

| | |
|------------------------------|---|
| Number of RF sputter sources | <input type="checkbox"/> pcs. |
| Target diameter | <input type="checkbox"/> 2" <input type="checkbox"/> 3" <input type="checkbox"/> 4" <input type="checkbox"/> 6" |
| Targets with special size | <input type="text"/> |
| Number of RF power supplies | <input type="checkbox"/> pcs. |

| | |
|--------------------------------|------------------------------|
| Ion assisted deposition | <input type="checkbox"/> yes |
|--------------------------------|------------------------------|

Questionnaire

page 2

Gas inlet (required for all plasma processes)

Required gases

Gas inlet system

☐ MFC ☐ manual leak valve

Vacuum chamber

Best suited standard size

If not, then special size

☐ yes

Chamber wall tempering

☐ cooling ☐ heating (by water, max. 65 °C)

Additional load lock system

☐ manual ☐ automatic ☐ with magazine for ☐ substrates

Pump system

Fore-vacuum pump

High vacuum pump

☐ dry ☐ oil-sealed
☐ cryo ☐ turbomolecular

Process pressure

Ultimate pressure

 mbar/ Torr
 mbar/ Torr

System control

(Standard is PLC with automatic pump system control and manual deposition control)

Manual process control

Semi-automatic proc. control

Automatic process control

☐ yes (i.e. manual deposition steps)
☐ yes (i.e. automatic single deposition steps)
☐ yes (i.e. automatic coating batches, recipe-processing)

Installation

Location

in a clean room completely

in the clean room wall

☐ yes
☐ yes

Main power supply

Voltage

Number of phases

Frequency

 V

 Hz

Description of other process or system issues, if required

Commercial aspects

Estimated budget

Planned delivery date

 currency ☐ EUR ☐ USD ☐ CHF

Calibration Systems

General

CS Calibration Systems

The requirements imposed on vacuum engineering with regard to accuracy of the measurements, reproducibility and unambiguity of the determined vacuum pressures have increased steadily over the last years

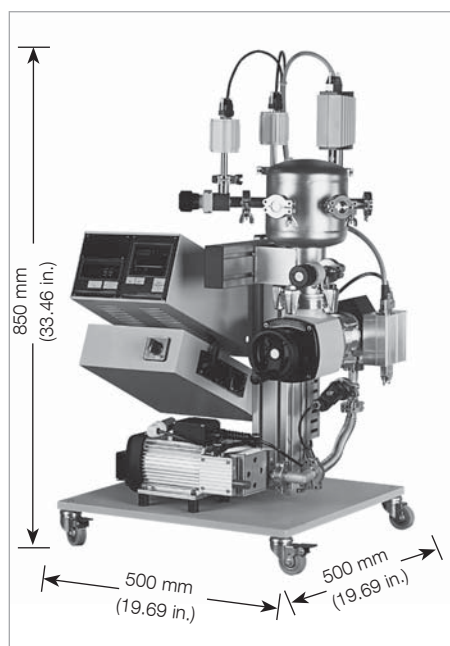
Routine calibrations of vacuum gauges are an important component of quality assurance schemes. The calibration systems from Oerlikon Leybold Vacuum put the customer in a position to check and recalibrate on his own the specified and necessary accuracy of his vacuum gauges.

Calibration systems are available for this purpose which cover a calibration range from 1000 mbar to 1×10^{-7} mbar (750 to 0.75×10^{-7} Torr).

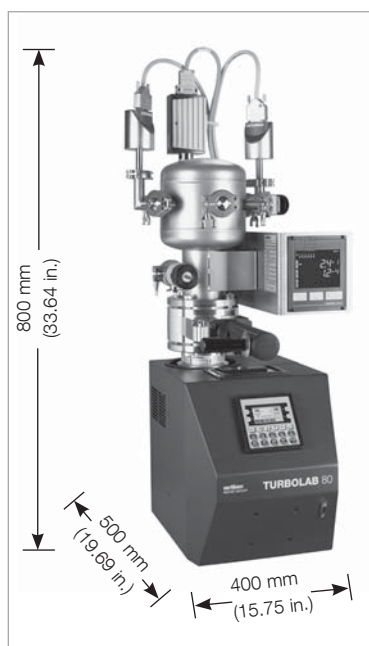
Each system is equipped with several certified reference pressure sensors (transmitter standards), which each cover a part of the specified range of calibration pressures. In the pump system, turbomolecular pumps TURBOVAC with DIVAC diaphragm pumps are used. A variable leak valve is used to let the gas into the calibration chamber. In the case of the calibration system CS7, the gas inlet line is, moreover, equipped with it's own pump system.

The CS 3 mobile is an implementation which may be easily transported in a space saving manner. To this end it may be disassembled in to 2 parts for subsequent on-site reassembly.

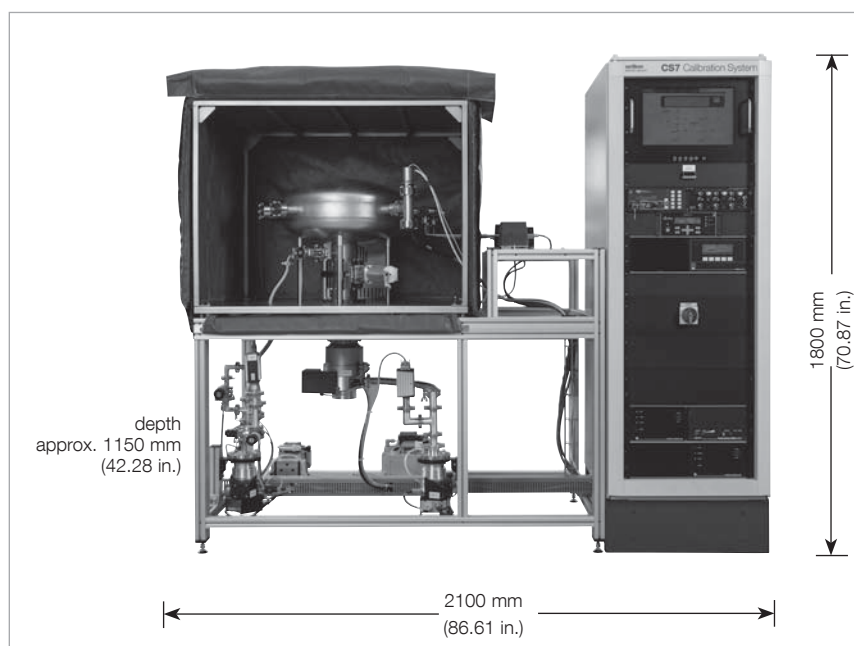
The CS7 is equipped with a heater for the vacuum chamber, for the purpose of attaining lower chamber pressures more rapidly. The temperature of the heating collars can be controlled whereby the maximum degassing temperature will depend on the components installed (flanges, pressure sensors, valves).



CS3 calibration system



Calibration system CS3 mobile



CS7 calibration system

Advantages to the User

- Vacuum gauges and measurement systems of any make may be calibrated
- Designed in accordance with DIN 28 418 resp. ISO/DIS 3567
- Transfer standards with PTB-, DAKK- or factory certificate
- Easier DIN/ISO 9000 approval
- Reliable and reproducible measurements
- Quick start-up
- Measurement system free of hydrocarbons through the utilisation of dry compressing vacuum pumps
- Simple operation
- CE approval

Products

Technical Data

Calibration System

| | | CS3 / CS3 mobile | CS7 |
|---|----------------|---|---|
| Calibration range | mbar (Torr) | 1000 to 1×10^{-3} (750 to 0.75×10^{-3}) | 1000 to 1×10^{-7} (750 to 0.75×10^{-7}) |
| Pressure measurement range | mbar (Torr) | 1000 to 2×10^{-6} (750 to 1.5×10^{-6}) | 1000 to 2×10^{-9} (750 to 1.5×10^{-9}) |
| Vacuum chamber connections (in brackets: quantity available on the side of the customer's system) | | 5 (3) x DN 16 ISO-KF 1 (0) x DN 25 ISO-KF | 6 (3) x DN 16 CF 6 (4) x DN 40 CF |
| Gas inlet | | via variable leak valve | via variable leak valve |
| Extra pump system for admitting gas | | no | yes |
| Heater for the vacuum chamber | | no | yes |

Application examples:

Which pressure sensors may be calibrated with which system?

Type of Sensor

Calibration System

| | CS3 / CS3 mobile | CS7 |
|---|------------------|-----|
| Diaphragm sensors | | |
| BOURDONVAC | ■ | ■ |
| Capsule vacuum gauges | ■ | ■ |
| DIAVAC DV 1000 | ■ | ■ |
| DI/DU 200/201/2000/2001 | ■ | ■ |
| CTR 90, CTR 91, CTR 100 (1000 - 1 Torr full scale) | ■ | ■ |
| CTR 91 (0.1 Torr full scale) / CTR 101 | | ■ |
| THERMOVAC sensors | | |
| TR 301, TR 306 | ■ | ■ |
| TR 211, TR 216, TTR 211, TTR 216, TTR 90, TTR 91, TTR 96, TTR 100, TTR 101 | ■ | ■ |
| SRG/VISCOVAC sensor (spinning rotor gauge) | | |
| VK 201, SRG | | ■ |
| PENNINGVAC sensors | | |
| PR 25, PR 26, PR 27, PR 35, PR 36, PR 37, PTR 90, PTR 225 | | ■ |
| IONIVAC sensors | | |
| ITR 90, ITR 100, ITR 200 | | ■ |
| IE 414, IE 514 | | ■ |

Ordering Information

Calibration System

| | CS3 / CS3 mobile | CS7 |
|----------------------------------|------------------|--------------|
| | Part No. | Part No. |
| Ordering information and options | upon request | upon request |

Vacuum - measuring, controlling

General

| | |
|---|-----|
| Applications for Vacuum Gauges | 669 |
| Select the Combination of Sensor and Gauges which is ideal for your Application | 670 |
| Basic Terms of Vacuum Metrology | 674 |
| Connection Accessories for Small Flanges | 676 |

Products

Mechanical Gauges (Vacuum Gauges Analog Readout)

| | |
|---|-----|
| Bourdon Vacuum Gauges. | 677 |
| Capsule Vacuum Gauges | 678 |
| Diaphragm Vacuum Gauge DIAVAC DV 1000 | 680 |
| Diaphragm Vacuum Gauge DIAVAC E | 682 |

Handheld Measurement Instruments

| | |
|-----------------------------------|-----|
| THERMOVAC Sensor TM 101 | 684 |
|-----------------------------------|-----|

Active Sensors / Transmitters

| | |
|--|-----|
| CERAVAC Transmitters CTR 100 and CTR 101 | 686 |
| THERMOVAC Transmitters TTR 91, TTR 91 S, TTR 96 S | 690 |
| THERMOVAC Transmitters with Fieldbus Interface Profibus or DeviceNet TTR 911 to TTR 916 PB | 694 |
| THERMOVAC Transmitters TTR 101, TTR 101 S2 | 698 |
| PENNINGVAC Transmitters PTR 225, PTR 225 S, PTR 237 | 702 |
| PENNINGVAC Transmitter PTR 90 | 706 |
| IONIVAC Transmitter ITR 90. | 710 |
| IONIVAC Transmitter ITR 200 S | 714 |
| Spiral Tube | 718 |

| | |
|---|------------|
| Connection Cables for Active Sensors | 720 |
|---|------------|

Operating Units for Active Sensors

| | |
|------------------------------|-----|
| DISPLAY ONE | 722 |
| DISPLAY TWO, THREE | 724 |
| CENTER ONE | 726 |
| CENTER TWO, THREE | 728 |

Ultra High Vacuum Operating Units and Passive Sensors

| | |
|--|-----|
| COMBIVAC CM 51, CM 52 | 730 |
| THERMOVAC Sensors TR 211, TR 211 NPT, TR 212, TR 216 | 734 |
| PENNINGVAC Sensors PR 25 to PR 28 | 736 |
| IONIVAC IM 540 | 738 |
| IONIVAC Sensors IE 414 and IE 514 | 742 |

Additional Sensors

| | |
|---|-----|
| Linear Pressure Sensors DI/DU 200, DI/DU 201, DI/DU 2000, DI/DU 2001, DI/DU 2001 rel. | 744 |
| Older Sensors / Replacement Sensors | 746 |

Pressure Switches and Control Instruments

Pressure Control System Move 750

Low Pressure Safety Switch PS 113 A 758

Pressure Switches PS 115 760

Switching Amplifier SV 110 762

Diaphragm Pressure Regulators MR 16 and MR 50. 764

Miscellaneous

Oerlikon Leybold Vacuum Calibration Service 766

VACVISION

Applications. 768

Products

Vacuum Controller **VACVISION** 770

Accessories for Vacuum Controller **VACVISION**. 772

Applications for Vacuum Gauges

| Gauges | BOURDONVAC A | BOURDONVAC C | Capsule vacuum gauge | DIAPAC DV 1000 | DIAPAC E | Handheld Measuring Instruments | CERAVAC transmitter CTR | CERAVAC transmitter CTR | CERAVAC transmitter CTR | IONIVAC transmitter CTR | IONIVAC IM 540 | Pressure switch PS 113 A | Pressure switch PS 115 | Diaphragm regulator MR |
|---|--------------|--------------|----------------------|----------------|----------|--------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|--------------------------|------------------------|------------------------|
| Mechanical engineering | | | | | | | | | | | | | | |
| Automotive industry; filling of brake and air conditioning systems | | | | | | | | | | | | | | |
| Vacuum conveying technology | | | | | | | | | | | | | | |
| Packaging technology | | | | | | | | | | | | | | |
| Isolation vacuum | | | | | | | | | | | | | | |
| Isolation vacuum | | | | | | | | | | | | | | |
| Absolute pressure measurements in gas mixtures | | | | | | | | | | | | | | |
| Drying and degassing processes | | | | | | | | | | | | | | |
| Solvent recovery | | | | | | | | | | | | | | |
| Vacuum pressure control in existing central vacuum supply systems | | | | | | | | | | | | | | |
| Electrics/electronics/optics | | | | | | | | | | | | | | |
| Evaporation and coating systems | | | | | | | | | | | | | | |
| Monitoring and controlling of sputter systems | | | | | | | | | | | | | | |
| Semiconductor technology (CVD, plasma etching etc.) | | | | | | | | | | | | | | |
| Ion implantation | | | | | | | | | | | | | | |
| Lamp production | | | | | | | | | | | | | | |
| Analytical instruments and surface physics | | | | | | | | | | | | | | |
| ESCA, SIMS, AES, XPS | | | | | | | | | | | | | | |
| Electron microscopy | | | | | | | | | | | | | | |
| Crystal growing | | | | | | | | | | | | | | |
| Gas analysis systems, mass spectrometers | | | | | | | | | | | | | | |
| Research | | | | | | | | | | | | | | |
| Measurement of ultimate pressure in UHV systems | | | | | | | | | | | | | | |
| Application in MBE systems | | | | | | | | | | | | | | |
| Application in MBE systems | | | | | | | | | | | | | | |
| Beam guidance systems, cyclotron | | | | | | | | | | | | | | |
| Fusion experiments | | | | | | | | | | | | | | |
| Space simulation chamber | | | | | | | | | | | | | | |
| System control/pressure control | | | | | | | | | | | | | | |
| Pressure checks on backing pumps and vacuum systems | | | | | | | | | | | | | | |
| Safety circuits in vacuum systems, protection of vacuum gate valves | | | | | | | | | | | | | | |
| Control of ionization vacuum gauges | | | | | | | | | | | | | | |
| Pressure measurements on HV pump systems, e.g. diffusion, TMP, cryopump systems | | | | | | | | | | | | | | |
| Venting systems | | | | | | | | | | | | | | |
| Valve control, pressure dependant systems control | | | | | | | | | | | | | | |
| Simple pressure control arrangements | | | | | | | | | | | | | | |
| Calibration | | | | | | | | | | | | | | |
| Calibration of vacuum gauges and mass spectrometers | | | | | | | | | | | | | | |
| Reference instruments for the determination of the physical properties of gases | | | | | | | | | | | | | | |
| Precision measurements of low pressures also, in the presence of corrosive or reactive gases, | | | | | | | | | | | | | | |
| Miscellaneous | | | | | | | | | | | | | | |
| Vacuum annealing, melting, soldering and hardening furnaces | | | | | | | | | | | | | | |
| Cooling and air conditioning technology | | | | | | | | | | | | | | |
| Electron beam welding | | | | | | | | | | | | | | |
| Metallurgy | | | | | | | | | | | | | | |

Select the Combination of Sensor and

Operating Ranges for Active Sensors

| mbar | 10 ⁻¹² | 10 ⁻¹¹ | 10 ⁻¹⁰ | 10 ⁻⁹ | 10 ⁻⁸ | 10 ⁻⁷ | 10 ⁻⁶ | 10 ⁻⁵ | 10 ⁻⁴ | 10 ⁻³ | 10 ⁻² | 10 ⁻¹ | 10 ⁰ | 10 ¹ | 10 ² | 10 ³ |
|--|-------------------|-------------------|-----------------------|----------------------|------------------|------------------|------------------|------------------|----------------------|------------------|----------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Capacitance Diaphragm | | | | | | | | | | | | | | | | |
| CERAVAC Transmitters (x = 2, 3, 4 or 5) ¹⁾ | | | | | | | | | | | | | | | | |
| CTR 100 | | | | | | | | | | | | 0.13 | | | 1330 | |
| CTR 100 | | | | | | | | | | | 0.013 | | | | 133 | |
| CTR 100 | | | | | | | | | | 0.0013 | | | | 13 | | |
| CTR 100 | | | | | | | | | 0.00013 | | | | 1.3 | | | |
| CTR 100 | | | | | | | | 0.000013 | | | 0.13 | | | | | |
| CTR 101 | | | | | | | | | | | | 0.13 | | | 1330 | |
| CTR 101 | | | | | | | | | | | 0.013 | | | | 133 | |
| CTR 101 | | | | | | | | | | 0.0013 | | | | 13 | | |
| CTR 101 | | | | | | | | | 0.00013 | | | | 1.3 | | | |
| CTR 101 | | | | | | | | 0.000013 | | | 0.13 | | | | | |
| Thermal Conductivity (according to Pirani) | | | | | | | | | | | | | | | | |
| THERMOVAC Transmitters ¹⁾ | | | | | | | | | | | | | | | | |
| TTR 101 (Pirani combined with capacitance diaphragm) | | | | | | | | | | 0.0005 | | | | | 1500 | |
| TTR 91 | | | | | | | | | | 0.0005 | | | | | 1000 | |
| TTR 96 S | | | | | | | | | | 0.0005 | | | | | 1000 | |
| TTR 911 | | | | | | | | | | 0.0005 | | | | | 1000 | |
| TTR 911 CC | | | | | | | | | | 0.0005 | | | | | 1000 | |
| TTR 916 | | | | | | | | | | 0.0005 | | | | | 1000 | |
| Cold Cathode Ionization (according to Penning) | | | | | | | | | | | | | | | | |
| PENNINGVAC Transmitters | | | | | | | | | | | | | | | | |
| PTR 225, DN 25 ISO-KF | | | | 1 x 10 ⁻⁹ | | | | | | 0.01 | | | | | | |
| PTR 237, DN 40 CF | | | | 1 x 10 ⁻⁹ | | | | | | 0.01 | | | | | | |
| PTR 90, DN 40 CF | | | | 5 x 10 ⁻⁹ | | | | | | | | | | | 1000 | |
| PTR 90, DN 40 ISO-KF | | | | 5 x 10 ⁻⁹ | | | | | | | | | | | 1000 | |
| PTR 90, DN 25 CF | | | | 5 x 10 ⁻⁹ | | | | | | | | | | | 1000 | |
| Hot Cathode Ionization | | | | | | | | | | | | | | | | |
| IONIVAC Transmitters (Bayard-Alpert combined with Pirani) ¹⁾ | | | | | | | | | | | | | | | | |
| ITR 90 | | | 5 x 10 ⁻¹⁰ | | | | | | | | | | | | 1000 | |
| ITR 200 with and without display | | | 5 x 10 ⁻¹⁰ | | | | | | | | | | | | 1000 | |
| Linear Pressure Sensors ¹⁾ | | | | | | | | | | | | | | | | |
| DI/DU 200 and 201 | | | | | | | | | | | | 0.1 | | | 200 | |
| DI/DU 2000 and 2001 | | | | | | | | | | | | | 1 | | 2000 | |
| DI/DU 2001 rel. | | | | | | | | | | | | | | -1000 | +1000 | |
| DI/VAC E | | | | | | | | | | | | | 1 | | +1000 | |
| Handheld Measurement Instruments | | | | | | | | | | | | | | | | |
| THERMOVAC Sensors | | | | | | | | | | | | | | | | |
| TM 90 | | | | | | | | | | | 1 x 10 ⁻² | | | | 1200 | |
| TM 101 | | | | | | | | | 5 x 10 ⁻⁴ | | | | | | 1200 | |
| mbar | 10 ⁻¹² | 10 ⁻¹¹ | 10 ⁻¹⁰ | 10 ⁻⁹ | 10 ⁻⁸ | 10 ⁻⁷ | 10 ⁻⁶ | 10 ⁻⁵ | 10 ⁻⁴ | 10 ⁻³ | 10 ⁻² | 10 ⁻¹ | 10 ⁰ | 10 ¹ | 10 ² | 10 ³ |

¹⁾ Different Part Numbers depend on the vacuum connection

Measuring,
controllingMeasuring,
controllingMeasuring,
controllingMeasuring,
controllingMeasuring,
controllingMeasuring,
controlling

Select the Combination of Sensor and

Operating Ranges for passive Sensors

| mbar | 10 ⁻¹² | 10 ⁻¹¹ | 10 ⁻¹⁰ | 10 ⁻⁹ | 10 ⁻⁸ | 10 ⁻⁷ | 10 ⁻⁶ | 10 ⁻⁵ | 10 ⁻⁴ | 10 ⁻³ | 10 ⁻² | 10 ⁻¹ | 10 ⁰ | 10 ¹ | 10 ² | 10 ³ |
|--|-------------------|-----------------------|-------------------|-----------------------|----------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Thermal Conductivity (according to Pirani) | | | | | | | | | | | | | | | | |
| THERMOVAC Sensors ¹⁾ | | | | | | | | | | | | | | | | |
| TR 211 | | | | | | | | | | 0.0005 | | | | | | 1000 |
| TR 211 NPT | | | | | | | | | | 0.0005 | | | | | | 1000 |
| TR 212 | | | | | | | | | | 0.0005 | | | | | | 1000 |
| TR 216 | | | | | | | | | | 0.0005 | | | | | | 1000 |
| Cold Cathode Ionization (according to Penning) | | | | | | | | | | | | | | | | |
| PENNINGVAC Sensors | | | | | | | | | | | | | | | | |
| PR 25 | | | | | 1 x 10 ⁻⁹ | | | | | 0.01 | | | | | | |
| PR 26 | | | | | 1 x 10 ⁻⁹ | | | | | 0.01 | | | | | | |
| PR 27 | | | | | 1 x 10 ⁻⁹ | | | | | 0.01 | | | | | | |
| PR 28 | | | | | 1 x 10 ⁻⁹ | | | | | 0.01 | | | | | | |
| IONIVAC Sensors | | | | | | | | | | | | | | | | |
| IE 414 (Bayard-Alpert) | | | | 2 x 10 ⁻¹¹ | | | | | | 0.01 | | | | | | |
| IE 514 (Extractor) | | 1 x 10 ⁻¹² | | | | | | | 0.0001 | | | | | | | |
| mbar | 10 ⁻¹² | 10 ⁻¹¹ | 10 ⁻¹⁰ | 10 ⁻⁹ | 10 ⁻⁸ | 10 ⁻⁷ | 10 ⁻⁶ | 10 ⁻⁵ | 10 ⁻⁴ | 10 ⁻³ | 10 ⁻² | 10 ⁻¹ | 10 ⁰ | 10 ¹ | 10 ² | 10 ³ |

¹⁾ Differences of the sensors in the same operating range caused by the materials in contact with the medium

Gauges which is ideal for your Application

Operating Units for passive Sensors

| | IONIVAC IM 540 | COMBIVAC | | | | | |
|-------------------|-------------------|----------|---------|--|--|--|--|
| | | CM 51 | CM 52 | | | | |
| Part No. EURO | 230 100 | - | - | | | | |
| Part No. US | 230 100 | - | - | | | | |
| Part No. RS 232 | - | 230 110 | 230 115 | | | | |
| Part No. Profibus | - | 230 111 | 230 116 | | | | |
| | | | | | | | |
| | | | | | | | |
| | | 1, 2 | 1, 2 | | | | |
| | | 1, 2 | 1, 2 | | | | |
| | | 1, 2 | 1, 2 | | | | |
| | | 1, 2 | 1, 2 | | | | |
| | | | | | | | |
| | | | | | | | |
| | | 3 | | | | | |
| | | 3 | | | | | |
| | | 3 | | | | | |
| | | 3 | | | | | |
| | | | | | | | |
| | 1, 2 | 3 | 3 | | | | |
| | 1, 2 | 3 | 3 | | | | |

1, 2, 3 indicate the channel to which the sensor may be connected

Basic Terms of Vacuum Metrology

Today, the total range of vacuum pressure accessible to measurement extends from atmospheric pressure (about 1000 mbar (750 Torr)) down to 10^{-12} mbar/Torr, i.e. it extends over 15 powers of ten. The instruments used for measuring the pressure within this wide range are called vacuum gauges. For physical reasons it is not possible to create a single vacuum sensor through which it might be possible to perform quantitative measurements within the entire pressure range. Therefore, a variety of different vacuum gauges are available, each with their own characteristic measurement range which commonly extends over several powers of ten. A difference is made between direct and indirect pressure measurements. In the case of direct (or absolute) pressure measurements, the readings obtained through the vacuum gauge are independent of the type of gas and the pressure which is to be measured. Common are so-called mechanical vacuum gauges where the pressure is determined directly by recording the force acting on the surface of a diaphragm. In the case of so-called indirect pressure measurements the pressure is determined as a function of a pressure dependant property of the gas (thermal conductivity, ionization probability, for example). These properties do not only depend on the pressure, but also on the molar mass of the gases. For this reason, the pressure readings obtained through vacuum gauges which rely on indirect pressure measurements, depend on the type of gas. The readings usually relate to air or nitrogen as the measurement gas. For the measurement of other vapors or gases the corresponding correction factors must be applied.

Vacuum Gauges where the Pressure Readings are Independent of the Type of Gas (Mechanical Vacuum Gauges)

BOURDON Vacuum Gauge

The inside of a tube which is bent into a circular arc (the so-called Bourdon tube) is connected to the vacuum system. Due to the effect of the external atmospheric pressure, the end of the tube bends more or less during the evacuation process. This actuates the pointer arrangement which is attached to this point. The corresponding pressure can be read off on a linear scale. With Bourdon gauges it is possible to roughly determine pressures between 10 mbar (7.5 Torr) and atmospheric pressure.

Capsule Vacuum Gauge

This vacuum gauge contains a hermetically sealed, evacuated, thinwalled diaphragm capsule which is located within the instrument. As the vacuum pressure reduces, the capsule bulges. This movement is transferred via a system of levers to a pointer and can then be read off as the pressure on a linear scale.

Diaphragm Vacuum Gauge

In the case of the diaphragm vacuum gauge which is capable of absolute pressure measurements, a sealed and evacuated vacuum chamber is separated by a diaphragm from the vacuum pressure to be measured. This serves as the reference quantity.

With increasing evacuation, the difference between the pressure which is to be measured and the pressure within the reference chamber becomes less, causing the diaphragm flex. This flexure may be transferred by mechanical means like a lever, for example, to a pointer and scale, or electrically by means of a strain gauge or a bending bar for conversion into an electrical measurement signal. The measurement range of such diaphragm vacuum gauges extends from 1 mbar (0.75 Torr) to over 2000 mbar (1500 Torr).

Capacitance Vacuum Gauge

The pressure sensitive diaphragm of these capacitive absolute pressure sensors is made of Al_2O_3 ceramics. The term "capacitive measurement" means that a plate capacitor is created by the diaphragm with a fixed electrode behind the diaphragm. When the distance between the two plates of this capacitor changes, a change in capacitance will result. This change, which is proportional to the pressure, is then converted into a corresponding electrical measurement signal. Here too, an evacuated reference chamber serves as the reference for the pressure measurements. With capacitance gauges it is possible to accurately measure pressures from 10^{-5} mbar/Torr to well above atmospheric pressure, whereby different capacitance gauges having diaphragms of different thickness (and therefore sensitivity) will have to be used.

Vacuum Gauges where the Pressure Readings depend of the Type of Gas

Thermal Conductivity Gauge (Pirani)

This measurement principle utilizes the thermal conductivity of gases for the purpose of pressure measurements in the range from 10^{-4} mbar/Torr to atmospheric pressure. Today, only the principle of the controlled Pirani gauge is used by Oerlikon Leybold Vacuum in order to attain a quick response. The filament within the gauge head forms one arm of a Wheatstone bridge. The heating voltage which is applied to the bridge is controlled in such a way, that the filament resistance and thus the temperature of the filament remains constant regardless of the quantity of heat given off by the filament. Since the heat transfer from the filament to the gas increases with increasing pressures, the voltage across the bridge is a measure of the pressure.

Improvements with regard to temperature compensation have resulted in stable pressure readings also in the face of large temperature changes, in particular when measuring low pressures.

Cold Cathode Ionization Vacuum Gauge (Penning)

Here the pressure is measured through a gas discharge within a gauge head whereby the gas discharge is ignited by applying a high tension. The resulting ion current is output as a signal which is proportional to the prevailing pressure. The gas discharge is maintained also at low pressures with the aid of a magnet.

New concepts for the design of such sensors permit safe and reliable operation of these so-called Penning sensors in the pressure range from 10^{-2} to 1×10^{-9} mbar/Torr.

Cold Cathode Ionization Vacuum Gauge (Penning)

These sensors commonly use three electrodes. A hot cathode emits electrons which impinge on an anode. The gas, the pressure of which is to be measured, is thus ionized. The resulting positive ion current is detected through the third electrode - the so-called ion detector - and this current is used as the signal which is proportional to the pressure.

The hot cathode sensors which are mostly used today, are based on the Bayard-Alpert principle. With this electrode arrangement it is possible to make measurements in the pressure range from 10^{-10} to 10^{-2} mbar/Torr.

Other electrode arrangements permit access to a higher range of pressures from 10^{-1} mbar/Torr down to 10^{-10} mbar/Torr. For the measurement of pressures below 10^{-10} mbar/Torr so-called extractor ionization sensors after Redhead are employed. In extractor ionization gauges the created ions are focused onto a very thin and short ion detector. Due to the geometrical arrangement of this system, interfering influences such as X-ray effects and ion desorption can be almost completely eliminated. The extractor ionization gauge permits pressure measurements in the range from 10^{-4} to 10^{-12} mbar/Torr.

Selection of the right Vacuum Gauge

When selecting a suitable instrument for pressure measurements, the pressure range is not the only criteria. The operating conditions for the instrument play an important part. If, for example, there is the risk of excessive contamination, vibrations, or if air inrushes are to be expected etc., the instrument must be rugged enough. Thus for industrial applications diaphragm gauges, controlled thermal conductivity gauges as well as cold cathode ionization gauges after Penning are strongly recommended. Precision instruments are very often quite sensitive to rough operating conditions. These should therefore only be used while observing the corresponding applications information.

Connection Accessories for Small Flanges

Ordering Information

DN 10 ISO-KF

DN 16 ISO-KF

DN 25 ISO-KF

| | Part No. | Part No. | Part No. |
|--|---------------|---------------|----------------|
| Outer centering ring with O-ring Aluminum / FPM (FKM) ((Viton)) | 183 53 | 183 53 | 183 54 |
| Fine filter on centering ring with O-ring Stainless steel / FPM (FKM) ((Viton)) | 883 95 | 883 96 | 883 97 |
| Baffle with centering ring (FPM) ((FKM)) | – | – | 230 078 |
| Connection accessories for metal seals or bake out room up to 150 °C | | | |
| Ultra sealing ring, aluminum (Set of 3) | 883 73 | 883 73 | 883 75 |
| Outer support ring | 883 74 | 883 74 | 883 76 |
| Clamping ring | 882 75 | 882 75 | 882 77 |

Ordering Information

DN 40 ISO-KF

DN 16 CF

DN 40 CF

| | Part No. | Part No. | Part No. |
|--|-------------------|---------------|---------------|
| Outer centering ring with O-ring Aluminum / FPM (FKM) ((Viton)) | 183 55 | – | – |
| Fine filter on centering ring with O-ring Stainless steel / FPM (FKM) ((Viton)) | 883 98 | – | – |
| Baffle with centering ring (FPM) ((FKM)) | 230 079 | – | – |
| Connection accessories for metal seals or bake out room up to 150 °C | | | |
| Ultra sealing ring, aluminum (Set of 3) | 883 77 | – | – |
| Outer support ring | 883 78 | – | – |
| Clamping ring | 882 78 | – | – |
| Connection accessories for CF connections | | | |
| Copper seals, (set of 10 pieces) | – | 839 41 | 839 43 |
| Screw (set of 25 pieces) | – | 839 00 | 839 01 |
| Replacement sinter filter with centering ring | 231 93 515 | – | – |

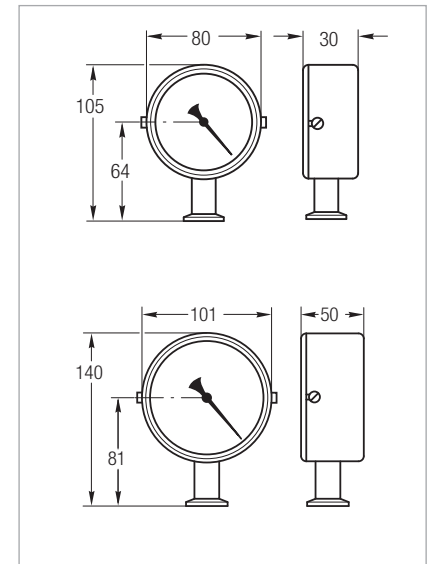
Products

Mechanical Gauges

Bourdon Vacuum Gauges



Rugged relative pressure vacuum gauges based on the Bourdon principle covering the pressure range from 1 to 1020 mbar (0.75 to 765 Torr).



Dimensional drawing for the BOURDONVAC A (top) and the BOURDONVAC C (bottom)

Advantages to the User

- Highly reliable, rugged, insensitive to vibrations
- Linear readout, independent of the type of gas
- Excellent media compatibility owing to the stainless steel movement (BOURDONVAC C)
- IP 54 protection (BOURDONVAC C)

Typical Applications

- Vacuum distillation
- Drying processes
- Vacuum conveying systems

Technical Data

BOURDONVAC A

BOURDONVAC C

| | | | |
|--------------------------------------|-------------|---|-------------------------|
| Measurement range | mbar (Torr) | 1 to 1020 (0.75 to 765) | 1 to 1020 (0.75 to 765) |
| Measurement uncertainty | % FS | 1 | 1 |
| Class 1 (EN 837) | % FS | 1 | 1 |
| Overload range (abs. briefly) | bar | 1.5 | 1.3 |
| Storage temperature range | °C | -25 to +60 | -25 to +60 |
| Nominal temperature range | °C | +10 to +60 | +10 to +100 (max.) |
| Flange connection | DN | 16 ISO-KF | 16 ISO-KF |
| Length of scale | mm | 207 | 188 |
| Diameter | mm | 80 | 101 |
| Overall height | mm | 105 | 140 |
| Weight | kg (lbs) | 0.25 (0.55) | 0.5 (1.10) |
| Leak tightness | mbar x l/s | 1×10^{-8} | 1×10^{-8} |
| Materials in contact with the medium | | Nickel plated standard steel, bronze, soft solder | Stainless steel 1.4404 |

Ordering Information

BOURDONVAC A

BOURDONVAC C

| | Part No. | Part No. |
|----------------------|----------|----------|
| Bourdon vacuum gauge | 160 40 | 161 20 |

Capsule Vacuum Gauges



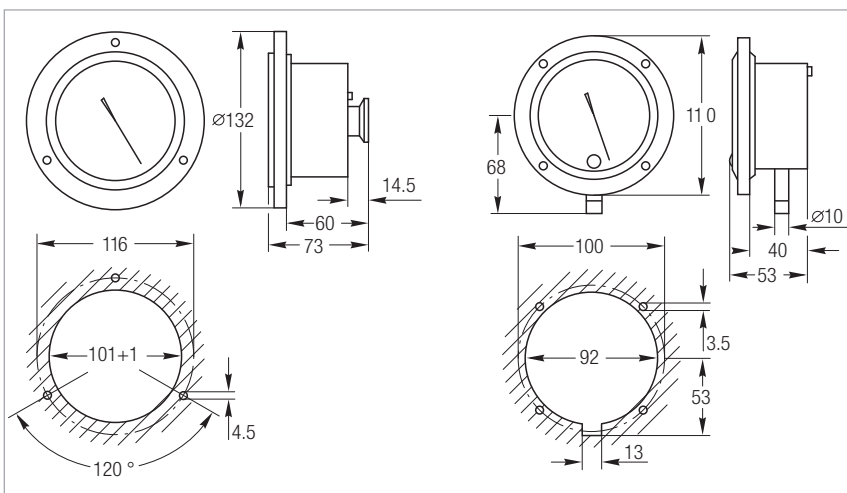
Rugged absolute pressure gauges for the pressure range from 1 to 1000 mbar (0.75 to 750 Torr).

Advantages to the User

- Rugged and insensitive to vibrations
- Models available for two measurement ranges (1 to 100 mbar (0.75 to 75 Torr) and 1 to 1000 mbar (0.75 to 750 Torr))
- Readout independent of the type of gas and changes in atmospheric pressure
- Linear pressure readout
- Installation direct via the connection flange or panel mounting
- Model with integrated isolation valve for use on packaging machines (Part No. 160 68)

Typical Applications

- Measurement of absolute pressures (for inert gases only)
- Vacuum conveying systems
- Operation monitoring
- Packaging



Dimensional drawings for the capsule vacuum gauges
Part Nos. 160 63/64 (left) and Part No. 160 68 (right)

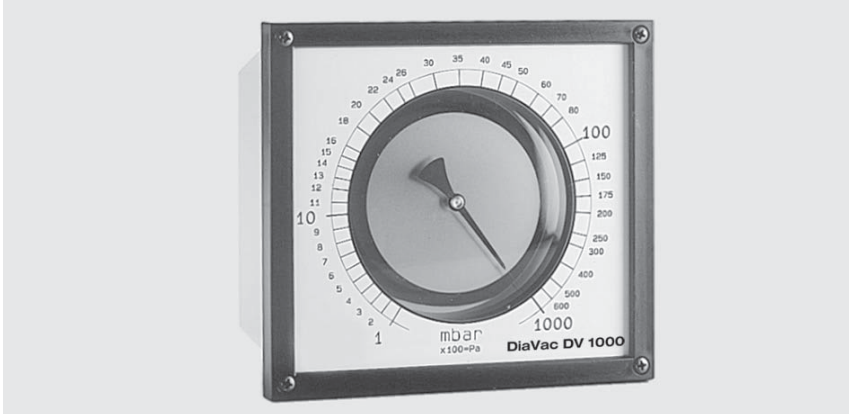
Technical Data**Capsule Vacuum Gauge**

| | | | | |
|--------------------------------------|-----------------|--|--|--|
| Measurement range | mbar (Torr) | 1 to 100 (0.75 to 75) | 1 to 100 (0.75 to 75) | 1 to 1000 (0.75 to 750) |
| Measurement uncertainty | % FS | 1.0 | 2.5 | 1.6 |
| Overload range (abs. briefly) | bar | 1.5 | 1.5 | 1.5 |
| Storage temperature range | °C | -25 to +60 | -25 to +60 | -25 to +60 |
| Nominal temperature range | °C | +10 to +50 | +10 to +50 | +10 to +50 |
| Length of scale | mm | 205 | 180 | 205 |
| Dead volume, approx. | cm ³ | 235 | 167 | 235 |
| Diameter | mm | 132 | 110 | 132 |
| Weight | kg (lbs) | 0.7 (1.54) | 0.6 (1.32) | 0.7 (1.54) |
| Vacuum connection | DN | 16 ISO-KF | 10 mm dia. hose nozzle with integrated isolation valve | 16 ISO-KF |
| Max. inclination when installed | | 45° | 45° | 45° |
| Materials in contact with the medium | | Brass Standard steel nickel plated Glass NBR Aluminum Copper beryllium Soft and hard solder Resin | Brass Standard steel nickel plated Glass NBR Aluminum Copper beryllium Soft and hard solder Resin | Brass Standard steel nickel plated Glass NBR Aluminum Copper beryllium Soft and hard solder Resin |

Ordering Information**Capsule Vacuum Gauge**

| | Part No. | Part No. | Part No. |
|----------------------|---------------|---------------|---------------|
| Capsule vacuum gauge | 160 63 | 160 68 | 160 64 |

Diaphragm Vacuum Gauge DIAVAC DV 1000



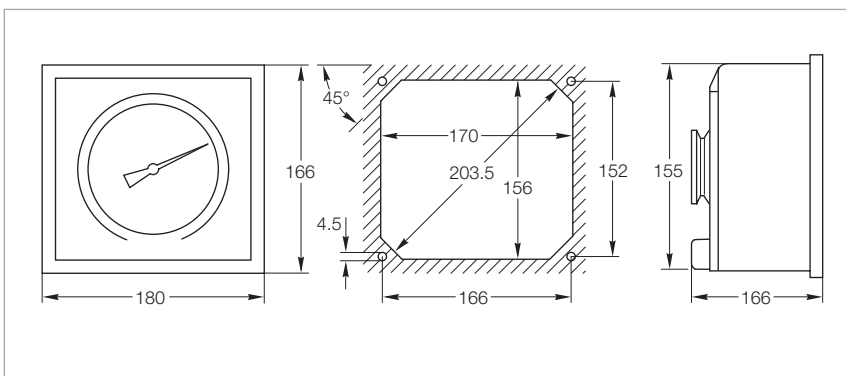
Rugged mechanical diaphragm vacuum gauge of high accuracy for the rough vacuum range from 1 to 1000 mbar (1 to 750 Torr).

Advantages to the User

- Wide measurement range from 1 to 1000 mbar (1 to 750 Torr) with high resolution in the range from 1 to 100 mbar (1 to 75 Torr)
- The scale of each gauge is individually calibrated
- Absolute pressure gauge
- Readout independent of the type of gas and changes in atmospheric pressure
- Stainless steel diaphragm for excellent compatibility with most media
- Laser welding technology for high precision diaphragm mount
- Rugged table-top housing, can be freely mounted above the flange connection; also for panel mounting
- Measurement chamber can be easily cleaned owing to the detachable measurement flange

Typical Applications

- Chemical processes
- Vacuum distillation
- Absolute pressure measurements for gas mixtures
- For use in explosion hazard rated areas
- Drying processes
- Lamp manufacture



Dimensional drawing and panel cut-out for the DIAVAC DV 1000

Technical Data**DIAVAC DV 1000**

| | | |
|--------------------------------------|-----------------|---|
| Measurement range | mbar (Torr) | 1 to 1000 (1 to 750) |
| Measurement uncertainty | | |
| 1 - 10 mbar (1.0 - 7.5 Torr) | | ±1 mbar (Torr) |
| 10 - 1000 mbar (7.5 - 750 Torr) | | ± 10% of meas. value |
| Storage temperature range | °C | -10 to +60 |
| Nominal temperature range | °C | 0 to +60 |
| Permissible overload (abs.) | bar | 3 |
| Length of scale | mm | 270 |
| Dead volume | cm ³ | 130 |
| Vacuum connection | DN | 40 ISO-KF |
| Dimension (W x H x D) | mm | 180 x 166 x 100 |
| Weight | kg (lbs) | 2.7 (5.95) |
| Materials in contact with the medium | | Stainless steel 1.4301, 1.4310 (diaphragm), FPM (FKM) |

Ordering Information**DIAVAC DV 1000**

| | Part No. |
|--|-----------------------------|
| DIAVAC DV 1000 | |
| mbar readout | 160 67 ¹⁾ |
| Torr readout | 896 06 ¹⁾ |
| DAkS calibration | 157 12 |
| Replacement sinter filter with centering ring, DN 40 ISO-KF | 231 93 515 |
| Replacement housing, complete | 240 000 |

¹⁾ Complete with centering ring and sintered filter

Diaphragm Vacuum Gauge DIAVAC E



The DIAVAC E is a fully electronic, versatile vacuum gauge for the measuring range from atmospheric pressure to 1 mbar/Torr.

The DIAVAC E has an integrated vacuum sensor made of alumina ceramic with outstanding corrosion resistance and superior long-term stability. A particular advantage is its cordless, battery-powered operation. Its simple operation and the combined digital/analog vacuum reading for precise

readout and quick trend detection, respectively, make the DIAVAC E very versatile.

Advantages to the User

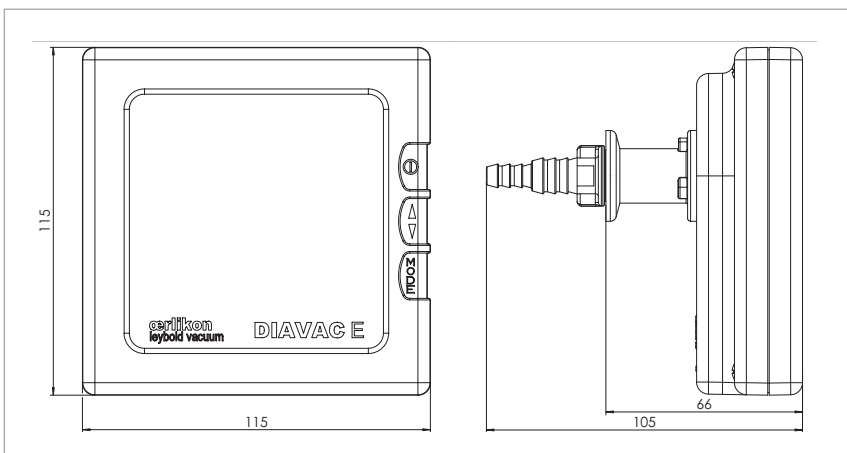
- High electromagnetic compatibility: Low emission level near detection limit, high degree of immunity to electromagnetic interference for use in industrial environments
- Large analog and digital vacuum display: Quick trend detection, precise readout
- User-selectable pressure units (mbar, hPa, Torr)
- Digital readjustment
- Capacitive alumina ceramic diaphragm vacuum sensor with excellent chemical resistance, accuracy and long term stability

Typical Applications

- Chemical process engineering
- Commissioning of vacuum systems
- Inspection and maintenance of vacuum pumps and systems

Supplied Equipment

Vacuum gauge complete with integrated vacuum sensor and battery, ready for use, with manual.



Dimensional drawing for the DIAVAC E

Technical Data

DIAVAC E

| | | |
|---------------------------|-------------|---|
| Measurement range | mbar (Torr) | 1 (1) to 1080 (810) |
| Measurement uncertainty | | < ±1 mbar/hPa/Torr / ±1 digit (after alignment, constant temperature) |
| Temperature dependence | | < 0.07 mbar/hPa / 0.05 Torr/K |
| Measurement cycle | | Selectable: automatically or 1x per 3s, 1x per 1s, 3x per 1s |
| Automatic switch off | | Selectable: 1-1000 min (factory default 15 min) or continuous operation |
| Storage temperature range | °C | -10 to +60 |
| Nominal temperature range | °C | +10 to +40 |
| Maximum media temperature | | |
| continuous operation | °C | +40 |
| short operation | °C | +80 |
| Power supply | | 9 V lithium battery, 1.2 Ah Ultra-life U9VL |
| Battery life | | |
| typical | h | 8.000 |
| standby | h | 40.000 |
| Protection class | | IP 40 |
| Dimension (W x H x D) | mm | 115 x 115 x 66 |
| Weight | kg (lbs) | 9 V lithium battery, 1.2 Ah Ultra-life U9VL5 |

Measuring,
controlling

Ordering Information

DIAVAC E

| | Part No. |
|--|------------------|
| DIAVAC E Ready for operation with pressure sensor and battery, including Operating Instructions | 245008V01 |
| Rubber vacuum tubing for DN 10 mm 1000 mm, caoutchouc | 172 02 |
| Rubber vacuum tubing for DN 16 ISO-KF 1000 mm | 172 03 |
| DAkkS calibration | 157 12 |
| Factory calibration | 157 22 |

Handheld Measuring Instruments

Digital THERMOVAC Sensor TM 101

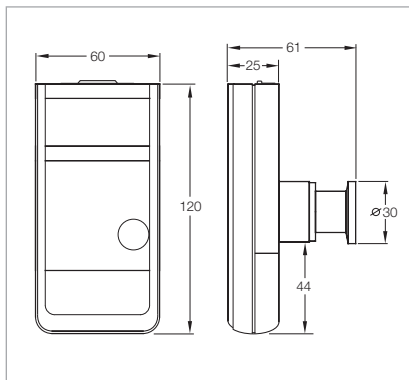


The digital compact THERMOVAC TM 101 combines high-quality sensor technology with modern process technology in a handy design.

The THERMOVAC TM 101 can operate optionally as a datalogger saving the pressure data during the measurement. Of course a subsequent simple transfer to a PC is possible via a USB.

The fully electronic THERMOVAC TM 101 is capable of measuring pressures within the pressure range of 1200 to 5×10^{-4} mbar (900 to 3.75×10^{-4} Torr) (7 decades).

By combining a piezo-resistive pressure sensor for the upper and a Pirani sensor for the lower pressure range, the measurements made by the THERMOVAC TM 101 are independent of the type of gas above pressures of 15 mbar (11.25 Torr). Especially noteworthy is the exceptionally long battery life.



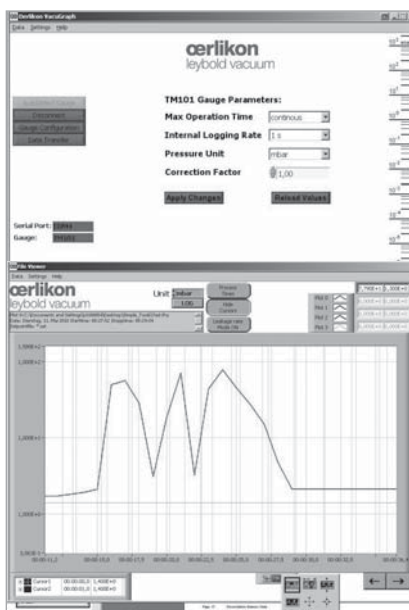
Dimensional drawings for the THERMOVAC TM 101

Advantages to the User

- Utilization is directly possible in a vacuum
- Measurement range 1200 to 5×10^{-4} mbar (7 decades)
- Adjustable gas type correction factor
- Pressure measurements above 15 mbar (11.25 Torr) are independent of the type of gas
- Pressure unit of measurement selectable between mbar, Torr and Pascal
- Large 4 digit 7 segment display
- Cordless power supply through a standard 9 V battery
- Data logging function with USB interface and internal memory for up to 2000 measured values
- Minimum and maximum memory function
- Online measurements via USB are possible
- Measurement data can be exported by way of ASCII text to Microsoft Excel, for example
- Protection class IP 40

Typical Applications

- Mobile pressure measurements of all kinds
- Checking and setting up of vacuum systems
- Ensuring operation and quality of vacuum pumps
- Maintenance and service
- Graphic representation of pump-down curves
- Coating systems
- Pressure measurements
 - on evaporators and vacuum melting furnaces
 - in chemical process engineering
 - on refrigerating and air-conditioning systems before filling in the refrigerant
 - during the production of gas filled pressurised lamps, respectively refilling
- Leak tests



Windows Software VacuGraph

Technical Data**THERMOVAC Sensor****TM 101**

| | | |
|---|--|--|
| Measurement principle | Piezo-resistive (gas-type independent) and thermal conductance Pirani | |
| Indicated units of measurement | mbar, Torr, microns, Pa | |
| Measurement range | mbar (Torr) | 1200 to 5×10^{-4} (900 to 3.75×10^{-4}) |
| Maximum overload | bar abs. | 2 |
| Accuracy | | |
| 1200 to 10 mbar (900 to 75 Torr) | % | ± 0.3 of full-scale |
| 10 to 2×10^{-3} mbar (7.5 to 1.5×10^{-3} Torr) | approx. % | 10 of measured value |
| $< 2 \times 10^{-3}$ mbar ($< 1.5 \times 10^{-3}$ Torr) | approx. % | < factor 2 |
| Materials in contact with the vacuum | Stainless steel, gold, tungsten, nickel, glass, Viton | |
| Measurement cycle | s | 1.6 |
| Data storing rate | s | 1 to 999 |
| Operating temperature | | |
| TM 101 | °C | +5 to +50 |
| Battery | °C | -20 to +45 |
| Storage temperature | | |
| TM 101 | °C | -20 to +60 |
| Battery | °C | +10 to +25 |
| Supply voltage | Rechargeable 9 V battery (recommendation: type Panasonic 6LR61PM, 9 V / 500 mAh) or 12 V AC adaptor (miniature jack, + terminal at the tip) | |
| Power consumption | | |
| < 200 mbar (< 150 Torr) | mW | 60 |
| > 200 mbar (> 150 Torr) | mW | 0.5 |
| Operating duration | | |
| 6LR61 alkaline (vacuum operation) | h | up to 75 |
| Display | LCD 12 mm | |
| Connection (stainless steel) | DN | 16 ISO-KF |
| PC interface | Mini USB-B connector | |
| Dimensions (without flange) | mm | 60 x 120 x 61 |
| Protection class | IP | 40 |
| Weight (including battery) | kg (lbs) | 0.23 (0.51) |

Ordering Information**THERMOVAC Sensor****TM 101**

| | Part No. |
|--|--------------------|
| TM 101, DN 16 ISO-KF Including AIMn battery, 9 V block 6LR 61 | 230 081 V01 |
| Accessory kit for VacuGraph Windows software including USB interface cable (2 m) protection case with foam insert and 15 V wall power supply for 100 - 260 V, 50/60 Hz mains and AIMn battery, 9 V block 6LR 61 | 230 082 V01 |

Active Sensors

CERAVAC Transmitters CTR 100 and CTR 101



The CERAVAC Transmitter with its diaphragm made of pure aluminium oxide ceramics offers excellent accuracy and reproducibility.

Advantages to the User

- Excellent accuracy
- Corrosion resistant
- High resolution
- Very good temperature stability
- Electrically and mechanically compatible with the conventional capacitance manometers with stainless steel diaphragm
- Heated and unheated types are available
- RS 232 C interface

Typical Applications

- Excellent accuracy
- Corrosion resistant
- High resolution
- Very good temperature stability
- Electrically and mechanically compatible with the conventional capacitance manometers with stainless steel diaphragm
- Heated and unheated types are available
- RS 232 C interface

The Ceramics Diaphragm

The stiffness of aluminium oxide ceramics is greater than that of metal so that the ceramics material offer improved long term stability characteristics when exposed to frequent pressure changes or overpressures. The aluminum oxide ceramics diaphragm of the CERAVAC sensors is capable of returning precisely to its initial position with respect to a certain pressure so that the measurements will be highly reproducible.

Since the diaphragm is not impaired by overpressures or frequent pressure changes, no blocking valves will be required – a significant contribution towards reducing costs.

Moreover, aluminium oxide ceramics diaphragms return faster to their initial position compared to metal diaphragms; the time need between the processes for the measurement to stabilise is reduced. This is particularly important in the case of measurements close to zero where metal diaphragms

take several minutes to return to their rest position.

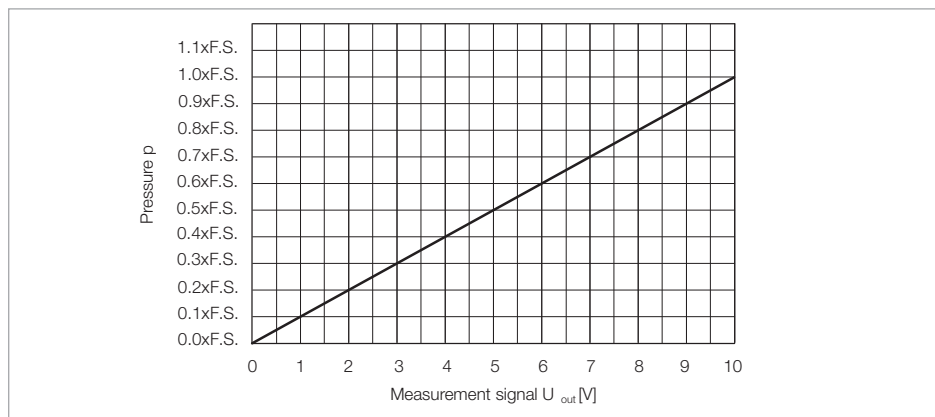
Whereas metal diaphragms suffer from residual tensions and unavoidable irregularities due to their production process, diaphragms made of aluminium oxide ceramics are exceptionally homogeneous, and owing to the firing process at 2500 °C entirely free of tensions. This considerably reduces part to part variations in the sensors.

Technical Data

CERAVAC Transmitter

CTR 100 (Temperature Compensated)

| | | |
|--------------------------------------|--|---|
| Full scale (FS) / Measurement range | 0.1 Torr / 1×10^{-5} - 0.1 Torr 1 Torr / 1×10^{-4} - 1 Torr Pressure Units: 1 Torr = 1.33 mbar = 133 Pascal | 10 Torr / 1×10^{-3} - 10 Torr 100 Torr / 0.01 - 100 Torr 1000 Torr / 0.1 - 1000 Torr Pressure Units: 1 Torr = 1.33 mbar = 133 Pascal |
| Materials in contact with the medium | Ceramic (Al ₂ O ₃), stainless steel 316, Vacon 70 | Ceramic (Al ₂ O ₃), stainless steel 316, Vacon 70 |
| Max. overrange pressure | 2000 Torr for 1/10/100 Torr sensors, 3000 Torr for 1000 Torr sensors | 2000 Torr for 1/10/100 Torr sensors, 3000 Torr for 1000 Torr sensors |
| Measurement uncertainty | 0.2% of reading ± temperature effect | 0.2% of reading ± temperature effect |
| Resolution | 0.003% of Full scale for 0.1/1 Torr sensors. | 0.003% of Full scale for 10/100/1000 Torr sensors |
| Temperature effects | | |
| Zero coefficient | %/°C | |
| Span coefficient | %/°C | |
| Response time | ms | |
| Nominal temperature range | °C | |
| Supply voltage | V DC | |
| Power consumption | W | |
| Signal output | V | |
| Interface | | |
| Weight, approx. | kg (lbs) | |
| Dead volume | cm ³ | |
| Connection cable | | |
| Calibration | | |



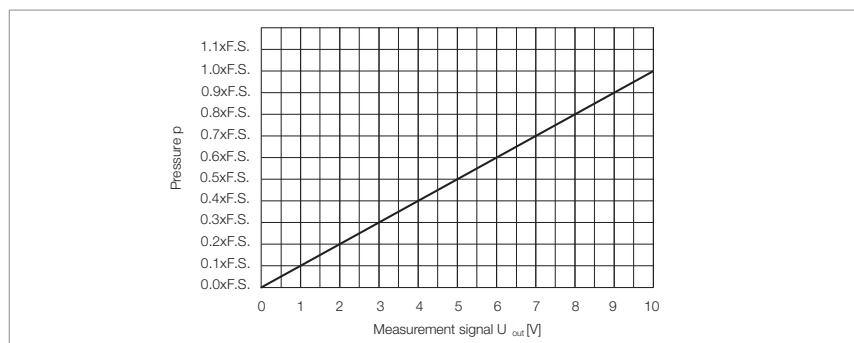
Characteristic of the CERAVAC Transmitter CTR 101

Technical Data

CERAVAC Transmitter

CTR 101 (45 °C heated)

| | | |
|--------------------------------------|--|---|
| Full scale (FS) / Measurement range | 0.1 Torr / 1×10^{-5} - 0.1 Torr Pressure Units: 1 Torr = 1.33 mbar = 133 Pascal | 1 Torr / 1×10^{-4} - 1 Torr 10 Torr / 1×10^{-3} - 10 Torr 100 Torr / 0,01 - 100 Torr 1000 Torr / 0,1 - 1000 Torr Pressure Units: 1 Torr = 1.33 mbar = 133 Pascal |
| Materials in contact with the medium | Ceramic (Al_2O_3), stainless steel 316, Vacon 70 | Ceramic (Al_2O_3), stainless steel 316, Vacon 70 |
| Max. overrange pressure | 1000 Torr for 0.1 Torr sensors | 2000 Torr for 1/10/100 Torr sensors, 3000 Torr for 1000 Torr sensors |
| Measurement uncertainty | 0.2% of reading \pm temperature effect | 0.15% of reading \pm temperature effect |
| Resolution | 0.0025% of Full scale for 0.1 Torr sensors | 0.0025% of Full scale for 1 Torr sensors 0.0015% of Full scale for 10/100/1000 Torr sensors |
| Temperature effects | | |
| Zero coefficient | %/°C | 0.005 of Full scale |
| Span coefficient | %/°C | 0.01 of reading |
| Rating | ms | ≤ 30 |
| Nominal temperature range | °C | +15 to +40 |
| Supply voltage | V DC | either ± 15 or +24 |
| Power consumption | W | ≤ 19 |
| Signal output | V | 0 - 10; linear |
| Weight, approx. | kg (lbs) | 0.89 (1.97) |
| Dead volume | cm ³ | 6 |
| Connection cable | see chapter "Products", para. "Connection Cable for Active Sensors" | see chapter "Products", para. "Connection Cable for Active Sensors" |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |



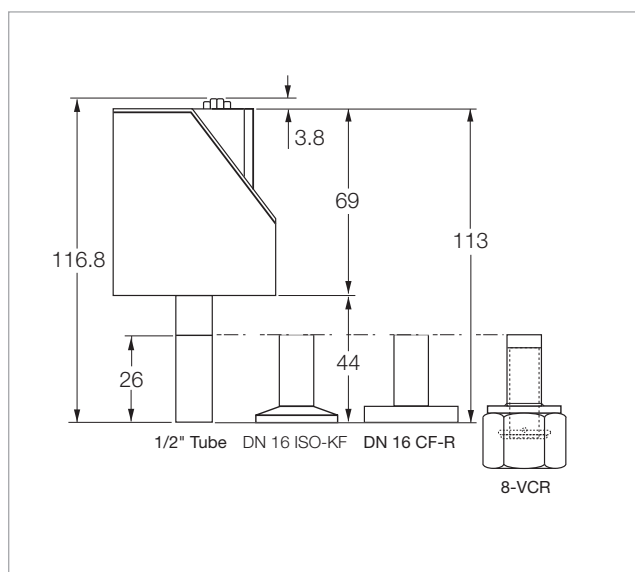
Characteristic of the THERMOVAC Transmitter CTR 101

Ordering Information

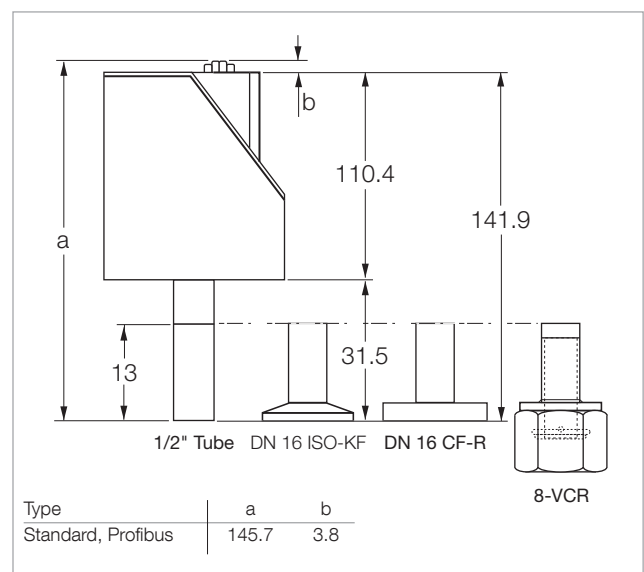
CERAVAC Transmitter

| | CTR 100 | CTR 101 |
|--------------|--|--|
| | Part No. | Part No. |
| DN 16 ISO-KF | | |
| 1000 Torr | 230 300 | 230 320 |
| 100 Torr | 230 301 | 230 321 |
| 20 Torr | 230 340 V01 | - |
| 10 Torr | 230 302 | 230 322 |
| 1 Torr | 230 303 | 230 323 |
| 0.1 Torr | 230 304 V01 | 230 324 |
| DN 16 CF-R | | |
| 1000 Torr | 230 305 | 230 325 |
| 100 Torr | 230 306 | 230 326 |
| 10 Torr | 230 307 | 230 327 |
| 1 Torr | 230 308 | 230 328 |
| 0.1 Torr | 230 309 V01 | 230 329 |
| Cajon 8-VCR | | |
| 1000 Torr | 230 310 | 230 330 |
| 100 Torr | 230 311 | 230 331 |
| 10 Torr | 230 312 | 230 332 |
| 1 Torr | 230 313 | 230 333 |
| 0.1 Torr | 230 314 V01 | 230 334 |
| 1/2" Tube | | |
| 1000 Torr | 230 315 | 230 335 |
| 100 Torr | 230 316 | 230 336 |
| 10 Torr | 230 317 | 230 337 |
| 1 Torr | 230 318 | 230 338 |
| 0.1 Torr | 230 319 V01 | 230 339 |
| Accessories | The installation of a spiral tube is recommended in connection with applications involving contamination (oil vapors or dusts) | The installation of a spiral tube is recommended in connection with applications involving contamination (oil vapors or dusts) |

Measuring,
controlling



Dimensional drawing for the CERAVAC Transmitter CTR 100



Dimensional drawing for the CERAVAC Transmitter CTR 101

THERMOVAC Transmitters

TTR 91 / TTR 91 S / TTR 96 S



THERMOVAC transmitters are active sensors (pressure to voltage converters) using thermal conductivity according to Pirani.

The further developed THERMOVAC transmitters have optimized price-to-performance ratio.

The value of the trigger point (TTR 91 S) can be switched easily on the analog output and be shown on the display of the operating unit.

Advantages to the User

- Rugged sensing cells made of stainless steel
- Compact design
- Stable measurements within a wide temperature range
- Highly resistant to overpressures
- Exchangeable sensing cells
- Fast response
- Available with integrated switching relay (TTR 91 S, TTR 96 S)
- TTR 91 (Part No. 230 035) is GOST standard compliant

Typical Applications

- Analytical engineering
- Safety circuits in vacuum systems
- Controlling ionization gauges
- General pressure measurement and control on systems in the fine and rough vacuum range

Sensor

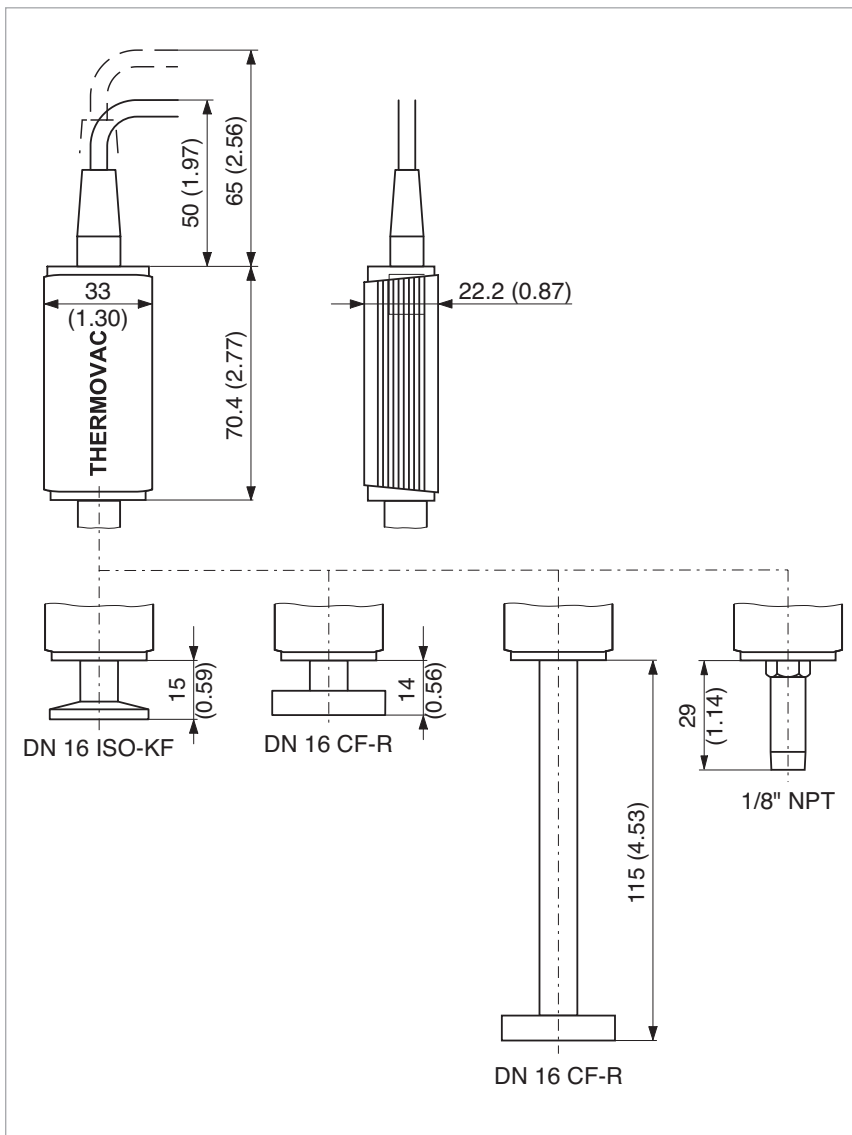
The THERMOVAC transmitter has a Pirani sensing cell equipped with a tungsten (TTR 91/TTR 91 S) or nickel (TTR 96 S) filament.

If required, the sensing cells can easily be aligned to any precisely known pressure value (atmospheric, "Zero", reference pressure) by pressing a button.

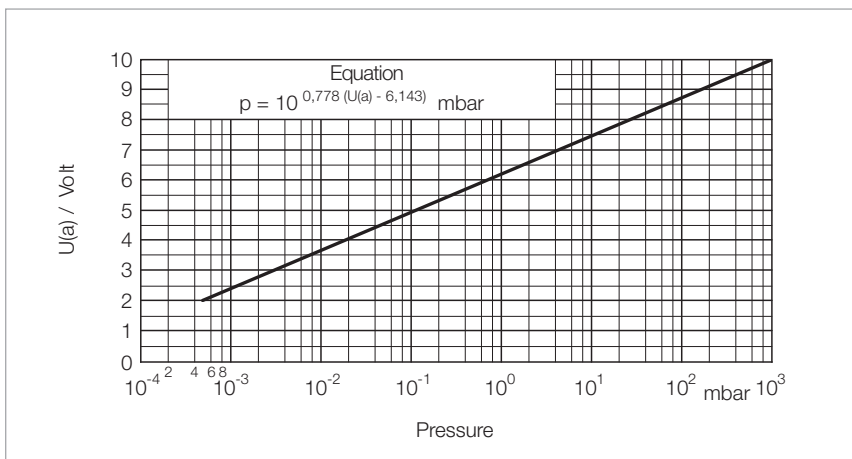
Integration of the transmitters in programmable control systems is facilitated by the linear characteristic, which can be defined by entering a simple equation into the computer.

The transmitters TTR 91 / TTR 91 S / TTR 96 S are compatible to older TTR models like TTR 211, TTR 216 S or TTR 90.

Built-in relays allow switching functions to be performed directly by the transmitter, without the need of a programmable control.



Dimensional drawing for the TTR 91 / TTR 91 S / TTR 96 S (measures in brackets are in inch)



Characteristic of the THERMOVAC Transmitters TTR 91 / TTR 91 S / TTR 96 S

Technical Data

THERMOVAC Transmitter

TTR 91 / TTR 91 S / TTR 96 S

| | | |
|---|-----------------|---|
| Measurement range | mbar (Torr) | 5×10^{-4} to 1000 (3.75×10^{-4} to 750) |
| Measurement uncertainty | | 15% in the range 1×10^{-3} to 100 mbar (0.75×10^{-3} to 75 Torr) |
| Measurement principle | | Thermal conductivity according to Pirani |
| Supply voltage | | 14 to 30 V DC Hum voltage $\leq 1 V_{ss}$ |
| Power consumption | VA | ≤ 1 |
| Storage temperature range | °C | -20 to +65 |
| Nominal temperature range | °C | +5 to +60 |
| Max. rel. humidity | % n.c. | ≤ 80 |
| Protection class | | IP 40 |
| Weight, approx., for DN 16 ISO-KF | kg (lbs) | 0.08 (0.18) |
| Sensor | | Exchangeable sensing cell |
| Bake out temperature, max. | °C | 80 (250 with long tube) |
| Dead volume, approx. | cm ³ | 2 (10 with long tube) |
| Materials in contact with the medium the filament | | Stainless steel, Nickel, Glass, NiFe Tungsten (TTR 91, TTR 91 S) or Nickel (TTR 96 S) |
| Overpressure rating (abs.) | bar | 10 |
| Signal output ($R_a > 10 k\Omega$) | | 0 to 10.3 V |
| Measurement signal | | 1.9 to 10 V DC, corresp. 5×10^{-4} to 1×10^3 mbar 1.286 V/decade, logarithmic Error: ≤ 0.5 V |
| Status signal | | Error: ≤ 0.5 V |
| Trigger (only TTR 91 S/TTR 96 S) | | Normally open relay contact |
| Adjustment range | mbar (Torr) | 2×10^{-3} to 500 (1.5×10^{-3} to 375) |
| Hysteresis | | 10% |
| Rating | ms | 30 V; 0.5 A DC |
| Error status | | Relay contact open |
| Status indicators (only TTR 91 S) | | Trigger (active): Green LED |
| Electrical connection | | FCC-68/RJ45 socket, 8-way with shield |
| Cable length, max. | m | 100 |

Ordering Information

THERMOVAC Transmitter TTR 91 / TTR 91 S / TTR 96 S

| | Part No. |
|---|--|
| Without switching threshold | |
| TTR 91, DN 16 ISO-KF | 230 035 |
| TTR 91, 1/8" NPT | 230 038 |
| TTR 91, DN 16 CF | 230 036 |
| TTR 91, 1/2" Tube, DN 16 CF bakeable | 230 037 |
| With switching threshold | |
| TTR 91 S, DN 16 ISO-KF | 230 040 |
| TTR 91 S, 1/8" NPT | 230 043 |
| TTR 91 S, 1/2" Tube, DN 16 CF bakeable | 230 042 |
| TTR 96 S, DN 16 ISO-KF | 230 045 |
| TTR 96 S, 1/2" Tube, DN 16 CF bakeable | 230 047 |
| Replacement sensing cell for TTR 91 / TTR 91 S | |
| DN 16 ISO-KF | 230 050 |
| 1/8" NPT | 230 053 |
| DN 16 CF | 230 051 |
| 1/2" Tube, DN 16 CF, bakeable | 230 052 |
| for TTR 96 S | |
| DN 16 ISO-KF | 230 055 |
| 1/8" NPT | 230 058 |
| DN 16 CF | 230 056 |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |
| Connection cable, FCC 68 on both ends, 8-polig mit Abschirmung | Type A |
| 5 m | 124 26 |
| 10 m | 230 012 |
| 15 m | 124 27 |
| 20 m | 124 28 |
| 30 m | 124 29 |
| 50 m | 124 31 |
| 75 m | 124 32 |
| 100 m | 124 33 |
| Accessories, optional | |
| Spiral tube DN 16 ISO-KF | 230 082 |

THERMOVAC Transmitters with Fieldbus Interface Profibus or DeviceNet TTR 911 / TTR 911 PB / TTR 911 D / TTR 911 CC / TTR 911 CC PB / TTR 916 / TTR 916 PB



Transmitter TTR 911; left with PB interface, right with display

The THERMOVAC transmitters are active sensors (pressure/voltage converters) the operation of which is based on the thermal conductivity principle according to Pirani. The transmitters offer a display range from 5×10^{-5} to 1000 mbar.

A selection of 3 different filament materials (TTR 911 = tungsten, TTR 916 = nickel, TTR 911 CC = ceramics coated tungsten) allows the selection of the matching sensor for every application.

In particular, the new TTR 911 CC models with sensing cells fully coated with ceramic material are especially well suited for demanding applications like dry etching, Atomic Layer Deposition (ALD) because these offer, compared to traditional sensing cells made of metal, an optimised degree of corrosion protection. Optionally the TTR 911/916 transmitters are available with a built-in display facilitating reading off of the measured values directly at the transmitter itself. As Fieldbus interfaces both Profibus and DeviceNet are available.

Advantages to the User

- 2 switching thresholds with a wide adjustment range (5×10^{-5} to 1000 mbar)
- Rugged Pirani sensing cells for different media are available
 - Tungsten (standard applications, without corrosive media)
 - Nickel (slightly corrosive media)
 - Ceramics coated (highest degree of corrosion protection)
- LED display for operation and switching threshold function
- High degree of reproducibility
- Sensing cells which are easy to replace
- Logarithmic signal output
- High level of EMI compatibility through shielded housing, FCC 68 compliant connectors and cables
- Computer interface (optional)
 - Profibus
 - DeviceNet
- Versions with display but without Fieldbus are available
- Complies with CE, ETL, ANSI/UL, CAN/CSA, RoHs and WEEE requirements

Typical Applications

- Analytical engineering
- Safety circuits in vacuum systems
- Controlling ionization gauges
- Vacuum furnaces
- General pressure measurement and control on systems in the medium and rough vacuum range with the following requirements:
 - Immediate data transfer to a PLC/computer via analog interface
 - Coverage of greater distances between the point of the measurement and processing station
 - Several locations which are to be monitored continuously
 - Low voltage supply
 - Simple, cost and space saving installation
 - Increased reliability
 - Simple to operate
 - Increased requirements as to electromagnetic compatibility (EMC)

Sensor

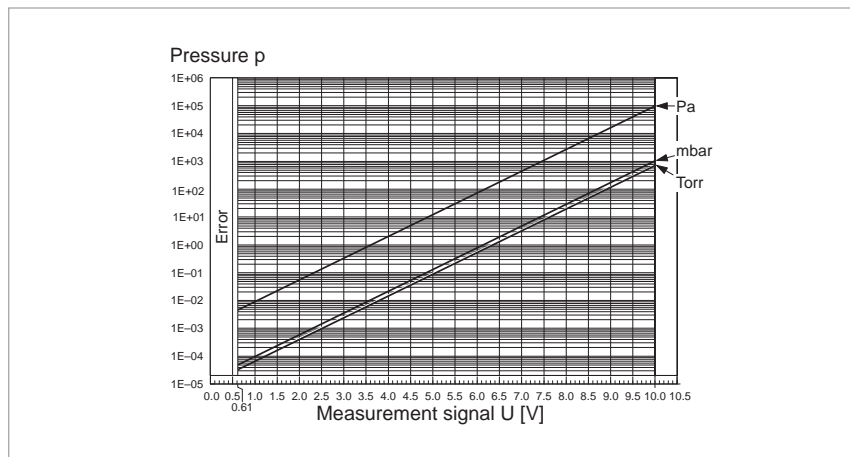
The THERMOVAC transmitter TTR 911 is equipped with a tungsten sensing filament which is suited for standard applications.

The transmitter models TTR 916 are equipped with a nickel sensing filament for applications involving increased quantities of water vapour or corrosive media.

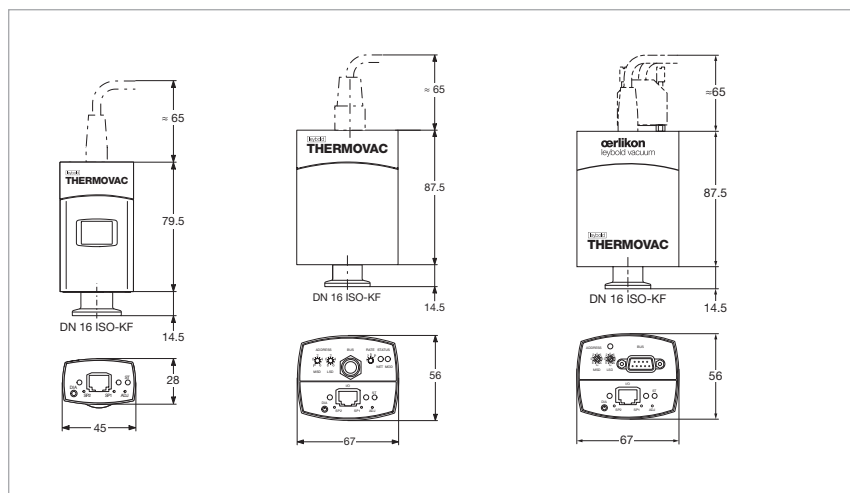
The THERMOVAC transmitter TTR 911 CC is suited for applications involving extremely corrosive media since the sensing filament coated with a ceramic material offers the highest degree of corrosion protection.

In all transmitter models, the sensing cells can be easily replaced should this be required.

Integration of the transmitter in programmable control systems is facilitated by the linear characteristic which may be defined by entering a simple equation into the computer. Through the built-in relays it is possible to perform important switching functions directly through the transmitter without the need of a PLC.



Characteristics of the TTR 911 and TTR 916



Dimensional drawing of the TTR 911 and TTR 916 with DN 16 ISO-KF flange.
On the left with display, at the centre with DeviceNet interface, on the right with Profibus interface

Technical Data

THERMOVAC Transmitters

TTR 911 / TTR 911 PB / TTR 911 D / TTR 911 CC / TTR 911 CC PB/

TTR 916 / TTR 916 PB

| | | |
|---|---|--|
| Display range | mbar (Torr) | 5 x 10 ⁻⁵ to 1000 (3.75 x 10 ⁻⁵ to 750) |
| Measurement uncertainty (N ₂) | mbar (Torr) mbar (Torr) mbar (Torr) | 5 x 10 ⁻⁴ to 1 x 10 ⁻³ (3.75 x 10 ⁻⁴ to 1 x 10 ⁻³), ± 50% of the measured value 1 x 10 ⁻³ to 100 (1 x 10 ⁻³ to 750), ± 15% of the measured value 100 to 1000 (75 to 750), ± 50% of the measured value |
| Principle of measurement | | Thermal conductivity acc. to Pirani |
| Supply voltage | V DC | +15 to +30, typ. 24 V |
| Power consumption | | |
| without Fieldbus | W | ≤ 2.5 |
| Profibus | W | ≤ 3 |
| DeviceNet | W | ≤ 3 |
| Storage temperature range | °C | -20 to +65 |
| Nominal temperature range | °C | +10 to +50 |
| Type of protection | | IP 40 |
| Dimensions (H x W x D) | mm | See dimensional drawing |
| Weight, approx. | kg (lbs) | 0.23 to 0.25 (0.51 to 0.55) |
| Sensor | | Exchangeable sensing cell |
| Filament | | Tungsten (TTR 911) / Al ₂ O ₃ coated tungsten (TTR 911 CC)/nickel (TTR 916) |
| Vacuum connection | DN | 16 ISO-KF |
| Degassing temperature, max. | °C | 80 at the flange |
| Dead volume, approx. | cm ³ | 4.7 |
| Materials in contact with the medium | | |
| Vacuum connection | | Stainless steel 1.4435 |
| Filament | | TTR 911: tungsten, TTR 911 CC: Al ₂ O ₃ coated tungsten, TTR 916: nickel |
| Vacuum feed through | | Glass |
| Orifice | | Stainless steel 1.4301 |
| Further materials | | Al ₂ O ₃ , Ni, NiFe, stainless steel 1.4301 |
| Overpressure rating (abs.) | bar | 5 |
| Signal output (R _s > 10 kΩ) | | 0 to 10 V |
| Measurement signal | | 0.61 to 10 V |
| Error signal | | 1.286 V/decade 0 to 0.5 |
| Switching threshold | | Semiconductor relay contact, normally open |
| Adjustment range | mbar (Torr) | 5 x 10 ⁻⁵ to 1000 (3.75 x 10 ⁻⁵ to 750) |
| Hysteresis | | Approximately 10% of the setup pressure value |
| Reaction time | ms | < 30 |
| Switching capacity | | < 30 V AC/DC, ≤ 0.3 A |
| Status indicators | | Operation indicator (power): LED green; error: LED red Switching threshold (enabled): LED green |
| Electrical connection | | FCC-68 socket, 8-way with shield |
| Cable length, max. | m | 100 (for the FCC connection), different maximum cable lengths apply to the Fieldbus interfaces |
| Interface | | |
| TTR 911 PB / 916 PB / TTR 911 CC PB | | Profibus |
| TTR 911 D | | DeviceNet |

Ordering Information

THERMOVAC Transmitters

TTR 911 / TTR 911 PB / TTR 911 D / TTR 911 CC / TTR 911 CC PB/

TTR 916 / TTR 916 PB

| | Part No. |
|--|--|
| TTR 911, DN 16 ISO-KF, with display Tungsten filament (2 switching thresholds) Replacement sensing cell | 89654V01 230650V01 |
| TTR 911 PB, DN 16 ISO-KF Tungsten filament (2 switching thresholds) Profibus interface Replacement sensing cell | 89650V01 230650V01 |
| TTR 911 D, DN 16 ISO-KF Tungsten filament (2 switching thresholds) DeviceNet interface Replacement sensing cell | 89651V01 230650V01 |
| TTR 911 CC, DN 16 ISO-KF Tungsten filament (2 switching thresholds) Ceramics coated Replacement sensing cell | 89658V01 230651V01 |
| TTR 911 CC PB, DN 16 ISO-KF Tungsten filament (2 switching thresholds) Ceramics coated Profibus interface Replacement sensing cell | 89659V01 230651V01 |
| TTR 916, DN 16 ISO-KF, with display Nickel filament (2 switching thresholds) Replacement sensing cell | 89656V01 230652V01 |
| TTR 916 PB, DN 16 ISO-KF Nickel filament (2 switching thresholds) Profibus interface Replacement sensing cell | 89652V01 230652V01 |
| Calibration | See Section "Miscellaneous", paragraph "Oerlikon Leybold Vacuum calibration service" |
| Connection cable, FCC 68 on both ends, 8-way with shield 5 m 10 m 15 m 20 m 30 m 50 m 75 m 100 m | Type A 124 26 230 012 124 27 124 28 124 29 124 31 124 32 124 33 |
| Optional accessories Spiral tube DN 16 ISO-KF | 230 082 |

THERMOVAC Transmitters

TTR 101 / TTR 101 S2 / TTR 101 S2 PB



The Pirani Capacitance Diaphragm Gauge is the first vacuum gauge which combines ceramic capacitance diaphragm and thermal conductivity technologies. The Oerlikon Leybold Vacuum TTR 101 offers superior accuracy and gas type independent readings between 10 mbar and 1500 mbar.

Advantages to the User

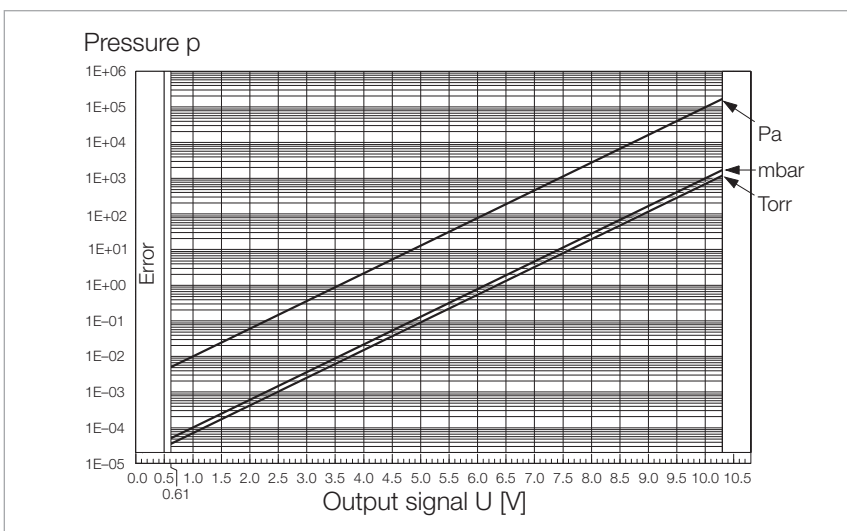
- Large display range 5×10^{-5} to 1500 mbar
- Gas type independent above 10 to 1500 mbar
- Available optional display, or with up to two integrated setpoints
- Easy to exchange plug & play sensor element with on-board calibration data - guarantees high reproducibility and low cost of ownership
- Compact design
- LED signal for set point relay status
- Rapid cycling
- NRTL, ETL, RoHs and WEEE standards

Typical Applications

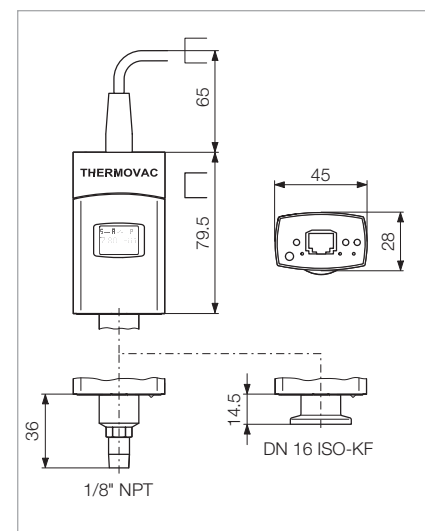
- General vacuum measurement and control from low to the high vacuum range
- Forevacuum pressure measurement
- Safety circuits in vacuum systems
- Load lock control
- Control of high vacuum ionization gauge

Option

Dust and other particles may cause increasing measurement errors and reduced lifetime. Therefore we recommend the installation of a fine filter in critical applications. Fine filters are listed in chapter "General", para. "Connection Accessories for Small Flanges".



Kennlinie des THERMOVAC-Transmitters TTR 101 (S2)



Maßzeichnung des TTR 101 (S2)

Technical Data

THERMOVAC Transmitter

TTR 101 / TTR 101 S2 / TTR 101 S2 PB

| | |
|---|---|
| Measurement principle 10 to 1500 mbar (7.5 to 1125 Torr) 1 to 10 mbar (0.75 to 7.5 Torr) 5 x 10 ⁻⁴ to 1 mbar (3.75 x 10 ⁻⁴ to 0.75 Torr) | Capacitive diaphragm sensor Mixed range Thermal conductivity acc. to Pirani |
| Measurement range mbar (Torr) | 5 x 10 ⁻⁵ to 1500 (3.8 x 10 ⁻⁵ to 1125) |
| Measurement range mbar (Torr) | 5 x 10 ⁻⁴ to 1500 (3.8 x 10 ⁻⁴ to 1125) |
| Measurement uncertainty (N ₂) 5 x 10 ⁻⁴ to 1 x 10 ⁻³ mbar 1 x 10 ⁻³ to 100 mbar 100 to 950 mbar 950 to 1050 mbar | ± 50% of reading ± 15% of reading ± 5% of reading ± 2,5% of reading |
| Repeatability (N ₂) 1 x 10 ⁻³ to 1100 mbar | ± 2% of reading |
| Output signal (measurement signal) Voltage range Measurement range Error signal Relationship between voltage and pressure | 0 to 10.23 V +0.61 to +10.23 V 0 V (factory default) 1.286 V / decade, logarithmic |
| Output impedance Load impedance Response time | 2 x 4.7 Ohm, short circuit-proof > 10 kΩ < 30 ms |
| Transmitter identification | 71.5 kΩ |
| HV transmitter alignment | at < 10 ⁻⁵ mbar |
| ATM transmitter alignment | at > 100 mbar |
| Semiconductor relay Adjustment range (N ₂) Hysteresis Switching characteristic Contact rating closed open Switching time | Switching thresholds SP 1/2 5.0 x 10 ⁻⁵ to 1500 mbar 10% of the threshold Low trip point < 30 V AC/DC, # 0.3 A resistive LED on LED off < 30 ms |

Further Technical Data

THERMOVAC Transmitter

TTR 101 / TTR 101 S2 / TTR 101 S2 PB

| | | |
|---|------------------------------------|--|
| Supply voltage at the transmitter Ripple | V DC | Class 2 / LPS +15 to +30 < 1 V _{ss} |
| Power consumption | W | ≤ 2.5 |
| Fuse to connect ahead | | 1 AT |
| Electrical connection Measurement cord Cable length | m | FCC 68 socket with shield: 0.14 mm ² / wire ≤ 100 |
| Earthing concept Vacuum connection and signal earth | | --> "Electrical connection" connected via 10 kV, 10 nF |
| Materials exposed to vacuum Vacuum connection Heating filament Vacuum feedthrough Orifice (for DN 16 ISO-KF only) Diaphragm Further materials | | Stainless steel 1.4435 W Glass Stainless steel Ceramic Ni, NiFe, Stainless steel 1.4301, SnAg |
| Internal volume DN 16 ISO-KF 1/8" NPT | cm ³ cm ³ | 4.7 5.2 |
| Admissible pressure | bar (abs.) | ≤ 5 |
| Burst pressure | bar (abs.) | 10 |
| Admissible temperature Operation (ambient) Bakeout at flange ¹⁾ , max. Heating filament Storage | °C °C °C °C | +10 to +50 ≤ 80 < 160 -20 to +65 |
| Relative humidity Annual average on 60 days | | ≤ 65% (non condensing) ≤ 85% (non condensing) |
| Mounting orientation | | Horizontal and vertical |
| Use | | Indoors only, altitudes up to 2000 m (6562 ft.) |
| Protection class | IP | 40 |
| Weight | kg (lbs) | 0.120 (0.265) |

¹⁾ For horizontal installation. While baking out, the technical data for measurement range, inaccuracy and repeatability may deviate

Ordering Information

THERMOVAC Transmitter

TTR 101 / TTR 101 S2 / TTR 101 S2 PB

| | Part No. |
|---|--|
| THERMOVAC TTR 101 without switching threshold without Display DN 16 ISO-KF 1/8" NPT | 230 350 V01 230 351 V01 |
| with Display DN 16 ISO-KF 1/8" NPT | 230 354 V01 230 355 V01 |
| THERMOVAC TTR 101 S2 with two switching thresholds without Display DN 16 ISO-KF 1/8" NPT | 230 352 V01 230 353 V01 |
| with Display DN 16 ISO-KF 1/8" NPT | 230 356 V01 230 357 V01 |
| THERMOVAC TTR 101 S2 PB with two switching thresholds without Display DN 16 ISO-KF | 230 358 V01 |
| with Display DN 16 ISO-KF | 230 360 V01 |
| Replacement sensor DN 16 ISO-KF 1/8" NPT | 230 361 V01 230 362 V01 |
| Centering ring with fine filter DN 16 ISO-KF | 883 96 |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |
| Connection cable, FCC 68 on both ends, 8-way, shielded 5 m 10 m 15 m 20 m 30 m 50 m 75 m 100 m | Type A 124 26 230 012 124 27 124 28 124 29 124 31 124 32 124 33 |
| Accessories, optional Spiral tube DN 16 ISO-KF | 230 082 |

PENNINGVAC Transmitters

PTR 225/ PTR 225 S/ PTR 225 PB/ PTR 237



The PENNINGVAC transmitters have been developed especially for integration in programmable control systems. As active sensors (pressure to voltage converters) - equipped with a rugged cold cathode sensing cell and with matched operating and processing electronics - these transmitters offer a wide measurement range of 1×10^{-9} to 1×10^{-2} mbar (0.75×10^{-9} to 0.75×10^{-2} Torr). The measurement signal may be transmitted over long distances without problems.

Advantages to the User

- All-metal cold cathode sensors (inverted Penning)
- High reproducibility
- Good ignition characteristics through the optimized design for the electrodes
- Low tendency for contamination (also during argon operation) due to high voltage reduction after ignition of the plasma and due to the titanium cathodes
- Switching threshold adjustable over a wide range (1×10^{-9} to 1×10^{-2} mbar (0.75×10^{-9} to 0.75×10^{-2} Torr)) and with a load-bearing relay contact (PTR 225 S)
- Low stray magnetic field
- High EMI compatibility through screened housing, FCC-68 connector and cables
- LED indicator for operation
- Logarithmic signal output (algorithm supplied)
- Intelligent interface
- CE mark
- High resistance against sputtering due to titanium cathode plates

Typical Applications

- Evaporation and sputtering systems
- Analytical engineering
- Vacuum furnaces
- High vacuum systems
- General pressure measurement and control on systems in the fine and rough vacuum range which have the following requirements:
 - Immediate data transfer to a programmable control/computer via analog interface
 - Coverage of greater distances between the point of the measurement and processing location
 - Several locations which are to be monitored continuously
 - Low voltage supply
 - Simple, cost and space saving installation
 - Increased reliability, also in argon processes (sputtering)
 - Simple operation
 - Increased requirements concerning electromagnetic compatibility (EMI)

Option

For protection of the sensors PTR 225 against contamination, radiation and other disturbing factors the installation of a baffle is recommended.



Baffle DN 25 ISO-KF, with centering ring, Part No. 230 078

Sensor

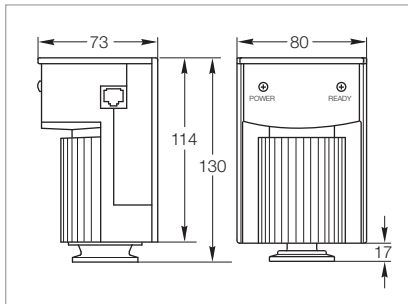
Cold cathode sensors - based on the well-proven principle of the inverted Penning - are built into the PENNINGVAC transmitters PTR 225/225 S/237 which have a DN 25 ISO-KF or DN 40 CF flange. The housing of the transmitter, including its electronics, as well as the magnet can easily be removed for degassing of the all-metal sensor with Al_2O_3 current feedthrough. The design of the Penning sensors with its

closed magnetic field causes a negligible stray field. Thus the PTR 225/225 S/237 may also be installed close to sensitive parts within a system.

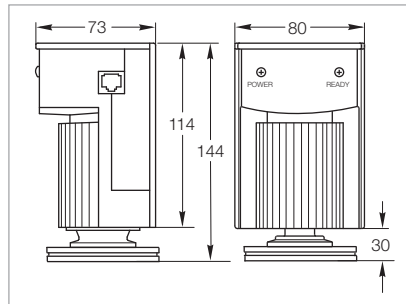
The anode ring and the titanium cathode plates can be exchanged easily for quick maintenance of the sensors in case of contamination. The shape of the cathode plates is such that they also act as a baffle for the sensors.

Integration of the transmitter in programmable control systems is facilitated by the linear characteristic which can be defined by entering a simple equation into the computer.

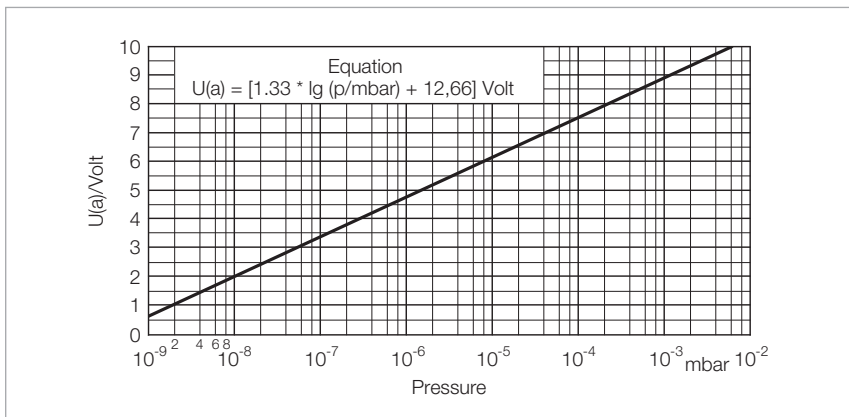
Built-in relays (PTR 225 S) allow switching functions to be performed directly by the transmitter, without the need of a programmable control.



Dimensional drawing for the PTR 225



Dimensional drawing for the PTR 237



Characteristic of the PTR 225/225 S/237

Technical Data

PENNINGVAC Transmitter

PTR 225 / PTR 225 S / PTR 225 PB / PTR 237

| | | |
|---|-----------------|---|
| Measurement range | mbar (Torr) | 1×10^{-9} to 1×10^{-2} (0.75×10^{-9} to 0.75×10^{-2}) |
| Measurement uncertainty | | 30% in the range 1×10^{-8} to 1×10^{-4} mbar (0.75×10^{-8} to 0.75×10^{-4} Torr) |
| Measurement principle | | Cold cathode ionization according to Penning |
| Supply voltage | | 14.5 to 36 V DC typ. 24 V DC hum voltage < 2 V _{ss} |
| Power consumption | VA | < 2 |
| Storage temperature range | °C | -20 to +70 |
| Nominal temperature range | °C | +10 to +50 |
| Max. rel. humidity (climatic class F) | % n.c. | 95 |
| Protection class | IP | 40 |
| Dimensions (H x W x D) | mm | 125 x 80 x 73 |
| Weight, approx. | kg (lbs) | 0,5 |
| Inflammability | | UL 94 - V 2 |
| Sensor | | Detachable for cleaning |
| Vacuum connection | | |
| PTR 225 (S) | DN | 25 ISO-KF |
| PTR 237 | DN | 40 CF |
| Degassing temperature, max. | °C | 250 with electronics detached |
| Dead volume, approx. | cm ³ | 21 |
| Materials in contact with the medium | | Stainless steel, CrNi, Al ₂ O ₃ ³²⁵⁰ with electronics detached ¹ NiFe, Mo, Cu, Ni, Ti |
| Overpressure rating (abs.) | bar | 10 |
| Signal output (R _a > 10 kΩ) Measurement signal | | 0 to 10,6 V 0.66 to 10 V, corresponds to 1×10^{-9} to 1×10^{-2} mbar logarithm. divisions 1.333 V/decade |
| Trigger (PTR 225 S) Adjustment range Hysteresis Rating Error status | mbar (Torr) | Changeover relay contact 1×10^{-9} to 1×10^{-3} (0.75×10^{-9} to 0.75×10^{-3}) About 30% of the adjusted pressure 60 V, 0.5 A DC Contact in its rest position when "no ignition" / "HT off" |
| High voltage control input | | ON: At U < 2.9 V, or U > 12 V OFF: At U > 3 V, or U < 7 V |
| Status output Ready to measure Error (no ignition) | | Voltage level HIGH (typ. 24 V DC) LOW (0 V) |
| Status indicators | | Operation: Orange LED Ready to measure (ignited): Green LED Trigger (active): Green LED |
| Monitor output (R _a > 100 kΩ) | | Jack socket (3.5 mm) at which the trigger setting is available |
| Electrical connection | | FCC-68 socket, 8-way with shield |
| Cable length, max. | m | 100 |
| Interface PTR 225 P | | Profibus DP |

Ordering Information

PENNINGVAC Transmitter

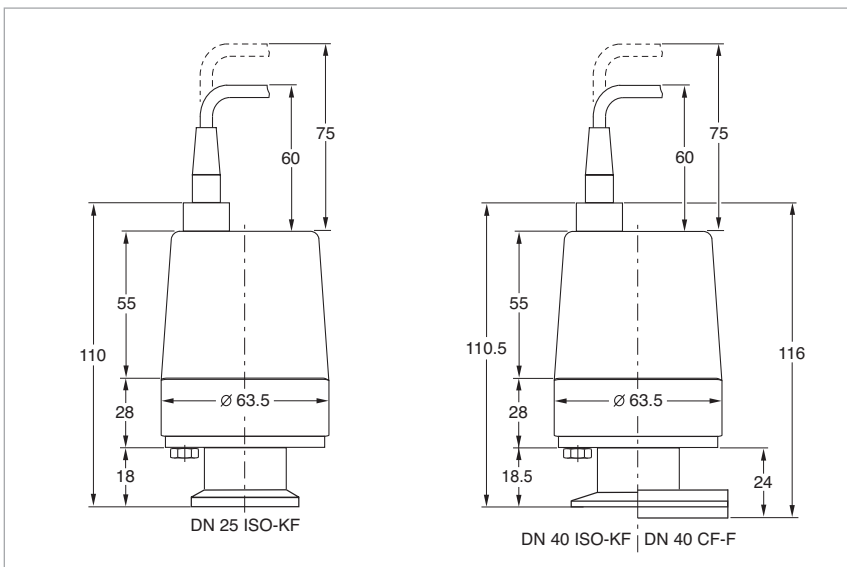
PTR 225 / PTR 225 S / PTR 225 PB / PTR 237

| | Part No. |
|---|--|
| PTR 225, DN 25 ISO-KF | 157 34 |
| PTR 225 S, DN 25 ISO-KF | 164 34 |
| PTR 225 PB, DN 25 ISO-KF Profibus interface | 896 41 |
| PTR 237, DN 40 CF | 157 36 |
| Baffle, DN 25 ISO-KF, with centering ring (FPM (FKM)) | 230 078 |
| Replacement cathode plates, titanium (set of 5 pieces) | EK 162 91 |
| Replacement anode ring | 200 28 711 |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |
| Connection cable, FCC 68 on both ends, 8-way, shielded | Type A |
| 5 m | 124 26 |
| 10 m | 230 012 |
| 15 m | 124 27 |
| 20 m | 124 28 |
| 30 m | 124 29 |
| 50 m | 124 31 |
| 75 m | 124 32 |
| 100 m | 124 33 |

PENNINGVAC Transmitter PTR 90



The PENNINGVAC transmitter combines the cold cathode ionization principle with the Pirani principle. This allows for complete coverage of the pressure range from 5×10^{-9} mbar to atmospheric pressure by a single transmitter. The cold cathode system is ignited directly through switching on the internal high-voltage at the optimum ignition pressure.



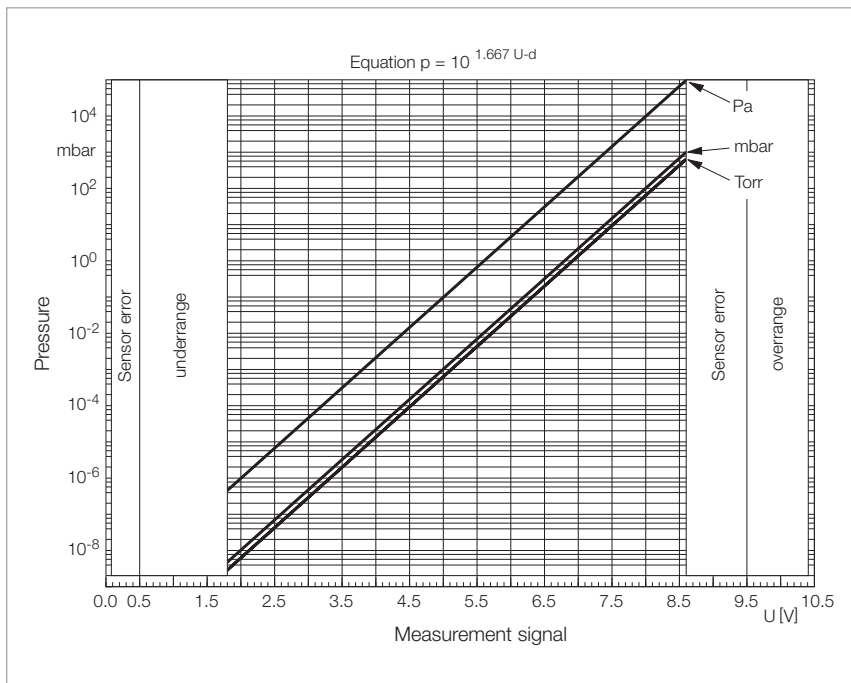
Dimensional drawing for the PENNINGVAC transmitters PTR 90

Advantages to the User

- High operational reliability through automatic ignition of the cold cathode
- Low complexity for installation and wiring due to the integration of two principles of measurement in a single casing
- Compact design
- Good serviceability
- Extra low voltage power supply
- Simple, cost and space saving installation
- Increased reliability also in connection with argon processes (sputtering)
- Simple to operate
- CE mark

Typical Applications

- Sputtering and coating technology
- Analytical technology
- Vacuum furnaces
- Multipurpose pressure measurement and control in the medium and high vacuum range



Characteristic of the PTR 90

Option

For protection of the sensor ITR 90 against contamination, radiation and other disturbing factors the installation of a baffle is recommended.

Two types of baffles are available:
A build-in version for CF connections is mounted in the sensor; the baffle for ISO-KF connections is integrated in a centering ring.



Baffle DN 25 ISO-KF, with centering ring,
Part No. 230 078

Technical Data

PENNINGVAC Transmitter

PTR 90

| | | |
|---|-------------|--|
| Measurement range | mbar (Torr) | 5 x 10 ⁻⁹ ... 1000 (3.75 x 10 ⁻⁹ ... 750) |
| Measurement uncertainty | % | 30 in the range 1 x 10 ⁻⁸ ... 100 mbar (in the range 0.75 x 10 ⁻⁸ ... 75 Torr) |
| Measurement principle | | Cold cathode measurement system based on the principle of the inverted magnetron and Pirani measurement system |
| Reproducibility | % | 5 in the range 1 x 10 ⁻⁸ ... 100 mbar (in the range 0.75 x 10 ⁻⁸ ... 75 Torr) |
| Output signal (measurement signal) | | |
| Voltage range | V | 0 - 10.5 |
| Measurement range | V | 1.82 to 8.6 |
| Relationship between voltage and pressure | | Logarithmic, 0.6 V/decade |
| Error signal | | < 0.5 V no power supply > 9.5 V Pirani sensor is defective (broken filament) |
| Supply voltage | V DC | 15 - 30 |
| Electrical connection | | FCC 68 socket, 8-way |
| Operating temperature | °C | +5 to +55 |
| Storage temperature | °C | -40 to +65 |
| Materials in contact with the medium | | Stainless steel, Ceramics, Mo, Ni, Au, W, Viton |
| Overpressure rating (abs.) | bar | 10 |
| Protection class | IP | 40 |

Ordering Information

PENNINGVAC Transmitter

PTR 90

| | Part No. |
|--|--|
| PTR 90 | |
| DN 25 ISO-KF | 230 070 |
| DN 40 ISO-KF | 230 071 |
| DN 40 CF | 230 072 |
| Baffle, with centering ring (FPM (FKM)) | |
| DN 25 ISO-KF | 230 078 |
| DN 40 ISO-KF | 230 079 |
| Magnet shield for PTR 90 | 230 073 V01 |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |
| Connection cable, FCC 68 on both ends, 8-way, shielded | Type A |
| 5 m | 124 26 |
| 10 m | 230 012 |
| 15 m | 124 27 |
| 20 m | 124 28 |
| 30 m | 124 29 |
| 50 m | 124 31 |
| 75 m | 124 32 |
| 100 m | 124 33 |

IONIVAC Transmitter ITR 90



The ITR 90 is a optimized combination transmitter. The combination of a hot cathode ionisation sensor according to Bayard-Alpert and a Pirani sensor permits vacuum pressure measurements of nonignitable gases and gas mixtures in the pressure range from 5×10^{-10} to 1000 mbar.

The ITR 90 can be ordered with integrated display or Profibus interface.

Advantages to the User

- Continuous pressure measurements from 10^{-10} mbar to atmospheric pressure
- High degree of reproducibility within the typical range for process pressures of 10^{-2} to 10^{-8} mbar
- Controlled switching on and off sequencing through the integrated double Pirani optimized the service life of the yttrium coated iridium cathodes
- Compact design
- Enclosed, rugged electrode geometry in a rugged metal housing
- Efficient degassing by electron bombardment
- Simple fitting of the sensor
- Extension for higher bake out temperatures during the measurements
- One signal covering 13 decades
- One flange joint for 13 decade
- ITR 90 model with built-in display for stand-alone operation without additional display components
- RS 232 C interface

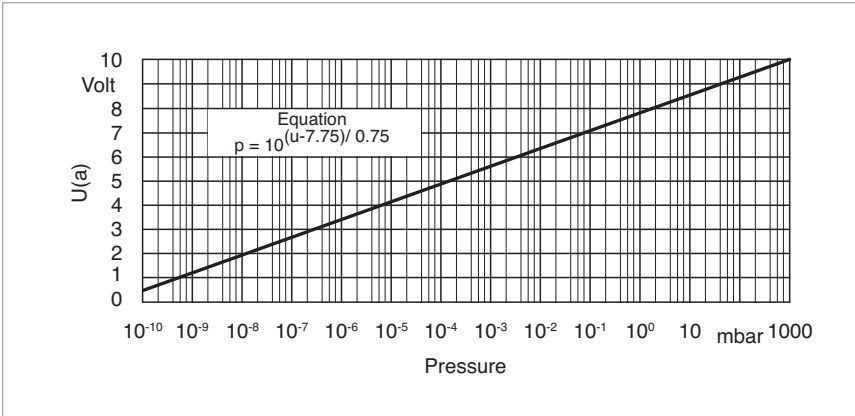
Typical Applications

- Analytical
- Evaporation and coating
- Vacuum furnaces
- General purpose pressure measurements in the fine and high vacuum ranges

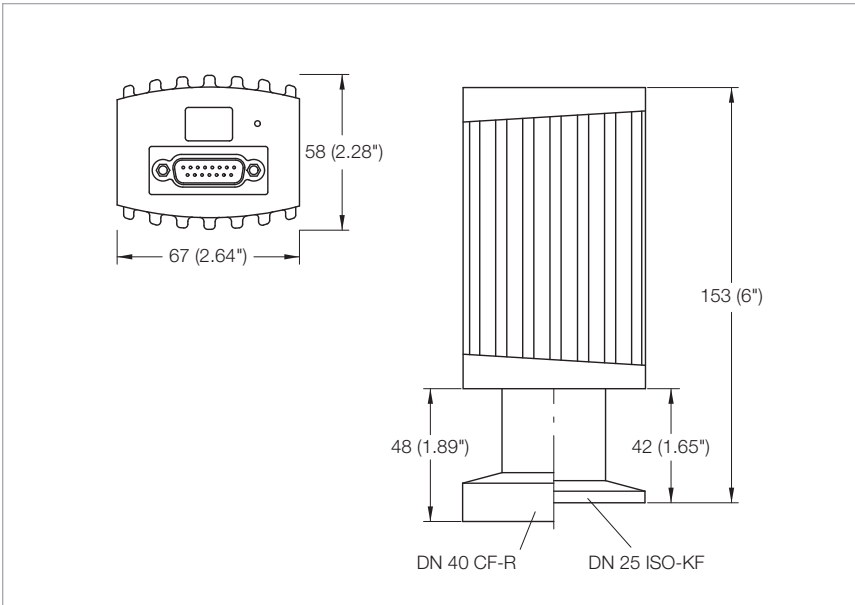
Sensor

The sensor of the ITR 90 contains a dual filament Pirani system as well as a Bayard-Alpert measurement system.

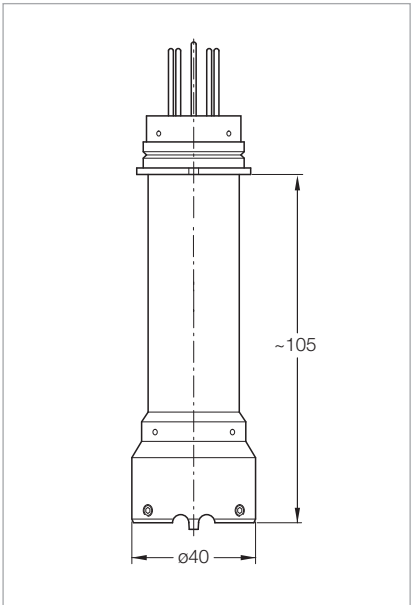
When using the bake out extension, measurements will be possible also at flange temperatures up to 150 °C.



Characteristic of the ITR 90



Dimensional drawing for the ITR 90; dimensions in brackets () are in inch



Dimensional drawing for the bake out extension

Technical Data

IONIVAC-Transmitter

ITR 90

| | | |
|---|-----------------|--|
| Measurement range | mbar (Torr) | 5 x 10 ⁻¹⁰ to 1000 (3.75 x 10 ⁻¹⁰ to 750) |
| Measurement uncertainty, 10 ⁻¹ - 1000 mbar | | ≥ 15% of the meas. value |
| Measurement uncertainty, 10 ⁻⁸ - 10 ⁻² mbar | | 15% of the meas. value |
| Reproducibility, 10 ⁻⁸ - 10 ⁻² mbar | | 5% of the meas. value |
| Principles of measurement | | Hot cathode ionization according to Bayard-Alpert combined with thermal conductivity according to Pirani |
| Degas | | Electron bombardment 3 minutes, max. |
| Supply voltage | | 20 to 28 V DC, typ. 24 V DC16 |
| Power consumption, max. | W | 16 |
| Storage / nominal temperature range | °C | -20 to +70 / 0 to +50 |
| Protection class | | IP 30 |
| Weight, approx. | | |
| ITR 90, DN 25 ISO-KF | kg (lbs) | 0.285 (0.64) |
| ITR 90, DN 40 CF | kg (lbs) | 0.550 (1.24) |
| Sensor | | Fully sealed, exchangeable |
| Degassing temperature, max. | °C | 150 ¹⁾ |
| Dead volume, approx. | cm ³ | 24 at DN 25 ISO-KF 34 at DN 40 CF |
| Materials in contact with the medium | | Cu, W, Glass, NiFe, Mo, Stainless steel, Aluminum, Iridium, Yttrium, NiCr |
| Overpressure rating (abs.) | bar | 2 |
| Signal output (R _a ≥ 10 kΩ) | | |
| Measurement signal | | 0 - 10 V, 0.774 - 10 V, 0.75 V pro decade |
| Error signal | | < 0,5 V |
| Interface (standard / optional) | | RS 232 C / ProfiBus |
| Electrical connection | | 15-way Sub-D male connector / pin contacts |
| Cable length, max. | m | 100 / 30 at RS 232 C |

¹⁾ Flange temperature when using the bake out extension

Ordering Information

IONIVAC-Transmitter ITR 90

without Display

with Display

| | Part No. | Part No. |
|--|--|--|
| ITR 90, DN 25 ISO-KF | 120 90 | 120 91 |
| ITR 90, DN 25 ISO-KF, Profibus interface | 230 030 | – |
| ITR 90, DN 40 CF-R, rotatable CF flange | 120 92 | 120 94 |
| ITR 90, DN 40 CF-R, rotatable CF flange Profibus interface | 230 031 | – |
| Power supply for IONIVAC transmitter 100 - 240 V AC / 24 V DC incl. 5 m connection cable and 5 m RS 232 C cable | 121 06 | 121 06 |
| Bake out extension (100 mm, approx.) | 127 06 | 127 06 |
| Baffle, DN 25 ISO-KF, with Installation baffle for CF/ISO-KF variant | 121 07 | 121 07 |
| Replacement sensor IE 90, DN 25 ISO-KF ¹⁾ IE 90, DN 40 CF-R ¹⁾ | E 121 02 E 121 03 | E 121 02 E 121 03 |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |
| Connection cable | see chapter "Products", para. "Connection Cable for Active Sensors" | see chapter "Products", para. "Connection Cable for Active Sensors" |

¹⁾ Including hex. socket screw key

IONIVAC Transmitter ITR 200 S



The ITR 200 S is an optimized dual cathode combination transmitter on the basis of the well proven ITR 90. The combination of a hot cathode ionization sensor according to Bayard-Alpert and a Pirani sensor allows vacuum pressure measurements of non-ignitable gases and gas mixtures in the pressure range from 5×10^{-10} to 1000 mbar.

Upon request, the pressure can be displayed on an integrated display.

Advantages to the User

- Service life increase and increased operational reliability through integration of a second hot cathode
- Full coverage of the pressure range from 5×10^{-10} mbar to atmospheric pressure
- High repeatability within the typical process pressure range of 10^{-2} to 10^{-8} mbar
- Controlled switching on and switching off through the integrated dual Pirani optimized the service life of the yttrium-coated iridium cathodes
- Compact design
- Enclosed, stable electrode geometry in rugged metal casing
- Efficient degassing through electron bombardment
- Simple to install
- ITR 200 S version with built-in display allows for stand-alone operation without the necessity for additional displays
- RS 232 C interface

Typical Applications

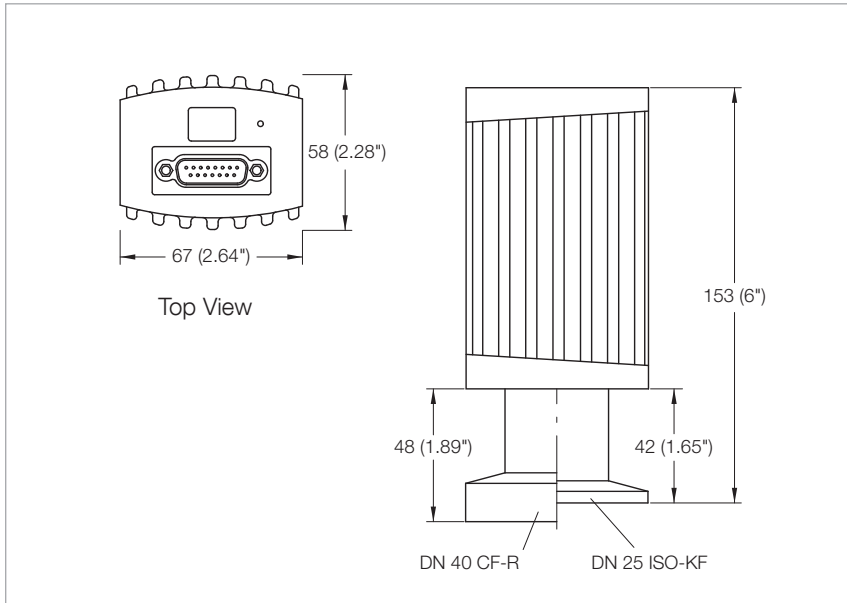
- Analytical engineering
- Sputtering and coating technology
- Vacuum furnaces
- Multipurpose pressure measurement in the medium and high vacuum range

Options

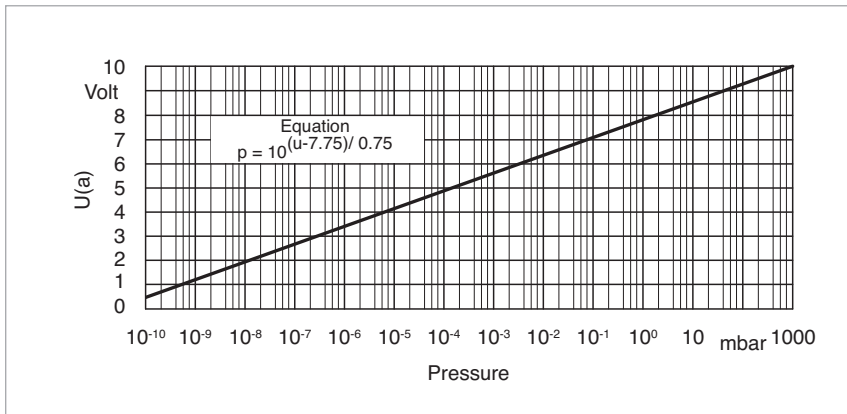
Upon request, the ITR 200 S can be supplied with an integrated display or a Profibus interface.

Sensor

The sensor of the ITR 200 S includes besides the Pirani system a dual cathode measurement system according to Bayard-Alpert. If one of the hot cathodes should burn out during operation, then the second cathode is automatically switched on. Moreover, each sensor contains a memory chip with the relevant system data. Thus after having exchanged a sensor, an automatic alignment is performed between sensor and operating electronics (plug and play).



Dimensional drawing for the ITR 200 S; dimensions in brackets () are in inch



Characteristic of the ITR 200 S

Technical Data

IONIVAC-Transmitter

ITR 200 S

| | | |
|---|-----------------|--|
| Measurement range | mbar (Torr) | 5×10^{-10} to 1000 (3.75×10^{-10} to 750) |
| Measurement uncertainty, 10^{-1} - 1000 mbar | | $\geq 15\%$ of the meas. value |
| Measurement uncertainty, 10^{-8} - 10^{-2} mbar | | 15% of the meas. value |
| Reproducibility, 10^{-8} - 10^{-2} mbar | | 5% of the meas. value |
| Principles of measurement | | Hot cathode ionization according to Bayard-Alpert combined with thermal conductivity according to Pirani |
| Degas | | Electron bombardment 3 minutes, max. |
| Supply voltage | | 20 to 28 V DC, typ. 24 V DC |
| Power consumption, max. | W | 20 |
| Storage / nominal temperature range | °C | -20 to +70 / 0 to +50 |
| Protection class | | IP 30 |
| Weight, approx. | | |
| ITR 200 S, DN 25 ISO-KF | kg (lbs) | 0.50 (1.10) |
| ITR 200 S, DN 40 CF | kg (lbs) | 0.75 (1.65) |
| Sensor | | Fully sealed, exchangeable |
| Degassing temperature, max. | °C | 150 ¹⁾ |
| Dead volume, approx. | cm ³ | 24 at DN 25 ISO-KF 34 at DN 40 CF |
| Materials in contact with the medium | | Cu, W, Glass, NiFe, Mo, Stainless steel, Iridium, Yttrium, NiCr |
| Overpressure rating (abs.) | bar | 2 |
| Signal output ($R_a \leq 10 \text{ k}\Omega$) | | |
| Measurement signal | | 0 - 10 V, 0.774 - 10 V, 0.75 V pro decade |
| Error signal | | < 0,5 V |
| Interface (standard / optional) | | RS 232 C / Profibus |
| Switching function | | |
| Standard | | 1 normally open contact |
| Profibus | | 2 normally open contacts |
| Electrical connection | | 15-way Sub-D male connector / pin contacts |
| Cable length, max. | m | 100 / 30 at RS 232 C |

¹⁾ Flange temperature when using the bake out extension

Ordering Information

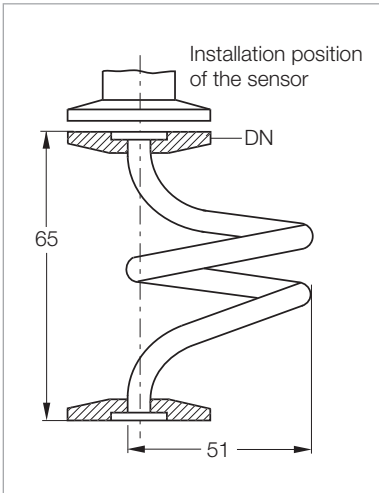
IONIVAC-Transmitter ITR 200 S without Display with Display

| | Part No. | Kat.-Nr |
|--|--|--|
| ITR 200 S, DN 25 ISO-KF 1 switching function | 230 250 | 230 251 |
| ITR 200 SP, DN 25 ISO-KF, Profibus interface, 2 switching functions | 230 252 | – |
| ITR 200 S, DN 40 CF-R, rotatable CF flange 1 switching function | 230 254 | 230 255 |
| ITR 200 SP, DN 40 CF-R, rotatable CF flange Profibus interface, 2 switching functions | 230 256 | – |
| Options | | |
| Power supply for IONIVAC transmitter 100 - 240 V AC / 24 V DC incl. 5 m connection cable and 5 m RS 232 C cable | 121 06 | 121 06 |
| Baffle, DN 25 ISO-KF, with Installation baffle for CF/ISO-KF variant | 121 07 | 121 07 |
| Replacement sensor | | |
| IE 200, DN 25 ISO-KF ²⁾ | 240 020 | 240 020 |
| IE 200, DN 40 CF-R ²⁾ | 240 021 | 240 021 |
| IE 200 SL ¹⁾ , DN 40 CF-R ²⁾ | – | 240 022 |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |
| Connection cable | see chapter "Products", para. "Connection Cable for Active Sensors" | see chapter "Products", para. "Connection Cable for Active Sensors" |

¹⁾ SL = long version (bake out version)

²⁾ Including hex. socket screw key

Spiral Tube



Dimensional drawing for the spiral tube

Advantages to the User

Pressure sensors may through the use of the spiral tube be better protected against contamination like condensate, vapours and dusts. Thus measurement accuracy is improved and a longer service life of the pressure sensors is attained.

Installation is recommended in connection with

- measurement system TTR (preferred)
- CERA-VAC CTR

Operating Principle

Through the specially developed geometry which provides a constant slope, possibly occurring contamination is removed.

Maintenance

Depending on the type of application regular maintenance on the spiral tube is recommended.

Note

- Measurement errors caused by the increased conductance of the component need to be taken into account
- Low vibration mounting must be ensured
- The sensor must be connected at the upper end

Technical Data

| | |
|-----------|-----------------|
| Materials | Stainless steel |
|-----------|-----------------|

Spiral Tube

Ordering Information

Spiral Tube

| | Part No. |
|--------------|----------|
| Spiral Tube | |
| DN 16 ISO-KF | 230 082 |
| DN 25 ISO-KF | 230 083 |
| DN 40 ISO-KF | 230 084 |

Connection Cables for Active Sensors

Active Sensors

Operating Units for Active Sensors

DISPLAY ONE

DISPLAY TWO DISPLAY THREE

CENTER ONE CENTER TWO CENTER THREE

| | | | |
|--|-----------------------------|---------------|---------------|
| THERMOVAC Transmitter TTR 91, TTR 91 S, TTR 96 S a. o. TTR 100, TTR 101, TTR 101 S2 TTR 911 PB/D/CC/CC PB, TTR 916 PB/D | Type A | Type A | Type A |
| PENNINGVAC Transmitter PTR 90, PTR 225, PTR 225 S, PTR 237 | Type A (only PTR 90) | Type A | Type A |
| CERAVAC Transmitter CTR 100, CTR 101 (digital signal) | – | – | Type C |
| IONIVAC Transmitter ITR 90, ITR 200 S | – | – | Type C |

Active Sensors

Operating Units for Active Sensors

IONIVAC IM 540 (Channel 3 and 4)

CMove

Bare wire ends

| | | | |
|---|---------------|---------------|---------------|
| THERMOVAC Transmitter TTR 91, TTR 91 S, TTR 96 S a. o. TTR 100, TTR 101 | Type A | Type A | – |
| CERAVAC Transmitter CTR 91, CTR 100, CTR 101 (analog signal) | Type B | Type B | Type E |
| IONIVAC Transmitter ITR 90, ITR 200 S | – | Type C | Type E |

Active Sensors

Operating Unit for Active Sensors

VACVISION

| | |
|---|---------------|
| THERMOVAC Transmitter TTR 91, TTR 91 S, TTR 96 S a. o. TTR 100, TTR 101 | Type F |
| PENNINGVAC Transmitter PTR 90, PTR 225, PTR 225 S, PTR 237 | Type F |

Technical Data

Connection Cable

| Cables | |
|--------|---|
| Type A | FCC 68 (RJ45) on both ends, 8-way, shielded |
| Type B | Sub-D 15-way female to FCC 68 (RJ45), 8-way, shielded |
| Type C | Sub-D 15-way female to Sub-D 15-way male, shielded |
| Type E | Sub-D 15-way female to bare wire ends, shielded |
| Type F | FCC 68 (RJ45), Sub-D 15-way male, shielded |

Ordering Information

Connection Cable

| | Type A | Type B |
|--------------|----------|----------|
| | Part No. | Part No. |
| Cable length | | |
| 5 m | 124 26 | 230 013 |
| 10 m | 230 012 | 230 014 |
| 15 m | 124 27 | 230 015 |
| 20 m | 124 28 | 230 016 |
| 30 m | 124 29 | 230 017 |
| 50 m | 124 31 | 230 019 |
| 75 m | 124 32 | 230 020 |
| 100 m | 124 33 | 230 021 |

Ordering Information

Connection Cable

| | Type C | Type E |
|--------------|-------------|----------|
| | Part No. | Part No. |
| Cable length | | |
| 5 m | 124 55 | 124 63 |
| 10 m | 230 022 | 163 69 |
| 15 m | 124 56 | 124 64 |
| 20 m | 124 57 | 124 65 |
| 30 m | 124 58 | — |
| 50 m | 230 345 V01 | — |

Ordering Information

Connection Cable

| | Type F |
|--------------|-------------|
| | Part No. |
| Cable length | |
| 5 m | 230 032 V01 |
| 10 m | 230 033 V01 |

Operating Units for Active Sensors

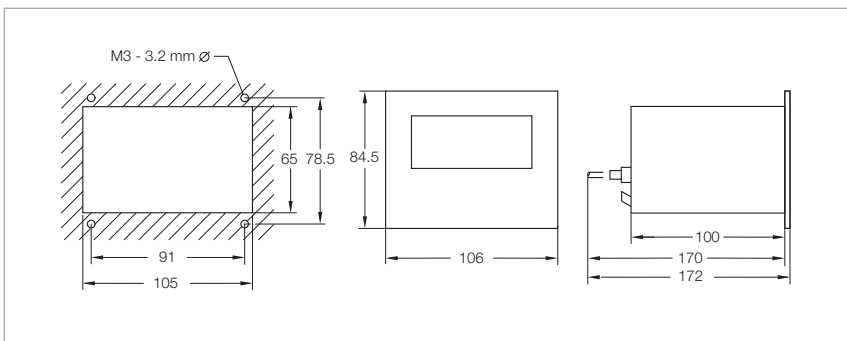
DISPLAY ONE



Cost-effective, compact single channel display unit for the transmitters from the THERMOVAC series and for PTR 90.

Advantages to the User

- Power supply voltage for the transmitters
- Four digit mantissa in the range from 5×10^{-9} to 2000 mbar
- Readout selectable between mbar, Torr or Pascal
- 0 to 10 V chart recorder output via plug-in screw terminals
- The switching threshold of the transmitters has been looped through to plug-in terminals
- The transmitter switching threshold settings are displayed
- Compact bench top enclosure (1/4 19", 2 HU)
- For fitting into 19", 3 HU racks
- Supply voltage 100 - 240 V



Dimensional drawing and panel cut-out for the DISPLAY ONE

Connectable Sensors

THERMOVAC

- TTR 100 *)
- TTR 101
- TTR 101 S2
- TTR 211 *)
- TTR 216 S *)
- TTR 90 *)
- TTR 90 S *)
- TTR 91
- TTR 91 S
- TTR 96 S
- TTR 911
- TTR 916

PENNINGVAC

- PTR 90

Linear pressure sensor

- DU 200
- DU 201
- DU 2000
- DU 2001
- DU 2001 rel.

*) Connecting of older sensors possible

Technical Data

DISPLAY ONE

| | |
|---|--|
| Number of measurement channels | 1 |
| Display for measured values | digital, 7 segment LED |
| Measurement range mbar (Torr) | 5×10^{-9} to 2000 (3.8×10^{-9} to 1500) |
| Unit of measurement (selectable) | mbar, Torr, Pa |
| Switching thresholds | from the transmitter are run to a terminal strip |
| Chart recorder output ($R_a > 2,5 \text{ k}\Omega$) | 0 - 10 Volt, characteristic corresponds to the connected transmitter |
| Mains connection | |
| EURO version V AC / Hz | 100 - 240 / 50/60 |
| US version V AC / Hz | 100 - 240 / 50/60 |

Ordering Information

DISPLAY ONE

| | Part No. |
|---|--|
| DISPLAY ONE with mains cord (EURO and US) | 230 001 |
| THERMOVAC Transmitter PENNINGVAC Transmitter PTR 90 | see chapter "Products", para. "Active Sensors" |
| Linear pressure sensors DU | see chapter "Products", para. "Additional Sensors" |
| Connection cables for THERMOVAC and PENNINGVAC (Type A) | see chapter "Products", para. "Connection Cables for Active Sensors" |
| Adapter panel for installation in a 2 HU, 19" rack | 230 005 |

DISPLAY TWO / THREE



Cost-effective, operating and display units for the transmitters from the THERMOVAC and PENNINGVAC series.

All channels are displayed simultaneously.

Advantages to the User

- Power supply voltage for the transmitters
- Display range from 1×10^{-9} to 2000 mbar (0.75×10^{-9} to 1500 Torr)
- Readout selectable between mbar, Torr or Pascal
- Adjustable switching thresholds with variable hysteresis, floating change-over contacts and visual indication of the switching status in the display
- Option of entering gas correction factors
- Separate chart recorder outputs 0 - 10 V for each measurement channel
- Compact bench top enclosure (1/4 19", 3 HU)
- For fitting into 19", 3 HU racks

Connectable Sensors

THERMOVAC

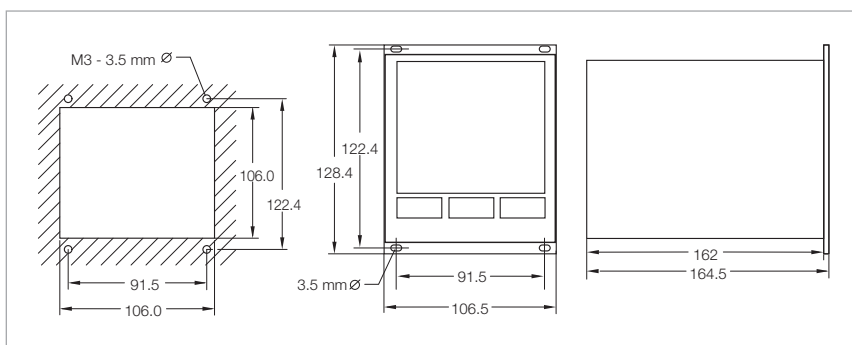
- TTR 211 *)
- TTR 216 S *)
- TTR 90 *)
- TTR 91
- TTR 96 S
- TTR 100 *)
- TTR 100 S2 *)
- TTR 101
- TTR 101 S2
- TTR 911
- TTR 916

PENNINGVAC

- PTR 90
- PTR 225
- PTR 225 S
- PTR 237

Linear pressure sensor

- DU 200
- DU 201
- DU 2000
- DU 2001
- DU 2001 rel.



Dimensional drawing and panel cut-out for the DISPLAY TWO and THREE

*) Connecting of older sensors possible

Technical Data**DISPLAY TWO****DISPLAY THREE**

| | | |
|--|---|---|
| Number of measurement channels | 2 | 3 |
| Display for measured values | 2 (1 per channel) | 3 (1 per channel) |
| Measurement range mbar (Torr) | $1 \cdot 10^{-10}$ to 2000 | $1 \cdot 10^{-10}$ to 2000 |
| Unit of measurement (selectable) | adjustable | adjustable |
| Gas type correction (for PTR) | 4 floating changeover contacts | 6 floating changeover contacts |
| Sensor connection | 60 V, 1 A DC / 30 V, 1 A AC | 60 V, 1 A DC / 30 V, 1 A AC |
| Sensor power supply V DC | 1 per channel, | 1 per channel, |
| Electrical outputs | configurable as 2nd switching threshold | configurable as 2nd switching threshold |
| Switching thresholds Number Adjustment range Hysteresis Relay contact Load rating Ready signal relay | 2 (1 per channel) sensor dependent adjustable 4 floating changeover contacts 60 V, 1 A DC / 30 V, 1 A AC 1 per channel, configurable as 2nd switching threshold | 3 (1 per channel) sensor dependent adjustable 6 floating changeover contacts 60 V, 1 A DC / 30 V, 1 A AC 1 per channel, configurable as 2nd switching threshold |
| Error message Relay contact Load rating | normally open contact 60 V, 1 A DC / 30 V, 1 A AC | normally open contact 60 V, 1 A DC / 30 V, 1 A AC |
| Chart recorder output ($R_a > 10 \text{ k}\Omega$) | 0 - 10 V per measurement channel, output characteristic corresponds to the connected transmitter | 0 - 10 V per measurement channel, output characteristic corresponds to the connected transmitter |
| Control input | PENNINGVAC PTR: high voltage on | PENNINGVAC PTR: high voltage on |
| Mains connection V AC / Hz | 85 - 240 / 50/60 | 85 - 240 / 50/60 |
| Power consumption W | < 10 | < 15 |
| Nominal temperature range °C | +5 to +50 | +5 to +50 |
| Weight kg (lbs) | 1.3 (2.87) | 1.4 (3.09) |
| Protection class IP | 40 | 40 |

Ordering Information**DISPLAY TWO****DISPLAY THREE**

| | Part No. | Part No. |
|---|---|---|
| DISPLAY TWO / THREE with mains cord (EURO and US) | 230 024 | 230 025 |
| THERMOVAC Transmitter | see chapter "Products", para. "Active Sensors" | see chapter "Products", para. "Active Sensors" |
| PENNINGVAC Transmitter | see chapter "Products", para. "Active Sensors" | see chapter "Products", para. "Active Sensors" |
| Connection cables for THERMOVAC and PENNINGVAC (Type A) | see chapter "Products", para. "Connection Cables for Active Sensors" | see chapter "Products", para. "Connection Cables for Active Sensors" |

CENTER ONE



Universal compact display and operating unit for the active sensors from the CERA VAC, THERMOVAC, PENNINGVAC and IONIVAC series.

Advantages to the User

- Power supply voltage for the transmitters
- Display range from 1×10^{-10} to 2000 mbar
- Automatic switchover to exponential readout of the measured data depending on the pressure range
- Readout selectable between mbar, Torr or Pascal
- Adjustable switching threshold with variable hysteresis, floating change-over contact and visual indication of the switching status on the display
- Zero correction for both display and chart recorder output through a key when using CERA VAC transmitters
- Option of entering gas correction factors for PENNINGVACs
- Chart recorder output 0 - 10 Volt
- RS 232 C interface with adjustable baud rate
- Relay output for error signalling
- Compact bench top enclosure (1/4 19", 2 HU)
- For fitting into 19", 3 HU racks
- CE and GOST standards compliant

Connectable Sensors

THERMOVAC

- TTR 211 *)
- TTR 216 S *)
- TTR 90 *)
- TTR 91
- TTR 96 S
- TTR 100 *)
- TTR 100 S2 *)
- TTR 101
- TTR 101 S2
- TTR 911
- TTR 916

PENNINGVAC

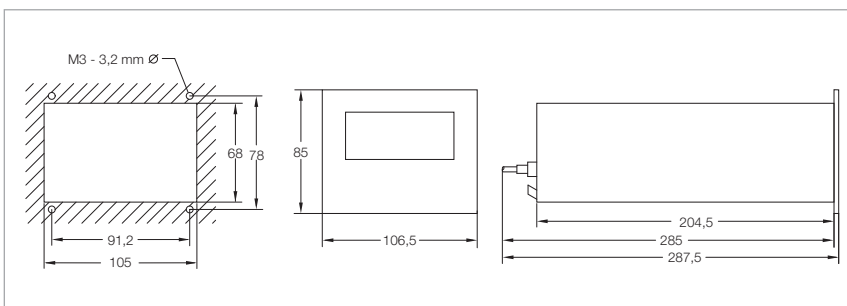
- PTR 90
- PTR 225
- PTR 225 S
- PTR 237

CERA VAC

- CTR 90 *)
- CTR 91 *)
- CTR 100
- CTR 101

IONIVAC

- ITR 90
- ITR 100 *)
- ITR 200 S
- ITR 200 SL



Dimensional drawing and panel cut-out for the CENTER ONE

*) Connecting of older sensors possible

Technical Data**CENTER ONE**

| | |
|--|---|
| Number of measurement channels | 1 |
| Display for measured values | digital, 7 segment LED, 5 digits |
| Measurement range mbar (Torr) | 1 x 10 ⁻¹⁰ to 2000 (0.75 x 10 ⁻¹⁰ to 1500) |
| Unit of measurement (selectable) | mbar, Torr, microns, Pa |
| Gas type correction | factor adjustable |
| Sensor connection | 15-way Sub-D socket FCC68 (RJ45) |
| Sensor power supply V DC | 24 |
| Electrical inputs and outputs | 9-way Sub-D plug |
| Switching thresholds Number Adjustment range Hysteresis Relay contact Load rating | 1 sensor dependent adjustable floating changeover contact 60 V, 0.5 A DC / 30 V, 0.5 A AC |
| Error message Relay contact Load rating | floating normally open contact 60 V, 0.5 A DC / 30 V, 0.5 A AC |
| Chart recorder output (R _a > 10 kΩ) | 0 - 10 Volt, characteristic corresponds to the connected transmitter |
| Control input | PTR: high voltage on ITR 100: emission on |
| Interface RS 232 C | 9-way Sub-D socket |
| Mains connection V AC / Hz | 85 V - 264 / 50-60 |
| Power consumption W | < 30 |
| Weight kg (lbs) | 0.85 (1.9) |
| Protection class IP | 30 |

Ordering Information**CENTER ONE**

| | Part No. |
|---|--|
| EURO version with 2 m EURO mains cord US version with 2 m US mains cord | 230 002 235 002 |
| THERMOVAC, PENNINGVAC, CERA VAC and IONIVAC transmitter | see chapter "Products", para. "Active Sensors" |
| Connection cables for THERMOVAC and PENNINGVAC (Type A), CERA VAC (Type B analog, Type C digital) and IONIVAC (Type C) | see chapter "Products", para. "Connection Cables for Active Sensors" |
| Adapter panel for installation in a 3 HU, 19" rack | 230 005 |
| Screw terminal for the 9-way output socket | 230 006 |

CENTER TWO / THREE



Universal display and operating units for the active sensors from the CERA VAC, THERMOVAC, PENNINGVAC and IONIVAC series. All channels are displayed simultaneously.

Advantages to the User

- Power supply voltage for the transmitters
- Display range from 1×10^{-10} to 2000 mbar (0.75×10^{-10} to 1500 Torr)
- Automatic switchover to exponential presentation of the measured data dependent on the pressure range
- Readout selectable between mbar, Torr, Micron or Pascal
- Adjustable switching thresholds with variable hysteresis, floating change-over contacts and visual indication of the switching status in the display, freely assignable to the individual measurement channels
- Zero correction for both display and chart recorder output through a key when using CERA VAC transmitters
- Option of entering gas correction factors for PENNINGVACs
- Separate chart recorder outputs 0 - 10 V for each measurement channel
- Additional chart recorder output 0 - 10 V programmable to several measurement channels
- RS 232 C interface with adjustable baud rate
- Relay output for error signalling
- Compact bench top enclosure (1/4 19", 3 HU)
- For fitting into 19", 3 HU racks

Connectable Sensors

THERMOVAC

- TTR 211 *)
- TTR 216 S *)
- TTR 90 *)
- TTR 91
- TTR 96 S
- TTR 100 *)
- TTR 100 S2 *)
- TTR 101
- TTR 101 S2
- TTR 911
- TTR 916

PENNINGVAC

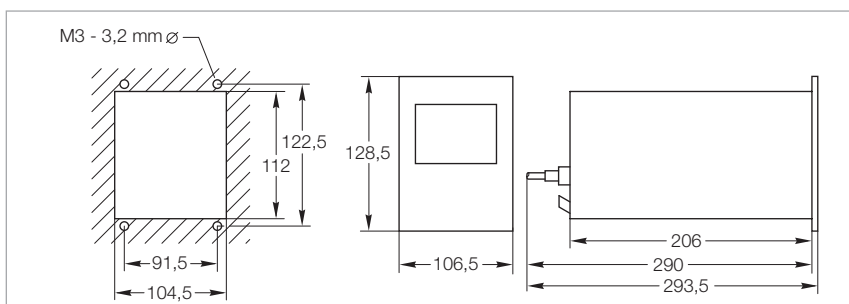
- PTR 90
- PTR 225
- PTR 225 S
- PTR 237

CERA VAC

- CTR 90 *)
- CTR 91 *)
- CTR 100
- CTR 101

IONIVAC

- ITR 90
- ITR 200 S
- ITR 200 SL



Dimensional drawing and panel cut-out for the CENTER TWO and THREE

*) Connecting of older sensors possible

Technical Data**CENTER TWO****CENTER THREE**

| | | |
|--|--|--|
| Number of measurement channels | 2 | 3 |
| Display for measured values | digital, 7 segment LED, 5 digits | digital, 7 segment LED, 5 digits |
| Measurement range mbar (Torr) | 1 x 10 ⁻¹⁰ to 2000 (0.75 x 10 ⁻¹⁰ to 1500) | 1 x 10 ⁻¹⁰ to 2000 (0.75 x 10 ⁻¹⁰ to 1500) |
| Unit of measurement (selectable) | mbar, Torr, microns, Pa | mbar, Torr, microns, Pa |
| Gas type correction | factor adjustable | factor adjustable |
| Sensor connection | 15-way Sub-D socket FCC68 (RJ45) | 15-way Sub-D socket FCC68 (RJ45) |
| Sensor power supply V DC | 24 | 24 |
| Electrical outputs | 25-way Sub-D socket | 25-way Sub-D socket |
| Switching thresholds | independently assignable | independently assignable |
| Number | 4 | 6 |
| Adjustment range | sensor dependent | sensor dependent |
| Hysteresis | adjustable | adjustable |
| Relay contact | floating changeover contact | floating changeover contact |
| Load rating | 60 V, 0.5 A DC / 30 V, 0.5 A AC | 60 V, 0.5 A DC / 30 V, 0.5 A AC |
| Error message | | |
| Relay contact | floating normally open contact | floating normally open contact |
| Load rating | 60 V, 0.5 A DC / 30 V, 0.5 A AC | 60 V, 0.5 A DC / 30 V, 0.5 A AC |
| Chart recorder output ($R_s > 10 \text{ k}\Omega$) | 0 - 10 V per measurement channel, output characteristic corresponds to the connected sensor, in addition one chart recorder output can be programmed | 0 - 10 V per measurement channel, output characteristic corresponds to the connected sensor, in addition one chart recorder output can be programmed |
| Control input | PENNINGVAC PTR: high voltage on | PENNINGVAC PTR: high voltage on |
| Interface RS 232 C | 9-way Sub-D socket | 9-way Sub-D socket |
| Mains connection V AC / Hz | 90 - 250 / 50/60 | 90 - 250 / 50/60 |
| Power consumption W | < 45 | < 65 |
| Nominal temperature range °C | +5 to +50 | +5 to +50 |
| Weight kg (lbs) | 1.1 (2.43) | 1.2 (2.65) |
| Protection class IP | 20 | 20 |

Ordering Information**CENTER TWO****CENTER THREE**

| | Part No. | Part No. |
|---|--|--|
| EURO version with 2 m EURO mains cord | 230 004 | 230 003 |
| US version with 2 m US mains cord | 235 004 | 235 003 |
| THERMOVAC, PENNINGVAC, CERA VAC and IONIVAC transmitters | see chapter "Products", para. "Active Sensors" | see chapter "Products", para. "Active Sensors" |
| Connection cables for THERMOVAC and PENNINGVAC (Type A), CERA VAC Type B analog, Type C digital) and IONIVAC (Type C) | see chapter "Products", para. "Connection Cables for Active Sensors" | see chapter "Products", para. "Connection Cables for Active Sensors" |
| Screw terminal for the 9-way output socket | 230 006 | 230 006 |

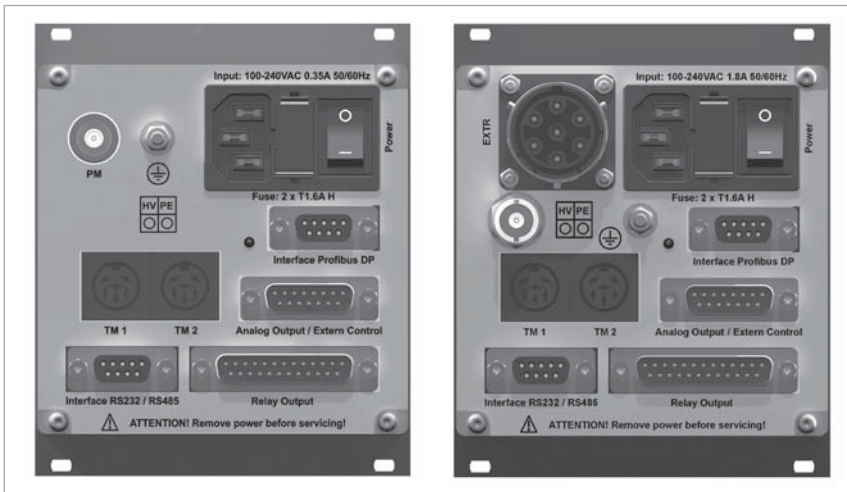
Ultra High Vacuum Operating Units and Passive Sensors

COMBIVAC CM 51/CM 52



The COMBIVAC CM 51 covers the complete pressure range between 10^{-9} and 1000 mbar by combining two measurement principles - THERMOVAC and PENNINGVAC - providing both monitoring and control functions.

The COMBIVAC CM 52 offers by combining two UHV principles of measurement (THERMOVAC absolute pressure sensor and Bayard-Alpert measurement system IE 414 or extractor measurement system IE 514) measurements of vacuum pressures in the range between 10^{-12} and 1000 mbar.



Rear side of the COMBIVAC CM 51 (left) and CM 52 (right)

Advantages to the User

- Compact 3 channel operating unit for a pressure range for passive sensors of
 - 10^{-9} to 1000 mbar (CM 51)
 - 10^{-12} to 1000 mbar (CM 52)
- Automatic switchover from THERMOVAC operation to
 - Penning (cold cathode) operation (CM 51)
 - UHV sensors (Bayard-Alpert measurement system IE 414 or extractor measurement system IE 514 (CM 52)
- Measurement cable lengths up to 100 meters are possible depending on the type of application
- Easy to operate
- Keyboard locking through SOFT-LOCK
- Two adjustable switching thresholds with a relay contact for each measurement channel
- Logarithmic chart recorder output 0 - 10 V or 2 - 10 V
- Wide range power supply 100 - 240 V
- Unit of pressure selectable between mbar, Torr und Pascal
- Compact, rugged Penning sensor insensitive to operation at high pressures (see para. "Sensors")
- Aligned and temperature compensated THERMOVAC sensors (see para. "Sensors")
- Cost-effective replacement sensors and electrodes
- Error message for each channel, for example in the case of broken filament, defective sensor line or failed plasma discharge
- Compact benchtop enclosure (1/4 19", 3 HU) made of metal for installation in front panel cut outs and 19" racks
- RS 232 C and Profibus interface
- CE mark
- RoHS-compliant

Typical Applications

- Universal monitoring the operation of high vacuum pump systems like:
 - Turbomolecular pump systems
 - Diffusion pump systems
 - Cryogenic pump systems
- Annealing, melting, brazing and hardening furnaces
- Coating systems
- Analytical instrumentation
- Deployment in thermal radiation resistant and degassable systems is possible
- Particle accelerators

Connectable Sensors

THERMOVAC

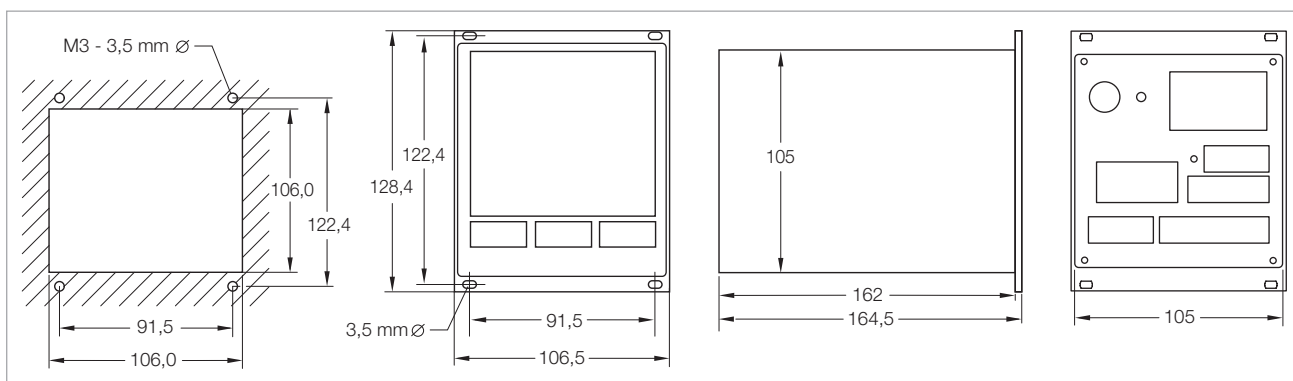
- TR 211
- TR 211 NPT
- TR 212
- TR 216

PENNINGVAC (only CM 51)

- PR 25
- PR 26
- PR 27
- PR 28

IONIVAC (only CM 52)

- IE 414
- IE 514



Front panel cut-out (left) and dimensional drawing (right) for the COMBIVAC CM 51 and CM 52

Technical Data

COMBIVAC

CM 51

CM 52

| Number of measurement channels | | 3 | 3 |
|----------------------------------|-------------|--|--|
| Measurement range | | | |
| Channel 1, 2 (THERMOVAC) | mbar (Torr) | 5 x 10 ⁻⁴ to 1000 (3.5 x 10 ⁻⁴ to 750) | 5 x 10 ⁻⁴ to 1000 (3.5 x 10 ⁻⁴ to 750) |
| Channel 3 (PENNINGVAC) | mbar (Torr) | 10 ⁻⁹ to 10 ⁻² (10 ⁻⁹ to 10 ⁻²) | – |
| Channel 3 | | | |
| (IE 414 Bayard-Alpert) | mbar (Torr) | – | 2 x 10 ⁻¹¹ to 1 x 10 ⁻² (1.5 x 10 ⁻¹¹ to 0.75 x 10 ⁻²) |
| (IE 514 Extractor) | mbar (Torr) | – | 2 x 10 ⁻¹² to 1 x 10 ⁻⁴ (1.5 x 10 ⁻¹² to 0.75 x 10 ⁻⁴) |
| Unit of measurement (selectable) | | mbar, Torr, Pa | mbar, Torr, Pa |
| Measurement uncertainty | | | |
| THERMOVAC | | ≤ 20% of the measured value in the range 10 ⁻³ to 10 ⁻² mbar (± 20%) in the range 10 ⁻² to 10 ² mbar (± 15%) | ≤ 20% of the measured value in the range 10 ⁻³ to 10 ⁻² mbar (± 20%) in the range 10 ⁻² to 10 ² mbar (± 15%) |
| PENNINGVAC | | ± 30% of the measured value in the range 10 ⁻⁸ to 10 ⁻⁴ mbar | – |
| IE 414/514 | | – | ± 10% of the displayed value (however, this value may increase depending on the type of application) |
| Measurement cable | m | up to 100 (application dependent) | up to 100 (application dependent) |
| Display for measured values | | digital, 7 segment LED, 4 digit mantissa and 2 digit exponent | digital, 7 segment LED 4 digit mantissa and 2 digit exponent |
| Type of gas (selectable) | | factor adjustable | factor adjustable |
| Switching thresholds | | 2 per channel | 2 per channel |
| Operating mode | | single, interval-trigger | single, interval-trigger |
| Adjustable switching thresholds | | | |
| THERMOVAC | mbar (Torr) | 5 x 10 ⁻³ to 500 (5 x 10 ⁻³ to 375) | 5 x 10 ⁻³ to 500 (5 x 10 ⁻³ to 375) |
| PENNINGVAC | mbar (Torr) | 1 x 10 ⁻⁸ to 9.9 x 10 ⁻³ (0.75 x 10 ⁻⁸ to 7.4 x 10 ⁻³) | – |
| Bayard-Alpert | mbar (Torr) | – | 1 x 10 ⁻⁸ to 5 x 10 ⁻³ (0.75 x 10 ⁻⁸ to 3.75 x 10 ⁻³) |
| Extractor | mbar (Torr) | – | 1 x 10 ⁻¹¹ to 1 x 10 ⁻¹¹ (0.75 x 10 ⁻¹¹ to 0.75 x 10 ⁻¹¹) |
| Switching relay hysteresis | | 10% of the trigger value (default), freely adjustable for THERMOVAC and PENNINGVAC | 10% of the trigger value (default), freely adjustable for THERMOVAC and IE 414 or 514 |
| Relay contact load rating | | AC/DC, max. 30 V / 1 A | AC/DC, max. 30 V / 1 A |
| Chart recorder output (default) | | | |
| THERMOVAC | | 0 to 10 V, log. divisions linear: 3 decades, approximately 10.5 V in case of a failure, logarithmic: (1 x 10 ⁻³ mbar), 1.67 V/decade | 0 to 10 V, log. divisions linear: 3 decades, approximately 10.5 V in case of a failure logarithmic: (1 x 10 ⁻³ mbar), 1.67 V/decade |
| PENNINGVAC | | logarithmic: (1 x 10 ⁻⁹ mbar), 1.43 V/ decade | – |
| IE 414 or 514 | | – | logarithmic: (1 x 10 ⁻¹² mbar), 1.00 V/decade |
| Interface | | RS 232 C, RS 485 and Profibus | RS 232 C, RS 485 and Profibus |
| Mains connection 50/60 Hz | V AC | 100 - 240 | 100 - 240 |
| Power consumption | W | < 10 | 65 |
| Storage temperature range | °C | -20 to +60 | -20 to +65 |
| Nominal temperature range | °C | +5 to +50 | +5 to +50 |
| Max. rel. humidity | % n.c. | 80 | 80 |
| Weight | kg (lbs) | 1.4 (3.09) | 1.4 (3.09) |
| Dimension (W x H x D) | mm | 106.4 x 128.5 x 164.5 | 106.4 x 128.5 x 164.5 |
| Installation depth | mm | approx. 220 | approx. 220 |
| Protection class | IP | 40 | 40 |

Ordering Information

COMBIVAC

| | CM 51 | CM 52 |
|--|----------------------------------|----------------------------------|
| | Part No. | Part No. |
| Operating unit COMBIVAC CM 51/52 including EURO and US mains cord, 2 m with RS 232 C / 485 with Profibus DB | 230 110 230 111 | 230 115 230 116 |
| Cable adapter CM 31 - CM 51 | 230 112 V01 | – |
| Options | | |
| 19" installation frame | 161 00 | 161 00 |
| 1/4 19" blank panel | 161 02 | 161 02 |
| THERMOVAC sensors for CM 51/52 | | |
| TR 211, DN 16 ISO-KF | 157 85 | 157 85 |
| TR 211, 1/8" NPT | 896 33 | 896 33 |
| TR 212, DN 16 ISO-KF | 158 52 | 158 52 |
| TR 212, DN 16 CF | 157 86 | 157 86 |
| TR 216, DN 16 ISO-KF | 157 87 | 157 87 |
| Gauge head cables for TR sensors | | |
| 5 m | 162 26 | 162 26 |
| 10 m | 162 27 | 162 27 |
| 15 m | 124 34 | 124 34 |
| 20 m | 162 28 | 162 28 |
| 30 m | 124 35 | 124 35 |
| 50 m | 124 37 | 124 37 |
| 75 m | 124 38 | 124 38 |
| 100 m | 124 39 | 124 39 |
| PENNINGVAC sensors for CM 51 | | |
| PR 25, DN 25 ISO-KF | 157 52 | – |
| PR 26, DN 40 ISO-KF | 136 46 | – |
| PR 27, DN 40 CF | 136 47 | – |
| PR 28, DN 40 CF, bakeable | 136 48 | – |
| Gauge cables for PR sensors | | |
| 5 m | 162 88 | – |
| 10 m | 162 89 | – |
| 15 m | 124 49 | – |
| 20 m | 157 56 | – |
| 30 m | 124 50 | – |
| 50 m | 124 52 | – |
| 75 m | 124 53 | – |
| 100 m | 124 54 | – |
| IONIVAC sensors for CM 52 | | |
| IE 414, DN 40 CF | – | 158 66 |
| IE 514, DN 40 CF | – | 158 67 |
| Mains cable | | |
| 3 m (US) | 800 102 V1002 | 800 102 V1002 |
| Gauge head cables for IE sensors | | |
| 5 m | – | 158 68 |
| 10 m | – | 150 88 |
| 15 m | – | 230 670 V01 |
| 5 m, bakeable to 200 °C | – | 158 44 |
| 10 m, bakeable to 200 °C | – | 230 671 V01 |
| Extension cables for IE 414/514 | | |
| 10 m | – | 245 002 |
| 20 m | – | 200 02 937 |
| 50 m | – | 245 010 V01 |
| up to 100 m (application dependent) | – | upon request |

THERMOVAC Sensors

TR 211 / TR 211 NPT / TR 212 / TR 216



These passive sensors use thermal conductivity technology according to Pirani.

Advantages to the User

- Measurement range 5×10^{-4} to 1000 mbar (3.75×10^{-4} to 750 Torr)
- Tungsten or platinum filament
- Cost-effective sensing cell
- Fully aligned and temperature compensated 0 to +40 °C
- Constant filament temperature

TR 211

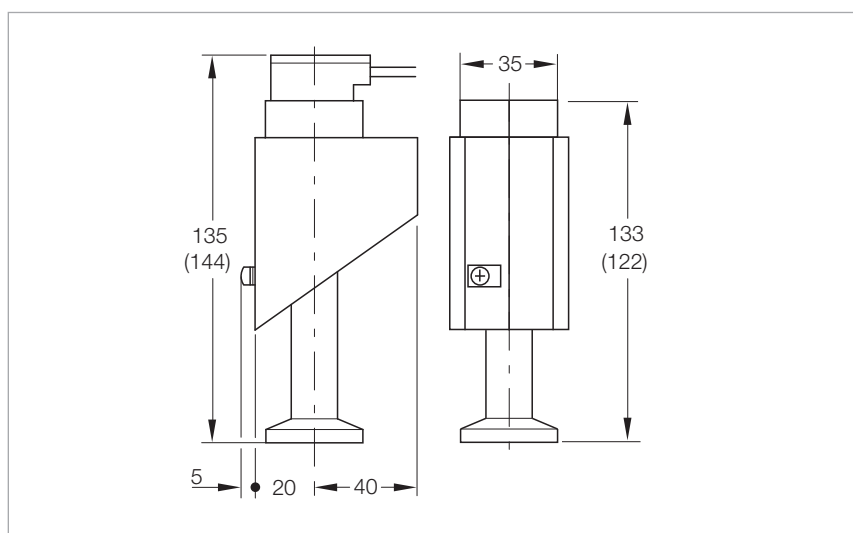
- Aluminum sensing cell with tungsten filament
- Improved temperature compensation

TR 211 NPT/TR 212

- Stainless steel sensing cell with tungsten filament
- Overpressure resistant

TR 216

- Stainless steel sensing cell with platinum filament and ceramics feed through
- Well suited for corrosive processes and water vapor atmospheres



Dimensional drawing for the TR 211, TR 212 and TR 216; TR 211 NPT in brackets

Technical Data**TR 211****TR 211 NPT****TR 212****TR 216**

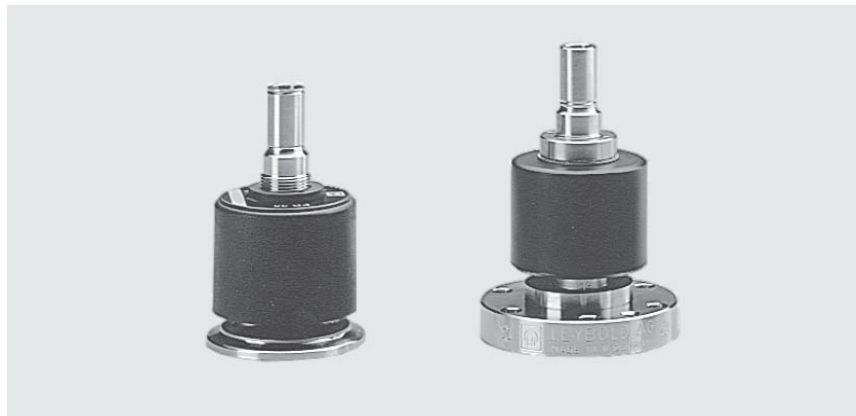
| | | | | | |
|--|-----------------|--|--|--|---|
| Measurement range | mbar (Torr) | 5 x 10 ⁻⁴ to 1000 (3.8 x 10 ⁻⁴ to 7.5 x 10 ²) | 5 x 10 ⁻⁴ to 1000 (3.8 x 10 ⁻⁴ to 7.5 x 10 ²) | 5 x 10 ⁻⁴ to 1000 (3.8 x 10 ⁻⁴ to 7.5 x 10 ²) | 5 x 10 ⁻⁴ to 1000 (3.8 x 10 ⁻⁴ to 7.5 x 10 ²) |
| Operating temperature range (compensated) | °C | 0 to +40 | 0 to +40 | 0 to +40 | 0 to +40 |
| Storage temperature range, max. | °C | 80 | 80 | 80 | 80 |
| Filament | | Tungsten | Tungsten | Tungsten | Platin |
| Filament temperature | °C | 110 | 110 | 110 | 110 |
| Permissible overload (abs.), max. | bar | 3 | 3 | 10 | 10 |
| Volume of the sensing cell, approx. | cm ³ | 11 | 11 | 11 | 11 |
| Vacuum connection | DN | 16 ISO-KF | 1/8" NPT | 16 ISO-KF/16 CF | 16 ISO-KF |
| Materials in contact with the medium | | Aluminum, Vacon, Glass, Tungsten CrNi 8020, | Stainless steel, Vacon, Glass, Tungsten CrNi 8020 epoxy cement | Stainless steel, Vacon, Glass, Tungsten CrNi 8020 | Stainless steel 1.4301 (SS 304), Al ₂ O ₃ ² , CrNi 8020, Platinum |
| Operating units | | THERMOVAC TM 21, 22, 23 / COMBIVAC CM 31, 32, 33, 51 / PIEZOVAC PV 20 | THERMOVAC TM 21, 22, 23 / COMBIVAC CM 31, 32, 33, 51 / PIEZOVAC PV 20 | THERMOVAC TM 21, 22, 23 / COMBIVAC CM 31, 32, 33, 51 / PIEZOVAC PV 20 | THERMOVAC TM 21, 22, 23 / COMBIVAC CM 31, 32, 33, 51 / PIEZOVAC PV 20 |

Ordering Information**TR 211****TR 211 NPT****TR 212****TR 216**

| | Part No. | Part No. | Part No. | Part No. |
|------------------------------|-----------------|-----------------|---------------|-----------------|
| THERMOVAC sensors Series 200 | | | | |
| DN 16 ISO-KF | 157 85 | - | 158 52 | 157 87 |
| DN 16 CF | - | - | 157 86 | - |
| DN 1/8" NPT | - | 896 33 | - | - |
| Replacement sensing cell | E 157 75 | E 896 34 | - | E 157 77 |

PENNINGVAC Sensors

PR 25 / PR 26 / PR 27 / PR 28



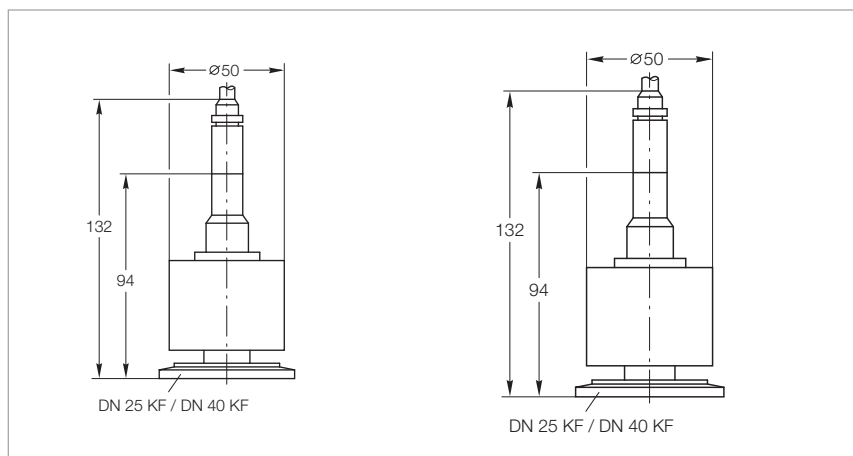
These passive sensors use cold cathode ionization technology according to Penning.

Advantages to the User

- Rugged
- Insensitive to air inrushes and vibrations
- Easy disassembly and cleaning of the measurement system
- Exchangeable cathode plate
- Improved ignition characteristic through titanium cathodes

Option

For protection of the PENNINGVAC sensors against contamination, radiation and other disturbing factors the installation of a baffle is recommended.



Dimensional drawing for the PENNINGVAC PR sensors

Technical Data**PR 25****PR 26****PR 27****PR 28**

| | | | | | |
|---------------------------------------|-----------------|--|--|--|--|
| Measurement range | mbar (Torr) | 1 x 10 ⁻⁹ to 10 ⁻² (0.75 x 10 ⁻⁹ to 10 ⁻²) | 1 x 10 ⁻⁹ to 10 ⁻² (0.75 x 10 ⁻⁹ to 10 ⁻²) | 1 x 10 ⁻⁹ to 10 ⁻² (0.75 x 10 ⁻⁹ to 10 ⁻²) | 1 x 10 ⁻⁹ to 10 ⁻² (0.75 x 10 ⁻⁹ to 10 ⁻²) |
| High voltage supply (anode potential) | | | | | |
| Trigger voltage | kV | 3.3 | 3.3 | 3.3 | 3.3 |
| Operation voltage | kV | 1.6 | 1.6 | 1.6 | 1.6 |
| Storage temperature range | °C | -25 to +80 | -25 to +80 | -25 to +80 | -25 to +80 |
| Nominal temperature range | °C | 0 to +80 | 0 to +80 | 0 to +80 | 0 to +200 |
| Bake out temperature (flange) | °C | – | – | – | 200 |
| Permissible overload (abs.) | bar | 6 ¹⁾ | 6 ¹⁾ | 6 ¹⁾ | 6 ¹⁾ |
| Dead volume | cm ³ | 21 | 21 | 21 | 21 |
| Materials in contact with the medium | | Stainless steel, Nichrome, Ceramics, Titanium | Stainless steel, Nichrome, Ceramics, Titanium | Stainless steel, Nichrome, Ceramics, Titanium | Stainless steel, Nichrome, Ceramics, Titanium |
| Weight, approx. | kg (lbs) | 0.75 (1.66) | 0.75 (1.66) | 0.8 (1.66) | 0.8 (1.66) |
| Vacuum connection | DN | 25 ISO-KF | 40 ISO-KF | 40 CF | 40 CF |
| Operating units | | COMBIVAC CM 31, 32, 33, 51 / PENNINGVAC PM 31 | COMBIVAC CM 31, 32, 33, 51 / PENNINGVAC PM 31 | COMBIVAC CM 31, 32, 33, 51 / PENNINGVAC PM 31 | COMBIVAC CM 31, 32, 33, 51 / PENNINGVAC PM 31 |

Ordering Information**PR 25****PR 26****PR 27****PR 28**

| | Part No. | Part No. | Part No. | Part No. |
|---|-------------------|-------------------|-------------------|-------------------|
| PENNINGVAC sensors | 157 52 | 136 46 | 136 47 | 136 48 |
| Replacement cathode plate, titanium (5 pcs., incl. 5 ceramics discs) | EK 162 91 | EK 162 91 | EK 162 91 | EK 162 91 |
| Replacement anode ring | 200 28 711 | 200 28 711 | 200 28 711 | 200 28 711 |
| Baffle, with centering ring (FPM (FKM)) | | | | |
| DN 25 | 230 078 | – | – | – |
| DN 40 | – | 230 079 | – | – |

¹⁾ When using an ultra sealing gasket at the vacuum connection

Note:

PR 26 replaces PR 31, 32, 35

PR 27 replaces PR 36

IONIVAC IM 540



The 3-channel display and operating unit IONIVAC IM 540 offers, by combination of up to 4 different principles of measurement - Pirani, capacitive, Bayard-Alpert and Extractor -, complete coverage and control of the vacuum pressure in the range between 10^{-12} mbar and atmospheric pressure.

Advantages to the User

- Precise UHV pressure measurements with the Bayard-Alpert sensor IE 414 (offering excellent longterm stability) or the Extractor sensor IE 514 (offering an extremely low X-ray limit of $< 1 \times 10^{-12}$ mbar)
- 1 measurement channel for IONIVAC sensor (Bayard-Alpert or Extractor)
- Possibility of simultaneously connecting a second IONIVAC sensor
- Degassing of the anode through electron bombardment with time-limit
- Continuous UHV measurement also during the degassing phase (up to $+250^\circ\text{C}$ with bakeable gauge head cable)
- 2 measurement channels for direct connection of transmitters from the series THERMOVAC TTR and CERA VAC CTR
- Selectable pressure units (mbar, Torr, Pascal, Micron)
- Display of a single measurement channel with pressure trend through analogue bargraph or simultaneous display of all measurement channels
- Two adjustable thresholds with adjustable hysteresis and freely assignable to the measurement channels
- Compact benchtop enclosure (1/2 19", 3 HU)
- RS 232 C interface provided as standard
- Simple software updates possible through the RS 232 interface
- Profibus interface (optional)
- CE mark

Typical Applications

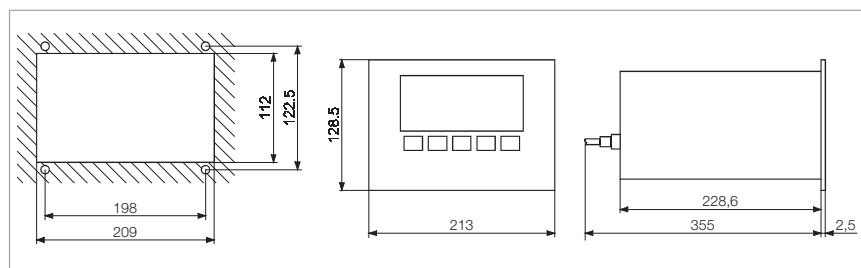
- Pressure measurement and control in the UHV range
- Measurement of ultimate pressure in UHV systems
- Checking of ultimate pressure in semiconductor production
- Total pressure measurements in the area of cryo technology
- Total pressure measurements in calibration systems

Connectable Sensors

- Bayard-Alpert sensor IE 414
- Extractor sensor IE 514 (see Chapter "Additional Sensors") combined with
- THERMOVAC TTR 211, TTR 216 S, TTR 90, TTR 91 and TTR 96 S
- CERA VAC CTR 90, CTR 91 and CTR 100 (see Chapter "Active Sensors")

Two passive sensors working with ionization technology (IE 414 and/or IE 514) could be connected simultaneously to the IONIVAC IM 540 while only one is in operation.

A pressure dependent emission control of these sensors is possible if a THERMOVAC TTR or CERA VAC CTR 100/CTR 91 of suitable range overlap is connected



Front panel cut-out (left) and dimensional drawing (right) for the IONIVAC IM 540

Technical Data

IONIVAC IM 540

| | | |
|--|-------------|---|
| Number of measurement channels | | 3 |
| Bayard-Alpert / Extractor | | Channel 1 or 2 |
| THERMOVAC / CERA-VAC | | Channel 3 and 4 |
| Measurement range | mbar (Torr) | 1×10^{-12} to 1100 (0.75×10^{-12} to 825) |
| Measurement range Extractor | mbar (Torr) | 1×10^{-12} to 1×10^{-4} (0.75×10^{-12} to 0.75×10^{-4}) |
| Measurement range Bayard-Alpert | mbar (Torr) | 1×10^{-11} to 1×10^{-2} (0.75×10^{-11} to 0.75×10^{-2}) |
| Measurement range switching | | automatic or decade pre-select |
| Units of measurement (selectable) | | mbar, Torr, microns, Pa |
| Measurement uncertainty | % | ± 10 of the value displayed |
| Trend indication | | bargraph |
| Measurement value display rate | | 1×10^{-10} to 1×10^{-2} mbar, 5 s^{-1} 1×10^{-12} to 1×10^{-10} mbar, 0.5 s^{-1} |
| Emission current | | |
| Extractor sensor | mA | 1.6 |
| Bayard-Alpert sensor | mA | 0.1 to 10; automatic control |
| Emission current shutdown at | | $p > 1 \times 10^{-2}$ mbar, broken cathode, short-circuit, interruption of the electric circuit |
| Bake out power | | |
| Extractor / Bayard-Alpert | W | 20 / 40 |
| Sensor power supply, potential for | | anode Extractor / Bayard-Alpert: 220 V, cathode Extractor / Bayard-Alpert: 100 V/80 V, Reflector Extractor: 205 V |
| Sensor connections | | Bayard-Alpert and Extractor - single operation is possible 2 x Bayard-Alpert or Extractor (redundant operation) |
| Measurement system detection | | automatically |
| Measurement system switchover | | automatically, pressure dependent, error dependent |
| Chart recorder outputs | | logarithmic 0 to 10 V (1 V / dec.) or linear 0 to 10 Volt error indication $U > 10.5 \text{ V}$ |
| Extractor / Bayard-Alpert ($R_a = 2,5 \text{ k}\Omega$) | | |
| Interface (standard / optional) | | RS 232 C / Profibus |
| Switching thresholds (single operation or interval) | | 2 with floating changeover contact |
| Mains connection | V AC / Hz | 90 - 264 / 50/60 |
| Storage temperature range | °C | -40 to +60 |
| Nominal temperature range | °C | +5 to +50 |
| Dimensions of the benchtop instrument (W x H x D) | mm | 213 x 128,5 x 250 |
| Weight, approx. | kg (lbs) | 3.0 (6.62) |

Ordering Information

IONIVAC IM 540

| | Part No. |
|---|---|
| IONIVAC IM 540 with mains cord 2 m (EURO and US) | 230 100 |
| Options Profibus DP interface | 230 101 |
| Calibration | see chapter "Miscellaneous", para. "Oerlikon Leybold Vacuum Calibration Service" |
| IONIVAC sensors IE 414, DN 40 CF Replacement cathode IE 414 IE 514, DN 40 CF Replacement cathode IE 514 | 158 66 158 63 158 67 158 61 |
| Gauge head cables for IE 414/514 5 m 10 m 15 m 5 m, bakeable to 200 °C 10 m, bakeable to 200 °C | 158 68 150 88 230 670 V01 158 44 230 671 V01 |
| Extension cables for IE 414/514 10 m 20 m | 245 002 200 02 937 |
| THERMOVAC transmitter TTR | see chapter "Products", para. "Active Sensors" |
| Connection cable for THERMOVAC (Type A) | see chapter "Products", para. "Connection Cable for Active Sensors" |
| CERAVAC transmitter CTR | see chapter "Products", para. "Active Sensors" |
| Connection cable for CERAVAC (Type B) | see chapter "Products", para. "Connection Cable for Active Sensors" |

IONIVAC Sensors IE 414 and IE 514



These passive sensors use hot cathode ionization technology.

IE 414

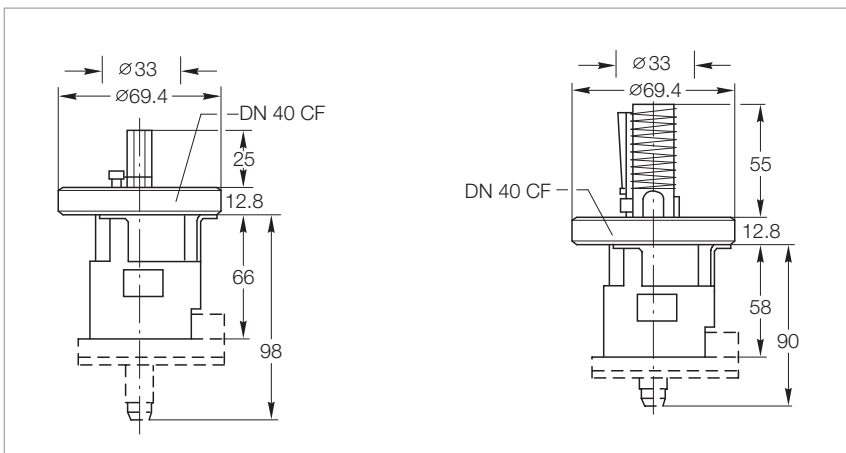
- Bayard-Alpert sensing system
- Measurement range to 2×10^{-11} mbar (1.5×10^{-11} Torr)
- Protection shield welded in place

IE 514

- Extractor sensing system
- Reliable to 1×10^{-12} mbar (0.75×10^{-12} Torr)
- Significant reduction of X-ray and ion desorption effects

Advantages to the User

- Exchangeable cathode
- High accuracy of the measurements due to individually calibrated sensing system



Dimensional drawing for the IE 414 (left) and IE 514 (right)

Technical Data**IE 414****IE 514**

| | | | |
|---|--------------------|---|---|
| Measurement range | mbar (Torr) | 2×10^{-11} to 10^{-2} (1.5×10^{-11} to 10^{-2}) | 10^{-12} to 1×10^{-4} (10^{-12} to 7.5×10^{-5}) |
| X-ray limit | mbar (Torr) | $\leq 10^{-11}$ ($\leq 10^{-11}$) | $\leq 10^{-12}$ ($\leq 10^{-12}$) |
| Operating temperature range | °C | 0 to +80 | 0 to +80 |
| Degassing temperature at the flange, max. | °C | 200 ¹⁾ / 350 ²⁾ | 200 ¹⁾ / 350 ²⁾ |
| Material | | | |
| Cathode | | Iridium with yttric oxid coating | Iridium with yttric oxid coating |
| Feedthrough pins | | NiFe 42 | NiFe 42 |
| Anode | | Pt/Ir 90/10/pt wire | Mo and CoNiCr |
| Vacuum connection | DN | 40 CF | 40 CF |
| Adjustment data | | | |
| Ion detector potential | V | 0 | 0 |
| Cathode potential | V | 80 | 100 |
| Anode potential | V | 220 | 220 |
| Emission current | mA | 0.06 to 0.6 | 1.6 |
| Heating current for the hot cathode | A | 1.4 | 1.4 |
| Heating current for the hot cathode | V | .7 | 3.7 |
| Heating current for the hot cathode | mbar ⁻¹ | 17.0 | 6.6 |
| Bake out operation, Electron bombardment | V / mA | 700 / 30 | 700 / 30 |
| Operating units | | IM 520, 510, 540 | IM 520, 510, 540 |

Ordering Information**IE 414****IE 514**

| | Part No. | Part No. |
|---------------------|---------------|---------------|
| IONIVAC sensors | 158 66 | 158 67 |
| Replacement cathode | 158 63 | 158 61 |

¹⁾ With bakeable gauge head cable

²⁾ With gauge head cable detached

Additional Sensors

Linear Pressure Sensors

DI/DU 200, DI/DU 201, DI/DU 2000,
DI/DU 2001, DI/DU 2001 rel.



DI 200 (left) and DI 2000 (right), DU similar

Piezo or capacitive pressure sensor based on ceramics technology. Available as absolute alternatively relative pressure sensor.

Advantages to the User

- Absolute pressure ranges from 0.1 to 200 mbar or 1 to 2000 mbar
- Relative pressure range from -1000 mbar to +1000 mbar
- Excellent overload characteristic due to the Al_2O_3 ceramics dia-phragm
- Highly corrosion resistant
- Independent of the type of gas
- Vibration resistant
- 2-wire pressure sensor (DI)
- 4-wire pressure sensor (DU)
- Supply voltage range
12 to 30 V DC (DI)
14.5 to 30 V DC (DU)
- Linear output signal 4 to 20 mA (DI)
- Linear output signal 2 to 10 V (DU)
- Compact design
- Digital zero adjustment possible via pushbutton
- IP 54 rated stainless steel housing (DI/DU 200 und DI/DU 201),
IP 54 rated aluminum housing (DI/DU 2000 und DI/DU 2001)
- DN 16 ISO-KF connection with female G 1/4" inside thread

Typical Applications

- Pressure measurements in the rough vacuum range, and for corrosive media (Solar, coating)
- Chemical process engineering
- Vacuum packaging
- Drying processes
- Casting resin technology (degassing of potting compounds)
- Measurement of operating and filling pressure, during the production of lamps
- Filling systems for brake fluids (DI 201/DI 2001)
- Filling systems for refrigerants
- Measurement of pressure relative to atmospheric pressure (DI/DU 2001 rel.)

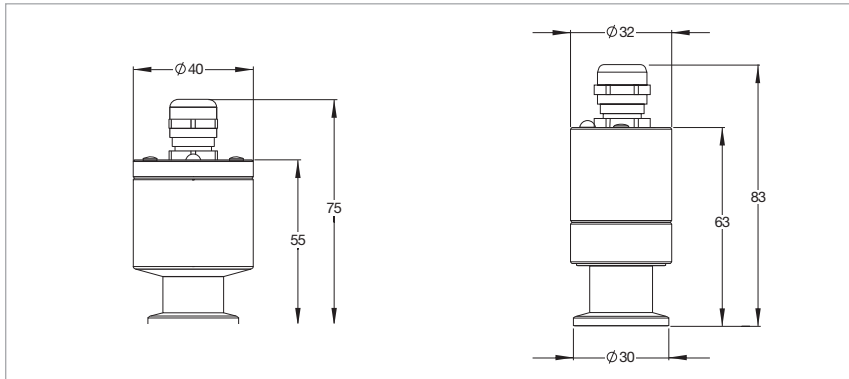
Operating Units for DU sensors

DISPLAY

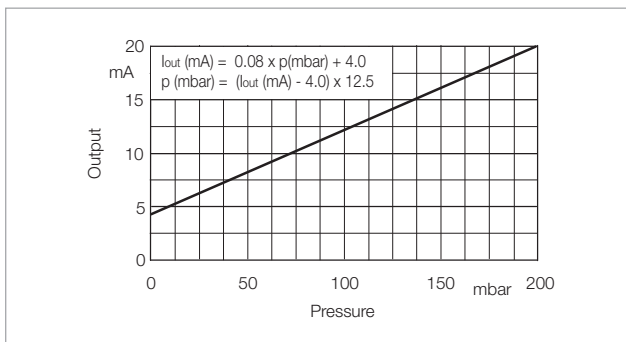
- ONE
- TWO
- THREE

CENTER

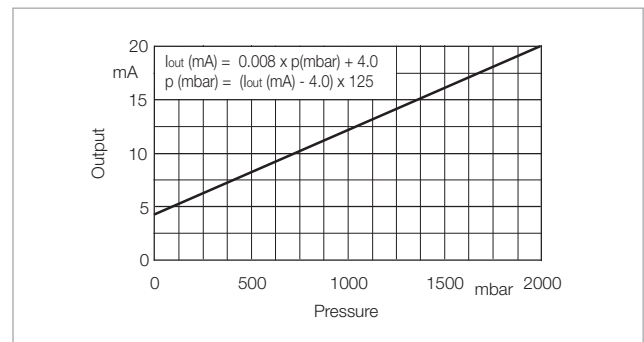
- ONE
- TWO
- THREE



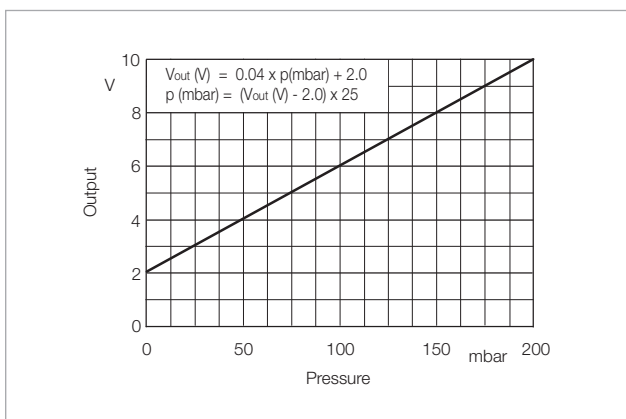
Dimensional drawing for the sensors
DI/DU 200 and DI/DU 201 (left), DI/DU 2000 and DI/DU 2001 (right)



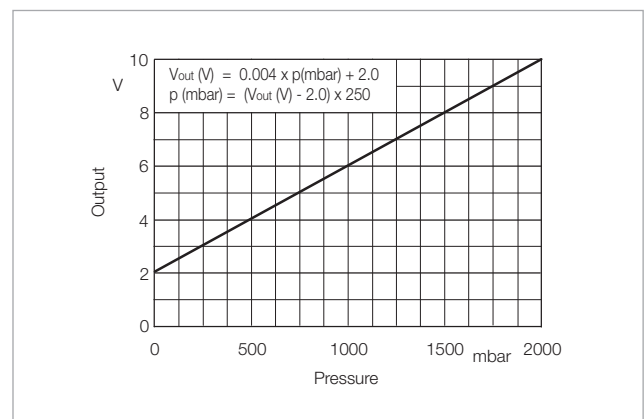
Characteristic of the DI 200 and DI 201 Sensors



Characteristic of the DI 2000 and DI 2001 Sensors



Characteristic of the DU 200 and DU 201 Sensors



Characteristic of the DU 2000 and DU 2001 Sensors

Technical Data

DI/DU 200

DI/DU 201

DI/DU 2000

DI/DU 2001

DI/DU 2001 rel.

| | | | | | | |
|--|-----------------|---|--|---|--|--|
| Measurement range | mbar (Torr) | 0.1 to 200 (0.075 to 150) | 0.1 to 200 (0.075 to 150) | 1 to 2000 (0.75 to 1500) | 1 to 2000 (0.75 to 1500) | -1000 to +1000 (-750 to +750) relative pressure |
| Overload range, max. (flange side) | bar | 6 | 6 | 5 | 5 | 5 |
| Nominal temperature range | °C | 0 to +60 | 0 to +60 | 0 to +60 | 0 to +60 | 0 to +60 |
| Measurement uncertainty ¹⁾ | % FS | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 ³⁾ |
| Repeatability | % FS | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Temperature error | | | | | | |
| Zero drift | % FS/10°K | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Sensitivity drift | % FS/10°K | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Measurement principle, gas type independent | | Capacitive | Capacitive | Piezoresistive | Piezoresistive | Piezoresistive |
| Sensing head supply | | | | | | |
| DI | | Two-wire system | Two-wire system | Two-wire system | Two-wire system | Two-wire system |
| DU | | Four-wire system | Four-wire system | Four-wire system | Four-wire system | Four-wire system |
| Output signal | | | | | | |
| DI | mA | 4 to 20 | 4 to 20 | 4 to 20 | 4 to 20 | 4 to 20 |
| DU | V | 2 to 10 | 2 to 10 | 2 to 10 | 2 to 10 | 2 to 10 |
| Supply voltage | | | | | | |
| Operating range | | | | | | |
| DI | V DC | 12 to 30 | 12 to 30 | 12 to 30 | 12 to 30 | 12 to 30 |
| DU | V DC | 14.5 to 30 | 14.5 to 30 | 14.5 to 30 | 14.5 to 30 | 14.5 to 30 |
| Dead volume | cm ³ | 3,9 | 3,9 | 1,8 | 1,8 | 1,8 |
| Vacuum connection | DN | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF | 16 ISO-KF |
| Electrical connection | | | | | | |
| DI | | diode plug 7pole, cable 5 m | diode plug 7pole, cable 5 m | diode plug 7pole, cable 5 m | diode plug 7pole, cable 5 m | diode plug 7pole, cable 5 m |
| DU | | plug FCC 68, cable 5 m | plug FCC 68, cable 5 m | plug FCC 68, cable 5 m | plug FCC 68, cable 5 m | plug FCC 68, cable 5 m |
| Weight, approx. | | | | | | |
| DI | kg (lbs) | 0.36 (0.79) | 0.36 (0.79) | 0.26 (0.57) | 0.26 (0.57) | 0.26 (0.57) |
| DU | kg (lbs) | 0.34 (0.75) | 0.34 (0.75) | 0.24 (0.53) | 0.24 (0.53) | 0.24 (0.53) |
| Protection class | IP | 54 | 54 | 54 | 54 | 54 |
| Materials in contact with the medium | | Stainless Steel 1.4305 Al ₂ O ₃ (96 %) Ceramics FPM (FKM) | Stainless Steel 1.4305 Al ₂ O ₃ (96 %) Ceramics EPDM | Stainless Steel 1.4305 Al ₂ O ₃ (96 %) Ceramics FPM (FKM) | Stainless Steel, 1.4305 Al ₂ O ₃ (96 %) Ceramics, EPDM | Stainless Steel 1.4305 Al ₂ O ₃ (96 %) Ceramics EPDM |
| Operating units | | | | | | |
| DI series | | – | – | – | – | – |
| DU series ²⁾ | | DISPLAY ONE, TWO, THREE CENTER ONE, TWO, THREE | DISPLAY ONE, TWO, THREE CENTER ONE, TWO, THREE | DISPLAY ONE, TWO, THREE CENTER ONE, TWO, THREE | DISPLAY ONE, TWO, THREE CENTER ONE, TWO, THREE | DISPLAY ONE, TWO, THREE CENTER ONE, TWO, THREE |

¹⁾ Sum of linearity, hysteresis and reproducibility

²⁾ May possibly require a firmware update

³⁾ 0.25 % FS in the range of -1000 ... + 200 mbar / 0.5 % FS in the range of > +200 mbar

Ordering Information

DI 200

DI 201

DI 2000

DI 2001

DI 2001 rel.

| | Part No. | Part No. | Part No. | Part No. | Part No. |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|
| Linear sensor DI complete with 5 m long connection cable and connecting plug (circular connector) | 158 12V01 | 158 14V01 | 158 13V01 | 158 15V01 | 245 000V01 |
| Extension cable circular connector, 7-pole socket/plug | | | | | |
| 10 m | 200 04 112 | 200 04 112 | 200 04 112 | 200 04 112 | 200 04 112 |
| 20 m | 200 02 645 | 200 02 645 | 200 02 645 | 200 02 645 | 200 02 645 |

Ordering Information

DU 200

DU 201

DU 2000

DU 2001

DU 2001 rel.

| | Part No. | Part No. | Part No. | Part No. | Part No. |
|---|--|------------------|------------------|------------------|------------------|
| Linear sensor DU complete with 5 m long connection cable and connecting plug (FCC68) | 230500V01 | 230501V01 | 230502V01 | 230503V01 | 230504V01 |
| Extension cable FCC68, socket/plug | | | | | |
| 10 m | 230505V01 | 230505V01 | 230505V01 | 230505V01 | 230505V01 |
| 20 m | 230506V01 | 230506V01 | 230506V01 | 230506V01 | 230506V01 |
| Operating unit | | | | | |
| DISPLAY ONE | 230 001 | 230 001 | 230 001 | 230 001 | 230 001 |
| DISPLAY TWO | 230 024 | 230 024 | 230 024 | 230 024 | 230 024 |
| DISPLAY THREE | 230 025 | 230 025 | 230 025 | 230 025 | 230 025 |
| CENTER ONE | see chapter "Products", "Operating Units for Active Sensors" | | | | |
| CENTER TWO | see chapter "Products", "Operating Units for Active Sensors" | | | | |
| CENTER THREE | see chapter "Products", "Operating Units for Active Sensors" | | | | |

Older Sensors / Replacement Sensors



Linear pressure sensor



Replacement sensor TTR 211



Replacement sensor TTR 216

Type

Corresponding Sensors/ Operating Units

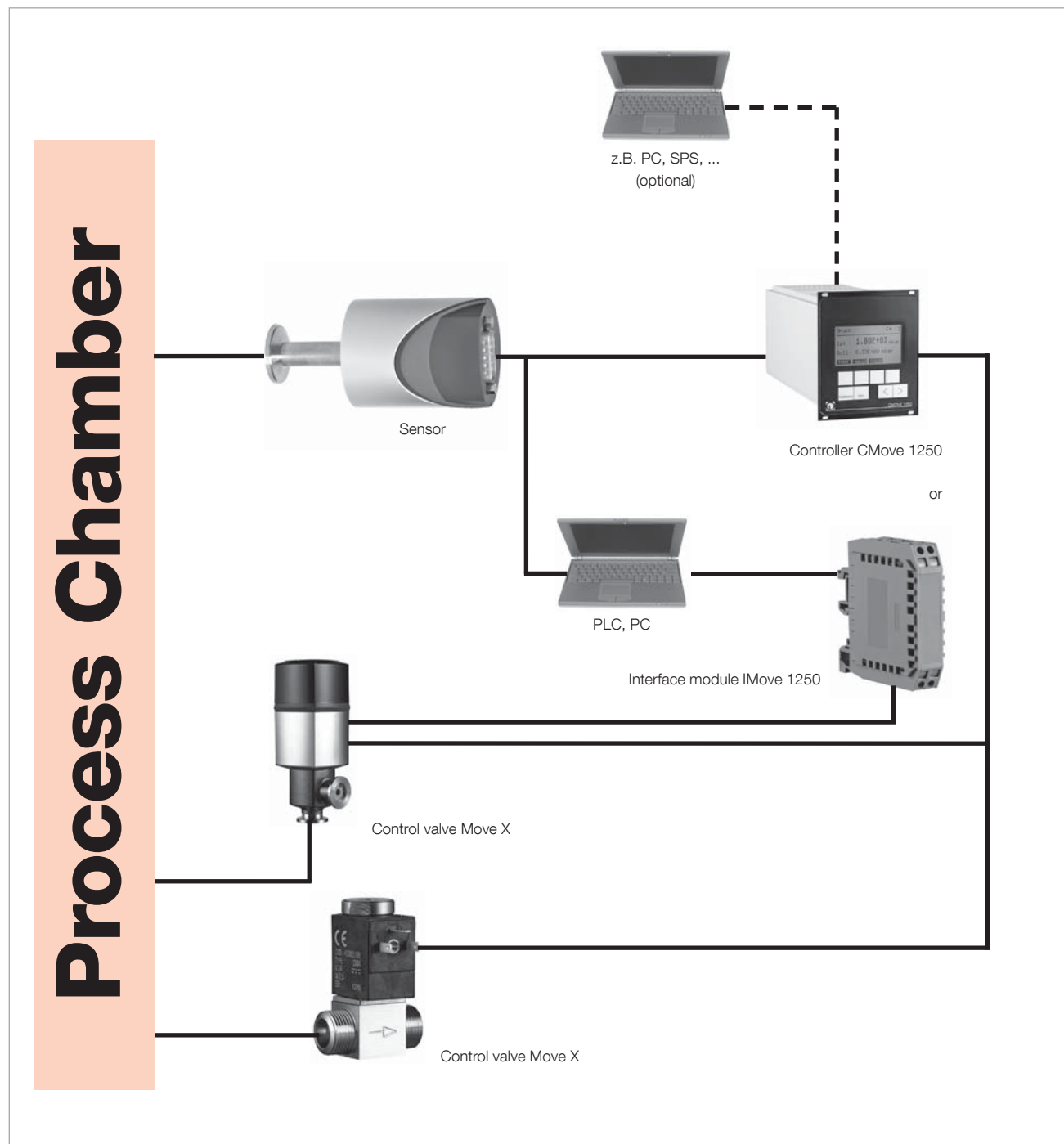
Ordering Information

| | | Part No. |
|---|--|---|
| Replacement sensor TTR 211 | TTR 211 PB / D | E 157 75 |
| Replacement sensor TTR 216 | TTR 216 PB / D | E 157 77 |
| Replacement spare sensor IE 100 DN 25 ISO-KF DN 40 CF | ITR 100 ITR 100 | E 163 61 E 163 67 |
| Replacement spare cathode IE 413 | IM 510 | 158 63 |
| Linear pressure sensor (Previous version) | DI 200 DI 201 DI 2000 DI-Adaptor for CENTER series ¹⁾ DI 2000 Adaptor | 158 12 158 14 158 13 245009V01 245022V01 |

¹⁾ For all DI-Sensors

Pressure Switches and Control Instruments

Pressure Control System Move



Control Valves Move 1250 and Move X

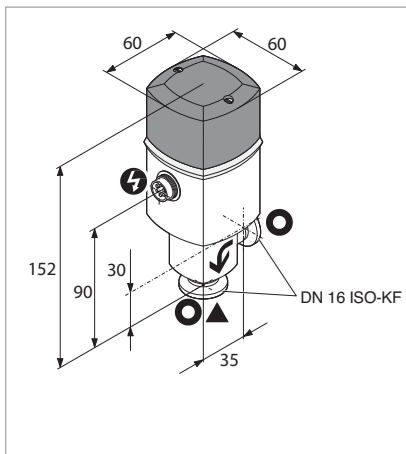


Control valve Move 1250

Control Valve Move 1250

Advantages to the User

- Extended control range from 1×10^{-6} to 1250 mbar x l/s
- High controllable gas throughput
- Corrosion resistant owing to FPM (FKM)/stainless steel
- In combination with CMove the valve closes automatically in the event of a power failure
- Valve driven either by the controller CMove 1250 or by a PC or a PLC through the IMove interface
- Electromotive pressure control with variable gas flow (upstream regulation) or with variable conductance (downstream regulation)



Dimensional drawing for the Move 1250

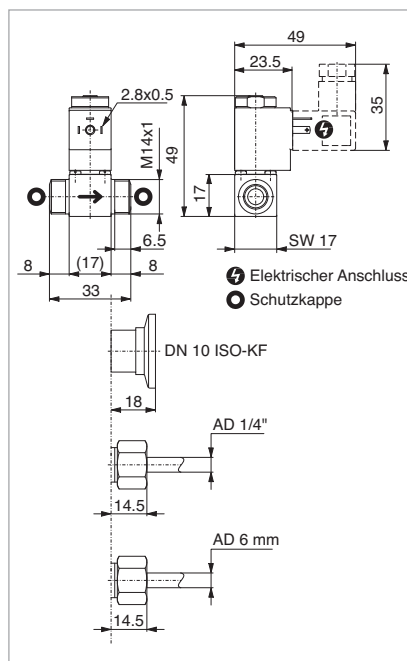


Control valve Move X

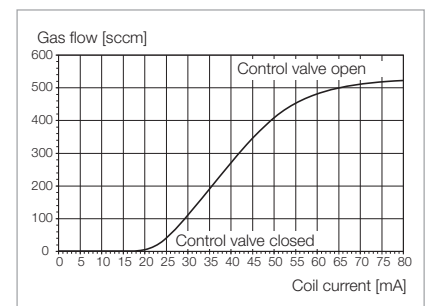
Control Valve Move X

Advantages to the User

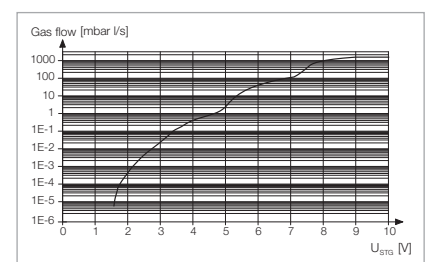
- 6 different valves for the gas flows ranging from 10 sccm FS to 5000 sccm FS
- Fast response
- Electromagnetic pressure regulation with variable gas flow (upstream regulation)
- Normally closed
- Many adapters are available



Dimensional drawing for the Move X with connection adapter



Example of a gas flow curve (mean value of 500 sccm FS) at a differential pressure of $\Delta p = 1$ bar for Move X



Gas flow curve of the Move 1250

Technical Data

Control Valve

Move 1250

Move X

| | | | |
|--|------------|---|--|
| Vacuum connection | | DN 16 ISO-KF | Threaded connection M 14 x 1 for accepting of: Flange connection DN 10 ISO-KF Pipe connection Ø 1/4" Pipe connection Ø 6 mm |
| Mounting orientation | | Any | Any, preferably vertical |
| Leak tightness | mbar x l/s | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ |
| Pressure range | | 1 x 10 ⁻⁸ mbar to 2.5 bar (absolute) | 1 x 10 ⁻⁸ mbar to 1000 mbar (max. pressure in closing direction 2 bar) |
| Gas flow ¹⁾ with filter, on the inlet side | | 5 x 10 ⁻⁶ to 1250 mbar x l/s | 10 sccm FS ^{2), 3)} 50 sccm FS ^{2), 3)} 100 sccm FS ^{2), 3)} 500 sccm FS ^{2), 3)} 1000 sccm FS ^{2), 3)} 5000 sccm FS ^{2), 3)} |
| with filter, on the inlet and the vacuum side | mbar x l/s | 5 x 10 ⁻⁶ to 1000 | – |
| Power supply | | | |
| Operation voltage | V DC | 24 (± 10%) | 0 to 24 |
| Power consumption | VA | 12 | 2.5 max. |
| Current consumption | mA | 500, 20 to 30 (closed circuit current) | – |
| Actuation | | Step motor | Coil |
| Digital | | CMove or IMove 1250 | CMove 1250 |
| Analog | V DC | 0 to 10 | – |
| Type of protection | IP | 40 | 51 |
| Closing time / opening time | s | 3 / 4 | – |
| Response time | ms | – | < 30 |
| Ambient temperature | °C | +5 to +40 | +5 to +50 |
| Bake out temperature | | | |
| Valve body | °C | 80 | +5 to +50 (during operation) |
| Actuator | °C | 60 | (during operation) |
| Material | | | |
| Valve body | | Stainless steel 1.4435 | Stainless steel 1.4301 |
| Valve needle, valve disc | | Stainless steel 1.4301 | – |
| Filter | | Stainless steel 1.4404 | – |
| Seals | | FPM | FPM |
| Dosing sleeve | | Fluoroplastomer | – |
| Armature disc | | – | Stainless steel 1.4510 |
| Guide tube | | – | Stainless steel 1.4105 |
| Weight | kg (lbs) | 0.5 (1.1) | 0.08 (0.18) |

¹⁾ For air at a differential pressure of Δp = 1 bar

²⁾ 1 sccm = 1.69 x 10⁻² $\frac{\text{mbar} \cdot \text{l}}{\text{s}}$

³⁾ Minimum flow: in each case 1% of FS (full-scale)

Ordering Information

Control Valve

| | Move 1250 | Move X |
|---|----------------|----------------|
| | Part No. | Part No. |
| Control Valve | | |
| Move 1250 | 230 219 | - |
| Move X with gas flow ¹⁾ | | |
| 10 sccm | - | 230 202 |
| 50 sccm | - | 230 203 |
| 100 sccm | - | 230 204 |
| 500 sccm | - | 230 205 |
| 1000 sccm | - | 230 206 |
| 5000 sccm | - | 230 207 |
| Accessories | | |
| Flange DN 10 ISO-KF | - | 284 50 |
| Tube 1/4" | - | 284 51 |
| Tube 6 mm | - | 284 52 |
| Filter for the inlet or vacuum side consisting of filtering candle, O-ring and two securing rings | 109 63 | - |
| Filter set consisting of 10 filter discs and 10 circular springs | - | 109 64 |
| Connection cable | | |
| CMove 1250 - Control valve Move 1250 | | |
| 3 m | 230 220 | - |
| 5 m | 230 221 | - |
| 10 m | 230 222 | - |
| 15 m | 230 223 | - |
| 20 m | 230 224 | - |
| 25 m | 230 225 | - |
| CMove 1250 - Control valve Move X | | |
| 3 m | - | 230 210 |
| 5 m | - | 230 211 |
| 10 m | - | 230 212 |
| 15 m | - | 230 213 |
| 20 m | - | 230 214 |
| 25 m | - | 230 215 |

¹⁾ To select the right components please ask us for information

Controller CMove 1250



Controller CMove 1250

Technical Applications

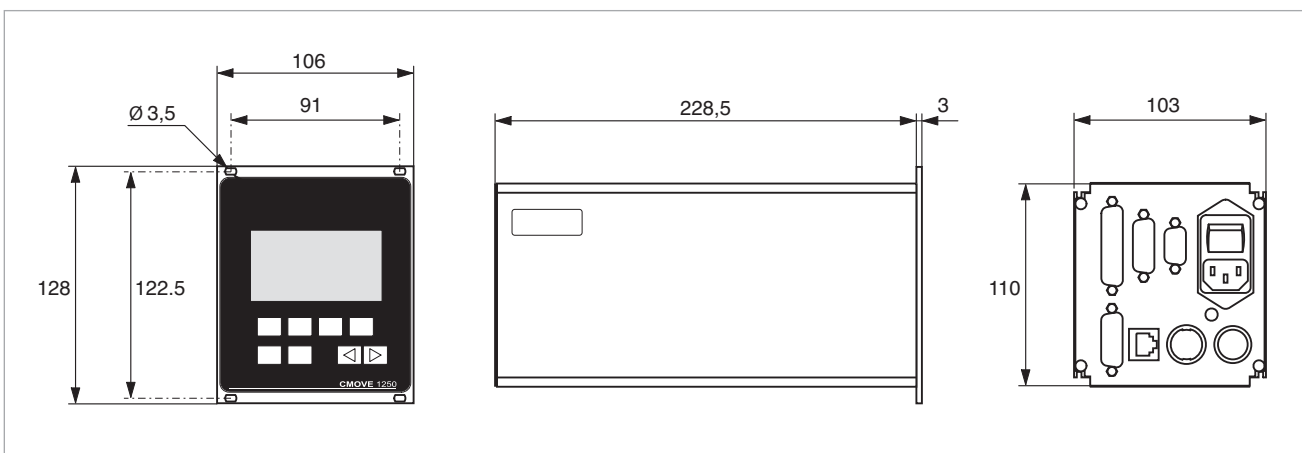
- Simple to operate
- Self-explanatory LCD display and function keys
- Analog/digital inputs/outputs and interfaces
- Digital input valve control, switch-over
- Pressure and gas flow adjustment
- Digital output valve control, error message
- Adjustable PID control algorithms
- 99 pre-programmed PI control algorithms for fast and simple operation
- For installation or tabletop use (1/4 19")

Typical Applications

The controller CMove in connection with the electric control valve Move 1250 or Move X is suited for applications in the areas like for example

- Semiconductor industry
- Analytical
- Coating
- Quality control
- Surface treatment

as well as in all applications where simple, fast and accurate pressure control is desired and necessary.



Dimensional drawing for the CMove 1250

Technical Data

Controller CMove 1250

| | | |
|--------------------------------|----------|--|
| Power supply | | |
| Mains voltage, 50/60 Hz | V AC | 90 - 250 |
| Power consumption | VA | 50 |
| Control types | | Auto = (PI) adjustable in 1 to 99 selectable steps PID = PID is user adjustable 0,5% F.S. sensor |
| Control accuracy ¹⁾ | | |
| Display | | LCD 64 x 128 Pixel |
| Display units (selectable) | | |
| Pressure | | mbar, Torr, Pa, mV |
| Flow | | mbar l/s, Torr l/s, Pa l/s, mV |
| Measurement range | | |
| Pressure control | | |
| CERAVAC | | |
| THERMOVAC | | |
| PENNINGVAC (not for PTR 90) | | |
| IONIVAC | | |
| Pressure control | mV | 0 to 10.000 |
| Flow control | | |
| with MOVE 1250 | | CLOSED, 5.0×10^{-6} to $1.25 \times 10^{+3}$ mbar x l/s |
| with MOVE X | | CLOSED, 1.0×10^{-6} to $1.0 \times 10^{+2}$ mbar x l/s |
| with analog output AA 2 | mV | 0 to 10 000 |
| Operating mode | | Gas flow regulation (upstream regulation) Pressure regulation (downstream regulation) |
| Operating | | Local operation or remote control |
| Digital input | | Flow matching, opening/closing of external valves / operating mode flow/regulation / switching on of emission/degas |
| Digital output | | Valve position indication; valve fault; sensor fault; status message for sensor and valve; pressure regulation upstream/downstream |
| Analog input | | 0 to 10 V DC setpoint pressure/flow |
| Analog output | | 0 to 10 V DC, Pressure sensor signal, valve signal, valve position MOVE 1250 |
| Serial interface | | RS 232 C, RS 485 C |
| Housing | | 1/4 19", for installation or tabletop use |
| Weight | kg (lbs) | 1.65 (3.64) |
| Temperature | | |
| Operation | °C | +5 to +50 |
| Storage | °C | -40 to +60 |
| Protection class | IP | 30 (EN 60 529) |

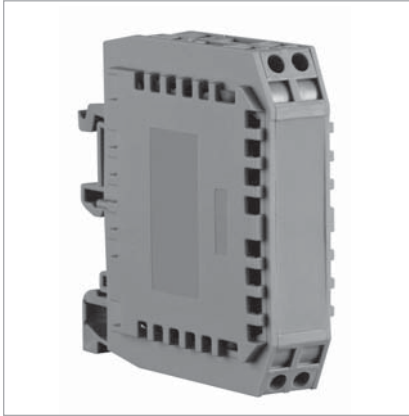
¹⁾ Valid for sensor setting 0 to +10 V linear and analog output A02

Ordering Information

Controller CMove 1250

| | Part No. |
|---|----------------|
| Controller CMove 1250 | 230 200 |
| Control valve | |
| Move 1250 | 230 219 |
| Move X with gas flow | |
| 10 sccm | 230 202 |
| 50 sccm | 230 203 |
| 100 sccm | 230 204 |
| 500 sccm | 230 205 |
| 1000 sccm | 230 206 |
| 5000 sccm | 230 207 |
| Connection cable | |
| CMove 1250 - Control valve Move 1250 | |
| 3 m | 230 220 |
| 5 m | 230 221 |
| 10 m | 230 222 |
| 15 m | 230 223 |
| 20 m | 230 224 |
| 25 m | 230 225 |
| CMove 1250 - Control valve Move X | |
| 3 m | 230 210 |
| 5 m | 230 211 |
| 10 m | 230 212 |
| 15 m | 230 213 |
| 20 m | 230 214 |
| 25 m | 230 215 |
| Sensor cable | |
| TTR 90, TTR 100, TTR 101, TTR 211, TTR 216, PTR 225, PTR 237 | |
| 5 m | 124 26 |
| 10 m | 230 012 |
| 15 m | 124 27 |
| 20 m | 124 28 |
| 30 m | 124 29 |
| 50 m | 124 31 |
| 75 m | 124 32 |
| 100 m | 124 33 |
| ITR 90, ITR 100, ITR 200 | |
| 5 m | 124 55 |
| 10 m | 230 022 |
| 15 m | 124 56 |
| 20 m | 124 57 |
| 30 m | 124 58 |
| CTR 90, CTR 91, CTR 100, CTR 101 | |
| 5 m | 230 013 |
| 10 m | 230 014 |
| 15 m | 230 015 |
| 20 m | 230 016 |
| 30 m | 230 017 |
| 50 m | 230 019 |
| 75 m | 230 020 |
| 100 m | 230 021 |

Interface Module IMove 1250 for Move 1250



Advantages to the User

- Status query and valve position

Typical Applications

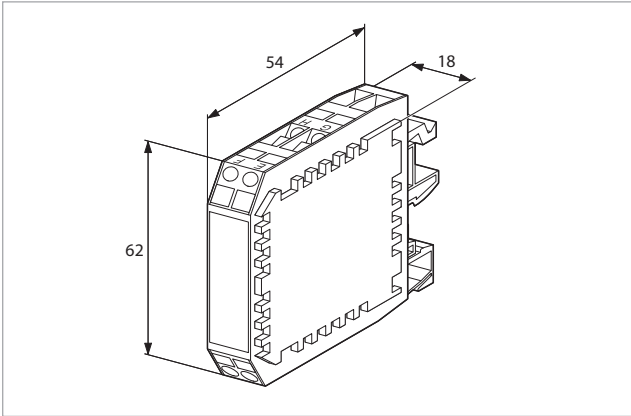
The interface module IMove 1250 connects a RS 232C interface (for example from a computer or a PLC) to the digital interface of the Move 1250 control valve.

Technical Data

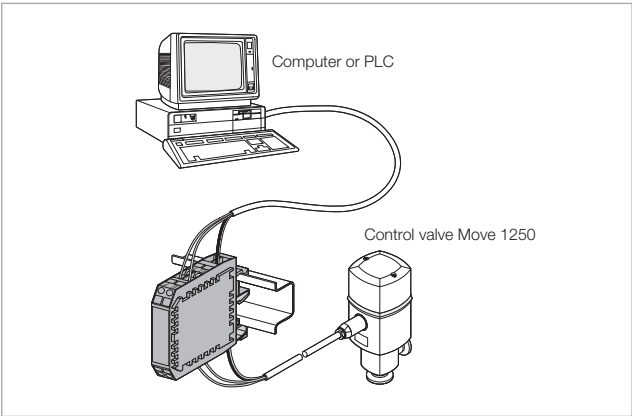
| | | |
|------------------------|------|---|
| Temperature | | |
| Operation | °C | +5 to +50 |
| Storage | °C | -10 to +65 |
| Protection class | IP | 30 |
| Operation voltage | V DC | 24 ± 10% |
| Current consumption | | |
| IMove 1250 | mA | < 50 (own consumption) |
| Move 1250 | mA | < 500 |
| Provide upfront fusing | | 1 AT |
| Interface | | RS 232 C |
| Mounting | | |
| Support rails | | EN 50022-35 (symmetrical EN 50035-G32 (asymmetrical) |
| Weight | g | 40 (0.09) |

Ordering Information

| | Part No. |
|----------------------------|----------------|
| Interface-Modul IMove 1250 | 230 201 |



Dimensional drawing for the IMove 1250



Connection of the IMove 1250

Low Pressure Safety Switch PS 113 A



Switch indicating whether or not the pressure has reached the level of the atmospheric pressure after venting. Preset diaphragm pressure switch set to a trigger of 6 mbar (4 Torr) below atmospheric pressure.

Advantages to the User

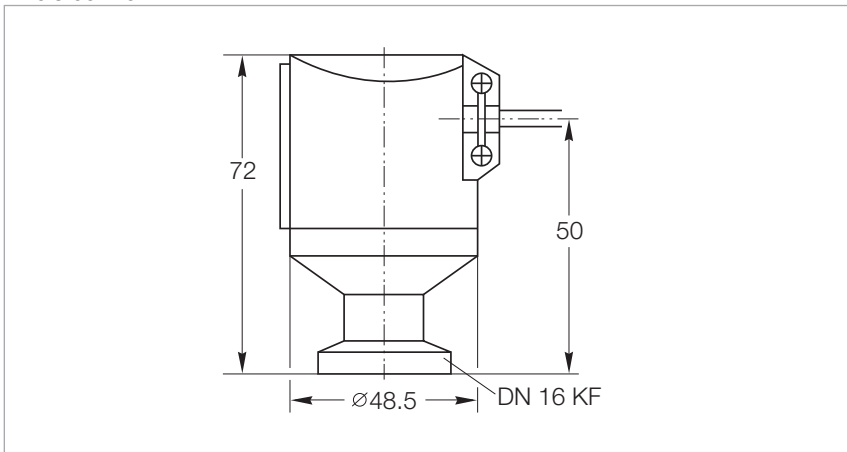
- Rugged design
- High switching capacity
- Corrosion protected
- Easy to use
- IP 44 protection
- Can be connected to a programmable control

Typical Applications

- Venting facilities
- Safety shutdown of vacuum systems
- Load locks
- Increased switching capacity when using the switching amplifier SV 110

Technical Note

Due to the diaphragm material used (EPDM) the PS 113 A is not suited for applications in which the process gas contains large quantities of helium. Owing to helium permeation, the leak rate of the diaphragm for helium amounts to values $\leq 1 \times 10^{-4}$ mbar x l/s.



Dimensional drawing for the low pressure safety switch PS 113 A

Technical Data**Low Pressure Safety Switch**

| | | |
|--|-----------------|---|
| Switching pressure | mbar (Torr) | Approx. 6 (4.5) below atmospheric pressure |
| Return switching pressure | mbar (Torr) | 3 (2.3) below atmospheric pressure |
| Switching inaccuracy | mbar (Torr) | 2 (1.5) |
| Max. permissible operating pressure (abs.) | mbar (Torr) | 2000 (1500) |
| Storage temperature range | °C | -25 to +85 |
| Nominal temperature range | °C | 0 to +85 |
| Switching contact | | Changeover contacts, gold-plated, for prog. controls |
| Contact life | | > 10 ⁵ switching cycles |
| Switching capacity | | 100 mA / 24 V AC 30 mA / 24 V DC |
| Electrical connection | | 6.3 mm flat plug |
| Vacuum connection | DN | 16 ISO-KF |
| Helium permeation | mbar (Torr) | ≤ 5 x 10 ⁻⁵ |
| Dead volume | cm ³ | 2 |
| Materials in contact with the medium | | Stainless steel 1.4305, Stainless steel 1.4310, Stainless steel 1.4300 PTFE coated, EPDM |
| Weight | g | 315 (0.70) |
| Protection class | IP | 44 |

Ordering Information**Low Pressure Safety Switch**

| | Part No. |
|---|----------------|
| Low pressure safety switch PS 113 A, DN 16 ISO-KF; complete with 3 m long cable | 230 011 |

Pressure Switch PS 115

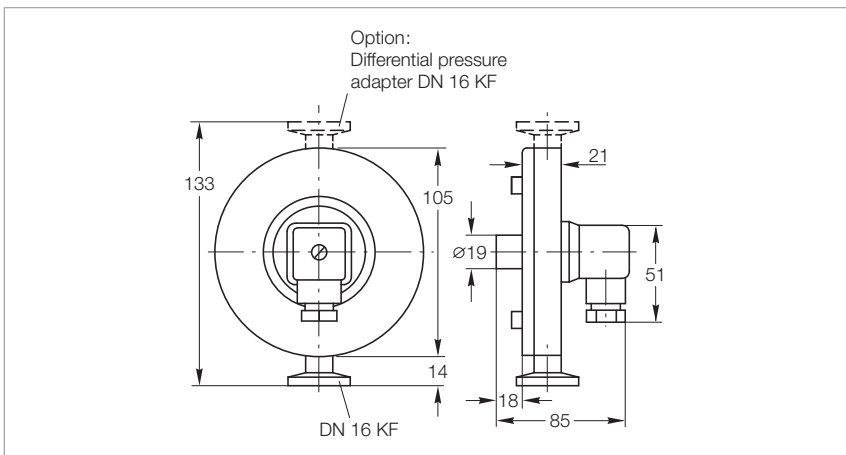


Rugged absolute pressure switch with electrical switching contact and an adjustable switching pressure between 0.5 and 2000 mbar (0.4 and 1500 Torr).

Through the differential pressure adapter (optional) the PS 115 pressure switch may be converted to operate as a differential pressure switch. The adapter consists of a DN 16 ISO-KF flange with screw-in thread and a sealing arrangement, and it is screwed into the PS 115 instead of the adjustment valve. The operating range extends to 2000 mbar (1500 Torr). Brief over-loading to 3000 mbar (2250 Torr) is permissible without impairing switching accuracy. In this operating range differential values of +5 to -20 mbar (+3.75 to -15 Torr) can be adjusted via the set screw.

Advantages to the User

- High switching accuracy (± 0.1 mbar)
- Stable long term operating characteristics
- Rugged, corrosion protected design
- Increased switching capacity (floating) when using the switching amplifier SV 110
- Switching contact (n.c.) in the reference chamber and thus protected against corrosion
- For operating pressures up to 3 bar
- For high ambient temperatures
- Upon request, the switching threshold may be set in the factory



Dimensional drawing for the pressure switch PS 115

Technical Data**Pressure Switch PS 115**

| | | |
|---|-----------------|---|
| Switching range | mbar (Torr) | 0.5 to 2000 (0.375 to 1500) |
| Overload limit | mbar (Torr) | 3000 (2250) |
| Sensitivity | mbar (Torr) | 0.1 (0.75) |
| Switching hysteresis | mbar (Torr) | 0.5 (0.375) |
| Temperature coefficient | %/°K | 0.4 of the switching value |
| Nominal temperature range | | |
| briefly (max. 8 h) | °C | 120 |
| continuous | °C | 0 to +90 |
| Switching contact | | Plug |
| Switching voltage | V | 24 |
| Switching current (max.) | mA | 10 |
| Contact resistance, max. | kW | 1 |
| Electrical connection | | Plug (DIN 43 650) |
| Protection class | IP | 65 |
| Vacuum connection | DN | 16 ISO-KF |
| Materials in contact with the medium | | |
| Measurement chamber | | Stainless steel 1.4301; 1.4401; 1.4310; 1.3541; FPM /FKM) |
| Reference chamber | | Stainless steel 1.4301; 1.4401; 1.3541; Glass; Gold |
| Volume of the measurement chamber approx. | cm ³ | 4 |
| Volume of the reference chamber, approx. | cm ³ | 20 |
| Weight | kg (lbs) | 1.3 (2.87) |

Ordering Information**Pressure Switch PS 115**

| | Part No. |
|--|--|
| Pressure Switch PS 115, DN 16 ISO-KF | 160 04 |
| Pressure switch adjustment | 160 05 |
| For floating installations without SV 110, Clamping ring DN 16 ISO-KF, plastic Centering ring, DN 16 ISO-KF, plastic | 200 28 306 200 28 307 |
| Option Differential pressure adapter, DN 16 ISO-KF for connection to the PS 115 | 160 74 |
| Spare parts kit PS 115 | E 160 06 |
| SV 110 switching amplifier | 160 78 |

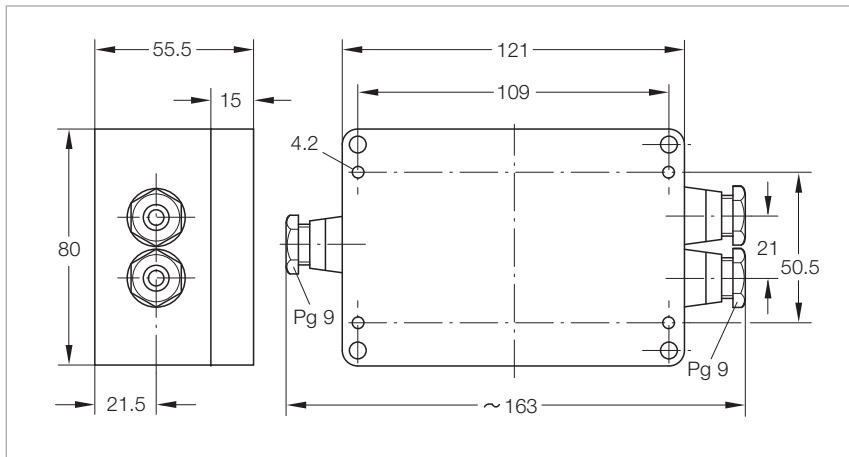
Switching Amplifier SV 110

The diaphragm contact of the pressure switches is connected on one side to ground and is rated to 24 V / 10 mA max. When wanting to switch higher voltages or currents, a switching amplifier will be needed. The switching amplifier is equipped with powerful floating changeover contacts. The output relay is energized as soon as the pressure drops below the switching threshold set up on the pressure switch.

The electrical connections are provided via screw terminals and are run out of the plastic enclosure through PG fittings.

Advantages to the User

- Increased ratings for the switch
- Changeover contact



Dimensional drawing for the switching amplifier SV 110

Technical Data

Switching Amplifier SV 110

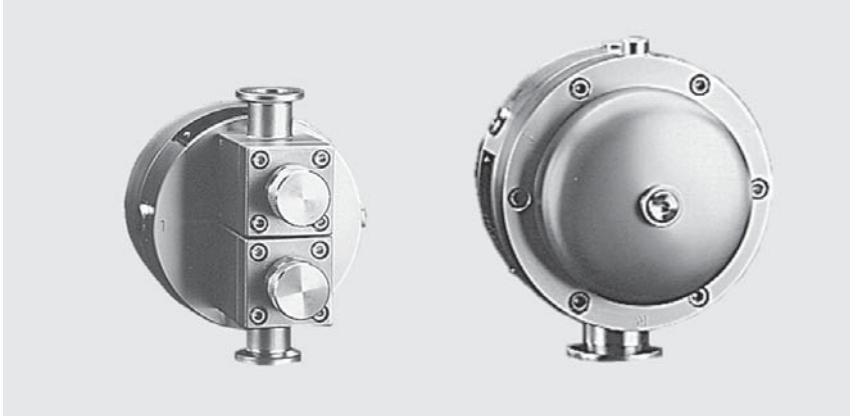
| | | |
|--|----------|-------------------|
| Mains connection 50/60 Hz (selectable) | | 110/130/220/240 V |
| Power consumption | VA | 3 |
| Output relay | | |
| Switching voltage / current | V / A | 250 / 5 |
| Switching power, max. | VA | 500 |
| Response time | ms | 30 |
| Release time | ms | 7 |
| Control circuit | V / mA | 24 / 10 |
| Ambient temperature, max. | °C | 50 |
| Weight, approx. | kg (lbs) | 0.36 (0.79) |

Ordering Information

Switching Amplifier SV 110

| | Part No. |
|----------------------------|----------|
| Switching amplifier SV 110 | 160 78 |

Diaphragm Pressure Regulators MR 16/MR 50



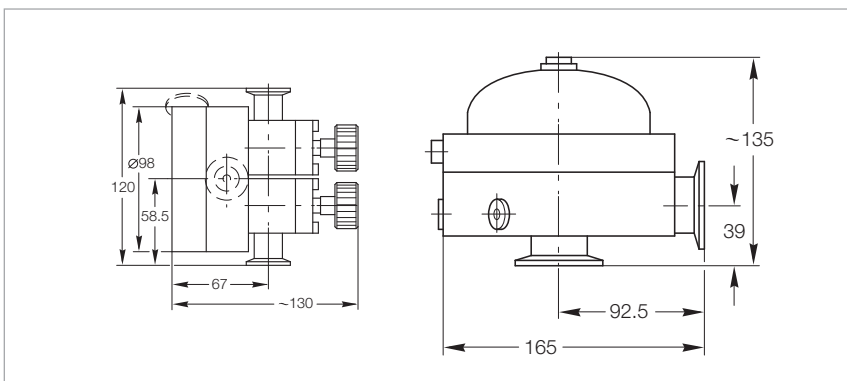
The MR 16/50 diaphragm regulators are absolute pressure regulators which automatically adapt the pumping speed of a vacuum pump depending on the amount of gas, without the need for an external power supply.

Advantages to the User

- Non-incremental, automatic pressure control
- Simple setting of the control pressures
- High control accuracy
- Corrosion protected stainless steel design
- Easy to disassemble for cleaning and maintenance
- Trouble-free operation in ex. areas
- Built-in isolation valves for the process connection and the vacuum pump (MR 16))

Typical Applications

- Distillation processes of all kinds
- Solvent recovery
- Drying processes
- Temperature control on bath cryostats
- Degassing of liquids and plastics



Dimensional drawing for the diaphragm regulator MR 16 (left) and MR 50 (right)

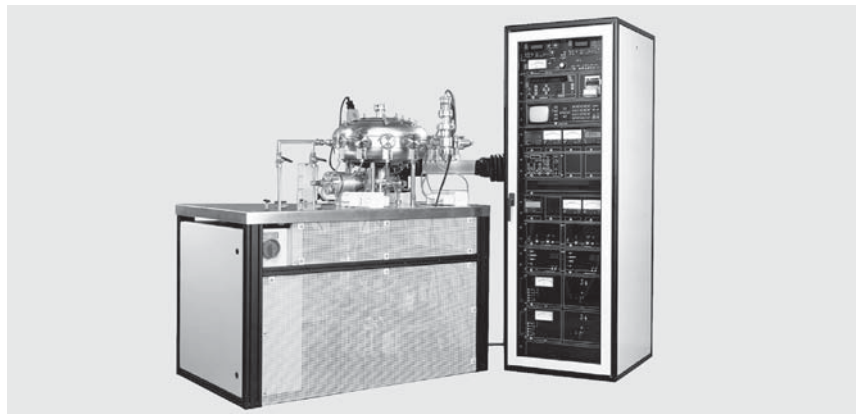
Technical Data**Diaphragm Pressure Regulator****MR 16****MR 50**

| | | | |
|--|-------------|--|--|
| Control range | mbar (Torr) | 10 to 1000 (7.5 to 750) | 10 to 1000 (7.5 to 750) |
| Control inaccuracy | | ± 2% of the pressure control (10 - 90% of flow) | ± 2% of the pressure control (10 - 90% of flow) |
| Throughput | m³/h | 16 | 50 |
| Nominal temperature range | °C | +5 to +100 | +5 to +100 |
| Storage temperature range | °C | -25 to +60 | -25 to +60 |
| Temperature coefficient | %/K | 0.3 | 0.3 |
| Setting time | ms | 5 | 5 |
| Permissible overload for brief periods | bar | 3 | 3 |
| Diaphragm material | | FPM (FKM)/EPDM | FPM (FKM)/EPDM |
| Housing material | | stainless steel 1.4571 | stainless steel 1.4571 |
| Installation orientation | | Any | Any |
| Dimensions | | see dimensional drawing | see dimensional drawing |
| Vacuum connection | 2x DN | 16 ISO-KF | 40 ISO-KF |
| Measurement connection | 3x thread R | 1/8" | 1/8" |
| Weight, approx. | kg (lbs) | 2.7 (6.0) | 8.0 (17.6) |

Ordering Information**Diaphragm Pressure Regulator****MR 16****MR 50**

| | Part No. | Part No. |
|--|--------------------|------------------------------------|
| Diaphragm pressure regulator MR 16, DN 16 ISO-KF MR 50, DN 40 ISO-KF | 160 25 - | - 160 27 |
| Options Stainless steel measurement flange, DN 16 ISO-KF, for connection to a reference and/or process chamber or pumping stud KALREZ diaphragm | 160 26 - | 160 26 200 28 597 |
| Spare Parts EPDM diaphragm and seal kit | EK 160 29 | - |
| Viton diaphragm and seal kit | EK 160 31 | - |
| Seal kit MR 50, incl. EPDM and Viton diaphragms | - | EK 160 32 |
| Adjustment screw for the adjustable valve, complete with seal | - | 240 00 |

Oerlikon Leybold Vacuum Calibration Service



Calibration of vacuum gauges in the pressure range from 10^{-8} to 1000 mbar (10^{-8} to 750 Torr) as DAkkS or factory calibration.

Advantages to the User

- Clear reference to the reference quantities
 - Reproducible measurements
 - Constantly high quality over time
 - Reliable checking of existing gauges
 - Unambiguous description of the process
- Since 1981 Oerlikon Leybold Vacuum has been offering to all customers an impartial calibration service for gauges and sensors of any make. A DAkkS calibration certificate or a factory calibration certificate is issued for every calibration. Instruments with insufficient long-term stability or such instruments where the principle of measurement is not suited for calibration, can not be calibrated.

Typical Applications

Calibrated vacuum gauges are used under the following conditions:

- If the requirements concerning reproducibility and comparability of experiment runs are high
- If an unambiguous reference is required for a large number of pressure gauges
- If an unambiguous description for processes is required
- If for experiments and processes unambiguous traceability of the measured pressures to basic quantities is demanded by the authorities
- If testing to DIN/ISO 9000 is required in the following areas
 - Research
 - Thin-film engineering
 - Manufacture of systems
 - Military
 - Energy
 - Chemistry production
 - Production of pharmaceuticals and herbicides
 - Sputtering systems
 - Aircraft and space industry
 - Manufacture of lamp

DAkkS / Factory Calibration

It is the task of the Deutschen Akkreditierungsstelle (DAkkS) to ensure traceability of industrial measurements and testing to national standards.

The DAkkS is supported jointly by the Federal Institution for Physics and Technology (PTB), the industry, the Federal Minister for Economics and the Western European Metrology Club (WEMC).

The transfer standards in the DAkkS calibration facility used by Oerlikon Leybold Vacuum are checked regularly (recalibrated) by the PTB.

Within the framework of the DAkkS, the calibration system at Oerlikon Leybold Vacuum has been checked and approved by the PTB and the applied transfer standards have been calibrated by the PTB.

Factory calibrations were performed with standards which have not been calibrated directly at the PTB; instead the transfer standards of the in-house calibration service are used. Thus traceability to national standards is ensured in both cases.

Technical Data**DAkkS Calibration**

| | | | | |
|-------------------|-------------|---------------------|---------------------|---------------------|
| Calibration range | mbar (Torr) | to 10 ⁻³ | to 10 ⁻⁵ | to 10 ⁻⁸ |
|-------------------|-------------|---------------------|---------------------|---------------------|

Ordering Information**DAkkS Calibration**

| | Part No. | Part No. | Part No. |
|-------------------|---------------|---------------|---------------|
| DAkkS calibration | 157 12 | 157 13 | 157 14 |

Technical Data**Factory Calibration**

| | | | | |
|-------------------|-------------|---------------------|---------------------|---------------------|
| Calibration range | mbar (Torr) | to 10 ⁻³ | to 10 ⁻⁵ | to 10 ⁻⁸ |
|-------------------|-------------|---------------------|---------------------|---------------------|

Ordering Information**Factory Calibration**

| | Part No. | Part No. | Part No. |
|---------------------|---------------|---------------|---------------|
| Factory calibration | 154 22 | 154 23 | 154 24 |

Calibration Systems are described in the Catalog Part "Vacuum Pump Systems".

Product VACVISION

Vacuum Controller for Monitoring and Controlling the entire Vacuum Process

Applications

Components supported by the VACVISION

| Rotary Vane Vacuum Pumps TRIVAC and Rotary Vane Vacuum Pumps SOGEVAC | VACVISION | Dry Compressing Scroll Pumps SCROLLVAC and Diaphragm Vacuum Pumps DIVAC | VACVISION | Turbomolecular Pumps TURBOVAC with Mechanical Rotor Suspension and Frequency Converter | VACVISION |
|--|-----------|---|-----------|---|-----------|
| S 1,5 | ■ | SCROLLVAC | | TURBOVAC | |
| TRIVAC | | SC 5 D | ■ | 50 | ■ |
| D 2.5 E | ■ | SC 15 D | ■ | 151 (C) | ■ |
| D 4 B | ■ | SC 30 D | ■ | 361 (C) | ■ |
| D 8 B | ■ | SC 60 D | ● | 600 C | ■ |
| D 16 B | ■ | | | 1000 C | ■ |
| D 25 B | ■ | DIVAC | | 1100 C | ■ |
| D 40 B | ● | 0.6 to 2.2 | ■ | T 1600 / T 1601 ²⁾ | ■ |
| D 65 B, D 65 B ³⁾ He | ● | 0.6 L to 2.2 L | ■ | SL 80 | ■ |
| D 16 B-DOT/ NT 16-DOT | ■ | 1.2 L AD und 2.2 L AD | ■ | SL 300 | ■ |
| D 16 B-Ex | ■ | 0.8 T und 0.8 LT | ■ | SL 700 | ■ |
| D 16 BCS, D 25 BCS | ■ | 2.5 T und 2.5 VT | ■ | TW 250 S ³⁾ | ■ |
| D 40 BCS | ■ | 3.5 TC und 4.8 VT | ■ | TW 501 | |
| D 65 BCS | ● | | | TW 1600 ²⁾ | ■ |
| D 16 + D 25 BCS-PFPE | ■ | | | TW 2401 | |
| D 40 BCS-PFPE | ● | | | | |
| D 65 BCS-PFPE | ● | | | | |
| | | | | Frequency Converter | |
| SOGEVAC | | | | TURBOTRONIK NT 10 | ▲ |
| SV 16, SV 25 | ■ | | | TURBO.DRIVE TD 20 classic | ■ |
| SV 40, SV 65 | ■ | | | TURBO.DRIVE TD 300 | ■ |
| SV 100 | | | | TURBO.DRIVE TD 400 | ■ |
| SV 200, SV 300 | ■ | | | TURBO.DRIVE TD 700 | ■ |
| SV 500, SV 630, SV 750 | | | | TURBO.DRIVE TD 35 | |
| SV 1200 | | | | TURBO.DRIVE TD 240 | |
| SV 10 B SV 16 B, SV 16 D | ■ | | | | |
| SV 25 B, SV 25 D | ■ | | | | |
| SV 40 B | ● | | | | |
| SV 65 B, SV 100 B, SV 120 B | ● | | | | |
| SV 300 B | ● | | | | |
| SV 500 B ¹⁾ | ● | | | | |
| SV 630 B(F), SV 750 B(F) | | | | | |
| SV 16 BI, SV 28 BI, SV 40 BI | ■ | | | | |
| SV 40 B Kategorie 1(i)/2(o) IIA | ■ | | | | |
| SV 40 B Kategorie 1(i)/2(o) IIB + H2 | ■ | | | | |
| SV 40 B Kategorie 3(i)/3(o) | ■ | | | | |

¹⁾ Up to 11 kW

²⁾ Integrated Frequency Converter

³⁾ With and without integrated Frequency Converter

■ = Direct connection is possible

● = Connection through E-box

▲ = Direct connection is possible, function is restricted

Components supported by the VACVISION

Turbomolecular Pumps TURBOVAC with Magnetic Rotor Suspension and Frequency Converter

| TURBOVAC MAG | VACVISION |
|------------------------|-----------|
| W 300 iP and W 400 iP | ■ |
| W 600 iP and W 700 iP | ■ |
| 1500 CT | ■ |
| W 300 P and W 400 P | ■ |
| W 600 P and W 700 P | ■ |
| W 830 and 830 C | ■ |
| W 1300 and 1300 C | ■ |
| W 1500 CT | ■ |
| W 2000 C and W 2000 CT | ■ |
| W 2200 C/T and W 2200 | ■ |
| W 2800 and C/CT | ■ |
| W 3200 and C/CT | ■ |
| Frequency Converter | |
| TURBO.DRIVE iS | ■ |
| MAG.DRIVE S | ■ |
| MAG.DRIVE digital | ■ |

LEYCON Valves

| | |
|---|-----------|
| Small valves of the "micro" range | VACVISION |
| Valves with ISO-KF flanges DN 16 to DN 50 | |
| Right-angle valves, bellows-sealed, manually operated | |
| Straight-through valves, bellows-sealed, manually operated | |
| Right-angle valves, bellows-sealed, electropneumatically operated | ■ |
| Right-angle valves, bellows-sealed, pneumatically operated | ■ |
| Straight-through valves, bellows-sealed, electropneumatically operated | ■ |
| Straight-through valves, bellows-sealed, pneumatically operated | ■ |
| Right-angle valves, bellows-sealed, electromagnetically operated | ■ |
| Valves with ISO-K flanges DN 63 to DN 160 | |
| Right-angle valves, bellows-sealed manually operated | |
| Right-angle valves, bellows-sealed, electropneumatically operated | ■ |
| Right-angle valves, bellows-sealed, electropneumatically operated (DN 250) | |
| SECUVAC valves | |
| Safety valves | |
| Power failure venting valves, DN 10 and 16 ISO-KF, electromagnetically operated | ■ |
| (Coarse) variable leak valves | |
| Venting valves, manually operated | |
| Venting valves, electromagnetically operated | ■ |
| Vacuum locks / sealing valves | |
| Right-angle valves according to DOT | |
| Pilot valves | |
| Purge gas and venting valves | ■ |
| UHV all metal right-angle valves | |
| UHV all metal variable leak valves | |

Gate Valves

| Gate Valves | VACVISION |
|--|-----------|
| Miniature UHV, ISO-KF, manually operated | |
| Miniature UHV, ISO-KF and CF, manually operated | |
| Miniature UHV, ISO-KF and CF, electropneumatically operated | ■ |
| HV, ISO-F, manually operated | |
| HV, ISO-F, electropneumatically operated | ■ |
| UHV, CF, manually operated | |
| UHV, ISO-F, electropneumatically operated | ■ |
| UHV, CF, electropneumatically operated | ■ |

Measuring,
controlling

Active Sensors (Transmitter)

| Active Sensors | VACVISION |
|------------------|-----------|
| CTR 100/101 | ■ |
| TTR 91/91S/96S | ■ |
| TTR 100/100S2 | ■ |
| PTR 225/235S/237 | |
| PTR 90 | ■ |
| ITR 90 | ■ |
| ITR 200S | ■ |

■ = Direct connection is possible

Products

Vacuum Controller for Monitoring and Controlling the entire Vacuum Process

VACVISION



VACVISION offers a platform capable of configuring vacuum systems in different ways and operating these with great flexibility.

The new compact **VACVISION** vacuum controller is equipped with a large TFT graphic display with touch panel.

The **VACVISION** offers intuitive operation, a guided configuration menu (wizard), simple hardware interfacing by colour-coded cable connections as well as a plug and play function.

The controller automatically detects up to 3 active vacuum gauge heads, five valves in total, and one each forevacuum and one high vacuum pump from Oerlikon Leybold Vacuum.

In addition the **VACVISION** offers the possibility of connecting venting facility, seal gas, heaters and cooling at the turbomolecular pump.

The controlling functions include pre-defined, configurable process set-ups.

The signals from the forevacuum transmitters can be utilized to start up the turbomolecular pumps and the high vacuum transmitters.

The **VACVISION** can be installed in a 19" rack or used as a benchtop unit.

Advantages to the User

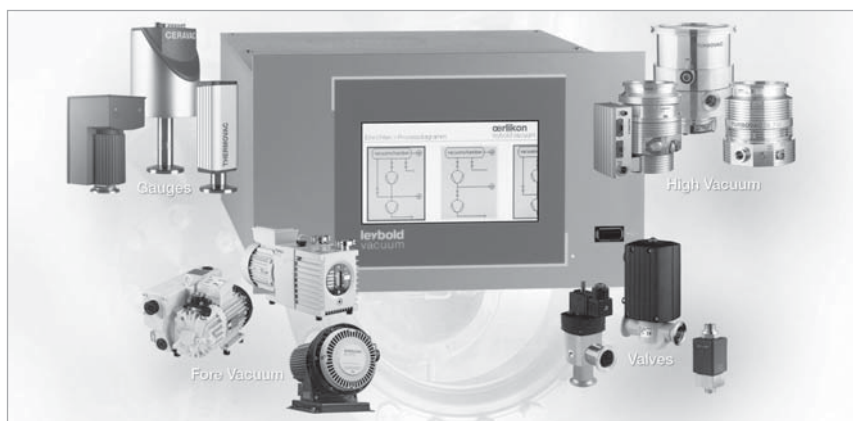
- Compact multipurpose vacuum controller
- Automatic control, controlling and regulating function of the vacuum system
- Simple configuration of vacuum systems with utmost flexibility
- Plug and play function
- Colour TFT graphic display 4.3", 480*272 pixel with touch panel
- USB interface (front panel) for software updates and process data transfers
- Interfaces: RS 232 C/485 C and Ethernet
- Relay options for heating pads, shutoff valve, switching signals, etc.
- Highly flexible to use
- Replaces existing PLCs and associated programming
- Short-circuit proof
- 24 V DC connection for uninterrupted power supply (UPS)
- Colour-coded and text identification on all cable sets

Typical Applications

- Research Universities Institutes
- Laboratories
- Analytics
- Process industry
- Quality control

Connectable Components

- Forevacuum pump
- High vacuum pump
- Active vacuum gauges (up to a total of three)
- Valves (up to 2 with checkback signalling and up to 3 without checkback signalling)



Full fore and high vacuum systems support

Technical Data

VACVISION

| | | |
|---|----------|--------------------------|
| Power supply | V / Hz | 100 - 240 +/-10% / 50/60 |
| Power consumption without backing pump and TMP Heater | W | < 100 |
| forevacuum pump connection, approx. | W | up to 750 |
| heater connection | W | up to 150 |
| continuous, max. | W | 1000 |
| Fuses (slow blow) | | |
| F1 mains power input | | 10 A |
| F2 heater | | 2 A |
| F3 backing pump | | 8 A |
| Protection class | IP | 30 |
| Ambient temperature during operation | °C | +5 to +40 |
| during storage | °C | -10 to +70 |
| Max. rel. humidity | % n.c. | 80 |
| Dimensions of the bench top unit (W x H x D) | mm | 213 x 128.5 x 350 |
| Weight, approx. | kg (lbs) | 4.5 (9.93) |

Measuring,
controlling

Ordering Information

VACVISION

| | Part No. |
|--|--------------------------------------|
| Vacuum controller VACVISION | 230400V01 |
| Mains cord set EU VACVISION US VACVISION | 230415V01 230416V01 |
| Cable set VACVISION 10 m Limited VACVISION , 5 m | 230410V01 230411V01 |
| Plug set | 230420V01 |
| Connecting cable Type F to PTR/TTR series 5 m 10 m | 124 55 230 022 |
| Connecting cable Type F to PTR/TTR series 5 m 10 m | 230032V01 230033V01 |
| VACVISION electrical box, 3 phases, 400 V to 11 kW (to control pumps > 750 W) | 230421V01 |
| VACVISION custom solutions | upon request |

Accessories

Connection Cables

Technical Data

Mains cable set contains

- 1x EURO resp. IEC connector, male MAINS IN, ident. POWER IN, 3 m long
- 1x EURO resp. IEC connector, female for forepump, 1 m long
- 1x EURO resp. IEC connector, earthed plug, female for TMP heater, 1 m long

Mains Cable Set EU VACVISION

Ordering Information

Mains Cable Set EU VACVISION

| | Part No. |
|------------------------------|-----------|
| Mains cable set EU VACVISION | 230415V01 |

Technical Data

Mains cable set contains

- 1x mains cord, ident. POWER IN, 3 m long
- 1x mains cord, ident. forepump, 1 m long
- 1x mains cord, ident. heater, 1 m long

Mains Cable Set US VACVISION

Ordering Information

Mains Cable Set US VACVISION

| | Part No. |
|------------------------------|-----------|
| Mains cable set US VACVISION | 230416V01 |

Technical Data

The cable set contains 10 m of each cable

- 1x Fan extension, ident. FAN COOLER
- 1x TMP pump (all except Anybus CC), D-Sub 9-way female/male, ident. RS 232
- 1x TMP pump (Anybus CC), D-Sub 9-way female/male, ident. RS 232 Anybus
- 2x valve cables M12 male, ident. PURGE and Vent
- 2x valve cables D-Sub 9-way male (with position indicator), ident. Valve and VV Valve
- 2x valve cables Phoenix 8-way, ident. X3 and X4
- 2x gauge heads, D-Sub 15-way female/male, ident. Gauge CTR/ITR; type C
- 2x gauge heads, D-Sub 15-way male/RJ 45, ident. Gauge PTR/TTR; type F
- 1x UPS , M9 male, ident. X17 USV

Cable Set VACVISION 10 m

Ordering Information

Cable Set VACVISION 10 m

| | Part No. |
|--------------------------|-----------|
| Cable set VACVISION 10 m | 230410V01 |

Technical Data

The cable set contains 5 m of each cable

- 1x TMP pump (all except Anybus CC), D-Sub 9-way female/male, ident. RS 232
- 1x TMP pump (Anybus CC), D-Sub 9-way female/male, ident. RS 232 Anybus
- 1x valve cable M12 male, ident. Vent
- 1x valve cable D-Sub 9-way male (with position indicator), ident. Ven
- 1x gauge head, D-Sub 15-way female/male, ident. Gauge CTR/ITR; type C
- 2x gauge heads, D-Sub 15-way male/RJ 45, ident. Gauge PTR and TTR; type F and plug
- 1 x valve plug, D-Sub 9-way male
- 2 x analog/digital I/O, Phoenix plug
- 1 x valve plug, M12 male EMC

Cable Set Limited VACVISION 5 m

Ordering Information

| |
|---------------------------------|
| Cable set Limited VACVISION 5 m |
|---------------------------------|

Cable Set Limited VACVISION 5 m

| Part No. |
|-----------|
| 230411V01 |

Technical Data

Plug set contains the following plugs

- 3 x valves without return signalling, M12 round plug
- 2 x valves with return signalling, D-Sub 9-way male
- 1 x RS 232 female, D-Sub 9-way female
- 1 x analog/digital I/O, Phoenix plug

Plug Set VACVISION

Ordering Information

| |
|--------------------|
| Plug set VACVISION |
|--------------------|

Plug Set VACVISION

| Part No. |
|-----------|
| 230420V01 |

1a Mains power output X2.1 TMP heater
100 - 240 VAC, fuse F2 1 AT - 2 AT

1b Fuse F2

1c Fuse F3

1d Mains power output X2.2 Forepump
100 - 240 VAC, fuse F3 3 AT - 8 AT

1e Mains power inlet X1 100 - 240 V AC

1f Fuse F1

1g Mains switch S1

2a 24 V DC input, UPS

2b Protective ground conductor M4

2c Fuse F4 1.25 AT 24 VDC, for X3 and X4

3a FV active vacuum gauge X11

3b HV active vacuum gauge X10

3c HV active vacuum gauge, extended X12

4a RS485 serial interface X13

4b RS232 serial interface X14 TMP

4c Ethernet Interface X15

5a HV valve with return signalling X5
D-Sub socket 24 V DC/12 W

5b FV valve with return signalling X6
D-Sub socket 24 V DC/12 W

5c Purge gas valve without return signalling X7
M12 socket 24 V DC/12 W

5d Venting valve without return signalling X8
M12 socket 24 V DC/12 W

5e Cooler valve without return signalling X9
M12 socket 24 V DC/12 W

6a Terminal strip X4
(X3, X4 totalling 12 W)

6b Terminal strip X3
(X3, X4 totalling 12 W)

The image shows the rear side of the VACVISION control panel. It features a variety of ports and components arranged in a structured layout. On the left, there are three large power outlets labeled 1a, 1d, and 1e, along with fuses F2, F3, and F1. A 24V DC input (2a) and a protective ground (2b) are also present. In the center, there are three vacuum gauge ports (3a, 3b, 3c) and two serial interface ports (4a, 4b). On the right, there is an Ethernet port (4c) and a series of terminal strips (6a, 6b). At the bottom, there are several valve ports (5a, 5b, 5c, 5d, 5e) and a cooler port (5f). The panel is labeled with various identifiers such as 'Heater X2.1', 'Forepump X2.2', 'Main Supply X1 F1 S1', 'Gauge 1 X10', 'Gauge 2 X11', 'Gauge 3 X12', 'HV Valve X5', 'FV Valve X6', 'Purge X7', 'Vent X8', 'Cooler X9', 'RS485 X13', 'RS232 X14', and 'ETH X15'.

Rear side of the VACVISION

**Ordering Information
for Components supported by the VACVISION**

| | Part No. |
|---|--|
| Active Sensors CERA-VAC Transmitters CTR 100/101 THERMO-VAC Transmitters TTR 91/91S/96S THERMO-VAC Transmitters TTR 101/101S2 PENNING-VAC Transmitters PTR 225/235S/237 (upon request) PENNING-VAC Transmitters PTR 90 IONIVAC Transmitters ITR 90 IONIVAC Transmitters ITR 200S | Part Nos. see Catalog Part "Vacuum measuring - controlling" |
| Forevacuum pumps (single phase (100 - 240 V for EU and US) to 750 W) ¹⁾ Rotary Vane Vacuum Pumps TRIVAC S 1,5 types D 2,5 E types D 4 B to D 25 B types | Part Nos. see Catalog Part "Oil Sealed Vacuum Pumps", Section "Rotary Vane Vacuum Pumps TRIVAC" |
| Rotary Vane Vacuum Pumps SOGEVAC ¹⁾ SV 10 B types | Part Nos. see Catalog Part "Oil Sealed Vacuum Pumps", Section "Rotary Vane Vacuum Pumps SOGEVAC" |
| Scroll Vacuum Pumps SCROLLVAC ¹⁾ SC 5 D to SC 30 D types | Part Nos. see Catalog Part "Dry Compressing Vacuum Pumps", Section "SCROLLVAC" |
| Scroll Vacuum Pumps SCROLLVAC ¹⁾ 0.6 to 2.2 types 0.6 L to 2.2 L types 1.2 LAD and 2.2 LAD types 1.4 HV3 and 3.8 HV3 types | Part Nos. see Catalog Part "Dry Compressing Vacuum Pumps", Section "DIVAC" |
| LEYCON Vacuum Valves (high and forevacuum and Venting Valves 24 V DC / 6 W) Right-Angle Valves, electropneumatically operated; DN 16 to 50 ISO-KF, AL and SS Right-Angle Valves, pneumatically operated; DN 16 to 50 ISO-KF, AL and SS Straight-Through Valves, electropneumatically operated; DN 16 to 50 ISO-KF, AL and SS Straight-Through Valves, pneumatically operated; DN 16 to 50 ISO-KF, AL and SS Right-Angle Valves, electromagnetically operated; DN 16 to 40 ISO-KF, AL and SS Right-Angle Valves, bellows-sealed, electromagnetically operated; DN 63 to 160 ISO-K, AL and SS Power Failure Venting Valves, electromagnetically actuated: DN 10 and 16 ISO-KF Venting Valves, electromagnetically operated; DN 16 ISO-KF Purge Gas and Venting Valves; 0.2 and 0.4 mbar x l x s ⁻¹ , DN 10 ISO-KF; as well as 1/4" or DN 16 ISO-KF | Part Nos. see Catalog Part "Vacuum Valves" |
| Gate Valves Miniature UHV Gate Valves, electropneumatically operated; DN 40 ISO-KF, AL and SS; as well as DN 40 CF, SS HV Gate Valves, electropneumatically operated; DN 63 to 250 ISO-F UHV Gate Valves, electropneumatically operated; DN 100 to 250 ISO-F UHV Gate Valves, electropneumatically operated; DN 63 to 200 CF | Part Nos. see Catalog Part "Vacuum Valves" |

¹⁾ The electrical box is required for pumps > 750 W

**Ordering Information
for Components supported by the VACVISION**

| | Part No. |
|--|-------------|
| Electronic Frequency Converters | |
| MAG.DRIVE S | 410300V0202 |
| MAG.DRIVE S with display | 410300V0212 |
| TURBO.DRIVE TD 20 <i>classic</i> | |
| without Service interface | 800075V0001 |
| with RS 232 C interface | 800075V0002 |
| with RS 485 C interface | 800075V0004 |
| with Profibus | 800075V0003 |
| with 25-pole I/O | 800075V0005 |
| TURBO.DRIVE TD 300 | |
| RS 232 | 800072V0001 |
| RS 232 and Profibus DP | 800072V0004 |
| TURBO.DRIVE TD 400 | |
| with USB interface | 800073V0008 |
| RS 232 C interface | 800073V0002 |
| RS 485 C interface | 800073V0003 |
| Profibus | 800073V0004 |
| TURBO.DRIVE TD 700 | |
| with RS 232 C interface | 800074V0001 |
| RS 485 C interface | 800074V0003 |
| Profibus | 800074V0004 |
| TD S | |
| without RS 232 (only X1 (24 V DC)) [only restricted function] | 800070V001 |
| RS 232 | 800070V002 |
| without RS 232 (X1) [only restricted function] | 800070V004 |
| RS 232, with heat sink | 800070V005 |
| without RS 232 (X1) [only restricted function]] | 800070V006 |
| Turbomolecular pumps with mechanical rotor suspension (control via RS 232 C) | |
| TURBOVAC SL 80 | |
| with compound stage | |
| DN 40 ISO-KF | 800002V3004 |
| DN 63 ISO-K / DN 16 ISO-KF | 800002V3001 |
| DN 63 ISO-K / DN 16 ISO-KF (SL 80 H) | 800002V3005 |
| DN 63 CF / DN 16 ISO-KF | 800002V3002 |
| DN 63 CF / DN 16 ISO-KF (SL 80 H) | 800002V3006 |
| without compound stage | |
| DN 63 ISO-K / DN 16 ISO-KF (SL 80 C) | 800002V3008 |
| TURBOVAC SL 300 | |
| DN 100 ISO-K / DN 16 ISO-KF | 800170V3005 |
| DN 100 CF / DN 16 ISO-KF | 800170V3006 |
| TURBOVAC SL 700 | |
| DN 160 ISO-K / DN 25 ISO-KF | 800051V3001 |
| DN 160 CF / DN 25 ISO-KF | 800051V3002 |
| TURBOVAC TW 1600 | |
| DN 200 ISO-F / DN 40 ISO-KF, water-cooled, RS 232 | 800041V2144 |
| DN 250 ISO-F / DN 40 ISO-KF, water-cooled, RS 232 | 800041V2444 |
| DN 250 CF / DN 40 ISO-KF, water-cooled, RS 232 | 800041V2844 |

Ordering Information
for Components supported by the VACVISION

| | Part No. |
|--|--|
| Turbomolecular pumps with magnetic rotor suspension (control via RS 232 C) with integrated or separate electronic frequency converter MAG.DRIVE iS or MAG.DRIVE S | |
| TURBOVAC MAG W 300 iP DN 100 ISO-K DN 100 CF | 410300V0505 410300V0506 |
| TURBOVAC MAG W 400 iP DN 160 ISO-K DN 160 CF | 410400V0505 410400V0506 |
| TURBOVAC MAG W 600 iP DN 160 ISO-K DN 160 CF | 410600V0505 410600V0506 |
| TURBOVAC MAG W 700 iP DN 200 ISO-K DN 200 CF | 410700V0505 410700V0506 |
| TURBOVAC MAG W 300 P DN 100 ISO-K DN 100 CF | 410300V0005 410300V0006 |
| TURBOVAC MAG W 400 P DN 160 ISO-K DN 160 CF | 410400V0005 410400V0006 |
| TURBOVAC MAG W 600 P DN 160 ISO-K DN 160 CF | 410600V0005 410600V0006 |
| TURBOVAC MAG W 700 P DN 200 ISO-K DN 200 CF | 410700V0005 410700V0006 |
| TURBOVAC MAG W 1500 CT DN 200 ISO-F DN 250 ISO-F DN 250 CF | 400026V0002 400027V0002 400030V0002 |
| Turbomolecular pumps with magnetic rotor suspension (control via RS 232 C) with separate electronic frequency converter MAG.DRIVE iS, MAG.DRIVE S or MAG.DRIVE digital | Part Nos. see Catalog Part "High Vacuum Pumps" Section "Turbomolecular Pumps" TURBOVAC MAG" |
| TURBOVAC MAG 1500 CT TURBOVAC MAG W 830 (C) TURBOVAC MAG W 1300 (C) TURBOVAC MAG W 2000 C/CT TURBOVAC MAG W 2000 TURBOVAC MAG W 2200 C/CT TURBOVAC MAG W 2800 C/CT TURBOVAC MAG W 3200 C/CT | |

Contents

Leak Detecting Instruments

General

| | |
|---|-----|
| Applications for Leak Detection Instruments | 778 |
| Accessories for Leak Detection Instruments | 779 |
| Leak Detection - Leak Testing. | 780 |
| Leak Detection Methods | 781 |
| Operating Principles of the Helium Leak Detectors | 783 |

Products

| | |
|---|-----|
| Helium Leak Detectors | |
| PHOENIX L300i | 786 |
| PHOENIX L300i DRY. | 788 |
| PHOENIX L300i MODUL | 790 |
| CART 300 for PHOENIX L300i | 793 |
| PHOENIX L500i | 794 |
| Special Versions | |
| PHOENIX L340i, Mobile Helium Leak Detector as Seated Workplace | 796 |
| PHOENIX L320i Fab, Mobile Helium Leak Detector for Increased Cleanliness Requirements | 797 |

Accessories

| | |
|---|-----|
| Remote Control Units for Leak Detectors RC 310. | 798 |
| Calibrated Leaks for Vacuum and Sniffer Applications. | 800 |
| Screw-in Calibrated Leaks | 802 |
| Accessories for the PHOENIX L300i, PHOENIX L300i DRY, PHOENIX L300i MODUL and PHOENIX L500i | 804 |
| Helium Sample Probes (Sniffers) | 806 |

Miscellaneous

| | |
|---------------------------------|-----|
| Connection Flanges. | 808 |
| Connection Components | 808 |

Applications for Leak Detecting Instruments

| Test Instruments / Leak Detectors | | PHOENIX L300i | PHOENIX L300i DRY | PHOENIX L300i MODUL (oil-free) | PHOENIX L300i MODUL (oil sealed) | PHOENIX L500i | PHOENIX L340i | PHOENIX L320i Fab |
|--------------------------------------|---|---------------|-------------------|-----------------------------------|-------------------------------------|---------------|---------------|-------------------|
| Applications | | | | | | | | |
| Semiconductor production | ■ | ■ | ■ | | ■ | | ■ | |
| Vacuum coating | ■ | | | ■ | ■ | | | |
| Research and development | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Chemistry/pharmaceutical | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Metallurgy/furnaces | ■ | | | ■ | ■ | | | |
| Lamps and tube manufacture | ■ | | | ■ | ■ | ■ | ■ | |
| Automotive industry | ■ | | | ■ | ■ | ■ | ■ | |
| Laser engineering | ■ | ■ | | | ■ | | | |
| Particle accelerators | | ■ | ■ | | ■ | | ■ | |
| Analytical engineering | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Systems with cryopumps | ■ | ■ | ■ | ■ | ■ | | ■ | |
| Cooling and air conditioning | | ■ | ■ | | ■ | | ■ | |
| Electrical engineering | ■ | ■ | ■ | ■ | ■ | | ■ | |
| Mechanical engineering | ■ | | | ■ | ■ | | ■ | |
| Power plants | ■ | | | ■ | ■ | | ■ | |
| Systems engineering | ■ | | | ■ | ■ | | ■ | |
| UHV applications | ■ | ■ | ■ | ■ | ■ | | ■ | |

Accessories for Leak Detecting Instruments

| Test Instruments / Leak Detectors | | PHOENIX L300i | PHOENIX L300i DRY | PHOENIX L300 MODUL (oil-free) | PHOENIX L300 MODUL (oil sealed) | PHOENIX L500i | PHOENIX L340i | PHOENIX L320i Fab |
|--------------------------------------|------|---------------|-------------------|----------------------------------|------------------------------------|-----------------|---------------|-------------------|
| Accessories | Page | | | | | | | |
| Remote control unit RC 310 | 788 | ■ | ■ | ■ | ■ | | ■ | ■ |
| Calibrated leaks | 792 | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Screw-in calibrated leaks | 794 | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Transportation means | 796 | ■ | ■ | ■ | ■ | | | |
| Partial flow system | 796 | ■ | | ■ | ■ | | | |
| PC software LeakWare | 796 | ■ | ■ | ■ | ■ | | ■ | ■ |
| Helium sniffers | 798 | ■ | ■ | ■ | ■ | ■ ¹⁾ | ■ | ■ |
| Exhaust filter sets | | standard | standard | | | standard | | |
| Interfaces | | standard | standard | standard | standard | standard | standard | standard |
| Gas ballast facilities | | standard | | | | standard | | |
| Trigger relay boards | | standard | standard | standard | standard | standard | standard | standard |

¹⁾ Upon request

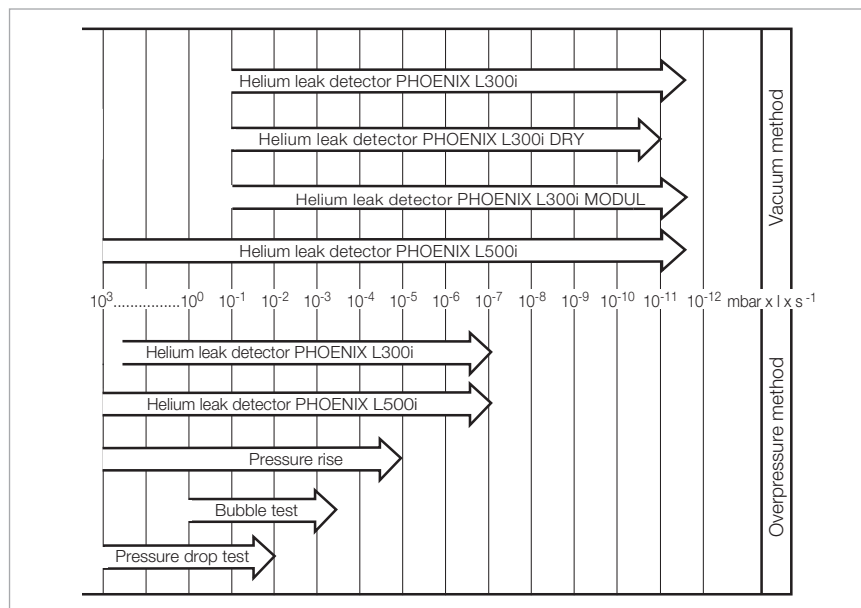
Leak Detection – Leak Testing

Whether a component or a system is leak-tight depends on the application it is to be used in and the leak rate that is acceptable. Absolutely leak-tight components and systems do not exist. A component is considered technically leak-tight if its leak rate remains below a value defined for this particular component. In order to provide a quantitative measure, the term “leak rate” with the symbol “ q_L ” was introduced. In vacuum technology $\text{mbar} \times \text{l} \times \text{s}^{-1}$ is used as the unit for leak rates.

A leak rate of $1 \text{ mbar} \times \text{l} \times \text{s}^{-1}$ exists in a closed vessel having a volume of 1 liter when the pressure increases by 1 mbar within one second, or in case of an overpressure it decreases by 1 mbar within one second.

$$q_L = \frac{V \times \Delta p}{\Delta t} \quad (\text{mbar} \times \text{l} \times \text{s}^{-1})$$

The wide range of leak rates from several $100 \text{ mbar} \times \text{l} \times \text{s}^{-1}$ to below $10^{-11} \text{ mbar} \times \text{l} \times \text{s}^{-1}$ as they occur in practice necessitates the use of different



Overview of the leak rate detection ranges

leak detection principles and hence leak detectors (see figure). Besides the determination of the total leak tightness, it is usually important to locate the leak, quickly and precisely, in order to seal it. Instruments for local

leak detection are called leak detectors. The leak detectors presented in this product section can be used for the localization of leaks, and in addition some are suitable for determining the total leak rate of test objects.

Leak Rate

| | $\text{Pa} \times \text{m}^3 \times \text{s}^{-1}$ | $\text{atm} \times \text{cm}^3 \times \text{s}^{-1} \text{ } ^{1)}$ $\text{mbar} \times \text{l} \times \text{s}^{-1} \text{ } ^{1)}$ | $\text{atm} \times \text{cm}^3 \times \text{s}^{-1} \text{ } ^{1)}$ $\text{cm}^3 \times \text{s}^{-1} \text{ } ^{1)}$ |
|---|--|--|--|
| $\text{Pa} \times \text{m}^3 \times \text{s}^{-1}$ | 1 | 10 | 9.87 |
| $1 \text{ mbar} \times \text{l} \times \text{s}^{-1} \text{ (He)}$ | 0.1 | 1 | 0.99 |
| $1 \text{ atm} \times \text{cm}^3 \times \text{s}^{-1} \text{ } ^{1)} = \text{cm}^3 \text{ (STP)} \times \text{s}^{-1}$ | 0.101 | 1.01 | 1 |
| $1 \text{ Torr} \times \text{l} \times \text{s}^{-1} \text{ } ^{1)}$ | 0.133 | 1.33 | 1.33 |
| $1 \text{ kg} \times \text{h}^{-1} \text{ air}$ | 23.4 | 234 | 234 |
| $1 \text{ g/a C}_2\text{H}_2\text{F}_4 \text{ (R 134a)}$ | 6.41×10^{-7} | 7.58×10^{-6} | 6.3×10^{-6} |

Leak Rate

| | $\text{atm} \times \text{cm}^3 \times \text{s}^{-1} \text{ } ^{1)}$ $\text{Torr} \times \text{l} \times \text{s}^{-1} \text{ } ^{1)}$ | $\text{kg} \times \text{h}^{-1}$ Air | g/a $\text{C}_2\text{H}_2\text{F}_4 \text{ (R 134a)}$ |
|---|--|--|---|
| $\text{Pa} \times \text{m}^3 \times \text{s}^{-1}$ | 7.5 | 4.28×10^{-2} | 2.28×10^6 |
| $1 \text{ mbar} \times \text{l} \times \text{s}^{-1} \text{ (He)}$ | 0.75 | 4.3×10^{-3} | 2.28×10^5 |
| $1 \text{ atm} \times \text{cm}^3 \times \text{s}^{-1} \text{ } ^{1)} = \text{cm}^3 \text{ (STP)} \times \text{s}^{-1}$ | 0.76 | 4.3×10^{-3} | 2.3×10^5 |
| $1 \text{ Torr} \times \text{l} \times \text{s}^{-1} \text{ } ^{1)}$ | 1 | 5.7×10^{-3} | 3.0×10^5 |
| $1 \text{ kg} \times \text{h}^{-1} \text{ air}$ | 175 | 1 | – |
| $1 \text{ g/a C}_2\text{H}_2\text{F}_4 \text{ (R 134a)}$ | 4.8×10^{-6} | – | 1 |

¹⁾ According to international system of units only $\text{Pa} \times \text{m}^3 \times \text{s}^{-1}$ is permissible

Leak Detection Methods

There are two main groups of leak detection methods; for both there are special instruments available:

Vacuum Methods

The equipment to be tested is evacuated. The pressure ratio between inside and outside is 0:1.

Overpressure Methods

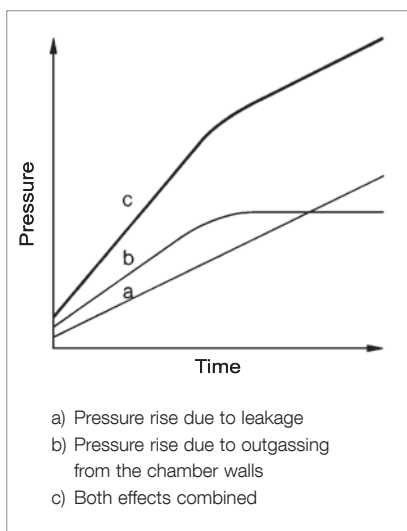
The equipment to be tested is pressurized with a search gas or a search gas mixture.

The pressure ratio between inside and outside is over 1:1.

Between the two methods there exist many variations depending on the particular application.

General Notes

1. The lowest leak rates can only be measured by employing the vacuum method, whereby the following applies: The lower the leak rate, the higher the requirements are concerning cleanliness and ultimate vacuum.
2. If possible the test objects should be tested under the same conditions that will be used in their final application, i.e. parts for vacuum operation should be tested according to the vacuum method and parts for overpressure operation should be tested using the overpressure method.



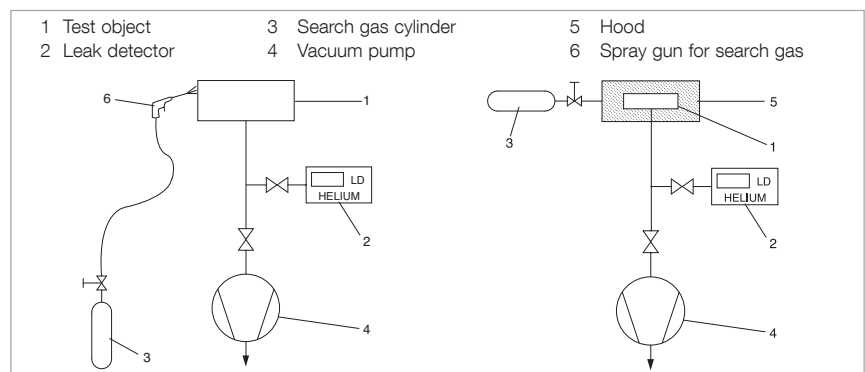
Pressure rise in a vacuum chamber after switching off the pump; double log. plot

Leak Testing Based on Vacuum Methods

(Vacuum inside the test object.)

Pressure Rise Method

With this method it is only possible to determine the total leak rate. The test object is evacuated with a vacuum pump or a vacuum pump system. A valve is used to isolate the test object from the vacuum pump. The pressure will then rise as a function of time. Curve (a) shows the theoretical pressure rise if there is only a leak. Curve (b) shows the pressure rise due to outgassing from the surfaces of the test object. This pressure rise tends to tail off in the direction of a saturation level. If in such a case the time allowed for monitoring the pressure rise is too short, a leak will be indicated which in reality does not exist. If one waits long enough for the pressure to rise, i.e. after the bend of curve (b) the outgassing process can then be disregarded, so that the leak rate can be determined from the known volume of the test object and the measured pressure rise over a fixed rise time (see equation on page before). Curve (c) shows the pressure rise as it occurs in practice, where out-gassing and leak rate add. The detectable leak rate depends on the volume of the test object, the obtained ultimate pressure and the out-gassing from the test object. In connection with very large test objects this method is time consuming if extremely low leak rates are to be determined in the fine and rough vacuum range.



Local leak detection – Evacuated test object (left) and Integral method – Evacuated test object (right)

Local Leak Detection

The test object is evacuated by a vacuum pump (auxiliary pump) until the pressure is low enough for the leak detector to operate. When using a helium leak detector, its own pump system will take care of further evacuation. Suspicious spots on the test object will then be sprayed with a fine jet of search gas. Search gas entering through leaks into the test object is pumped out by the vacuum pump and it is converted by the leak detector into an electrical signal which is then displayed. This permits rapid detection and determination of the size of even the smallest leaks.

Integral Method

Determination of the total leak rate of a test object. The testing arrangement is the same as for local leak detection, but in this case the test object is not sprayed with search gas on selected areas, but it is surrounded by a hood or a chamber which is filled with the search gas. Thus the entire outer surface of the test object comes into contact with the search gas. If the search gas enters the test object, the total leak rate is indicated independently of the number of existing leaks. With helium leak detectors it is possible to determine the helium content of the air. This is utilized in the detection of gross leaks.

Leak Testing Based on Overpressure Methods

(Overpressure within the test object.)

Pressure Drop Method

The test object is filled with a gas (for example air or nitrogen) until the testing pressure is reached. Precision vacuum gauges are used to detect a possible pressure drop during the testing period. This method is simple to implement, it is suitable for the determination of gross leaks and can be improved upon by using differential pressure gauges. By applying soap solutions or similar, leaks can be located.

Local Leak Detection with Leak Detectors – Sniffing

The test object is filled with the search gas or the search gas/air mixture to which the leak detector is sensitive. The leak detector is equipped with a sniffer probe, whereby there is a low pressure at the probe tip. If the sniffer tip passes suspicious points on the test object the search gas coming out of the leak is sucked in and transferred to the detection system of the leak detector. After conversion into electrical signals these are displayed optically and acoustically by the leak detector.

Integral Method – Hood Test

To determine the total leak rate of a test object subjected to a search gas overpressure, the test object is surrounded by a hood of a known volume. The search gas which escapes through the leaks collects in the hood.

After a fixed accumulation period a sniffer probe is used to measure the concentration of the search gas which has collected in the hood.

Before this the leak detector should be calibrated by a reference measurement using a known search gas concentration.

The leak rate can then be determined by the equation for q_L where V is the volume of the hood, Δp is the partial pressure difference of the search gas (concentration change) and t is the accumulation period.

Uncertainties in the determination of the volume, leaks in the hood and a wrong accumulation period make precise leak rate measurements based on this method very questionable.

Integral Method – Vacuum Hood Test

This test is a variation of the hood test described above, which has considerable advantages. A vacuum chamber which is evacuated by an auxiliary pump and which is connected to a leak detector is used as the hood. The search gas escaping through the leaks is converted by the detection system of the leak detector into electrical signals which are immediately displayed. After calibration of the leak detector with a calibrated leak it is possible to quantitatively determine the total leak rate.

This method permits the detection of very small leaks and is especially suited for automatic industrial leak detection.

Integral Method – Bombing-Test

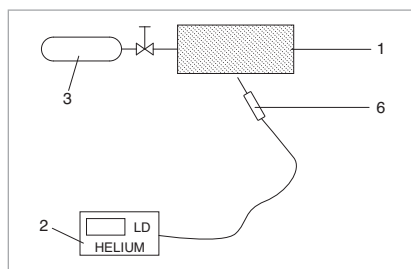
This method is used for testing hermetically sealed components such as transistors, IC-packages or dry reed relays. It is basically a variation of the vacuum hood test. Here the test objects are placed in a vessel which is pressurized with the search gas – preferably helium. At a fairly high search gas pressure and after a period of up to several hours it is tried to enrich the search gas inside leaky test objects. This is the actual so called “bombing” process.

After this, the test objects are transferred to a vacuum chamber and their total leak rate is determined in the same way as in the vacuum hood test. During evacuation of the vacuum chamber down to the required testing pressure, those test objects which have a gross leak already lost their accumulated search gas. These parts are not detected as leaking during the actual leak test. Therefore the test with the vacuum chamber is often preceded by a “bubble test”.

This method permits the detection of the lowest leak rates and is used mainly in automatic industrial leak testing especially when it is not possible to fill the parts with gas in any other way.

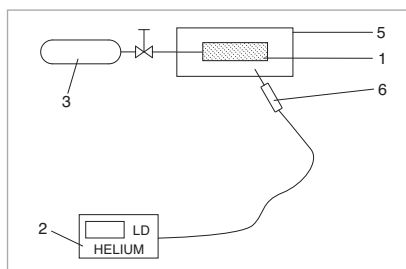
Key to the Figures

- | | |
|-----------------|-----------------------|
| 1 Test object | 3 Search gas cylinder |
| 2 Leak detector | 4 Vacuum pump |

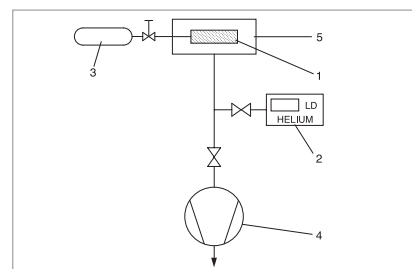


Local leak detection –
Search gas overpressure in the test object

- | |
|-----------------|
| 5 Hood |
| 6 Sniffer probe |



Integral method (search gas accumulation)
Search gas overpressure in the test object



Integral method –
Search gas overpressure in the test object

Operating Principles of the Helium Leak Detectors

Operating Principle

A helium leak detector permits the localization of leaks and the quantitative determination of the leak rate, i.e. the gas flow through the leak. Such a leak detector is therefore a helium flow meter.

In practice the leak detector performs this task by firstly evacuating the part which is to be tested, so that gas from the outside may enter through an existing leak due to the pressure difference present. If only helium is brought in front of the leak (for example by using a spray gun) this helium flows through the leak and is pumped out by the leak detector. The helium partial pressure present in the leak detector is measured by a sector mass spectrometer and is displayed as a leak rate. This is usually given in terms of volume flow of the helium (pV-flow).

Important Specifications

The two most important features of a leak detector are its measurement range (detection limits) and its response time.

The measurement range is limited by the lowest and the highest detectable leak rate. The lowest detectable leak rate is defined by the sum of drift and noise in the most sensitive measurement range. Usually the sum of noise amplitude and zero drift per minute is made to be equivalent to the lowest detectable leak rate. With leak detectors the amount of drift is so low, that the noise amplitude alone determines the detection limit.

The highest detectable leak rate depends strongly on the method employed. Especially the counterflow method and partial flow operation (see description below) permit the measurement of very high leak rates even with a sensitive helium leak detector. In addition the multistage switchable high impedance input amplifiers of the leak detectors also permit the measurement of high leak rates.

In practical applications, especially in the localization of leaks the response time is of great significance. This is the time it takes from spraying the test object with

helium until a measured value is displayed by the leak detector. The response time of the electronic signal conditioning circuitry is an important factor in the overall response time. In the case of leak detectors the response time of the electronic circuitry is well below 1 s.

The volume flow rate for helium at the point of the test object is of decisive significance to leak detection on components which are pumped down solely by the leak detector. This volume flow rate provided by the leak detector takes care of the helium entering through a leak and it ensures quick detection by the leak detector. On the other hand the volume of the test object delays the arrival of the helium signal. The response time can be calculated on the basis of the following simple equation:

$$\text{Response time for helium } t_A = 3 \frac{V}{S_{\text{He}}} \\ (\text{for 95\% of the final value})$$

with V = Volume of the test object
 S_{He} = Volume flow rate for helium at the point of the test object
(or at the inlet of the leak detector, if it alone pumps down the test object).

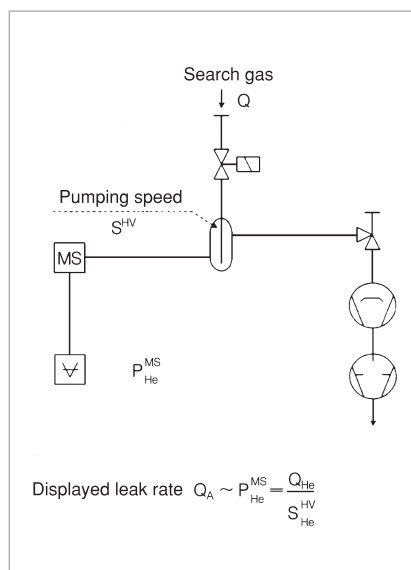
Main Flow Method

The classic operating principle of helium leak detectors is based on the main flow method. Here the entire helium flow passes through the high vacuum system of the leak detector, where the mass spectrometer measures the partial pressure of the helium. In this, the use of a liquid nitrogen cold trap is essential to remove water vapor or other condensable gases in the vacuum system which impair the operation. Moreover, the use of a cold trap permits the low operating pressures for the mass spectrometer to be reached (below 10^{-4} mbar) despite the directly connected (and possibly contaminated) test object.

The advantages of the main flow method are:

- Highest sensitivity, i.e. low detection limit
- Short response time due to a high volume flow rate at the inlet.

The main flow method is thus especially suitable for stationary leak detection on components. Leak detection on systems having their own pump sets and at higher pressures requires the use of an external throttling valve, i.e. a partial flow with subsequently reduced sensitivity is utilized.



Main flow method

Counterflow Method

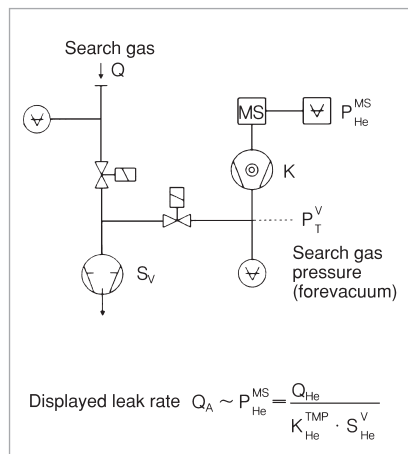
With this method the test object is not connected to the high vacuum. Instead it is connected to the forevacuum (between turbomolecular pump and backing pump), so that the entire gas flow (especially water vapor) does not contribute to the pressure increase in the mass spectrometer. Thus a cold trap is no longer required!

The helium which now enters the forevacuum can still be detected, as it is able to flow against the pumping direction of the turbomolecular pump into the mass spectrometer. This is due to the high particle velocity of the helium. The sensitivity of this counterflow arrangement is equal to that of the main flow principle, provided the right combination of volume flow rate of the backing pump and helium compression of the turbomolecular pump is used.

The advantages of the counterflow method are:

- No liquid nitrogen is required
- High permissible inlet pressures (i.e. pressure within the test object)

This makes the counterflow method especially suitable for mobile leak detection on systems. For leak detection on larger components where a short response time is essential (i.e. high volume flow rate) an additional turbomolecular pump stage is required at the inlet of the leak detector.



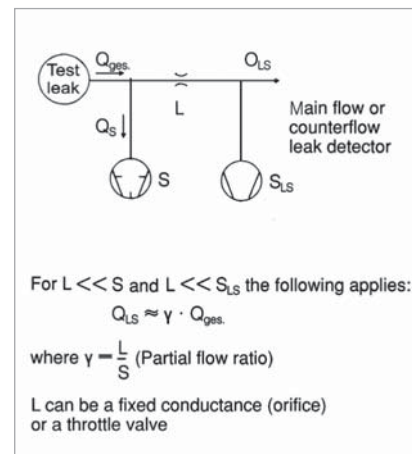
Counterflow method

Partial Flow Method

In order to expand the measurement range in the direction of higher leak rates and for operation at higher inlet pressures, helium leak detectors incorporate a partial flow or a gross leak system. This consists basically of a throttle and a rotary vane pump. At pressures above the normal inlet pressure (main flow: above 10^{-2} mbar, counterflow: above 10^{-1} mbar) or in the case of high helium leak rates, the inlet valve is closed and the main flow is allowed to enter the partial flow pump, whereas only a small part enters the leak detector via the partial flow throttle. Thus the total pressure and the helium pressure are dropped to values suitable for operation of the leak detector.

To obtain correct leak rate readings in the partial flow mode, the partial flow ratio, i.e. the ratio between the actually measured gas flow and the total gas flow must be known and stable.

In all leak detectors this is achieved by a partial flow throttle made of ruby with a precisely machined hole. This ensures that the quantitatively determined leak rates are always correct without calibration, even for gross leaks.



Partial flow method

Calibration of Helium Leak Detectors with Calibrated Leaks

In the process of leak detection one expects that a test object which does not have a leak produces a zero reading on the leak detector. In this any malfunctions are excluded. Thus calibrated leaks, i.e. artificial leaks which produce a known helium leak rate are essential for reliable results.

To obtain a quantitatively correct leak rate reading the sensitivity of the leak detector must also be adjusted. This requires the use of a calibrated leak.

Oerlikon Leybold Vacuum offers calibrated helium leaks of various designs covering the range between 10^{-9} to 10^{-4} mbar x l x s⁻¹ as part of the standard range of products. All leak rates are traceable to the standards of the DAkkS Calibration Service controlled

by the PTB (Federal Institution of Physics and Technology). If requested each helium calibrated leak can be supplied with a calibration certificate issued by the DAkkS Calibration Service. The calibration itself is performed by the DAkkS Calibration Service for Vacuum which is run by Oerlikon Leybold Vacuum on behalf of the PTB.

Products

Helium Leak Detector PHOENIX L300i



PHOENIX L300i

Advantages to the User

- Lowest detectable leak rate
- Short He recovering time condition
- Quick startup under 2 minutes
- Extremely fast response time
- Oil-free gas admission system
- One of the smallest helium leak detectors in the world
- High sensitivity
- Fast leak rate readout also at low leak rates
- Service friendly through modular design

Typical Applications

Leak tests in connection with

- Quality assurance
- Automotive industry
- Analytical instruments
- Systems manufacture
- Power station engineering
- Research and development
- Semiconductor industry
- High vacuum and ultra-high vacuum engineering
- Ideal tool for industrial series production testing – in the cooling and air conditioning industries, for example

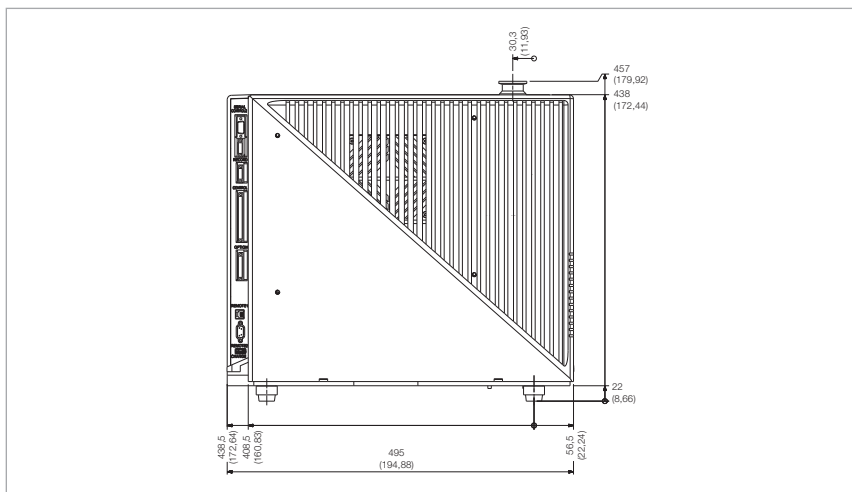
The PHOENIX L300i is a portable multi-purpose helium leak detector and equally well suited to both service and series production testing.

The rugged modular design and its ease of use make the PHOENIX L300i one of the most user-friendly leak detector in its class.

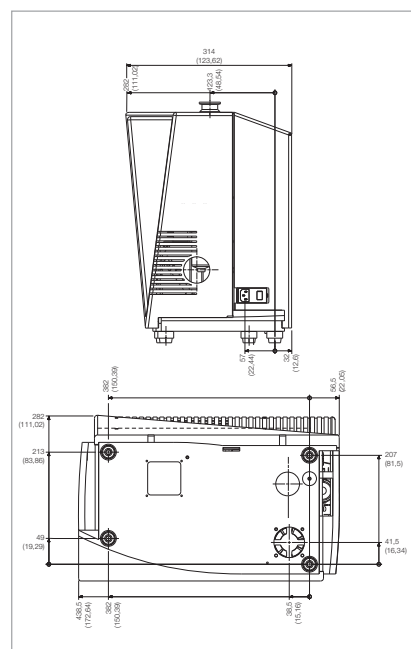
Through the remote controls tablet and RC 310, remote monitoring and control is possible.

In connection with the sniffer lines which are available as accessories the PHOENIX L300i may also be used as a sniffer leak detector.

In connection with a partial flow pump set the PHOENIX L300i may also be used for the detection of leaks on large vessels.



Dimensional drawing for the PHOENIX L300i (rear side)



Dimensional drawing for the PHOENIX L300i (side and upper side)

Technical Data

PHOENIX L300i

| | | |
|---|--|---|
| Minimum detectable helium leak rate | | |
| Vacuum mode | mbar x l x s ⁻¹ | ≤ 5 x 10 ⁻¹² |
| Sniffer mode | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁷ |
| Minimum detectable hydrogen leak rate | | |
| Vacuum mode | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻⁸ |
| Sniffer mode | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁷ |
| Units of measurement (selectable) | | |
| Pressure | | mbar, Pa, atm, Torr |
| Leak rate | | mbar x l x s ⁻¹ , Pa x m ³ x s ⁻¹ , Torr x l x s ⁻¹ , atm x cc x sec ⁻¹ , sft ³ /yr |
| Sniffer mode | | ppm, g/a eq, oz/yr eq |
| Leak rate measurement range | mbar x l x s ⁻¹ | 1 x 10 ⁻¹² to 1 x 10 ⁻¹ |
| Measurement ranges | | 12 decades |
| Max. inlet pressure | mbar (Torr) | 15 (11.25) |
| Pumping speed during the evacuation process | | |
| 50 Hz | m ³ x h ⁻¹ (cfm) | 2.5 (1.5) |
| 60 Hz | m ³ x h ⁻¹ (cfm) | 3.0 (1.8) |
| Pumping speed (helium) at the inlet | | |
| GROSS mode | l/s | 0.4 |
| FINE mode | l/s | > 2,5 |
| Time constant of the leak rate signal (blanked off, 63% of final value) | s | < 1 |
| Run-up time (after starting) | min | ≤ 2 |
| Mass spectrometer | | 180° magnetic sector field |
| Ion source | | 2 filaments; iridium/yttria-oxide |
| Detectable masses | amu | 2, 3 and 4 |
| Inlet port | DN | 25 ISO-KF |
| Dimensions (W x H x D) | | 495 x 457 x 314 |
| Weight | kg (lbs) | 40.0 (88.2) |
| Available languages | | English, German, Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish and Korean |

Ordering Information

PHOENIX L300i

| | Part No. |
|--|------------------|
| PHOENIX L300i | |
| EURO version | |
| 230 V, 50/60 Hz, mbar readout, with integrated calibrated leak TL 7 | 250000V01 |
| US version | |
| 115 V, 60 Hz, mbar readout, with integrated calibrated leak TL 7 | 251000V01 |
| Japan version | |
| 100 V, 50/60 Hz, mbar readout, with integrated calibrated leak TL 7 | 251100V01 |
| Tablet incl. software (APP), WiFi module, protection case (IP 67) PHOENIX L300i | 252005V01 |
| Tablet incl. software (APP), communication cable and E-chip, protection case (IP 67) PHOENIX L300i | 252005V02 |
| Tablet holder PHOENIX L300i | 252007V01 |
| BARCODE scanner tablet PHOENIX L300i | 252008V01 |
| Tablet table stand | 252009V01 |
| Tablet lock | 252010V01 |
| Partial flow system (115-230 V) | 140 20 |
| PC software LeakWare | 140 90 |
| For further accessories see para. "Accessories for PHOENIX L300i, PHOENIX L300i DRY and PHOENIX L300i MODUL" | |

Portable and Dry Helium Leak Detector PHOENIX L300i DRY



PHOENIX L300i DRY

The PHOENIX L300i DRY is a compact portable helium leak detector capable of meeting the highest cleanliness requirements.

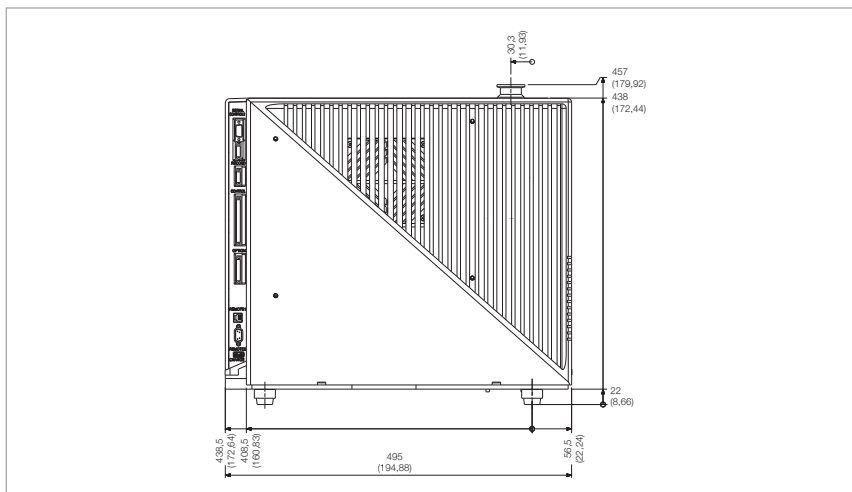
Based on the well-proven technology of the PHOENIX L300i, equipped with an oil-free pump system, the PHOENIX L300i DRY meets the highest requirements concerning cleanliness while at the same time being small in size.

Advantages to the User

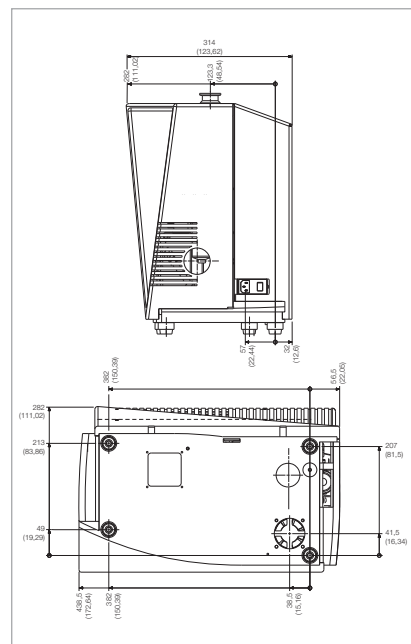
- Oil-free "dry" pump system
- Small footprint
- Quick start-up
- Extremely fast response
- Service friendly through modular design
- Integrated helium contamination protection

Typical Applications

- Leak tests with stringent requirements concerning cleanliness, for example
- Semiconductor industry
 - after repairs or maintenance work
 - Production of semiconductor components
 - Pharmaceutical/medicine
 - Laser



Dimensional drawing for the PHOENIX L300i DRY (rear side)



Dimensional drawing for the PHOENIX L300i DRY (side and upper side)

Technical Data

PHOENIX L300i DRY

| | | |
|---|--|---|
| Minimum detectable helium leak rate | | |
| Vacuum mode | mbar x l x s ⁻¹ | ≤ 3 x 10 ⁻¹¹ |
| Sniffer mode | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁷ |
| Minimum detectable hydrogen leak rate | | |
| Vacuum mode | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻⁸ |
| Sniffer mode | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁷ |
| Units of measurement (selectable) | | |
| Pressure | | mbar, Pa, atm, Torr |
| Leak rate | | mbar x l x s ⁻¹ , Pa x m ³ x s ⁻¹ , Torr x l x s ⁻¹ , atm x cc x sec ⁻¹ , sft ³ /yr |
| Sniffer mode | | ppm, g/a eq, oz/yr eq |
| Leak rate measurement range | mbar x l x s ⁻¹ | 1 x 10 ⁻¹¹ to 1 x 10 ⁻¹ |
| Measurement ranges | | 11 decades |
| Max. inlet pressure | mbar (Torr) | 15 (11.25) |
| Pumping speed during the evacuation process | | |
| 50 Hz | m ³ x h ⁻¹ (cfm) | 1.6 (0.94) |
| 60 Hz | m ³ x h ⁻¹ (cfm) | 1.8 (1.06) |
| Pumping speed (helium) at the inlet | | |
| GROSS mode | l/s | 0.02 |
| PRECISION mode | l/s | 0.4 |
| FINE mode | l/s | > 2,5 |
| Time constant of the leak rate signal (blanked off, 63% of final value) | s | < 1 |
| Run-up time (after starting) | min | ≤ 2 |
| Mass spectrometer | | 180° magnetic sector field |
| Ion source | | 2 filaments; iridium/yttria-oxide |
| Detectable masses | amu | 2, 3 and 4 |
| Inlet port | DN | 25 ISO-KF |
| Dimensions (W x H x D) | | 495 x 457 x 314 |
| Weight | kg (lbs) | 35.5 (78.4) |
| Available languages | | English, German, Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish and Korean |

Ordering Information

PHOENIX L300i DRY

| | Part No. |
|--|------------------|
| PHOENIX L300i DRY | |
| EURO version | |
| 230 V, 50 Hz, mbar readout, with integrated calibrated leak TL 7 | 250001V01 |
| US version | |
| 115 V, 60 Hz, mbar readout, with integrated calibrated leak TL 7 | 251001V01 |
| Japan version | |
| 100 V, 50/60 Hz, mbar readout, with integrated calibrated leak TL 7 | 251101V01 |
| Tablet incl. software (APP), WiFi module, protection case (IP 67) PHOENIX L300i | 252005V01 |
| Tablet incl. software (APP), communication cable and E-chip, protection case (IP 67) PHOENIX L300i | 252005V02 |
| Tablet holder PHOENIX L300i | 252007V01 |
| BARCODE scanner tablet PHOENIX L300i | 252008V01 |
| Tablet table stand | 252009V01 |
| Tablet lock | 252010V01 |
| Partial flow system (115-230 V) | 140 20 |
| PC software LeakWare | 140 90 |
| For further accessories see para. "Accessories for PHOENIX L300i, PHOENIX L300i DRY and PHOENIX L300i MODUL" | |

Mobile and Flexible Helium Leak Detector

PHOENIX L300i MODUL



PHOENIX L300i MODUL

The PHOENIX L300i MODUL combines the excellent characteristics of the PHOENIX L300i with those of the pump system which has been added to the basic leak detector module.

This results in two basic groups:

- Dry, mobile leak detectors with selectable pumping speed
- Oil sealed, mobile leak detectors offering a high pumping speed at an optimum price-to-performance ratio.

PHOENIX L300i MODUL with Oil Sealed Backing Pump

This combination represents a powerful leak detector, the pumping speed of which is adapted to the particular application in each case.

Advantages to the User

- Cost-effective leak detector
- Pumping speed optimized for the particular application
- Fast response
- Quick recovery
- High sensitivity
- Fast leak rate readout also at low leak rates

Typical Applications

All applications involving short cycles and/or larger volumes and which require a mobile system, for example:

- Automotive industry
- Cooling and air conditioning
- Manufacturers of furnaces/machines/systems
- Packaging

The PHOENIX L300i MODUL represents the basic unit of an entire family of leak detectors. It is based on the PHOENIX L300i, but it does not include an integrated backing pump. The customer has to select and add an external backing pump depending on the special application. For example when large vacuum chambers have to be evacuated or higher leak testing cycles are required.

PHOENIX L300i MODUL with Dry Compressing Scroll Pump

This combination represents a dry high-performance leak detector.

Advantages to the User

- Very high pumping speed which is also acceptable for testing semiconductor production chambers without having to use their own pump systems
- Fast response
- Quick recovery (after helium contamination)
- Absolutely dry
- High sensitivity

Typical Applications

All applications which demand a clean process, for example:

- Semiconductor industry (chip manufacturers)
- Semiconductor industry (tool manufacturers and subcontractors)
- High purity gas industry
- Research and development
- UHV applications

Technical Data

PHOENIX L300i MODUL

| | | with 1-stage Rotary Vane Pump | with 2-stage Rotary Vane Pump | with Scroll Pump |
|--|--|---|---|---|
| Minimum detectable helium leak rate | | | | |
| Vacuum mode | mbar x l x s ⁻¹ | $\leq 5 \times 10^{-11}$ | $\leq 5 \times 10^{-12}$ | $\leq 8 \times 10^{-12} \text{ } ^1) / \leq 5 \times 10^{-11} \text{ } ^2)$ |
| Sniffer mode | mbar x l x s ⁻¹ | $< 1 \times 10^{-7}$ | $< 1 \times 10^{-7}$ | $< 1 \times 10^{-7}$ |
| Minimum detectable hydrogen leak rate | | | | |
| Vacuum mode | mbar x l x s ⁻¹ | $\leq 1 \times 10^{-8}$ | $\leq 1 \times 10^{-8}$ | $\leq 1 \times 10^{-8}$ |
| Sniffer mode | mbar x l x s ⁻¹ | $< 1 \times 10^{-7}$ | $< 1 \times 10^{-7}$ | $< 1 \times 10^{-7}$ |
| Max. permissible inlet pressure | | 15 | 15 | 15 |
| with partial flow system | | 1000 | 1000 | 1000 |
| Pumping speed during the evacuation process with the pump (50 Hz) | | | | |
| SOGEVAC SV 16 BI | m ³ x h ⁻¹ (cfm) | 16 | – | – |
| SOGEVAC SV 28 BI | m ³ x h ⁻¹ (cfm) | 25 | – | – |
| SOGEVAC SV 40 BI | m ³ x h ⁻¹ (cfm) | 40 | – | – |
| TRIVAC D 16 B | m ³ x h ⁻¹ (cfm) | – | 16 | – |
| TRIVAC D 25 B | m ³ x h ⁻¹ (cfm) | – | 26 | – |
| SCROLLVAC SC 15 D | m ³ x h ⁻¹ (cfm) | – | – | 13 |
| SCROLLVAC SC 30 DL | m ³ x h ⁻¹ (cfm) | – | – | 26 |
| Pumping speed for helium at the inlet flange | | | | |
| | l/s | > 2,5 | > 2,5 | > 2,5 |
| Time constant of the leak signal (blanked off, 63% of final value) | | | | |
| | s | < 1 | < 1 | < 1 |
| Leak rate measurement range | | | | |
| | mbar x l x s ⁻¹ | 1×10^{-12} to $1 \cdot 10^{-1}$ | 1×10^{-12} to $1 \cdot 10^{-1}$ | 1×10^{-12} to $1 \cdot 10^{-1}$ |
| Units of measurement (selectable) | | | | |
| Pressure | | mbar, Pa, atm, Torr | mbar, Pa, atm, Torr | mbar, Pa, atm, Torr |
| Leak rate | | mbar x l x s ⁻¹ , Pa x m ³ x s ⁻¹ , Torr x l x s ⁻¹ , atm x cc x sec ⁻¹ , sft ³ /yr | mbar x l x s ⁻¹ , Pa x m ³ x s ⁻¹ , Torr x l x s ⁻¹ , atm x cc x sec ⁻¹ , sft ³ /yr | mbar x l x s ⁻¹ , Pa x m ³ x s ⁻¹ , Torr x l x s ⁻¹ , atm x cc x sec ⁻¹ , sft ³ /yr |
| Sniffer mode | | ppm, g/a eq, oz/yr eq | ppm, g/a eq, oz/yr eq | ppm, g/a eq, oz/yr eq |
| Time until ready for operation | | | | |
| | min | ≤ 2 | ≤ 2 | ≤ 2 |
| Mass spectrometer | | 180° magnetic sector field | 180° magnetic sector field | 180° magnetic sector field |
| Ion source | | 2 yttrium/iridium long-life cathodes | 2 yttrium/iridium long-life cathodes | 2 yttrium/iridium long-life cathodes |
| Detectable masses | | | | |
| | amu | 2, 3 and 4 | 2, 3 and 4 | 2, 3 and 4 |
| Test port | | 1 x DN 25 ISO-KF | 1 x DN 25 ISO-KF | 1 x DN 25 ISO-KF |
| Dimensions (W x H x D) | | | | |
| | mm | 495 x 456 x 314 | 495 x 456 x 314 | 495 x 456 x 314 |
| Weight (without pump) | | | | |
| | kg (lbs) | 30 | 30 | 30 |
| Available languages | | English, German, Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish, Korean | English, German, Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish, Korean | English, German, Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish, Korean |

¹⁾ With SCROLLVAC SC 30 DL

²⁾ With SCROLLVAC SC 15 D

The following Part Numbers contain only the individual components needed for assembly by the customer.

Ordering Information

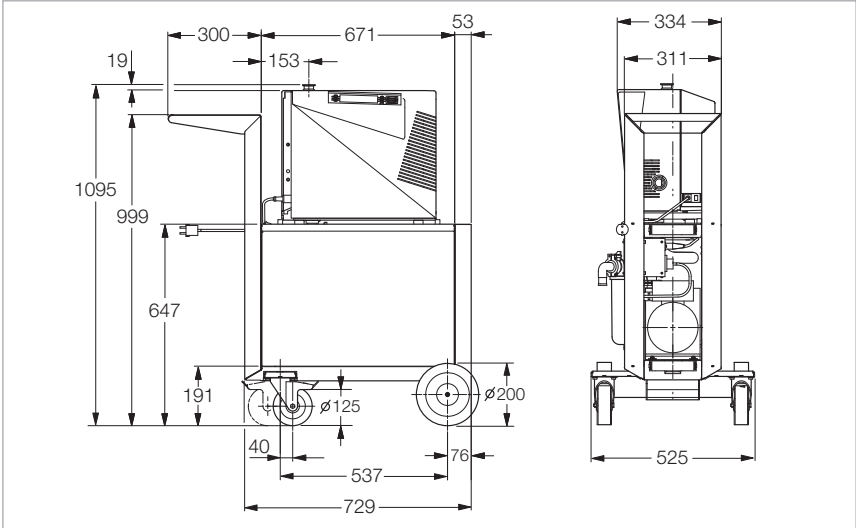
PHOENIX L300i MODUL

| | Part No. | Part No. |
|--|--------------------------------------|------------------------------------|
| PHOENIX L300i MODUL without backing pump 115 - 230 V / 50/60 Hz | 250002V01 | 250002V01 |
| Accessories | | |
| Recommended backing pumps | Euro version 230 V, 50 Hz | US version 115 V, 60 Hz |
| SOGEVAC SV 16 BI | 960 286 | upon request |
| SOGEVAC SV 28 BI | 960 277 | upon request |
| SOGEVAC SV 40 BI | upon request | upon request |
| TRIVAC D 16 B | 113 25 | upon request |
| TRIVAC D 25 B | 113 35 | upon request |
| SCROLLVAC SC 15 D | 133 001 | 133 101 |
| SCROLLVAC SC 30 DL | 133 050 | 133 051 |
| For further accessories see para. "Accessories for PHOENIX L300i, PHOENIX L300i DRY and PHOENIX L300i MODUL" | | |

CART 300 for PHOENIX L300i



CART 300 (with PHOENIX L300i)



Dimensional drawing for CART 300
(here as an example with leak detector and scroll pump SCROLLVAC SC 30 DL)

Technical Data

CART 300

| | | |
|--|----|-------------------|
| Dimensions (W x H x D) | mm | 525 x 1095 x 1024 |
| Weight without leak detector and pump, approx. kg (lbs) (here as an example with leak detector and scroll pump SCROLLVAC SC 30 DL) | | 50.0 (110.38) |

Ordering Information

CART 300

| | Euro version | US version |
|--------------------------------|--------------|------------|
| | Part No. | Part No. |
| CART 300 | | |
| without E-Box | 252 005 | 252 005 |
| with E-Box 230 V, EURO version | 252 006 | - |

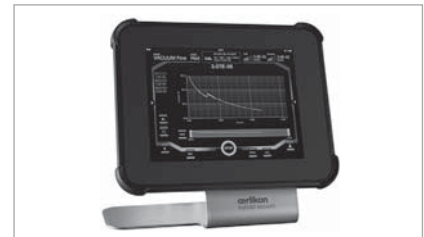
Helium Leak Detector

PHOENIX L500i



PHOENIX L500i

The PHOENIX L500i Helium leak detector opens up new dimensions of productivity and reliability for your applications. This is your solution, pioneered with an intelligent tablet control. The smartest and unparalleled user experience in leak detection.



PHOENIX L500i tablet control

Advantages to the User

- High reliable leak detection
- Fast and reproducible test results
- Improved system design for a high degree of productivity and uptime
- Approved for serial testing
- Rapid evacuation, low contamination degree
- Compact and mobile unit, ergonomic working position
- Simple and comfortable operation
- Sleep mode/wake-up function provides system ready at shift start
- All connections on the backside, easy access to all facilities
- 3 years warranty on the long-life cathodes in the ion sources

Typical Applications

Quality control of components and subassemblies from industries like

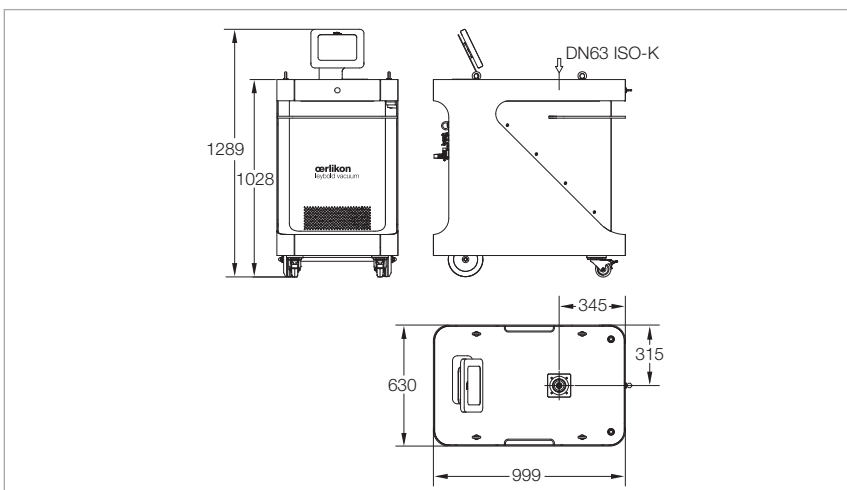
- Electrical engineering (feedthroughs, vacuum sensors, lamps, transformers)
- Automotive (fuel systems, gears)
- Refrigeration and air conditioning
- Packaging (medical, pharmaceutical and food products, barrels)
- Research (fusion facilities, space simulators, particle accelerators)

Smart Monitoring and Control

- Wireless operation via tablet using WiFi (included within the standard delivery) within a distance of up to 50 m
- Unique ergonomic tablet retainer (included within the standard delivery)
- Easy set-up and intuitive touch-screen operation
- Selectable operation mode for maximized flexibility
- Data logger and readout

High Speed leak detection

- Response time < 1 s
- Helium pumping speed at the inlet up to 50 l/s
- Extremely short Helium recovery time
- Efficient standby mode and wake-up function saving time and energy
- Reliable and reproducible test results



Dimensional drawing for the PHOENIX L500i

Technical Data

PHOENIX L500i

| | | |
|--|--|---|
| Smallest detectable He leak rate (per AVS 2.1 and EN 1518) | mbar x l x s ⁻¹ | < 5 x 10 ⁻¹² |
| Max. permissible inlet pressure | | |
| Qualitative measurement | mbar (Torr) | 1000 (750) |
| Quantitative measurement | mbar (Torr) | 100 (75) |
| Detectable masses | amu | 2, 3 and 4 |
| Run-up time (until ready of operation) | min | < 3 |
| Inlet flange | DN | 63 ISO-K |
| Max. He pumping speed at the inlet | l/s | 50 |
| Response time | s | < 1 |
| Supply voltages 3 phases/N/PE, 50/60 Hz | V | 200/208/380/400/460 |
| Weight | kg (lbs) | 385 (849) |
| Dimensions (L x W x H) | mm | 999 x 630 x 1028 |
| Tablet ingress protection category with charging cable | IP | 65 |
| with cover on the charging connection | IP | 67 |
| Available languages | | English, German |
| Units of measurement (selectable) | | |
| Pressure | | mbar, Pa, atm, Torr |
| Leak rate | | mbar x l x s ⁻¹ , Pa x m ³ x s ⁻¹ , Torr x l x s ⁻¹ , atm x cc x sec ⁻¹ , sft ³ /yr |
| Sniffer mode | | ppm, g/a eq, oz/yr eq |
| Leak rate measurement range | mbar x l x s ⁻¹ | 5 x 10 ⁻¹² to 1000 |
| Pumping speed during the evacuation process | | |
| 50 Hz | m ³ x h ⁻¹ (cfm) | 65 (40.0) |
| 60 Hz | m ³ x h ⁻¹ (cfm) | 78 (45.9) |
| Time constant of the leak rate signal (blanked off, 63% of final value) | s | < 0.2 |
| Mass spectrometer | | 180° magnetic sector field |
| Ion source | | 2 filaments; iridium/yttria-oxide |

Ordering Information

PHOENIX L500i

| | Part No. |
|--|-------------------|
| Helium leak detector PHOENIX L500i | |
| Rotary vane vacuum pump filled with | |
| Mineral oil LVO 100 | 503504V901 |
| PFPE oil LVO 400 | 503504V902 |
| Calibrated leak | |
| TL 9 | 144 08 |
| TL 8 | 165 57 |
| TL 6 | 155 66 |
| TL 4 | 155 65 |
| TL 4-6 | 155 80 |
| Reducer DN 63 ISO-K / DN 40 ISO-KF | 887 40 |
| Search gas spray gun for Helium (including 5 m long hose) | 165 55 |
| Antistatic worktop | optional |

PHOENIX L340i

Mobile Helium Leak Detector as Seated Workplace



PHOENIX L340i

The PHOENIX L340i is a mobile leak testing station. It was developed preferably for testing of small series production parts in the vacuum or the sniffer mode. Based on its small footprint and being equipped with 4 wheels it will fit through any standard doorway.

The integrated standard components comprise PHOENIX L300i MODUL with two-stage, oil sealed rotary vane vacuum pump TRIVAC D 25 B as well as a power supply and controller unit.

The PHOENIX L340i is operated through the PHOENIX L300i operator panel, which for this purpose has been integrated in the front panel of the unit. Operation and technical parameters of the PHOENIX L340i can be directly derived from the PHOENIX L300i. Optionally, the PHOENIX L340i may be equipped with an exhaust filter AF16-25 for the TRIVAC, with a dry compressing backing pump SCROLLVAC SC 30 DL or also with a remote control.

Advantages to the User

- Mobile, convenient seated workplace
- Simple to operate, identical with the PHOENIX L300i
- Compact size, since only standard components like the PHOENIX L300i MODUL or TRIVAC D 25 B have been integrated
- High detection sensitivity for helium, thus very small leaks can be detected
- Rapid entry in to the ready mode
- High pumping speed due to separate backing pump

Typical Applications

- Quality assurance on
- one off and small series production products
 - equipment for research and development

Technical Data

PHOENIX L340i

| | | |
|---|----------------------------------|---|
| Lowest detectable helium leak rate (vacuum operation) | mbar x l x s ⁻¹ | $\leq 5 \times 10^{-12}$ |
| Maximum detectable helium leak rate (vacuum operation) | mbar x l x s ⁻¹ | > 0.1 |
| Connecting flange for units under test | DN | 40 ISO-KF |
| Pumping speed during the evacuation process | | |
| with TRIVAC D 25 B | m ³ x h ⁻¹ | approx. 25 |
| with SCROLLVAC SC 30 DL (60 Hz) | m ³ x h ⁻¹ | approx. 25 |
| Pumping speed for helium at the inlet flange | l/s | > 2.5 |
| Time constant of the leak rate signal (blanked off, 63% of the final value) | s | < 1 |
| Time until entering the ready mode | min | < 2 |
| Dimensions (W x H x D) | mm | 780 x 1000 x 1000 |
| Height of the bench top | mm | 750 |
| Available languages | | English, German, Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish and Korean |

Ordering Information

PHOENIX L340i

| | Part No. |
|----------------------|--------------|
| PHOENIX L340i | upon request |
| Custom PHOENIX L340i | upon request |

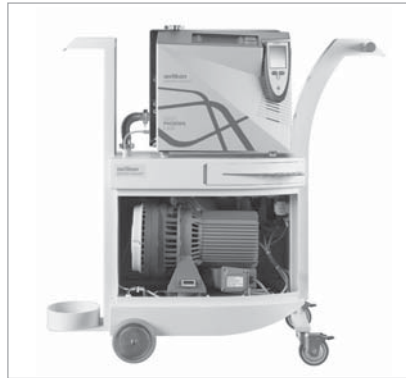
PHOENIX L320i Fab

Mobile Helium Leak Detector

for Increased Cleanness Requirements



PHOENIX L320i Fab



PHOENIX L320i Fab,
with side cover removed

Advantages to the User

- Pleasantly designed mobile leak detector
- Compact dimensions
- High pumping speed due to separate backing pump
- Low particle emissions due to encapsulated backing pump
- Rapid entry in to the ready mode
- High detection sensitivity for helium, thus very small leaks can be detected

- Exclusively standard components have been integrated: convenient access, simple maintenance

Typical Applications

Quality assurance on the following:

- Equipment operated in areas with increased cleanness requirements
- Equipment for research and development
- One off products

The PHOENIX L320i Fab is a mobile helium leak detector, chiefly designed to be operated in rooms subject to increased cleanness requirements.

A PHOENIXL 300 Modul serves as the helium leak detection unit, the backing pump is a dry compressing SCROLLVAC SC 30 DL.

Both principal components of the PHOENIX L320i Fab have been accommodated in a visually pleasing and space saving chassis. In order to significantly suppress the emission of particles, the backing pump has been fitted within an encapsulated housing and is supplied with fresh air from the bottom (fan). The side panels of this housing can be easily removed.

The PHOENIX L320i Fab is equipped with useful accessories like gas cylinder holder, hooks for the sniffer hoses and mains cord as well as a separate switch for the backing pump.

Technical Data

PHOENIX L320i Fab

| | | |
|---|----------------------------------|---|
| Lowest detectable helium leak rate (vacuum operation) | mbar x l x s ⁻¹ | ≤ 5 x 10 ⁻¹² |
| Lowest detectable helium leak rate (sniffer operation) | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁷ |
| Connecting flange for units under test | DN | 25 ISO-KF |
| Maximum detectable helium leak rate (vacuum operation) | mbar x l x s ⁻¹ | > 0.1 |
| Pumping speed during the evacuation process with SCROLLVAC SC 30 DL | m ³ x h ⁻¹ | approx. 25 |
| Pumping speed for helium in the vacuum mode | l/s | > 2.5 |
| Time constant of the leak rate signal (blanked off, 63% of the final value) | s | < 1 |
| Time until entering the ready mode | min | < 2 |
| Dimensions (W x H x D) | mm | 450 x 1200 x 1150 |
| Available languages | | English, German, Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish and Korean |

Ordering Information

PHOENIX L320i Fab

| | Part No. |
|--------------------------|--------------|
| PHOENIX L320i Fab | upon request |
| Custom PHOENIX L320i Fab | upon request |

Accessories

RC 310 C / RC 310 WL Remote Control Units for Leak Detectors



Wired remote control unit RC 310 C



Wireless remote control unit RC 310 WL

The RC 310 remote control unit with their industrial design RC 310 WL (wireless) and RC 310 C (cable) and integrated data memory offer utmost flexibility during the leak detection process.

The RC 310 WL permits wireless remote monitoring up to a distance of 100 m. The RC 310 units support the current leak detectors of the PHOENIX L300i series as well as the UL 200 and L 200 models.

Advantages to the User

- Easy operation via Touch Screen Panel 3.5"
- Wireless transmission up to 100 m, wired transmission up to 34 m
- Data transfer to Windows is possible
- Data backup on internal 32 MB data logger or USB stick is possible
- Possible operating with or without cable
- Adjustable alarm trigger
- Magnetic holder on the rear of the instrument
- Rugged industrial design with an IP 42 rating
- Scroll function for measured data (optional)
- USB connection for data transfer and software updates
- Adjustable loudspeaker and headphone output
- Search function (paging) via audible signal
- Peak hold (maximum value indication)
- For simultaneous detection of up to 10 leak detectors

Typical Applications

- Mobile use with a portable leak detector due to wireless link
- Leak detection for analytics
 - Medicine technology
 - Solar systems
 - Research and development
 - Vacuum equipment
 - Accessories for the automotive industry
 - IT branch
 - Process industry



Different color displays on the remote control unit

Technical Data

RC 310

| | | |
|--|----------|--|
| Display | | TFT graphic touch panel 1/4 VGA / 3.5"; 240 x 320 px |
| Memory capacity | | |
| Internal memory capacity | MB | 64 |
| of this available for recording data | MB | 32 |
| or memory stick | | |
| Battery operating time (RC 310 WL only), (depending on charging condition) | hours | > 8 |
| Wireless transmission range RC 310 WL | m | up to 100 |
| HF output power (4 mW) | dBm | +6 |
| Wireless transmission frequency RC 310 WL | GHz | 2.4 |
| Audio alarm at 1 m distance, max. | dB(A) | 70 |
| Headphone jack stereo 3.5 mm | Ohm | > 2 x 32 |
| Permissible ambient temperature | °C | +5 to +40 |
| Battery charger | | |
| Mains voltages | V | 100 -240 (+/- 10%) |
| Frequencies | Hz | 50/60 |
| Connectable leak detectors | | PHOENIX L300I series, UL 200 line, L 200 series |
| Detection of leak detectors | | up to 10 |
| Available languages | | English, German |
| Further languages | | Chinese, Japanese (Katakana), Russian, French, Italian, Spanish, Polish and Korean |
| Protection class | IP | 42 |
| Charger protection class | IP | 56 |
| RC 310 WL radio permits | | CE, FCC, IC, TELEC, MIC, MII |
| Dimensions (L x W x H) | mm | 210 x 90 x 45 |
| Weight | | |
| RC 310 C, approx. | kg (lbs) | 0.4 (0.88) |
| RC 310 WL, approx. | kg (lbs) | 0.5 (1.1) |

Ordering Information

RC 310

| | Part No. |
|--|--------------------|
| Remote control | |
| RC 310 C, wired with 4 m long connection cable | 252 013 V01 |
| RC 310 WL, wireless with battery charger (for integrated rechargeable battery) and wireless transmitter with connection cable (additional 4 m long connection cable) | 252 014 V01 |
| Accessories | |
| Wireless transmitter with connection cable (for operation of a further PHOENIXL) | 252 015 V01 |
| Extension cable, 10 m (three extensions max. are possible) | 140 22 |

Calibrated Leaks for Vacuum and Sniffer Applications



Test leaks

Calibrated Leaks for Vacuum Applications

TL 4 and TL 6

Calibrated leaks without gas reservoir (capillary type of leak) for sensitivity and signal response time determinations during vacuum leak detection and for determination of sniffer sensitivity for overpressure leak detection. Nominal leak rate ranges 10^{-4} mbar x l x s⁻¹ for TL 4 and 10^{-6} mbar x l x s⁻¹ for TL 6. Suitable for helium. A purging valve with hose nozzle permits a rapid exchange of the gas in the dead volume.

TL 4-6

Helium calibrated leak (capillary leak) for gross leaks, adjustable in the range between 10^{-4} to 10^{-6} mbar x l x s⁻¹, with exchangeable helium reservoir, pressure gauge and two manually operated valves. For calibration of leak rate readings and the alignment of helium mass spectrometers in the vacuum pressure range and for determining the sensitivity of sniffers in the overpressure range.

TL 4

Calibrated helium leak (capillary leak) with reservoir which may be refilled and with a leak rate in the range of 10^{-4} mbar x l x s⁻¹. Special calibrated leak for use in a vacuum.

TL 7 (For installation within the PHOENIX L300i)

Helium calibrated leak (capillary leak) with helium reservoir and electro-magnetically operated valve. Leak rate range 10^{-7} mbar x l x s⁻¹. The electro-magnetically operated valve provided permits the opening and closing of the calibrated leak to be controlled by the leak detector's software.

TL 7

Calibrated helium leak (capillary leak) with helium reservoir, manual valve and He gas.

TL 8 and TL 9

Helium calibrated leak calibrated for a leak rate in the range of 10^{-8} mbar x l x s⁻¹ (helium leak rate) for TL 8 and 10^{-9} mbar x l x s⁻¹ for TL 9, with gas reservoir and diaphragm shutoff valve. For alignment of a helium mass spectrometer, for calibration of the leak rate display of helium leak detectors and for response time measurements in connection with larger volumes.

Note

All calibrated leaks with the exception of the TL 4 are not suited for use in a vacuum.

Calibrated leaks are required for the alignment of mass spectrometers, for the calibration of leak rates and for determining the response time of vacuum systems.

Advantages to the User

- Factory certificate (included) in accordance with DIN 55 350-18-4.2.2
- Highly accurate
- Very low temperature dependence
- Determination of the nominal leak rate by comparison with a calibrated leak having a PTB ¹⁾ certificate
- DAKKS ²⁾ certificate (optional), traceable to PTB
- Custom models for special applications

The nominal leak rate applies only if the calibrated leak has been connected to a vacuum system at a pressure of less than 1 mbar.

¹⁾ Federal Institution of Physics and Technology

²⁾ Deutsche Akkreditierungsstelle GmbH (German Calibration Service)

Calibrated Leaks for Sniffer Applications

These calibrated leaks have been set to a fixed value within the typical leak rate range (see Ordering Information). The exchangeable calibration gas reservoir is monitored through the built-in manometer.

Helium calibrated leaks

S-TL 4 to S-TL 6 with leak rates from 10^{-4} to 10^{-6} mbar x l x s⁻¹.

Set of Calibrated Leaks for Power Plants

These three calibrated leaks of 1000, 100 and 10 mbar x l x s⁻¹ allow leak tests under partial flow conditions under the ambient conditions of power plants.

Technical Data

Leak Rate Range

Leak Detection Method

Connection Flange

| | | | |
|--|---|--|---------------------|
| TL 4, without helium gas reservoir | 10^{-4} mbar x l x s ⁻¹ | Vacuum and sniffer | DN 16 ISO-KF |
| TL 6, without helium gas reservoir | 10^{-6} mbar x l x s ⁻¹ | Vacuum and sniffer | DN 16 ISO-KF |
| TL 4-6, with helium gas reservoir | 10^{-4} to 10^{-6} mbar x l x s ⁻¹ | Vacuum and sniffer | DN 16 ISO-KF |
| TL 4, with helium gas reservoir | 10^{-4} mbar x l x s ⁻¹ | Vacuum | Discharging opening |
| TL 7, with helium gas reservoir | 10^{-7} mbar x l x s ⁻¹ | Vacuum (for installation within the PHOENIX L300i) | Nozzle |
| TL 7, with manual valve and helium gas reservoir | 10^{-7} mbar x l x s ⁻¹ | Vacuum | DN 10 ISO-KF |
| TL 8, with helium gas reservoir | 10^{-8} mbar x l x s ⁻¹ | Vacuum | DN 10 ISO-KF |
| TL 9, with helium gas reservoir | 10^{-9} mbar x l x s ⁻¹ | Vacuum | DN 10 ISO-KF |
| S-TL 4, with helium gas reservoir | 10^{-4} mbar x l x s ⁻¹ | Sniffer | Nozzle |
| S-TL 5, with helium gas reservoir | 10^{-5} mbar x l x s ⁻¹ | Sniffer | Nozzle |
| S-TL 6, with helium gas reservoir | 10^{-6} mbar x l x s ⁻¹ | Sniffer | Nozzle |

Ordering Information

Calibrated Leak

| | Part No. |
|--|------------------------------------|
| TL 4, without helium gas reservoir ¹⁾ | 155 65 |
| TL 6, without helium gas reservoir ¹⁾ | 155 66 |
| TL 4-6, with helium gas reservoir ¹⁾ | 155 80 |
| TL4, with helium gas reservoir ¹⁾ | 122 67 |
| TL 7, with helium gas reservoir ¹⁾ for installation within the PHOENIX L300i filling pressure 8 bar filling pressure 2,9 bar | 140 23 V01 140 23 |
| TL 7, with manual valve and helium gas reservoir ¹⁾ | 142 10 |
| TL 8, with helium gas reservoir ¹⁾ | 165 57 |
| TL 9, with helium gas reservoir ¹⁾ | 144 08 |
| S-TL 4, with helium gas reservoir ¹⁾ | 122 37 |
| S-TL 5, with helium gas reservoir ¹⁾ | 122 38 |
| S-TL 6, with helium gas reservoir ¹⁾ | 122 39 |
| Set of calibrated leaks for power plants 1000, 100, 10 mbar x l x s ⁻¹ | 115 16 |
| Rubber bladder with hose clamp | 890 11 |
| Helium can; 1 l, 12 bar (for TL 4-6) | 252 001 |
| DAkKS calibration for TL 7/8/9 | 154 15 |
| Factory calibration for He test leaks | 154 16 |

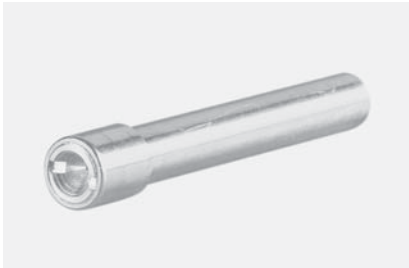
¹⁾ With factory certificate

Screw-in Calibrated Leaks

The manufacturers of helium leak testing systems are in need of calibrated leaks of various sizes with individually adjusted leak rates for the purpose of setting up and calibrating their systems.

Depending on the type of application these calibrated leaks are either installed in the test sample as a master leak or used as a continually available facility in the test chamber itself.

Oerlikon Leybold Vacuum is offering a complete family of calibrated leaks which are capable of meeting the requirements concerning type and required leak rate.



Calibrated leak with screw-in sleeve

Calibrated Leak with Screw-in Sleeve

Is used as a so-called master leak to check the entire helium leak testing system.

Generally two leaktight test samples are equipped with these calibrated leaks. These will ensure proper separation between "passed and rejected" parts.

They are fitted to the customer's test samples either by a welded joint or the screw-in sleeve is glued in place.

Typical Applications

- As a master calibrated leak built-in directly into the test sample
- Directly installed to the test chamber
- Use as a calibrated leak for sniffer applications



Calibrated leak with pin type casing

Calibrated Leak with Pin Type Casing

Serves as a calibrated leak for the entire helium leak testing system without being influenced by the presence of a test sample.

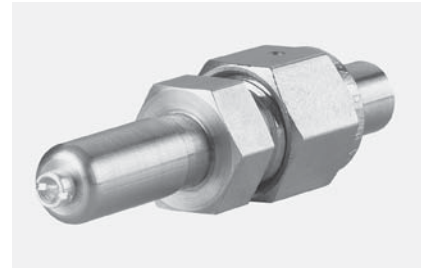
Here a dummy is placed in the test chamber. The connection to the test chamber is directly by a DN 10 ISO-KF fitting. The test gas connection is either by a VCO fitting or a hose nozzle for flexible connections.

Connections on the side of the customer's system are

- 16 ISO-KF running to the vacuum chamber
- Hose nozzle, 10 mm in diameter or VCO fitting, 10 mm in diameter

Advantages to the User

- Various types adapted to different customer requirements
- Simple to operate
- Easy to install



Calibrated leak with cylindrical casing

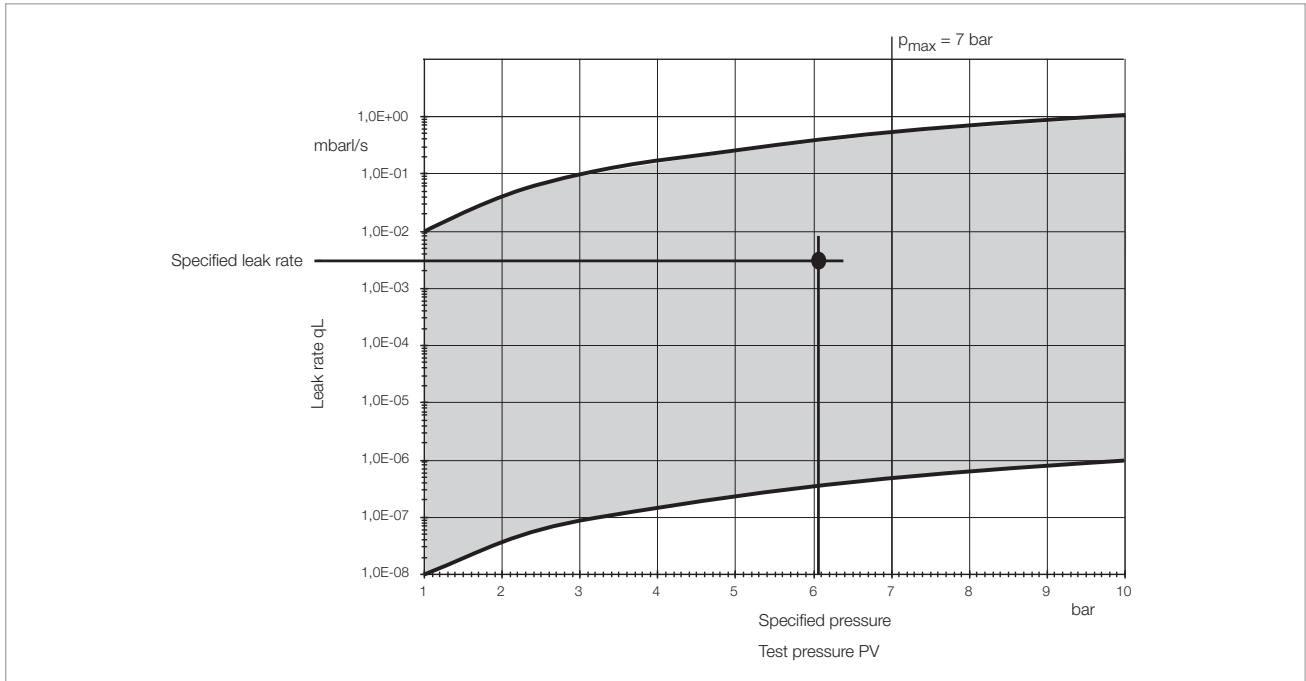
Calibrated Leak with Cylindrical Casing

Is used to check the sensitivity of a sniffing facility.

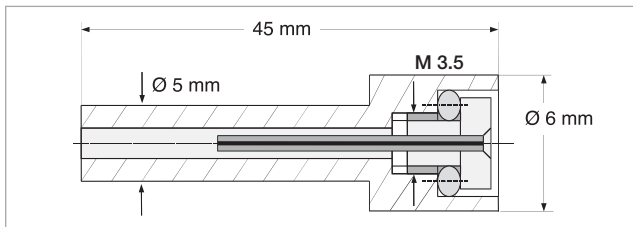
Before and after the actual test, the operator checks the sensitivity of his test facility within the scope of a plausibility check.

The connection on the side of the customer's system is provided via a VCO fitting for a diameter of 10 mm.

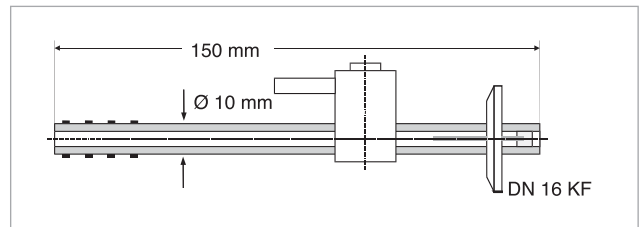
- Ideal installation dimensions
- As a rule, all calibrated leaks are supplied with a certificate (factory certificate) indicating the leak rate which has been set up



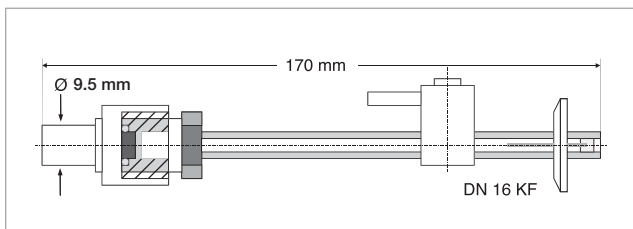
Leak rate as a function of applied forevacuum with reference to 0 bar (> 7 bar upon request)



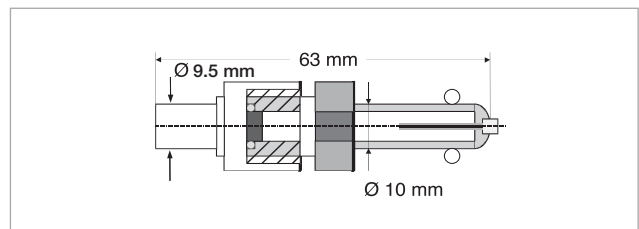
Calibrated leak with screw-in sleeve



Calibrated leak with pin type casing and hose nozzle



Calibrated leak with pin type casing and VCO fitting



Calibrated leak with cylindrical casing and VCO fitting

Ordering Information ¹⁾

Calibrated Leak

| | Part No. |
|---|----------|
| Calibrated leak | |
| with screw-in sleeve | 143 00 |
| with pin type casing and VCO fitting | 143 04 |
| with pin type casing and hose nozzle | 143 08 |
| with cylindrical casing and VCO fitting | 143 12 |

¹⁾ When ordering please always state leak rate, test pressure and helium concentration

Accessories for PHOENIX L300i, PHOENIX L300i DRY, PHOENIX L300i MODUL and PHOENIX L500i



Extension line

10 m Extension Line

The use of extension lines permits operation of the PHOENIXL 300 up to 34 m away from the test objects. A maximum of three extension lines (of 10 m each) may be connected in series.



Search gas spray gun

Search Gas Spray Gun

The search gas spray gun with PVC hose (5 m long) is used for well aimed spraying of search gas at places where a leak is suspected.



Transport Case 300

Transport Case 300

For impact protected transportation of the PHOENIXL 300; complete with strong carrying handles and plastic castors. Separate case for accessories.



Partial flow system without pump

Partial Flow System only for PHOENIX L300i and PHOENIX L300i MODUL

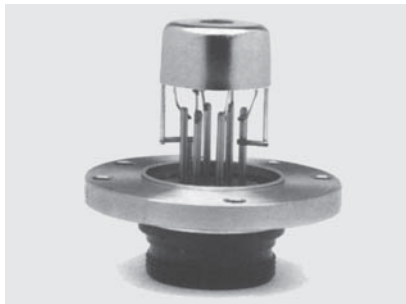
with following advantages:

- Faster response
- Entry into the measure mode already at an inlet pressure of 1000 mbar.
- Faster venting of large test objects or leak detection of mass production.

Equipment:

Valve block (with inlet valve, venting valve, bypass or purging valve) plus right-angle bellows valve DN 25 ISO-KF made of stainless steel, solenoid drives, suited for remote control by the PHOENIX L300i.

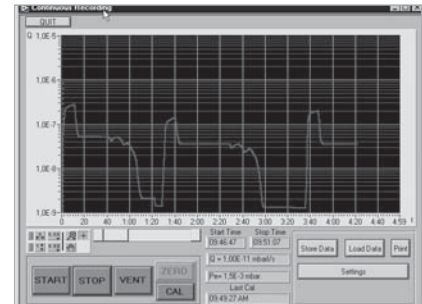
The partial flow systems are available without pumps.



Replacement ion source

Replacement Ion Source

Complete replacement component, including two built-in yttrium coated iridium cathodes

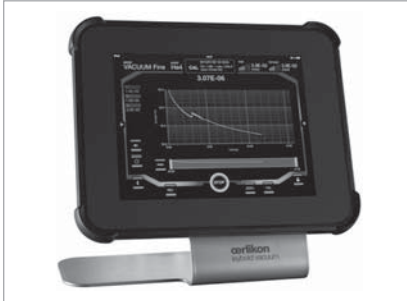


PC software LeakWare

PC Software LeakWare

The Windows PC software is used for data acquisition, documentation of the measurements and to control the operation of the leak detector.

Hardware > 486 DX and 8 MB Ram
Software Windows.



Tablet including Software, Protection Case and charging cable; tablet table stand



Tablet holder PHOENIX L300i



BARCODE Scanner tablet PHOENIX L300i

Ordering Information

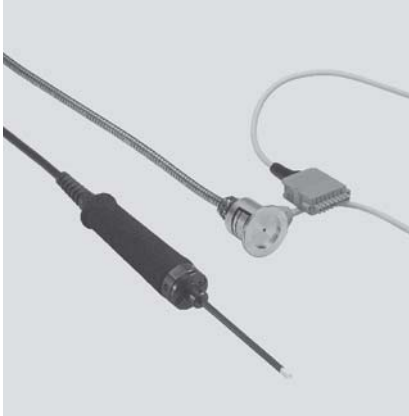
Accessories

| | Part No. |
|---|---------------------------------|
| Transport Case 300 Dimensions, including castors and handles approx. 600 x 790 x 380 mm (W x H x D) | 252 004 |
| Partial flow system ¹⁾ for PHOENIX L300i and PHOENIX L300i Modul 115 - 230 V / 50/60 Hz, without pump | 140 20 |
| AF 16-25 exhaust filter, for partial flow system | 189 11 |
| Replacement ion source | 165 04 |
| PC software LeakWare | 140 90 |
| 10 m long extension line for RC 310 | 140 22 |
| Search gas spray gun | 165 55 |
| Tablet incl. software (APP) and protection case (IP 67) PHOENIX L300i ²⁾ | 252005V01 or 252005V01-X |
| Tablet holder PHOENIX L300i ²⁾ | 252007V01 or 252007V01-X |
| BARCODE Scanner tablet PHOENIX L300i | 252008V01 |
| Tablet table stand PHOENIX L300i/500i ²⁾ | 252009V01 or 252009V01-X |
| Tablet lock | 252010V01 |

¹⁾ 5 centering rings, 5 clamping rings and 1 vacuum hose 1 m with DN 25 ISO-KF are included

²⁾ Extension „X“ respectively with actual tablet version

Helium Sample Probes (Sniffers)



Helium sniffer line SL 300



Helium sniffer QUICK-TEST QT 100 with sniffer



Helium sniffer line SL 301 in transport case

Advantages to the User

Helium Sniffer Line SL 300 and SL 301 for PHOENIX L300i

- Sniffer line connects directly at the test connection
- Status LEDs red and green (only at SL 300)
- ZERO pushbutton (only at SL 300)
- Easy filter removable
- Very fast response
- Extremely low detection limit $< 1 \times 10^{-7} \text{ mbar} \times \text{l} \times \text{s}^{-1}$
- Rigid sniffer tip 120 mm
- Very rugged industrial design

Helium Sniffers QUICK-TEST QT 100 for PHOENIX L300i

- Sniffer leak detection for greater distances between test object and leak detector
- Diaphragm pump for sucking the search gas
- Smallest detectable leak rate $1 \times 10^{-6} \text{ mbar} \times \text{l} \times \text{s}^{-1}$
- Short response and decay times
- High sniffer velocity
- Switching power supply, can be run off mains voltages from 100 to 230 V AC

Typical Applications

- Storage and transportation vessels for gases and liquids
- Gas supply systems
- Gas compressors
- Components for the cooling and air conditioning industries
- Heat pumps and components for thermal energy recovery units
- Chemical production plants
- Supply and phone lines laid in the ground
- Power station condensers and turbines
- Window and door seals of car bodies, refrigerators and alike
- Revision checks on leak testing systems
- Measurement of helium concentrations ranging from ppm to %
- All hollow objects exposed to overpressures

Technical Data

SL 300 / SL 301

QT 100

| | | | |
|-------------------------------|----------------------------|--------------------|---------------------|
| Smallest detectable leak rate | mbar x l x s ⁻¹ | < 10 ⁻⁷ | 10 ⁻⁶ |
| Inlet pressure | mbar | < 0.13 | – |
| Supply voltage | | – | 100-230 V, 50/60 Hz |
| Signal response time for | | | |
| SL 301 at a length of | | | |
| 4 m | s | < 1 | – |
| 10 m | s | < 4 | – |
| SL 300 at a length of | | | |
| 5 m | s | < 1 | 1 |
| 10 m | s | < 5 | – |
| 20 m | s | – | < 6 |
| 50 m | s | – | 20 |
| Connection flange | DN | 25 ISO-KF | 25 ISO-KF |
| Weight | kg (lbs) | 0.6 (1.3) | 3.5 (7.7) |

Ordering Information

SL 300 / SL 301

QT 100

| | Part No. | Part No. |
|--|---------------------|---------------|
| Helium sniffer line with rigid sniffer tip 120 mm | | |
| SL 300 | | |
| red/green LED | | |
| ZERO button | | |
| 4 m long, straight handle | 252 003 | – |
| SL 301 | | |
| 4 m long, straight handle | 252 025 V01 | – |
| 10 m long, straight handle | 252 026 V01 | – |
| Helium sniffer QUICK-TEST QT 100 | – | 155 94 |
| Sniffer line for the QT 100 | | |
| 5 m | – | 140 08 |
| 20 m | – | 140 09 |
| 50 m | – | 121 83 |
| Spare Parts for SL 301 | | |
| Filter insert, 2 pieces | ESLMSA-92097 | – |
| Stainless steel tube with capillary tube | E-LST-30 | – |

Miscellaneous

Connection Flanges

Leak Detectors

Helium Sniffers

Calibrated Leaks

| | | | | | |
|---------------------|----------------|--------|----------------|--------|----------------|
| PHOENIX L300i | – DN 25 ISO-KF | SL 300 | – DN 25 ISO-KF | TL 4 | – DN 16 ISO-KF |
| PHOENIX L300i DRY | – DN 25 ISO-KF | QT | – DN 25 ISO-KF | TL 6 | – DN 16 ISO-KF |
| PHOENIX L300i MODUL | – DN 25 ISO-KF | ST 100 | – DN 25 ISO-KF | TL 4-6 | – DN 16 ISO-KF |

If components of the same nominal width are connected, only one centering ring and one clamping ring will be required.

Connection Components

When wanting to connect accessories (helium sniffer and calibrated leaks) to a leak detector, the following reducers and components may be necessary:

Reduction

Reducers

Centering Rings Stainless steel/FPM

Clamping Rings Aluminum

| | Part No. | Part No. | Part No. |
|--------------------------|--|--|---|
| DN 25 ISO-KF / 16 ISO-KF | 183 86 (Aluminum) or 885 04 (Stainless steel) | DN 25 ISO-KF, 883 47 DN 16 ISO-KF, 883 46 | DN 20 / 25 ISO-KF, 183 42 DN 10 / 16 ISO-KF, 183 41 |
| DN 40 ISO-KF / 25 ISO-KF | 183 87 (Aluminum) or 885 05 (Stainless steel) | DN 40 ISO-KF, 883 48 DN 25 ISO-KF, 883 47 | DN 32 / 40 ISO-KF, 183 43 DN 20 / 25 ISO-KF, 183 42 |
| DN 40 ISO-KF / 16 ISO-KF | 183 89 (Aluminum) or 885 07 (Stainless steel) | DN 40 ISO-KF, 883 48 DN 16 ISO-KF, 883 46 | DN 32 / 40 ISO-KF, 183 43 DN 10 / 16 ISO-KF, 183 41 |
| DN 63 ISO-K / 40 ISO-KF | 269 40 (Aluminum) or 887 40 (Stainless steel) | DN 63 ISO-K, 887 03 DN 40 ISO-KF, 883 48 | DN 63 / 250 ISO-K, ¹⁾ DN 32 / 40 ISO-KF, 183 43 |

¹⁾ See clamps for ISO-K flanges in the Product Part "Flanges and Fittings"

The following metal hoses are recommended to connect the leak detectors to systems:

Nominal Width

Length

Ordering Information

| | | Part No. |
|--------------|-------|---------------|
| DN 16 ISO-KF | 1.0 m | 868 01 |
| DN 16 ISO-KF | 0.5 m | 867 91 |
| DN 25 ISO-KF | 1.0 m | 868 03 |
| DN 25 ISO-KF | 0.5 m | 867 93 |
| DN 40 ISO-KF | 1.0 m | 868 05 |
| DN 40 ISO-KF | 0.5 m | 867 95 |

Further connecting components, like quick clamping rings and other components are described in Product Part "Flanges and Fittings"

Contents

Flange and Fittings

General

| | |
|---|-----|
| Introduction | 810 |
| These Arguments Prove Oerlikon Leybold Vacuum's QUALITY | 811 |
| Materials | 812 |
| The Right Connection from Oerlikon Leybold Vacuum | 813 |
| Flange Connections | 814 |

Products

| | |
|---|-----|
| ISO-KF Flange Fittings and Components | 816 |
| Version for the North and South American Continent | 835 |
| ISO-K Clamp Flange Fittings and Components | 842 |
| Version for the North and South American Continent | 855 |
| ISO-F and DIN EN 1092-1 Fixed Flange Fittings and Components | 856 |
| ISO-F Fixed Flange Fittings and Components | 857 |
| DIN EN 1092-1 Fixed Flange Fittings and Components | 861 |
| Version for the North and South American Continent | 862 |
| CF Flanges Fittings and Components | 864 |
| Observation Windows for Vacuum Systems | 878 |
| ISO-KF / ISO-K Observation Windows | 879 |
| CF Observation Windows | 880 |

For information on electrical, rotary/linear motion and liquid feedthroughs, please refer to Catalog Part "Feedthroughs".

General to Flange and Fittings

Introduction

According to DIN 28 400, the term "Ultra-high Vacuum (UHV)" designates the pressure range below 10^{-7} mbar.

Several physical quantities, such as mean free path, monolayer time, flow density of the particles impinging on the walls, leak rate and the degassing rate are of significance in the characterization of this pressure range. For the definitions of these quantities refer to technical publications on this subject.

In order to attain or maintain pressures below 10^{-7} mbar, the following pre-conditions must be met:

- The vapor pressure of the pump fluid or lubricant should be in accordance with the desired ultimate pressure
- the leak and degassing rates of the entire apparatus including its installations must be extremely low.

Generally, both leak rate and backstreaming effects through the pump can be kept at sufficiently low levels by using suitable UHV sealing materials and pumps.

However, a sufficiently low outgassing rate can only be achieved by baking out the entire apparatus at temperatures of about 300 °C (572 °F) for a longer period of time. It is only under these conditions that the mono-layers of atoms or molecules, which attach quite firmly to the surfaces of the vacuum apparatus including its installations, are desorbed.

Consequently, components for UHV systems are generally made of stainless steel. Metal gaskets, ceramic feedthroughs and bakeable observation windows are used exclusively.

For applications in the extreme UHV range (XHV) the outgassing rate of the CF flanges and the UHV components can be reduced by about two orders of magnitude by a special degassing process.

The high standard of development and manufacture combined with the use of high quality materials guarantee that UHV components from Oerlikon Leybold Vacuum are able to meet even the most demanding requirements.

Advantages to the User

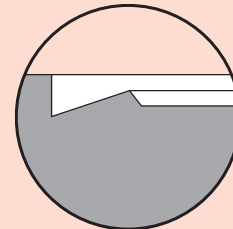
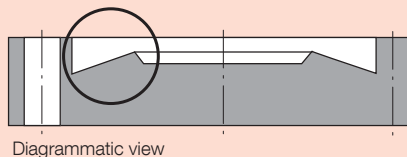
- Stabilized Oerlikon Leybold Vacuum knife-edge
- High reliability
- Special knife edge profiles ensure the highest degree of leak tightness
- Flange connection can be baked out up to 450 °C (842 °F)
- Easy to assemble, helium-tight
- Symmetrical flange connection
- Equal sealing profiles
- Small outside diameter with respect to the nominal width
- Can be joined by welding or brazing using any desired process, also with other nickel chromium steel grades
- For use either with a flat gasket made of OFHC copper (oxygen-free) or FPM (FKM) O-ring
- Self-centering
- Fixed and rotary flanges in almost any size

These Arguments Prove Oerlikon Leybold Vacuum's QUALITY

- Availability of all components at short notice
- Worldwide advice at any time to answer your questions relating to vacuum systems
- Utilization of most advanced manufacturing methods
- Environment-friendly cleaning baths with complete waste disposal and recycling facilities
- Environment-friendly and secure packaging
- Total Quality Management methods during all processing stages
- Controlled material quality
- Compatible to your existing flanges of the same system
- Highly leak-tight down to leak rates of 1×10^{-9} mbar \times l \times s $^{-1}$; all components are subjected to a helium leak test
- Low outgassing rates of the materials through
- choice of the right material quality, especially for vacuum apparatus
- excellent cleaning methods
- Documentation available for all components

- The well-proven Oerlikon Leybold Vacuum geometry for the cutting edges

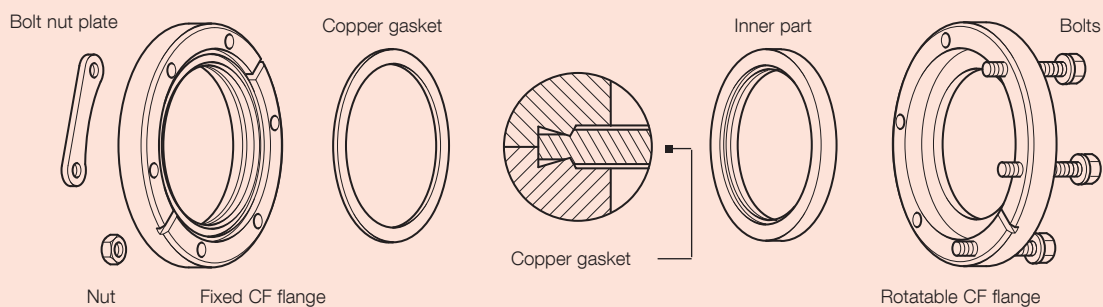
The stabilized Oerlikon Leybold Vacuum profile for the cutting edges



- **Forged steel materials** of high tensile strength and density
- Material quality for standard applications **DIN 1.4301 corresponds to AISI 304**
- Tightly checked, **close dimensional tolerances** for the entire sealing geometry
- **Low degassing rates** of the tube material used

Advantages

Reliable sealing of UHV connections
over hundreds of
heating cycles



General

Vacuum systems (i.e. systems for pressures ranging from 2.5 bar to 10^{-9} mbar (1.9×10^{-3} Torr to 0.75×10^{-9} Torr)) are quickly and easily assembled owing to the modular construction principle which is based on interchangeable standard components by means of vacuum-tight, demountable flange connections. Individual components may be exchanged easily at any time. Depending on the intended use and size of the connection, flanges of different types have been developed. The ISO-KF flange connection was developed by Oerlikon Leybold Vacuum many years ago and has been widely accepted by all users of vacuum equipment. This catalog part lists all flange connections and fittings including adaptors for ultra-high vacuum components.

Components marked with [< 1000 mbar (< 750 Torr)] are not allowed for use at pressures exceeding 1000 mbar abs.

The components and flange connections are intended for use in connection with vacuum systems. They have not been designed to support mechanical loads. All loads must be supported separately at the connection components.

Flange Designations

The designations used by Oerlikon Leybold Vacuum for clamp flanges, fixed flanges (bolted) and collar flanges with retaining rings correspond both to the international standards ¹⁾ and to the usual nomenclature in vacuum technology.

¹⁾ The nominal width DN corresponds only approximately to the inner diameter, i.e. is not necessarily identical to the inner diameter. Differences in the actual inner diameter are quite normal in practice and do not contravene standards.

Materials

Stainless Steel

| German Material No. | AISI/SAE | DIN Designation |
|---------------------|----------|---------------------|
| 1.4301 | 304 | X5 CrNi 18 10 |
| 1.4305 | 303 | X10 CrNi S 18 9 |
| 1.4306 | 304 L | X2 CrNi 19 11 |
| 1.4310 | 301 | X12 CrNi 17 7 |
| 1.4401 | 316 | X5 CrNiMo 17 12 2 |
| 1.4404 | 316 L | X2 CrNiMo 17 12 2 |
| 1.4435 | 316 L | X2 CrNiMo 18 14 3 |
| 1.4541 | 321 | X10 CrNiTi 18 9 |
| 1.4571 | 316 Ti | X6 CrNiMoTi 17 12 2 |
| 1.4552 | – | X5 CrNiNb 18 9 |

Aluminium

| German Material No. | AISI | DIN Designation |
|---------------------|--------------|-----------------|
| 3.0255.10 | AA 1050 1-0 | Al 99.5 w |
| 3.0615.71 | AA 6012-T6 | AlMgSiPb |
| 3.1655.53 | AA 2011-T352 | AlCuBiPb |
| 3.2162.05 | 380.0 (AA) | GD-AlSi8Cu3 |
| 3.2315.08 | 6082-F (AA) | AlMgSi1 |
| 3.2315.71 | 6082-T6 | AlMgSi1 |
| 3.2315.72 | 6063 (AA) | AlMgSi1 |
| 3.2381.02 | 520.0 (AA) | GK AlSi 10 Mg |
| 3.2381.62 | 520.0 (AA) | GK AlSi 10 Mgwa |
| 3.2582.05 | 160 X | GD-AlSi 12 |

Steel

| German Material No. | AISI | DIN Designation |
|---------------------|------|-----------------|
| 1.0037 | – | St 37-2 |
| 1.0308 | – | St 35 |
| 1.0831 | – | St 52 |
| 1.1141 | – | CK 15 |
| 1.1181 | – | CK 35 |

Gaskets

| Code Designation | Chemical Designation | Typical Trade Name |
|------------------|---------------------------------|--------------------|
| CR | Chloroprene-caoutchouc | Neoprene |
| FPM (FKM) | Fluor-caoutchouc | Viton® |
| NBR | Acrylonitrile-butadienrubber | Perbunan® |
| PTFE | Polytetrafluor-ethylene | Teflon® |
| EPDM | Ethylene propylene dien rubber– | |

Hoses and Tubes

| Code Designation | Chemical Designation | Typical Trade Name |
|------------------|----------------------|--------------------|
| NR | Natural rubber | – |
| PVC | Polyvinylchloride– | |

The Right Connection from Oerlikon Leybold Vacuum

ISO-F

1. Flange
2. Vacuum sealing disk consisting of centering ring and O-ring gasket with outer support ring
3. ISO-K flange
4. Bolt with nut
5. Collar flange with retaining ring

ISO-KF

1. ISO-KF flanges
2. Centering ring with O-ring gasket
3. Clamping ring
4. Tee
5. Elbow
6. PVC coiled vacuum tubing
7. Clamp
8. Cross
9. Blank flange
10. Small flange with hose nozzle
11. ISO-KF clamp flange connection
12. Adapter reducer ISO-K - ISO-KF

ISO-K

1. ISO-K flange
2. Centering ring with O-ring gasket and outer support ring
3. Clamp
4. Tee
5. Elbow
6. Cross with lateral DN 10/40 ISO-KF flanges
7. Flexible vacuum tubing
8. Cross
9. Intermediate flange with gauge port
10. Clamp flange with tubulation
11. Blank flange
12. Flexible compensation element

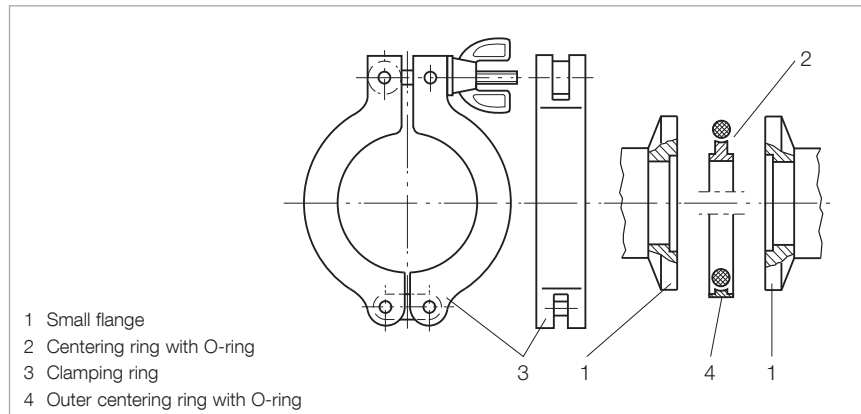
CF

1. CF flange connection
2. Reducer / ISO-K-CF
3. Adapter CF-ISO-K/ISO-KF
4. Double cross
5. Adjustment piece
6. Elbow
7. Ceramic intermediate piece
8. Tee
9. UHV observation window
10. Blank flange

Flange Connections

ISO-KF Connection

The ISO-KF connection (to DIN 28 403 and ISO 2861) permits rapid fitting and replacement of components in vacuum systems. It consists of two symmetrical ISO-KF flanges **(1)**, a centering ring with O-ring gasket **(2)** and a clamping ring **(3)**. High vacuum tight ISO-KF connections can be made without the use of tools simply by turning the wing nut of the clamping ring.

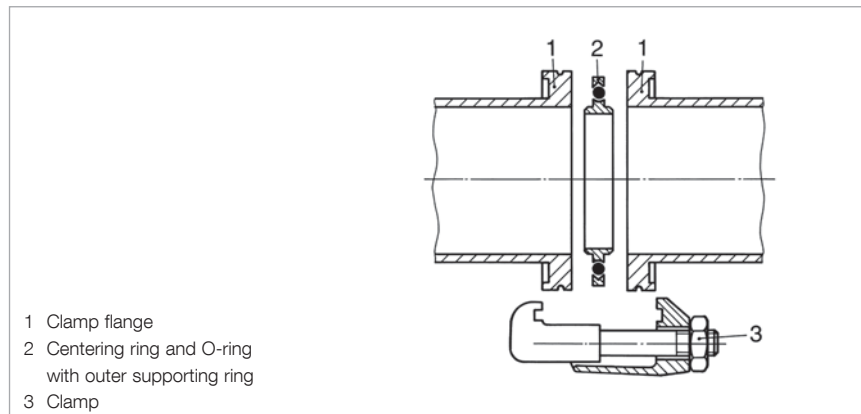


ISO-KF flange connection

ISO-K Clamp Flange Connection

The clamp flange connection (to DIN 28 404 and ISO 1609) allows components from DN 63 to DN 630 to be connected in any position regardless of the bolt hole arrangement on any fixed flanges.

It consists of two clamp flange components **(1)**, a centering ring **(2)** with an outer ring enclosing the O-ring gasket, and several clamps **(3)** which the connection is assembled and tightened with. Since the centering ring can be firmly inserted into the centering groove of the flange, even horizontal connections are quickly and easily fitted.



ISO-K clamp flange connection

ISO-F / DIN Fixed Bolted Flange Fittings

With the appropriate collar flanges, the clamp flange can be connected to various fixed bolted flange systems (ISO-F, DIN EN 1092-1, etc.) see figures in chapter "ISO-F and DIN EN 1092-1 Fixed Flange Fittings".

CF Flanges and Components

The CF flange connection consists of two geometrically identical flanges with a flat gasket made of OFHC copper, bolts and nuts and washers.

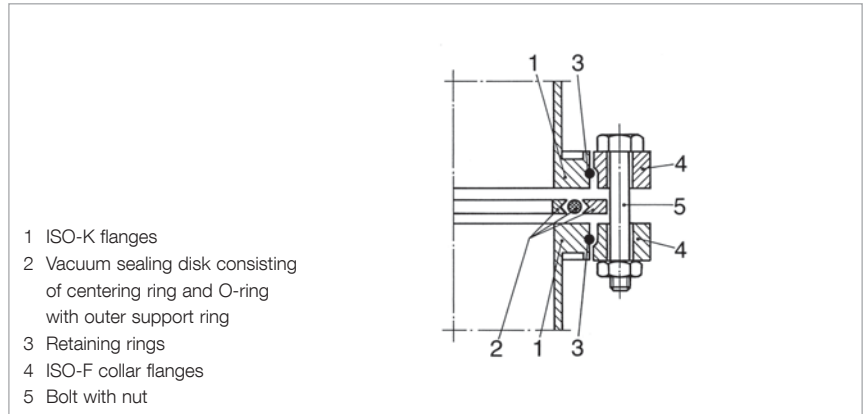
CF components are made of selected, corrosion resistant types of stainless steel.

All components are inside welded to prevent right from the beginning any cracks or pocket holes which might constitute a so-called virtual leak.

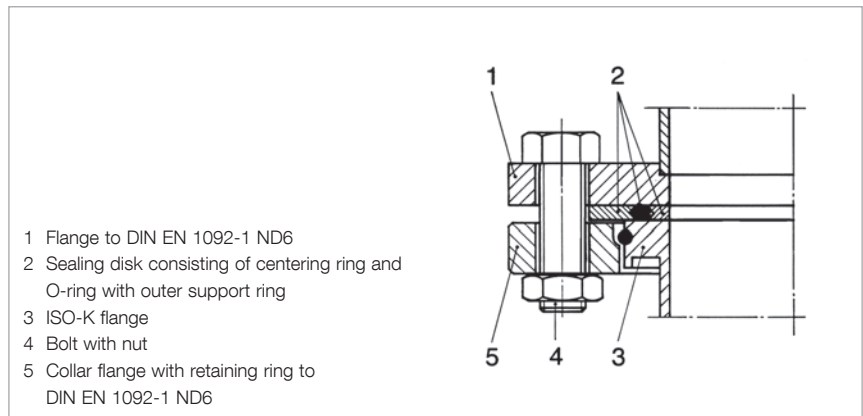
Bake Out Temperatures for the Gaskets

CR and FPM (FKM) gaskets can be inserted in all listed flange types, while aluminium gaskets may be used for higher vacuum requirements.

CR gaskets can be used in the temperature range from -40 °C to +100 °C [-40 °F to +212 °F] (max. bakeout temperature), FPM (FKM) gaskets from -15 °C to +150 °C [+5 °F to +302 °F] (max. bakeout temperature). Aluminium gaskets from -196 °C to +200 °C [-321 °F to +392 °F] (max. bakeout temperature gradient; ΔT max. 2.5 °/min).



Clamped flange connection with collar flanges



Connection between a DIN EN 1092-1 ND 6 flange and an ISO-K flange with DIN EN 1092-1 collar flange

ISO-KF Flange Fittings and Components

DN 16 ISO-KF to DN 50 ISO-KF Aluminium Design (to DIN 28 403) [Tubes similar DIN 28 403]

The small flange connection developed by Oerlikon Leybold Vacuum has become the basis of the international standard for vacuum technology.

Advantages to the User (Aluminium and Stainless Steel)

- Quick, safe and reliable
- No tools are need to provide a vacuum-tight seal
- Suitable down to pressures of 10^{-7} mbar (0.75×10^{-7} Torr)
- Easy to disassemble and clean
- In the case of special requirements as to degassing for the purpose of reducing the outgassing rate and in case of special requirements as to corrosion resistance, we recommend the use of stainless steel components.

Additional Benefits of the Stainless Steel Types

- Can be baked out up to 200 °C (392 °F) when using metal seals
- Can be degassed up to 150 °C (302 °F) with FPM (FKM) gaskets
- With metal seals suitable for pressures down to 10^{-9} mbar (0.75×10^{-9} Torr)
- Corrosion resistant
- Low degassing rate
- For standard applications involving pressures up to 2.5 bar (1.9×10^3 Torr) abs. even with outside ring resp. ultra sealing ring and 3-part clamping ring 5 bar
- Can be degassed up to 200 °C (392 °F) with UHV aluminium rings or disks

Flexible Compensation Elements

Vacuum systems and pump systems often require components which are capable of protecting sensitive instruments against impacts or excessive vibrations while linking tubes at the same time.

Advantages to the User

- Easy and quick to install
- Safe and reliable
- Tubes may be turned in any direction
- No centering and sealing ring required
- Capable of withstanding temperatures up to 80 °C (176 °F)
- Suitable for pressures down to 10^{-5} mbar (0.75×10^{-5} Torr)

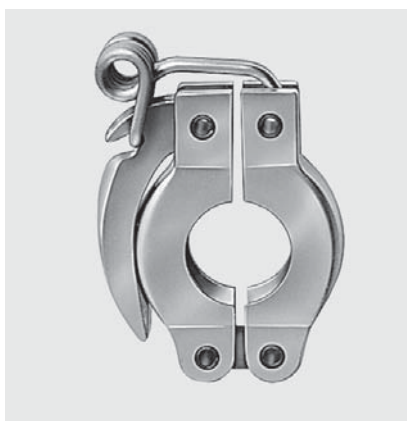
Quick Clamping Ring

Advantages to the User

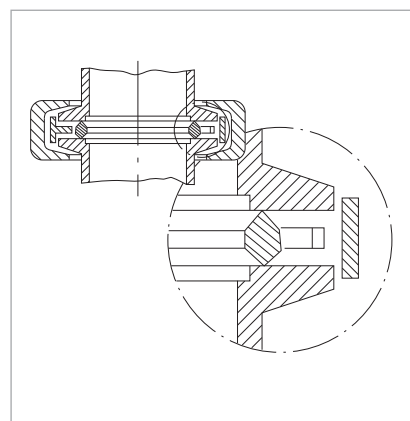
- Quick and effective fitting and disassembly
- Can be fitted with one hand
- Closing action via lever with clamping spring
- Corrosion resistant



Fitting a centering ring to an ISO-KF component



Quick clamping ring



Small flange connection with ultra sealing ring



Fitting an elbow



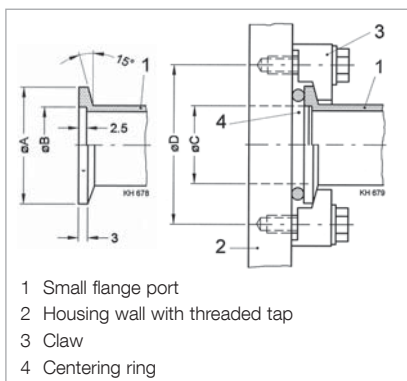
Clamping ring for ultra sealing disk



Small flange connection with clamping ring



Small flange components made of stainless steel

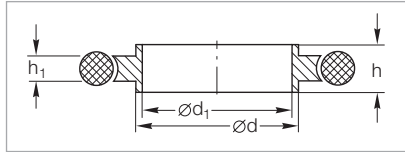


Small flange connection

Technical Data

| Nominal diameter | | A | B | C | D | Number of claws |
|------------------|-----|------|------|------|------|-----------------|
| DN 10 ISO-KF | mm | 30.0 | 12.2 | 12.2 | 45.0 | 4 |
| | in. | 1.18 | 0.48 | 0.48 | 1.77 | |
| DN 16 ISO-KF | mm | 30.0 | 17.2 | 17.2 | 45.0 | 4 |
| | in. | 1.18 | 0.68 | 0.68 | 1.77 | |
| DN 25 ISO-KF | mm | 40.0 | 26.2 | 26.2 | 55.0 | 4 |
| | in. | 1.57 | 1.03 | 1.03 | 2.17 | |
| DN 40 ISO-KF | mm | 55.0 | 41.2 | 41.2 | 71.0 | 4 |
| | in. | 2.17 | 1.62 | 1.62 | 2.80 | |
| DN 50 ISO-KF | mm | 75.0 | 52.4 | 52.4 | 91.0 | 4 |
| | in. | 2.95 | 2.06 | 2.06 | 3.58 | |

Centering Rings (Aluminium 3.1655.53/Stainless Steel 1.4305) with O-Ring (CR / FPM (FKM))



Dimensional drawing for the centering rings with O-ring

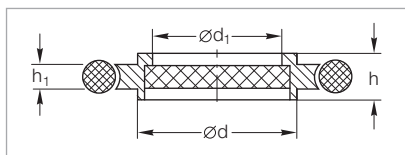
Technical Data

| DN | ISO-KF | 10 | 16 | 20 | 25 | 32 | 40 | 50 |
|----------------|----------|------------|------------|------------|------------|------------|------------|------------|
| d | mm (in.) | 12 (0.47) | 17 (0.67) | 22 (0.87) | 26 (1.02) | 34 (1.34) | 41 (1.61) | 52 (2.05) |
| d ₁ | mm (in.) | 10 (0.40) | 16 (0.63) | 20 (0.79) | 25 (0.98) | 32 (1.26) | 40 (1.57) | 50 (1.97) |
| h | mm (in.) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) |
| h ₁ | mm (in.) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) |

Ordering Information

| | | | | | | | | |
|-------------------------------------|----------|---------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Aluminium/CR | Part No. | 183 21 | 183 26 | 183 22 | 183 27 | 183 23 | 183 28 | 183 25 |
| Aluminium/FPM (FKM) | Part No. | 182 01 | 182 06 | 182 02 | 182 07 | 182 03 | 182 08 | 182 05 |
| Aluminium/FPM (FKM) (Set of 10 pcs) | Part No. | - | 210841V01 | - | 210843V01 | - | 210845V01 | - |
| | Part No. | - | - | 210842V01 | - | 210844V01 | - | 210846V01 |
| Stainless steel/FPM (FKM) | Part No. | 883 21 | 883 46 | 883 22 | 883 47 | 883 23 | 883 48 | 883 25 |

Centering Rings (Stainless Steel) with Sintered Metal Filter (Stainless Steel 1.4404 and O-Ring (FPM (FKM)))



Dimensional drawing for the centering rings with sintered metal filter and O-ring

Sintered metal filter:

Air throughput at 20 °C (68 °F) and 200 mbar differential pressure approx. 1 m³ x h⁻¹ x cm², pore size: 20 µm

Technical Data

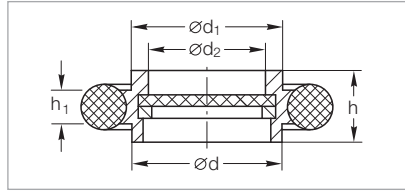
| DN | ISO-KF | 10 | 16 | 25 | 40 | 50 |
|----------------|----------|------------|------------|------------|------------|------------|
| d | mm (in.) | 12 (0.47) | 17 (0.67) | 26 (1.02) | 41 (1.61) | 52 (2.05) |
| d ₁ | mm (in.) | 8 (0.31) | 14 (0.55) | 23 (0.91) | 38 (1.50) | 48 (1.89) |
| h | mm (in.) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) |
| h ₁ | mm (in.) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) |

Ordering Information

| | | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel | Part No. | 883 50 | 883 51 | 883 52 | 883 53 | 883 54 |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Centering Rings with Fine Filter (Stainless Steel 1.4305) with O-Ring (FPM (FKM))



Dimensional drawing for the centering rings with fine filter

Filter material:

Stainless steel mesh 1.4404,
size of pore: 4 μm

Separation grade:

1 μm particles to 98%
(Filter material not available separately)

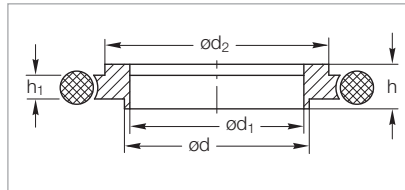
Technical Data

| DN | ISO-KF | 10 | 16 | 25 | 40 | 50 |
|----------------|----------|------------|------------|------------|------------|------------|
| d | mm (in.) | 12 (0.47) | 17 (0.67) | 26 (1.02) | 41 (1.61) | 52 (2.05) |
| d ₁ | mm (in.) | 12 (0.47) | 17 (0.67) | 26 (1.02) | 41 (1.61) | 52 (2.05) |
| d ₂ | mm (in.) | 9 (0.35) | 13 (0.51) | 22 (0.87) | 35.5 (1.4) | 46 (1.81) |
| h | mm (in.) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) |
| h ₁ | mm (in.) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) |

Ordering Information

| Stainless steel | Part No. | 883 95 | 883 96 | 883 97 | 883 98 | 883 99 |
|-----------------|----------|--------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|--------|

Centering Ring Adaptors (Aluminium 3.1655.53/Stainless Steel 1.4301) with O-ring (NBR / FPM (FKM))



Dimensional drawing for the centering ring adaptors with O-ring

Technical Data

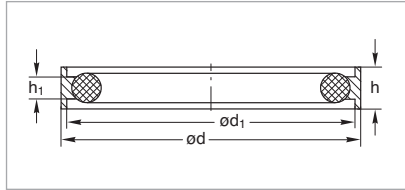
| DN | ISO-KF | 10/16 | 20/25 | 32/40 |
|----------------|----------|------------|------------|------------|
| d | mm (in.) | 12 (0.47) | 22 (0.87) | 34 (1.34) |
| d ₁ | mm (in.) | 10 (0.40) | 20 (0.79) | 32 (1.26) |
| d ₂ | mm (in.) | 17 (0.67) | 26 (1.02) | 41 (1.61) |
| h | mm (in.) | 8 (0.31) | 8 (0.31) | 8 (0.31) |
| h ₁ | mm (in.) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) |

Ordering information

| Aluminium/FPM (FKM) | Part No. | 182 56 | 182 57 | 182 58 |
|-------------------------------------|----------|-----------|-----------|-----------|
| Aluminium/FPM (FKM) (Set of 10 pcs) | Part No. | 210847V01 | 210848V01 | 210849V01 |
| Aluminium/NBR | Part No. | 183 56 | 183 57 | 183 58 |
| Stainless steel/FPM (FKM) | Part No. | 883 56 | 883 57 | 883 58 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Outer Centering Rings (Aluminium 3.1655.53) with O-Ring (CR / FPM (FKM))



Dimensional drawing for the outer centering rings with O-ring

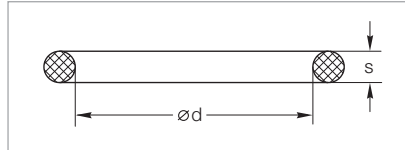
Technical Data

| DN | ISO-KF | 10/16 | 20/25 | 32/40 | 50 |
|----------------|----------|-------------|-------------|-------------|-------------|
| d | mm (in.) | 32 (1.26) | 42 (1.65) | 57 (2.24) | 77 (3.03) |
| d ₁ | mm (in.) | 30.2 (1.19) | 40.2 (1.58) | 55.2 (2.17) | 75.2 (2.96) |
| h | mm (in.) | 7 (0.28) | 7 (0.28) | 7 (0.28) | 7 (0.28) |
| h ₁ | mm (in.) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) |

Ordering information

| | | | | | |
|---------------------|----------|---------------|---------------|---------------|---------------|
| Aluminium/CR | Part No. | 183 50 | 183 51 | 183 52 | 183 59 |
| Aluminium/FPM (FKM) | Part No. | 183 53 | 183 54 | 183 55 | 183 60 |

Spare O-Ring Gaskets for ISO-KF Flange Connections



Dimensional drawing for the spare O-ring gaskets for ISO-KF flange connections

Technical Data

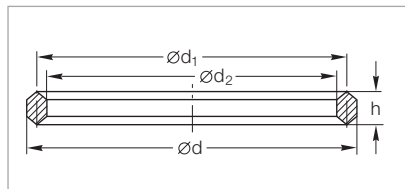
| DN | ISO-KF | 10 | 16 ¹⁾ | 20 | 25 ¹⁾ | 32 | 40 ¹⁾ | 50 |
|----|----------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|
| d | mm (in.) | 15 (0.59) | 18 (0.71) | 25 (0.98) | 28 (1.10) | 40 (1.57) | 42 (1.65) | 55 (2.17) |
| s | mm (in.) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) |

Ordering Information

| | | | | | | | | |
|---------------------------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| FPM (FKM) (Set of 10 pcs) | Part No. | ES210600 | – | ES210610 | – | ES210620 | – | ES210630 |
| | Part No. | – | ES210605 | – | ES210615 | – | ES210625 | – |

¹⁾ Also for adaptor/centering rings

Ultra Sealing Rings (Aluminium 3.2315.71)



Dimensional drawing for the ultra sealing rings

Technical Data

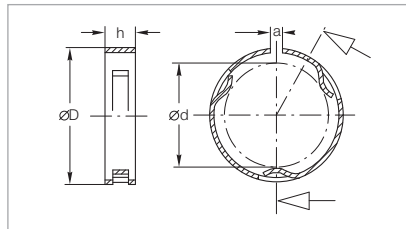
| DN | ISO-KF | 10/16 | 20/25 | 32/40 | 50 |
|----------------|----------|-------------|-------------|-------------|-------------|
| d | mm (in.) | 25.6 (1.01) | 35.6 (1.40) | 50.6 (1.99) | 65.6 (2.58) |
| d ₁ | mm (in.) | 22.6 (0.89) | 32.6 (1.38) | 47.6 (1.87) | 62.6 (2.46) |
| d ₂ | mm (in.) | 19.6 (0.77) | 29.6 (1.17) | 44.6 (1.76) | 59.6 (2.35) |
| h | mm (in.) | 4.5 (0.18) | 4.5 (0.18) | 4.5 (0.18) | 4.5 (0.18) |

Ordering Information

| | | | | | |
|-----------------------------|----------|---------------|---------------|---------------|---------------|
| Aluminium (set of 3 pieces) | Part No. | 883 73 | 883 75 | 883 77 | 883 79 |
|-----------------------------|----------|---------------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Outer Support Rings (Stainless Steel 1.4310) for Ultra Sealing Rings



Dimensional drawing for the outer support rings

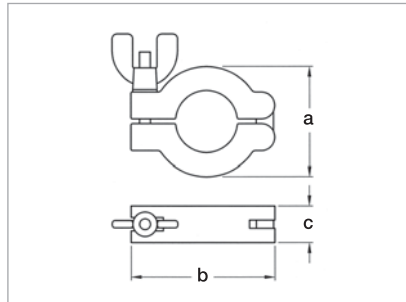
Technical Data

| DN | ISO-KF | 10/16 | 20/25 | 32/40 | 50 |
|----|----------|-----------|-----------|-----------|-----------|
| a | mm (in.) | 3 (0.12) | 3 (0.12) | 3 (0.12) | 3 (0.12) |
| D | mm (in.) | 32 (1.26) | 42 (1.65) | 57 (2.24) | 77 (3.03) |
| d | mm (in.) | 25 (0.98) | 35 (1.38) | 50 (1.97) | 65 (2.56) |
| h | mm (in.) | 7 (0.28) | 7 (0.28) | 7 (0.28) | 7 (0.28) |

Ordering Information

| Stainless steel | Part No. | 883 74 | 883 76 | 883 78 | 883 69 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

Clamping Rings (Aluminium 3.2582.05)



Dimensional drawing for the clamping rings

Max. torque at the wing nut: 2 Nm

Technical Data

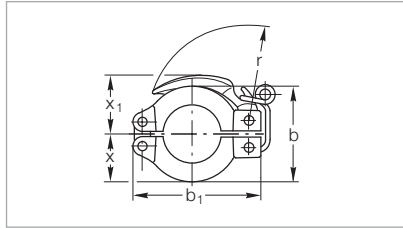
| DN | ISO-KF | 10/16 | 20/25 | 32/40 | 50 |
|----|----------|-----------|-----------|-----------|------------|
| a | mm (in.) | 45 (1.77) | 55 (2.17) | 70 (2.76) | 95 (3.74) |
| b | mm (in.) | 61 (2.40) | 72 (2.83) | 90 (3.54) | 123 (4.84) |
| c | mm (in.) | 16 (0.63) | 16 (0.63) | 18 (0.71) | 25 (0.98) |

Ordering Information

| Aluminium | Part No. | 183 41 | 183 42 | 183 43 | 183 45 |
|-----------------------------|----------|---------|---------|---------|---------|
| Individually packed for USA | Part No. | 210 041 | 210 042 | 210 043 | 210 045 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Quick Clamping Rings (Aluminium 3.2582.05)



Dimensional drawing for the quick clamping rings

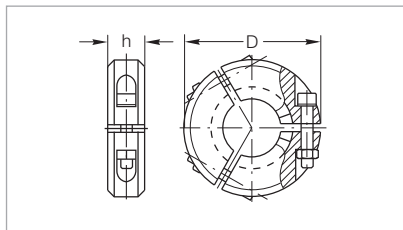
Technical Data

| DN | ISO-KF | 10/16 | 20/25 | 32/40 |
|----------------|----------|-----------|-----------|-----------|
| b | mm (in.) | 45 (1.77) | 55 (2.17) | 70 (2.76) |
| b ₁ | mm (in.) | 61 (2.40) | 72 (2.83) | 90 (3.54) |
| r | mm (in.) | 48 (1.89) | 56 (2.20) | 74 (2.91) |
| x | mm (in.) | 22 (0.87) | 27 (1.06) | 35 (1.38) |
| x ₁ | mm (in.) | 30 (1.18) | 34 (1.34) | 44 (1.73) |

Ordering Information

| Aluminium | Part No. | 183 46 | 183 47 | 183 48 |
|-----------|----------|--------|--------|--------|
|-----------|----------|--------|--------|--------|

Clamping Collars (Aluminium 3.2162.05) for Ultra Sealing Rings



Dimensional drawing for the clamping collars for ultra sealing rings

Technical Data

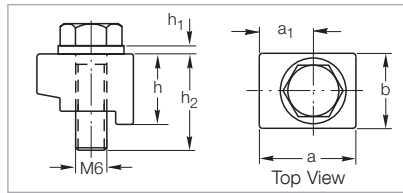
| DN | ISO-KF | 10/16 | 20/25 | 32/40 | 50 |
|---------------------------------|----------|--------------------------|--------------------------|--------------------------|--------------------------|
| D | mm (in.) | 52 (2.05) | 75 (2.95) | 90 (3.54) | 115 (4.52) |
| h | mm (in.) | 18 (0.71) | 20 (0.79) | 23 (0.90) | 28 (1.10) |
| Hexagon socket screw to DIN 912 | mm (in.) | M 4 x 30 (M 4 x 1.18) | M 6 x 30 (M 6 x 1.18) | M 8 x 35 (M 8 x 1.38) | M 8 x 50 (M 8 x 1.97) |

Ordering Information

| Aluminium | Part No. | 882 75 | 882 77 | 882 78 | 882 79 |
|-----------|----------|--------|--------|--------|--------|
|-----------|----------|--------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Claw, complete (Aluminium 3.2315.08)



Dimensional drawing for the claw, complete

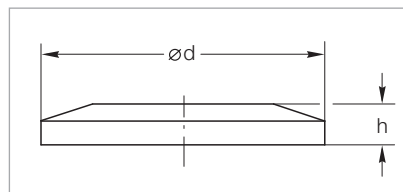
Technical Data

| | | |
|----------------|----------|-------------|
| DN | ISO-KF | 10 - 50 |
| a | mm (in.) | 19.5 (0.77) |
| a ₁ | mm (in.) | 11.5 (0.45) |
| b | mm (in.) | 14.0 (0.55) |
| h | mm (in.) | 12.5 (0.49) |
| h ₁ | mm (in.) | 1.6 (0.06) |
| h ₂ | mm (in.) | 20.0 (0.79) |

Ordering Information

| | | |
|-----------------------------|----------|---------------|
| Aluminium (Set of 4 pieces) | Part No. | 885 00 |
|-----------------------------|----------|---------------|

Blank Flanges (Aluminium 3.2315.71 / Stainless Steel 1.4301)



Dimensional drawing for the blank flanges

Technical Data

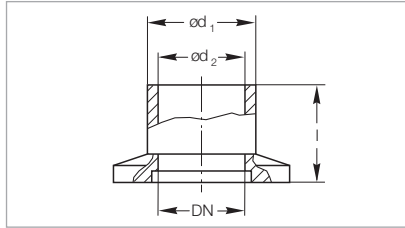
| | | | | | | |
|----|----------|-----------|-----------|-----------|-----------|-----------|
| DN | ISO-KF | 10 | 16 | 25 | 40 | 50 |
| d | mm (in.) | 30 (1.18) | 30 (1.18) | 40 (1.57) | 55 (2.17) | 75 (2.95) |
| h | mm (in.) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 6 (0.24) |

Ordering Information

| | | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|
| Aluminium | Part No. | 184 41 | 184 46 | 184 47 | 184 48 | 184 45 |
| Stainless steel | Part No. | 884 41 | 884 36 | 884 37 | 884 38 | 884 45 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

ISO-KF Flanges with Short Tubulation (Steel 1.0037 / Stainless Steel 1.4301)



Dimensional drawing for the ISO-KF flanges with short tubulation

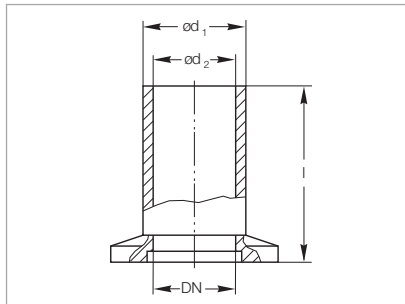
Technical Data

| DN | ISO-KF | 10 | 16 | 25 | 40 | 50 |
|-------------------------------|-------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| d_1 (Steel/Stainless steel) | mm (in.) | 16/16 (0.63/0.63) | 20/20 (0.79/0.79) | 30/30 (1.18/1.18) | 45/45 (1.77/1.77) | 55/54 (2.17/2.13) |
| d_2 (Steel/Stainless steel) | mm (in.) | 12/12 (0.47/0.47) | 16/16 (0.63/0.63) | 26/26 (1.02/1.02) | 41/41 (1.61/1.61) | 51/50 (2.01/1.97) |
| l | mm (in.) | 20 (0.79) | 20 (0.79) | 20 (0.79) | 20 (0.79) | 20 (0.79) |

Ordering Information

| | | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|
| Steel | Part No. | 182 31 | 182 32 | 182 33 | 182 34 | 182 35 |
| Stainless steel | Part No. | 866 31 | 866 32 | 866 33 | 866 34 | 866 35 |

ISO-KF Flanges with Long Tubulation (Steel 1.0037 / Stainless Steel 1.4301)



Dimensional drawing for the ISO-KF flanges with long tubulation

Technical Data

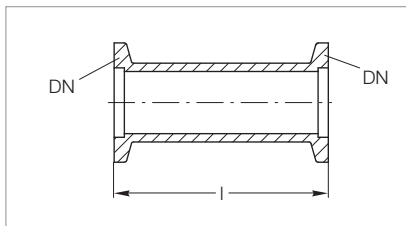
| DN | ISO-KF | 10 | 16 | 25 | 40 | 50 |
|-------------------------------|-------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| d_1 (Steel/Stainless steel) | mm (in.) | 16/16 (0.63/0.63) | 20/20 (0.79/0.79) | 30/30 (1.18/1.18) | 45/45 (1.77/1.77) | 55/54 (2.17/2.13) |
| d_2 (Steel/Stainless steel) | mm (in.) | 12/12 (0.47/0.47) | 16/16 (0.63/0.63) | 26/26 (1.02/1.02) | 41/41 (1.61/1.61) | 51/50 (2.01/1.97) |
| l | mm (in.) | 70 (2.76) | 70 (2.76) | 70 (2.76) | 70 (2.76) | 70 (2.76) |

Ordering Information

| | | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|
| Steel | Part No. | 182 81 | 182 82 | 182 83 | 182 84 | 182 85 |
| Stainless steel | Part No. | 866 81 | 866 82 | 866 83 | 866 84 | 866 85 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Intermediate Pieces (Aluminium 3.2315.72 / Stainless Steel 1.4301)



Dimensional drawing for the intermediate pieces

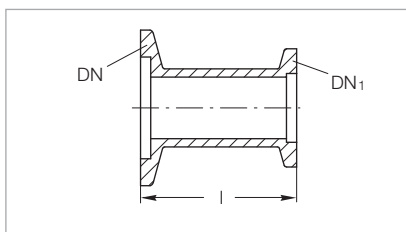
Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|----|----------|-----------|------------|------------|
| L | mm (in.) | 80 (3.15) | 100 (3.94) | 130 (5.12) |

Ordering Information

| Aluminium | Part No. | 184 80 | 184 81 | 184 82 |
|-----------------|----------|--------|--------|--------|
| Stainless steel | Part No | 884 17 | 884 18 | 884 19 |

Reducers (Aluminium 3.2315.72 / Stainless Steel 1.4305)



Dimensional drawing for the reducers

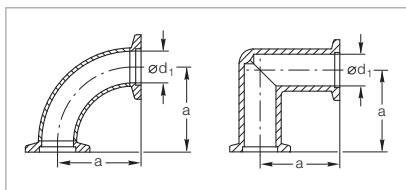
Technical Data

| DN/DN ₁ | ISO-KF | 25/16 | 40/16 | 40/25 | 50/40 |
|--------------------|----------|-----------|-----------|-----------|-----------|
| L | mm (in.) | 40 (1.57) | 40 (1.57) | 40 (1.57) | 40 (1.57) |

Ordering Information

| Aluminium | Part No. | 183 86 | 183 89 | 183 87 | 183 88 |
|-----------------|----------|--------|--------|--------|--------|
| Stainless steel | Part No. | 885 04 | 885 07 | 885 05 | 885 06 |

Pipe Bend 90° (Stainless Steel 1.4301) / Mitred Elbow 90° (Aluminium 3.2315.08)



Dimensional drawings for the pipe bends 90° (stainless steel, left) and the mitred elbows 90° (aluminium, right)

Technical Data

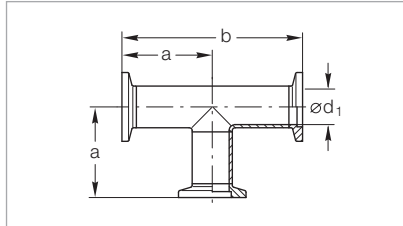
| DN | ISO-KF | 16 | 16 | 25 | 25 | 40 | 40 | 50 |
|----------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| a | mm (in.) | 40 (1.57) | 40 (1.57) | 50 (1.97) | 50 (1.97) | 65 (2.56) | 65 (2.56) | 70 (2.76) |
| d ₁ | mm (in.) | 16 (0.63) | 15 (0.59) | 25 (0.98) | 25 (0.98) | 39 (1.54) | 39 (1.54) | 49 (1.93) |
| Conductance | l/s | 6.5 | – | 18.9 | – | 56.5 | – | – |

Ordering Information

| Aluminium | Part No. | 184 36 | – | 184 37 | – | 184 38 | – | – |
|-----------------|----------|--------|--------|--------|--------|--------|-------|--------|
| Stainless steel | Part No. | – | 884 61 | – | 884 62 | – | 88464 | 884 65 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Tees (Aluminium 3.2315.08 / Stainless Steel 1.4301)



Dimensional drawing for the tees

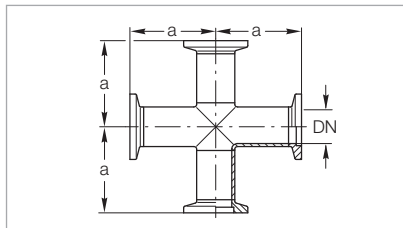
Technical Data

| DN | ISO-KF | 16 | 16 | 25 | 25 | 40 | 40 | 50 |
|--|-----------------|-----------|-----------|------------|------------|------------|-------------|------------|
| a | mm (in.) | 40 (1.57) | 40 (1.57) | 50 (1.97) | 50 (1.97) | 65 (2.56) | 65 (2.56) | 70 (2.76) |
| b | mm (in.) | 80 (3.15) | 80 (3.15) | 100 (3.94) | 100 (3.94) | 130 (5.12) | 130 (5.12) | 140 (5.51) |
| d₁ (aluminium) | mm (in.) | 16 (0.63) | – | 25 (0.98) | – | 39 (1.54) | – | – |
| d₁ (stainless steel) | mm (in.) | – | 16 (0.63) | – | 25 (0.98) | – | 40.5 (1.59) | 53 (2.09) |
| Conductance | l/s | 6.5 | – | 18.9 | – | 56.5 | – | – |

Ordering Information

| | | | | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Aluminium | Part No. | 184 06 | – | 184 07 | – | 184 08 | – | – |
| Stainless steel | Part No. | – | 884 71 | – | 884 72 | – | 884 74 | 884 75 |

4-Way Crosses (Aluminium 3.2315.08 / Stainless Steel 1.4301)



Dimensional drawing for the 4-way crosses

Technical Data

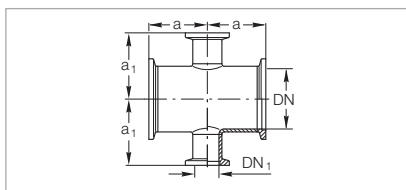
| DN | ISO-KF | 16 | 16 | 25 | 25 | 40 | 40 | 50 |
|-------------|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| a | mm (in.) | 40 (1.57) | 40 (1.57) | 50 (1.97) | 50 (1.97) | 65 (2.56) | 65 (2.56) | 70 (2.76) |
| Conductance | l/s | 6.5 | – | 18.9 | – | 56.5 | – | – |

Ordering Information

| | | | | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Aluminium | Part No. | 184 71 | – | 184 74 | – | 184 75 | – | – |
| Stainless steel | Part No. | – | 884 85 | – | 884 86 | – | 884 87 | 884 88 |

Important: In the table of Chapter “General” the German designation for the type of steel is also stated in accordance with AISI.

4-Way Reducer Crosses with lateral DN 16 Flanges (Aluminium 3.2315.08 / Stainless Steel 1.4301)



Dimensional drawing for the 4-way reducer crosses with lateral DN 16 flanges

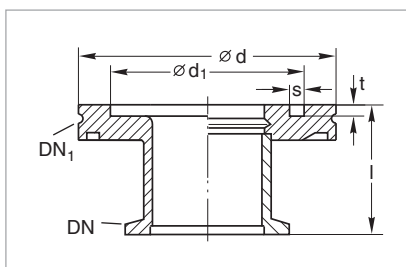
Technical Data

| DN/DN ₁ | ISO-KF | 25/16 | 40/16 | 50/16 |
|--------------------|----------|-----------|-----------|-----------|
| a | mm (in.) | 35 (1.38) | 40 (1.57) | 50 (1.97) |
| a ₁ | mm (in.) | 35 (1.38) | 45 (1.77) | (1.97) |

Ordering Information

| | | | | |
|-----------------|----------|---------------|---------------|---------------|
| Aluminium | Part No. | 184 57 | 184 58 | - |
| Stainless steel | Part No. | 884 96 | 884 97 | 884 98 |

Adaptors/Reducers ISO-KF – ISO-K



Dimensional drawing for the adaptor reducers ISO-KF – ISO-K;
left: aluminium; right: stainless steel

Technical Data

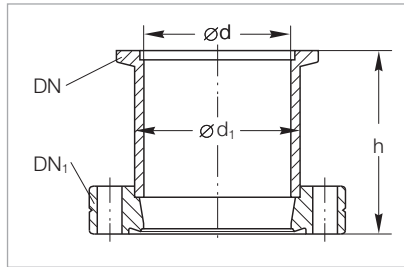
| DN | ISO-KF | 40 | 50 | 40 |
|-----------------|----------|------------|------------|------------|
| DN ₁ | ISO-K | 63 | 63 | 100 |
| d | mm (in.) | 95 (3.74) | 95 (3.74) | 130 (5.12) |
| d ₁ | mm (in.) | 70 (2.76) | 70 (2.76) | 102 (4.02) |
| l | mm (in.) | 40 (1.57) | 45 (1.77) | 40 (1.57) |
| s | mm (in.) | 5 (0.2) | 5 (0.2) | 5 (0.2) |
| t | mm (in.) | 4.5 (0.18) | 4.5 (0.18) | 4.5 (0.18) |
| Weight | kg (lbs) | 0.5 (1.10) | 0.6 (1.32) | 0.8 (1.77) |

Ordering Information

| | | | | |
|------------------------|----------|---------------|---------------|---------------|
| Stainless steel 1.4305 | Part No. | 887 40 | 887 41 | 887 42 |
| Aluminium 3.2315.71 | Part No. | 269 40 | 269 41 | - |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Adaptors ISO-KF – CF (Stainless Steel 1.4301)



Dimensional drawing for the adaptors CF – ISO-KF

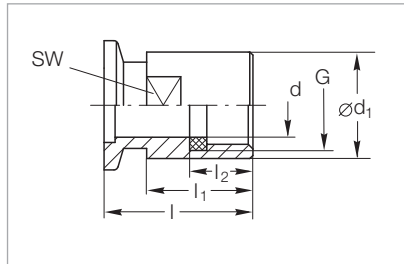
Technical Data

| DN | ISO-KF | 16 | 25 | 16 | 25 | 40 | 40 |
|-----------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| DN ₁ | CF | 16 | 16 | 40 | 40 | 40 | 63 |
| d | mm (in.) | 16 (0.63) | 16 (0.63) | 16 (0.63) | 26 (1.02) | 37 (1.36) | 41 (1.61) |
| h | mm (in.) | 35 (1.38) | 35 (1.38) | 30 (1.18) | 30 (1.18) | 50 (1.97) | 35 (1.38) |
| d ₁ (tube) | mm (in.) | 20 (0.79) | 20 (0.79) | 20 (0.79) | 30 (1.18) | 41 (1.61) | 45 (1.77) |

Ordering Information

| Stainless steel DIN 1.4301 | Part No. | 837 81 | 837 83 | 837 82 | 837 84 | 837 36 | 837 86 |
|----------------------------|----------|--------|--------|--------|--------|--------|--------|
|----------------------------|----------|--------|--------|--------|--------|--------|--------|

Screw-on Flanges (Stainless Steel 1.4305 / FPM (FKM))



Dimensional drawing for the screw-on flanges

Technical Data

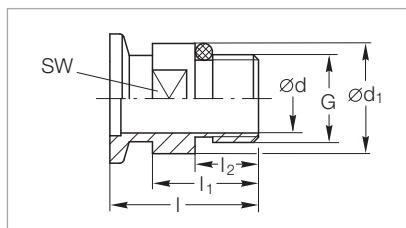
| DN | ISO-KF | 10 | 16 | 25 | 40 |
|--------------------------------|----------|-----------|-----------|-----------|-----------|
| l | mm (in.) | 35 (1.34) | 35 (1.34) | 45 (1.77) | 50 (1.97) |
| l ₁ | mm (in.) | 25 (0.98) | 25 (0.98) | 35 (1.34) | 40 (1.57) |
| l ₂ | mm (in.) | 15 (0.59) | 15 (0.59) | 25 (0.98) | 30 (1.18) |
| d | mm (in.) | 10 (0.39) | 15 (0.59) | 24 (0.94) | 38 (1.50) |
| d ₁ | mm (in.) | 20 (0.79) | 25 (0.98) | 39 (1.54) | 54 (2.13) |
| G (according to DIN ISO 228-1) | | G 3/8 | G 1/2 | G 1 | G 1 1/2 |
| SW (width across flats) | mm (in.) | 17 (0.67) | 21 (0.83) | 36 (1.42) | 50 (1.97) |

Ordering Information

| Stainless steel | Part No. | 884 25 | 884 26 | 884 27 | 884 28 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

Important: In the table of Chapter “General” the German designation for the type of steel is also stated in accordance with AISI.

Screw-in Flanges (Stainless Steel 1.4305 and 1.4571 / FPM (FKM))



Dimensional drawing for the screw-in flanges

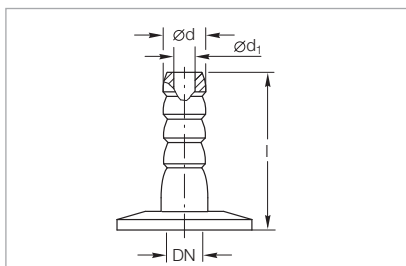
Technical Data

| DN | ISO-KF | 10 | 16 | 16 | 16 | 25 | 40 |
|--------------------------------|----------|-----------|-----------|-----------|-----------------------------|-----------|-----------|
| I | mm (in.) | 35 (1.34) | 26 (1.02) | 35 (1.34) | 42 (1.65) | 45 (1.77) | 50 (1.97) |
| I ₁ | mm (in.) | 25 (0.98) | – | 25 (0.98) | – | 35 (1.34) | 40 (1.57) |
| I ₂ | mm (in.) | 15 (0.59) | 8 (0.31) | 15 (0.59) | 11,5 (0.45) | 25 (0.98) | 30 (1.18) |
| d | mm (in.) | 12 (0.47) | 5 (0.20) | 16 (0.63) | 5 (0.20) | 25 (0.98) | 41 (1.61) |
| d ₁ | mm (in.) | 22 (0.87) | – | 26 (1.02) | – | 39 (1.54) | 54 (2.13) |
| M | mm (in.) | – | – | – | M 16 x 1,5 (M 16 x 0.06) | – | – |
| G (according to DIN ISO 228-1) | | G 3/8 | G 1/8 | G 1/2 | – | G 1 | G 1 1/2 |
| SW (width across flats) | mm (in.) | 19 (0.75) | 13 (0.51) | 22 (0.87) | 17 (0.67) | 36 (1.42) | 50 (1.97) |

Ordering Information

| | | | | | | | |
|------------------------|----------|---------------|---------------|---------------|-------------------|---------------|---------------|
| Stainless steel 1.4305 | Part No. | 886 30 | – | 886 31 | 168 40 V01 | 886 32 | 886 33 |
| Stainless steel 1.4571 | Part No. | – | 160 26 | – | – | – | – |

ISO-KF Flanges with Hose Nozzles (Aluminium 3.0615.71 and Stainless Steel 1.4305)



Dimensional drawing for the ISO-KF flanges with hose nozzle

Technical Data

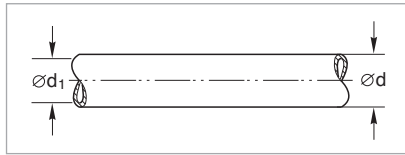
| DN | ISO-KF | 16 | 25 | 40 |
|------------------------------|----------|-----------|-----------|-----------|
| d | mm (in.) | 12 (0.47) | 12 (0.47) | 12 (0.47) |
| d ₁ ¹⁾ | mm (in.) | 7 (0.26) | 7 (0.26) | 7 (0.26) |
| I | mm (in.) | 40 (1.57) | 40 (1.57) | 40 (1.57) |

Ordering Information

| | | | | |
|-----------------|----------|---------------|---------------|---------------|
| Aluminium | Part No. | 182 90 | 182 91 | 182 92 |
| Stainless steel | Part No. | 885 14 | 885 08 | 885 09 |

¹⁾ Also recommended inside diameter for the hose

Rubber Vacuum Hoses (NR) for Hose Nozzles



Dimensional drawing for rubber vacuum hoses

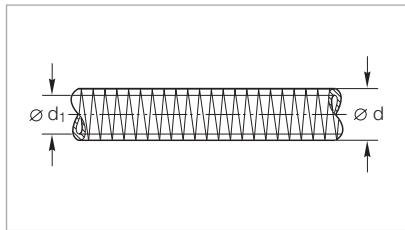
Technical Data

| DN | ISO-KF | 10 | 16 | 20 |
|----------------------|----------|--------------------------|--------------------------|--------------------------|
| d | mm (in.) | 17 (0.66) | 25 (0.98) | 32 (1.26) |
| d ₁ | mm (in.) | 7 (0.28) | 10 (0.39) | 16 (0.63) |
| Length | m (in.) | by the metre | by the metre | by the metre |
| Hardness – Shore A – | | 55 ±5 | 55 ±5 | 55 ±5 |
| Temperature range | °C (°F) | -30 to +85 (-22 to +185) | -30 to +85 (-22 to +185) | -30 to +85 (-22 to +185) |

Ordering Information

| Rubber vacuum hose | Part No. | 172 02 | 172 03 | 172 04 |
|--------------------|----------|--------|--------|--------|
|--------------------|----------|--------|--------|--------|

PVC Coiled Vacuum Hoses without Flanges



Dimensional drawing for the PVC vacuum hoses

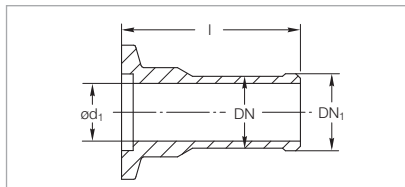
Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|----------------|----------|--------------|--------------|--------------|
| d | mm (in.) | 23 (0.91) | 33 (1.30) | 53 (2.09) |
| d ₁ | mm (in.) | 16 (0.63) | 25 (0.98) | 40 (1.57) |
| Length | m (in.) | by the metre | by the metre | by the metre |

Ordering Information

| PVC coiled vacuum hose | Part No. | 172 41 | 172 42 | 172 43 |
|------------------------|----------|--------|--------|--------|
|------------------------|----------|--------|--------|--------|

ISO-KF Flanges with Hose Nozzle (Aluminium 3.0615.71)



Dimensional drawing for the ISO-KF flanges with hose nozzle

Technical Data

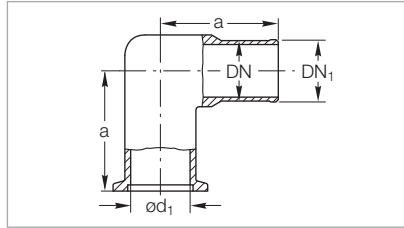
| DN | ISO-KF | 16 | 25 | 40 |
|------------------------|----------|-----------|-----------|-----------|
| DN ₁ (tube) | mm (in.) | 17 (0.67) | 26 (1.02) | 41 (1.61) |
| d ₁ | mm (in.) | 13 (0.51) | 22 (0.87) | 37 (1.46) |
| l | mm (in.) | 40 (1.57) | 40 (1.57) | 40 (1.57) |

Ordering Information

| Aluminium | Part No. | 182 45 | 182 46 | 182 47 |
|-----------|----------|--------|--------|--------|
|-----------|----------|--------|--------|--------|

Important: In the table of Chapter “General” the German designation for the type of steel is also stated in accordance with AISI.

Elbows 90° with Hose Nozzle (Aluminium 3.2381.02)



Dimensional drawing for the elbows 90° with hose nozzle

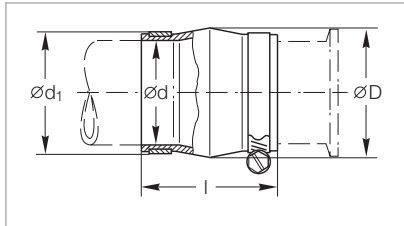
Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|------------------------|----------|-----------|-----------|-----------|
| DN ₁ (tube) | mm (in.) | 17 (0.67) | 26 (1.02) | 41 (1.61) |
| a | mm (in.) | 40 (1.57) | 50 (1.97) | 65 (2.56) |
| d ₁ | mm (in.) | 16 (0.63) | 25 (0.98) | 39 (1.54) |

Ordering Information

| Aluminium | Part No. | 182 15 | 182 16 | 182 17 |
|-----------|----------|--------|--------|--------|
|-----------|----------|--------|--------|--------|

CR Compensation Elements with Integrated Support Ring



Dimensional drawing for the compensation elements with integrated support ring

Technical Data

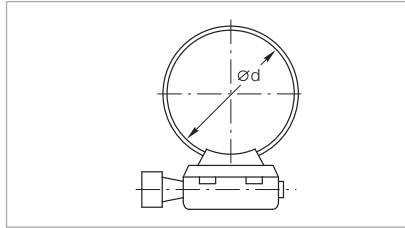
| DN | ISO-KF | 16 | 25 | 40 |
|--------------------|----------------------------|------------------------|------------------------|------------------------|
| D | mm (in.) | 44 (1.73) | 50 (1.97) | 68 (2.68) |
| d (tube tolerance) | mm (in.) | 16 (0.63) | 25 (0.98) | 40 (1.57) |
| d ₁ | mm (in.) | 24 (0.94) | 33 (1.30) | 48 (1.89) |
| l | mm (in.) | 58 (2.28) | 60 (2.36) | 64 (2.52) |
| Leak rate | mbar x l x s ⁻¹ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ | ≤ 1 x 10 ⁻⁵ |

Ordering Information

| Stainless steel/CR | Part No. | 182 78 ¹⁾ | 182 79 ¹⁾ | 182 80 ¹⁾ |
|--------------------|----------|----------------------|----------------------|----------------------|
|--------------------|----------|----------------------|----------------------|----------------------|

¹⁾ Is supplied complete with stainless steel hose clamps

Hose Clamps (Stainless Steel 1.4301)



Dimensional drawing for the hose clamps

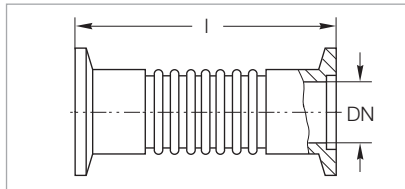
Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|-----------------|----------|-----------------------|-----------------------|-----------------------|
| d (min. / max.) | mm (in.) | 13 / 32 (0.51 / 1.26) | 19 / 44 (0.75 / 1.73) | 29 / 76 (1.14 / 2.99) |

Ordering Information

| Stainless steel | Part No. | 866 21 | 866 22 | 866 23 |
|-----------------|----------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|

Bellows (Stainless Steel 1.4571) with Flanges (Stainless Steel 1.4301)



Dimensional drawing for the bellows with flanges

Technical Data

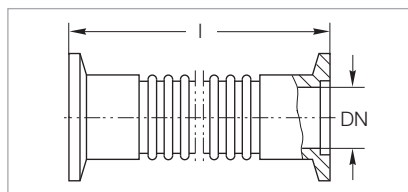
| DN | ISO-KF | 16 | 25 | 40 | 50 |
|----------------|-----------------------|--------------|--------------|--------------|-------------|
| l | mm (in.) | 70 (2.76) | 80 (3.15) | 100 (3.94) | 100 (3.94) |
| Wall thickness | mm (in.) | 0.13 (0.005) | 0.13 (0.005) | 0,15 (0.006) | 0,2 (0.008) |
| Compression | mm (in.) | 6.5 (0.26) | 8 (0.31) | 11 (0.43) | 10 (0.39) |
| Tension | mm (in.) | 4 (0.16) | 5 (0.20) | 7 (0.28) | 6 (0.24) |
| max. angle | degrees ¹⁾ | ±21 | ±17 | ±15 | ±15 |
| Lateral motion | mm (in.) | ±4 (±0.16) | ±3,5 (±0.14) | ±7 (±0.28) | ±8 (±0.31) |

Ordering Information

| Stainless steel | Part No. | 872 41 | 872 43 | 872 45 | 872 46 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

¹⁾ When utilizing the maximum bending angle, no extension along the axial axis will be possible!

Vacuum Hoses ¹⁾ with Flanges (Stainless Steel 1.4571)



Dimensional drawing for the vacuum hoses with flanges

Technical Data

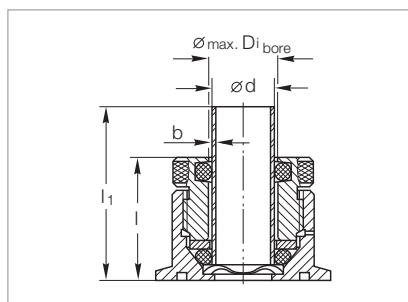
| DN | ISO-KF | 16 | 25 | 40 | 50 |
|---|----------|-------------|-------------|-------------|-------------|
| Max. bending radius (inside) with multiple bending with single bend | mm (in.) | 68.5 (2.70) | 103 (4.06) | 129 (5.08) | 198 (7.80) |
| | mm (in.) | 50 (1.97) | 63 (2.48) | 100 (3.94) | 130 (5.12) |
| Wall thickness | mm (in.) | 0.2 (0.008) | 0.2 (0.008) | 0.2 (0.008) | 0.3 (0.012) |

Ordering Information

| | | | | | |
|-------------------------|----------|---------------|---------------|---------------|---------------|
| L = 250 mm (9.84 in.) | Part No. | 867 81 | 867 83 | 867 85 | 867 86 |
| L = 500 mm (19.69 in.) | Part No. | 867 91 | 867 93 | 867 95 | 867 96 |
| L = 750 mm (29.53 in.) | Part No. | 867 41 | 867 43 | 867 45 | 867 46 |
| L = 1000 mm (39.37 in.) | Part No. | 868 01 | 868 03 | 868 05 | 868 06 |

¹⁾ Flexible vacuum hoses must be linked to an external mechanical assembly

ISO-KF Flanges with Compression Fitting for Glass/Metal/Plastic Tubes (Aluminium 3.061571/FPM (FKM))



Dimensional drawing for the ISO-KF flanges with compression fitting

Only for pressure ≤ 1000 mbar (≤ 750 Torr)

Technical Data

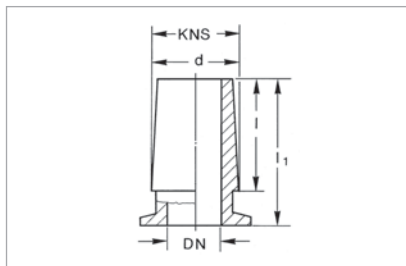
| DN | ISO-KF | 10 | 40 |
|--------------------------|----------------------|------------|------------|
| b | mm (in.) | 1.5 (0.06) | 1.5 (0.06) |
| d (glass) | mm (in.) | 10 (0.39) | 26 (1.02) |
| L | mm (in.) | 30 (1.18) | 45 (1.77) |
| L ₁ | mm (in.) | 50 (1.97) | 65 (2.56) |
| Di _{bore} -max. | ±0.2 mm (±0.008 in.) | 11 (0.43) | 27 (1.06) |

Ordering Information

| | | | |
|--|----------|------------------|-------------------|
| Compression fitting | Part No. | 184 61 | 184 66 |
| Sealing set (FPM (FKM)) for high temperatures (150 °C (302 °F)) (set = 10 pcs) | Part No. | ES 105 94 | ES 210 610 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

ISO-KF Flanges with Ground Cone (Stainless Steel 1.4301)



Dimensional drawing for the ISO-KF flanges with ground cone

Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|-------------|----------|-----------------------|-----------------------|-----------------------|
| KNS - d / l | mm (in.) | 19 / 26 (0.75 / 1.02) | 29 / 32 (1.14 / 1.26) | 45 / 40 (1.77 / 1.57) |
| l_1 | mm (in.) | 40 (1.57) | 45 (1.77) | 55 (2.17) |
| Taper | | 1:10 | 1:10 | 1:10 |

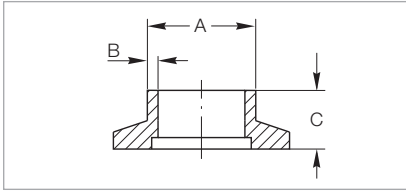
Ordering Information

| | | | | |
|-----------------|----------|---------------|---------------|---------------|
| Stainless steel | Part No. | 184 87 | 184 85 | 184 86 |
|-----------------|----------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ISO-KF Flanges with Short Weld Stub, Standard-Inch Diameters



Dimensional drawing for the ISO-KF flanges
with short weld stub

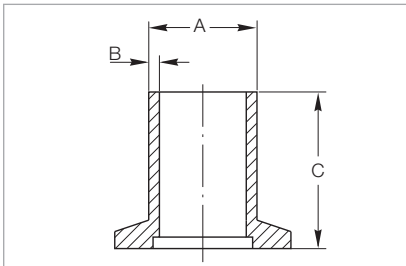
Technical Data

| DN | ISO-KF | 25 | 40 | 50 |
|------------------------|----------|-------------|-------------|-------------|
| ∅ A | mm (in.) | 25.4 (1.00) | 38.1 (1.50) | 50.8 (2.00) |
| B | mm (in.) | 1.7 (0.07) | 2.1 (0.08) | 2.1 (0.08) |
| C | mm (in.) | 12.7 (0.50) | 19.0 (0.75) | 19.0 (0.75) |
| Tube fitting O.D. size | | 1" | 1 1/2" | 2" |

Ordering Information

| Stainless steel | Part No. | 899 612 | 899 614 | 899 615 |
|-----------------|----------|---------|---------|---------|
|-----------------|----------|---------|---------|---------|

ISO-KF Flanges with Long Weld Stub, Standard-Inch Diameters



Dimensional drawing for the ISO-KF flanges
with long weld stub

Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|------------------------|----------|-------------|-------------|-------------|
| ∅ A | mm (in.) | 19.0 (0.75) | 25.4 (1.00) | 38.1 (1.50) |
| B | mm (in.) | 1.7 (0.07) | 1.7 (0.07) | 2.1 (0.08) |
| C | mm (in.) | 40.0 (1.58) | 40.0 (1.58) | 40.0 (1.58) |
| Tube fitting O.D. size | | 3/4" | 1" | 1 1/2" |

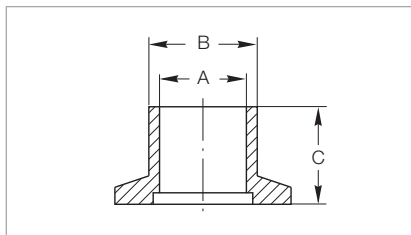
Ordering Information

| Stainless steel | Part No. | 899 621 | 899 622 | 899 624 |
|-----------------|----------|---------|---------|---------|
|-----------------|----------|---------|---------|---------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ISO-KF Flanges with Weld Stub, Metric Diameters



Dimensional drawing for the ISO-KF flanges
with weld stub

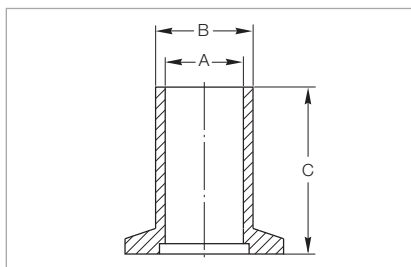
Technical Data

| DN | ISO-KF | 16 | 25 | 40 | 50 |
|-----|----------|-----------|-----------|-----------|-----------|
| Ø A | mm (in.) | 16 (0.63) | 25 (0.98) | 40 (1.58) | 50 (1.97) |
| B | mm (in.) | 20 (0.79) | 28 (1.10) | 45 (1.77) | 55 (2.17) |
| C | mm (in.) | 16 (0.63) | 19 (0.75) | 25 (0.98) | 25 (0.98) |

Ordering Information

| Stainless steel | Part No. | 884 21 | 884 22 | 884 23 | 883 85 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

ISO-KF Flanges with Weld Neck, Metric Diameters



Dimensional drawing for the ISO-KF flanges
with weld neck

Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|-----|----------|-----------|-----------|-----------|
| Ø A | mm (in.) | 16 (0.63) | 25 (0.98) | 40 (1.58) |
| B | mm (in.) | 20 (0.79) | 28 (1.10) | 45 (1.77) |
| C | mm (in.) | 57 (2.25) | 57 (2.25) | 57 (2.25) |

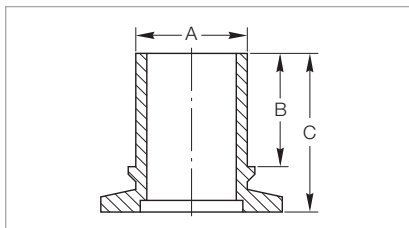
Ordering Information

| Stainless steel | Part No. | 884 31 | 884 32 | 884 33 |
|-----------------|----------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ISO-KF Flanges for Tube Fittings, Male



Dimensional drawing for the ISO-KF flanges
for tube fittings, male

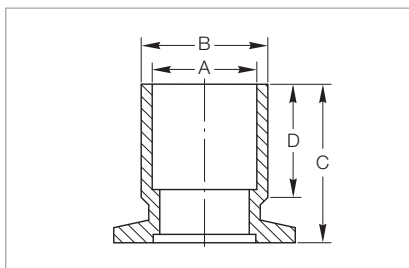
Technical Data

| DN | ISO-KF | 16 | 25 | 40 | 40 |
|------------------------|----------|-------------|-------------|-------------|-------------|
| Ø A | mm (in.) | 19.0 (0.75) | 29.0 (1.13) | 44.5 (1.75) | 41.0 (1.63) |
| B | mm (in.) | 17.5 (0.69) | 29.0 (1.13) | 29.0 (1.13) | 29.0 (1.13) |
| C | mm (in.) | 29.0 (1.13) | 35.0 (1.38) | 46.0 (1.81) | 46.0 (1.81) |
| Tube fitting I.D. size | | 3/4" | 1 1/8" | 1 3/4" | 1 5/8" |

Ordering Information

| Brass | Part No. | 910280119 | 910280120 | 910280126 | 910280121 |
|-------|----------|-----------|-----------|-----------|-----------|
|-------|----------|-----------|-----------|-----------|-----------|

ISO-KF Flanges for Tube Fittings, Female



Dimensional drawing for the ISO-KF flanges
for tube fittings, female

Technical Data

| DN | ISO-KF | 16 | 25 | 40 | 40 |
|------------------------|----------|-------------|-------------|-------------|-------------|
| Ø A | mm (in.) | 19.0 (0.75) | 29.0 (1.13) | 54.0 (2.13) | 41.0 (1.63) |
| Ø B | mm (in.) | 22.0 (0.88) | 32.0 (1.25) | 57.0 (2.24) | 44.5 (1.75) |
| C | mm (in.) | 25.4 (1.00) | 35.0 (1.38) | 35.0 (1.38) | 35.0 (1.38) |
| D | mm (in.) | 13.0 (0.50) | 17.0 (0.67) | 16.0 (0.63) | 19.0 (0.75) |
| Tube fitting O.D. size | | 3/4" | 1 1/8" | 2 1/8" | 1 5/8" |

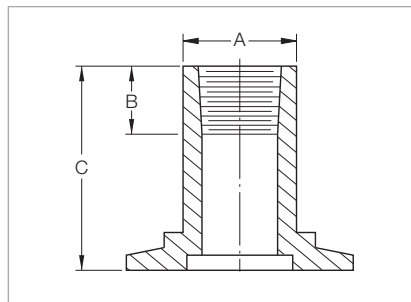
Ordering Information

| Brass | Part No. | 910280122 | 910280123 | 910280124 | 910280125 |
|-------|----------|-----------|-----------|-----------|-----------|
|-------|----------|-----------|-----------|-----------|-----------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ISO-KF/NPT Female Adaptor



Dimensional drawing
for the ISO-KF/NPT female adaptors

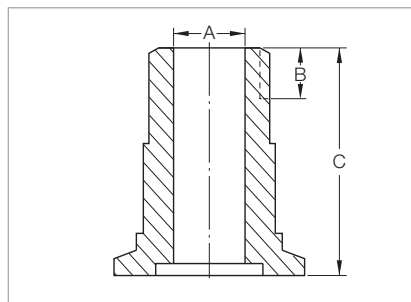
Technical Data

| DN | ISO-KF | 16 | 25 | 40 | |
|-----------|----------|-------------|-------------|-------------|------|
| Ø A | mm (in.) | 16.0 (0.62) | 25.0 (1.00) | 38.0 (1.50) | |
| B | mm (in.) | 10.0 (0.39) | 10.0 (0.39) | 10.0 (0.39) | |
| C | mm (in.) | 25.4 (1.00) | 25.4 (1.00) | 25.4 (1.00) | |
| Pipe size | NPT | 1/8" | 1/4" | 1/8" | 1/4" |

Ordering Information

| Stainless steel | Part No. | 899 604 | 899 643 | 899 605 | 899 644 | 899 606 | 899 645 |
|-----------------|----------|---------|---------|---------|---------|---------|---------|
|-----------------|----------|---------|---------|---------|---------|---------|---------|

ISO-KF/NPT Male Adaptor



Dimensional drawing
for the ISO-KF/NPT male adaptors

Technical Data

| DN | ISO-KF | 16 | 25 | 25 |
|-----------|----------|-------------|-------------|-------------|
| Ø A | mm (in.) | 9.5 (0.38) | 16.0 (0.63) | 23.8 (0.94) |
| B | mm (in.) | 10.0 (0.40) | 13.5 (0.53) | 17.0 (0.68) |
| C | mm (in.) | 38.0 (1.50) | 46.0 (1.81) | 63.5 (2.50) |
| Pipe size | NPT | 1/4" | 1/2" | 1" |

Ordering Information

| Carbon steel | Part No. | 899 601 | 899 602 | 899 626 |
|-----------------|----------|-----------|---------|---------|
| Stainless steel | Part No. | 992780678 | - | - |

Technical Data

| DN | ISO-KF | 40 | 40 | 40 | 40 |
|-----------|----------|-------------|-------------|-------------|-------------|
| Ø A | mm (in.) | 25.4 (1.00) | 31.8 (1.25) | 38.1 (1.50) | 38.2 (1.50) |
| B | mm (in.) | 17.0 (0.68) | 18.0 (0.71) | 18.4 (0.72) | 19.2 (0.76) |
| C | mm (in.) | 50.8 (2.00) | 63.5 (2.50) | 63.5 (2.50) | 63.5 (2.50) |
| Pipe size | NPT | 1" | 1 1/4" | 1 1/2" | 2" |

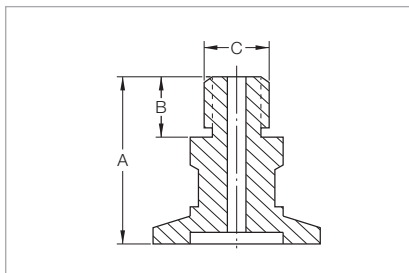
Ordering Information

| Stainless steel | Part No. | 899 603 | 899 627 | 899 628 | 899 629 |
|-----------------|----------|---------|---------|---------|---------|
|-----------------|----------|---------|---------|---------|---------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ISO-KF/Metric Adaptor



Dimensional drawing for the ISO-KF/
metric adaptors

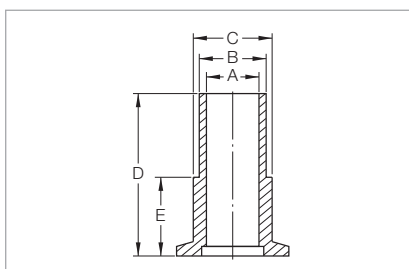
Technical Data

| | | |
|--------------|----------|--------------------------|
| DN | ISO-KF | 16 |
| A | mm (in.) | 50.8 (2.00) |
| B | mm (in.) | 12.7 (0.50) |
| Ø C / thread | mm (in.) | M 16 x 1.5 (M 16 x 0.06) |

Ordering Information

| | | |
|--------------|----------|-----------------|
| Carbon steel | Part No. | 99258004 |
|--------------|----------|-----------------|

Hose Adaptor



Dimensional drawing for the hose adaptors

Technical Data

| DN | ISO-KF | 16 | 25 | 40 |
|-------------------|----------|-------------|-------------|-------------|
| Ø A | mm (in.) | 16.0 (0.63) | 21.0 (0.81) | 32.0 (1.2) |
| Ø B | mm (in.) | 19.5 (0.77) | 26.0 (1.02) | 39.0 (1.54) |
| Ø C | mm (in.) | 20.0 (0.79) | 28.0 (1.10) | 45.0 (1.77) |
| D | mm (in.) | 29.0 (1.13) | 29.0 (1.13) | 29.0 (1.13) |
| E | mm (in.) | 13.0 (0.50) | 13.0 (0.50) | 13.0 (0.50) |
| Nominal I.D. hose | | 3/4" | 1" | 1 1/2" |

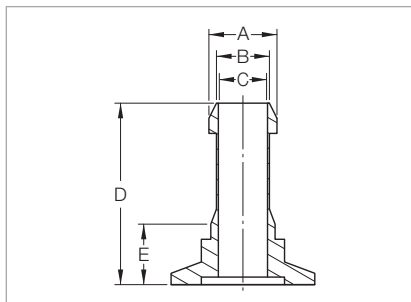
Ordering Information

| | | | | |
|-----------------|----------|------------------|------------------|------------------|
| Stainless steel | Part No. | 992780668 | 992780670 | 992780672 |
|-----------------|----------|------------------|------------------|------------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ISO-KF Nipples, American Standard



Dimensional drawing for the ISO-KF nipples
american standard

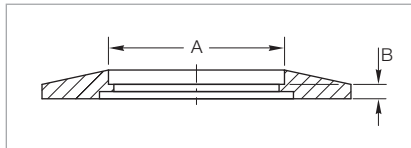
Technical Data

| DN | ISO-KF | 16 | 16 | 25 |
|------------------------|----------|-------------|-------------|-------------|
| Ø A | mm (in.) | 9.5 (0.38) | 16.1 (0.64) | 16.1 (0.64) |
| Ø B | mm (in.) | 7.6 (0.30) | 14.3 (0.56) | 14.3 (0.56) |
| Ø C | mm (in.) | 5.6 (0.22) | 11.9 (0.47) | 11.9 (0.47) |
| D | mm (in.) | 40.0 (1.58) | 40.0 (1.58) | 40.0 (1.58) |
| E | mm (in.) | 12.7 (0.50) | 12.7 (0.50) | 12.7 (0.50) |
| Tube fitting O.D. size | | 1/4" | 1/2" | 1/2" |

Ordering Information

| Stainless steel | Part No. | 899 674 | 899 675 | 899 676 |
|-----------------|----------|---------|---------|---------|
|-----------------|----------|---------|---------|---------|

Flanges with Welded Socket



Dimensional drawing for the flanges
with welded sockets

Technical Data

| DN | ISO-KF | 25 | 40 |
|------------------------|----------|-------------|-------------|
| Ø A | mm (in.) | 26.2 (1.03) | 41.1 (1.62) |
| B | mm (in.) | 3.0 (0.12) | 3.0 (0.12) |
| Tube fitting O.D. size | | 1" | 1 1/2" |

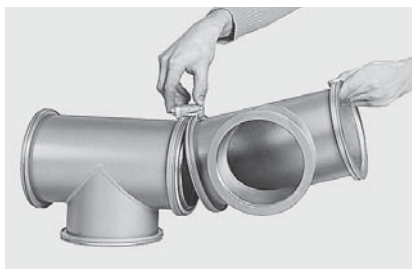
Ordering Information

| Stainless steel | Part No. | 899 632 | 899 634 |
|-----------------|----------|---------|---------|
|-----------------|----------|---------|---------|

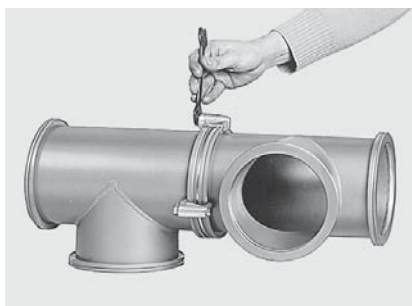
Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

ISO-K

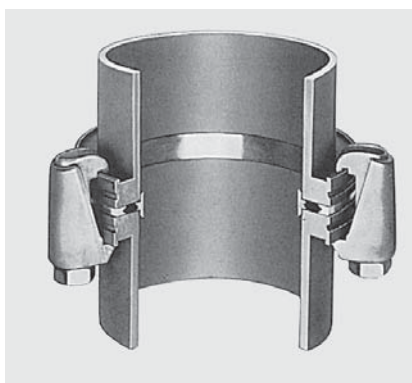
Clamp Flange Fittings and Components



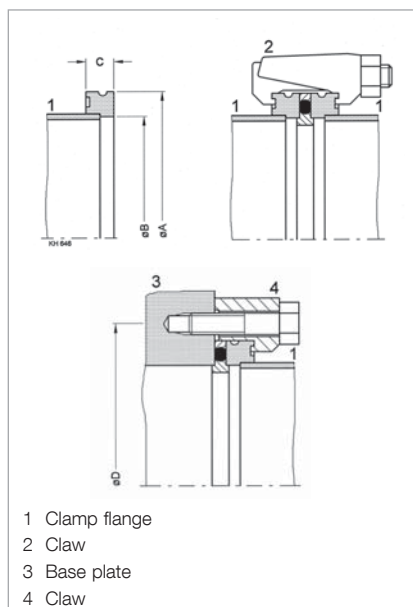
Attaching a clamp flange component and fitting of the clamp



Tightening the clamping bolt



ISO-K clamp flange connection



Flange Components DN 63 to DN 630 ISO-K (to DIN 28 404 in line with ISO 1609/3669)

The clamp flange connection was introduced to the vacuum industry by Oerlikon Leybold Vacuum. Since the fitting of clamp flanges does not depend on any bolt holes in the flange, these components may be installed in any orientation.

Advantages to the User

- Quick to fit
- Safe and reliable
- Can be turned in any direction
- Easy to disassemble, thus easy to clean
- Suitable for pressures down to 10^{-7} mbar (0.75×10^{-7} Torr) when using O-rings and down to 10^{-9} mbar (0.75×10^{-9} Torr) when using metal gaskets
- Easily adaptable to other flange systems
- Mounted by means of clamps (ISO-K) or collar flange with retaining ring (ISO-F, DIN EN 1092-1)
- Clamp flange components are used with CR or FPM (FKM) gaskets or with ultra sealing disks made of aluminium

- Degassing temperatures
for CR, max. 100 °C (212 °F)
for FPM (FKM), max. 150 °C (302 °F)
for the ultra sealing disk, max. 200 °C (392 °F)

The pressure range for the application depends in each case on the sealing method which is used and is thus limited for ultra sealing disks to 10^{-9} mbar (0.75×10^{-9} Torr), for FPM (FKM) gaskets to 10^{-8} mbar (0.75×10^{-8} Torr) and for CR sealed components to 10^{-7} mbar (0.75×10^{-7} Torr).

Flexible Compensation Elements (CR)

Vacuum systems and pump systems often require components which are capable of protecting sensitive instruments against impacts or excessive vibrations while linking tubes at the same time.

Advantages to the User

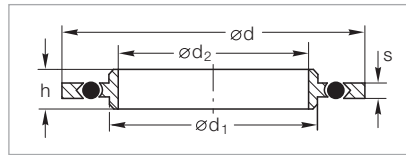
- Easy and quick to install
- Safe and reliable
- Tubes may be turned in any direction
- No centering ring and sealing ring is needed since the seal is provided by the smooth tube surface
- Capable of withstanding temperatures up to 100 °C (212 °F)
- Suitable for pressures down to 10^{-5} mbar (0.75×10^{-5} Torr)

Technical Data

| Nominal diameter | | A | B | C | Number of clamps | D | Screws for claws | Number of claws |
|------------------|-----|-------|-------|------|------------------|-------|------------------|-----------------|
| DN 63 ISO-K | mm | 95 | 70 | 12 | 4 | 110 | M 8 x 35 | 4 |
| | in. | 3.74 | 2.76 | 0.47 | | 4.33 | M 8 x 1.38 | |
| DN 100 ISO-K | mm | 130 | 102 | 12 | 4 | 145 | M 8 x 35 | 8 |
| | in. | 5.12 | 4.02 | 0.47 | | 5.71 | M 8 x 1.38 | |
| DN 160 ISO-K | mm | 180 | 153 | 12 | 4 | 200 | M 10 x 35 | 8 |
| | in. | 7.09 | 6.02 | 0.47 | | 7.87 | M 10 x 1.38 | |
| DN 200 ISO-K | mm | 240 | 213 | 12 | 6 | 260 | M 10 x 35 | 12 |
| | in. | 9.45 | 8.39 | 0.47 | | 10.24 | M 10 x 1.38 | |
| DN 250 ISO-K | mm | 290 | 261 | 12 | 6 | 310 | M 10 x 35 | 12 |
| | in. | 11.42 | 10.28 | 0.47 | | 12.20 | M 10 x 1.38 | |
| DN 320 ISO-K | mm | 370 | 318 | 17 | 8 | 395 | M 12 x 50 | 12 |
| | in. | 14.57 | 12.52 | 0.67 | | 15.55 | M 12 x 1.97 | |
| DN 400 ISO-K | mm | 450 | 400 | 17 | 8 | 480 | M 12 x 50 | 16 |
| | in. | 17.72 | 15.75 | 0.67 | | 18.90 | M 12 x 1.97 | |
| DN 500 ISO-K | mm | 550 | 501 | 17 | 12 | 580 | M 12 x 50 | 16 |
| | in. | 21.65 | 19.72 | 0.67 | | 22.83 | M 12 x 1.97 | |
| DN 630 ISO-K | mm | 690 | 651 | 22 | 12 | 720 | M 12 x 55 | 20 |
| | in. | 27.17 | 25.63 | 0.87 | | 28.35 | M 12 x 2.17 | |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Centering Rings (Aluminium / Stainless Steel) with O-Ring (CR/FPM (FKM))



Dimensional drawing for the centering rings with O-ring

Technical Data

| DN | ISO-K | 63 | 100 | 160 | 200 | 250 |
|----------------|----------|------------|------------|------------|------------|-------------|
| d | mm (in.) | 96 (3.78) | 128 (5.04) | 179 (7.05) | 239 (9.41) | 287 (11.30) |
| d ₁ | mm (in.) | 70 (2.76) | 102 (4.02) | 153 (6.02) | 213 (8.39) | 261 (10.28) |
| d ₂ | mm (in.) | 67 (2.64) | 99 (3.90) | 150 (5.91) | 210 (8.27) | 258 (10.16) |
| h | mm (in.) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) |
| s | mm (in.) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) | 3.9 (0.15) |

Ordering Information

| | | | | | | |
|---------------------------|----------|---------------|---------------|---------------|---------------|---------------|
| Aluminium/FPM (FKM) | Part No. | 268 41 | 268 42 | 268 43 | 268 44 | 268 45 |
| Aluminium/CR | Part No. | 268 05 | 268 06 | 268 09 | 268 19 | 268 17 |
| Stainless steel/FPM (FKM) | Part No. | 887 03 | 887 04 | 887 07 | 887 02 | 887 08 |

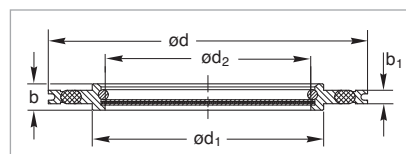
Technical Data

| DN | ISO-K | 320 | 400 | 500 | 630 | 800 |
|----------------|----------|-------------|-------------|-------------|-------------|-------------|
| d | mm (in.) | 358 (14.09) | 440 (17.32) | 541 (21.30) | 691 (27.20) | 840 (33.07) |
| d ₁ | mm (in.) | 318 (12.52) | 400 (15.75) | 501 (19.72) | 651 (25.63) | 800 (31.50) |
| d ₂ | mm (in.) | 313 (12.32) | 395 (15.55) | 496 (19.53) | 646 (25.43) | 795 (31.18) |
| h | mm (in.) | 14 (0.55) | 14 (0.55) | 14 (0.55) | 14 (0.55) | 14 (0.55) |
| s | mm (in.) | 5.6 (0.22) | 5.6 (0.22) | 5.6 (0.22) | 5.6 (0.22) | 5.6 (0.22) |

Ordering Information

| | | | | | | |
|---------------------|----------|---------------|---------------|---------------|---------------|---------------|
| Aluminium/FPM (FKM) | Part No. | 268 46 | 268 47 | 268 48 | 268 49 | 268 50 |
| Aluminium/CR | Part No. | 268 18 | 268 14 | 268 15 | 268 16 | – |

Centering Rings with Fine Filter (Stainless Steel 1.4301) and O-Ring (FPM (FKM))



Dimensional drawing for the centering rings with fine filter

Filter
material: Stainless steel 1.4404,
size of pores: 4 µm,
separation grade: 1 µm particles to 98%

Technical Data

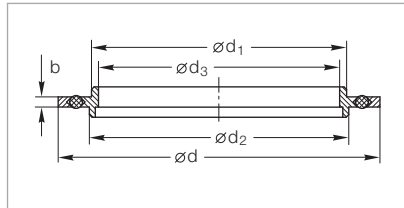
| DN | ISO-K | 63 | 100 |
|----------------|----------|-----------|------------|
| b | mm (in.) | 8 (0.31) | 8 (0.31) |
| b ₁ | mm (in.) | 4 (0.16) | 4 (0.16) |
| d | mm (in.) | 96 (3.78) | 128 (5.04) |
| d ₁ | mm (in.) | 70 (2.76) | 102 (4.02) |
| d ₂ | mm (in.) | 62 (2.44) | 94 (3.7) |

Ordering Information

| | | | |
|-----------------|----------|---------------|---------------|
| Stainless steel | Part No. | 887 20 | 887 21 |
|-----------------|----------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Centering Ring Adaptors (Aluminium) with O-Ring (FPM (FKM)), ISO-K – ISO-KF



Dimensional drawing for the centering ring adaptors with O-ring

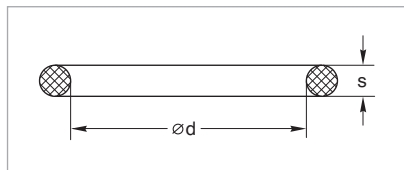
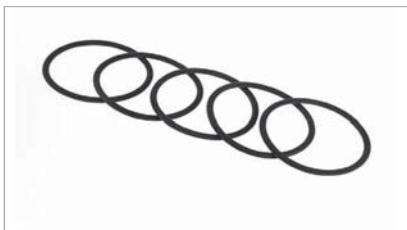
Technical Data

| DN | ISO-K / ISO-KF | 100 / 100 | 160 / 150 | 250 / 250 |
|----------------|----------------|------------|------------|-------------|
| b | mm (in.) | 4 (0.16) | 4 (0.16) | 4 (0.16) |
| d | mm (in.) | 126 (4.96) | 177 (6.97) | 285 (11.22) |
| d ₁ | mm (in.) | 100 (3.94) | 150 (5.91) | 250 (9.84) |
| d ₂ | mm (in.) | 102 (4.02) | 153 (6.02) | 261 (10.28) |
| d ₃ | mm (in.) | 95 (3.74) | 145 (5.71) | 244 (9.61) |

Ordering Information

| Aluminium/FPM (FKM) | Part No. | 105 25 | 105 35 | 105 45 |
|---------------------|----------|--------|--------|--------|
|---------------------|----------|--------|--------|--------|

O-Ring Gaskets for Clamp Flange Fittings



Dimensional drawing for the spare O-ring for clamp flange fittings

Technical Data

| DN | ISO-K | 63 | 100 | 160 | 200 | 250 | 320 |
|------------------|----------|-----------|------------|------------|------------|------------|-------------|
| d | mm (in.) | 75 (2.95) | 107 (4.21) | 158 (6.22) | 208 (8.19) | 253 (9.96) | 329 (12.95) |
| s | mm (in.) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 7 (0.28) |
| Quantity per set | | 5 | 5 | 5 | 5 | 5 | 1 |

Ordering Information

| FPM (FKM) | Part No. | ES210635 | ES210645 | ES210650 | ES210655 | ES210660 | E210665 |
|-----------|----------|----------|----------|----------|----------|----------|---------|
|-----------|----------|----------|----------|----------|----------|----------|---------|

Technical Data

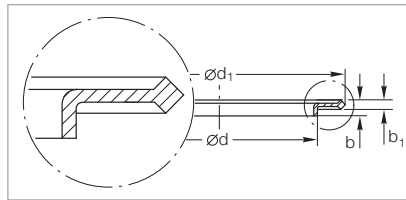
| DN | ISO-K | 400 | 500 | 630 | 800 | 1000 |
|------------------|----------|-------------|-------------|-------------|-------------|--------------|
| d | mm (in.) | 405 (15.94) | 506 (19.92) | 658 (25.90) | 808 (31.80) | 1006 (39.61) |
| s | mm (in.) | 7 (0.28) | 7 (0.28) | 7 (0.28) | 7 (0.28) | 7 (0.28) |
| Quantity per set | | 1 | 1 | 1 | 1 | 1 |

Ordering Information

| FPM (FKM) | Part No. | E210670 | E210675 | E210741 | E210746 | E210751 |
|-----------|----------|---------|---------|---------|---------|---------|
|-----------|----------|---------|---------|---------|---------|---------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Ultra Sealing Disks (Aluminium 3.2315.70) ¹⁾



Dimensional drawing for the ultra sealing disks

Technical Data

| DN | ISO-K / ISO-F | 63 | 100 | 160 | 250 |
|----------------|---------------|-------------|--------------|--------------|---------------|
| b | mm (in.) | 4.5 (0.18) | 4.5 (0.18) | 4.5 (0.18) | 4.5 (0.18) |
| b ₁ | mm (in.) | 2.6 (0.10) | 2.6 (0.10) | 2.6 (0.10) | 2.6 (0.10) |
| d | mm (in.) | 69.8 (2.75) | 101.8 (4.01) | 152.8 (6.02) | 260.8 (10.27) |
| d ₁ | mm (in.) | 85.6 (3.37) | 116.6 (4.59) | 166.6 (6.56) | 276.6 (10.89) |

Ordering Information

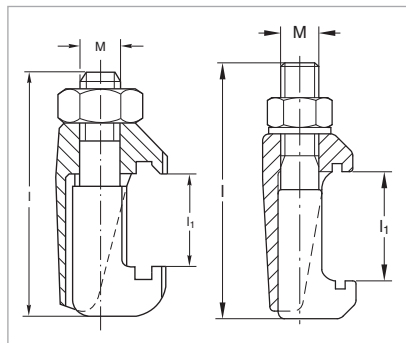
| Aluminium | Part No. | 886 24 | 886 25 | 886 26 | 886 27 |
|-----------|----------|--------|--------|--------|--------|
|-----------|----------|--------|--------|--------|--------|

¹⁾ Only for collar ring connections

Clamps for ISO-K



Clamps for ISO-K, stainless steel



Dimensional drawing for the clamps,
right: Part No. 210 061

Exact numbers of clamps see first page of
the chapter "(ISO-K) Clamp Flange Fittings
and Components"

Technical Data

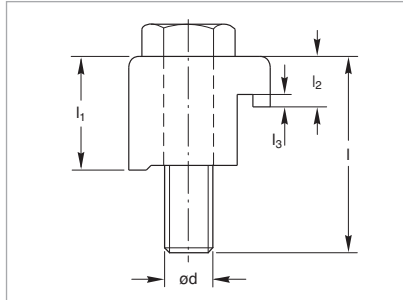
| DN | ISO-K | 63 / 250 | 63 / 250 | 320 / 500 | 630 | 320 / 630 |
|---|-------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Number of required clamps per connection | | 4 / 6 | 4 / 6 | 8 / 12 | 12 | 8 / 12 |
| M | thread | M 10 | M 10 | M 12 | M 12 | M 12 |
| l | mm (in.) | 60.0 (2.36) | 68.0 (2.68) | 78.0 (3.07) | 88.0 (3.46) | 82.5 (3.25) |
| l ₁ | mm (in.) | 17 to 27 (0.67 to 1.06) | 25 to 35 (0.98 to 1.38) | 27 to 39 (1.06 to 1.54) | 31 to 49 (1.22 to 1.93) | 29 to 47 (1.14 to 1.85) |

Ordering Information

| | | | | | | |
|-------------------------|----------|--------|--------|--------|--------|---------|
| 1 set = 4 clamps | | | | | | |
| Galvanized steel 1.1181 | Part No. | 267 01 | 267 02 | 267 10 | 267 11 | - |
| Stainless steel 1.4401 | Part No. | 887 99 | - | - | - | 210 061 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Claws (Galvanized Steel 1.1181) for ISO-K



Dimensional drawing for the claws for ISO-K

Exact numbers of clamps see first page of the chapter "(ISO-K) Clamp Flange Fittings and Components"

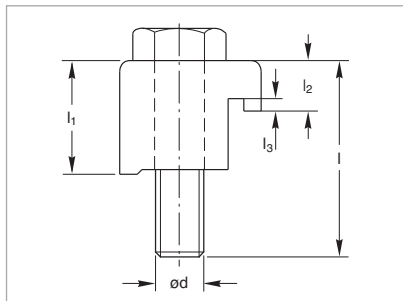
Technical Data

| DN | ISO-K | 63 / 100 | 160 / 250 | 320 / 500 | 630 |
|---|----------|-------------|-------------|-------------|-------------|
| Number of required claws per connection | | 4 / 8 | 8 / 12 | 12 / 16 | 20 |
| d | thread | M 8 | M 10 | M 12 | M 12 |
| l | mm (in.) | 35 (1.38) | 35 (1.38) | 50 (1.97) | 55 (2.17) |
| l ₁ | mm (in.) | 22.5 (0.89) | 23.0 (0.91) | 36.5 (1.44) | 41.5 (1.63) |
| l ₂ | mm (in.) | 8.6 (0.34) | 9.1 (0.36) | 15.9 (0.63) | 16 (0.63) |
| l ₃ | mm (in.) | 2.5 (0.10) | 2.5 (0.10) | 2.5 (0.10) | 2.5 (0.10) |

Ordering Information

| 1 set = 4 claws | Part No. | 268 25 | 268 26 | 268 27 | 268 28 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

Claws for Sealing Groove in Base Plate (Galvanized Steel 1.1181) for ISO-K



Dimensional drawing for the claws for sealing groove

Exact numbers of clamps see first page of the chapter "(ISO-K) Clamp Flange Fittings and Components"

Technical Data

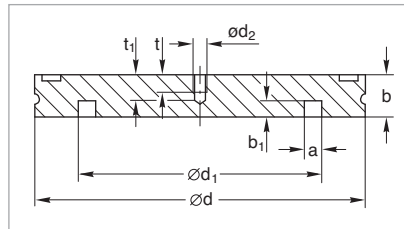
| DN | ISO-K | 63 / 100 | 160 / 250 | 320 / 500 |
|----------------|----------|-------------|------------|-------------|
| d | thread | M 8 | M 10 | M 12 |
| l | mm (in.) | 30 (1.18) | 35 (1.38) | 45 (1.77) |
| l ₁ | mm (in.) | 18.6 (0.73) | 19 (0.75) | 31 (1.22) |
| l ₂ | mm (in.) | 8.6 (0.34) | 9.0 (0.35) | 16.0 (0.63) |
| l ₃ | mm (in.) | 2.5 (0.10) | 2.5 (0.10) | 2.5 (0.10) |

Ordering Information

| 1 set = 4 claws | Part No. | 268 76 | 268 77 | 268 78 |
|-----------------|----------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Blank Flanges (Nickel-Plated Steel 1.0037 / Stainless Steel 1.4301)



Dimensional drawing for the blank flanges

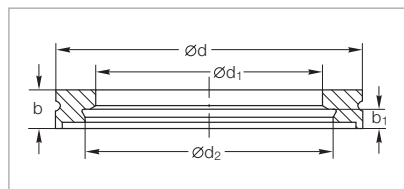
Technical Data

| DN | ISO-K | 63 | 100 | 160 | 200 | 250 | 320 | 400 | 500 | 630 |
|----------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|
| a | mm in. | 5 0.20 | 5 0.20 | 5 0.20 | 5 0.20 | 5 0.20 | 5 0.20 | 5 0.20 | 5 0.20 | 5 0.20 |
| b | mm in. | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 | 17 0.67 | 17 0.67 | 17 0.67 | 22 0.87 |
| b ₁ | mm in. | 4.5 0.18 | 4.5 0.18 | 4.5 0.18 | 4.5 0.18 | 4.5 0.18 | 6.5 0.26 | 6.5 0.26 | 6.5 0.26 | 6.5 0.26 |
| d | mm in. | 95 3.74 | 130 5.12 | 180 7.09 | 240 9.45 | 290 11.42 | 370 14.57 | 450 17.72 | 550 21.65 | 690 27.17 |
| d ₁ | mm in. | 70 2.76 | 102 4.02 | 153 6.02 | 213 8.39 | 261 10.28 | 318 12.52 | 400 15.75 | 501 19.72 | 651 25.63 |
| d ₂ | thread | – | – | – | – | – | – | – | M 8 | M 8 |
| t | mm in. | 8 0.31 | 8 0.31 | 8 0.31 | 8 0.31 | 8 0.31 | 8 0.31 | 8 0.31 | 8 0.31 | 8 0.31 |
| t ₁ | mm in. | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 | 12 0.47 |

Ordering Information

| | | | | | | | | | | |
|---------------------|----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Nickel-plated steel | Part No. | 26947 | 26948 | 26949 | – | 26956 | – | – | – | – |
| Stainless steel | Part No. | 88755 | 88756 | 88757 | 88754 | 88758 | 88759 | 88760 | 88761 | 88762 |

Welding Flanges



Dimensional drawing for the welding flanges

Technical Data

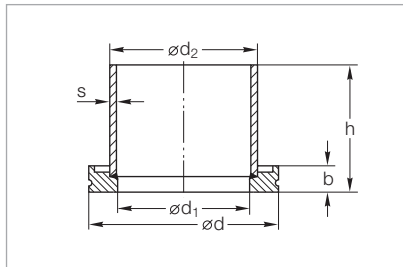
| DN | ISO-K | 63 | 100 | 160 | 200 | 250 |
|----------------|----------|-------------|--------------|--------------|--------------|---------------|
| b | mm (in.) | 12 (0.47) | 12 (0.47) | 12 (0.47) | 12 (0.47) | 12 (0.47) |
| b ₁ | mm (in.) | 6 (0.24) | 6 (0.24) | 6 (0.24) | 6 (0.24) | 6 (0.24) |
| d | mm (in.) | 95 (3.74) | 130 (5.12) | 180 (7.09) | 240 (9.45) | 290 (11.42) |
| d ₁ | mm (in.) | 70 (2.76) | 102 (4.02) | 153 (6.02) | 213 (8.39) | 261 (10.28) |
| d ₂ | mm (in.) | 76.6 (3.02) | 108.7 (4.28) | 159.8 (6.29) | 219.8 (8.65) | 267.8 (10.54) |

Ordering Information

| | | | | | | |
|------------------------|----------|---------------|---------------|---------------|---------------|---------------|
| Steel 1.0831 | Part No. | 269 61 | 269 62 | 269 63 | – | 269 65 |
| Stainless steel 1.4301 | Part No. | 886 61 | 886 62 | 886 63 | 886 64 | 886 65 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Clamp Flanges with Tubulation (Steel 1.0831, 1.0308 / Stainless Steel 1.4301)



Dimensional drawing for the clamp flanges with tubulation

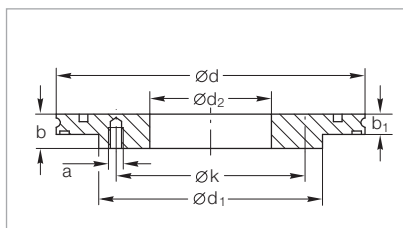
Technical Data

| DN | ISO-K | 63 | 100 | 160 | 200 | 250 | 320 | 400 | 500 | 630 |
|---------------------|-------|------|------|------|-------|-------|-------|-------|-------|-------|
| d | mm | 95 | 130 | 180 | 240 | 290 | 370 | 450 | 550 | 690 |
| | in. | 3.74 | 5.12 | 7.09 | 9.45 | 11.42 | 14.57 | 17.72 | 21.65 | 27.17 |
| d ₁ | mm | 70 | 102 | 153 | 213 | 261 | 318 | 400 | 501 | 651 |
| | in. | 2.76 | 4.02 | 6.02 | 8.39 | 10.28 | 12.52 | 15.75 | 19.72 | 25.63 |
| d ₂ | mm | 76.1 | 108 | 159 | 219.1 | 267 | 324 | 406 | 508 | 660 |
| | in. | 3.00 | 4.25 | 6.26 | 8.63 | 10.51 | 12.76 | 15.98 | 20.00 | 25.98 |
| h | mm | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | in. | 3.94 | 3.94 | 3.94 | 3.94 | 3.94 | 3.94 | 3.94 | 3.94 | 3.94 |
| s (steel) | mm | 2.9 | 2.9 | 2.9 | — | 3 | 3 | 3 | 4 | 5 |
| | in. | 0.11 | 0.11 | 0.11 | — | 0.12 | 0.12 | 0.12 | 0.16 | 0.20 |
| s (stainless steel) | mm | 2.3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 5 |
| | in. | 0.09 | 0.08 | 0.08 | 0.12 | 0.12 | 0.12 | 0.12 | 0.16 | 0.20 |
| b | mm | 12 | 12 | 12 | 12 | 12 | 17 | 17 | 17 | 22 |
| | in. | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.67 | 0.67 | 0.67 | 0.87 |

Ordering Information

| | | | | | | | | | | |
|------------------------|----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Steel 1.0831, 1.0308 | Part No. | 26904 | 26905 | 26906 | — | 26917 | — | — | — | — |
| Stainless steel 1.4301 | Part No. | 88640 | 88641 | 88642 | 88643 | 88718 | 88719 | 88646 | 88647 | 88648 |

Reducing Flanges (Stainless Steel 1.4301)



Dimensional drawing for the reducing flanges

Technical Data

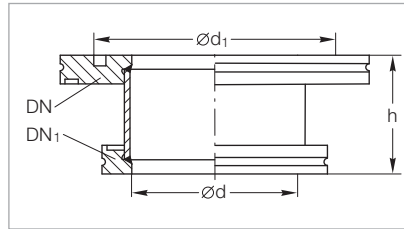
| DN | ISO-K | 160/63 | 160/100 | 200/100 | 200/160 | 250/160 |
|----------------|----------|------------|------------|------------|------------|-------------|
| a | thread | M 8 | M 8 | M 8 | M 10 | M 10 |
| b | mm (in.) | 22 (0.87) | 25 (0.98) | 20 (0.79) | 25 (0.98) | 22 (0.87) |
| b ₁ | mm (in.) | 12 (0.47) | 12 (0.47) | 12 (0.47) | 12 (0.47) | 12 (0.47) |
| d | mm (in.) | 180 (7.09) | 180 (7.09) | 240 (9.49) | 240 (9.49) | 290 (11.42) |
| d ₁ | mm (in.) | 130 (5.12) | 165 (6.50) | 165 (6.50) | 225 (8.86) | 225 (8.86) |
| d ₂ | mm (in.) | 70 (2.76) | 102 (4.02) | 102 (4.02) | 153 (6.02) | 153 (6.02) |
| k | mm (in.) | 110 (4.33) | 145 | 145 (5.71) | 200 (7.87) | 200 (7.87) |

Ordering Information

| | | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel | Part No. | 886 14 | 886 15 | 886 17 | 886 16 | 886 50 |
|-----------------|----------|---------------|---------------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Reducers (Stainless Steel)



Dimensional drawing for the reducers

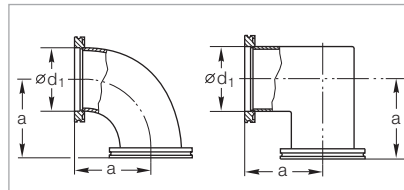
Technical Data

| | | | |
|-----------------|----------|------------|-------------|
| DN | ISO-K | 100 | 250 |
| DN ₁ | ISO-K | 63 | 200 |
| d | mm (in.) | 70 (2.76) | 213 (8.39) |
| d ₁ | mm (in.) | 102 (4.02) | 261 (10.28) |
| h | mm (in.) | 50 (1.97) | 50 (1.97) |

Ordering Information

| | | | |
|-----------------|----------|---------------|---------------|
| Stainless steel | | | |
| 1.4301 | Part No. | 887 89 | — |
| 1.4305 | Part No. | — | 887 93 |

Pipe Bend (Stainless Steel 1.4301); from DN 160 ISO-K Mitred Elbow



Dimensional drawing for the pipe bends (left) and the mitred elbows (right)

Technical Data

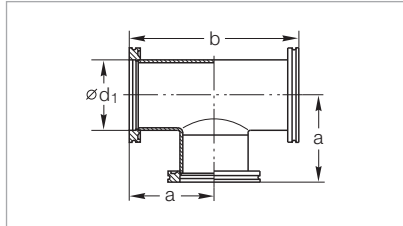
| | | | | | |
|----------------|----------|------------|------------|-------------|-------------|
| DN | ISO-K | 63 | 100 | 160 | 250 |
| a | mm (in.) | 88 (3.46) | 108 (4.25) | 138 (5.43) | 208 (8.19) |
| d ₁ | mm (in.) | 70 (2.76) | 102 (4.02) | 153 (6.02) | 261 (10.28) |
| Weight | kg (lbs) | 1.1 (2.43) | 2.2 (4.8) | 5.9 (13.02) | 9.9 (21.85) |
| Conductance | l/s | 208 | 470 | 1200 | 3700 |

Ordering Information

| | | | | | |
|-----------------|----------|---------------|---------------|---------------|---------------|
| Stainless steel | Part No. | 887 25 | 887 26 | 887 27 | 887 28 |
|-----------------|----------|---------------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Tees (Stainless Steel 1.4301)



Dimensional drawing for the tees

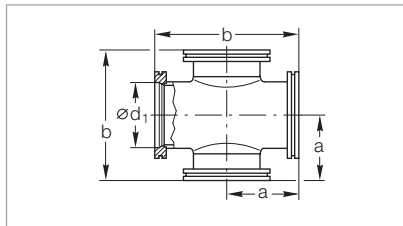
Technical Data

| DN | ISO-K | 63 | 100 | 160 | 250 |
|----------------|----------|------------|------------|-------------|-------------|
| a | mm (in.) | 88 (3.46) | 108 (4.25) | 138 (5.43) | 208 (8.19) |
| b | mm (in.) | 176 (6.93) | 216 (8.50) | 276 (10.87) | 416 (16.38) |
| d ₁ | mm (in.) | 70 (2.76) | 102 (4.02) | 153 (6.02) | 261 (10.28) |
| Weight | kg (lbs) | 1.6 (3.53) | 3.2 (7.06) | 7.6 (16.78) | 8.1 (17.88) |

Ordering Information

| Stainless steel | Part No. | 887 35 | 887 36 | 887 37 | 887 38 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

4-Way Crosses (Stainless Steel 1.4301)



Dimensional drawing for the 4-way crosses

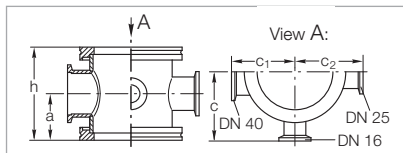
Technical Data

| DN | ISO-K | 63 | 100 | 160 | 250 |
|----------------|----------|------------|------------|-------------|-------------|
| a | mm (in.) | 88 (3.46) | 108 (4.25) | 138 (5.43) | 208 (8.19) |
| b | mm (in.) | 176 (6.93) | 216 (8.50) | 276 (10.87) | 416 (16.38) |
| d ₁ | mm (in.) | 70 (2.76) | 102 (4.02) | 153 (6.02) | 261 (10.28) |

Ordering Information

| Stainless steel | Part No. | 887 45 | 887 46 | 887 47 | 887 48 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

Branching Pieces with lateral DN 16/25/40 ISO-KF Flanges (Stainless Steel 1.4301)



Dimensional drawing for the branching pieces with lateral DN 16/25/40 flanges

Can not be used with collar flanges ISO-F and DIN EN 1092-1

Technical Data

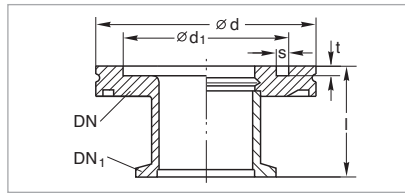
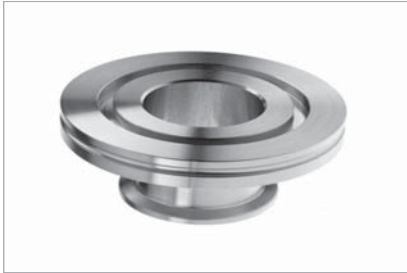
| DN | ISO-K | 63 | 100 | 160 |
|----------------|----------|-----------|------------|------------|
| a | mm (in.) | 44 (1.73) | 50 (1.97) | 50 (1.97) |
| h | mm (in.) | 88 (3.46) | 100 (3.94) | 100 (3.94) |
| c | mm (in.) | 66 (2.60) | 82 (3.23) | 107 (4.21) |
| c ₁ | mm (in.) | 59 (2.32) | 77 (3.03) | 105 (4.13) |
| c ₂ | mm (in.) | 64 (2.52) | 80 (3.15) | 107 (4.21) |

Ordering Information

| Stainless steel | Part No. | 886 71 | 886 72 | 886 73 |
|-----------------|----------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Adaptors-Reducers ISO-K – ISO-KF



Dimensional drawing for the adaptors-reducer
ISO-K – ISO-KF;
left: aluminium; right: stainless steel

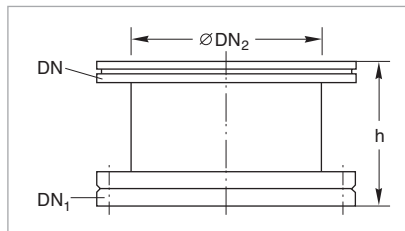
Technical Data

| | | | | |
|-----------------|----------|------------|------------|------------|
| DN | ISO-K | 63 | 63 | 100 |
| DN ₁ | ISO-KF | 40 | 50 | 40 |
| d | mm (in.) | 95 (3.74) | 95 (3.74) | 130 (5.12) |
| d ₁ | mm (in.) | 70 (2.76) | 70 (2.76) | 102 (4.02) |
| l | mm (in.) | 40 (1.57) | 45 (1.77) | 40 (1.57) |
| s | mm (in.) | 5 (0.2) | 5 (0.2) | 5 (0.2) |
| t | mm (in.) | 4.5 (0.16) | 4.5 (0.16) | 4.5 (0.16) |
| Weight | kg (lbs) | 0.5 (1.1) | 0.6 (1.32) | 0.8 (1.77) |

Ordering Information

| | | | | |
|------------------------|----------|---------------|---------------|---------------|
| Stainless steel 1.4305 | Part No. | 887 40 | 887 41 | 887 42 |
| Aluminium 3.2315.71 | Part No. | 269 40 | 269 41 | – |

Adaptors ISO-K – CF



Dimensional drawing for the adaptors ISO-K – CF

Technical Data

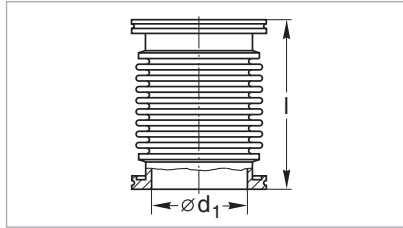
| | | | | |
|-----------------|----------|-----------|------------|------------|
| DN | ISO-K | 63 | 100 | 160 |
| DN ₁ | CF | 63 | 100 | 160 |
| o. D. | in. | 4 1/2 | 6 | 8 |
| DN ₂ | mm (in.) | 66 (2.60) | 104 (4.09) | 153 (6.02) |
| h | mm (in.) | 90 (3.54) | 90 (3.54) | 90 (3.54) |

Ordering Information

| | | | | |
|----------------------------|----------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 837 01 | 837 02 | 837 03 |
|----------------------------|----------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Bellows (Stainless Steel 1.4571) with Flanges (Stainless Steel 1.4301)



Dimensional drawing for the bellows

Technical Data

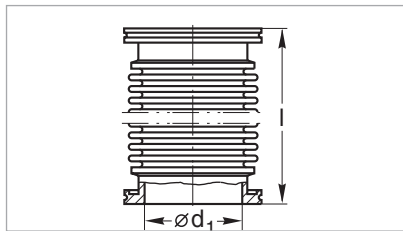
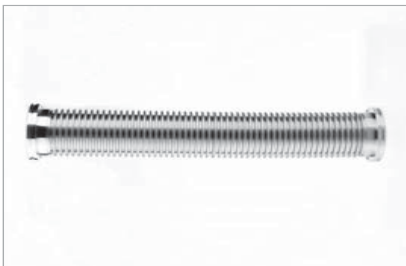
| DN | ISO-K | 63 | 100 | 160 | 250 |
|----------------------|-----------------------|----------------|----------------|----------------|----------------|
| d_1 | mm (in.) | 70 (2.76) | 102 (4.02) | 153 (6.02) | 261 (10.78) |
| l | mm (in.) | 132 (5.20) | 132 (5.20) | 150 (5.91) | 200 (7.87) |
| Weight | kg (lbs) | 1.0 (2.21) | 3.9 (8.61) | 6.2 (13.69) | 9.3 (20.53) |
| Compression | mm (in.) | 20 (0.79) | 28 (1.10) | 22 (0.87) | 30 (1.18) |
| Tension | mm (in.) | 20 (0.79) | 28 (1.10) | 22 (0.87) | 30 (1.18) |
| Max. bending angle | degrees ¹⁾ | $\pm 30^\circ$ | $\pm 30^\circ$ | $\pm 14^\circ$ | $\pm 13^\circ$ |
| Lateral displacement | mm (in.) | 7.5 (0.28) | 9.0 (0.35) | 3.5 (0.14) | 4.5 (0.18) |

Ordering Information

| Stainless steel | Part No. | 887 70 | 887 71 | 887 72 | 887 68 |
|-----------------|----------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|

¹⁾ When utilizing the maximum bend, no extension along the axial axis will be possible!

Flexible Vacuum Hoses (Stainless Steel 1.4571) with Flanges (Stainless Steel 1.4301)



Dimensional drawing for the flexible vacuum hoses

Technical Data

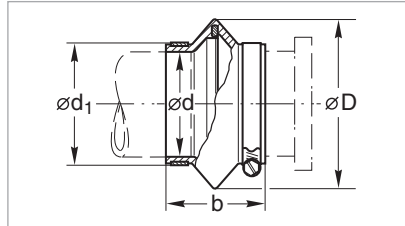
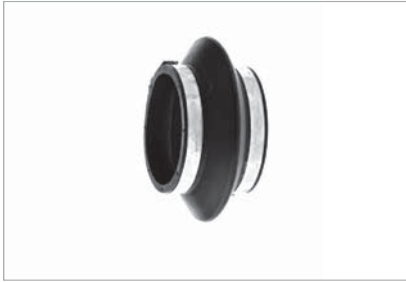
| DN | ISO-K | 63 | 63 | 63 | 63 | 100 | 100 | 100 | 100 |
|--|-----------|-------------|--------------|--------------|---------------|--------------|--------------|--------------|---------------|
| d_1 | mm in. | 70 2.76 | 70 2.76 | 70 2.76 | 70 2.76 | 102 2.76 | 102 4.02 | 102 4.02 | 102 4.02 |
| l | mm in. | 250 9.84 | 500 19.69 | 750 29.53 | 1000 39.37 | 250 9.84 | 500 19.69 | 750 29.53 | 1000 39.37 |
| Max. bending radius with multiple bending | mm in. | 250 9.84 | 250 9.84 | 250 9.84 | 250 9.84 | 370 14.57 | 370 14.57 | 370 14.57 | 370 14.57 |
| with single bend | mm in. | 160 8.30 | 160 8.30 | 160 8.30 | 160 8.30 | 240 9.45 | 240 9.45 | 240 9.45 | 240 9.45 |

Ordering Information

| Stainless steel | Part No. | 868 37 | 867 97 | 868 34 | 868 07 | 868 38 | 867 98 | 868 35 | 868 08 |
|-----------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|
|-----------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Flexible Compensation Elements (CR)



Dimensional drawing for the flexible compensation elements

Technical Data

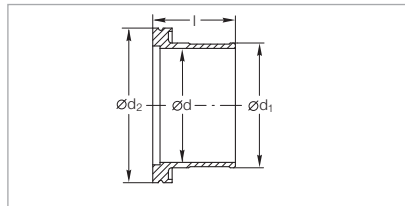
| DN | ISO-K | 63 | 100 | 160 |
|-------|----------|------------|------------|------------|
| D | mm (in.) | 120 (4.72) | 150 (5.91) | 200 (7.87) |
| d | mm (in.) | 75 (2.95) | 106 (4.17) | 155 (6.10) |
| d_1 | mm (in.) | 85 (3.35) | 116 (4.57) | 165 (6.50) |
| b | mm (in.) | 70 (2.76) | 72 (2.83) | 72 (2.83) |

Ordering Information

| CR | Part No. | 272 23 ¹⁾ | 272 24 ¹⁾ | 272 25 ¹⁾ |
|----|----------|----------------------|----------------------|----------------------|
|----|----------|----------------------|----------------------|----------------------|

¹⁾ Is supplied complete with stainless steel hose clamps

Connections for Flexible Compensation Elements (Aluminium 3.2315.71)



Dimensional drawing for the connections for flexible compensation elements

Technical Data

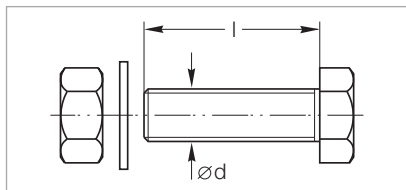
| DN | ISO-K | 63 | 100 | 160 |
|-------|----------|-----------|------------|------------|
| d | mm (in.) | 70 (2.76) | 102 (4.02) | 150 (5.91) |
| d_1 | mm (in.) | 76 (2.99) | 107 (4.21) | 156 (6.14) |
| d_2 | mm (in.) | 95 (3.74) | 130 (5.12) | 180 (7.09) |
| l | mm (in.) | 51 (2.01) | 56 (2.20) | 56 (2.20) |

Ordering Information

| Aluminium | Part No. | 272 35 | 272 36 | 272 37 |
|-----------|----------|--------|--------|--------|
|-----------|----------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Bolts for Clamp Flange Fittings (Steel 8.8, zinc coated)



Dimensional drawing for the bolts
for clamp flange fittings

Technical Data

| DN | ISO-K | 63 - 100 | 160 - 250 | 320 - 500 | 630 |
|------------------|----------|-----------|-----------|-----------|-----------|
| Dimensions | | | | | |
| d | thread | M 8 | M 10 | M 12 | M 12 |
| l | mm (in.) | 40 (1.57) | 50 (1.97) | 70 (2.76) | 80 (3.15) |
| Quantity per set | | | | | |
| Bolts | | 8 | 12 | 16 | 20 |
| Nuts | | 8 | 12 | 16 | 20 |
| Washers | | 8 | 12 | 16 | 20 |

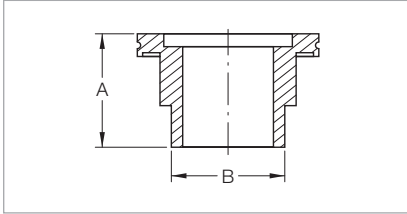
Ordering Information

| Set | Part No. | 887 81 | 887 82 | 887 83 | 887 84 |
|-----|----------|--------|--------|--------|--------|
|-----|----------|--------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ISO-K to NPT Adaptor



Dimensional drawing for the ISO-K / NPT adaptor

Technical Data

| | | |
|-----|----------|-------------------|
| DN | | 63 ISO-K / 2" NPT |
| A | mm (in.) | 60.0 (2.36) |
| Ø B | mm (in.) | 51.0 (2" NPT) |

Ordering Information

| | | |
|-----------------|----------|-----------------|
| Stainless steel | Part No. | 72103040 |
|-----------------|----------|-----------------|

ISO-F and DIN EN 1092-1 Fixed Flange Fittings, ND 6

Note: ND 6 states a dimension and not refer to an operating pressure of 6 bar!

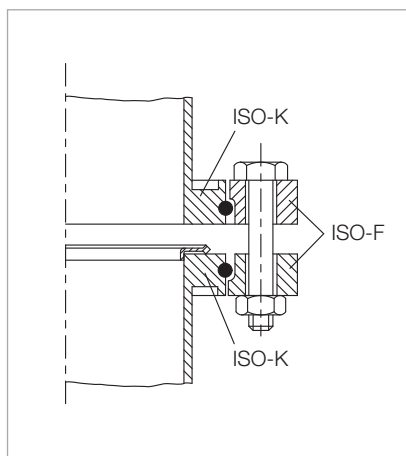


Mating clamp flanges with tubulation
using collar rings and sealing disk

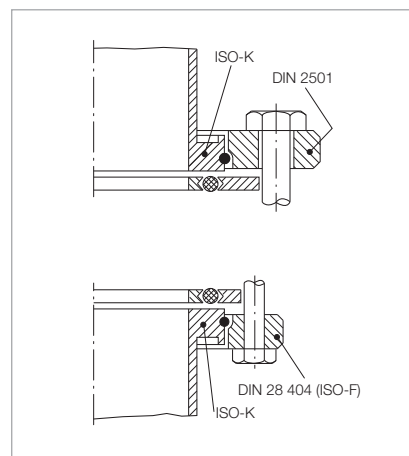
In addition to clamp flange connections, fixed welded flanges (ISO-F or to DIN EN 1092-1) are used in the area of vacuum engineering to interconnect valves, pumps and other components.

Advantages to the User

- A high vacuum seal is maintained also at large nominal width and high mechanical loads
- Evenly distributed sealing force through a large number of bolts
- Can be easily adapted to other flange systems
- Vacuum sealing disks consist of a CR O-ring seal with inner and outer aluminium ring
- Fixed flanges and collar flanges may also be constructed as all-metal seals by using ultra sealing disks



Mating clamp flanges using bolted collar rings and ultra sealing disk



Comparison: Clamp flange with collar flange to DIN EN 1092-1 and clamp flange with collar flange to DIN 28 404; ISO-F

Collar Flange

Steel

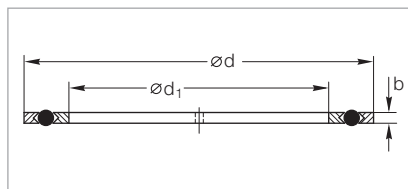
Stainless Steel

| | | |
|----------------|----------------------|--------|
| Bolts and nuts | Galvanized 8.8 steel | 1.4401 |
| Retaining ring | Steel | 1.4310 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

ISO-F Fixed Flange Fittings

Vacuum Sealing Disks for ISO-F Flanges (Aluminium/CR)



Dimensional drawing for vacuum sealing disks

Technical Data

| DN | ISO-F | 63 | 100 | 160 | 250 | 320 |
|----------------|----------|-----------|------------|------------|-------------|-------------|
| d | mm (in.) | 98 (3.86) | 132 (5.20) | 185 (7.28) | 295 (11.61) | 375 (14.76) |
| d ₁ | mm (in.) | 73 (2.87) | 107 (4.21) | 160 (6.30) | 270 (10.63) | 330 (12.99) |
| b | mm (in.) | 4 (0.16) | 4 (0.16) | 4 (0.16) | 4 (0.16) | 6 (0.24) |

Ordering Information

| Aluminum/CR | Part No. | 171 09 | 171 10 | 171 11 | 171 12 | 171 19 |
|-------------|----------|--------|--------|--------|--------|--------|
|-------------|----------|--------|--------|--------|--------|--------|

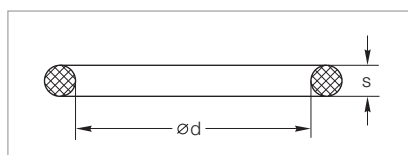
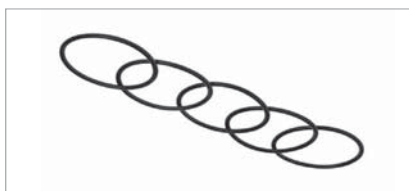
Technical Data

| DN | ISO-F | 400 | 500 | 630 | 800 | 1000 |
|----------------|----------|-------------|-------------|-------------|-------------|--------------|
| d | mm (in.) | 460 (18.11) | 560 (22.05) | 701 (27.60) | 870 (34.25) | 1070 (42.13) |
| d ₁ | mm (in.) | 415 (16.34) | 515 (20.28) | 656 (25.83) | 825 (32.48) | 1025 (40.35) |
| b | mm (in.) | 6 (0.24) | 6 (0.24) | 6 (0.24) | 6 (0.24) | 6 (0.24) |

Ordering Information

| Al/CR | Part No. | 171 14 | 171 15 | 171 16 | 171 17 | 171 18 |
|-------|----------|--------|--------|--------|--------|--------|
|-------|----------|--------|--------|--------|--------|--------|

Spare O-Ring Gaskets for ISO-F Flange Connection



Dimensional drawing for O-rings

Technical Data

| DN | ISO-F | 63 | 100 | 160 | 250 | 320 |
|------------------|----------|-----------|------------|------------|-------------|-------------|
| d | mm (in.) | 80 (3.15) | 110 (4.33) | 165 (6.50) | 265 (10.43) | 325 (12.75) |
| s | mm (in.) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 5 (0.20) | 8 (0.31) |
| Quantity per set | | 5 | 5 | 5 | 5 | 1 |

Ordering Information

| CR | Part No. | ES210701 | ES210711 | ES210716 | ES210721 | E210726 |
|----|----------|----------|----------|----------|----------|---------|
|----|----------|----------|----------|----------|----------|---------|

Technical Data

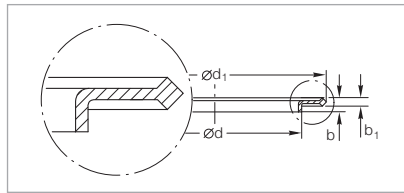
| DN | ISO-F | 400 | 630 | 800 | 1000 |
|------------------|----------|-------------|-------------|-------------|--------------|
| d | mm (in.) | 412 (16.22) | 640 (25.20) | 820 (32.28) | 1023 (40.28) |
| s | mm (in.) | 8 (0.31) | 8 (0.31) | 8 (0.31) | 8 (0.31) |
| Quantity per set | | 1 | 1 | 1 | 1 |

Ordering Information

| CR | Part No. | E210731 | E210741 | E210746 | E210751 |
|----|----------|---------|---------|---------|---------|
|----|----------|---------|---------|---------|---------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Ultra Sealing Disks (Aluminium 3.2315.71) for ISO-F Flanges



Dimensional drawing for O-rings

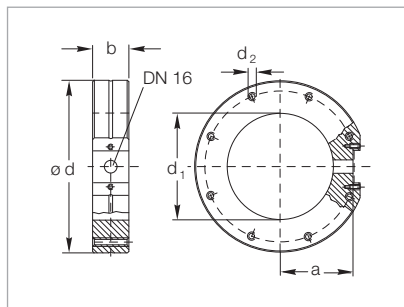
Technical Data

| DN | ISO-K / ISO-F | 63 | 100 | 160 | 250 |
|----------------|---------------|-------------|--------------|--------------|---------------|
| b | mm (in.) | 4.5 (0.18) | 4.5 (0.18) | 4.5 (0.18) | 4.5 (0.18) |
| b ₁ | mm (in.) | 2.6 (0.10) | 2.6 (0.10) | 2.6 (0.10) | 2.6 (0.10) |
| d | mm (in.) | 69.8 (2.75) | 101.8 (4.01) | 152.8 (6.02) | 260.8 (10.27) |
| d ₁ | mm (in.) | 85.6 (3.37) | 116.6 (4.59) | 166.6 (6.56) | 276.6 (10.89) |

Ordering Information

| | | | | | |
|-----------|----------|---------------|---------------|---------------|---------------|
| Aluminium | Part No. | 886 24 | 886 25 | 886 26 | 886 27 |
|-----------|----------|---------------|---------------|---------------|---------------|

Measurement Flanges



Dimensional drawing for the measurement flanges

Technical Data

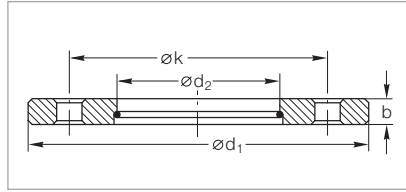
| DN | ISO-K | 63 | 100 | 160 |
|--------------------------|----------|-------------|-------------|--------------|
| a | mm (in.) | 52.3 (2.06) | 71.3 (2.81) | 102.3 (4.03) |
| b | mm (in.) | 30 (1.18) | 30 (1.18) | 30 (1.18) |
| d | mm (in.) | 130 (5.12) | 165 (6.50) | 225 (8.86) |
| d ₁ | mm (in.) | 70 (2.76) | 102 (4.02) | 153 (6.02) |
| d ₂ | thread | M 8 | M 8 | M 10 |
| Number of threaded holes | | 4 | 8 | 8 |

Ordering Information

| | | | | |
|---------------------------------|----------|---------------|---------------|---------------|
| Stainless steel 1.4301 | Part No. | 286 60 | 286 61 | 286 62 |
| Recommended centering ring (2x) | Part No. | 887 03 | 887 04 | 887 07 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

ISO-F Collar Flanges with Retaining Ring for use with Clamp Flange Fittings (Steel 1.0037)



Dimensional drawing for collar flanges with retaining ring

Technical Data

| DN | ISO-F | 63 | 100 | 160 | 200 | 250 |
|-----------------|----------|-------------|--------------|--------------|--------------|---------------|
| d_1 | mm (in.) | 130 (5.12) | 165 (6.50) | 225 (8.86) | 285 (11.22) | 335 (13.19) |
| d_2 | mm (in.) | 95.6 (3.76) | 130.6 (5.14) | 180.9 (7.12) | 240.9 (9.48) | 290.9 (11.45) |
| k | mm (in.) | 110 (4.93) | 145 (5.71) | 200 (7.87) | 260 (10.24) | 310 (12.20) |
| b | mm (in.) | 12 (0.47) | 12 (0.47) | 16 (0.63) | 16 (0.63) | 16 (0.63) |
| Number of holes | | 4 | 8 | 8 | 12 | 12 |

Ordering Information

| Nickel-plated steel | Part No. | 267 67 | 267 70 | 267 71 | 267 68 | 267 72 |
|---------------------|----------|--------|--------|--------|--------|--------|
|---------------------|----------|--------|--------|--------|--------|--------|

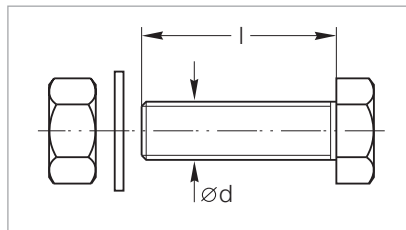
Technical Data

| DN | ISO-F | 320 | 400 | 500 | 630 |
|-----------------|----------|---------------|---------------|---------------|---------------|
| d_1 | mm (in.) | 425 (16.73) | 510 (20.08) | 610 (24.02) | 750 (29.53) |
| d_2 | mm (in.) | 370.8 (14.60) | 451.0 (17.76) | 551.0 (21.69) | 691.0 (27.20) |
| k | mm (in.) | 395 (15.51) | 480 (18.90) | 580 (22.83) | 720 (28.35) |
| b | mm (in.) | 20 (0.79) | 20 (0.79) | 20 (0.79) | 24 (0.95) |
| Number of holes | | 12 | 16 | 16 | 20 |

Ordering Information

| Nickel-plated steel | Part No. | 267 76 | 267 74 | 267 75 | 267 77 |
|---------------------|----------|--------|--------|--------|--------|
|---------------------|----------|--------|--------|--------|--------|

Bolts, Nuts and Washers for ISO-F Flange Connection (Steel 8.8, zinc coated)



Dimensional drawing for the bolts for ISO-F flange connections

Technical Data

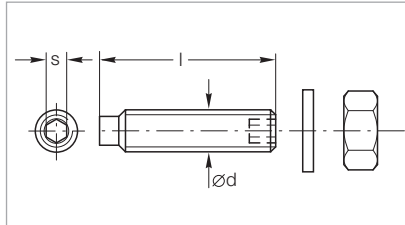
| DN | ISO-F | 63 - 100 | 160 - 250 | 320 - 500 | 630 |
|------------------|----------|-----------|-----------|-----------|-----------|
| Dimensions | | | | | |
| d | thread | M 8 | M 10 | M 12 | M 12 |
| l | mm (in.) | 40 (1.57) | 50 (1.97) | 70 (2.76) | 80 (3.15) |
| Quantity per set | | | | | |
| Bolts | | 8 | 12 | 16 | 20 |
| Nuts | | 8 | 12 | 16 | 20 |
| Washers | | 8 | 12 | 16 | 20 |

Ordering Information

| Set | Part No. | 887 81 | 887 82 | 887 83 | 887 84 |
|-----|----------|--------|--------|--------|--------|
|-----|----------|--------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Bolts, Nuts and Washers for Joints with VAT Gate Valves



Dimensional drawing for the set screws, nuts and washers

Technical Data

| DN | ISO-F | 63-100 | 160-250 |
|-------------------------|----------|-----------|-----------|
| Dimensions | | | |
| d | thread | M 8 | M 10 |
| l | mm (in.) | 45 (1.77) | 55 (2.17) |
| s | mm (in.) | 4 (0.16) | 6 (0.24) |
| Quantity per set | | | |
| Bolts | | 16 | 12 |
| Nuts | | 16 | 12 |
| Washers | | 16 | 12 |

Ordering Information

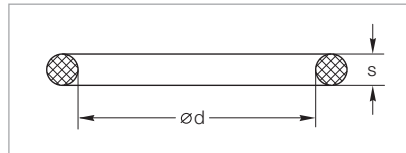
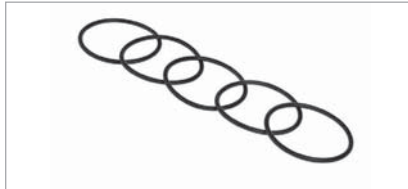
| Set | Part No. | 839 13 | 210 071 |
|-----|----------|--------|---------|
|-----|----------|--------|---------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

DIN EN 1092-1 Fixed Flange Fittings; Dimensions to DIN EN 1092-1, ND 6

Note: ND 6 states a dimension and does not refer to an operating pressure of 6 bar!

Spare O-Ring Gaskets for Vacuum Sealing Disks DIN EN 1092-1



Dimensional drawing for O-ring gaskets

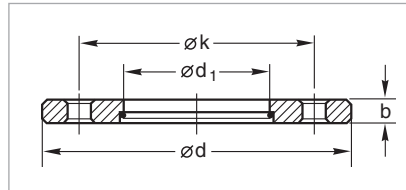
Technical Data

| DN | ISO-F | 63 | 100 | 160 |
|------------------|----------|-----------|------------|------------|
| d | mm (in.) | 80 (3.15) | 110 (4.23) | 165 (6.50) |
| s | mm (in.) | 5 (0.20) | 5 (0.20) | 5 (0.20) |
| Quantity per set | | 5 | 5 | 5 |

Ordering Information

| CR | Part No. | ES210701 | ES210711 | ES210716 |
|----|----------|----------|----------|----------|
|----|----------|----------|----------|----------|

Collar Flanges with Retaining Ring (Steel 1.0037)



Dimensional drawing for collar flanges with retaining ring

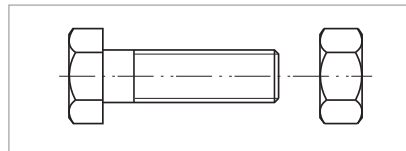
Technical Data

| DN | DIN | 63 | 100 | 160 |
|----------------|----------|-------------|--------------|--------------|
| d | mm (in.) | 160 (6.30) | 210 (8.27) | 265 (10.43) |
| d ₁ | mm (in.) | 95.6 (3.76) | 130.6 (5.14) | 180.9 (7.12) |
| k | mm (in.) | 130 (5.12) | 170 (6.69) | 225 (8.86) |
| b | mm (in.) | 12 (0.47) | 15 (0.59) | 15 (0.59) |

Ordering Information

| Steel | Part No. | 267 47 | 267 50 | 267 51 |
|-------|----------|--------|--------|--------|
|-------|----------|--------|--------|--------|

Bolts and Nuts for DIN Collar Flange



Dimensional drawing for bolts and nuts

Technical Data

| DN | DIN | 63 | 100 | 160 | 250 |
|-------------------------------|----------|-----------|-----------|-----------|-----------|
| Dimensions | | | | | |
| d | thread | M 12 | M 16 | M 16 | M 16 |
| l | mm (in.) | 40 (1.57) | 50 (1.97) | 50 (1.97) | 50 (1.97) |
| Number of bolts/nuts required | | 4 | 8 | 8 | 12 |

Ordering Information

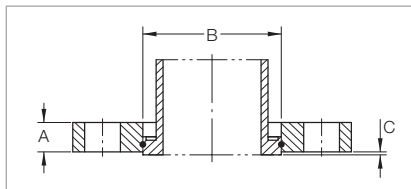
| | | | | | |
|-------------------------------|----------|------------|------------|------------|------------|
| 1 bolt (galvanized 8.8 steel) | Part No. | 201 02 381 | 201 02 434 | 201 02 434 | 201 02 434 |
| 1 nut (galvanized 8.8 steel) | Part No. | 211 01 115 | 211 01 117 | 211 01 117 | 211 01 117 |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

ANSI Fittings

Flanges, Rotatable Bolt Type



Dimensional drawing for the flanges,
rotatable type
(tube piece shown in phantom not included)

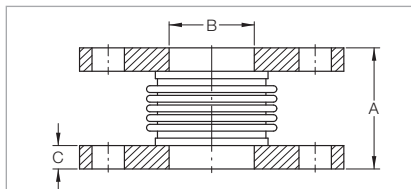
Technical Data

| DN | ISO-K to ANSI | 63 3" | 100 4" | 160 6" | 250 10" |
|-----|------------------|-------------|--------------|--------------|---------------|
| A | mm (in.) | 13.0 (0.50) | 13.0 (0.50) | 16.0 (0.63) | 22.0 (0.88) |
| Ø B | mm (in.) | 95.5 (3.76) | 131.0 (5.14) | 181.0 (7.12) | 291.0 (11.45) |
| C | mm (in.) | 1 (0.039) | 1 (0.039) | 1 (0.039) | 1 (0.039) |

Ordering Information

| | | | | | |
|--------------------------------------|----------|-------------------|-------------------|-------------------|------------------|
| Stainless steel | Part No. | 982780700 | 982780701 | 982780702 | 982780703 |
| Spare retaining ring (Set of 10 pcs) | Part No. | ES23102401 | ES23102402 | ES23102412 | - |

Bellows



Dimensional drawing for the bellows

Combined axial/lateral deflection cannot
exceed 100%.

Example: 75% axial rating - 25% lateral
rating

Technical Data

| DN | ANSI | 3" | 4" | 6" |
|-----------------------------|----------|---------------------------------|---------------------------------|---------------------------------|
| A | mm (in.) | 120.0 (4.72) | 120.0 (4.72) | 200.0 (7.87) |
| Ø B | mm (in.) | 78.0 (3.07) | 102.0 (4.03) | 154.0 (6.07) |
| C | mm (in.) | 12.7 (0.50) | 12.7 (0.50) | 12.7 (0.50) |
| Rated deflection in axial | mm (in.) | 15.0 (0.58) | 18.0 (0.70) | 29.5 (1.16) |
| Rated deflection in lateral | mm (in.) | 5.0 (0.19) | 6.0 (0.22) | 8.0 (0.31) |
| Spring rate | lbf/in. | 263.0 | 340.0 | 260.0 |
| Compression / tension | mm (in.) | 11.68 / 3.56 (0.460 / 0.140) | 14.22 / 3.56 (0.560 / 0.140) | 22.86 / 6.60 (0.900 / 0.260) |

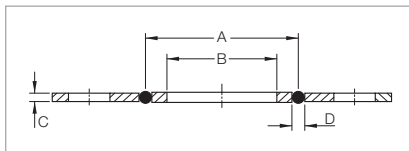
Ordering Information

| | | | | |
|--|----------|------------------|------------------|------------------|
| Stainless steel bellows with carbon steel flanges | Part No. | 991051013 | 991051014 | 991051016 |
|--|----------|------------------|------------------|------------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Only available for purchase in North and South America

Sealing Disk Assembly



Dimensional drawing for the sealing disk assembly

Technical Data

| DN | ANSI | 3" | 4" | 6" |
|-----|----------|-------------|--------------|--------------|
| ∅ A | mm (in.) | 91.0 (3.60) | 121.0 (4.75) | 171.0 (6.72) |
| ∅ B | mm (in.) | 78.0 (3.07) | 102.0 (4.03) | 154.0 (6.07) |
| C | mm (in.) | 3.2 (0.13) | 3.2 (0.13) | 3.2 (0.13) |
| ∅ D | mm (in.) | 4.0 (0.16) | 4.0 (0.16) | 4.0 (0.16) |

Ordering Information

| | | | | |
|-----------------|----------|------------------|------------------|------------------|
| Aluminium | Part No. | 910181605 | 910181606 | 910181607 |
| Stainless steel | Part No. | – | 910181617 | – |

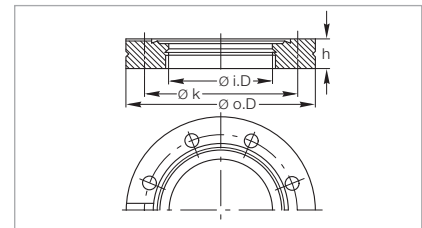
Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

CF Flange Fittings and Components

CF Flanges



The CF flange connection consists of two identical flanges with a flat gasket made of **OFHC copper**, bolts, nuts and washers.



Dimensional drawing for CF flanges

Sealing Principle

When assembling the CF flange connection, the flat copper gasket fits with a slight clearance into the outer recess of the flanges and thus assures good centering of the flange connection. If the flange bolts are properly tightened according to the instructions, the knife edge of the flanges penetrates into the flat copper gasket, whereby the shear action of the outer face of the cutting edge – as seen from the flange axis – produces a yield pressure on the copper gasket, while the inner face of the edge produces a cutting action.

During this process the copper gasket adapts it-self optimally to the micro-structure of the outer knife edge. This explains the high sealing effect and the especially low leak rates of CF flange connections. A radial groove extending right up to the sealing ring is provided for leak testing of the flange connection. In order to ensure that the sealing knife edge is not damaged during frequent use of the flanges, the conventional geometry of such knife edges for CF flanges has been developed further. By using the Oerlikon Leybold Vacuum developed obtuse angled knife edge

profile the strength of the sealing knife edges has been significantly stabilized. In addition to the actual knife edge, the flanges are provided with a concentric sealing surface for placement of a FPM (FKM) gasket or a supporting ring with FPM O-ring, which may be baked up to 150 °C (302 °F) (does not apply to observation windows).

This design has the advantage, that it is possible to equip the apparatus with elastomer gaskets prior to final assembly, so that the system can be tested under normal high vacuum conditions.

Technical Data

| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 | 250 |
|------------------------|-------------|----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|
| Outside diameter o. D. | mm (in.) | 34.0 (1.33) | 69.5 (2.75) | 113.5 (4.50) | 152.0 (6.00) | 202.5 (8.00) | 253.0 (10.00) | 305.0 (12.00) |
| Inside diameter i. D. | mm (in.) | 16.0 (0.63) | 36.8 (1.375) | 66.0 (2.50) | 104.0 (4.00) | 155.0 (6.00) | 200.0 (8.00) | 250.0 (10.00) |
| Bolt circle diameter k | mm (in.) | 27.0 (1.06) | 58.7 (2.31) | 92.2 (3.63) | 130.3 (5.13) | 181.0 (7.13) | 231.8 (9.13) | 284.0 (11.18) |
| High h | mm (in.) | 7.5 (0.30) | 13.0 (0.51) | 17.5 (0.69) | 20.0 (0.79) | 22.0 (0.87) | 24.5 (0.97) | 24.5 (0.97) |
| Number of holes | | 6 | 6 | 8 | 16 | 20 | 24 | 32 |
| Hole diameter | mm (in.) | 4.3 (0.17) | 6.6 (0.26) | 8.4 (0.33) | 8.4 (0.33) | 8.4 (0.33) | 8.4 (0.33) | 8.4 (0.33) |

Conversion Factors

- Magnetizing field H, unit:
Previously used unit: Oersted (Oe) $A \times m^{-1}$
 $1 \text{ Oe} = 79.577 (A \times m^{-1})$
- Strength of the magnetic field B, unit:
Previously used unit: Gauß (G) $Vs \times m^{-2} = \text{Tesla (T)}$
 $1 \text{ G} = 10^{-4} Vs \times m^{-2} = 10^{-4} \text{ T}$

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

CF Components



CF components are manufactured according to the requirements outlined in the introductory chapter. They are made from selected and corrosion resistant types of stainless steel. Both design and production methods are such, that the components meet the requirements of UHV applications. All components are fusion welded from the inside to prevent fissures and pocket holes (virtual leaks which cannot be located by leak detection methods from the outside). If welding from the outside cannot be avoided due to design constraints, the welding seam penetrates to the inner side, the side of the vacuum.

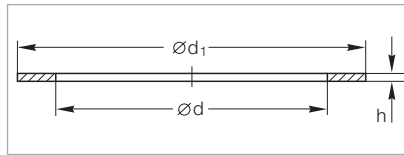
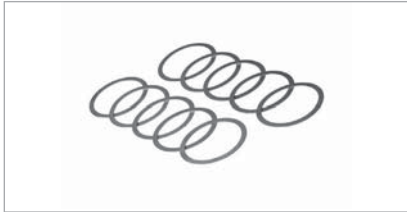
A carefully implemented cleaning process and suitable packaging for the components are essential prerequisites for obtaining pressures in the UHV range within reasonably short pump down times after assembly (providing the remainder of the apparatus is clean too).

For applications in the extreme UHV range (XHV) the outgassing rate of the CF flanges and the UHV components can be reduced by about two orders of magnitude by a special degassing process.

Advantages to the User

- Low degassing rates
- High degassing temperature
- Leak rates below $1 \times 10^{-11} \text{ mbar} \times \text{l} \times \text{s}^{-1}$
- Basic dimensions correspond to those of the components from other international manufacturers
- Bolts may be inserted from the side of the body

Copper Gaskets for CF Flanges (OFHC Copper – Oxygen-Free)



Dimensional drawing for the copper gaskets for CF flanges

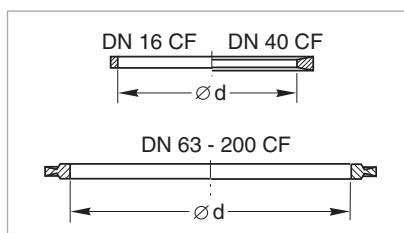
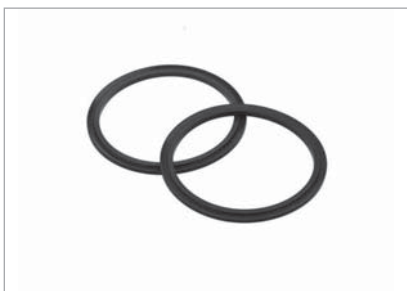
Technical Data

| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 | 250 |
|------------------|----------|-------------|-------------|-------------|--------------|--------------|--------------|---------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 | 10.00 | 12.00 |
| d | mm (in.) | 16.2 (0.64) | 39.0 (1.54) | 63.6 (2.50) | 101.8 (4.01) | 152.6 (6.01) | 203.4 (8.01) | 254.0 (10.00) |
| d ₁ | mm (in.) | 21.3 (0.84) | 48.1 (1.89) | 82.4 (3.24) | 120.5 (4.74) | 171.3 (6.74) | 222.1 (8.74) | 272.7 (10.74) |
| Set of 5 | | – | – | – | – | – | – | x |
| Set of 10 | | x | x | x | x | x | x | – |

Ordering Information

| | | | | | | | | |
|-------------------|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Quality: Standard | Part No. | ES83941 | ES83943 | ES83944 | ES83945 | ES83946 | ES83947 | ES83948 |
|-------------------|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|

FPM (FKM) Profiled Gasket without Support Ring



Dimensional drawing for the profiled gaskets without support ring

Technical Data

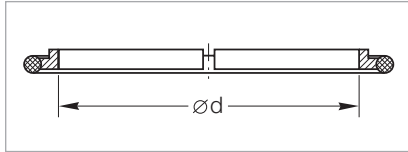
| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 |
|---------------------|----------|-------------|-------------|-------------|--------------|--------------|--------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 | 10.00 |
| d | mm (in.) | 16.0 (0.63) | 42.0 (1.65) | 69.7 (2.74) | 107.8 (4.24) | 156.0 (6.14) | 206.0 (8.11) |
| Bakeout temperature | °C (°F) | 160 (320) | 160 (320) | 160 (320) | 160 (320) | 160 (320) | 160 (320) |
| Set of 2 | | – | – | x | x | x | x |
| Set of 5 | | x | x | – | – | – | – |

Ordering Information

| | | | | | | |
|----------|----------------|----------------|----------------|----------------|----------------|----------------|
| Part No. | ES83921 | ES83923 | ES83934 | ES83935 | ES83936 | ES83937 |
|----------|----------------|----------------|----------------|----------------|----------------|----------------|

Important: In the table of Chapter “General” the German designation for the type of steel is also stated in accordance with AISI.

FPM (FKM) O-ring with Support Ring



Dimensional drawing for the FPM (FKM) O-rings with support ring

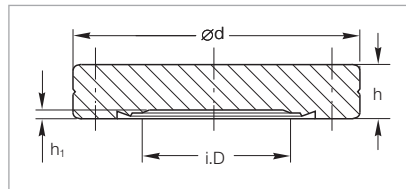
Technical Data

| | | |
|---------------------|----------|--------------|
| DN | CF | 250 |
| Outside diameter | in. | 12 |
| d | mm (in.) | 248.3 (9.78) |
| Bakeout temperature | °C (°F) | 160 (320) |

Ordering Information

| | | |
|------------------------------|----------|---------------|
| FPM O-ring with support ring | Part No. | 839 03 |
|------------------------------|----------|---------------|

CF Blank Flanges, Fixed



Dimensional drawing for the CF blank flanges, fixed

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

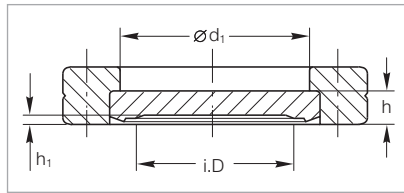
| | | | | | | | | |
|------------------|----------|-------------|-------------|--------------|--------------|--------------|--------------|---------------|
| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 | 250 |
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 | 10.00 | 12.00 |
| Inside diameter | mm (in.) | 14.0 (0.55) | 38.0 (1.50) | 66.0 (2.60) | 104.0 (4.09) | 155.0 (6.10) | 205.0 (8.07) | 256.0 (10.08) |
| d | mm (in.) | 34.0 (1.34) | 69.5 (2.74) | 113.5 (4.47) | 152.0 (5.98) | 202.5 (7.97) | 253.0 (9.96) | 305.0 (12.01) |
| h | mm (in.) | 7.5 (0.30) | 13.0 (0.51) | 17.5 (0.69) | 20.0 (0.79) | 22.0 (0.87) | 24.5 (0.97) | 24.5 (0.97) |
| h ₁ | mm (in.) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) |

Ordering Information

| | | | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 835 01 | 835 03 | 835 04 | 835 05 | 835 06 | 835 07 | 835 09 |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

CF Blank Flanges, Rotatable



Dimensional drawing for the CF blank flanges, rotatable

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

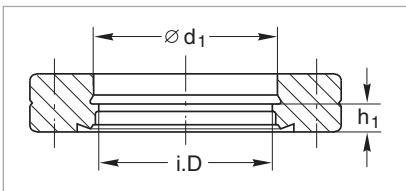
Technical Data

| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 | 250 |
|------------------|-------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 | 10.00 | 12.00 |
| Inside diameter | mm (in.) | 14.0 (0.55) | 38.0 (1.50) | 66.0 (2.6) | 104.0 (4.09) | 155.0 (6.10) | 205.0 (8.07) | 256.0 (10.08) |
| d_1 | mm (in.) | 18.6 (0.73) | 41.0 (1.61) | 71.0 (2.80) | 109.0 (4.29) | 160.0 (6.30) | 206.0 (8.11) | 257.0 (10.12) |
| h | mm (in.) | 5.8 (0.23) | 7.6 (0.30) | 12.6 (0.50) | 14.3 (0.56) | 15.8 (0.62) | 17.1 (0.67) | 18.0 (0.71) |
| h_1 | mm (in.) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) | 1.4 (0.06) |

Ordering Information

| | | | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 835 21 | 835 23 | 835 24 | 835 25 | 835 26 | 835 27 | 835 29 |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|

CF Bore Flanges, Fixed



Dimensional drawing for the CF bore flanges, fixed

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

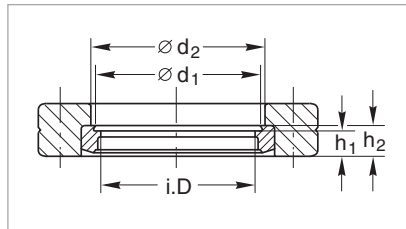
| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 | 250 |
|------------------|-------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 | 10.00 | 12.00 |
| Inside diameter | mm (in.) | 16.0 (0.63) | 36.8 (1.45) | 66.0 (2.60) | 104.0 (4.09) | 155.0 (6.10) | 200.0 (7.87) | 250.0 (9.84) |
| d_1 | mm (in.) | 18.3 (0.72) | 40.3 (1.59) | 70.3 (2.77) | 108.5 (4.27) | 159.5 (6.28) | 205.5 (8.09) | 256.5 (10.10) |
| h_1 | mm (in.) | 4.2 (0.17) | 5.5 (0.22) | 9.5 (0.37) | 11.0 (0.43) | 12.0 (0.47) | 12.5 (0.49) | 12.5 (0.49) |

Ordering Information

| | | | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 835 41 | 835 37 | 835 38 | 835 39 | 835 40 | 835 47 | 835 49 |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

CF Bore Flanges, Rotatable



Dimensional drawing for the CF bore flanges, rotatable

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

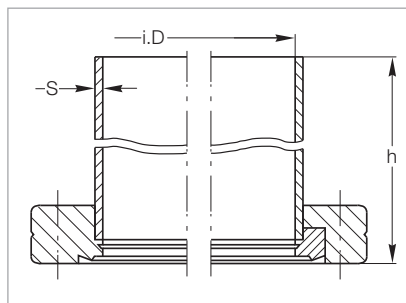
Technical Data

| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 | 250 |
|------------------|----------|-------------|-------------|-------------|--------------|--------------|--------------|---------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 | 10.00 | 12.00 |
| Inside diameter | mm (in.) | 16.0 (0.63) | 36.8 (1.45) | 66.0 (2.60) | 104.0 (4.09) | 155.0 (6.10) | 200.0 (7.87) | 250.0 (9.84) |
| d_1 | mm (in.) | 18.3 (0.72) | 40.3 (1.59) | 70.3 (2.77) | 108.5 (4.27) | 159.5 (6.28) | 205.5 (8.09) | 256.5 (10.10) |
| d_2 | mm (in.) | 18.6 (0.73) | 41.0 (1.61) | 71.0 (2.80) | 109.0 (4.29) | 160.0 (6.30) | 206.0 (8.11) | 257.0 (10.12) |
| h_1 | mm (in.) | 4.2 (0.17) | 5.5 (0.22) | 9.5 (0.37) | 11.0 (0.43) | 12.0 (0.47) | 12.5 (0.49) | 12.5 (0.49) |
| h_2 | mm (in.) | 5.8 (0.23) | 7.6 (0.30) | 12.6 (0.50) | 14.3 (0.56) | 15.8 (0.62) | 17.1 (0.67) | 18.0 (0.71) |

Ordering Information

| | | | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 835 61 | 835 58 | 835 59 | 835 60 | 835 69 | 835 67 | 835 78 |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|

CF Flanges with Tube End



Dimensional drawing for the CF flanges with tube end; left fixed, right rotatable

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

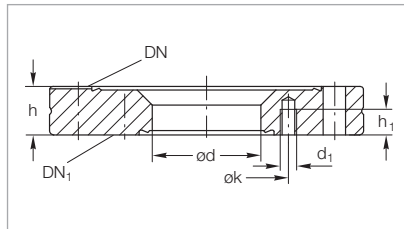
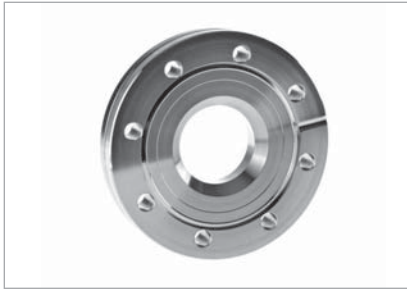
| DN | CF | 16 | 40 | 63 | 100 | 160 |
|------------------|----------|-------------|-------------|--------------|--------------|--------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 |
| Inside diameter | mm (in.) | 16.0 (0.63) | 36.8 (1.45) | 66.0 (2.60) | 104.0 (4.09) | 155.0 (6.10) |
| s | mm (in.) | 1.0 (0.04) | 1.6 (0.06) | 2.0 (0.08) | 2.0 (0.08) | 2.0 (0.08) |
| h | mm (in.) | 38.0 (1.50) | 63.0 (2.48) | 105.0 (4.13) | 135.0 (5.32) | 167.0 (6.58) |

Ordering Information

| | | | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|--|--|
| Stainless steel DIN 1.4301 | | | | | | | | |
| Tube end | | | | | | | | |
| fixed | Part No. | 835 51 | 835 31 | 835 32 | 835 33 | 835 34 | | |
| rotatable | Part No. | 835 71 | 835 82 | 835 74 | 835 75 | 835 76 | | |

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

CF Reducing Flanges



Dimensional drawing for the CF reducing flanges, fixed

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

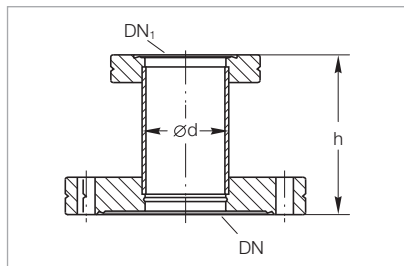
Technical Data

| DN | CF | 40 | 63 | 100 | 100 | 160 | 160 |
|------------------|----------|-------------|-------------|-------------|-------------|-------------|--------------|
| Outside diameter | in. | 2.75 | 4.50 | 6.00 | 6.00 | 8.00 | 8.00 |
| DN ₁ | CF | 16 | 40 | 40 | 63 | 40 | 100 |
| k | mm (in.) | 27.0 (1.06) | 58.7 (2.31) | 58.7 (2.31) | 92.2 (3.63) | 58.7 (2.31) | 130.0 (5.12) |
| h | mm (in.) | 13.0 (0.51) | 17.5 (0.69) | 20.0 (0.79) | 20.0 (0.79) | 22.0 (0.87) | 22.0 (0.87) |
| h ₁ | mm (in.) | 5.5 (0.22) | 9.0 (0.35) | 9.0 (0.35) | 11.0 (0.43) | 9.0 (0.35) | 11.0 (0.43) |
| d | mm (in.) | 16.0 (0.63) | 39.0 (1.54) | 39.0 (1.54) | 66.0 (2.60) | 39.0 (1.54) | 104.0 (4.09) |
| d ₁ | mm (in.) | M 4 (M 4) | M 6 (M 6) | M 6 (M 6) | M 8 (M 8) | M 6 (M 6) | M 8 (M 8) |

Ordering Information

| | | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 836 85 | 836 86 | 836 87 | 836 89 | 836 90 | 836 91 |
| Matching stud bolts | Part No. | 839 10 | 839 11 | 839 11 | 839 13 | 839 11 | 839 13 |

CF Reducing Pieces



Dimensional drawing for the CF reducing pieces

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

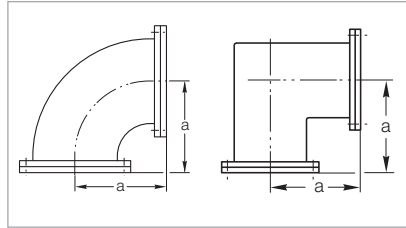
| DN | CF | 40 | 63 | 100 | 100 | 160 |
|------------------|----------|-------------|-------------|-------------|-------------|--------------|
| Outside diameter | in. | 2.75 | 4.50 | 6.00 | 6.00 | 8.00 |
| DN ₁ | CF | 16 | 40 | 40 | 63 | 100 |
| h | mm (in.) | 45.0 (1.77) | 75.0 (2.95) | 75.0 (2.95) | 95.0 (3.74) | 105.0 (4.13) |
| d (tube) | mm (in.) | 18.0 (0.71) | 40.0 (1.57) | 40.0 (1.57) | 70.0 (2.76) | 108.0 (4.25) |

Ordering Information

| | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 837 10 | 837 15 | 837 16 | 837 19 | 837 22 |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Pipe Bend 90°; from DN 160 CF Mitred Elbow



Dimensional drawing for the pipe bends 90° (left) and the mitred elbows (right)

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

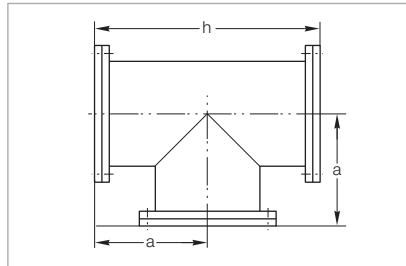
| DN | CF | 16 | 40 | 63 | 100 | 160 |
|------------------|----------|-------------|-------------|--------------|--------------|--------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 |
| a | mm (in.) | 38.0 (1.50) | 63.0 (2.48) | 105.0 (4.13) | 135.0 (5.32) | 167.0 (6.58) |

Ordering Information

Stainless steel DIN 1.4301

| Elbow 90° with a rotatable flange | Part No. | 836 04 | 836 05 | 836 06 | 836 07 | 836 08 |
|-----------------------------------|----------|--------|--------|--------|--------|--------|
|-----------------------------------|----------|--------|--------|--------|--------|--------|

Tees



Dimensional drawing for the tees

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

| DN | CF | 16 | 40 | 63 | 100 | 160 |
|------------------|----------|-------------|--------------|--------------|---------------|---------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 |
| a | mm (in.) | 38.0 (1.50) | 63.0 (2.48) | 105.0 (4.13) | 135.0 (5.32) | 167.0 (6.58) |
| h | mm (in.) | 76.0 (2.99) | 126.0 (4.96) | 210.0 (8.27) | 270.0 (10.63) | 334.0 (13.15) |

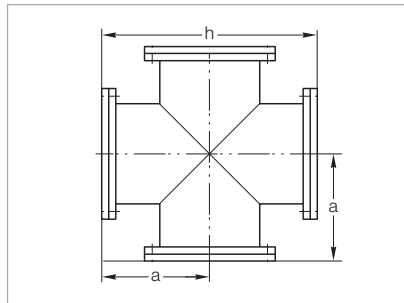
Ordering Information

Stainless steel DIN 1.4301

| Tee with a rotatable flange on each axis | Part No. | 836 14 | 836 15 | 836 16 | 836 17 | 836 18 |
|--|----------|--------|--------|--------|--------|--------|
|--|----------|--------|--------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Crosses



Dimensional drawing for the crosses

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

| DN | CF | 16 | 40 | 63 | 100 | 160 |
|------------------|----------|-------------|--------------|--------------|---------------|---------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 |
| a | mm (in.) | 38.0 (1.50) | 63.0 (2.48) | 105.0 (4.13) | 135.0 (5.32) | 167.0 (6.58) |
| h | mm (in.) | 76.0 (2.99) | 126.0 (4.96) | 210.0 (8.27) | 270.0 (10.63) | 334.0 (13.15) |

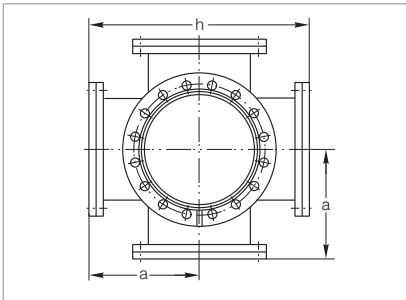
Ordering Information

Stainless steel DIN 1.4301

Cross with a rotatable flange on each axis

| Part No. | 836 34 | 836 35 | 836 36 | 836 37 | 836 38 |
|----------|--------|--------|--------|--------|--------|
|----------|--------|--------|--------|--------|--------|

Double Crosses



Dimensional drawing for the double crosses

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

| DN | CF | 40 | 63 | 100 | 160 |
|------------------|----------|--------------|--------------|---------------|---------------|
| Outside diameter | in. | 2.75 | 4.50 | 6.00 | 8.00 |
| a | mm (in.) | 63.0 (2.48) | 105.0 (4.13) | 135.0 (5.32) | 167.0 (6.58) |
| h | mm (in.) | 126.0 (4.96) | 210.0 (8.27) | 270.0 (10.63) | 334.0 (13.15) |

Ordering Information

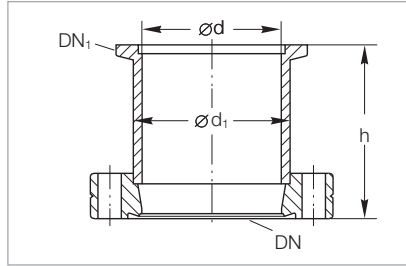
Stainless steel DIN 1.4301

Double cross with a rotatable flange on each axis

| Part No. | 836 45 | 836 46 | 836 47 | 836 48 |
|----------|--------|--------|--------|--------|
|----------|--------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

CF/ISO-KF Adaptors



Dimensional drawing for the CF/ISO-KF adaptors

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

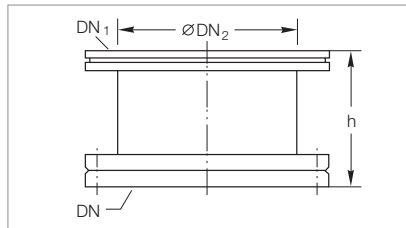
Technical Data

| | | | | | | | |
|-----------------------|----------|-------------|-------------|-------------|-------------|-------------|-------------|
| DN | CF | 16 | 16 | 40 | 40 | 40 | 63 |
| Outside diameter | in. | 1.33 | 1.33 | 2.75 | 2.75 | 2.75 | 4.50 |
| DN ₁ | ISO-KF | 16 | 25 | 16 | 25 | 40 | 40 |
| d | mm (in.) | 16.0 (0.63) | 16.0 (0.63) | 16.0 (0.63) | 26.0 (1.02) | 37.0 (1.36) | 41.0 (1.61) |
| h | mm (in.) | 35.0 (1.38) | 35.0 (1.38) | 30.0 (1.18) | 30.0 (1.18) | 50.0 (1.97) | 35.0 (1.38) |
| d ₁ (tube) | mm (in.) | 20.0 (0.79) | 20.0 (0.79) | 20.0 (0.79) | 30.0 (1.18) | 41.0 (1.61) | 45.0 (1.77) |

Ordering Information

| | | | | | | | |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 837 81 | 837 83 | 837 82 | 837 84 | 837 36 | 837 86 |
|----------------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|

CF/ISO-K Adaptors



Dimensional drawing for the CF/ISO-K adaptors

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

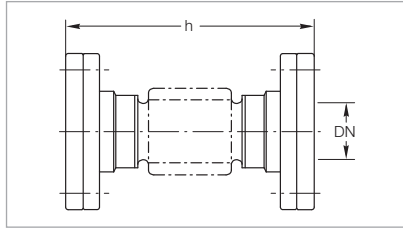
| | | | | |
|------------------|----------|-------------|--------------|--------------|
| DN | CF | 63 | 100 | 160 |
| Outside diameter | in. | 4.50 | 6.00 | 8.00 |
| DN ₁ | ISO-K | 63 | 100 | 160 |
| DN ₂ | mm (in.) | 66.0 (2.60) | 104.0 (4.09) | 153.0 (6.02) |

Ordering Information

| | | | | |
|----------------------------|----------|---------------|---------------|---------------|
| Stainless steel DIN 1.4301 | Part No. | 837 01 | 837 02 | 837 03 |
|----------------------------|----------|---------------|---------------|---------------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Flexible Connecting Components (CF Bellows)



Dimensional drawing for the CF bellows

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

| DN | CF | 16 | 40 | 63 | 100 |
|------------------|----------|-------------------------|--------------------------|--------------------------|--------------------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 |
| h | mm (in.) | 76 ±1.5 (2.99 ±0.06) | 126 ±2.0 (4.96 ±0.08) | 139 ±2.0 (5.47 ±0.08) | 142 ±2.0 (5.59 ±0.08) |

Ordering Information

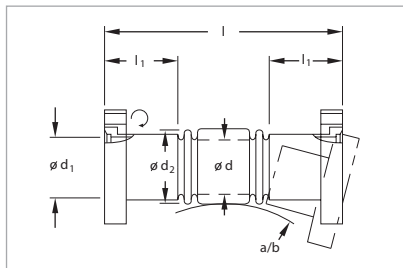
Stainless steel

CF bellows

with one rotatable flange

| Part No. | 880 01 | 880 02 | 880 03 | 880 04 |
|----------|--------|--------|--------|--------|
|----------|--------|--------|--------|--------|

Flexible Connecting Components (CF Corrugated Hoses)



Dimensional drawing for the CF corrugated hoses

For missing dimensions see "Technical Data" at the beginning of the Chapter "CF Flanges"

Technical Data

| DN | CF | 16 | 16 | 16 | 16 |
|------------------|----------|--------------|---------------|---------------|----------------|
| Outside diameter | in. | 1.33 | 1.33 | 1.33 | 1.33 |
| l | mm (in.) | 250.0 (9.84) | 500.0 (19.69) | 750.0 (29.53) | 1000.0 (39.37) |
| l ₁ | mm (in.) | 23.0 (0.91) | 23.0 (0.91) | 23.0 (0.91) | 23.0 (0.91) |
| d | mm (in.) | 15.0 (0.59) | 15.0 (0.59) | 15.0 (0.59) | 15.0 (0.59) |
| d ₁ | mm (in.) | 16.0 (0.63) | 16.0 (0.63) | 16.0 (0.63) | 16.0 (0.63) |
| d ₂ | mm (in.) | 22.5 (0.89) | 22.5 (0.89) | 22.5 (0.89) | 22.5 (0.89) |
| a | mm (in.) | 70.0 (2.76) | 70.0 (2.76) | 70.0 (2.76) | 70.0 (2.76) |
| b | mm (in.) | 50.0 (1.97) | 50.0 (1.97) | 50.0 (1.97) | 50.0 (1.97) |

Ordering Information

Stainless steel

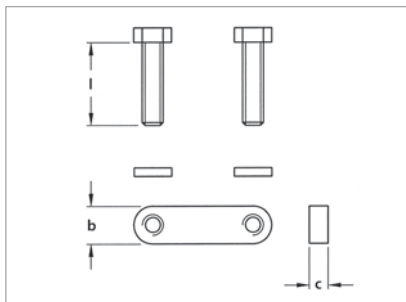
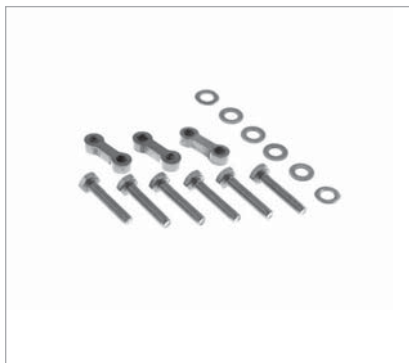
CF corrugated hose

with one rotatable flange

| Part No. | 885 56 | 885 68 | 885 65 | 885 73 |
|----------|--------|--------|--------|--------|
|----------|--------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Bolts with Bolt Nut Plate and Washers



Dimensional drawing for the bolts with bolt nut plate and washers

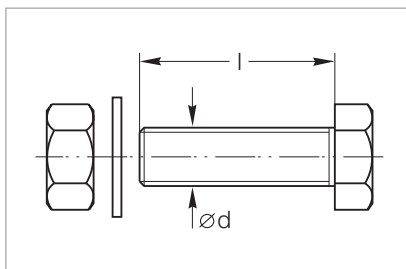
Technical Data

| DN | CF | 16 | 40 | 63 | 100/160 |
|--------------------|-------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00/8.00 |
| Dimensions (d x l) | mm (in.) | M 4 x 20 (M 4 x 0.79) | M 6 x 35 (M 6 x 1.38) | M 8 x 45 (M 8 x 1.77) | M 8 x 55 (M 8 x 2.17) |
| l | mm (in.) | 20.0 (0.79) | 35.0 (1.38) | 45.0 (1.77) | 55.0 (2.15) |
| b | mm (in.) | 7.0 (0.28) | 10.0 (0.39) | 12.0 (0.47) | 12.0 (0.47) |
| c | mm (in.) | 4.0 (0.16) | 5.0 (0.20) | 8.0 (0.32) | 8.0 (0.32) |
| Sealing torque | Nm (lbf-in) | 4 (35.40) | 10 (88.51) | 20 (177.02) | 20 (177.02) |
| Quantity per set | | | | | |
| Bolts | | 6 | 6 | 8 | 20 |
| Bolt nut plate | | 3 | 3 | 4 | 10 |
| Washers | | 6 | 6 | 8 | 20 |

Ordering information

| Set | Part No. | 838 87 | 838 88 | 838 89 | 838 91 |
|-----|----------|--------|--------|--------|--------|
|-----|----------|--------|--------|--------|--------|

Hexagon Bolts, Set for CF Flanges



Dimensional drawing for the hexagon bolts for CF flanges

Technical Data

| DN | CF | 16 | 40 | 63 | 100 | 160 | 200 | 250 |
|--------------------|-------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Outside diameter | in. | 1.33 | 2.75 | 4.50 | 6.00 | 8.00 | 10.00 | 12.00 |
| Dimensions (d x l) | mm (in.) | M 4 x 20 (M 4 x 0.79) | M 6 x 35 (M 6 x 1.38) | M 8 x 45 (M 8 x 1.77) | M 8 x 50 (M 8 x 1.97) | M 8 x 55 (M 8 x 2.17) | M 8 x 60 (M 8 x 2.36) | M 8 x 60 (M 8 x 2.36) |
| Sealing torque | Nm (lbf-in) | 4 (35.40) | 10 (88.51) | 20 (177.02) | 20 (177.02) | 20 (177.02) | 20 (177.02) | 20 (177.02) |
| Quantity per set | | | | | | | | |
| Bolts | | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Nuts | | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Washers | | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

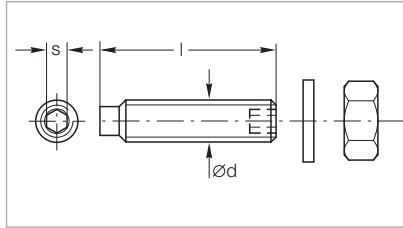
Ordering information

| Set | Part No. | 839 00 | 839 01 | 838 81 | 839 04 | 839 05 | 839 07 | 839 07 ¹⁾ |
|-----|----------|--------|--------|--------|--------|--------|--------|----------------------|
|-----|----------|--------|--------|--------|--------|--------|--------|----------------------|

¹⁾ 2 sets are required

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Set Screws, Nuts and Washers for CF Flanges



Dimensional drawing for the set screws, nuts and washers for CF flanges

Technical Data

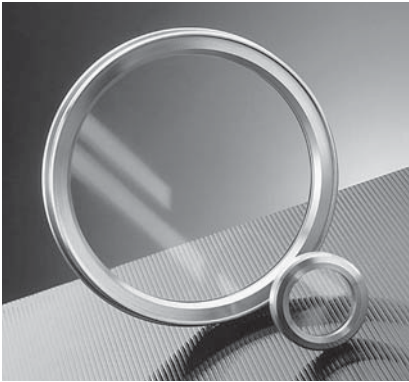
| DN | CF | 16 | 40 | 63 - 100 |
|--------------------|-------------|-----------------------|-----------------------|-----------------------|
| Dimensions (d x l) | mm (in.) | M 4 x 20 (M 4 x 0.79) | M 6 x 35 (M 6 x 1.38) | M 8 x 45 (M 8 x 1.77) |
| s | mm (in.) | 2.0 (0.08) | 3.0 (0.12) | 4.0 (0.16) |
| Sealing torque | Nm (lbf-in) | 4 (35.40) | 10 (88.51) | 20 (177.02) |
| Quantity per set | | | | |
| Bolts | | 6 | 6 | 16 |
| Nuts | | 6 | 6 | 16 |
| Washers | | 6 | 6 | 16 |

Ordering information

| Set | Part No. | 839 10 | 839 11 | 839 13 |
|-----|----------|--------|--------|--------|
|-----|----------|--------|--------|--------|

Important: In the table of Chapter "General" the German designation for the type of steel is also stated in accordance with AISI.

Observation Windows for Vacuum Systems

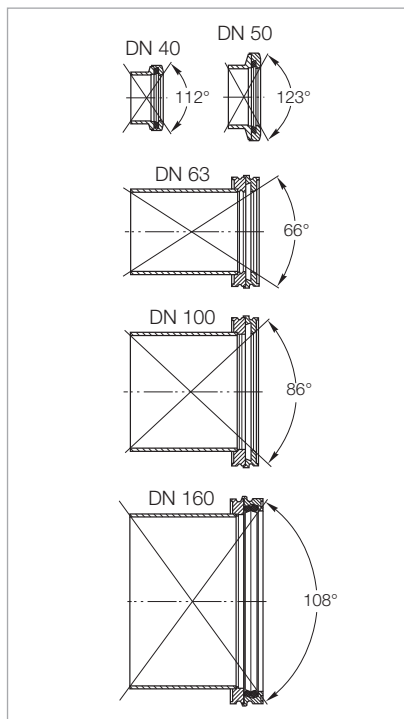


Observation of the phenomena in the vacuum chamber is very important for many vacuum processes. Measurements and monitoring can often be accomplished only by means of external instruments used under normal atmospheric pressure conditions.

This calls for highly transparent, rugged observation windows featuring a wide angle view.

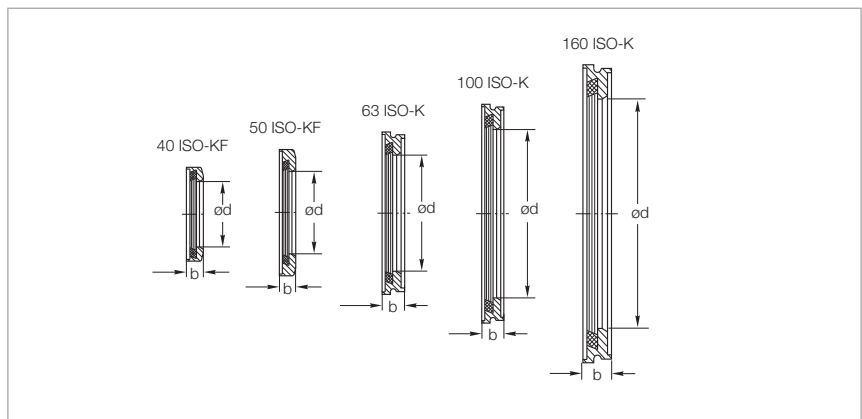
Advantages to the User

- Flat design
- Easy to fit and remove
- Easy to clean
- Wide viewing angle
- Can be baked out up to 150 °C (302 °F)
- May be combined with ISO-KF and ISO-K components
- No special mounting components are required
- The FPM (FKM) O-ring seals against the atmosphere (integrated centering ring)
- Each observation window is subjected to a leak test (thereby ensuring safe operation!)

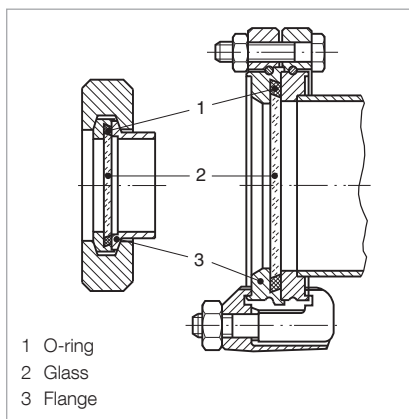


Viewing angle into vacuum chamber through observation window DN 40 ISO-KF - DN 160 ISO-K (mounting on matching flanges with tubulation)

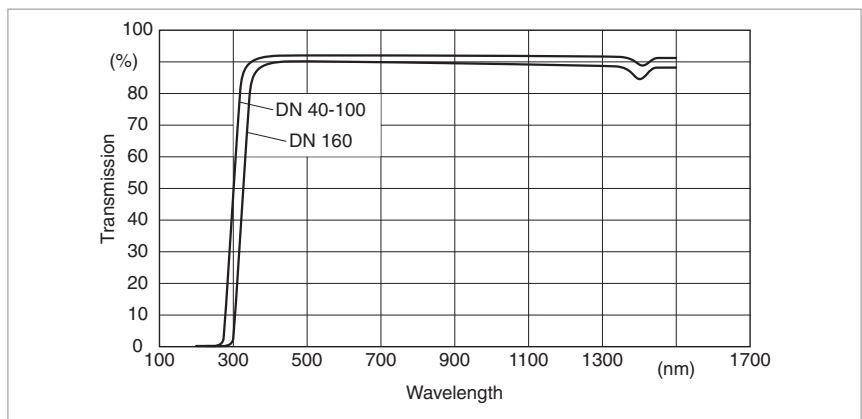
ISO-KF/ISO-K Observation Windows



Window dimensions for the observation windows



ISO-KF and ISO-K observation windows, fully installed



Transmittance as a function of the wavelength for Oerlikon Leybold Vacuum viewports DN 40 ISO-KF to DN 160 ISO-K for different window thicknesses

Technical Data

Observation Windows

| | | | | | | |
|---------------------------|----------|-------------|-------------|-------------|--------------|--------------|
| DN | | 40 ISO-KF | 50 ISO-KF | – | – | – |
| DN | | – | – | 63 ISO-K | 100 ISO-K | 160 ISO-K |
| Thickness of glass window | mm (in.) | 4.0 (0.16) | 4.0 (0.16) | 4.0 (0.16) | 5.0 (0.20) | 9.0 (0.35) |
| Diameter of glass window | mm (in.) | 44.0 (1.73) | 54.0 (2.13) | 75.0 (2.95) | 109.0 (4.29) | 160.0 (6.30) |
| b | mm (in.) | 10.0 (0.39) | 10.0 (0.39) | 13.5 (0.53) | 13.0 (0.51) | 17.0 (0.67) |
| d | mm (in.) | 40.0 (1.57) | 50.0 (1.97) | 70.0 (2.76) | 102.0 (4.02) | 153.0 (6.02) |
| Viewing angle | ° | 112 | 123 | 66 | 86 | 108 |

The glass used is a borosilicate glass (BOROFLOAT® 33) with a refractive index of $n = 1.472$
 Dielectric number (at 25 °C (77 °F)) 4.8 at 1 MHz
 Flange material Stainless steel 1.4301
 Glass material Borosilicate
 O-ring material FPM (FKM)
 Leak rate $< 10^{-8}$ mbar x l/s

Ordering Information

Observation Windows

| | Part No. | Part No. | Part No. | Part No. | Part No. |
|---------------------|----------------|----------------|----------------|----------------|----------------|
| DN | 40 ISO-KF | 50 ISO-KF | – | – | – |
| DN | – | – | 63 ISO-K | 100 ISO-K | 160 ISO-K |
| Observation Windows | 210 131 | 210 132 | 210 133 | 210 134 | 210 135 |

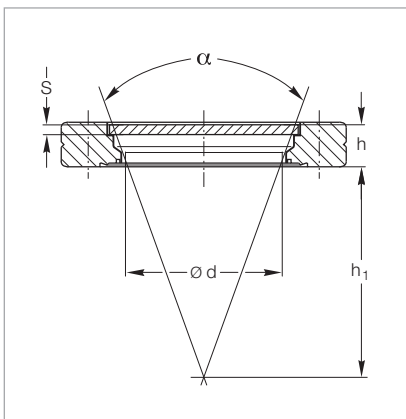
CF Observation Windows



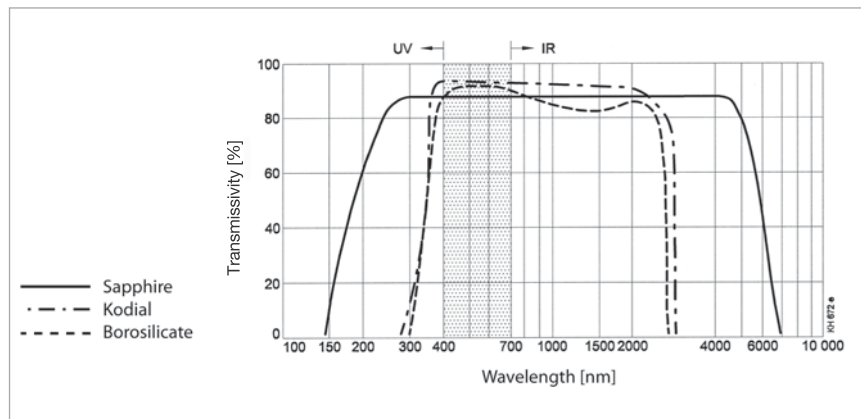
Standard glass is normally only used for visual observations, for photography of experiment details and, among other things, for pyrometer measurements.

Advantages to the User

- Optically plane-parallel glass surface up to just before the edge
- Flange with a wide viewing angle



Dimensional drawing for CF observation windows



Optical transmissivity for the CF observation windows

Technical Data

| DN | CF | 40 | 63 | 100 | 160 |
|-----------------------------------|----------|---------------------------|---------------------------|---------------------------|---------------------------|
| Thickness of the glass (s) | mm (in.) | 3.0 (0.12) | 3.5 (0.14) | 6.0 (0.24) | 8.0 (0.32) |
| Diameter of viewing area (d) | mm (in.) | 38.0 (1.50) | 65.0 (2.56) | 90.0 (3.54) | 135.0 (5.32) |
| Viewing angle (α) | ° | 38.0 | 57 | 71 | 92 |
| Spacing of the glass (h), approx. | mm (in.) | 11.0 (0.43) | 16.4 (0.65) | 8.0 (0.32) | 10.0 (0.39) |
| Viewing distance (h_1) | mm (in.) | 50.0 (1.97) | 50.0 (1.97) | 50.0 (1.97) | 50.0 (1.97) |
| Wavelength range | nm | 400 to 3000 | 400 to 3000 | 400 to 3000 | 400 to 3000 |
| Material | | Vacon (compensation ring) | Vacon (compensation ring) | Vacon (compensation ring) | Vacon (compensation ring) |
| Mean transmission ratio | % | 93 in the visible range | 93 in the visible range | 93 in the visible range | 93 in the visible range |
| Type of glass | | Kodial | Kodial | Kodial | Kodial |
| Max. heating rate | min | 5 | 5 | 5 | 5 |
| Max. bakeout temperature | °C (°F) | 400 (752) | 400 (752) | 400 (752) | 400 (752) |

Ordering Information

| CF observation window | Part No. | 210 112 | 210 114 | 210 115 | 210 116 |
|-----------------------|----------|---------|---------|---------|---------|
|-----------------------|----------|---------|---------|---------|---------|

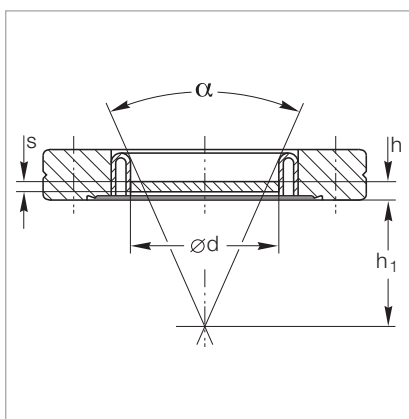
CF Sapphire Observation Windows



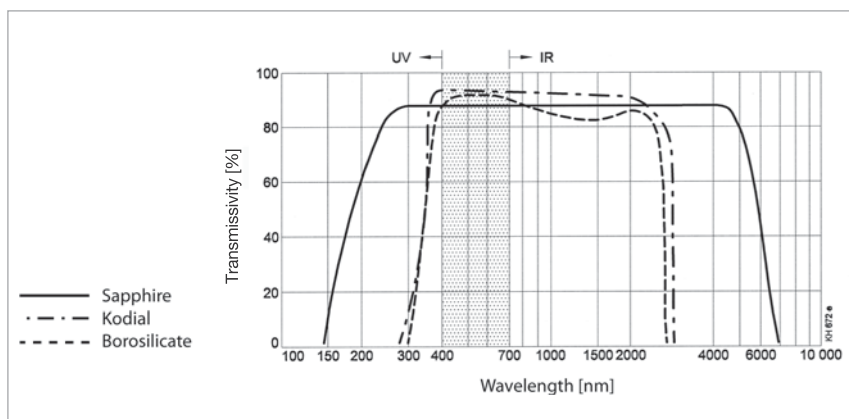
Sapphire exhibits a transmissivity range of 250 nm to 5500 nm. The infrared limit is shifted far in to the infrared range. For this reason, glass of this type is used in connection with sun simulation tests, Laser experiments, high-temperature plasma measurements and spectroscopic measurements, for example.

Advantages to the User

- Optically plane-parallel glass surface up to just before the edge



Dimensional drawing for the CF sapphire observation windows



Optical transmissivity for the CF Sapphire observation windows

Technical Data

| | | |
|-----------------------------------|----------|-------------|
| DN | CF | 40 |
| Thickness of the glass (s) | mm (in.) | 3.0 (0.12) |
| Diameter of viewing area (d) | mm (in.) | 23.0 (0.91) |
| Viewing angle (α) | ° | 23 |
| Spacing of the glass (h), approx. | mm (in.) | 10.0 (0.39) |
| Viewing distance (h_1) | mm (in.) | 50.0 (1.97) |
| Wavelength range | nm | 250 to 5500 |
| Mean transmission ratio | % | > 80 |
| Type of glass | | Sapphire |
| Max. heating rate | min | 5 |
| Max. bakeout temperature | °C (°F) | 400 (752) |

Ordering Information

| | | |
|---------------------------------|----------|---------|
| CF sapphire observation windows | Part No. | 210 122 |
|---------------------------------|----------|---------|

Feedthroughs

Products

| | |
|---|-----|
| Feedthroughs | 884 |
| Current Feedthroughs | 884 |
| High Current Feedthroughs | 888 |
| Rotary Feedthroughs | 890 |
| Liquid Feedthroughs | 891 |
| Rotary / Linear Motion Feedthroughs | 892 |
| CF Feedthroughs | 894 |
| Linear Motion Mechanical Feedthroughs | 894 |
| Current Feedthroughs | 896 |
| Accessories for Feedthroughs | 898 |
| Connectors, vacuum side | 898 |
| Connectors, atmospheric side | 899 |
| CF Liquid Feedthrough | 900 |

Feedthroughs

Current Feedthroughs

General

Current feedthroughs for vacuum applications, as well as their corresponding connectors, comply with the German VDE Regulations 0100, 0660 and 0110 Section 1. The latter refers to air gaps and leakage paths.

- All current feedthroughs are tested according to VDE Regulations

Important

The special regional safety regulations must be observed! These may differ from the regulations which apply in Germany! The voltages stated on the following pages apply to atmospheric pressure and the right connector from Oerlikon Leybold Vacuum. The voltage specifications apply also to that part of the feedthrough which is exposed to the vacuum, provided the pressure in these areas is less than 10^{-1} mbar (0.75×10^{-1} Torr).

At pressures over 10^{-1} mbar (0.75×10^{-1} Torr) voltage breakdowns may occur depending on the distance between the electrodes, the type of rarefied gas, the type of contamination, the distribution of the electric field, etc.

Operators are advised to check each application individually or to get in touch with Oerlikon Leybold Vacuum for advice.

In applications where VDE regulations need not be applied, higher operating voltages are permissible. Please contact us for further information regarding your particular application.

The test and operating voltages refer to a vacuum pressure of $< 1 \times 10^{-4}$ mbar ($< 0.75 \times 10^{-4}$ mbar) and when using the connectors recommended by Oerlikon Leybold Vacuum. Electrical power may only be applied via the external plugs.

Abbreviations used in connection with feedthroughs:

F Feedthrough

| | |
|-----------|-----------|
| E | Current |
| L | Liquid |
| N | Normal |
| P | Precision |
| F | Frequency |
| HC | Current |
| HV | Voltage |
| L | Linear |
| R | Rotary |

Current Feedthroughs

Technical Data

FE 16 / 9S

FE 16 / 9

| | | | |
|---|----------|---|---|
| Vacuum connection | DN | 16 ISO-KF | 16 ISO-KF |
| Number of feedthroughs | | 9 | 9 |
| Voltage per pole ¹⁾ | V | 50 | 50 |
| Current per pole ¹⁾ | A | 2 | 2 |
| Connection | | | |
| Vacuum side | | solder connection | connector |
| Air side | | connector | connector |
| Diameter of connecting wire | mm (in.) | 0.8 (0.03) / 1.2 (0.05) | – |
| Test voltage | V / Hz | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ |
| Pressure (absolute) | | 1 x 10 ⁻⁸ mbar to 2.5 bar (0.75 x 10 ⁻⁸ Torr to 1875 Torr) | 1 x 10 ⁻⁸ mbar to 2.5 bar (0.75 x 10 ⁻⁸ Torr to 1875 Torr) |
| Bakeout temperature (feedthrough, connector) | °C (°F) | 130 (266) | 130 (266) |
| Housing | | Stainless steel | Stainless steel |
| Insulator | | PEEK / Araldit | PEEK / Araldit |
| Seal | | FPM (FKM) | FPM (FKM) |
| Contact (feedthrough, connector) | | gold-plated brass | gold-plated brass |

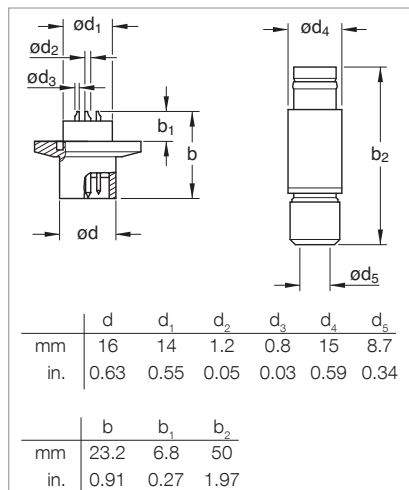
Ordering Information

FE 16 / 9S

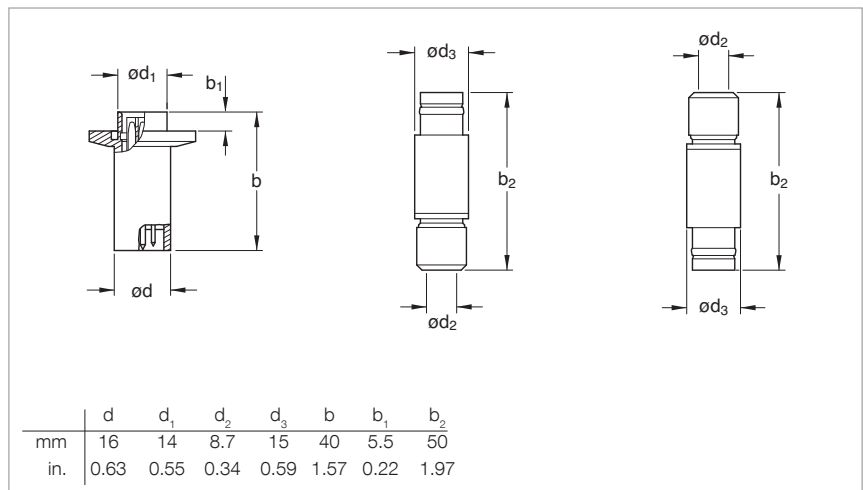
FE 16 / 9

| | Part No. | Part No. |
|------------------------|----------------|----------------|
| Current feedthroughs | 210 302 | 210 304 |
| Connector: vacuum side | – | 210 305 |
| Connector: air side | 210 303 | 210 303 |

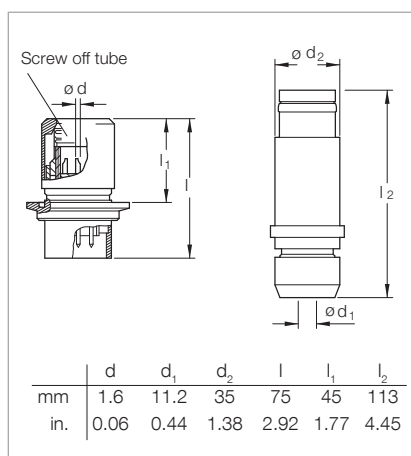
¹⁾ Local regulations concerning use must be followed



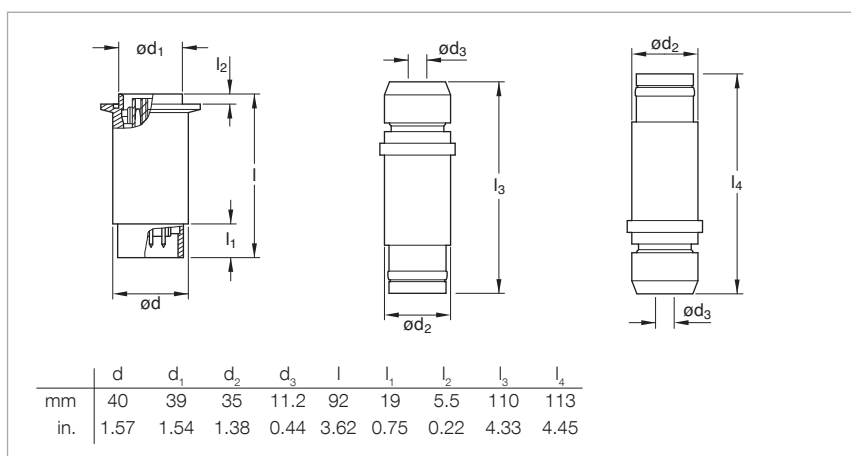
Dimensional drawing for the feedthrough FE 16/9S (left) and the connector for air side (right)



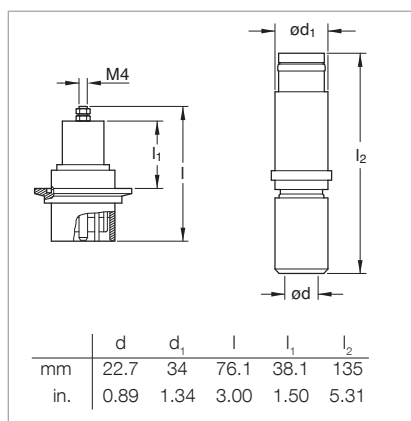
Dimensional drawing for the feedthrough FE 16/9 (left), the connector for vacuum side (middle) and the connector for air side (right)



Dimensional drawing for the feedthrough FE 40/7S (left) and the connector for air side (right)



Dimensional drawing for the feedthrough FE 40/7 (left), the connector for vacuum side (middle) and the connector for air side (right)



Dimensional drawing for the feedthrough FEHV 40/1 (left) and the connector for air side (right)



Technical Data**FE 40 / 7S****FE 40 / 7****FEHV 40 / 1**

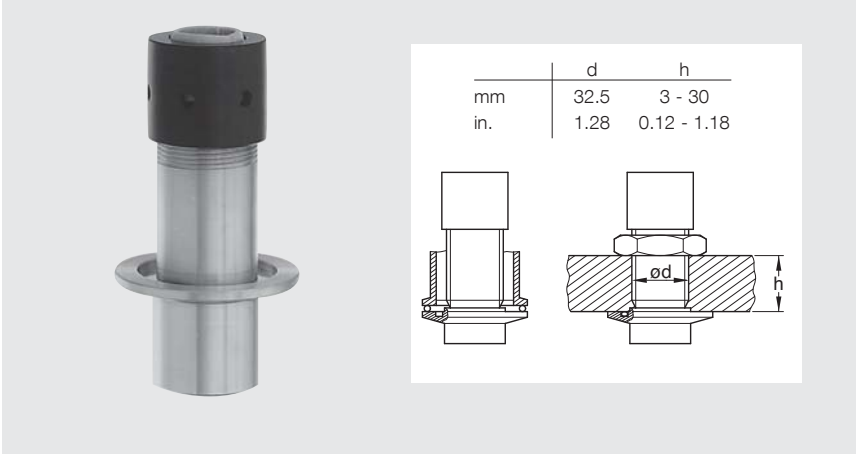
| | | | | |
|---|----------------------------|---|---|---|
| Vacuum connection | DN | 40 ISO-KF | 40 ISO-KF | 40 ISO-KF |
| Number of feedthroughs | | 7 | 7 | 1 |
| Voltage per pole ¹⁾ | V | 380 | 380 | 6000 |
| Current per pole ¹⁾ | A | 16 | 16 | 25 |
| Connection Vacuum side Air side | | solder connection connector | connector connector | screw coupling connector |
| Diameter of connecting wire | mm (in.) | dia. 1.8 (0.07) | – | – |
| Test voltage | kV / Hz | – | – | 15 / 50 |
| Tightness | mbar x l x s ⁻¹ | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ |
| Pressure (absolute) | | 1 x 10 ⁻⁸ mbar x l x s ⁻¹ to 2.5 bar | 1 x 10 ⁻⁸ mbar x l x s ⁻¹ to 2.5 bar | 1 x 10 ⁻⁸ mbar x l x s ⁻¹ to 2.5 bar |
| Bakeout temperature (feedthrough, connector) | °C (°F) | 130 (266) | 130 (266) | 130 (266) |
| Housing | | chrom-plated steel | chrom-plated steel | chrom-plated steel |
| Insulator | | PTFE / Araldit | PTFE / Araldit | PTFE |
| Seal | | FPM (FKM) | FPM (FKM) | FPM (FKM) |
| Contact (feedthrough, connector) | | gold-plated stainless steel | gold-plated stainless steel | nickel-plated brass |

Ordering Information**FE 40 / 7S****FE 40 / 7****FEHV 40 / 1**

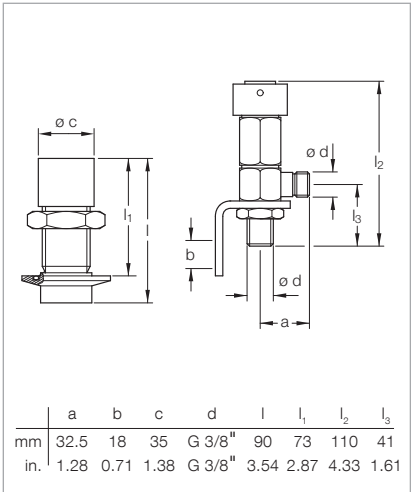
| | Part No. | Part No. | Part No. |
|------------------------|----------------|----------------|----------------|
| Current feedthroughs | 210 325 | 210 326 | 210 350 |
| Connector: vacuum side | – | 210 328 | – |
| Connector: air side | 210 327 | 210 327 | 210 351 |

¹⁾ Local regulations concerning use must be followed

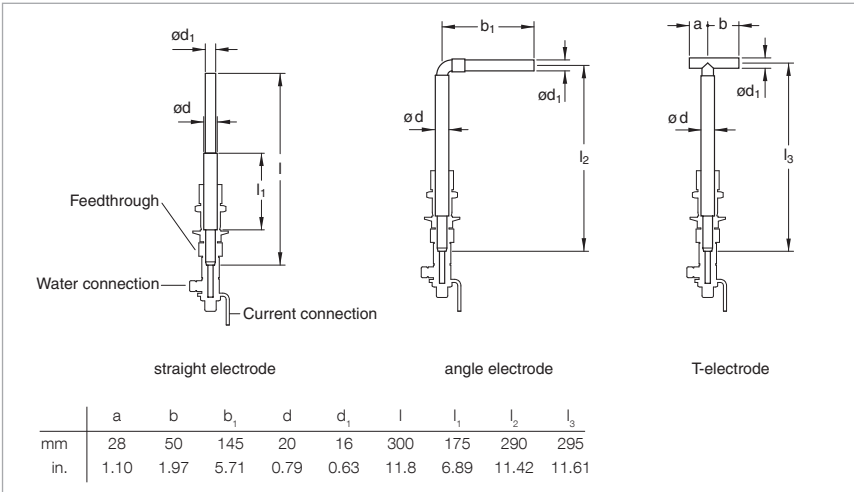
High Current Feedthroughs



- Selection of electrodes
- Slide into mounted feedthrough
- Current connection with water cooling



Dimensional drawing for the feedthrough FEHC 40/1 (left) and current connection with water cooling (right)



Dimensional drawings for the copper electrodes for the feedthrough FEHC 40/1

Technical Data

FEHC 40/1

| | | |
|------------------------|----------------------------|---|
| Vacuum connection | DN | 40 ISO-KF |
| Number of feedthroughs | | 1 |
| Voltage | V | 50 |
| Current | A | 250 |
| with water cooling | A | 1500 |
| Tightness | mbar x l x s ⁻¹ | 1 x 10 ⁻⁹ |
| Pressure (absolute) | | 1 x 10 ⁻⁸ mbar to 2.5 bar (max. 10 bar with external centering ring) |
| Bakeout temperature | °C (°F) | 110 (230) |
| Housing | | aluminum |
| Insulator | | thermoplast and thermoset |
| Seal | | FPM (FKM) |

Ordering Information

FEHC 40/1

| | Part No. |
|---|----------------|
| High current feedthroughs | 210 352 |
| Current connection with water cooling ¹⁾ | 210 356 |
| Straight electrode | 210 353 |
| Angle electrode | 210 354 |
| T-electrode | 210 355 |

¹⁾ Not insulated

Rotary Feedthroughs

- ISO-KF / ISO-K
- For transmitting high torque
- With FPM (FKM) shaft seal and ball bearings

Technical Data

FR 25/50 N

FR 63/100 N

| | | | |
|------------------------------------|----------------------------|--------------------------------------|--------------------------------------|
| Vacuum connection | DN | 25 ISO-KF | 63 ISO-K |
| Feedthrough / seal | | FPM (FKM) | FPM (FKM) |
| Shaft connection | mm (in.) | dia. 8 (0.31) | dia. 20 (0.79) |
| Transferable torque | Nm | 6 | 100 |
| Rotational speed ¹⁾ | 1/min | 1000 | 500 |
| Shaft load | | | |
| Radial | N | 150 | 500 |
| Axial | N | 50 | 100 |
| Service life (revolutions) | | 20 000 000 | 10 000 000 |
| Tightness, static | mbar x l x s ⁻¹ | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ |
| Pressure (absolute) | | 1 x 10 ⁻⁹ mbar to 1 bar | 1 x 10 ⁻⁹ mbar to 1 bar |
| Operating temperature, max. | °C (°F) | 50 (122) | 50 (122) |
| Bakeout temperature | °C (°F) | 110 (230) | 110 (230) |
| Materials exposed to process media | | Stainless steel, aluminum, FPM (FKM) | Stainless steel, aluminum, FPM (FKM) |
| Weight | kg (lbs) | 0.2 (0.44) | 2 (4.42) |

Ordering Information

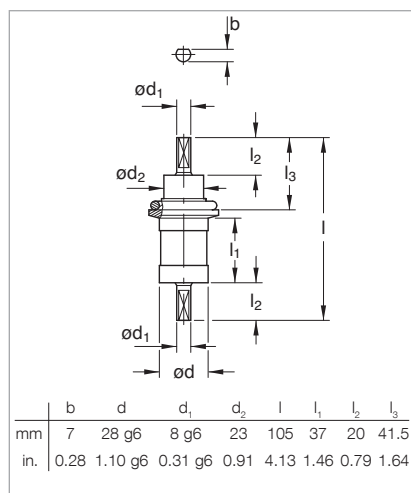
FR 25/50 N

FR 63/100 N

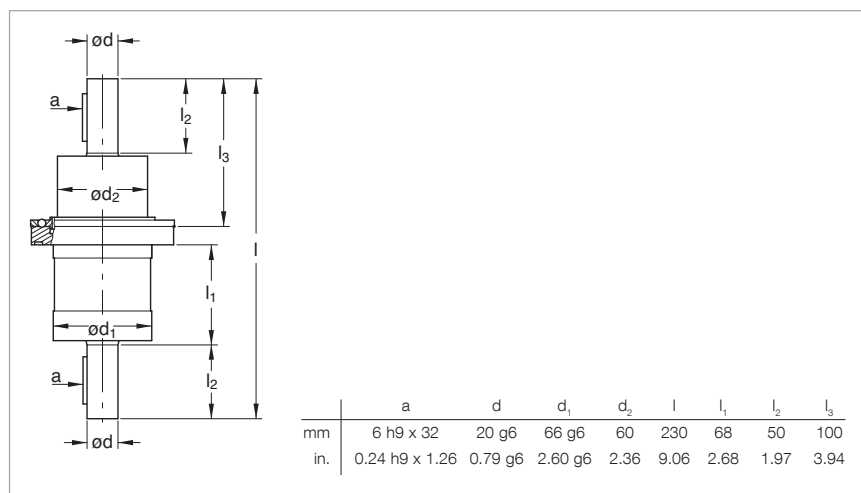
| | Part No. | Part No. |
|--------------------|----------------|------------------------------|
| Rotary feedthrough | 210 151 | 210 153 ²⁾ |

¹⁾ When a reduced service life is acceptable, the rotational speed can be increased by up to a factor of two

²⁾ Centering ring, CR/aluminum Part No. 268 05, FPM (FKM)/stainless steel Part No. 887 03



Dimensional drawing
for the feedthrough FR 25/50 N



Dimensional drawing for the feedthrough FR 63/100 N

Liquid Feedthroughs

- For H₂O and LN₂
- Thermally insulated
- Especially suited for very hot and very cold applications

Technical Data

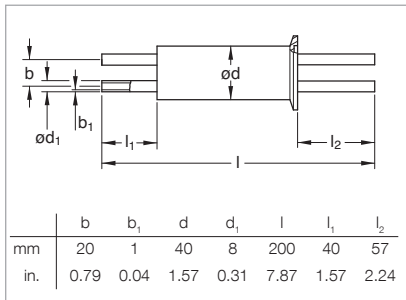
FL 40K/2

| | | |
|---------------------|----------------------------|---|
| Vacuum connection | DN | 40 ISO-KF |
| Feedthrough / seal | | welded |
| Connection | mm (in.) | dia. 8 x 1 (0.31 x 0.04) |
| Number of tubes | | 2 |
| Tightness | mbar x l x s ⁻¹ | 1 x 10 ⁻⁹ |
| Pressure (absolute) | | 1 x 10 ⁻⁹ mbar to 2.5 bar (max. 10 bar with external centering ring) |
| Temperature range | °C (°F) | -200 to +150 (-328 to +302) |
| Material | | Stainless steel |
| Weight | kg (lbs) | 0.3 (0.66) |

Ordering Information

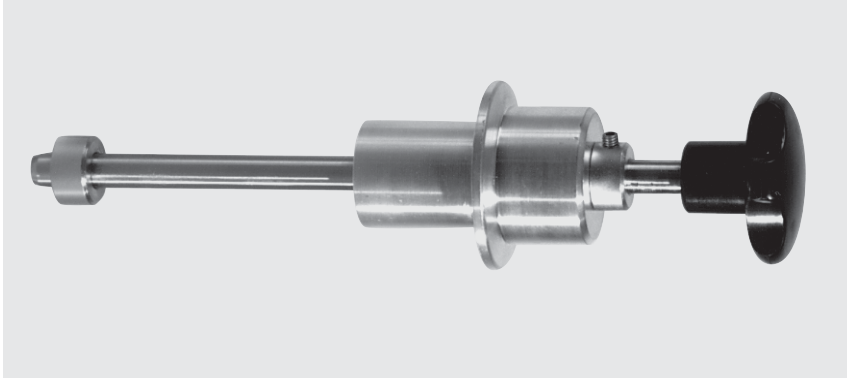
FL 40K/2

| | Part No. |
|--------------------|----------------|
| Liquid feedthrough | 210 275 |

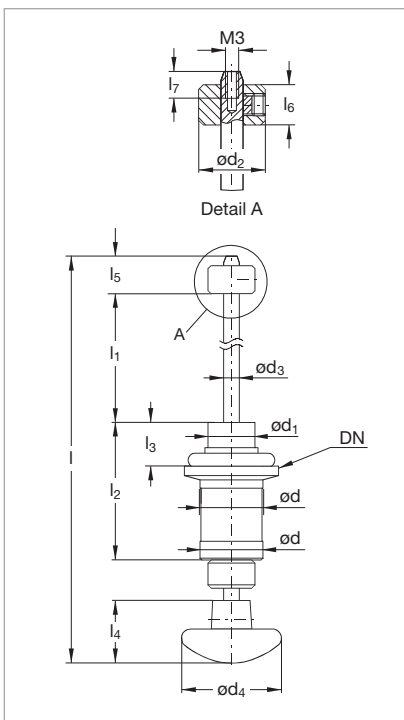


Dimensional drawing for the liquid feedthrough
FL 40K/2

Rotary / Linear Motion Feedthroughs



- Two FPM (FKM) shaft seals
- Direct push/pull and rotary actuation
- With locking ring and optional anti-rotation device



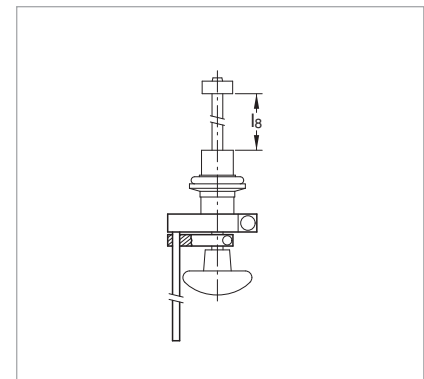
Dimensional drawing for the feedthroughs FNRL

Dimension Table

| Feedthroughs | DN | d | d ₁ | d ₂ | d ₃ |
|--------------|-----------|----------------|----------------|---------------------|---|
| FNRL 16/50 | 16 | 20g6 0.79g6 | 15 0.59 | 15 0.59 | 5 ^{+0.03} _{-0.05} 0.20 |
| FNRL 25/100 | 25 | 25g6 0.98g6 | 23 0.91 | 22 0.87 | 8 ^{+0.06} _{-0.08} 0.31 |
| | | d ₄ | l | l ₁ max. | l ₂ |
| FNRL 16/50 | mm in. | 32 1.26 | 134 5.28 | 50 1.97 | 44 1.73 |
| FNRL 25/100 | mm in. | 50 1.97 | 210 8.27 | 100 3.94 | 58 2.28 |
| | | l ₄ | l ₅ | l ₆ | l ₇ |
| FNRL 16/50 | mm in. | 20 0.79 | 10.5 0.41 | 8 0.31 | 6 0.24 |
| FNRL 25/100 | mm in. | 32 1.26 | 11 0.43 | 9 0.35 | 8 0.31 |

Dimension Table

| Anti-rotation device | l ₈ = l ₁ from | |
|----------------------|--------------------------------------|-------------|
| | FNRL 16/50 | FNRL 25/100 |
| Part No. 210 225 | 50 1.97 | — — |
| Part No. 210 226 | — — | 100 3.94 |



Dimensional drawing for the anti-rotation device

Technical Data**FNRL 16/50****FNRL 25/100**

| | | | |
|-------------------------------------|----------------------------|---|---|
| Vacuum connection | DN | 16 ISO-KF | 25 ISO-KF |
| Feedthrough / seal | | FPM (FKM) | FPM (FKM) |
| Shaft connection | mm (in.) | M 3 x 6 / dia. 5 (M 3 x 0.24 / dia. 0.20) | M 4 x 8 / dia. 8 (M 4 x 0.31 / dia. 0.31) |
| Stroke | mm (in.) | 50.0 (1.97) | 100.0 (3.94) |
| Shaft load | | | |
| Radial, at max. displacement | N | 10 | 15 |
| Torsion | Nm | 2 | 8 |
| Tightness, static | mbar x l x s ⁻¹ | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ |
| Operating pressure range (absolute) | | 1 x 10 ⁻⁸ mbar to 1 bar | 1 x 10 ⁻⁸ mbar to 1 bar |
| Operating temperature, max. | °C (°F) | 50 (122) | 50 (122) |
| Bakeout temperature | °C (°F) | 110 (230) | 110 (230) |
| Materials exposed to process media | | Stainless steel, aluminum, FPM (FKM) | Stainless steel, aluminum, FPM (FKM) |
| Weight | kg (lbs) | 0.1 (0.22) | 0.2 (0.44) |

Ordering Information**FNRL 16/50****FNRL 25/100**

| | Part No. | Part No. |
|-----------------------------|----------------|----------------|
| Rotary / linear feedthrough | 210 200 | 210 201 |
| Anti-rotation device | 210 225 | 210 226 |

CF Feedthroughs

CF feedthroughs are available in a variety of field-proven designs, specifically:

- Linear motion mechanical feedthroughs
- Rotary motion mechanical feedthroughs

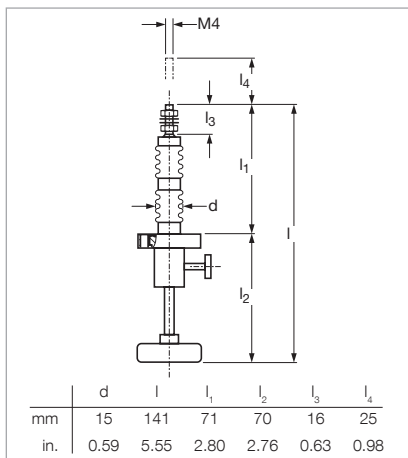
A stainless steel bellows is used to seal off the CF linear and rotary feedthroughs against the atmosphere.

All feedthroughs can be installed in the vacuum systems in any orientation.

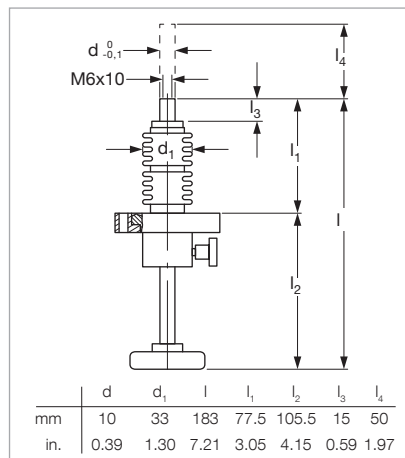
Abbreviations used in connection with feedthroughs:

| | |
|-----------|-------------|
| F | Feedthrough |
| E | Electric |
| L | Liquid |
| N | Normal |
| P | Precision |
| F | Frequency |
| HC | Current |
| HV | Voltage |
| L | Linear |
| R | Rotary |

Linear Motion Mechanical Feedthroughs



Dimensional drawing for the FNL 16/25 linear motion feedthrough



Dimensional drawing for the FNL 40/50 linear motion feedthrough

Technical Data

FNL 16/25

FNL 40/50

| Nominal width | DN | 16 CF-R | 40 CF-R |
|------------------------------------|----------------------------|-------------------------------------|-------------------------------------|
| Shaft connection | mm (in.) | M 4 x 16 (M 4 x 0.63) | M 6 x 10, Ø 10 (M 6 x 0.39, Ø 0.39) |
| Feedthrough / seal | | bellows | bellows |
| Actuator | | manually | manually |
| Travel | mm (in.) | 25.0 (0.98) | 50.0 (1.97) |
| Scale division | mm (in.) | 5.0 (0.20) | 10.0 (0.39) |
| Shaft load | | | |
| Radial at max. displacement | N | 20 | 100 |
| Axial, against vacuum | N | 85 | 140 |
| Axial, against atmosphere | N | 100 | 200 |
| Torsion | Nm (lbf-in) | 0.2 (1.77) | 0.5 (4.43) |
| Tightness | mbar x l x s ⁻¹ | 5 x 10 ⁻¹¹ | 5 x 10 ⁻¹¹ |
| Pressure absolute | | 1 x 10 ⁻¹⁰ mbar to 2 bar | 1 x 10 ⁻¹⁰ mbar to 2 bar |
| Bakeout temperature feedthrough | °C (°F) | 300 (572) | 300 (572) |
| Weight | kg (lbs) | 0.15 (0.33) | 0.75 (1.66) |
| Materials exposed to process media | | Stainless steel | Stainless steel |

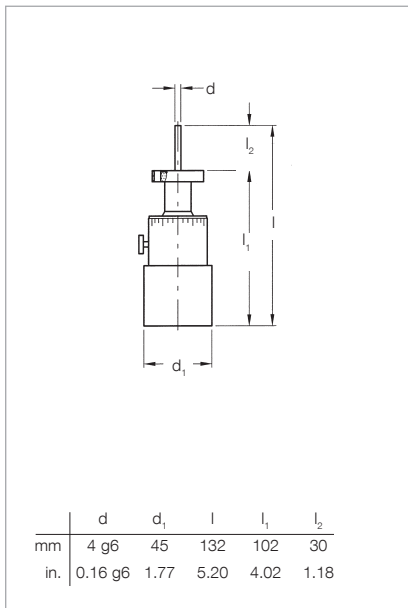
Ordering information

FNL 16/25

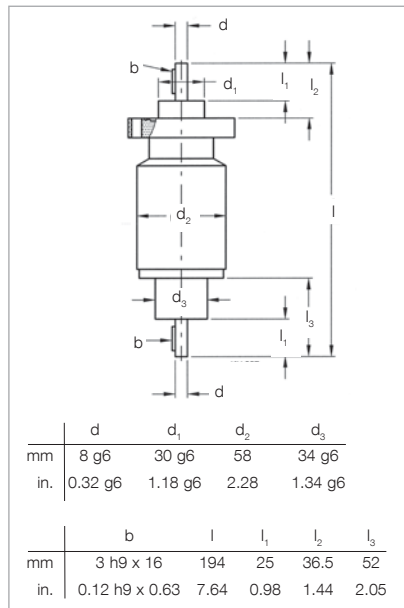
FNL 40/50

| | Part No. | Part No. |
|---------------------------|----------|----------|
| Linear motion feedthrough | 210 250 | 210 251 |

Linear Motion Mechanical Feedthroughs



Dimensional drawing for the FPR 16/5 N rotary feedthrough



Dimensional drawing for the FNR 40/20 N rotary feedthrough

The rotation of the drive knob is translated via a gearless drive system to the shaft on the vacuum side. This shaft runs on ball bearings which do not require any maintenance during the entire service life.

Technical Data

FPR 16/5 N

FNR 40/20 N

| | | | |
|------------------------------------|----------------------------|-------------------------------------|-------------------------------------|
| Nominal width | DN | 16 CF-F | 40 CF-F |
| Shaft connection | mm (in.) | dia. 4 (0.16) | dia. 8(0.32) |
| Feedthrough / seal | | bellow | bellow |
| Transferable torque | | | |
| Dynamic | Nm (lbf-in) | 0.4 (3.54) | 4.0 (35.40) |
| Dynamic, at 300 °C (572 °F) | Nm (lbf-in) | 0.2 (1.77) | 2.0 (17.70) |
| Static | Nm (lbf-in) | 0.2 (1.77) | 3.0 (26.55) |
| Rotational speed | rpm | 200 | 1000 |
| at max. torque | rpm | – | 500 |
| Scale division | mm | 10° | – |
| Shaft load | | | |
| Radial | N | 10 | 60 |
| Axial | N | 5 | 20 |
| Tightness | mbar x l x s ⁻¹ | 5 x 10 ⁻¹¹ | 5 x 10 ⁻¹¹ |
| Pressure absolute | | 1 x 10 ⁻¹⁰ mbar to 2 bar | 1 x 10 ⁻¹⁰ mbar to 2 bar |
| Bakeout temperature | °C (°F) | 300 (572) | 300 (572) |
| Weight | kg (lbs) | 0.3 (0.66) | 1.5 (3.31) |
| Materials exposed to process media | | Stainless steel | Stainless steel |

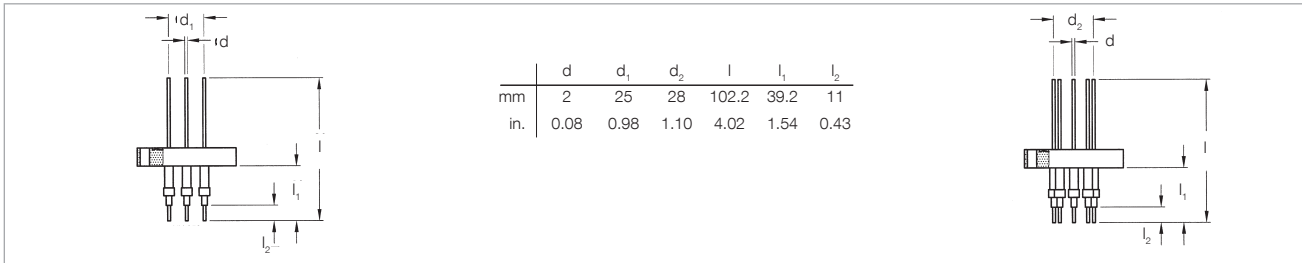
Ordering information

FPR 16/5 N

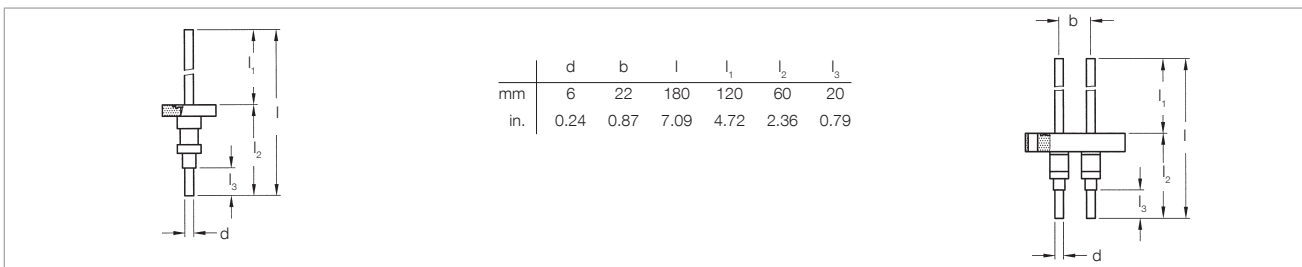
FNR 40/20 N

| | Part No. | Part No. |
|--------------------|----------------|----------------|
| Rotary feedthrough | 210 154 | 210 155 |

Current Feedthroughs



Dimensional drawing for the current feedthrough FE 40/4 (left) and FE 40/9 (right)



Dimensional drawing for the current feedthrough FEHC 16/1 (left) and FEHC 40/2 (right)

Technical Data

FE 40/4

FE 40/9

FEHC 16/1

FEHC 40/2

| Nominal width | DN | CF 40-F | CF 40-F | CF 16-F | CF 40-F |
|-------------------------------------|----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Number of feedthroughs | | 4 | 9 | 1 | 2 |
| Number of connection pieces | | | | | |
| vacuum side (set) | | 5 | 2 x 5 | 2 | 2 |
| atmospheric side (set) | | 5 | 2 x 5 | 2 | 2 |
| Voltage per pole ¹⁾ | kV | 1 | 1 | 4 | 4 |
| Current per pole ¹⁾ | A | 8 | 8 | 150 | 150 |
| Bakeout temperature | °C (°F) | 400 (752) | 400 (752) | 400 (752) | 400 (752) |
| Temperature rise at max. current ΔT | °C/min | 40 | 40 | 50 | 50 |
| Tightness | mbar x l x s ⁻¹ | 5 x 10 ⁻¹¹ | 5 x 10 ⁻¹¹ | 5 x 10 ⁻¹¹ | 5 x 10 ⁻¹¹ |
| Pressure absolute | | 1 x 10 ⁻¹⁰ mbar to 2 bar | 1 x 10 ⁻¹⁰ mbar to 2 bar | 1 x 10 ⁻¹⁰ mbar to 2 bar | 1 x 10 ⁻¹⁰ mbar to 2 bar |
| Flange | | Stainless steel | Stainless steel | Stainless steel | Stainless steel |
| Conductor | | Stainless steel | Stainless steel | Copper | Copper |
| Insulator | | Al ₂ O ₃ | Al ₂ O ₃ | Al ₂ O ₃ | Al ₂ O ₃ |
| Weight | kg (lbs) | 0.3 (0.66) | 0.4 (0.88) | 0.15 (0.33) | 0.45 (0.91) |

Ordering information

FE 40/4

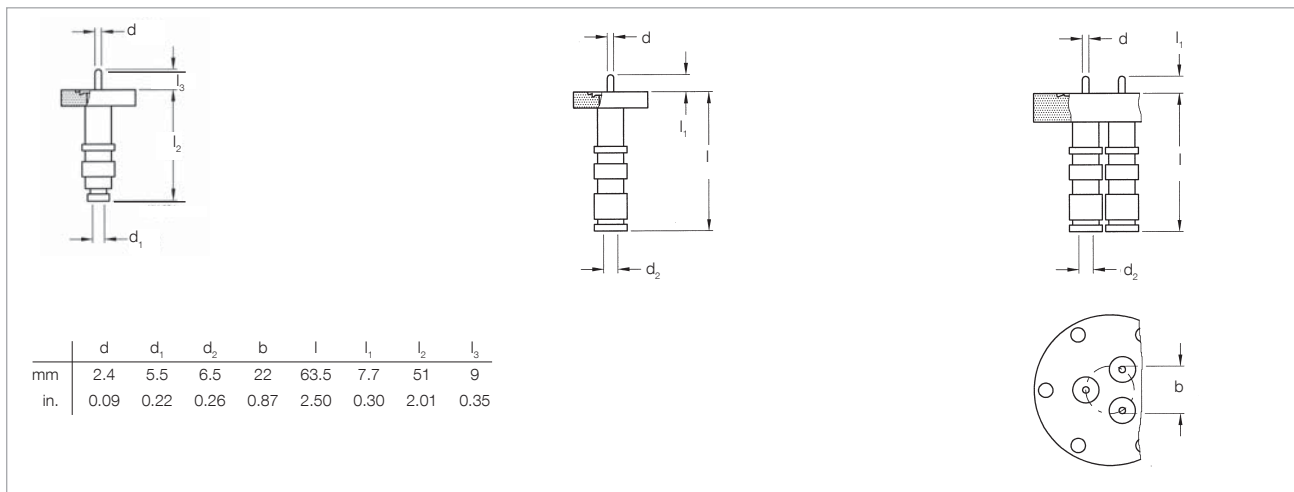
FE 40/9

FEHC 16/1

FEHC 40/2

| | Part No. | Part No. | Part No. | Part No. |
|-------------------------------------|----------------|-------------------|----------------|----------------|
| Current feedthrough | 210 310 | 210 313 | 210 335 | 210 342 |
| Connection piece, vacuum side (set) | 210 312 | 2x 210 312 | 210 337 | 210 337 |
| Connector, atmospheric side (set) | 210 311 | 2x 210 311 | 210 336 | 210 336 |

¹⁾ Local safety regulations must be met



Dimensional drawing for the current feedthrough FEF 16/1 (left), FEHV 16/1 (middle) and FEHV 40/3 (right)

Technical Data

FEF 16/1

FEHV 16/1

FEHV 40/3

| Nominal width | DN | CF 16-F | CF 16-F | CF 40-F |
|--|----------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Number of feedthroughs | | 1 | 1 | 3 |
| Voltage | | | | |
| AC, 50 Hz | kV | 0.35 | 3.5 | 3.5 |
| DC | kV | 0.5 | 5.0 | 5.0 |
| Current | A | 3 | 3 | 3 |
| Frequency | MHz | 150 | – | – |
| Impedance | Ω | 50 - 60 | – | – |
| Insulation resistance at 20 °C (68 °F) | Ω | 10 ⁺¹⁰ | 10 ⁺¹⁰ | 10 ⁺¹⁰ |
| Bakeout temperature | | | | |
| with connector | °C (°F) | 50 (122) | 50 (122) | 50 (122) |
| without connector | °C (°F) | 400 (572) ¹⁾ | 400 (572) ¹⁾ | 400 (572) ¹⁾ |
| Tightness | mbar x l x s ⁻¹ | 1 x 10 ⁻¹⁰ | 1 x 10 ⁻¹⁰ | 1 x 10 ⁻¹⁰ |
| Pressure absolute ²⁾ | | 1 x 10 ⁻¹⁰ mbar to 2.5 bar | 1 x 10 ⁻¹⁰ mbar to 2.5 bar | 1 x 10 ⁻¹⁰ mbar to 2.5 bar |
| Housing, flange, conductor | | Stainless steel | Stainless steel | Stainless steel |
| Feedthrough, seal | | Al ₂ O ₃ | Al ₂ O ₃ | Al ₂ O ₃ |
| Weight | kg (lbs) | 0.14 (0.31) | 0.14 (0.31) | 0.5 (1.10) |

Feedthroughs

Ordering information

FEF 16/1

FEHV 16/1

FEHV 40/3

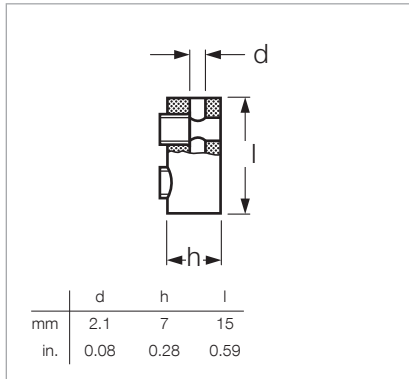
| | Part No. | Part No. | Part No. |
|-------------------------------------|------------------------|-------------------------|-------------------------|
| Current feedthrough | 210 404 | 210 402 | 210 403 |
| Outside plug (included in delivery) | BNC UG 88/U | MHV UG 932/U | MHV UG 932/U |
| Cable | RG 58/U | RG 59/U | RG 59/U |

¹⁾ With elastomer seal up to 150 °C (302 °F)

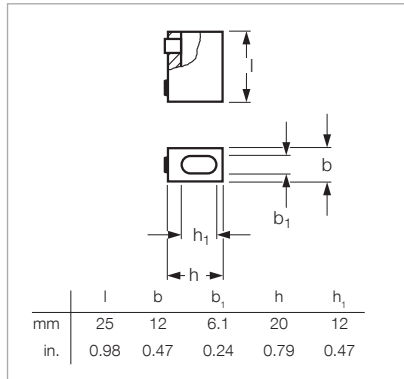
²⁾ Pressure at 400 °C (572 °F) reduced to 2 bar

Accessories for Feedthroughs

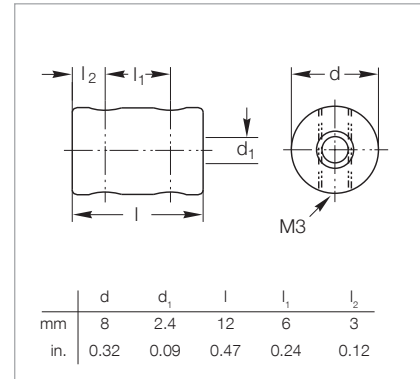
Connectors, vacuum side



Dimensional drawing for the connector used on FE 40/4 / FE 40/9



Dimensional drawing for the connector used on FE 16/1, FEHC 40/2 and FEHC 16/1



Dimensional drawing for the connector used on FEHV 16/1, FEHV 40/3 and FEF 16/1

Technical Data

Connectors Vacuum Side

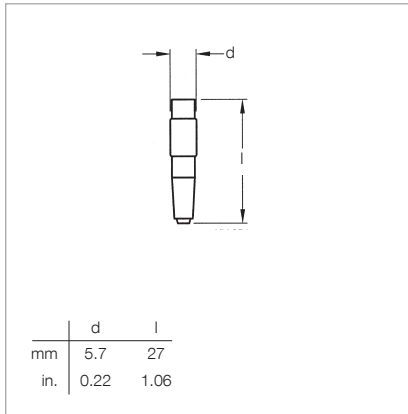
| Connector for feedthrough | | FE 40/4 / FE 40/9 | FEHC 40/2 / FEHC 16/1 | FEHV 16/1 / FEHV 40/3 / FEF 16/1 |
|---------------------------|---------|-------------------|-----------------------|----------------------------------|
| Current max. | A | 12 | 90 | 13 |
| Bakeout temperature | °C (°F) | 400 (752) | 400 (752) | 350 (662) |
| Material | | Stainless steel | Stainless steel | Copper |

Ordering information

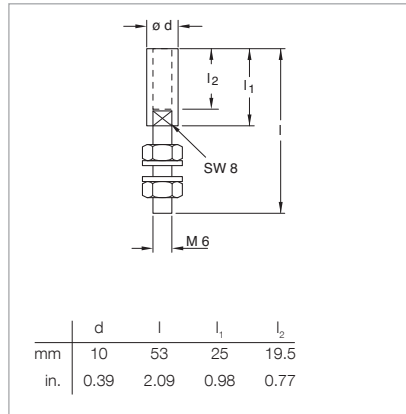
Connectors Vacuum Side

| | Part No. | Part No. | Part No. |
|-----------------------------------|----------------|----------------|---------------|
| Connector, vacuum side | - | - | 846 47 |
| Connector, vacuum side (Set of 5) | 210 312 | - | - |
| Connector, vacuum side (Set of 2) | - | 210 337 | - |

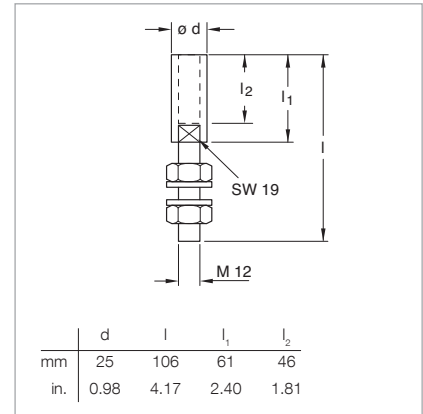
Connectors, atmospheric side



Dimensional drawing for the outside plug used on FE 40 /4 and FE 40/9



Dimensional drawing for the outside plug used on FE 16/1, FEHC 40/2 and FEHC 16/1



Dimensional drawing for the outside plug used on FEHC 40/1

Technical Data

Connectors Atmospheric Side

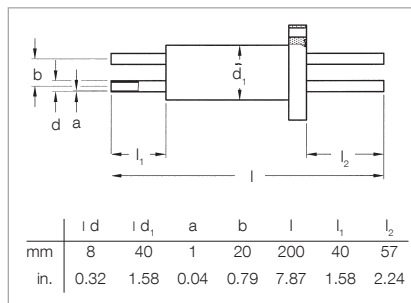
| Connector for feedthrough | | FE 40/4 / FE 40/9 | FE 16/1 / FEHC 40/2 / FEHC 16/1 | FEHC 40/1 |
|------------------------------|--------|-------------------|---------------------------------|---------------------|
| Current max. | A | 12 | 90 | 250 |
| Not insulated, for use up to | V | 50 | 50 | 50 |
| Bakeout temperature | C (°F) | 50 (122) | 150 (302) | 150 (302) |
| Material | | gold-plated brass | silver-plated brass | silver-plated brass |

Ordering information

Connectors Atmospheric Side

| | Part No. | Part No. | Part No. |
|--|----------------|----------------|----------------|
| Connector, atmospheric side | - | - | 210 339 |
| Connector, atmospheric side (Set of 5) | 210 311 | - | - |
| Connector, atmospheric side (Set of 2) | - | 210 336 | - |

CF Liquid Feedthrough



Dimensional drawing for the FL 40C/2 CF liquid feedthrough

The thermally insulated CF liquid feedthrough is used to convey cold or hot gases, liquids or liquid nitrogen.

Technical Note

The ends of the tubes are long enough that they may be bent apart so that an UHV compatible connection can be provided.

Technical Data

FL 40C/2

| | | |
|-------------------|----------------------------|---|
| Nominal width | DN | 40 CF-F |
| Feedthrough | | welded |
| Connection | mm (in.) | dia. 8 x 1 (0.31 x 0.04) |
| Number of tubes | | 2 |
| Tightness | mbar x l x s ⁻¹ | 1 x 10 ⁻¹⁰ |
| Pressure absolute | | 10 ⁻⁹ mbar to 10 bar (at 400 °C (752 °F) max. 2 bar) |
| Temperature range | C (°F) | -200 to +400 (-328 to +752) |
| Material | | Stainless steel |
| Weight | kg (lbs) | 0.4 (0.88) |

Ordering information

FL 40C/2

| | Part No. |
|-----------------------|----------|
| CF liquid feedthrough | 210 276 |

Contents

Valves

General

| | |
|---|-----|
| The Oerlikon Leybold Vacuum Valve Program | 903 |
|---|-----|

Products

Small Valves of the “micro” Range

| | |
|---|-----|
| Overview | 907 |
| Right-Angle and Straight-Through Valves, Bellows-Sealed, Various Drives | 908 |

Valves with ISO-KF Flanges

| | |
|----------------|-----|
| Overview | 911 |
|----------------|-----|

Nominal Width DN 16 ISO-KF to DN 50 ISO-KF

| | |
|--|-----|
| Right-Angle Valves, Bellows-Sealed, Manually Operated | 912 |
| Straight-Through Valves, Bellows-Sealed, Manually Operated | 913 |
| Right-Angle Valves, Bellows-Sealed, (Electro)pneumatically Operated | 914 |
| Straight-Through Valves, Bellows-Sealed, (Electro)pneumatically Operated | 916 |
| Right-Angle and Straight-Through Valves, Electromagnetically Operated | 918 |

Valves with ISO-K Flanges

| | |
|----------------|-----|
| Overview | 921 |
|----------------|-----|

Nominal Width DN 63 ISO-K to DN 160 ISO-K

| | |
|-------------------------------------|-----|
| Right-Angle Valves, Bellows-Sealed | |
| Manually Operated | 922 |
| Electropneumatically Operated | 924 |

Nominal Width DN 250 ISO-K

| | |
|---|-----|
| Right-Angle Valves, Bellows-Sealed, Electropneumatically Operated | 926 |
|---|-----|

Special Valves with ISO-KF / ISO-K / CF Flange

| | |
|----------------|-----|
| Overview | 928 |
|----------------|-----|

Nominal Width DN 10 ISO-KF to DN 40 ISO-KF or ISO-K

| | |
|--|-----|
| SECUVAC Vacuum Safety Valves | 929 |
| Interference Suppression Kit - Illuminated | 931 |
| Safety Valve | 932 |
| Power Failure Venting Valves, Electromagnetically Actuated | 933 |
| Coarse Variable Leak Valves without Isolation Valve | 934 |
| Variable Leak Valves with Isolation Valve | 935 |

Venting Valves

| | |
|------------------------------------|-----|
| Manually Operated | 936 |
| Electromagnetically Operated | 937 |

| | |
|---------------------------------------|-----|
| Vacuum Locks and Sealing Valves | 938 |
|---------------------------------------|-----|

| | |
|-------------------|-----|
| Ball Valves | 940 |
|-------------------|-----|

Accessories for the Electropneumatically Operated Valves

| | |
|--|-----|
| Pilot Valves | 942 |
| Interference Suppression Kit - Illuminated | 942 |
| Solenoid Coils for DN 250 ISO-K | 943 |

| | |
|---|-----|
| Special Valves for Turbomolecular Pumps | 944 |
|---|-----|

Nominal Width DN 16 CF to DN 63 CF

UHV Valves

| | |
|--|-----|
| All-Metal Right-Angle Valves | 946 |
| All-Metal Variable Leak Valves | 947 |

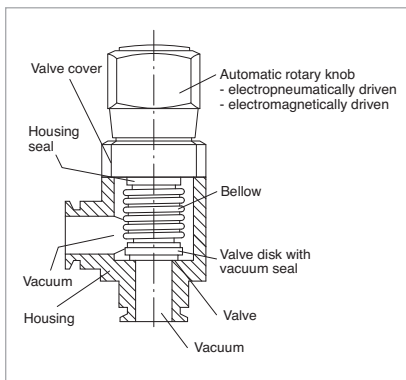
Gate Valves with ISO-KF / CF / ISO-F Flange

| | |
|--|-----|
| Overview | 949 |
| Miniature Gate Valves, ISO-KF, Manually Operated (Articulated Lever) | 950 |
| Miniature UHV Gate Valves, ISO-KF and CF | |
| Manually Operated (Handwheel) | 952 |
| Electropneumatically Operated | 954 |
| HV Gate Valves, ISO-F | |
| Manually Operated | 956 |
| Electropneumatically Operated | 958 |
| UHV Gate Valves, CF, Manually Operated | 960 |
| UHV Gate Valves, Electropneumatically Operated | |
| ISO-F Flange | 962 |
| CF Flange | 964 |

The Oerlikon Leybold Vacuum Valve Program

The long-standing experience of Oerlikon Leybold Vacuum in the area of vacuum engineering is reflected in the selection and the design of the valves and vacuum protection components for a wide variety of applications. The range of products is such that a reliable solution can be offered for every vacuum engineering application. Many years of service and the reliability of the valves is ensured by design. Oerlikon Leybold Vacuum valves are well-proven in many widely varying areas of research and industry.

The Design of a Vacuum Valve Scope of the Range of Valves



The range of Oerlikon Leybold Vacuum valves comprises:

- Small valves **micro**
- Right-angle and straight-through valves with a nominal width of DN 16 to DN 40 with ISO-KF flanges
- Right-angle valves with a nominal width of DN 63 to DN 250 with ISO-K flanges
- Gate valves with a nominal width of DN 16 to DN 250 with various flanges
- Ball valves
- Special valves

It is the aim of Oerlikon Leybold Vacuum to meet, through the offered range of isolation components and valves, the customers requirements regarding the design of such components. For this reason all valves are available with different driving systems.

With the exception of the special valves you may select between an electro-pneumatic drive or an electro-magnetic drive system.

Right-angle valves DN 16 ISO-KF to DN 40 ISO-KF as well as DN 63 ISO-K to DN 160 ISO-K are either available with an aluminium or stainless steel body (the latter up to DN 100 ISO-K only).

The special characteristics of the application in each case result in special requirements concerning features of the valves, for example:

- Coating
 - Short switching cycles (e.g. 1.5 s)
 - Very high number of opening and switching cycles (e.g. over 10 million cycles)
- Analytical engineering
 - High conductance (similar to the corresponding flange components, like bends, for example)
 - High integral leak tightness for the valves (leak rates below 10^{-9} mbar l/s)
- Lamps and tubes manufacture
 - Temperature resistant
 - Permissible ambient temperatures, 50 °C max.
- Accelerator technology
 - Materials capable of resisting radiation, high temperatures and corrosion at the same time
- Metallurgy and furnace manufacture
 - Rugged and insensitive to contamination
- Chemistry
 - Choice of materials in contact with the medium for the valve body

All applications have the following requirements in common:

- Quiet opening action with very little vibration
- Compact design, low weight
- Highly visible, unambiguous position indicator
- For use within the pressure range from 10^{-8} to 2500 mbar, if not stated otherwise
- Fully operational within the entire specified pressure range

Oerlikon Leybold Vacuum valves meet these requirements, unless otherwise stated by the technical data.

Quality Assurance

The various markets, like Analytical or Coating, for example are very demanding regarding certain important features for the valves which are to be used in the new generation of instruments currently under development. Demanded are, among other things, high reliability during the entire service life, high integral leak tightness, a high number of opening/closing cycles as well as a fast response.

The valves from Oerlikon Leybold Vacuum meet all these demanding requirements!

For further information on flange connections and flange components please refer to Catalog Parts "Flanges and Fittings" and "Feedthroughs".

Flange Designations

The flange designations used in this Catalog Part are in line with the international standards and the nomenclature used in practice:

| Flange Type | Standard | Designation with standardized nominal width ¹⁾ (DN) |
|---|--------------------------|---|
| Small flanges | ISO 2861/1 DIN 28 403 | "ISO-KF" e.g. DN 40 ISO-KF |
| Clamp flanges | ISO 1609 DIN 28 404 | "ISO-K" e.g. DN 100 ISO-K |
| Fixed flanges/ collar flanges with retaining ring | ISO 1609 DIN 28 404 | "ISO-F" "F" for fixed flange e.g. DN 250 ISO-F |

In the case of gate valves equipped with CF flanges the following must be noted:

The designation DN 35 CF for UHV flanges has been changed to DN 40 CF with the sealing parameters remaining unchanged; the same applies to DN 150 CF which has changed to DN 160 CF.

Advantages to the User

- Compact design
- Integral leak rate less than 10^{-8} mbar l x s⁻¹
- FPM (FKM) sealed
- For pressures up to 2000 mbar
- Seal in both directions ²⁾
- Principal dimensions comparable to Oerlikon Leybold Vacuum flange components of the same nominal width
- Reliable operation ensured regardless of the valve's orientation
- Optical valve position indicator as standard (not for valves of the "micro" range)
- Electrical valve position indicator as standard (not for valves of the "micro" range)
- Operation of electromagnetic ISO-KF valves off supply voltages ranging from 100 to 230 V AC

- The inside of the housing in contact with the medium is sealed off against the atmosphere by a bellows type seal which is free of lubricants.

All further technical data as well possible deviations from the general specifications stated here can be found along with the descriptions for the individual valve types.

For various applications and special design requirements Oerlikon Leybold Vacuum offers a range of special valves:

- SECUVAC vacuum safety valves (DN 16 ISO-KF to DN 100 ISO-K)
- Venting valves / power failure venting valves
- Vacuum locks / sealing valves
- Variable leak valves
- Ball valves (straight-through valve)

Accessories

All connecting components like centering rings, clamps or clamping rings needed to connect the valves must be ordered separately (see Catalog Parts "Flanges and Fittings" and "Feedthroughs").

Materials

The valve bodies and the inside parts are made of selected, vacuum compatible materials, like wrought aluminum or cast stainless steel.

The raw components are subjected to a 100% test before they are further processed.

The materials which are used are described in the tables at the end of the chapter "General".

Gaskets

Shown in the table at the end of the chapter "General" are the types of gasket used in the valves together with their brief or chemical designations and their thermal ratings.

Other Materials

| | |
|---------------------------|--------------------|
| Plastic: | Polyamide 6 (PA 6) |
| Grey cast iron: | GG 20 (0.6020) |
| Brass: | Ms 58 |
| Brass (nickel-plated): | CuZn39Pb3 |
| Nimonic | |
| Bronze | |
| Spring steel | |

¹⁾ The standardized nominal width (DN) corresponds approximately to the inside diameter, but need not necessarily be identical to the inside diameter.

²⁾ High vacuum systems are very demanding as to the leak tightness of the vacuum components used. For this reason each individual Oerlikon Leybold Vacuum valve is subjected to a helium leak test before delivery. The valves are only considered as leak tight, if a leak rate of less than 10^{-9} mbar x l x s⁻¹ can be measured for the body and the valve seat. In the case of our high vacuum valves with ISO-KF and ISO-K flanges a leak rate of less than 10^{-9} mbar x l x s⁻¹ is maintained also during actuation.

This means that in the case of a gas flow of the mentioned order of magnitude the pressure would increase only by 3 mbar in a vessel of 1 liter and in 100 years.

Materials

Aluminum Alloys

| Material No. | | Brief Designation |
|--------------|------|-------------------|
| DIN | AA | DIN |
| 3.0615 | – | AlMgSiPbF28 |
| 3.2153 | – | G AlSi7Cu3 |
| 3.2315 | 6081 | AlMgSi1F28 |
| 3.2341 | – | G AlSi5Mg wa |
| 3.2371 | – | G AlSi7Mg06 |
| 3.2373 | – | G AlSi9Mg |
| 3.2381 | – | G AlSi10Mg wa |
| 3.3527 | – | AlMg2Mn0,8F20 |

Stainless Steels

| Material No. | | Brief Designation |
|--------------|--------|---------------------|
| DIN | AISI | DIN |
| 1.4034 | 420 | X 46 Cr 13 |
| 1.4301 | 304 | X5 CrNi 18 10 |
| 1.4305 | 303 | X10 CrNi 51 89 |
| 1.4306 | 304 L | X2 CrNi 18 10 |
| 1.4308 | – | G-X6 CrNi 18 1 |
| 1.4310 | 301 | X12 CrNi 17 7 |
| 1.4404 | 316 L | X2 CrNiMo 17 13 3 |
| 1.4435 | 316 L | X2 CrNiMo 18 14 3 |
| 1.4541 | 321 | X10 CrNiTi 18 10 |
| 1.4571 | 316 Ti | X6 CrNiMoTi 17 12 2 |

Standard Steels

| Material No. | Brief Designation |
|--------------|-------------------|
| DIN | DIN |
| 1.0388 | St4/St14 |
| 1.0425 | H II |

Materials used for the Gaskets

| Brief Designation | Chemical Designation | Typical Trade Name | Degassing Temperature |
|-------------------|-----------------------------------|--------------------|-----------------------|
| FPM (FKM) | Fluor caoutchouc | Viton | up to 150 °C |
| NBR | Acrylonitrile-butadiene rubber | Perbunan | up to 80 °C |
| PTFE | Polytetrafluor ethylene | Teflon | up to 250 °C |
| EPDM | Ethylene-propylenedien caoutchouc | – | up to 150 °C |

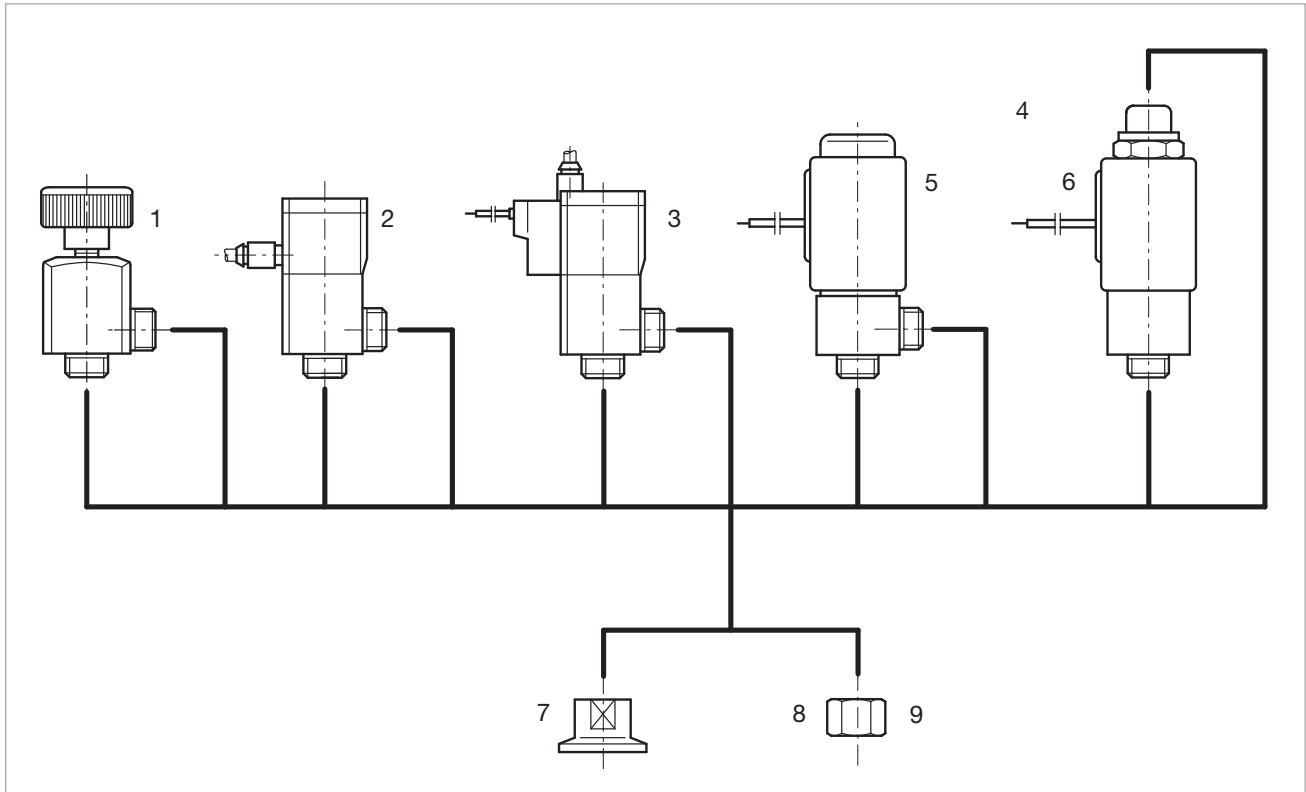
Abbreviations used in the valve designations

| Brief Designation | Valve Type |
|-------------------|---|
| EMD | Solenoid straight-through valve |
| EME | Solenoid right-angle valve |
| EPD | Electropneumatic straight-through valve |
| EPE | Electropneumatic right-angle valve |
| MAN | Manual operation |
| PD | Pneumatic straight-through valve |
| PE | Pneumatic right-angle valve |

Products

Small Valves of the “micro” Range

Overview



Oerlikon Leybold Vacuum small valves **micro** are available with any of four drive systems, two types of body and three adaptors.

Types of drive

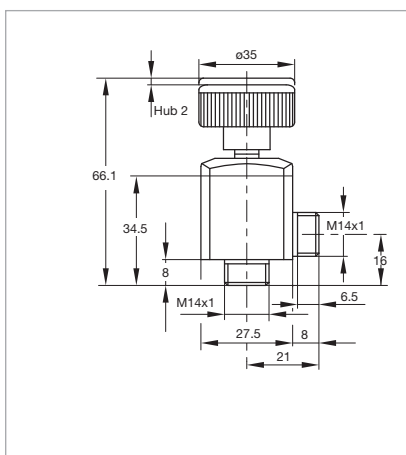
- Manual (1)
- Pneumatic (2)
- Electropneumatic (3)
- Electromagnetic (4)

Types of valve body

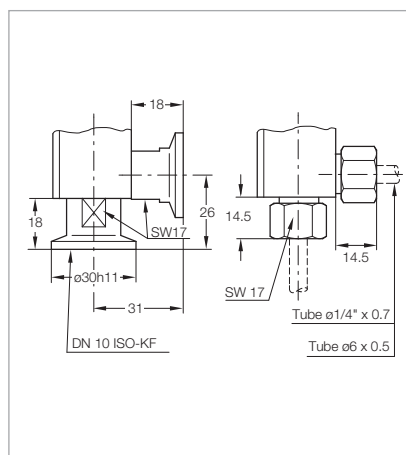
- Right-angle valve (5)
- Straight-through valve (6)

as well as adaptor

- DN 10 ISO-KF flange (7)
- 1/4" tube (8)
- 6 mm tube (9)



Dimensional drawing for the **micro** MAN



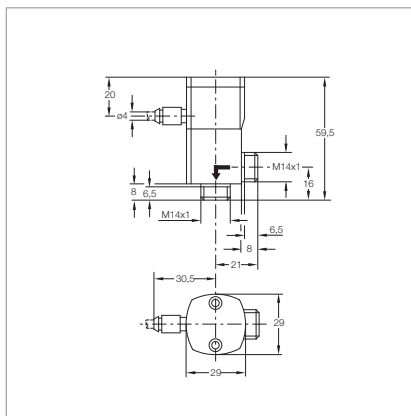
Connection dimensions for small valves **micro**

Technical Information

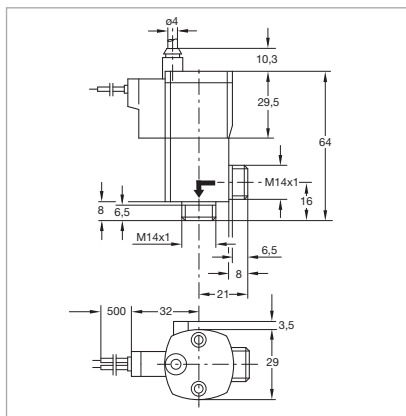
micro valves are supplied without adaptor.

The adaptors must be ordered additionally.

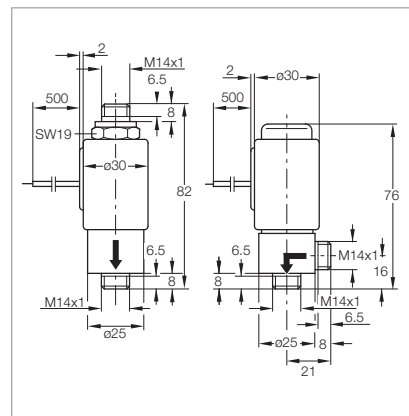
Right-Angle and Straight-Through Valves, Bellows-Sealed, Various Drives



Dimensional drawing for the pneumatically actuated small valves **micro**



Dimensional drawing for the electropneumatically actuated small valves **micro**



Dimensional drawing for the electromagnetic actuated small valves **micro**

Advantages to the User

- Small size
- High conductance in the molecular flow range
- Long service life of over 2 million switching cycles
- High switching frequency
- Protection class IP 50

Typical Applications

- Gas handling systems in production machines
- Latest generation analytical equipment

Technical Data

Small Valves "micro"

| | | Manual | Electropneumatic | Pneumatic | Electromagnetic |
|----------------------------|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Nominal width | mm | 5 | 5 | 5 | 5 |
| Integral leak rate | mbar x l/s | 10 ⁻⁹ | 10 ⁻⁹ | 10 ⁻⁹ | 10 ⁻⁹ |
| Switching cycles | | — | 5 mio. | 5 mio. | 2 mio. |
| Max. pressure differential | bar abs. | 4 | 3 | 3 | 1 |
| Closure time | ms | — | 35 | 35 | 7 |
| Opening time | ms | — | 35 | 35 | 30 |
| Max. switching frequency | min ⁻¹ | — | 150 | 150 | 300 |
| Conductance, molecular | l/s | 0.4 | 0.4 | 0.4 | 0.3 |
| Supply voltage | V DC | — | 24 (with pilot valve) | — | 24 |
| Max. power consumption | W | — | 1 | — | 10 |
| Material | | | | | |
| Valve body | | stainless steel (1.4301) | stainless steel (1.4301) | stainless steel (1.4301) | stainless steel (1.4301) |
| Inside section | | stainless steel (1.4301) | stainless steel (1.4301) | stainless steel (1.4301) | stainless steel (1.4301) |
| Gaskets | | O-rings of FPM (FKM) | O-rings of FPM (FKM) | O-rings of FPM (FKM) | O-rings of FPM (FKM) |
| Drive | | aluminum/plastic | aluminum anodized | aluminum anodized | stainless steel 1.4105 |

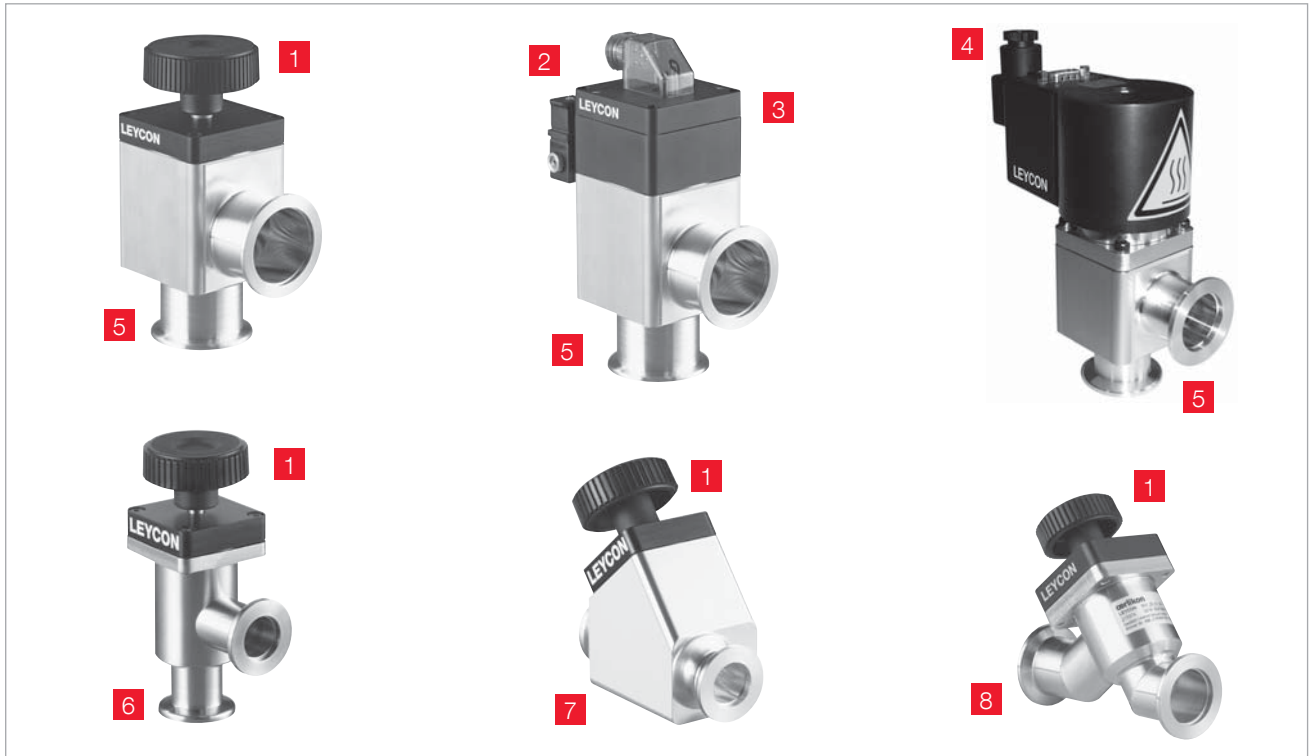
Ordering Information

Small Valves "micro"

| | | Manual | Electropneumatic | Pneumatic | Electromagnetic |
|---|------|------------------|------------------|---------------|-----------------|
| | Type | Part No. | Part No. | Part No. | Part No. |
| Right-Angle Valves | | | | | |
| Manual | MAN | 284 48 | - | - | - |
| Without pilot valve, normally closed | PE | - | - | 284 40 | - |
| With pilot valve, normally closed | EPE | - | 284 41 | - | - |
| With pilot valve, normally closed, with flanges DN 10 ISO-KF | PE | - | - | 284 47 | - |
| Electromagnetic, normally closed | EME | - | - | - | 284 44 |
| Straight-Through Valves | | | | | |
| Electromagnetic, normally closed | EMD | - | - | - | 284 45 |
| Electromagnetic, normally open | EMD | - | - | - | 284 46 |
| Adaptor (1 piece) | | | | | |
| Flange DN 10 ISO-KF | | 284 50 | 284 50 | 284 50 | 284 50 |
| Tube 1/4" | | 284 51 | 284 51 | 284 51 | 284 51 |
| Tube 6 mm | | 284 52 | 284 52 | 284 52 | 284 52 |
| Spare parts | | | | | |
| Seal kit | | ES 105 80 | 105 81 | 105 81 | 108 82 |
| Spare part kit | | 105 85 | 105 82 | 105 82 | - |
| Spare part set for micro EME | | - | - | - | 105 83 |
| Spare part set for micro EMD | | - | - | - | 105 84 |

Valves with ISO-KF Flanges

Overview



Oerlikon Leybold Vacuum ISO-KF valves are available with any of four drive systems and four types of body having a nominal width of DN 16, 25, 40 and 50 ISO-KF.

Abbreviations used in connection with bellows sealed valves:

B Bellows sealed

A Angle (valve)

I Inline (valve)

V Valve

M Rotary knob

P Pneumatically actuated
(without pilot valve)

EP Electropneumatically actuated
(with pilot valve)

EM Electromagnetically actuated

AL Aluminum body

SS Stainless steel body

BAV ... EP AL ...

Types of drive

- Rotary knob **1** with bellows seal
- Pneumatic **2** with bellows seal
- Electropneumatic **3** with bellows seal
- Electromagnetic **4**

Types of valve body

- Right-angle valve, aluminum body **5**
- Right-angle valve, stainless steel body **6**
- Straight-through valve, aluminum body **7**
- Straight-through valve, stainless steel body **8**

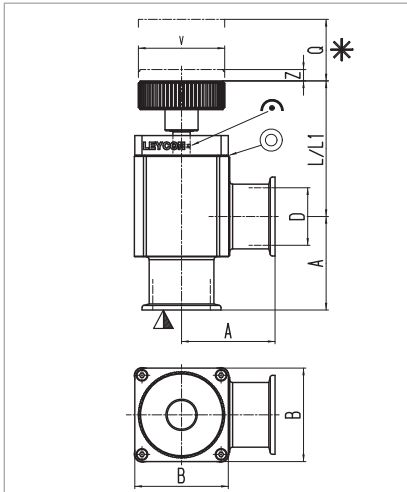
Materials Used

| | Aluminum version | Stainless steel version |
|---|---|----------------------------|
| Housing | Aluminum (AlMgSi) EN-AW 6060 ¹⁾ | Stainless steel (AISI 304) |
| Inner section ¹⁾ | Aluminum (AlMgSi) | Stainless steel (AISI 304) |
| Drive unit ²⁾ | Aluminum | Aluminum |
| Valve disk | AISI 316L | AISI 316L |
| Bellows | AISI 316 | AISI 316 |
| Head and disk O-ring | Viton | Viton |
| Rotary knob | Plastic | Plastic |
| Position indicating cover ²⁾ | Plastic | Plastic |
| Housing cover ¹⁾ | Plastic | Plastic |

¹⁾ For the solenoid version only

²⁾ For pneumatic and electropneumatic version only

Right-Angle Valves, Bellows-Sealed, Manually Operated



Dimensional drawing for the manually operated, bellows-sealed, right-angle valves

Dimension Table

| DN | ISO-KF | 16 | 25 | 40 | 50 |
|------------------|--------|------|------|------|-------|
| A | mm | 40 | 50 | 65 | 70 |
| B | mm | 40 | 48 | 65 | 77 |
| D | mm | 16 | 25 | 40 | 50 |
| L ¹⁾ | mm | 64.9 | 60.9 | 94.3 | 101.1 |
| L1 ²⁾ | mm | 67.4 | 64.3 | 97.3 | 104.1 |
| Q | mm | 46.0 | 44.0 | 73.5 | 85.5 |
| V | mm | 40 | 40 | 60 | 60 |
| Z ³⁾ | mm | 3.6 | 4.7 | 7.9 | 9.3 |

¹⁾ Aluminum version

²⁾ Stainless steel version

³⁾ Disk stroke is greater due to the transmission

Advantages to the User

Valves with Rotary Knob

- Allow also for reduced venting of systems
- Suited as a manually operated variable leak valve to roughly control gas flows
- Leak tight in both directions up to a pressure of 2.0 bar and easy to open
- Installation in any orientation

Connection Icons

- ▼ Side of the valve seat
- * Required clearance
- ☺ Mechanical position indicator
- ⊙ Leak detection bore

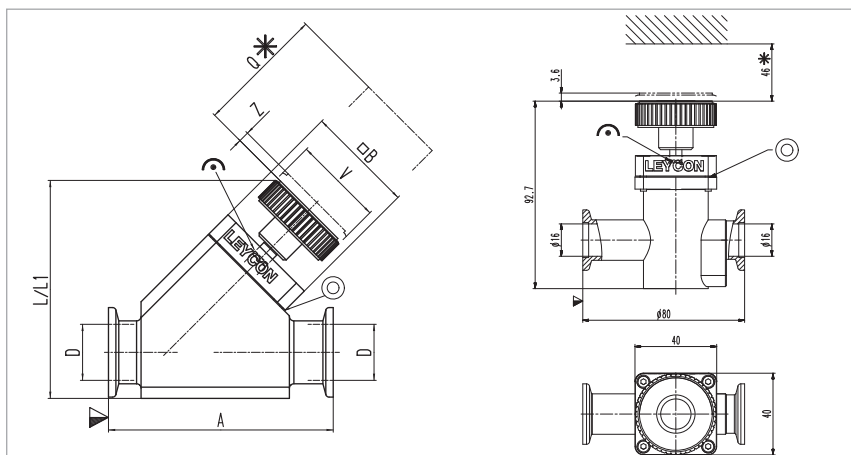
Technical Data

| | | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF | |
|--|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel |
| Service life | cycles | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| Conductance at molecular flow | $l \times s^{-1}$ | 5 | 5 | 14 | 14 | 45 | 45 | 50 | 50 |
| Leak rate | $mbar \times l \times s^{-1}$ | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} |
| Operating pressure range | mbar | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 |
| Differential pressure, closing and opening direction | bar | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 |
| Ambient / operating temperature, max. | °C | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| Seal | | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) |
| Weight | kg | 0.3 | 0.3 | 0.4 | 0.5 | 1.0 | 1.1 | 1.4 | 1.5 |

Ordering Information

| | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF | |
|--|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|
| | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel |
| | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
| Right-angle valve, rotary knob | | | | | | | | |
| BAV ... M AL | 215 375 | - | 215 376 | - | 215 377 | - | 215 378 | - |
| BAV ... M AL EPDM | 215 384 V01 | - | - | - | - | - | - | - |
| BAV ... M SS | - | 215 383 | - | 215 385 | - | 215 386 | - | 215 387 |
| Spare parts | | | | | | | | |
| Bellows feedthrough | E 242 292 | E 242 292 | E 233 014 | E 233 014 | E 229 542 | E 229 542 | E 244 980 | E 244 980 |
| Knob | E 245 912 | E 245 912 | E 245 912 | E 245 912 | E 245 913 | E 245 913 | E 245 913 | E 245 913 |
| Seal kit consisting of disk seal (O-ring) and head seal (O-ring) | EK 242 324 | EK 242 324 | EK 241 077 | EK 241 077 | EK 241 079 | EK 241 079 | EK 245 556 | EK 245 556 |

Straight-Through Valves, Bellows-Sealed, Manually Operated



Dimensional drawing for the manually operated, bellows-sealed straight-through valves; right DN 16 ISO-KF

Dimension Table

| DN | ISO-KF | 16 | 25 | 40 | 50 |
|------------------|--------|------|-------|-------|-------|
| A | mm | 80 | 100 | 130 | 178 |
| B | mm | 40 | 48 | 65 | 77 |
| D | mm | 16 | 25 | 40 | 50 |
| L ¹⁾ | mm | 90.6 | 97.0 | 143.5 | 167.2 |
| L1 ²⁾ | mm | 92.8 | 105.8 | 152.5 | 172.1 |
| Q | mm | 46.0 | 44.0 | 73.5 | 85.5 |
| V | mm | 40 | 40 | 60 | 60 |
| Z ³⁾ | mm | 3.6 | 4.7 | 7.9 | 9.3 |

¹⁾ Aluminum version

²⁾ Stainless steel version

³⁾ Disk stroke is greater due to the transmission

Advantages to the User

Valves with Rotary Knob

- Allow also for reduced venting of systems
- Suited as a manually operated variable leak valve to roughly control gas flows
- Leak tight in both directions up to a pressure of 2.0 bar and easy to open
- Installation in any orientation

Connection Icons

- ▼ Side of the valve seat
- * Required clearance
- ⊙ Mechanical position indicator
- ⊙ Leak detection bore

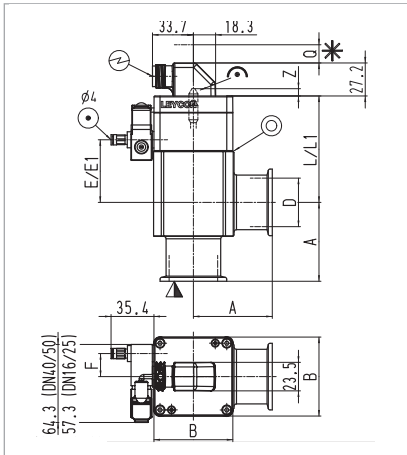
Technical Data

| | | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF |
|--|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum |
| Service life | cycles | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| Conductance at molecular flow | $l \times s^{-1}$ | 5 | 5 | 14 | 14 | 45 | 45 | 50 |
| Leak rate | $mbar \times l \times s^{-1}$ | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} |
| Operating pressure range | mbar | $10^{-8} - 5000$ | $10^{-8} - 5000$ | $10^{-8} - 5000$ | $10^{-8} - 5000$ | $10^{-8} - 5000$ | $10^{-8} - 5000$ | $10^{-8} - 5000$ |
| Differential pressure, closing and opening direction | bar | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 |
| Ambient / operating temperature, max. | °C | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| Seal | | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) |
| Weight | kg | 0.4 | 0.8 | 0.5 | 0.5 | 1.3 | 1.2 | 2.2 |

Ordering Information

| | | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF |
|--|--|--------------|---------------|--------------|---------------|--------------|---------------|--------------|
| | | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum |
| | | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
| Straight-through valve, rotary knob | | | | | | | | |
| BAV ... M AL | | 215 313 | - | 215 388 | - | 215 389 | - | 215 390 |
| BAV ... M SS | | - | 215 379 | - | 215 374 | - | 215 381 | - |
| Spare parts | | | | | | | | |
| Bellows feedthrough | | E 242 292 | E 242 292 | E 233 014 | E 233 014 | E 229 542 | E 229 542 | E 244 980 |
| Knob | | E 245 912 | E 245 912 | E 245 912 | E 245 912 | E 245 913 | E 245 913 | E 245 913 |
| Seal kit consisting of disk seal (O-ring) and head seal (O-ring) | | EK 242 324 | EK 242 324 | EK 241 077 | EK 241 077 | EK 241 079 | EK 241 079 | EK 245 556 |

Right-Angle Valves, Bellows-Sealed, (Electro)pneumatically Operated



Dimensional drawing right-angle valves,
with fitted pilot valve

Dimension Table

| DN | ISO-KF | 16 | 25 | 40 | 50 |
|------------------|--------|------|------|------|------|
| A | mm | 40 | 50 | 65 | 70 |
| B | mm | 40 | 48 | 65 | 77 |
| D | mm | 16 | 25 | 40 | 50 |
| L ¹⁾ | mm | 65.2 | 60.6 | 87.7 | 96.0 |
| L1 ²⁾ | mm | 67.7 | 64.0 | 90.7 | 99.0 |
| Q | mm | 46.0 | 44.0 | 73.5 | 85.5 |
| F | mm | 9 | 13 | 19 | 20 |
| Z | mm | 2.0 | 4.0 | 9.5 | 10.0 |
| E ¹⁾ | mm | 35.6 | 30.6 | 51.6 | 58.4 |
| E1 ²⁾ | mm | 38.1 | 34.0 | 54.6 | 61.4 |

¹⁾ Aluminum version

²⁾ Stainless steel version

Connection Icons

- ▼ Side of the valve seat
- * Required clearance
- ☉ Mechanical position indicator
- ⊙ Leak detection bore
- ⊕ Electrical connection
- ⊙ Compressed air connection

Advantages to the User

- Quiet opening and closing action with very little vibration
- Short opening and closing times
- Optical valve position indicator as standard
- Very low leak rate and insensitive to particles owing to bellows seal. Always closed in case the compressed air supply fails
- Electric position indicator is standard
- With and without pilot valve as standard
- Standard electrical and compressed air connections
- Protection class IP 50
- The valves are closed by the restoring force of a spring
- Installation in any orientation and no restrictions as to the direction of flow

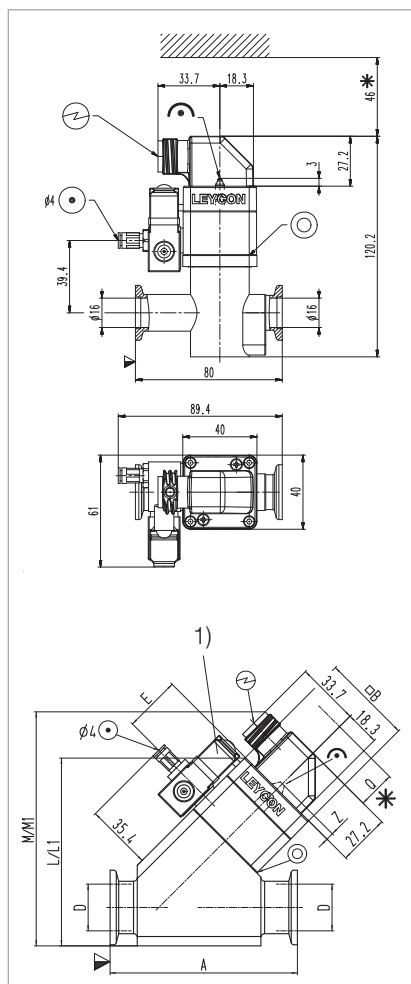
Technical Data

| | | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF | |
|--|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel |
| Service life | cycles | 10 mio. | 10 mio. | 10 mio. | 10 mio. | 10 mio. | 10 mio. | 10 mio. | 10 mio. |
| Conductance at molecular flow | $l \times s^{-1}$ | 5 | 5 | 14 | 14 | 45 | 45 | 80 | 80 |
| Leak rate | mbar $\times l \times s^{-1}$ | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} |
| Operating pressure range | mbar | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 |
| Differential pressure, closing and opening direction | bar | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 |
| Ambient / Operating temperature, max. | °C | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| Seal | | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) |
| Closing time / opening time | ms | 100 / 100 | 100 / 100 | 210 / 120 | 210 / 120 | 550 / 250 | 550 / 250 | 650 / 400 | 650 / 400 |
| Switching frequency | 1/min | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Position indicator, switching capacity | | | | | | | | | |
| Voltage | V AC / V DC | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 |
| Current | A | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 |
| Power | W | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 |
| Control valve | V DC / W | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 |
| Compressed air, overpressure | bar | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 |
| Air cylinder, volume | cm ³ | 0.004 | 0.004 | 0.011 | 0.011 | 0.035 | 0.035 | 0.047 | 0.047 |
| Compressed air connection | mm | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 |
| Weight, with pilot valve | kg | 0.3 | 0.3 | 0.4 | 0.5 | 1.0 | 1.1 | 1.4 | 1.5 |

Ordering Information

| | | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF | |
|--|--|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|
| | | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel |
| | | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
| Right-angle valves, bellows sealed | | | | | | | | | |
| BAV ... P AL | | 215 315 | - | 215 316 | - | 215 317 | - | 215 318 | |
| BAV ... P SS | | - | 215 335 | - | 215 336 | - | 215 337 | - | 215 338 |
| BAV ... EP AL 24 V AC | | 215 319 | - | 215 320 | - | 215 321 | - | 215 322 | - |
| BAV ... EP SS 24 V AC | | - | 215 339 | - | 215 340 | - | 215 341 | - | 215 342 |
| BAV ... EP AL 24 V DC | | 215 323 | - | 215 324 | - | 215 325 | - | 215 326 | - |
| BAV ... EP AL 24 V DC, normally open | | 215 395 V01 | - | 215 394 V01 | - | 215 130 | - | - | - |
| BAV ... EP SS 24 V DC | | - | 215 347 | - | 215 348 | - | 215 349 | - | 215 350 |
| BAV ... EP AL 115 V AC | | 215 327 | - | 215 328 | - | 215 329 | - | 215 330 | - |
| BAV ... EP SS 115 V AC | | - | 215 351 | - | 215 352 | - | 215 353 | - | 215 354 |
| BAV ... EP AL 230 V AC | | 215 331 | - | 215 332 | - | 215 333 | - | 215 334 | - |
| BAV ... EP SS 230 V AC | | - | 215 343 | - | 215 344 | - | 215 345 | - | 215 346 |
| Spare parts | | | | | | | | | |
| Bellows feedthrough | | E 242 292 | E 242 292 | E 233 014 | E 233 014 | E 229 542 | E 229 542 | E 244 980 | E 244 980 |
| Seal kit consisting of disk seal (O-ring) and head seal (O-ring) | | EK 242 324 | EK 242 324 | EK 241 077 | EK 241 077 | EK 241 079 | EK 241 079 | EK 245 556 | EK 245 556 |
| Mating plug (included with the valve) | | 599998003 | 599998003 | 599998003 | 599998003 | 599998003 | 599998003 | 599998003 | 599998003 |

Straight-Through Valves, Bellows-Sealed, (Electro)pneumatically Operated



Dimensional drawing
for the straight-through valves
with fitted pilot valve (EP)
without pilot valve (P)
(on top DN 16 ISO-KF, stainless steel)
1) pilot valve

Dimension Table

| DN | ISO-KF | 16 | 25 | 40 | 50 |
|----|--------|------|-------|-------|-------|
| A | mm | 80 | 100 | 130 | 178 |
| B | mm | 40 | 48 | 65 | 77 |
| D | mm | 16 | 25 | 40 | 50 |
| L | mm | 91.5 | 100.3 | 140.9 | 170.1 |
| Q | mm | 46.0 | 44.0 | 73.5 | 85.5 |
| E | mm | 29.6 | 30.0 | 36.1 | 37.6 |
| Z | mm | 2.0 | 4.0 | 9.5 | 10.0 |
| M | mm | 120 | 125 | 160 | 185 |

Connection Icons

- ▼ Side of the valve seat
- * Required clearance
- ☉ Mechanical position indicator
- ⊙ Leak detection bore
- ⊕ Electrical connection
- ⊙ Compressed air connection

Advantages to the User

- Quiet opening and closing action with very little vibration
- Short opening and closing times
- Optical valve position indicator as standard
- Very low leak rate and insensitive to particles owing to bellows seal – thus always closed in case the compressed air supply fails
- Electric position indicator is standard
- With and without pilot valve as standard
- Protection class IP 50
- Standard electrical and compressed air connections
- The valves are closed by the restoring force of a spring

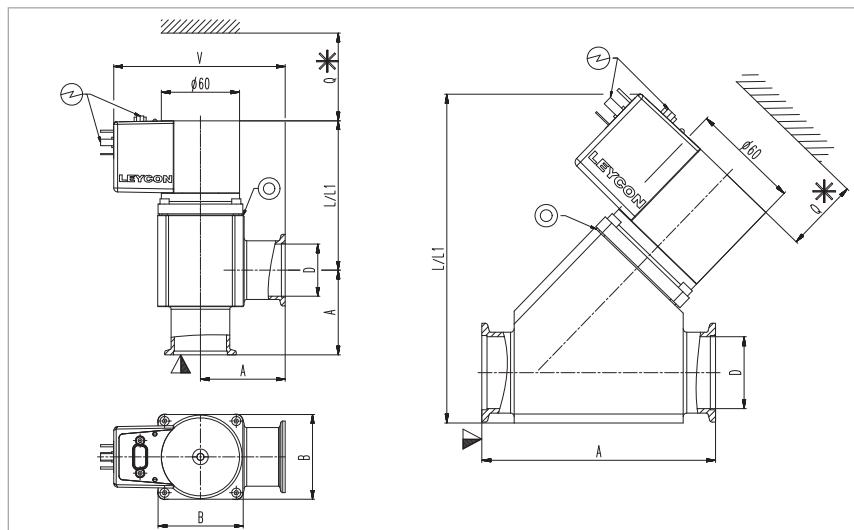
Technical Data

| | | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF |
|---|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum |
| Service life | cycles | 10 mio. | 10 mio. | 10 mio. | 10 mio. | 10 mio. | 10 mio. | 10 mio. |
| Conductance at molecular flow | $l \times s^{-1}$ | 5 | 5 | 14 | 14 | 45 | 45 | 80 |
| Leak rate | $mbar \times l \times s^{-1}$ | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} |
| Operating pressure range | mbar | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 | 10^{-8} - 5000 |
| Differential pressure, closing and opening direction | bar | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 | 5 / 2 |
| Ambient / Operating temperature, max. | °C | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| Seal | | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) | FPM (FKM) |
| Closing time / opening time | ms | 100 / 100 | 100 / 100 | 210 / 120 | 210 / 120 | 550 / 250 | 550 / 250 | 650 / 400 |
| Switching frequency | 1/min | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Position indicator, switching capacity | | | | | | | | |
| Voltage | V AC / V DC | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 |
| Current | A | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 |
| Power | W | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 |
| Pilot valve | V DC / W | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 | 24 / 2.5 |
| Compressed air, overpressure | bar | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 | 4 to 8 |
| Air cylinder, volume | l | 0.004 | 0.004 | 0.011 | 0.011 | 0.035 | 0.035 | 0.047 |
| Compressed air connection | mm | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 | 4 and 6 |
| Weight, with pilot valve | kg | 0.3 | 0.8 | 0.5 | 0.5 | 1.3 | 1.2 | 2.2 |

Ordering Information

| | | DN 16 ISO-KF | | DN 25 ISO-KF | | DN 40 ISO-KF | | DN 50 ISO-KF |
|--|------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|
| | | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum | Stainl. Steel | Aluminum |
| | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. | Part No. |
| Straight-through valve, bellows sealed | | | | | | | | |
| BIV ... P SS | - | 215 355 | - | 215 356 | - | 215 357 | - | - |
| BIV ... EP SS 24 V AC | - | 215 359 | - | 215 360 | - | 215 361 | - | - |
| BIV ... EP AL 24 V DC | 215 314 | - | 215 391 | - | 215 392 | - | 215 393 | - |
| BIV ... EP SS 24 V DC | - | 215 367 | - | 215 368 | - | 215 369 | - | - |
| BIV ... EP SS 115 V AC | - | 215 371 | - | 215 372 | - | 215 373 | - | - |
| BIV ... EP SS 230 V AC | - | 215 363 | - | 215 364 | - | 215 365 | - | - |
| Spare parts | | | | | | | | |
| Bellows feedthrough | E 242 292 | E 242 292 | E 233 014 | E 233 014 | E 229 542 | E 229 542 | E 244 980 | |
| Seal kit consisting of disk seal (O-ring) and head seal (O-ring) | EK 242 324 | EK 242 324 | EK 241 077 | EK 241 077 | EK 241 079 | EK 241 079 | EK 245 556 | |
| Mating plug (included with the valve) | 599998003 | 599998003 | 599998003 | 599998003 | 599998003 | 599998003 | 599998003 | |

Right-Angle and Straight-Through Valves, Electromagnetically Operated



Dimensional drawing for the electromagnetically operated valves,
right-angle valves (left) and straight-through valves (right)

**Dimension Table
Right-Angle Valves**

| DN | ISO-KF | 16 | 25 | 40 |
|----|--------|-------|-------|-------|
| A | mm | 40 | 50 | 65 |
| B | mm | 40 | 48 | 65 |
| D | mm | 16 | 25 | 40 |
| L | mm | 100 | 93 | 114 |
| L1 | mm | 102.5 | 103.4 | 117.0 |
| Q | mm | 46.0 | 44.0 | 73.5 |
| V | mm | 106.5 | 116.5 | 131.5 |

**Dimension Table
Straight-Through Valves**

| DN | ISO-KF | 16 | 25 | 40 |
|----|--------|-------|-------|-------|
| A | mm | 80 | 100 | 130 |
| B | mm | 40 | 48 | 65 |
| D | mm | 16 | 25 | 40 |
| L | mm | 148 | 153 | 183 |
| L1 | mm | 149.5 | 161.0 | 192.0 |
| Q | mm | 46.0 | 44.0 | 73.5 |

Connection Icons

- ▼ Side of the valve seat
- * Required clearance
- ⊙ Leak detection bore
- ⊗ Electrical connection

Electromagnetic valves are particularly well suited for vacuum systems in which the valves need to be remotely controlled and where compressed air is not readily available.

Advantages to the User

- Selectable operating mode:
 - Remote control via programmable control or personal computer
 - direct operation by switching the supply voltage on and off
- Well visible, unambiguous optical position indicator: open (green LED) and closed (orange LED)
- Integrated electrically floating position indicator (opto-coupler for 48 V DC)
- Optical error indicator (LEDs flash)
- Protection class IP 40
- Spring action closure, thus closed when the power fails
- Low operating temperature
- Installation in any orientation and no restrictions as to the direction of flow

Technical Data

DN 16 ISO-KF

DN 25 ISO-KF

DN 40 ISO-KF

| | | | | |
|---|-------------------------------|-----------------------|-----------------------|-----------------------|
| Service life | cycles | 200,000 | 200,000 | 200,000 |
| Conductance at molecular flow | $l \times s^{-1}$ | 5 | 14 | 45 |
| Leak rate | $mbar \times l \times s^{-1}$ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ |
| Operating pressure range | mbar | 10^{-8} to 2 bar | 10^{-8} to 2 bar | 10^{-8} to 2 bar |
| Differential pressure, closing and opening direction | bar | ≤ 2 | ≤ 2 | ≤ 2 |
| Ambient / operating temperature, min. / max. | °C | 0 to +50 | 0 to +50 | 0 to +50 |
| Opening / closing time | s | 0.2 | 0.2 | 0.2 |
| Switching frequency | 1/min | 15 | 15 | 15 |
| at ambient temperature | °C | 20 | 20 | 20 |
| Rating, max. | V AC / V DC | 48 | 48 | 48 |
| Rating for the valve position indicator, max. | mA | 500 | 500 | 500 |
| Power consumption, max. | | | | |
| Actuation | W | 700 (~100 ms) | 700 (~100 ms) | 700 (~100 ms) |
| Hold | W | 10 | 10 | 10 |
| Supply voltage, max. | V AC | 100 - 115 / 200 - 240 | 100 - 115 / 200 - 240 | 100 - 115 / 200 - 240 |
| Frequency | Hz | 50/60 | 50/60 | 50/60 |
| Protection class | IP | 40 | 40 | 40 |
| Weight | kg | 1.3 | 1.5 | 1.8 |

Ordering Information

DN 16 ISO-KF

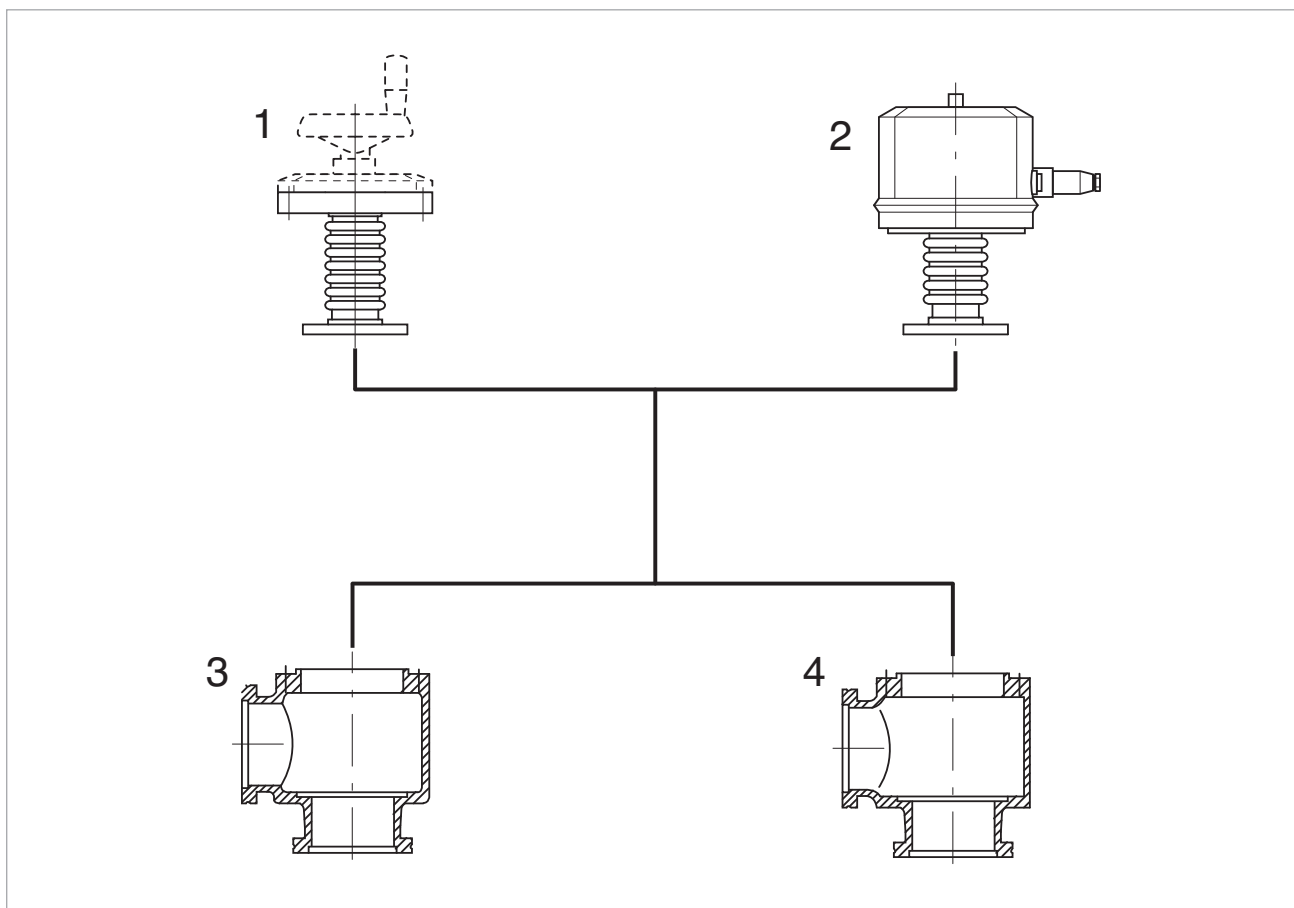
DN 25 ISO-KF

DN 40 ISO-KF

| | Part No. | Part No. | Part No. |
|--|---------------------------------|--------------------|--------------------|
| Right-angle valve, bellows-sealed, electromagnetic actuator, microprocessor controlled | Aluminum Stainless steel | | |
| BAV ... EM AL | | | |
| 100-120 V, 50/60 Hz | 215 004 V02 - | 215 064 V02 | 215 124 V02 |
| 200-240 V, 50/60 Hz | 215 004 V01 - | 215 064 V01 | 215 124 V01 |
| BAV ... EM SS | | | |
| 100-120 V, 50/60 Hz | - 215 006 V02 | 215 079 V02 | 215 134 V02 |
| 200-240 V, 50/60 Hz | - 215 006 V01 | 215 079 V01 | 215 134 V01 |
| Spare parts | | | |
| Seal kit | EK 396 788 | EK 388 499 | EK 388 450 |

Valves with ISO-K Flanges

Overview



Oerlikon Leybold Vacuum valves with ISO-K flanges are available with any of two drives and either of two bodies.

Types of drive

- Handwheel **(1)**
- Electropneumatic drive, bellows-sealed **(2)**

Body types

- Right-angle valve with aluminum body **(3)**
- Right-angle valve with stainless steel body **(4)**

Advantages to the User

- Full exchangeability of the subassemblies
- Two types of drive
- Two body options
- Standard nominal widths to DIN 28 404 and ISO 1609
- Simplified stocking of spare parts

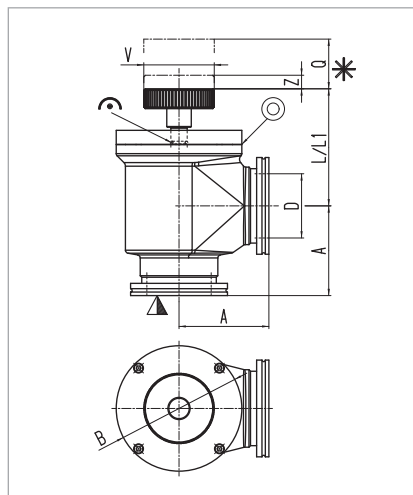
Connection Pictograms

- ➊ Position indicator connection
- ➋ Compressed air connection
- ➌ Power connection
- ➍ Position indicator

From DN 63 ISO-K only right-angle valves are available.

Nominal widths DN 63 ISO-K and DN 100 ISO-K are available in aluminum and stainless steel, DN 160 ISO-K in aluminum only.

Right-Angle Valves, Bellows-Sealed, Manually Operated



Dimensional drawing for the right-angle valves, bellows-sealed, manually operated

The universal valves are particularly well suited for systems where remote control is not mandatory. Moreover, the valves may be used for maintenance purposes in connection with backing pumps or condensate separators.

Dimension Table

| DN | ISO-K | |
|----|-------|-------|
| 63 | | |
| A | mm | 200.0 |
| B | mm | 107.6 |
| C | mm | 141.5 |
| D | mm | 88.0 |
| E | mm | 13.4 |

Advantages to the User

- Removable handle
- Modular design
- Rugged and compact
- Easy to clean
- Gentle venting of systems
- Seal in both directions up to a pressure difference of 1.5 bar
- Easy manual operation, for an effortless vacuum-tight seal
- May also be used as a variable leak valve to roughly control gas flows
- Installation in any orientation and no restrictions as to the direction of flow

Technical Data

DN 63 ISO-K

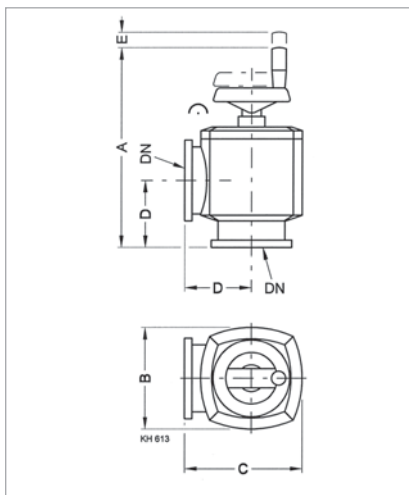
| | | |
|--|-------------------------------|---|
| Service life | cycles | 3 millions |
| Conductance at molecular flow | $l \times s^{-1}$ | 160 |
| Leak rate | $mbar \times l \times s^{-1}$ | 1×10^{-9} |
| Operating pressure range | mbar | 1×10^{-8} to 4 |
| Differential pressure, closing and opening direction | bar | $< 5 / < 2$ |
| Opening against differential pressure | bar | < 1 in both directions |
| Ambient / Operating temperature, max. | °C | 80 |
| Seal | | FKM (Viton) |
| Weight | | |
| Aluminum body | kg | 2.4 |
| Stainless steel body | kg | 4.0 |
| Material | | |
| Valve body | | aluminum alloy (EN AC-42000) or stainless steel AISI 304 (1.4301, 1.4305) |
| Disk | | stainless steel AISI 316L (1.4404, 1.4435) |
| Bellows | | stainless steel AISI 316L (1.4404, 1.4435), 316 Ti (1.4571) |

Ordering Information

DN 63 ISO-K

| | Part No. |
|--|------------|
| Right-angle valve, bellows-sealed, manually operated | |
| Aluminum body | 107 80 V01 |
| Stainless steel body | 107 83 V01 |
| Spare parts | |
| Seal kit | EK 357 196 |
| Bellows feedthrough | EK 248 442 |

Right-Angle Valves, Bellows-Sealed, Manually Operated



Dimensional drawing for the right-angle valves, bellows-sealed, manually operated

These universal valves are ideal especially for smaller systems, where remote control is not essential. They may be also installed in larger systems, where backing pumps or condensate separators or similar units are to be cut off at longer intervals for maintenance purposes by maintenance personnel.

Dimension Table

| | | |
|----|-------|-----|
| DN | ISO-K | 100 |
| A | mm | 320 |
| B | mm | 164 |
| C | mm | 190 |
| D | mm | 108 |
| E | mm | 25 |

Advantages to the User

- Gentle venting of systems
- Seal in both directions up to a pressure difference of 1.5 bar
- Easy manual operation, for an effortless vacuum-tight seal
- May also be used as a variable leak valve to roughly control gas flows
- Installation in any orientation and no restrictions as to the direction of flow

Technical Data

DN 100 ISO-K

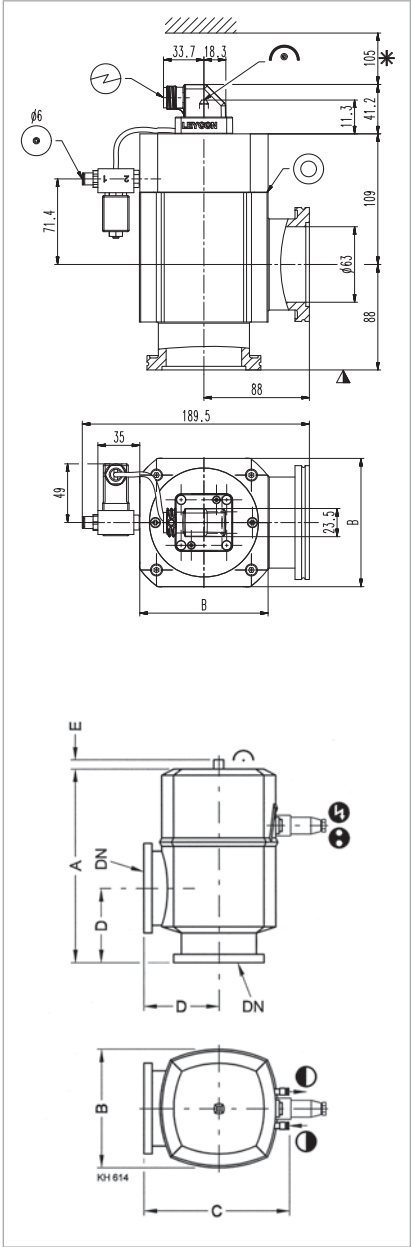
| | | |
|---|-------------------------------|--|
| Service life | cycles | 10.000 |
| Conductance at molecular flow | $l \times s^{-1}$ | 330 |
| Leak rate | $mbar \times l \times s^{-1}$ | 1×10^{-9} |
| Operating pressure range | mbar | $10^{-8} - 1500$ |
| Differential pressure, closing and opening direction | bar | 1.5 |
| Opening against differential pressure at the valve disk | bar | 1.5 |
| Ambient / Operating temperature, max. | °C | 60 |
| Seal | | FPM (FKM) |
| Weight | | |
| Aluminum body | kg | 6.1 |
| Stainless steel body | kg | 11.1 |
| Material | | |
| Valve body | | aluminum alloy (3.2373.63) or stainless steel (1.4305) |
| Inside section | | stainless steel (1.4541/1.4301) |
| Lid | | grey cast iron (GG 20) |
| Gasket | | O-rings made of FPM (FKM) |

Ordering Information

DN 100 ISO-K

| | Part No. |
|--|-------------------|
| Right-angle valve, bellows-sealed, manually operated | |
| Aluminum body | 107 81 |
| Stainless steel body | 107 84 |
| Spare parts | |
| Seal kit | ES 215 271 |
| Inside section | 215 274 |

Right-Angle Valves, Bellows-Sealed, Electropneumatically Operated



Dimensional drawing for the electropneumatically actuated right-angle valves (above DN 63 ISO-K)

Electropneumatically actuated right-angle valves are used in automated vacuum systems which need to be controlled electrically.

Dimension Table

| DN | ISO-K | 63 | 100 | 160 |
|----|-------|-------|-------|-------|
| A | mm | 197 | 282 | 366 |
| B | mm | 123 | 170 | 221 |
| C | mm | 189.5 | 208.0 | 264.0 |
| D | mm | 88 | 108 | 138 |
| E | mm | 41.2 | 14.0 | 14.0 |
| ● | mm | 6 | 6 | 6 |

Advantages to the User

- Pneumatic or electropneumatic opening
- Short opening and closing times
- Optical position indicator
- Electric position indicator
- With and without pilot valve IP 54
- Protection class IP 50
- The valves are closed by the restoring force of a spring
- Installation in any orientation and no restrictions as to the direction of flow

Technical Data

DN 63 ISO-K

DN 100 ISO-K

DN 160 ISO-K

| | | | | |
|--|----------------------------|---------------------------|---------------------------|---------------------------|
| Service life | cycles | 3.0 mio. | 1.5 mio. | 1.5 mio. |
| Conductance for molecular flow | l x s^{-1} | 160 | 330 | 800 |
| Leak rate | mbar x l x s^{-1} | 1×10^{-9} | 1×10^{-9} | 1×10^{-9} |
| Operating pressure range | mbar | 1×10^{-8} - 4000 | 1×10^{-8} - 1500 | 1×10^{-8} - 1500 |
| Differential pressure, closing and opening direction | bar | 2.0 | 1.5 | 1.5 |
| Opening against differential pressure at the valve disk | bar | 1.5 | 1.5 | 1.5 |
| Ambient / operating temperature, max. | °C | 80 | 60 | 60 |
| Seal | | FPM (FKM) | FPM (FKM) | FPM (FKM) |
| Closing time / opening time | ms | 250 / 300 | 300 / 450 | 550 / 450 |
| Switching frequency | 1/min | 60 | 60 | 40 |
| Position indicator, rating | V AC / A V DC / A | 50 / 0.1 50 / 0.1 | 250 / 0.125 50 / 0.25 | 250 / 0.125 50 / 0.25 |
| Compressed air, overpressure | bar | 4 to 8 | 4 to 8 | 4 to 8 |
| Compressed air volume | cm^3 | 112 | 195 | 570 |
| Compressed air connection | mm | 6 | 6 | 6 |
| Weight with pilot valve | | | | |
| Aluminum housing | kg | 3.5 | 6.7 | 11.4 |
| Stainless steel housing | kg | 4.0 | 11.7 | – |

Ordering Information

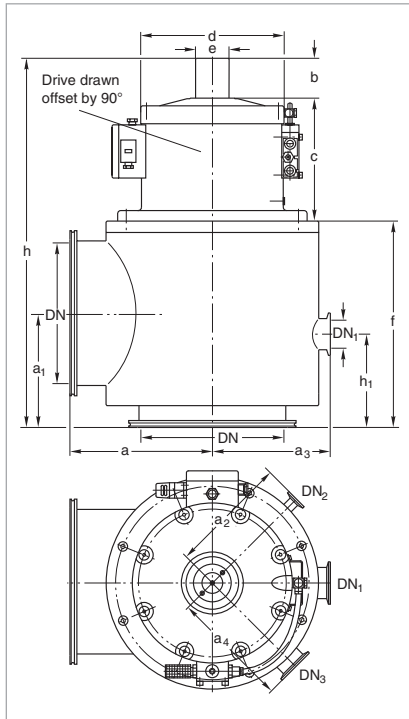
DN 63 ISO-K

DN 100 ISO-K

DN 160 ISO-K

| | Part No. | Part No. | Part No. |
|---|-------------------|-------------------|-------------------|
| Right-angle valve, bellows-sealed, electropneumatic drive without pilot valve | | | |
| Aluminum body | 107 90 V01 | 107 91 | 107 92 |
| Stainless steel body | 107 93 V01 | 107 94 | – |
| Valve with pilot valve 24 V DC | | | |
| Aluminum body | 108 00 V01 | 108 01 | 108 02 |
| Stainless steel body | 108 10 V01 | 108 11 | – |
| Valve with pilot valve 24 V AC | | | |
| Aluminum body | 108 03 V01 | 108 04 | 108 05 |
| Stainless steel body | 108 13 V01 | 108 14 | – |
| Valve with pilot valve 100 - 115 V AC | | | |
| Aluminum body | 108 20 V01 | 108 21 | 108 22 |
| Stainless steel body | – | – | – |
| Valve with pilot valve 200 - 240 V AC | | | |
| Aluminum body | 108 25 V01 | 108 26 | 108 27 |
| Stainless steel body | 108 35 V01 | 108 36 | – |
| Spare parts | | | |
| Seal kit | EK 357 196 | ES 215 271 | ES 215 291 |
| Bellows feedthrough | E 248 442 | E 215 273 | E 215 293 |
| Mating plug (included with the valve) | 599998003 | 599998003 | 599998003 |

Right-Angle Valves, Bellows-Sealed, Electropneumatically Operated



Dimensional drawing for the right-angle valves with bellows

Right-angle valves of this size are used, for example in metallurgy, large coat-ers, in the area of space simulation.

Dimension Table

| | DN | 250 ISO-K |
|-----------------------------------|----|-----------|
| DN | mm | 261 |
| h, ca. | mm | 650 |
| a | mm | 250 |
| a ₁ | mm | 200 |
| a ₂ , a ₄ | mm | 208 |
| a ₃ | mm | 205 |
| h ₁ | mm | 163 |
| DN ₁ , for bypass 1 | | 50 ISO-KF |
| DN ₂ , for bypass 2 | | 40 ISO-KF |
| DN ₃ , for meas. conn. | | 16 ISO-KF |
| b | mm | 69.5 |
| c | mm | 218 |
| d | mm | 250 |
| e | mm | 58 |
| f | mm | 363 |
| Travel | mm | 62.5 |
| Travel/DN ¹⁾ | mm | 1/4 |

¹⁾ For example travel = 1/4 DN

Advantages to the User

- No vibrations when the valve open or closes
- Low leak rate ($< 10^{-9}$ mbar $\times l \times s^{-1}$) – drive system basically insensitive to particles
- Non-contact valve position indicator for reliable indication of the valve's position (open/closed)
- Wide range of different solenoid coils for all commonly used control voltages
- Additional flange for bypass lines and for connecting vacuum gauges (see Catalog Part "Vacuum - measuring, controlling")

Technical Data

DN 250 ISO-K

| | | |
|---|----------------------------|---|
| Service life, vertical | cycles, approx. | 1 x 10 ⁶ |
| Conductance at molecular flow | l x s ⁻¹ | 2700 |
| Leak rate | mbar x l x s ⁻¹ | 1 x 10 ⁻⁹ |
| Opening / closing time, at 6 bar compressed air pressure | s | 6 / 6 |
| Compressed air, overpressure | bar | 4 to 8 |
| Hose diameter | mm | 6 x 1 |
| Compressed air cylinder, volume | cm ³ | 2100 |
| Max. ambient temperature | °C | 40 |
| Weight | kg | 66 |
| Supply voltage | V | Various voltages are possible; see chapter "Special Valves with ISO-KF / ISO-K / CF Flanges", para. "Accessories for the Electropneumatically Operated Valves", product "Solenoid Coils" |
| Material | | |
| Body, valve disk | | stainless steel |
| Drive / Compressed air cylinder | | aluminum / cast aluminum (3.2153) |
| Piston rod, Intermediate flange | | stainless steel (1.4305) |
| Gaskets | | FPM (FKM) |
| Lid | | aluminum (3.2341) |
| Hood | | plastic (PA 6) |

Ordering Information

DN 250 ISO-K

| | Part No. |
|---|-----------------|
| Right-angle valve, bellows-sealed, electropneumatic drive without solenoid coil Stainless steel body | 281 84 |
| Solenoid coil for various supply voltages | X |
| Interference suppression kits for different voltages | Y |
| Spare parts | |
| Seal kit | E 105 65 |
| Inside section | E 105 75 |

X = Part Nos. see chapter "Special Valves with ISO-KF / ISO-K / CF Flanges",
para. "Accessories for the Electropneumatically Operated Valves", product "Solenoid Coil"

Y = Part Nos. see chapter "Special Valves with ISO-KF / ISO-K / CF Flanges",
para. "Accessories for the Electropneumatically Operated Valves", product "Pilot Valves"

Special Valves with ISO-KF/ISO-K/CF Flange

Overview



Oerlikon Leybold Vacuum offers a range of special valves for a variety of different applications and to meet special design requirements of customers.

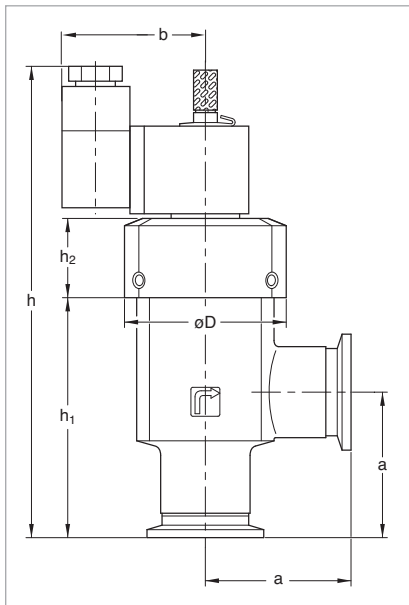
Among these are:

- SECUVAC vacuum safety valves (DN 16 ISO-KF to DN 100 ISO-K) **1**
- Venting Valves **2**

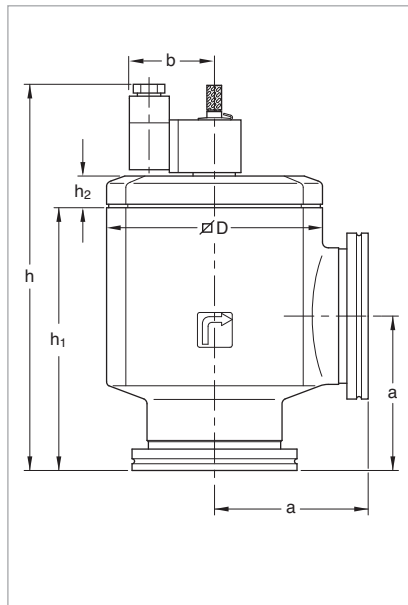
- Power failure venting valves **3**
- Vacuum Locks **4**
- Sealing Valves **4**
- Variable leak valves **5**
- Ball Valves **6**

These valves ideally supplement our range of ISO-KF and ISO-K valves.

SECUVAC Vacuum Safety Valves



Dimensional drawing for the SECUVAC valves with ISO-KF small flanges



Dimensional drawing for the SECUVAC valves with ISO-K clamp flanges

These solenoid right-angle valves were specially developed for use with rotary vacuum pumps which are not equipped with a built-in anti-suckback valve. The SECUVAC safety valve protects the vacuum system against unplanned venting via the backing pump in case of a power failure and it ensures that the vacuum system remains sealed until the backing pump, after it has restarted, has evacuated the connecting lines.

Dimension Table Special Valves (ISO-KF)

| | DN | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
|----------------------|----|-----------|-----------|-----------|
| a | mm | 40 | 50 | 65 |
| b | mm | 49 | 49 | 49 |
| D | mm | 44 | 56 | 82 |
| h | mm | 138.6 | 161.8 | 178.3 |
| h₁ | mm | 62.3 | 82.5 | 100.0 |
| h₂ | mm | 24 | 27 | 26 |

Dimension Table Special Valves (ISO-K)

| | DN | 63 ISO-K | 100 ISO-K |
|----------------------|----|----------|-----------|
| a | mm | 88 | 108 |
| b | mm | 49 | 49 |
| D | mm | 124 | 164 |
| h | mm | 220.5 | 263.5 |
| h₁ | mm | 150 | 175 |
| h₂ | mm | 18.2 | 36.2 |

Advantages to the User

Two valve functions in one:

- Fast-closing high vacuum isolation valve for separating the vacuum chamber or a vapor jet pump (a diffusion pump, for example) from the backing pump
- Venting valve for venting of the valve's chamber and thus the pump (backing pump)
- Immediate closing action upon power failure
- Opening action only after the in-take line has been evacuated
- Delayed isolation of the vacuum chamber and venting the vacuum pump (negligible "gulp")

Typical Applications

- Safety isolation valve between backing pump and vacuum chamber or vapor jet pumps (protection of the vacuum chamber against venting in the event of a power failure)

Technical Data

| | | SECUVAC Valve | | |
|-------------------------------|-------------------------------|---------------------------|---------------------------|---------------------------|
| | | DN 16 ISO-KF | DN 25 ISO-KF | DN 40 ISO-KF |
| Conductance at molecular flow | $l \times s^{-1}$ | 3.8 | 11.0 | 30.5 |
| Current consumption DC | W | 2.5 | 2.5 | 2.5 |
| Actuation / holding AC | VA | 5.0 / 3.7 | 5.0 / 3.7 | 5.0 / 3.7 |
| Leak tightness, body | $mbar \times l \times s^{-1}$ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ |
| Leak tightness, valve disk | $mbar \times l \times s^{-1}$ | $< 1 \times 10^{-5}$ | $< 1 \times 10^{-5}$ | $< 1 \times 10^{-5}$ |
| Installation orientation | | any | any | any |
| Operating pressure range | mbar | 1×10^{-8} - 1000 | 1×10^{-8} - 1000 | 1×10^{-8} - 1000 |
| Differential pressure | | | | |
| for opening | mbar | 150 | 150 | 150 |
| for closing | mbar | 150 | 150 | 150 |
| Opening time | s | < 15 | < 15 | < 15 |
| Closing time / reaction time | ms | < 100 / < 50 | < 100 / < 50 | < 100 / < 50 |
| Ambient temperature | °C | +5 to +50 | +5 to +50 | +5 to +50 |
| Protection | IP | 65 | 65 | 65 |
| Weight | kg | 0.3 | 0.5 | 0.9 |
| Material | | | | |
| Body | | aluminum | aluminum | aluminum |
| Gaskets | | FPM (FKM) | FPM (FKM) | FPM (FKM) |

Technical Data

| | | SECUVAC Valve | |
|-------------------------------|-------------------------------|---------------------------|---------------------------|
| | | DN 63 ISO-K | DN 100 ISO-K |
| Conductance at molecular flow | $l \times s^{-1}$ | 126 | 300 |
| Current consumption DC | W | 2.5 | 2.5 |
| Actuation / holding AC | VA | 5.0 / 3.7 | 5.0 / 3.7 |
| Leak tightness, body | $mbar \times l \times s^{-1}$ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ |
| Leak tightness, valve disk | $mbar \times l \times s^{-1}$ | $< 1 \times 10^{-5}$ | $< 1 \times 10^{-5}$ |
| Installation orientation | | any | any |
| Operating pressure range | mbar | 1×10^{-8} - 1000 | 1×10^{-8} - 1000 |
| Differential pressure | | | |
| for opening | mbar | 150 | 150 |
| for closing | mbar | 150 | 150 |
| Opening time | s | < 30 | < 30 |
| Closing time / reaction time | ms | < 100 / < 50 | < 100 / < 50 |
| Ambient temperature | °C | 5 to 50 | 5 to 50 |
| Protection | IP | 65 | 65 |
| Weight | kg | 2.4 | 5.1 |
| Material | | | |
| Body | | aluminum | aluminum |
| Gaskets | | FPM (FKM) | FPM (FKM) |

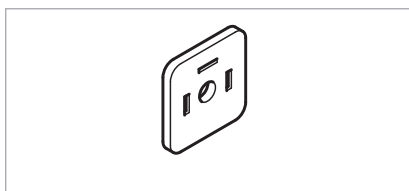
Ordering Information

| | DN 16 ISO-KF | SECUVAC Valve DN 25 ISO-KF | DN 40 ISO-KF |
|--|--------------|-------------------------------|--------------|
| | Part No. | Part No. | Part No. |
| SECUVAC valve | | | |
| 24 V DC | 215 015 | 215 065 | 215 135 |
| 100 - 115 V AC | 215 016 | 215 066 | 215 136 |
| 200 - 230 V AC | 215 017 | 215 067 | 215 137 |
| Spare parts | | | |
| Seal kit | E 105 02 | E 105 04 | E 105 05 |
| Solenoid coils for SECUVAC valves and power failure venting valves | | | |
| 24 V DC | E 215 242 | E 215 242 | E 215 242 |
| 100 - 115 V AC / 50/60 Hz | E 215 241 | E 215 241 | E 215 241 |
| 200 - 230 V AC / 50/60 Hz | E 215 240 | E 215 240 | E 215 240 |
| Filter for SECUVAC valves and power failure venting valves (set of 5 pcs.) | 215 701 | 215 701 | 215 701 |

Ordering Information

| | DN 63 ISO-K | SECUVAC Valve DN 100 ISO-K |
|--|-------------|-------------------------------|
| | Part No. | Part No. |
| SECUVAC valve | | |
| 24 V DC | 215 205 | 215 225 |
| 100 - 115 V AC | 215 206 | - |
| 200 - 230 V AC | 215 207 | 215 227 |
| Spare parts | | |
| Seal kit | E 105 07 | E 105 08 |
| Solenoid coils for SECUVAC valves and power failure venting valves | | |
| 24 V DC | E 215 242 | E 215 242 |
| 100 - 115 V AC / 50/60 Hz | E 215 241 | E 215 241 |
| 200 - 230 V AC / 50/60 Hz | E 215 240 | E 215 240 |
| Filter for SECUVAC valves and power failure venting valves (set of 5 pcs.) | 215 701 | 215 701 |

Interference Suppression Kit - Illuminated



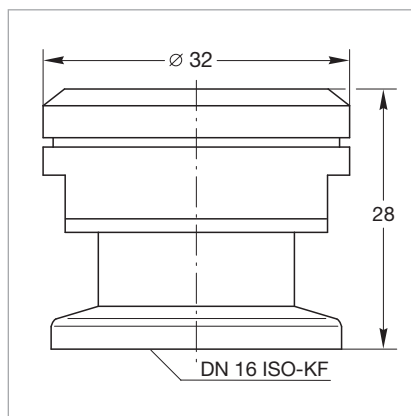
As an option for the solenoid coil, an interference suppression kit is offered which reliably prevents any interferences from affecting other equipment operating in the vicinity.

Ordering Information

Interference Suppression Kit

| | Part No. |
|---|----------|
| Interference suppression kit 24 V DC | 104 96 |

Safety Valve



Dimensional drawing for the safety valve

Typical Applications

- Protecting sealed vacuum systems like cryopumps, cryostats, lifting devices, for example against internal overpressures
- Mandatory for systems which are separated when cold, as a means of protection against overpressures

Technical Data

Safety Valve

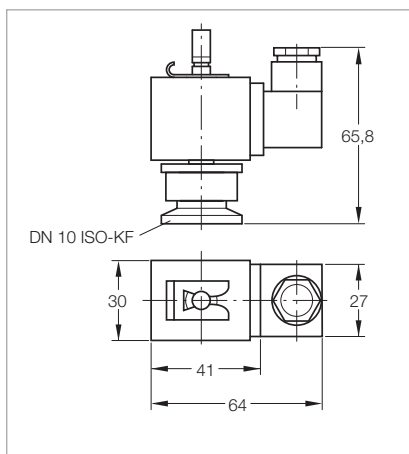
| | | |
|---|---------------------|---|
| Responding pressure | mbar | 1150 ±40 |
| Flow at 140 mbar | l x h ⁻¹ | 500 |
| Valve disk | | Spring loaded, with O-ring seal |
| Leak rate in the closed state mbar x l x s ⁻¹ (Torr x l x s ⁻¹) | | < 1 x 10 ⁻⁸ (< 0.75 x 10 ⁻⁸) |
| Connection | DN | 16 ISO-KF |
| Diameter | mm | 32 |
| Overall height | mm | 28 |
| Weight | kg | 0.3 |

Ordering Information

Safety Valve

| | Part No. |
|-------------------------------------|----------|
| Safety valve on DN 16 ISO-KF flange | 890 39 |

Power Failure Venting Valves, Electromagnetically Actuated



Dimensional drawing for the power failure venting valve

Power failure venting valves are open when de-energized and are used to automatically vent pumps, systems or vacuum vessels in the event of a power failure.

Permissible pressure difference
< 2.5 bar (0 bar on the vacuum side).

Advantages to the User

- Can be installed in any orientation
- Protection against being contaminated by filtering of the inflowing air
- Easy to install
- Simple filter exchange

Technical Data

| | | |
|---|----------------------------|------------------------|
| Leak tightness | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁷ |
| Venting time for a 50 l vessel | s | 270 |
| Opening time / closing time ¹⁾ | ms | 30 / 30 |
| Protection class to DIN 40 050 | IP | 65 |
| Permissible ambient temperature | °C | 50 |
| Weight | kg | 0.1 |
| Dimensions (W x H x D) | mm | 64 x 66 x 30 |
| Material | | |
| Body | | aluminum |
| Seal | | NBR |
| Armature | | brass |
| Filter | | bronze |

Power Failure Venting Valves electromagnetically actuated

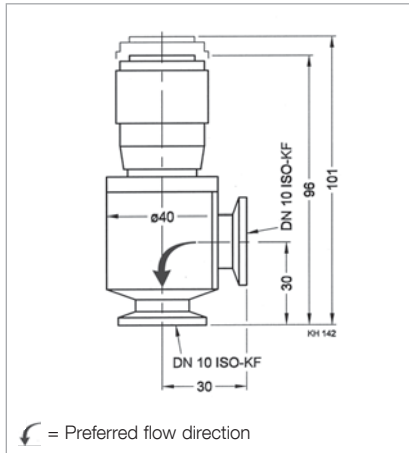
Ordering Information

Power Failure Venting Valves electromagnetically actuated

| | Part No. |
|---|--------------------|
| Power failure venting valve DN 10 ISO-KF, electromagnetically actuated, with inlet filter | |
| 230 V / 50/60 Hz | 174 26 |
| 24 V DC | 174 46 |
| Centering ring DN 10 ISO-KF with sinter filter | 883 50 |
| Spare solenoid valves | see SECUVAC valves |
| Filter for SECUVAC valves and power failure venting valves (set of 5 pcs.) | 215 701 |

¹⁾ At a differential pressure $V_p = 0$ bar

Coarse Variable Leak Valve without Isolation Valve

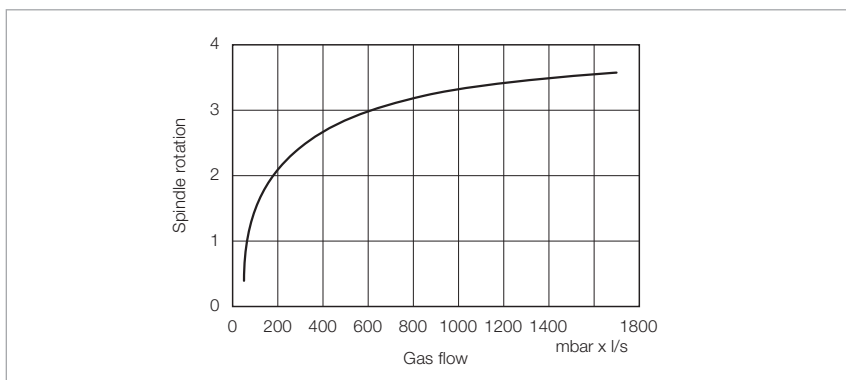


Dimensional drawing for the coarse variable leak valve without isolation valve

With coarse variable leak valves without isolation valve precisely defined quantities of gas may be admitted within a controllable period of time into evacuated vessels.

Applications

- Gas admission rates of 40 to 1700 mbar x l x s⁻¹ allow coarse variable leak valves to be used in almost all applications



Variable leak characteristic for the coarse variable leak valve without isolation valve

Technical Data

Coarse Variable Leak Valve without Isolation Valve

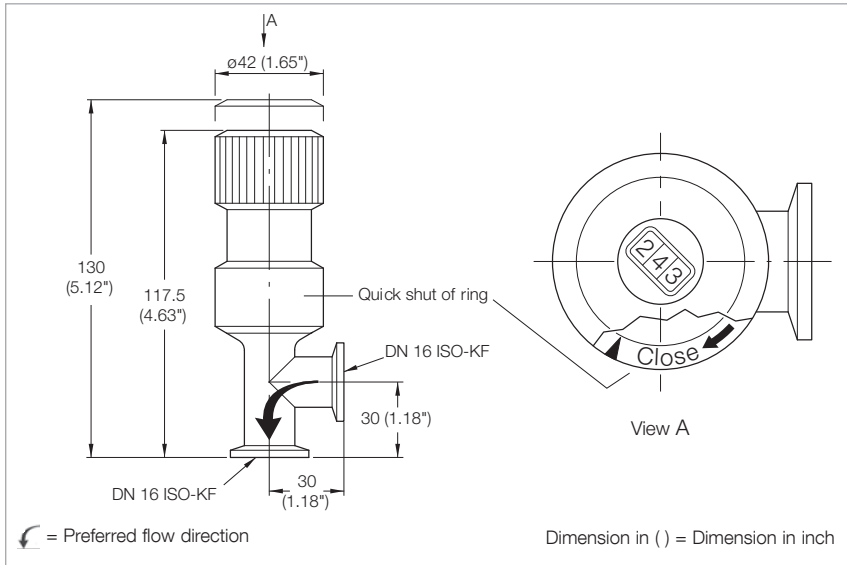
| | | |
|---------------------------------|----------------------------|----------------------------|
| Gas flow controllable | mbar x l x s ⁻¹ | 40 - 1700 |
| Tightness | mbar x l x s ⁻¹ | 1 x 10 ⁻⁸ |
| Differential pressure | bar | 3 |
| Bake out temperature, housing | °C | 100 |
| Material (housing / valve disk) | | aluminum / stainless steel |
| Seal | | FPM (FKM) |
| Weight | kg | 0.2 |

Ordering Information

Coarse Variable Leak Valve without Isolation Valve

| | Part No. |
|---|----------|
| Coarse variable leak valve without isolation valve, DN 10 ISO-KF | 215 020 |

Variable Leak Valve with Isolation Valve

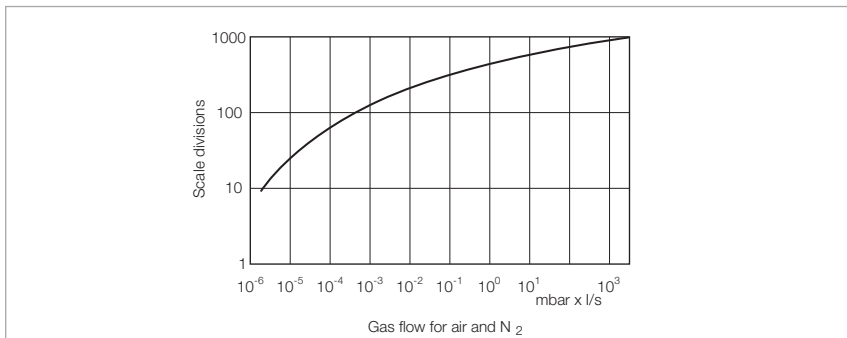


Dimensional drawing for the variable leak valve with isolation valve

Variable leak valves with a isolation valve permit an interruption of the gas supply without changing the gas admission rate setting.

Applications

- Gas admission rates of 1000 to 5×10^{-6} mbar x l x s⁻¹ allow variable leak valves to be used in almost all applications
- Through the digital display, the opening point may be accurately set at any time or a certain gas flow may be defined
- Blocking valve



Variable leak characteristic for the variable leak valve with isolation valve

Technical Data

Variable Leak Valve with Isolation Valve

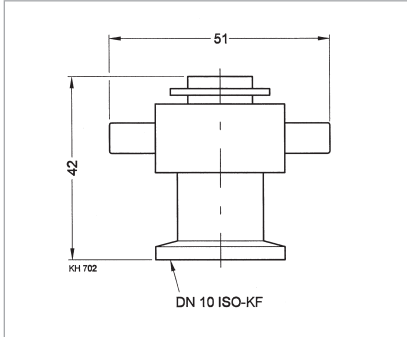
| | | |
|------------------------------------|----------------------------|---------------------------|
| Gas flow controllable | mbar x l x s ⁻¹ | 5×10^{-6} - 1000 |
| Tightness | mbar x l x s ⁻¹ | 1×10^{-9} |
| Differential pressure | bar | 2.5 |
| Dead volume | cm ³ | 0.032 |
| Operating temperature | °C | 80 |
| Bakeout temperature, flanges | °C | 150 |
| Material (housing, needle, filter) | | stainless steel |
| Material (needle sleeve) | | fluorplastomer |
| Seal | | FPM (FKM) |
| Weight | kg | 0.4 |

Ordering Information

Variable Leak Valve with Isolation Valve

| | Part No. |
|---|----------------|
| Variable leak valve with isolation valve, DN 16 ISO-KF | 215 010 |

Venting Valves, Manually Operated



Dimensional drawing for the venting valve,
manually operated

Venting valves are used to vent small vacuum systems.

Advantages to the User

- Simple opening and closing of the valve by loosening or tightening the screw cap

Technical Data

Venting Valve manually operated

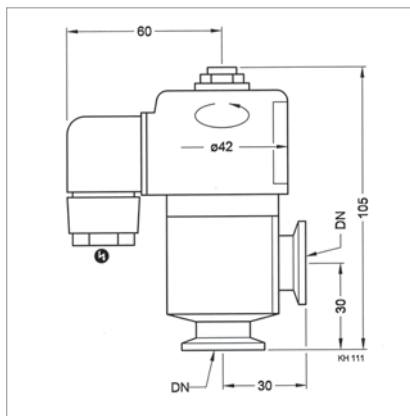
| | | |
|-------------------------------|----------------------------------|---|
| Tightness | mbar x l x s⁻¹ | $< 1 \times 10^{-9}$ |
| Weight | kg | 0.15 |
| Dimensions (W x H x D) | mm | 51 x 42 x 30 |
| Material | | |
| Body | | aluminum (3.0615), stainless steel (1.4301) |
| Inside section | | aluminum (3.0615), stainless steel (1.4301) |
| Seal | | FPM (FKM) |
| Screw cap | | brass (nickel-plated) |

Ordering Information

Venting Valve manually operated

| | Part No. |
|--|-----------------|
| Venting valve DN 10 ISO-KF, manually operated (screw cap) | |
| Aluminum | 173 24 |
| Stainless steel | 173 37 |

Venting Valves, Electromagnetically Actuated



Dimensional drawing for the venting valve,
electromagnetically actuated

Venting valves are used to vent small vacuum systems and are closed when no power is applied.

Advantages to the User

- Open when power is applied, closed with no power
- Seals on one side against atmospheric pressure
- Protected against dirt by a filter

Technical Data

Venting Valve electromagnetically actuated

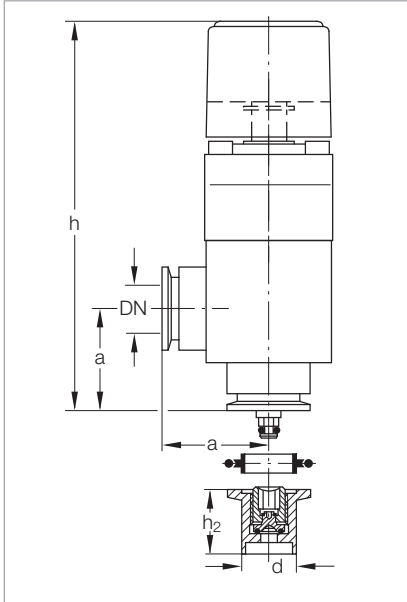
| | | |
|--|----------------------------|----------------------------------|
| Leak rate | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁹ |
| Venting time for a 100 l chamber | s | 23 |
| Mains connection | V / Hz V / Hz V DC | 230 / 50/60 115 / 50/60 24 |
| Power consumption, actuation / holding | VA | 35 / 15 |
| Differential pressure in closing / opening direction | bar | 5 / 1 |
| Can be opened to a pressure difference of | bar | 2 |
| Service life | cycles | 1.5 mio. |
| Switching frequency | 1/min | 50 |
| Opening / closing time | ms | 60 / 45 |
| Conductance for molecular flow | l x s ⁻¹ | 1 |
| Weight | kg | 0.46 |
| Dimensions (W x H x D) | mm | 105 x 120 x 42 |
| Material | | |
| Valve body | | aluminum |
| Gasket | | FPM (FKM) |

Ordering Information

Venting Valve electromagnetically actuated

| | Part No. |
|---|----------------|
| Venting valve DN 10 ISO-KF, electromagnetically actuated | |
| 24 V DC | 215 021 |
| 230 V AC | 215 024 |
| Centering ring with sintered metal filter, DN 10 ISO-KF | 883 50 |

Vacuum Locks and Sealing Valves



Dimensional drawing for the sealing valves

Dimension Table

| | DN | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
|----------------------|----|-----------|-----------|-----------|
| a | mm | 40 | 50 | 65 |
| d | mm | 16 | 25 | 38 |
| h | mm | 124 | 160 | 190 |
| h₂ | mm | 30 | 30 | 40 |

A screw-in sealing element with a hex. socket into which the spindle of the gas lock is inserted for actuation has been integrated within the tubulation.

After having filled in the gas or evacuated the chamber, the gas lock is detached from the small flange and may thus be reused for an unlimited number of times on other sealing valves.

Advantages to the User

- Simple to use, handy knob
- Compact, low weight
- Also well-suited for operating older types of sealing valves from Oerlikon Leybold Vacuum
- Long travel and high conductance, thus short pumpdown times
- Spindle can be arrested in its end position
- Double O-ring seal offering a very low leak rate ($< 1 \times 10^{-7}$ mbar \times l \times s $^{-1}$) and a long service life

- May be used in the entire rough and medium vacuum range
- Long service life
- Secured against inadvertent opening
- Temperature resistant

| | |
|----------------|--------|
| Vacuum lock | 60 °C |
| Blocking valve | 100 °C |
- May be protected by a standard blank flange against becoming dirty

Typical Applications

- Sealing of evacuated or gas-filled chambers
- Post-evacuation of vessels
- Topping up and exchanging the gas filling in vessels
- Sealing valves with stainless steel ISO-KF connection and stainless steel tubulation for welding to the chamber

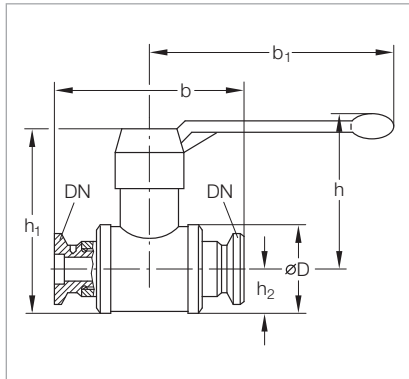
Technical Data**Vacuum Lock / Sealing Valve****DN 16 ISO-KF****DN 25 ISO-KF****DN 40 ISO-KF**

| | | | | |
|-----------------------------------|----------------------------|----------------------|----------------------|----------------------|
| Leak rate | | | | |
| Sealing valve | mbar x l x s ⁻¹ | 1 x 10 ⁻⁷ | 1 x 10 ⁻⁷ | 1 x 10 ⁻⁷ |
| Vacuum lock | mbar x l x s ⁻¹ | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ | 1 x 10 ⁻⁹ |
| Travel for the vacuum lock | mm | 56 | 76 | 108 |
| Free passage in the sealing valve | mm | 3 | 8 | 18 |
| Absolute pressure | bar | 2.5 | 2.5 | 2.5 |
| Weight | | | | |
| Vacuum lock | kg | 0.35 | 1.0 | 1.8 |
| Sealing valve | kg | 0.04 | 0.1 | 0.12 |
| Material | | | | |
| Vacuum lock | | aluminum | aluminum | aluminum |
| Seal | | FPM (FKM) | FPM (FKM) | FPM (FKM) |

Ordering Information**Vacuum Lock / Sealing Valve****DN 16 ISO-KF****DN 25 ISO-KF****DN 40 ISO-KF**

| | Part No. | Part No. | Part No. |
|--|-------------------|-------------------|-------------------|
| Vacuum lock, aluminum body | 283 25 | 283 26 | 283 27 |
| Sealing valve with tubulation, stainless steel body | 283 21 | 283 22 | 283 23 |
| Clamping ring | 183 41 | 183 42 | 183 43 |
| Centering ring | 883 46 | 883 47 | 883 48 |
| Repair kit | | | |
| Vacuum lock | EK 215 055 | EK 215 056 | EK 215 057 |

Ball Valves



Dimensional drawing for the ball valves

Dimension Table

| DN | 10 ISO-KF | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
|-------------------------|-----------|-----------|-----------|-----------|
| b mm | 75 | 100 | 130 | 160 |
| b₁ mm | 80 | 80 | 110 | 138 |
| h mm | 55 | 55 | 62 | 90 |
| h₁ mm | 55 | 58 | 80 | 110 |
| h₂ mm | 15.0 | 15.0 | 20.0 | 27.5 |
| D mm | 26 | 30 | 42 | 60 |

Ball valves are rugged and cost-effective straight-through valves of small size, which are opened or closed simply by operating a lever. The valve position (OPEN/CLOSED) can be determined from the lever's position. The lever may be detached.

Ball valves are provided with lubricated gaskets and when open they permit an unobstructed passage.

Advantages to the User

- Leak tight on both sides against the atmosphere; can be opened against atmospheric pressure

Technical Data

Ball Valve

| | | DN 10 ISO-KF | DN 16 ISO-KF | DN 25 ISO-KF | DN 40 ISO-KF |
|-----------------------------------|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Leak rate | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁶ | < 1 x 10 ⁻⁶ | < 1 x 10 ⁻⁶ | < 1 x 10 ⁻⁶ |
| Conductance for molecular flow | l x s ⁻¹ | 1.5 | 3 | 9 | 30 |
| Pressure absolute, min. / max. | mbar / bar | 10 ⁻⁵ / 5 | 10 ⁻⁵ / 5 | 10 ⁻⁵ / 5 | 10 ⁻⁵ / 5 |
| Weight | kg | 0.35 | 0.4 | 0.75 | 2.6 |
| Material | | | | | |
| Body | | brass (nickel-plated) | brass (nickel-plated) | brass (nickel-plated) | brass (nickel-plated) |
| Gaskets | | PTFE | PTFE | PTFE | PTFE |
| Ball | | brass (hard chromium-plated) | brass (hard chromium-plated) | brass (hard chromium-plated) | brass (hard chromium-plated) |
| ISO-KF flanges | | aluminum (3.0615) | aluminum (3.0615) | aluminum (3.0615) | aluminum (3.0615) |

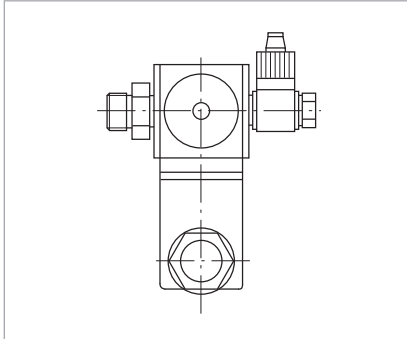
Ordering Information

Ball Valve

| | DN 10 ISO-KF | DN 16 ISO-KF | DN 25 ISO-KF | DN 40 ISO-KF |
|----------------------------|---------------|---------------|---------------|---------------|
| | Part No. | Part No. | Part No. | Part No. |
| Ball valve | | | | |
| Brass body (nickel-plated) | 174 94 | 174 95 | 174 96 | 174 97 |

Accessories for the Electropneumatically Operated Valves

Pilot Valves



Pilot valve

A range of pilot valves is available for actuation of the electropneumatic ISO-KF valves, which cover all commonly used control voltages.

Advantages to the User

- Easy to fit to the pneumatic cylinder, adaptor is included with the DOT valve

Supplied Equipment

- Hose connection and gasket for connection to the compressed air supply

Ordering Information

ISO-KF Pilot Valves for DOT Valves (incl. Solenoid Coil)

| | Part No. |
|---|----------|
| ISO-KF pilot valve for DOT valves, incl. solenoid coil 230 V AC / 50/60 Hz (normally closed) | 280 70 |
| 110 - 120 V AC / 50/60 Hz (normally closed) | E 280 72 |
| 24 V DC (normally closed) | E 280 74 |

Ordering Information

Spare Pilot Valve for ISO-K valves from DN 250 without coil

| | Part No. |
|---|--------------|
| Spare pilot valve for DN 250 ISO-K to DN 630 ISO-K | E 200 07 927 |

Interference Suppression Kit – Illuminated

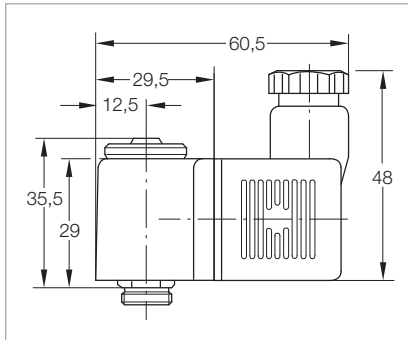
As an option for the solenoid coil and the pilot valves an interference suppression kit is offered so as to reliably prevent any pick-up of interference by sensitive equipment in the vicinity of the solenoid coils.

Ordering Information

Interference Suppression Kit for different voltages

| | Part No. |
|--|--------------|
| Interference Suppression Kit 110 V AC | upon request |

Solenoid Coils for DN 250 ISO-K



Dimensional drawing for the solenoid coils

Oerlikon Leybold Vacuum is offering a range of solenoid coils for the purpose of adapting the electropneumatically operated valve to different commonly used control voltages.

Advantages to the User

- Easy to fit (plug on and tighten with a knurled screw)

Technical Data

Solenoid Coils for Pilot Valves

| | | V= | V≈ |
|--|-----|---------------------------|--------------------------------|
| Voltage | V | 24 DC | 24/110/230 AC; 50/60 Hz |
| Permissible voltage variation | % | ±10 | ±10 at nominal frequency |
| Permissible frequency variation | % | – | ±10 at nominal frequency |
| Power consumption at nominal operating voltage | W | 4.1 at 12 V / 4.5 at 24 V | Actuate: 7.5 VA / Hold: 6.0 VA |
| Operating time | | 100% ED | 100% ED |
| Type of protection to DIN 40 050 | IP | 65 | 65 |
| Hose connection | | Pg 9 | Pg 9 |
| Class of insulation material to VDE 0580 | | F | F |
| Test mark | | VDE | VDE |
| Max. response time | ms | 10 | 10 |
| Weight | kg | 0.065 | 0.055 |
| Torque for the knurled screw, min. / max | Ncm | 100 / 150 | 100 / 150 |

Ordering Information

Solenoid Coils for Pilot Valves

| | Part No. |
|---------------------------------|--------------|
| Solenoid coils for pilot valves | |
| 230 V AC / 50/60 Hz | E 280 77 |
| 110 - 120 V AC / 50/60 Hz | upon request |
| 24 V AC / 50/60 Hz | E 280 79 |
| 24 V DC | E 280 80 |

Special Valves for Turbomolecular Pumps

Solenoid Venting Valve



Technical Data

| | | |
|-------------------|----------|------------|
| Drive voltage | V DC | 24 |
| Power consumption | W | 4 |
| Connecting flange | DN | 16 ISO-KF |
| Weight, approx. | kg (lbs) | 0.3 (0.66) |

Venting Valve

Ordering Information

Venting Valve

| | Part No. |
|---|--------------------|
| Solenoid venting valve, normally closed | 800120V0011 |

Power Failure Venting Valve



Technical Data

| | | |
|-------------------|----------|------------|
| Drive voltage | V DC | 24 |
| Power consumption | W | 4 |
| Connecting flange | DN | 16 ISO-KF |
| Weight, approx. | kg (lbs) | 0.3 (0.66) |

Power Failure Venting Valve

Ordering Information

Power Failure Venting Valve

| | Part No. |
|--|--------------------|
| Power failure venting valve, normally open | 800120V0021 |

Purge Gas and Venting Valve



Technical Data

| | | |
|-------------------|----------|------------|
| Connecting flange | DN | 10 ISO-KF |
| Weight, approx. | kg (lbs) | 0.7 (1.55) |

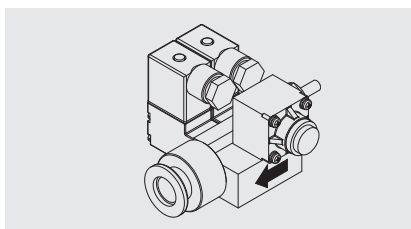
Purge Gas and Venting Valve

Ordering Information

Purge Gas and Venting Valve

| | Part No. |
|--|---------------|
| Purge gas and venting valve, 230 V 0.2 mbar x l x s ⁻¹ (12 sccm) | 855 19 |
| 0.4 mbar x l x s ⁻¹ (24 sccm) | 855 29 |

Purge Gas and Venting Valve



Technical Data

| | | |
|--------------------------|----------|-------------------------------|
| Connecting flange | | |
| Inlet | | 1/4" tube |
| Outlet | | pump specific or DN 16 ISO-KF |
| Purge gas pressure, abs. | bar | 1.5 to 6,0 |
| Weight, approx. | kg (lbs) | 0.5 (1.1) |

Purge Gas and Venting Valve

Ordering Information

Purge Gas and Venting Valve

| | Part No. |
|--|---------------|
| Purge gas and venting valve 24 V DC; 0.6 mbar x l x s ⁻¹ | 121 33 |

Further 0.6 mbar x l x s⁻¹ valves upon request

Purge Gas and Venting Valve for ClassicLine and SL Pumps



Technical Data

| | | |
|-------------------------|----------|------------|
| Connecting flange | | |
| Pump side | DN | 10 ISO-KF |
| Gas connection | G | 1/4" |
| Seal gas pressure, abs. | bar | 1 |
| Weight, approx. | kg (lbs) | 0.3 (0.66) |

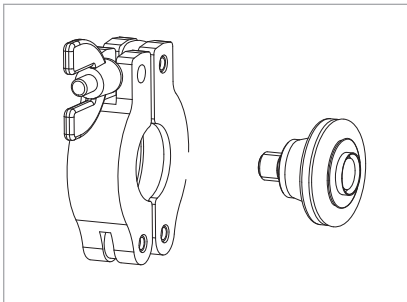
Purge Gas and Venting Valve

Ordering Information

| | Part No. |
|--|--------------------|
| Purge gas and venting valve at 1 bar | 113 50 |
| 0.2 mbar x l x s ⁻¹ (12 sccm), 24 V DC | 800152V0041 |
| 0.2 mbar x l x s ⁻¹ (12 sccm), 110 - 115 V DC | 800152V0019 |
| 0.2 mbar x l x s ⁻¹ (12 sccm), 230 V DC | 800152V0013 |
| 0.4 mbar x l x s ⁻¹ (24 sccm), 24 V DC | 800152V0013 |
| 0.4 mbar x l x s ⁻¹ (24 sccm), 110 - 115 V DC | 800152V0042 |
| 0.4 mbar x l x s ⁻¹ (24 sccm), 230 V DC | 800152V0014 |
| 0.6 mbar x l x s ⁻¹ (36 sccm), 24 V DC | 800152V0012 |
| 0.6 mbar x l x s ⁻¹ (36 sccm), 110 - 115 V DC | 800152V0043 |
| 0.6 mbar x l x s ⁻¹ (36 sccm), 230 V DC | 800152V0040 |

Purge Gas and Venting Valve

Adaptor Set for Seal Gas and Venting Valve for the SL pumps



Technical Data

Pump flange adaptor M8/DN 10 ISO-KF
including adaptor centering ring
DN 10/DN 16 ISO-KF with sinter filter insert
and clamping ring

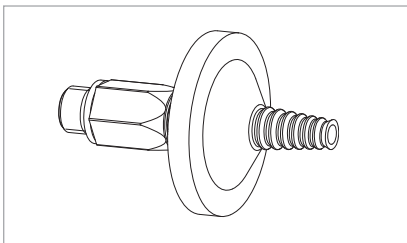
Adaptor Set

Ordering Information

| | Part No. |
|--|--------------------|
| Adaptor set for purge gas and venting valve | 800110V0011 |

Adaptor Set

Gas Filter to G 1/4" for Purge Gas and Venting Valve



Technical Data

Gas filter
including fitting G 1/4" and 2 gaskets

Gas Filter

Ordering Information

| | Part No. |
|---|---------------------|
| Gas filter to G 1/4" for seal gas and venting valve | 800110V0012 |
| Replacement filter for gas filter to G 1/4" for seal gas and venting valve | E 200 18 515 |

Gas Filter

UHV All-Metal Right-Angle Valves



The all-metal right-angle valves are of a fully welded design. The valve disk may be exchanged through the side flange.

Due to the selection of suitable materials, the valve stem need not be lubricated after every bake-out cycle.

The drive spindle of the valves transfers the motion via a pressure plate onto the sleeve-guided valve stem carrying the screwed-on valve disk. The valve disk consists of a copper plate.

Due to the specific properties of copper (ductility) this design offers great advantages over other materials: long service life and low closing forces when operating the valve.

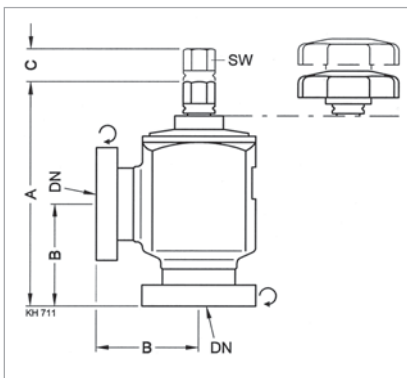
A very high leak tightness achieved, even with a low closing force.

The compact design offers good operational characteristics also in view of temperature changes, offers a short flow path and hence improved conductance.

Advantages to the User

- Leak rate at the valve seat below 10^{-11} mbar x l x s⁻¹
- Absolutely reliable sealing of valve seat
- Simplest operation
- No lubrication of the spindle is necessary after bakeout
- Large removable handwheel for easy operation

UHV All-Metal Right-Angle Valves, with Rotatable Flanges on Both Sides



Dimensional drawing for the UHV all-metal right-angle valve

Dimension Table

| DN | A | B | C | SW |
|---------|-------|-------|------|------|
| 16 CF-R | 88.0 | 38.0 | 15.5 | 8.0 |
| 40 CF-R | 140 | 63 | 26 | 17 |
| 63 CF-R | 211.0 | 105.0 | 36.4 | 22.0 |

Technical Data

| | | UHV All-Metal Right-Angle Valves, with Rotatable Flanges on Both Sides | | |
|--|----------|--|---|---|
| DN | CF | 16 | 40 | 63 |
| Connection flange rotatable | DN | 16 CF-R | 40 CF-R | 63 CF-R |
| Service life | cycles | 1000 | 1000 | 1000 |
| Conductance for molecular flow | l/s | 3 | 38 | 100 |
| Pressure, absolute | | | | |
| min. | mbar | 1×10^{-11} | 1×10^{-11} | 1×10^{-11} |
| max. | bar | 4 | 4 | 4 |
| Mounting orientation | mm | any | any | any |
| Bake out temperature without handwheel | °C | 350 | 350 | 350 |
| Bake out temperature with handwheel | °C | 80 | 80 | 80 |
| Max. heating and cooling rate | °C/min | 4 | 4 | 2 |
| Bellows | Material | Stainless steel 1.4541 ¹⁾ | Stainless steel 1.4541 ¹⁾ | Stainless steel 1.4541 ¹⁾ |
| Housing | Material | Stainless steel 1.4301 ²⁾ welded | Stainless steel 1.4301 ²⁾ welded | Stainless steel 1.4301 ²⁾ welded |
| Valve disk | Material | Copper | Copper | Copper |
| Valve disk seal | Material | Copper | Copper | Copper |
| Weight | kg | 0.4 | 2.0 | 5.0 |

Ordering information

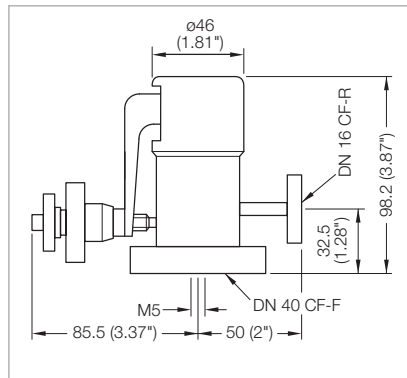
UHV All-Metal Right-Angle Valves, with Rotatable Flanges on Both Sides

| | Part No. | Part No. | Part No. |
|----------------------------------|----------------|----------------|---------------|
| UHV all-metal right-angle valves | 289 80 | 289 81 | 289 82 |
| Spare valve disk, 2 pieces | 215 410 | - | - |
| Spare hand wheel, plastic | 215 412 | 215 442 | - |

¹⁾ = AISI Type 316

²⁾ = AISI Type 304

UHV All-Metal Variable Leak Valves



Dimensional drawing for the all-metal variable leak valves

Technical Data

UHV All-Metal Variable Leak Valves

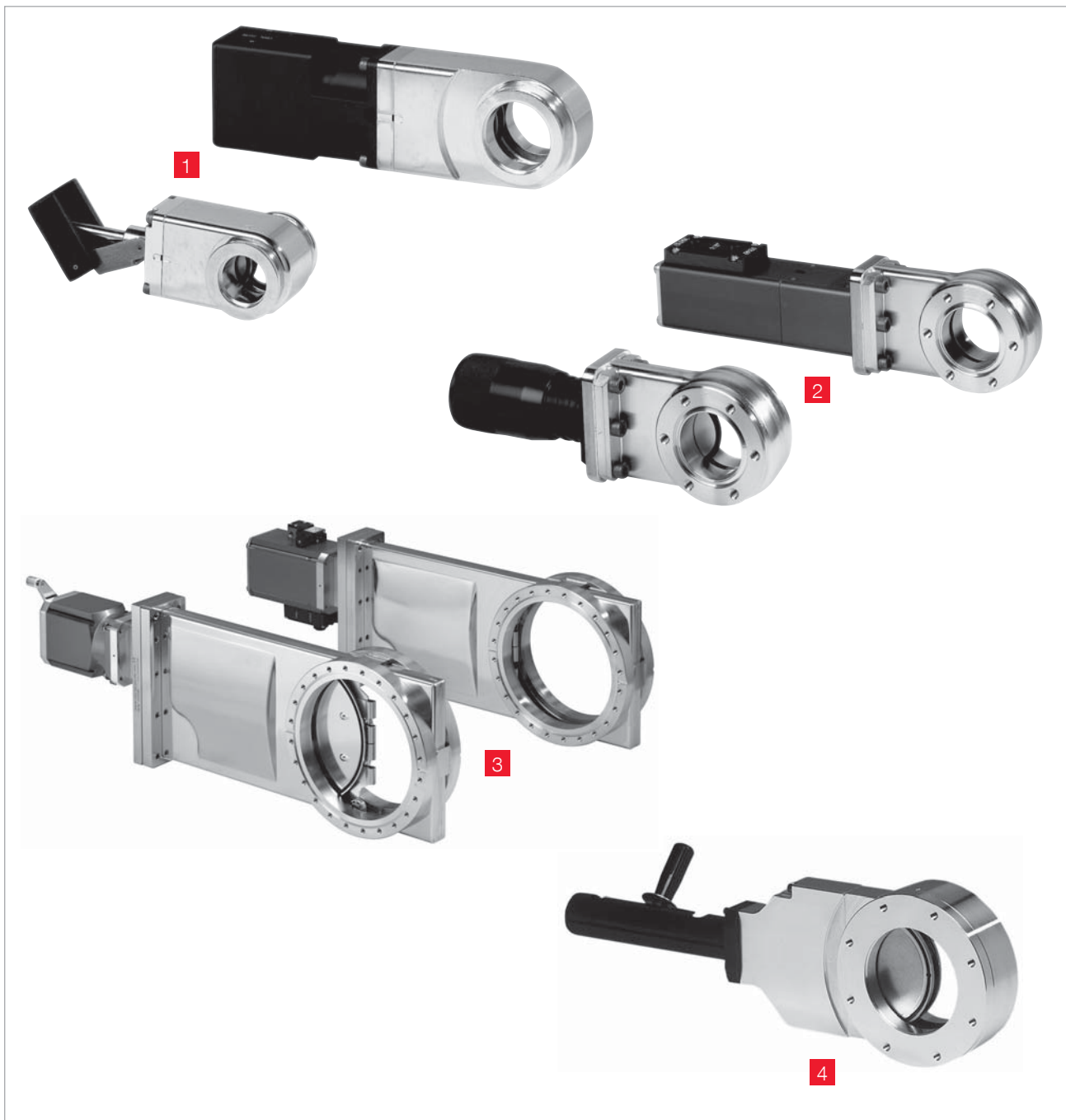
| | | | |
|--------------------------------|----------------------------|--|-----------------------|
| Connection flanges | | | |
| Input | DN | | 16 CF-R |
| Output | DN | | 40 CF-R |
| Gas flow, min. for | | | |
| Pure gas | mbar x l x s ⁻¹ | | 10 ⁻¹⁰ |
| Air | mbar x l x s ⁻¹ | | 10 ⁻⁹ |
| Gas flow | | | |
| max. | mbar x l x s ⁻¹ | | 600 |
| adjustable, max. | mbar x l x s ⁻¹ | | 100 |
| Tightness | mbar x l x s ⁻¹ | | 1 x 10 ⁻¹¹ |
| Pressure absolute | | | |
| min. | mbar | | 1 x 10 ⁻¹⁰ |
| max. | bar | | 30 |
| Conductance for molecular flow | l x s ⁻¹ | | 0.7 |
| Operating temperature | °C | | 200 |
| Bakeout temperature | °C | | 350 |
| Valve seat | Material | | Copper alloy |
| Valve plate | Material | | Sapphire |
| Housing | Material | | Stainless steel |
| Weight | kg | | 1.4 |

Ordering information

UHV All-Metal Variable Leak Valves

| | Part No. |
|-----------------------------------|-----------------|
| UHV all-metal variable leak valve | 289 90 |
| Spare valve plate | E 289 87 |
| Spare valve seat | E 289 88 |
| Tool kit for valve seat | E 290 97 |

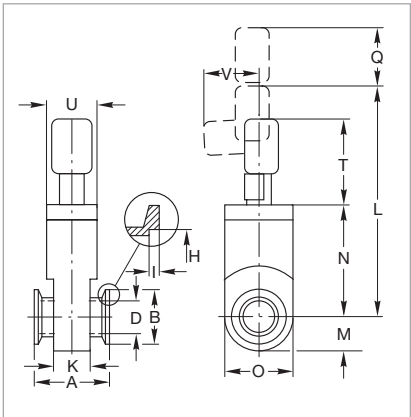
Gate Valves with ISO-KF / CF / ISO-F Flanges Overview



- 1** Miniature UHV gate valves,
ISO-KF flange
- 2** Miniature UHV gate valves,
CF flange
- 3** UHV gate valves
- 4** HV gate valves

For the precise installation dimensions, please refer to the product's Operating Instructions.

Miniature Gate Valves, ISO-KF, Manually Operated (Articulated Lever)



Dimensional drawing for the miniature UHV gate valves, articulated lever, ISO-KF flange

Dimension Table

| | DN | 16 ISO-KF | 25 ISO-KF | 40 ISO-KF |
|---|----|-----------|-----------|-----------|
| A | mm | 40 | 50 | 51 |
| B | mm | 30 | 40 | 55 |
| D | mm | 15 | 24 | 39 |
| H | mm | 17.2 | 26.2 | 41.2 |
| I | mm | 3 | 3 | 3 |
| K | mm | 25 | 32 | 31 |
| L | mm | 100 | 139 | 208 |
| M | mm | 15.0 | 22.0 | 32.5 |
| N | mm | 39 | 59 | 93 |
| O | mm | 30 | 44 | 65 |
| Q | | | | |
| T | mm | 25 | 35 | 55 |
| U | mm | 37 | 50 | 85 |
| V | mm | 25 | 32 | 40 |
| | mm | 30 | 30 | 50 |

Advantages to the User

- Cost-effective gate valve for industrial applications with elastomer-sealed push gate feedthrough
- Aluminum body
- Slim and light-weight
- Low play in the locked state and low wear

Technical Data

Miniature Gate Valve

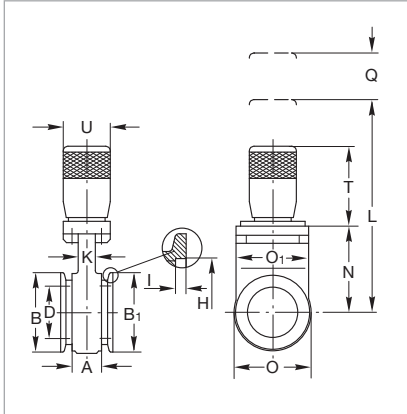
| | | DN 16 ISO-KF | DN 25 ISO-KF | DN 40 ISO-KF |
|---|----------------------|----------------------------------|----------------------------------|----------------------------------|
| Tightness | Body | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ |
| | Valve seat | | | |
| Pressure range, abs. | | 1×10^{-7} mbar to 2 bar | 1×10^{-7} mbar to 2 bar | 1×10^{-7} mbar to 2 bar |
| High vacuum conductance | $l \times s^{-1}$ | 10 | 34 | 140 |
| Differential pressure at the valve gate | bar | ≤ 2 in both directions | ≤ 2 in both directions | ≤ 2 in both directions |
| Max. differential pressure during opening | mbar | ≤ 30 | ≤ 30 | ≤ 30 |
| Service life until first maintenance | cycles | 50,000 | 50,000 | 50,000 |
| Degassing temperature for the valve | $^{\circ}C$ | 100 / 100 | 100 / 100 | 100 / 100 |
| | manual open / closed | | | |
| Installation orientation | | any | any | any |
| Weight | kg | 0.4 | 0.4 | 0.7 |
| Material | | | | |
| Valve body | | AlMgSi1 (3.2315) | AlMgSi1 (3.2315) | AlMgSi1 (3.2315) |
| Valve gate | | AISI 301 (1.4310) | AISI 301 (1.4310) | AISI 301 (1.4310) |
| Seal (head, gate) | | Viton/Viton | Viton/Viton | Viton/Viton |

Ordering Information

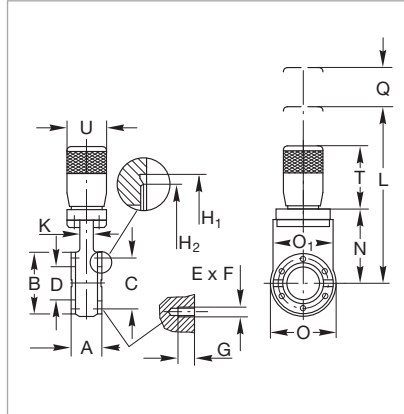
Miniature Gate Valve

| | | DN 16 ISO-KF | DN 25 ISO-KF | DN 40 ISO-KF |
|--|--|---------------|---------------|---------------|
| | | Part No. | Part No. | Part No. |
| Miniature gate valve, manually operated, articulated lever | | 286 06 | 286 08 | 286 09 |

Miniature UHV Gate Valves, ISO-KF and CF, Manually Operated (Handwheel)



Dimensional drawing for the miniature UHV gate valves, manually operated (handwheel), DN 40 ISO-KF



Dimensional drawing for the miniature UHV gate valves, manually operated (handwheel), DN 40 CF

Advantages to the User

- Bellows-sealed feedthrough
- Valve technology with only one moving part
- Equipped with a mechanical position indicator
- Low particle generating and vibration free actuation
- Compact design

Dimension Table

| | DN | 40 ISO-KF | 40 CF |
|----------------|----|-----------|---------|
| A | mm | 50 | 35 |
| B | mm | 72 | 72 |
| B ₁ | mm | 55 | – |
| C | mm | – | 58.7 |
| D | mm | 40 | 40 |
| E x F | | – | 6 x M 6 |
| G | mm | – | 7 |
| H | mm | 41.2 | – |
| H ₁ | mm | – | 48.3 |
| H ₂ | mm | – | 42 |
| I | mm | 3 | – |
| K | mm | 16 | 16 |
| L | mm | 198 | 198 |
| N | mm | 82 | 82 |
| O | mm | 76 | 76 |
| O ₁ | mm | 70 | 70 |
| Q | mm | 55 | 55 |
| T | mm | 73 | 73 |
| U | mm | 45 | 45 |

Technical Data

Miniature UHV Gate Valve

| | | DN 40 ISO-KF | DN 40 CF |
|---|----------------------------|-------------------------------------|-------------------------------------|
| Tightness | | | |
| Body | mbar x l x s ⁻¹ | $< 5 \times 10^{-10}$ | $< 5 \times 10^{-10}$ |
| Valve seat | mbar x l x s ⁻¹ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ |
| Pressure range, abs. | | 1 x 10 ⁻¹⁰ mbar to 2 bar | 1 x 10 ⁻¹⁰ mbar to 2 bar |
| High vacuum conductance | l x s ⁻¹ | 160 | 220 |
| Differential pressure at the valve gate | bar | ≤ 2 in both directions | ≤ 2 in both directions |
| Max. differential pressure during opening | mbar | ≤ 30 | ≤ 30 |
| Service life until first maintenance | cycles | 50,000 | 50,000 |
| Degassing temperature | | | |
| valve open / closed | °C | 250 / 200 | 250 / 200 |
| manually operated | °C | 250 | 250 |
| Installation orientation | | any | any |
| Weight | kg | 1.5 | 1.5 |
| Material | | | |
| Valve body | | AISI 304 (1.4301) | AISI 304 (1.4301) |
| Valve gate | | AISI 304 (1.4301) | AISI 304 (1.4301) |
| Bellows | | AISI 316 L (1.4435) | AISI 316 L (1.4435) |
| Seal (head, gate) | | Viton/Viton | Viton/Viton |

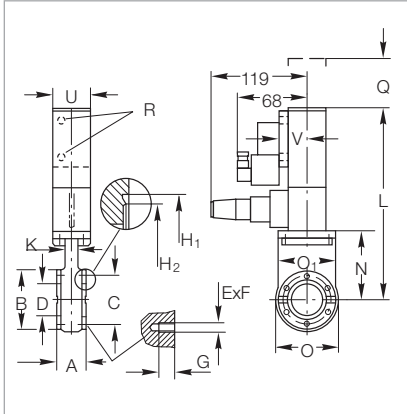
Ordering Information

Miniature UHV Gate Valve

| | | DN 40 ISO-KF | DN 40 CF |
|--|--|---------------|---------------|
| | | Part No. | Part No. |
| Miniature gate valve, manually operated, handwheel | | 286 15 | 286 84 |
| 6 set screws with nuts and washers ¹⁾ | | – | 839 11 |

¹⁾ For dimensions E x F see table "Connections for CF"

Miniature UHV Gate Valves, ISO-KF / CF, Electropneumatically Operated



Dimensional drawing for the miniature UHV gate valves; electropneumatically operated, CF flange

Dimension Table

| | DN | 40 ISO-KF | 40 CF |
|----------------|----|-----------|---------|
| A | mm | 51 | 35 |
| B | mm | 55 | 72 |
| C | mm | – | 58.7 |
| D | mm | 40 | 40 |
| E x F | mm | – | 6 x M 6 |
| G | mm | – | 7 |
| H | mm | 41.2 | – |
| H ₁ | mm | – | 48.3 |
| H ₂ | mm | – | 42 |
| I | mm | 3 | – |
| K | mm | 31 | 16 |
| L | mm | 196 | 230 |
| M | mm | 32.5 | – |
| N | mm | 88 | 82 |
| O | mm | 65 | 76 |
| O ₁ | mm | – | 70 |
| Q | mm | 55 | 55 |
| T | mm | – | 73 |
| U | mm | 40 | 45 |
| V | mm | 65 | 32.5 |
| W | mm | 61 | – |
| W ₁ | mm | 50 | – |

Advantages to the User

- Double-acting electropneumatic actuator (with position indicator and pilot valve); bellows-sealed feedthrough
- Valve technology with only one moving part
- Equipped with a mechanical position indicator
- Actuation free of particles and vibrations
- Short closing time, very long service life
- Compact design

Technical Data

Miniature UHV Gate Valve

| | | DN 40 ISO-KF (Stainless Steel) | DN 40 CF (Stainless Steel) |
|---|----------------------------|--|--|
| Tightness | | | |
| Body | mbar x l x s ⁻¹ | $< 5 \times 10^{-10}$ | $< 5 \times 10^{-10}$ |
| Valve seat | mbar x l x s ⁻¹ | $< 1 \times 10^{-9}$ | $< 1 \times 10^{-9}$ |
| Pressure range, abs. | | 1 x 10 ⁻¹⁰ mbar to 2 bar | 1 x 10 ⁻¹⁰ mbar to 2 bar |
| High vacuum conductance | l x s ⁻¹ | 160 | 220 |
| Differential pressure at the valve gate | bar | ≤ 2 in both directions | ≤ 2 in both directions |
| Max. differential pressure during opening | mbar | ≤ 30 | ≤ 30 |
| at reduced service life | bar | 1 | 1 |
| Service life until first maintenance | cycles | 50,000 | 50,000 |
| Degassing temperature valve open / closed | °C | ≤ 250 / 200 | ≤ 250 / 200 |
| pneumatic actuation | °C | ≤ 200 | ≤ 200 |
| position indicator / pilot valve | °C | 80 / 50 | 80 / 50 |
| Warming-up and cooling down speed | °C x h ⁻¹ | 50 | 50 |
| Compressed air, min. / max. | bar | 4.5 / 7.0 | 4.5 / 7.0 |
| Closing / opening time | s | 0.7 | 0.7 |
| Pilot valve supply voltage / power consumption | | 24 V DC / 6 W or 230 V AC, 50/60 Hz / 2 W | 24 V DC / 6 W or 230 V AC, 50/60 Hz / 2 W |
| Switching capacity of the position indicator at 80 °C | A | 5 at 250 V AC; 3 at 50 V DC | 5 at 250 V AC; 3 at 50 V DC |
| Installation orientation | | any | any |
| Weight | kg | 1.8 | 1.8 |
| Material | | | |
| Valve body | | AISI 304 (1.4301) | AISI 304 (1.4301) |
| Gate | | AISI 304 (1.4301) | AISI 304 (1.4301) |
| Bellows | | AISI 316 L (1.4435) | AISI 316 L (1.4435) |
| Seal (head, gate) | | Metal/Viton | Metal/Viton |

Ordering Information

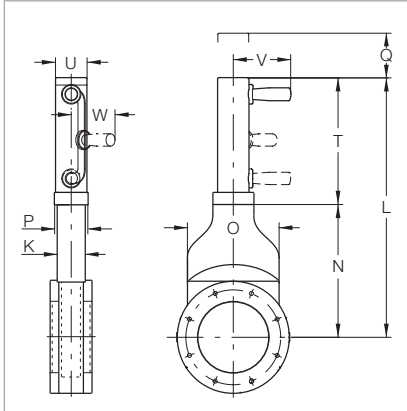
Miniature UHV Gate Valve

| | | DN 40 ISO-KF (Stainless Steel) | DN 40 CF (Stainless Steel) |
|--|---|--------------------------------|----------------------------|
| | | Part No. | Part No. |
| Miniature gate valve, electropneumatically operated | 24 V DC / 6 W | 286 36 | 286 99 |
| | 230 V AC, 50/60 Hz / 2 W | 286 35 | 286 94 |
| | 6 set screws with nuts and washers ¹⁾ | – | 839 11 |

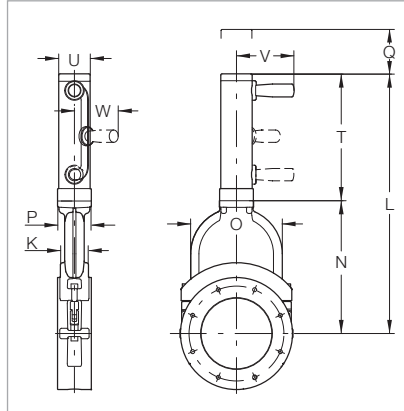
¹⁾ For dimensions E x F see table "Connections for CF"

HV Gate Valves, ISO-F

Manually Operated



Dimensional drawing for the HV gate valves; manually operated, DN 63 ISO-F and DN 100 ISO-F



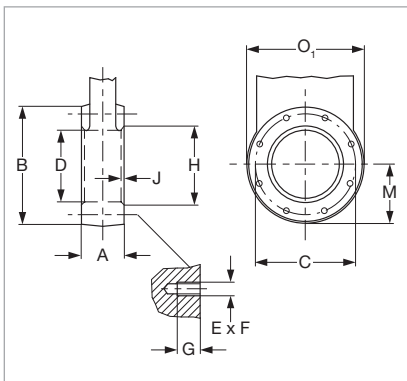
Dimensional drawing for the HV gate valves; manually operated, DN 160 ISO-F

Advantages to the User

- Cost-effective gate valve for industrial applications with elastomer-sealed push gate feedthrough
- Aluminum body
- Slim and light-weight
- Low play in the locked state and low wear

Dimension Table

| | DN | 63 ISO-F | 100 ISO-F | 160 ISO-F |
|----------|----|----------|-----------|-----------|
| K | mm | 36 | 36 | 58 |
| L | mm | 329.5 | 413.0 | 547.0 |
| N | mm | 155.5 | 203.5 | 280.0 |
| O | mm | 100 | 140 | 192 |
| P | mm | 48 | 48 | 70 |
| Q | mm | 25 | 25 | 60 |
| T | mm | 174.0 | 209.5 | 267.0 |
| U | mm | 43 | 43 | 65 |
| V | mm | 94 | 94 | 122 |
| W | mm | 75 | 75 | 95 |



Connection dimensions for ISO-F flanges (HV gate valves)

Connections for ISO-F

| | DN | 63 ISO-F | 100 ISO-F | 160 ISO-F |
|----------------------|----|----------|-----------|-----------|
| A | mm | 60 | 60 | 70 |
| B | mm | 130 | 165 | 235 |
| C | mm | 110 | 145 | 200 |
| D | mm | 65 | 100 | 150 |
| E x F | | 4 x M8 | 8 x M8 | 8 x M10 |
| G | mm | 12 | 12 | 16 |
| H | mm | 70 | 102 | 153 |
| J | mm | 3 | 3 | 5 |
| M | mm | 65.5 | 83.0 | 117.5 |
| O₁ | mm | 131 | 166 | 237 |

Technical Data

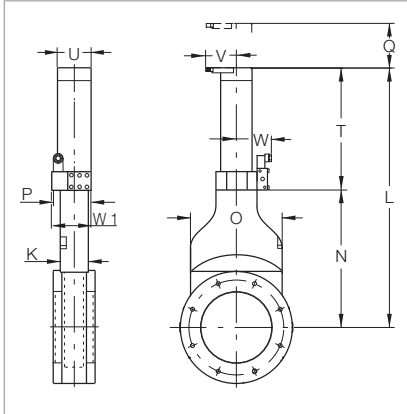
| | | HV Gate Valve | | |
|---|----------------------------|---|---|---|
| | | DN 63 ISO-F | DN 100 ISO-F | DN 160 ISO-F |
| Tightness | | | | |
| Body | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ |
| Valve seat | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ |
| Pressure range, abs. | | 1 x 10 ⁻⁷ mbar to 1.6 bar | 1 x 10 ⁻⁷ mbar to 1.6 bar | 1 x 10 ⁻⁷ mbar to 1.6 bar |
| High vacuum conductance | l x s ⁻¹ | 550 | 2000 | 6000 |
| Differential pressure at the valve gate | bar | 1.6 in both directions | 1.6 in both directions | 1.6 in both directions |
| Max. differential pressure during opening | mbar | ≤ 30 | ≤ 30 | ≤ 30 |
| Service life until first maintenance | cycles | 200,000 | 200,000 | 100,000 |
| Degassing temperature | | | | |
| valve | °C | 120 | 120 | 120 |
| manually operated | °C | 80 | 80 | 80 |
| Installation orientation | | any | any | any |
| Weight | kg | 3.0 | 4.5 | 9.0 |
| Material | | | | |
| Valve body | | AlMg4.5Mn | AlMg4.5Mn | G-AlSi7Mg |
| Valve gate | | AISI 304 (1.4301) | AISI 304 (1.4301) | AlMgSi1 |
| Mechanism | | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) |
| Gaskets (head, gate) | | Viton | Viton | Viton |

Ordering Information

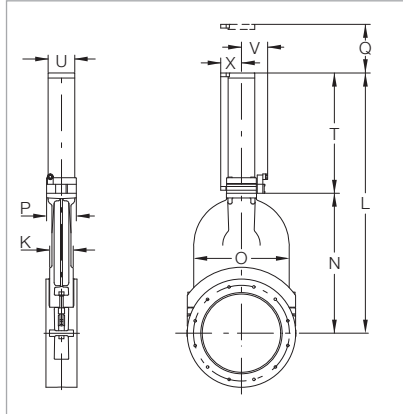
| | | HV Gate Valve | | |
|--|--------|---------------|---------------|----------------|
| | | DN 63 ISO-F | DN 100 ISO-F | DN 160 ISO-F |
| | | Part No. | Part No. | Part No. |
| HV gate valve, manually operated | | 286 25 | 286 26 | 215 633 |
| Set screws with nuts and washers ¹⁾ | | 839 13 | 839 13 | 210 071 |
| (Package each containing) | pieces | 16 | 16 | 12 |

¹⁾ For dimensions E x F see table "Connections for ISO-F"

HV Gate Valves, ISO-F, Electropneumatically Operated



Dimensional drawing for the gate valves;
DN 63 ISO-F and DN 100 ISO-F



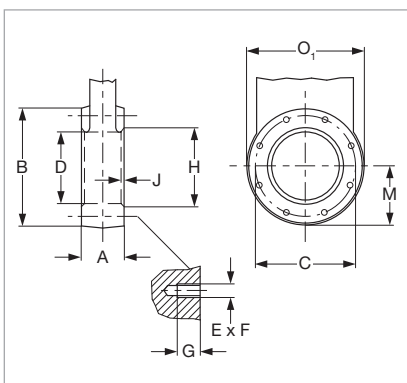
Dimensional drawing for the gate valves;
DN 160 ISO-F to DN 250 ISO-F

Advantages to the User

- Cost-effective gate valve for industrial applications with elastomer-sealed push gate feedthrough
- Aluminum body
- Slim and light-weight
- Low play in the locked state and low wear

Dimension Table

| | DN | 63 ISO-F | 100 ISO-F | 160 ISO-F | 200 ISO-F | 250 ISO-F |
|----------------|----|----------|-----------|-----------|-----------|-----------|
| K | mm | 36 | 36 | 58 | 66 | 76 |
| L | mm | 341.5 | 424.0 | 547.0 | 688.0 | 843.0 |
| L ₁ | mm | 155.5 | 203.5 | 280.0 | 363.5 | 453.0 |
| N | mm | 100 | 140 | 192 | 240 | 308 |
| O | mm | 58 | 58 | 70 | 80 | 96 |
| P | mm | 25 | 25 | 60 | 80 | 100 |
| Q | mm | 186.0 | 221.5 | 267.0 | 324.5 | 390.0 |
| T | mm | 55 | 55 | 65 | 75 | 86 |
| U | mm | 56.0 | 56.0 | 71.5 | 76.5 | 84.5 |
| V | mm | 72 | 72 | – | – | – |
| W | mm | 65.5 | 65.5 | – | – | – |
| X | mm | 59 | 59 | 57 | 62 | 67 |



Connection dimensions for ISO-F flanges
(HV Gate Valves)

Connections for ISO-F

| | DN | 63 ISO-F | 100 ISO-F | 160 ISO-F | 200 ISO-F | 250 ISO-F |
|----------------|----|----------|-----------|-----------|-----------|-----------|
| A | mm | 60 | 60 | 70 | 80 | 100 |
| B | mm | 130 | 165 | 235 | 288 | 350 |
| C | mm | 110 | 145 | 200 | 260 | 310 |
| D | mm | 65 | 100 | 150 | 200 | 261 |
| E x F | | 4 x M8 | 8 x M8 | 8 x M10 | 12 x M10 | 12 x M10 |
| G | mm | 12 | 12 | 16 | 16 | 16 |
| H | mm | 70 | 102 | 153 | 213 | – |
| J | mm | 3 | 3 | 5 | 5 | – |
| M | mm | 65.5 | 83.0 | 117.5 | 144.0 | 175.0 |
| O ₁ | mm | 131 | 166 | 237 | 290 | 352 |

Technical Data

HV Gate Valve

| | | DN 63 ISO-F | DN 100 ISO-F | DN 160 ISO-F | DN 200 ISO-F | DN 250 ISO-F |
|---|----------------------------|---|---|---|---|---|
| Tightness | | | | | | |
| Body | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ |
| Valve seat | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ |
| Pressure range, abs. | | 1 x 10 ⁻⁷ mbar to 1.6 bar | 1 x 10 ⁻⁷ mbar to 1.6 bar | 1 x 10 ⁻⁷ mbar to 1.6 bar | 1 x 10 ⁻⁷ mbar to 1.6 bar | 1 x 10 ⁻⁷ mbar to 1.2 bar |
| High vacuum conductance | l x s ⁻¹ | 550 | 2000 | 6000 | 12000 | 22000 |
| Differential pressure at the valve gate, max. | | ≤ 1600 in both directions | ≤ 1600 in both directions | ≤ 1600 in both directions | ≤ 1600 in both directions | ≤ 1200 in both directions |
| during opening, max. | mbar | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 |
| Compressed air, min. / max. | bar | 4 / 7 | 4 / 7 | 4 / 7 | 4 / 7 | 4 / 7 |
| Closing / opening time | s | 1.5 | 2.0 | 2.0 | 3.0 | 5.0 |
| Service life until first maintenance | cycles | 200,000 | 200,000 | 100,000 | 100,000 | 100,000 |
| Degassing temperature valve | | 120 | 120 | 120 | 120 | 120 |
| pneumatic drive | °C | 80 | 80 | 80 | 80 | 80 |
| position indicator | °C | 80 | 80 | 80 | 80 | 80 |
| pilot valve | °C | 50 | 50 | 50 | 50 | 50 |
| Switching capacity for the position indicator | | 5 at 230 V AC; 3 at 50 V DC | 5 at 230 V AC; 3 at 50 V DC | 5 at 230 V AC; 3 at 50 V DC | 5 at 230 V AC; 3 at 50 V DC | 5 at 230 V AC; 3 at 50 V DC |
| Installation orientation | | any | any | any | any | any |
| Weight | kg | 3.0 | 4.5 | 9.0 | 18.0 | 25.0 |
| Material | | | | | | |
| Valve body | | AlMg4.5Mn | AlMg4.5Mn | G-AlSi7Mg | G-AlSi7Mg | G-AlSi7Mg |
| Valve gate | | AISI 304 (1.4301) | AISI 304 (1.4301) | AlMgSi1, | AlMgSi1, | AlMgSi1, |
| Mechanism | | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) | AISI 301 (1.4310), AISI 304 (1.4301), AISI 420 (1.4034) |
| Gaskets (head, gate) | | Viton | Viton | Viton | Viton | Viton |

Ordering Information

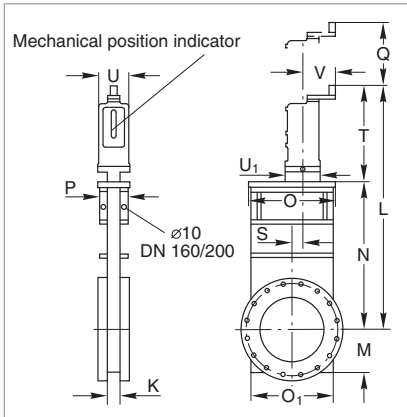
HV Gate Valve

| | | DN 63 ISO-F | DN 100 ISO-F | DN 160 ISO-F | DN 200 ISO-F | DN 250 ISO-F |
|--|--------|---------------------|---------------------|----------------------|----------------------|----------------------|
| | | Part No. | Part No. | Part No. | Part No. | Part No. |
| HV gate valve, electropneumatically operated | | | | | | |
| 24 V DC / 2.5 W | | 286 55 | 286 56 | – | – | – |
| 24 V DC / 6 W | | – | – | 215 643 | 215 644 | 215 645 |
| 230 V AC, 50 Hz / 7.1 W | | 286 45 | 286 46 | 215 653 | 215 654 | 215 655 |
| Set screws with nuts and washers ¹⁾ (Package each containing) | | | | | | |
| | pieces | 839 13 16 | 839 13 16 | 210 071 12 | 210 071 12 | 210 071 12 |

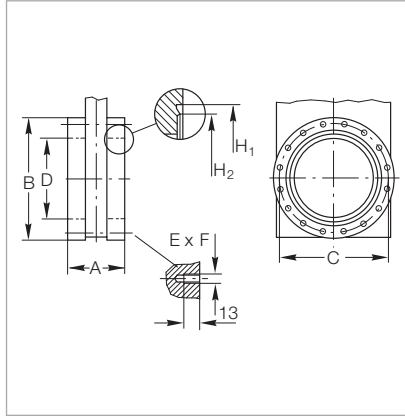
¹⁾ For dimensions E x F see table "Connections for ISO-F"

UHV Gate Valves, CF

Manually Operated



Dimensional drawing for the UHV gate valves
DN 63 CF to DN 200 CF



Connection dimensions for CF flanges
(UHV gate valves)

Advantages to the User

- Valve and wheel can be degassed at temperatures up to 250 °C (up to 200 °C when closed)
- Stainless steel body (non-rusting)
- Bellows-sealed feedthrough
- Low play in the locked state and low wear
- Compact
- Mechanically locked in the closed state
- Mechanical position indicator

Dimension Table

| | DN | 63 CF | 100 CF | 160 CF | 200 CF |
|----------------------|----|-------|--------|--------|--------|
| K | mm | 27 | 27 | 27 | 35 |
| L | mm | 408 | 462 | 552 | 660 |
| M | mm | 57 | 73 | 99 | 125 |
| N | mm | 192 | 247 | 336 | 430 |
| O | mm | 115 | 145 | 200 | 250 |
| O₁ | mm | 112 | 142 | 192 | 240 |
| P | mm | 70 | 70 | 70 | 80 |
| Q | mm | 180 | 220 | 290 | 350 |
| S | mm | 11.0 | 9.0 | 25.0 | 38.5 |
| T | mm | 184 | 184 | 184 | 200 |
| U | mm | 70 | 70 | 70 | 90 |
| U₁ | mm | 83 | 83 | 83 | 103 |
| V | mm | 77 | 77 | 77 | 94 |

Connections for CF

| | DN | 63 CF | 100 CF | 160 CF | 200 CF |
|----------------------|----|--------|---------|---------|---------|
| A | mm | 70 | 70 | 70 | 80 |
| B₂ | mm | 113.5 | 151.6 | 202.4 | 253.2 |
| C | mm | 92.1 | 130.2 | 181.0 | 231.8 |
| D | mm | 70 | 100 | 150 | 200 |
| E x F | | 8 x M8 | 16 x M8 | 20 x M8 | 24 x M8 |
| H₁ | mm | 82.5 | 120.65 | 171.45 | 222.3 |
| H₂ | mm | 77.4 | 115.5 | 166.0 | 217.0 |

Technical Data

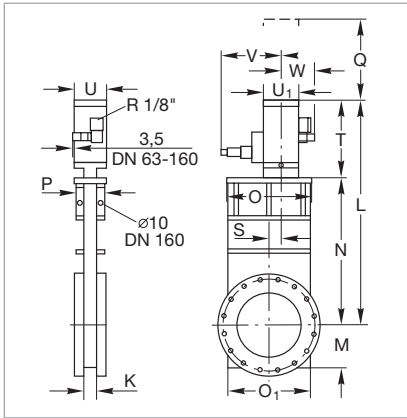
| | | UHV Gate Valve | | | |
|--|----------------------------|---|---|---|---|
| | | DN 63 CF | DN 100 CF | DN 160 CF | DN 200 CF |
| Tightness | | | | | |
| Body | mbar x l x s ⁻¹ | < 5 x 10 ⁻¹⁰ | < 5 x 10 ⁻¹⁰ | < 5 x 10 ⁻¹⁰ | < 5 x 10 ⁻¹⁰ |
| Valve seat | mbar x l x s ⁻¹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ |
| Pressure range, abs. | | 1 x 10 ⁻¹⁰ mbar to 1.6 bar | 1 x 10 ⁻¹⁰ mbar to 1.6 bar | 1 x 10 ⁻¹⁰ mbar to 1.6 bar | 1 x 10 ⁻¹⁰ mbar to 1.6 bar |
| High vacuum conductance | l x s ⁻¹ | 600 | 1700 | 6000 | 12000 |
| Differential pressure at the valve gate | bar | ≤ 1.6 in both directions | ≤ 1.6 in both directions | ≤ 1.6 in both directions | ≤ 1.6 in both directions |
| Max. differential pressure during opening | mbar | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 |
| Number of spindle turns for full travel | | 10 | 13 | 17 | 17 |
| Service life until first maintenance | cycles | 50,000 | 50,000 | 50,000 | 50,000 |
| Degassing temperature | | | | | |
| valve open / closed | °C | 250 / 200 | 250 / 200 | 250 / 200 | 250 / 200 |
| manually operated | °C | 250 | 250 | 250 | 250 |
| Warming-up / cooling down speed | °C x h ⁻¹ | 50 | 50 | 50 | 50 |
| Installation orientation | | any | any | any | any |
| Weight | kg | 9 | 12 | 18 | 28 |
| Material | | | | | |
| Body | | AISI 304 (1.4301) | AISI 304 (1.4301) | AISI 304 (1.4301) | AISI 304 (1.4301) |
| Bellows | | AISI 316 L (1.4435) | AISI 316 L (1.4435) | AISI 316 L (1.4435) | AISI 316 L (1.4435) |
| Mechanism | | AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) | AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) | AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) | AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) |
| Gaskets (head, gate) | | Metal / Viton | Metal / Viton | Metal / Viton | Metal / Viton |

Ordering Information

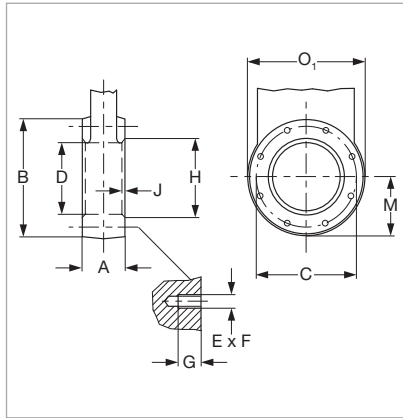
| | | UHV Gate Valve | | | |
|--|--|----------------|---------------|-------------------|-------------------|
| | | DN 63 CF | DN 100 CF | DN 160 CF | DN 200 CF |
| | | Part No. | Part No. | Part No. | Part No. |
| UHV gate valve, manually operated | | 286 85 | 286 86 | 286 87 | 286 88 |
| 16 set screws with nuts and washers ¹⁾ | | 839 13 | 839 13 | 2 x 839 13 | 2 x 839 13 |

¹⁾ For dimensions E x F see table "Connections for ISO-F"

UHV Gate Valves, ISO-F, Electropneumatically Operated



Dimensional drawing for the UHV gate valves
ISO-F



Connection dimensions for ISO-F flanges
(UHV gate valves)

Advantages to the User

- Valve and pneumatic drive can be degassed at temperatures up to 250 °C and 200 °C respectively
- Stainless steel body (non-rusting)
- Double-acting electropneumatic actuator (with position indicator and pilot valve)
- Bellows-sealed feedthrough
- Low play in the locked state and low wear
- Compact
- Mechanically locked in the closed state

Dimension Table

| | DN | 63 ISO-F | 100 ISO-F | 160 ISO-F | 250 ISO-F |
|----------------|----|----------|-----------|-----------|-----------|
| K | mm | 27 | 27 | 27 | 41 |
| L | mm | 346 | 418 | 523 | 800 |
| M | mm | 57 | 73 | 99 | 161 |
| N | mm | 192 | 247 | 336 | 560 |
| O | mm | 115 | 145 | 200 | 345 |
| O ₁ | mm | 112 | 142 | 192 | 322 |
| P | mm | 70 | 70 | 70 | 80 |
| Q | mm | 180 | 220 | 290 | 450 |
| S | mm | 11 | 9 | 25 | 65 |
| T | mm | 154 | 171 | 187 | 240 |
| U | mm | 70 | 70 | 70 | 90 |
| U ₁ | mm | 83 | 83 | 83 | 103 |
| V | mm | 145 | 145 | 145 | 155 |
| W | mm | 77 | 77 | 77 | 87 |

Connections for ISO-F

| | DN | 63 ISO-F | 100 ISO-F | 160 ISO-F | 250 ISO-F |
|-------|----|----------|-----------|-----------|-----------|
| A | mm | 70 | 70 | 70 | 100 |
| B | mm | 130 | 165 | 225 | 350 |
| C | mm | 110 | 145 | 200 | 310 |
| D | mm | 70 | 100 | 150 | 261 |
| E x F | | 4 x M8 | 8 x M8 | 8 x M10 | 12 x M10 |
| G | mm | 13 | 13 | 13 | 15 |
| H | mm | – | 102 | 153 | – |
| J | mm | – | 3 | 5 | – |

Technical Data

UHV Gate Valve

| | | DN 100 ISO-F | DN 160 ISO-F | DN 250 ISO-F |
|---|----------------------------------|--|--|--|
| Tightness | Body | $< 5 \times 10^{-10}$ | $< 5 \times 10^{-10}$ | $< 5 \times 10^{-10}$ |
| | Valve seat | | | |
| Pressure range, abs. | | 1×10^{-10} mbar to 1 bar | 1×10^{-10} mbar to 1 bar | 1×10^{-10} mbar to 1 bar |
| High vacuum conductance | $l \times s^{-1}$ | 1700 | 6000 | 26000 |
| Differential pressure at the valve gate | bar | 1 in both directions | 1 in both directions | 1 in both directions |
| Max. differential pressure during opening | mbar | 30 | 30 | 30 |
| Compressed air, min. / max. | bar | 4 / 7 | 4 / 7 | 5 / 7 |
| Closing / opening time | s | 1.2 | 1.5 | 4.0 |
| Compressed air cylinder, volume | l | 0.11 | 0.14 | 0.35 |
| Service life until first maintenance | cycles | 50,000 | 50,000 | 50,000 |
| Degassing temperature | valve open / closed | 250 / 200 | 250 / 200 | 250 / 200 |
| | pneumatic drive | 200 | 200 | 200 |
| | position indicator / pilot valve | 80 / 50 | 80 / 50 | 80 / 50 |
| Warming-up / cooling down speed | $^{\circ}C \times h^{-1}$ | 50 | 50 | 50 |
| Pilot valve supply voltage / power consumption | | 24 V DC / 6 W or 230 V AC, 50 Hz / 7.1 W | 24 V DC / 6 W or 230 V AC, 50 Hz / 7.1 W | 24 V DC / 6 W |
| Switching capacity for the position indicator at 80 $^{\circ}C$ | A | 5 at 250 V AC; 3 at 50 V DC | 5 at 250 V AC; 3 at 50 V DC | 5 at 250 V AC; 3 at 50 V DC |
| Installation orientation | | any | any | any |
| Weight | kg | 12 | 18 | 42 |
| Material | | | | |
| Body | | AISI 304 (1.4301) | AISI 304 (1.4301) | AISI 304 (1.4301) |
| Bellows | | AISI 316 L (1.4435) | AISI 316 L (1.4435) | AISI 316 L (1.4435) |
| Mechanism | | AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) | AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) | AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) |
| Gaskets (head, gate) | | Metal / Viton | Metal / Viton | Metal / Viton |

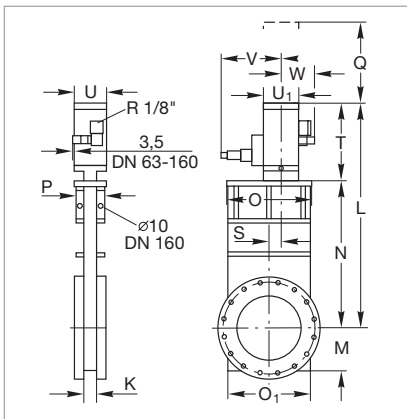
Ordering Information

UHV Gate Valve

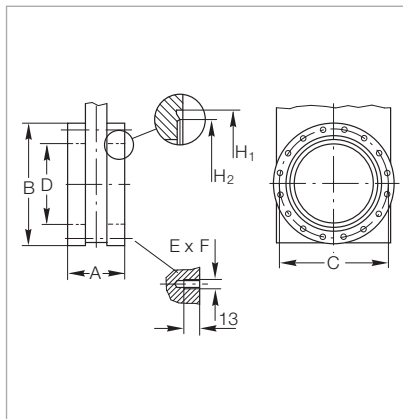
| | | DN 100 ISO-F | DN 160 ISO-F | DN 250 ISO-F |
|--|-------------------------|---------------------|----------------------|----------------------|
| | | Part No. | Part No. | Part No. |
| UHV gate valve, electropneumatically operated | 24 V DC / 6 W | 286 73 | 286 74 | 286 81 |
| | 230 V AC, 50 Hz / 7.1 W | 286 76 | 286 77 | - |
| Set screws with nuts and washers ¹⁾ (Package each containing) | pieces | 839 13 16 | 210 071 12 | 210 071 12 |

¹⁾ For dimensions E x F see table "Connections for ISO-F"

UHV Gate Valves, CF, Electropneumatically Operated



Dimensional drawing for the UHV gate valves CF electropneumatically operated



Connection dimension for CF flanges (UHV Gate Valves)

Dimension Table

| | DN | 63 CF | 100 CF | 160 CF | 200 CF |
|----------------------|----|-------|--------|--------|--------|
| K | mm | 27 | 27 | 27 | 35 |
| L | mm | 346 | 418 | 523 | 630 |
| M | mm | 57 | 73 | 99 | 125 |
| N | mm | 192 | 247 | 336 | 430 |
| O | mm | 115 | 145 | 200 | 250 |
| O₁ | mm | 112 | 142 | 192 | 240 |
| P | mm | 70 | 70 | 70 | 80 |
| Q | mm | 180 | 220 | 290 | 350 |
| S | mm | 11 | 9 | 25 | 38,5 |
| T | mm | 154 | 171 | 187 | 200 |
| U | mm | 70 | 70 | 70 | 90 |
| U₁ | mm | 83 | 83 | 83 | 103 |
| V | mm | 145 | 145 | 145 | 155 |
| W | mm | 77 | 77 | 77 | 87 |

Connections for CF

| | DN | 63 CF | 100 CF | 160 CF | 200 CF |
|----------------------|----|--------|---------|---------|---------|
| A | mm | 70 | 70 | 70 | 80 |
| B₂ | mm | 113.5 | 151.6 | 202.4 | 253.2 |
| C | mm | 92.1 | 130.2 | 181.0 | 231.8 |
| D | mm | 70 | 100 | 150 | 200 |
| E x F | | 8 x M8 | 16 x M8 | 20 x M8 | 24 x M8 |
| H₁ | mm | 82.5 | 120.65 | 171.45 | 222.3 |
| H₂ | mm | 77.4 | 115.5 | 166.0 | 217.0 |

Advantages to the User

- Double-acting electropneumatic actuator (with position indicator and pilot valve)
- Bellows-sealed feedthrough
- Valve and pneumatic drive can be degassed at temperatures up to 250 °C and 200 °C respectively
- Stainless steel body (non-rusting)
- Low play in the locked state and low wear
- Compact
- Mechanically locked in the closed state

Technical Data

UHV Gate Valve

| | | DN 63 CF | DN 100 CF | DN 160 CF | DN 200 CF |
|---|----------------------------------|--|--|--|--|
| Tightness | Body | $< 5 \times 10^{-10}$ $< 1 \times 10^{-9}$ | $< 5 \times 10^{-10}$ $< 1 \times 10^{-9}$ | $< 5 \times 10^{-10}$ $< 1 \times 10^{-9}$ | $< 5 \times 10^{-10}$ $< 1 \times 10^{-9}$ |
| | Valve seat | | | | |
| Pressure range, abs. | | 1 x 10 ⁻¹⁰ mbar to 1 bar | 1 x 10 ⁻¹⁰ mbar to 1 bar | 1 x 10 ⁻¹⁰ mbar to 1 bar | 1 x 10 ⁻¹⁰ mbar to 1 bar |
| High vacuum conductance | | 600 | 1700 | 6000 | 12000 |
| Differential pressure at the valve gate | | 1 in both directions | 1 in both directions | 1 in both directions | 1 in both directions |
| Max. differential pressure during opening | | 30 | 30 | 30 | 30 |
| Compressed air, min. / max. | | 4 / 7 | 4 / 7 | 4 / 7 | 5 / 7 |
| Closing / opening time | | 1.0 | 1.2 | 1.5 | 4.0 |
| Compressed air cylinder, volume | | 0.08 | 0.11 | 0.14 | 0.35 |
| Service life until first maintenance | | 50,000 | 50,000 | 50,000 | 50,000 |
| Degassing temperature | valve open / closed | 250 / 200 | 250 / 200 | 250 / 200 | 250 / 200 |
| | pneumatic drive | 200 | 200 | 200 | 200 |
| | position indicator / pilot valve | 80 / 50 | 80 / 50 | 80 / 50 | 80 / 50 |
| | | | | | |
| Warming-up / cooling down speed | | 50 | 50 | 50 | 50 |
| Pilot valve supply voltage / power consumption | | 24 V DC / 6 W or 230 V AC, 50 Hz / 7.1 W | 24 V DC / 6 W or 230 V AC, 50 Hz / 7.1 W | 24 V DC / 6 W or 230 V AC, 50 Hz / 7.1 W | 24 V DC / 6 W or 230 V AC, 50 Hz / 7.1 W |
| Switching capacity for the position indicator at 80 °C | | 5 at 250 V AC; 3 at 50 V DC | 5 at 250 V AC; 3 at 50 V DC | 5 at 250 V AC; 3 at 50 V DC | 5 at 250 V AC; 3 at 50 V DC |
| Installation orientation | | any | any | any | any |
| Weight | | 9 | 12 | 18 | 28 |
| Material | Body | AISI 304 (1.4301) AISI 316 L (1.4435) AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) Metal / Viton | AISI 304 (1.4301) AISI 316 L (1.4435) AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) Metal / Viton | AISI 304 (1.4301) AISI 316 L (1.4435) AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) Metal / Viton | AISI 304 (1.4301) AISI 316 L (1.4435) AISI 304 (1.4301), AISI 316 L (1.4404), AISI 301 (1.4310), AISI 420 (1.4034) Metal / Viton |
| | Bellows | | | | |
| | Mechanism | | | | |
| | | | | | |
| Gaskets (head, gate) | | | | | |

Ordering Information

UHV Gate Valve

| | | DN 63 CF | DN 100 CF | DN 160 CF | DN 200 CF |
|--|--|--------------------------------|--------------------------------|--------------------------------|---------------------------|
| | | Part No. | Part No. | Part No. | Part No. |
| UHV gate valve, electropneumatically operated 24 V DC / 6 W 230 V AC, 50 Hz / 7.1 W | | 286 89 286 95 | 286 90 286 96 | 286 91 286 97 | 286 92 - |
| 16 set screws with nuts and washers ¹⁾ | | 839 13 | 839 13 | 2 x 839 13 | 2 x 839 13 |

¹⁾ For dimensions E x F see table "Connections for CF"

Turboradial Blowers

General

TURBOSTREAM Blowers for the Laser Industry 968

Products

Turboradial Blower

- TURBOSTREAM Classic, with mechanical bearings
 - TST S (single-stage)
 - TST D (two-stage)
- TURBOSTREAM MAG, magnetically levitated
 - MAG TST S (single-stage)

as well as corresponding operating units and accessories

Regarding technical data, versions, applications and ordering information please contact your nearest Oerlikon Leybold Vacuum representative.

TURBOSTREAM Blowers for the Laser Industry

Beginning in 1988, the TURBOSTREAM technology was introduced by Oerlikon Leybold Vacuum GmbH. Since that time improvements have been worked out and implemented together with our customers on a continual basis. This was very much facilitated by the modular concept of the units, which also today puts us in a position where we are able to fulfil your future requirements as to a tailor-made solution.

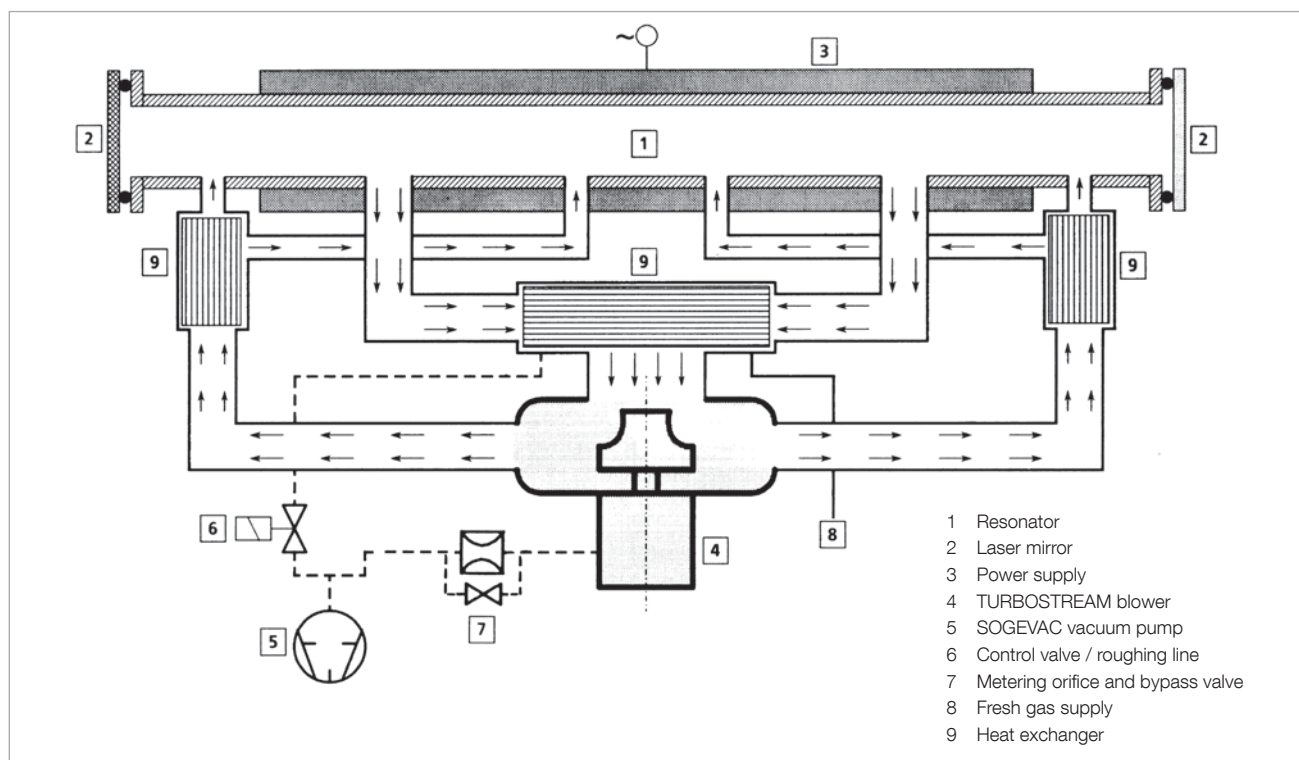
Today the unique TURBOSTREAM range from Oerlikon Leybold Vacuum is capable of improving the capabilities of your Laser system both at the Laser manufacturer and the end user with regard to:

- Quality
- Productivity
- Compactness
- Efficiency
- Reliability and
- Saving of costs

Just see how this works for you!

TURBOSTREAM Blower and Fast-flow CO₂ Laser

The CO₂ containing gas mixture which maintains in the resonator the laser effect is discharged from the resonator in the hot state and is cooled in the heat exchanger. After the gas has passed through the TURBOSTREAM, the gas is cooled once more in the downstream heat exchanger before it is returned back into the resonator.



Gas circulation in a fast axial flow CO₂ laser with TURBOSTREAM blower

Design Principle

The gas flows via the inlet flange (1) into the pump chamber of the blower. There it is radially accelerated by the rotating blade wheel (2) and is deflected via diffuser (4) into the ducts (5).

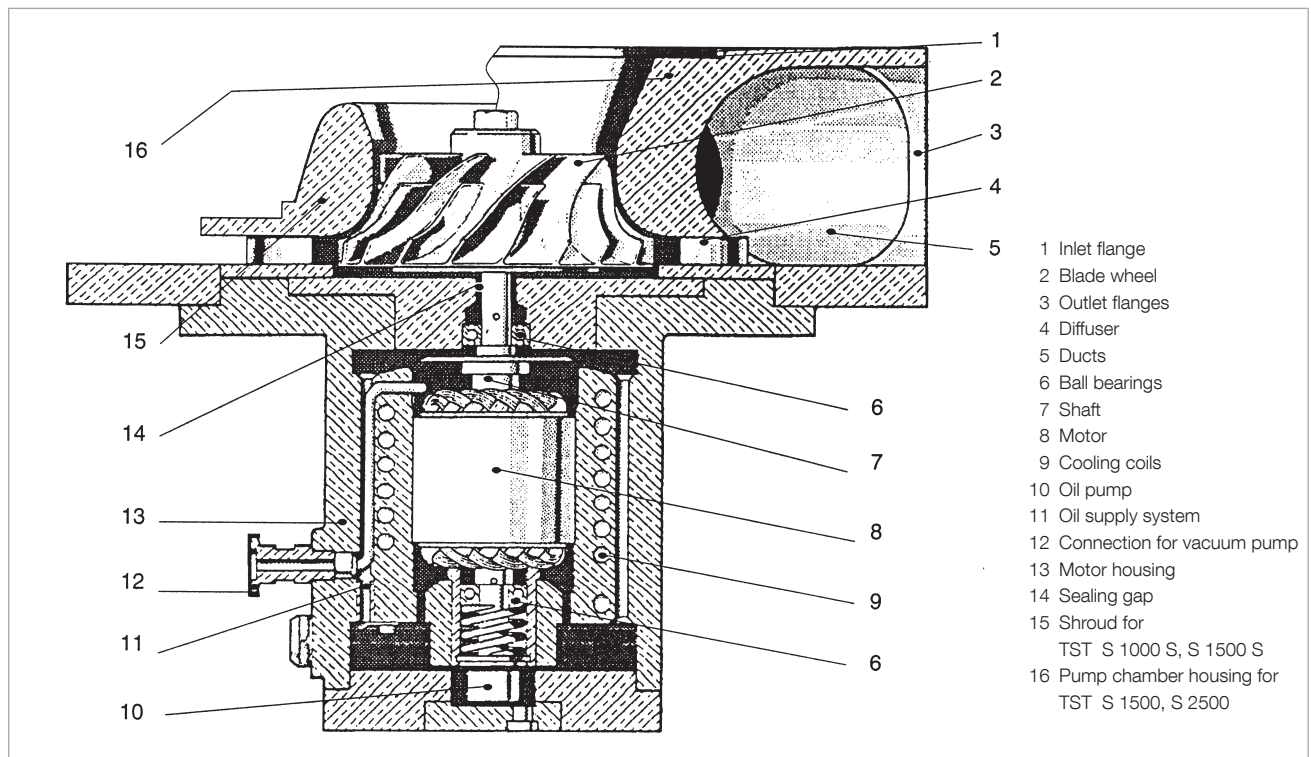
The gas then leaves the TURBO-STREAM through the outlet flanges (3).

The TURBOSTREAM blower is driven by a 3-phase motor (8). Blade wheel (2) and motor rotor are located on one

shaft (7). The stator of the motor has been built into the motor housing (13). The two hybrid ball bearings (6) of the shaft are oil-lubricated. An oil pump (10) feeds the oil through the shaft to the bearings. The motor housing of the TURBOSTREAM is water-cooled (9).

Pump chamber housing and motor housing are separated by a wear-free sealing gap.

To prevent small amounts of oil mist from entering the pump chamber via the gap (14), a small quantity of gas is constantly extracted (12) from the motor housing by the vacuum pump of the laser system. This ensures a steady gas flow from the pump chamber to the motor housing, reliably excluding the entry of oil into the pump chamber.



Cross-section of a TURBOSTREAM blower, left upper half: with shroud; right upper half: with pump chamber housing

Supplied Equipment

Depending on customer requirements the mechanical interface to the resonator can be designed either as a pump chamber housing or a shroud. The pump chamber housing completely matches the contour of the blade wheel. Only the intake piping and the two gas discharge pipings need to be provided for integrating this blower flow-wise in the resonator circuit. The shroud version of the blower utilises for a partial section of the blade wheel the matching structures provided by the system. This arrangement of “resonator / TURBOSTREAM with shroud” can thus be more compact.

- Generally all TURBOSTREAM blowers are equipped with a vibration sensor (GUARD) which monitors the ball bearings. The electrical connection between vibration sensor and frequency converter is provided by a connecting cable which is laid separately.

- The TURBOSTREAM is equipped with an integrated motor temperature monitoring sensor (PTC) which – should the motor cooling facility fail, due to an insufficient supply of cooling water, for example – will protect the electric motor against overheating.
- Some versions of the TURBOSTREAM are equipped with an oil level monitoring facility which automates regular monitoring of the oil level.

Electric Power Supply

A separate frequency converter supplies power to the TURBOSTREAM blower.

The TURBOSTREAM blower and the frequency converter are connected to each other by a connecting cable and by a PTC monitoring cable.

The frequency converter must be built into an electrical cabinet. It has been provided with protection against output short circuits, short circuits to ground and overloads. It is equipped with a 5 digit display for indicating the operating status, a floating contact for indicating error conditions and a connection for the PTC resistor for the purpose of monitoring the motor temperature.

The GUARD vibration sensor is supplied with power from the frequency converter. The error status generated when the GUARD comes into action is evaluated by the frequency converter and results in an interruption of the power supply to the TURBOSTREAM blower and an error message on the frequency converter.

The drive of the TURBOSTREAM blower and the frequency converter have been optimally matched.

Contents

Oils / Greases / Lubricants

General

| | |
|--|-----|
| LEYBONOL Lubricant Classifications | 973 |
| Vacuum Pump Oils | 974 |
| Oil Types | 974 |
| Diffusion Pump Oils | 976 |
| Special Lubricants | 977 |
| Greases. | 977 |
| General Information and Recommendations for Oils | 979 |
| Storage of LEYBONOL Oils and Greases | 981 |

Products

| | |
|--|-----|
| LEYBONOL LVO 1XX Mineral Oils. | 982 |
| LEYBONOL LVO 2XX Ester Oils. | 986 |
| LEYBONOL LVO 3XX PAO Oils | 989 |
| LEYBONOL LVO 4XX PFPE Oils | 990 |
| LEYBONOL LVO 5XX Diffusion Pump Oils | 992 |
| LEYBONOL LVO 7XX Special Lubricants | 995 |
| LEYBONOL LVO 8XX Greases | 996 |

Miscellaneous

| | |
|--|------|
| LEYBONOL LVO 9XX Services | 1000 |
| Oil Analysis for Your Safety | 1000 |
| Application Assessment. | 1002 |
| Glossary | 1003 |
| LEYBONOL Oil Analyses | 1005 |
| ISO Viscosity Grade. | 1006 |

Our Formula for your success:
Your Vacuum pump
+ Your Application
+ LEYBONOL

= High Performance



Excellent Vacuum Performance

LEYBONOL has been specially developed to achieve the best possible ultimate pressure capable for your pump. It also provides a low vapor pressure over the entire vacuum range. LEYBONOL keeps your production running!

Long Lifetime

Vacuum suitable additives protect your pump and extend its life expectancy. LEYBONOL allows long oil change intervals helping to substantially reduce your maintenance costs.



Superior Lubrication

LEYBONOL reduces wear and tear caused by friction. Its superior lubrication properties reduce overall power consumption while also allowing for easy start ups.

Extensive Quality Controls

LEYBONOL oils are subjected to frequent on-going and rigorous testing to ensure that each batch is consistent and will provide the same outstanding vacuum performance.

Highest Industry Standards

LEYBONOL meets the highest industry standards such as

- RoHS - Conformity
- Freedom of VOC (Volatile Organic Compounds)
- BAM Registration (for some LEYBONOL products)
(BAM = Bundesanstalt für Materialforschung und -prüfung)
- NSF H1 (NSF International / Nonfood Compounds Registration Program)
(some products from the LEYBONOL line are NSF registered)

LEYBONOL® is a registered trademark of Oerlikon Leybold Vacuum GmbH

LEYBONOL® Lubricant Classifications

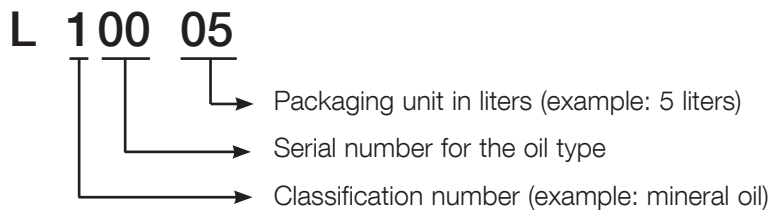
| | | |
|----------------|---|-------------------------------|
| LVO 1XX | = | Mineral oil |
| LVO 2XX | = | Ester oil |
| LVO 3XX | = | PAO oil (Polyalphaolefins) |
| LVO 4XX | = | PFPE oil (Perfluoropolyether) |
| LVO 5XX | = | Diffusion pump oil |
| LVO 7XX | = | Special lubricants |
| LVO 8XX | = | Greases |
| LVO 9XX | = | Services / analyses |

Self-explanatory part numbers

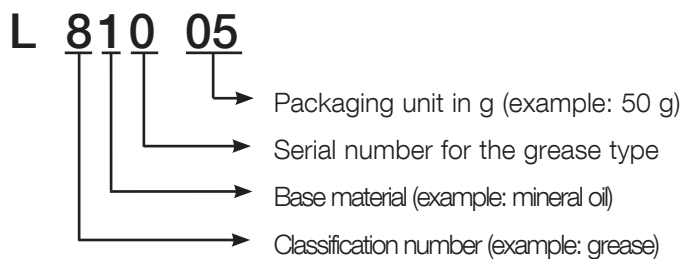
Example for LVO 100

| | | |
|-----------------|---|-------------------|
| L 100 01 | = | 1 liter |
| L 100 05 | = | 5 liters |
| L 100 20 | = | 20 liters |
| L 100 99 | = | 208 liters (drum) |

Example 1: mineral oil, No. 00, 5 liters



Example 2: grease, based on mineral oil, No. 0, 50 g



LEYBONOL® is a registered trademark of Oerlikon Leybold Vacuum GmbH

Vacuum Pump Oils

LEYBONOL lubricating oils for vacuum pumps need to fulfil demanding requirements. Their vapor pressure must be low at high temperatures and the water content and water uptake must be minimal. Their viscosity characteristics need to be flat; lubricating properties need to be excellent and they need to be resistant against thermal decomposition and increased mechanical stress.

All the LEYBONOL oils listed in the following have been subjected in our factory laboratories to very comprehensive tests closely resembling the conditions encountered in practice by the respective pump series.

Under vacuum engineering conditions lubricating oils may react very differently compared to what is being expected of them.

In order to ensure the best possible performance of the vacuum pumps, the use of LEYBONOL vacuum pump oils qualified by Oerlikon Leybold Vacuum is recommended.

When using third party oils, the oil change intervals and the performance of the vacuum pump may be reduced. Also unwanted deposits may occur which may cause severe damage to the vacuum pump.

Our oils are subjected to an involved qualification process with respect to their technical suitability in our vacuum pumps.

Our warranty commitment is dependent on the usage of lubricating oils which are specifically qualified by us.

No liability will be assumed for any kind of damage caused through the usage of types of oil which have not been qualified or which are unsuitable.

In order to adapt the pumps to the different applications of our customers, different types of oil are used in our vacuum pump series.

Please note that owing to differing properties not all types of oil may be used in all our vacuum pump series. If you can not find the combination of pump and oil you require by way of a Part No., please ask us for a quotation.

Oil Types

Mineral Oils (LEYBONOL LVO 1XX)

Mineral oils are products distilled and refined from crude oil. These do not consist of precisely defined constituents but rather consist of a complex mixture. The way in which the mineral oil is pre-treated and its composition is decisive as to the applications it will be suited for. Depending on the distribution of the hydrocarbons and the dominance of certain properties, mineral oils are grouped according to paraffin-base, naphthenic and aromatic. For the purpose of attaining especially low ultimate pressures, mineral oils must be selected on the basis of a core fraction.

The thermal and chemical resistance of mineral oils has been found to be adequate in the majority of applications. They offer a high degree of compatibility with elastomers and resistance to hydrolysis.

Mineral oils also include the group of hydrocracked oils. These are frequently also termed semi-synthetic oils. Hydrocracked oils are produced under a very high hydrogen pressure at high temperature and are substantially free of aromatic compounds and olefins.

Hydrocracking oils exhibit a higher thermal stability compared to conventional mineral oils. In most cases the intervals between the oil changes can be extended.

Synthetic Oils

Synthetic oils are produced through chemical reactions. The group of synthetic oils includes liquids differing widely as to their chemical structure and composition. Correspondingly, their physical and chemical properties differ considerably. Synthetic oils are used in those cases where special properties of the oil are required which can not be fulfilled by mineral oils.

Synthetic oils are among others:

Ester Oils (LEYBONOL LVO 2XX)

Ester oils are organic compounds which excel especially through their high thermal resistance to cracking compared to mineral oils. Chemical resistance is generally quite good, but will depend on the type of ester oil. Elastomer compatibility and resistance against hydrolysis are not so good compared to mineral oils.

They should not be used when pumping acids, halogens or alkaline media like ammonia in connection with humidity.

Polyalphaolefins (PAO) (LEYBONOL LVO 3XX)

Polyalphaolefin oils are synthetic hydrocarbons which are paraffin like, but have a uniform structure. Thermal and chemical resistance is better compared to mineral oils.

Owing to their good flowing properties when cold they can be used at low temperatures.

Elastomer compatibility and resistance against hydrolysis are comparable to mineral oils.

Perfluoropolyether (PFPE) (LEYBONOL LVO 4XX)

These are oils which are only composed of carbon (C), fluorine (F) and oxygen (O) atoms. The existing

C-O and C-F bonds are highly stable. For this reason PFPE oils are practically inert against all chemical and oxidizing influences.

Perfluoropolyethers will not polymerise under the influence of high energy radiation.

Perfluoropolyethers are used when pumping strongly oxidative substances like oxygen, ozone or nitric oxides as well as highly reactive substances like halogens and hydrogen halides. Regarding Lewis acids (for example, boron trifluoride BF_3 , aluminium trichloride AlCl_3) they are not completely inert. Here reactions may take place at temperatures over approximately 150 °C (302 °F).

Perfluoropolyethers are thermally highly stable. PFPE is not flammable. Thermal decomposition may only take place at temperatures of over 290 °C (554 °F).

Caution: perfluoropolyethers will – when decomposed – release toxic and corrosive gases: hydrogen fluoride HF, carbonyl difluoride COF_2 among others. For this reason open fires must be avoided in the workspace where PFPE is being used. Do not smoke in the workspace where PFPE is being used.

Only suitably prepared pumps must be used in connection with perfluoropolyethers, since it is essential that these be free of hydrocarbons.

Changing from one basic type of oil to PFPE must be left exclusively to authorised Service Centers. The pumps will have to be fully disassembled and carefully cleaned. Gaskets and filters will have to be exchanged and suitable greases will have to be used.

Other Types of Synthetic Oil

Further types of synthetic oil like polyglycols, phosphate esters or silicone oils are not recommended by us for our forevacuum pumps. These types of oil exhibit specific properties which may have a negative effect when used in forevacuum pumps.

Safety data sheets are available to professional users from:

e-mail “documentation.vacuum@oerlikon.com” or Internet “www.oerlikon.com/leyboldvacuum”.

Diffusion Pump Oils

Pump fluids for oil diffusion pumps must exhibit a low vapor pressure at room temperature and must be able to resist thermal decomposition and oxidation to a large extent. Surface tension of the pump fluids must be high to reduce creep of oil films. They must be chemically inert, exhibit a high flash point and evaporation heat must be low. Moreover, the pump fluids should permit high pumping speeds over a wide range of pressures and be cost effective.

One type of pump fluid alone cannot meet these comprehensive requirements.

It is therefore required to select a pump fluid according to the operating pressure and the requirements of the application in each case.

Mineral oils (LEYBONOL LVO 500 and LVO 510)

Mineral oils for diffusion pumps are closely tolerated fractions of a high quality base product distilled with particular care.

These pump fluids are especially suited for work in a high vacuum.

Silicone oil (LEYBONOL LVO 520 and LVO 510)

Silicone oils are composed of precisely defined chemical compounds and are highly resistant. Owing to their extremely low vapor pressure, silicone oils are particularly well suited as a working fluid. Even after numerous air inrushes, silicone oils suffer neither ageing nor mass spectrometrically apparent alterations.

Strong mineral acids, alkalis and strong oxidants are capable of decomposing silicone oils.

(LEYBONOL LVO 540) is a hydrocarbon compound

LVO 540 has been developed for utilisation in oil vapour jet pumps.

It is thermally and chemically highly resistant and excels through a high degree of oxidation resistance.

It delivers the essential high pumping speed of the vapour jet pumps in the medium vacuum range.

Safety data sheets are available to professional users from:

e-mail "documentation.vacuum@oerlikon.com" or Internet "www.oerlikon.com/leyboldvacuum".

Special Lubricants

(LEYBONOL LVO 7XX)

All special lubricants are summarised under the name of LEYBONOL LVO 7xx which are used in connection with special applications.

For example, LEYBONOL LVO 700 is a H1 registered, extremely stable special lubricant for vacuum pumps. This special lubricant has been devel-

oped for special applications where reactions with chemically active substances cannot be avoided.

Greases

(LEYBONOL LVO 8XX)

Greases are solid to semi-solid substances which consist of the principal components base oil and thickener.

The base oil provides most of the lubrication and will in most cases define the service temperature. The thickener binds the oil and can increase the lubricity or the thermal stability of the grease.

Added to these two constituencies are additives which may improve the per-

formance of the grease in specific areas depending on the specific application.

As base oils, frequently mineral oils, synthetic oils on the basis of ester oils, PAOs, silicone oils or also PFPE (perfluoropolyethers) are used.

Thickeners are roughly categorised in soap thickeners like lithium, for example and non-soap thickeners like polyurea or PTFE.

Greases will reduce friction and wear, ensure moveability of components, will seal off against contaminants or are used as anti-rust and anticorrosion agents.

Through the selection of corresponding base oil types, thickeners and additives, greases can be optimised for different applications.

Safety data sheets are available to professional users from:

e-mail "documentation.vacuum@oerlikon.com" or Internet "www.oerlikon.com/leyboldvacuum".

General Information and Recommendations for Oils

Lubricant Functions

The term "Lubricant" actually describes only one of the five important functions of the oil:

Lubrication

Oil is used as a **lubricant** helping to reduce friction and provide a protective film against mechanical wear. For example, the vanes of a vacuum pump are forced by the centrifugal force against the pump ring at a force of several Newtons. The oil protects the vanes against friction since they slide along on the oil film. When viewing a running pump from the inside using stroboscopic light it is apparent how an oil wave builds up in front of the vanes, pressing the vanes away from the pump ring. The vanes never touch the pump ring or the bearing covers allowing the pump to operate for 10,000s of hours.

Cooling

The oil conducts the heat produced by friction and gas compression away so that the pump will always be operated at its optimum operating temperature. The oil here functions as a coolant.

Means of transport (dispersing properties of oils)

As a **means of transport** the oil absorbs process substances or other particles keeping them suspended (dispersed). In this way pump sections are protected against suffering damage. Sludge deposits and oil thickening shall be avoided.

Corrosion Protection

The oil shall protect the inner pump surfaces against corrosion. Corrosion can occur when the pump is used to pump water vapor or other chemical vapours which condense. The oil wets and protects the inner pump surfaces helping to keep condensate away from these. The oil acts as a **corrosion inhibitor**.

Applies only to a lesser extent to PFPE (LVO 4XX).

Sealing

As a **sealing agent** oil improves the attainable ultimate pressure and the attainable pumping speed. This is the principal function of vacuum pump oil. Oil sealed pumps are capable of attaining a much improved ultimate pressure compared to oil-free rotary vane pumps of similar construction.

In oil sealed pumps an oil film is created on the guiding components as well as on the tips and sides of the vanes.

The oil seals the intermediate spaces around the edges and tips of the vanes thereby preventing gas molecules from flowing back through leaks.

This improves the attainable ultimate pressure and the attainable pumping speed within all pressure ranges.

Oil Lifetime

Oil lifetime is dependent on a number of parameters.

An important influencing factor is that of the temperature. Mineral oils are commonly specified for a maximum temperature limit of 80 °C (176 °F). Above this temperature, to put it simply, it can be said that a temperature increase by 10 °C (50 °F) will cut oil lifetime in half. This results in thickening of the oil.

Synthetic oils may depending on the type be operated constantly at 100 to 160 °C (320 °F). PFPE oils can be operated constantly at a temperature of 250 °C (482 °F) max., however, lower maximum temperatures need to be taken into account depending on the process medium.

PFPE oils are not subject to any typical oil ageing since they are almost inert (for this see also the chapter "Vacuum Pump Oils", paragraph Perfluoropolyethers PFPE).

When operating a pump under conditions which are too cold, then water vapor or other vapours may condense. The condensed liquid may then cause a loss of the lubricating properties or cause corrosion within the pump.

The following parameters among others have a direct influence on the oil temperature:

- Ambient temperature
- Operating pressure
- Operating frequency 50 or 60 Hz
- Temperature of the pumped gases
- Gas ballast type and flow
- Water or air cooling
- Cooling water temperature and condition of the cooling water circuit
- Oil volume

A further important factor regarding oil lifetime is the avoidance of influences which have a modifying effect on the oil like the ingress of reactive or aggressive substances, water vapor, dust or contaminants in general.

For dispersion of process media and cleaning of the oil by oil filters, we offer a number of different standard approaches.

Please contact us.

Our experts shall be pleased to assist you in the selection process for suitable accessories (for this refer also to paragraph "Oil Cleaning").

Oil Check

The condition of the oil can be determined by way of an oil analysis.

Assessing the colour of the oil alone does not indicate the condition of the lubricant in a conclusive way. Colour changes and a turbid appearance of the oil can be indicative of contamination with foreign substances or oxidation. A turbid appearance may be indicative of water, for example. Depending on the type of oil a dark discolouration of the oil can occur already after a few operating hours, but without any negative effects on the application as in the case of LVO 210, for example.

For this reason only a comparison between the fresh oil and the used oil through an analysis will help (see chapter "Services"). For the purpose of detecting a necessary oil change, viscosity and the neutralisation number (TAN - total acid number) are analysed in comparison with fresh oil.

Changes in viscosity exceeding 20% necessitate an oil change. If the neutralisation number (TAN) in the case of mineral oils and PAOs increases to a level of 2 mg KOH/g then an oil change should be done. Above this value ageing of a mineral oil or PAO will increase exponentially.

In the case of ester oils, a higher neutralisation number can be accepted since here oil ageing will not be exponential. However, this requires that trend analyses confirm a low increase and that the other oil data be inconspicuous.

Oil Cleaning

Oerlikon Leybold Vacuum offers a number of different standard oil filter devices.

These include:

- Mechanical oil filters for depositing dust, crystalline decomposition products and sludge
- Chemical oil filters for separating substances dissolved in the oil by way of adsorption to activated aluminium oxide
- Various separators for the intake side for avoiding the ingress of process media into the pump

Please contact us.

Our experts shall be pleased to assist you in the selection process for suitable accessories.

Details on the respective pump accessories and additional information can also be found in the corresponding Catalog Part.

Oxygen Applications

In applications in which pure oxygen or oxygen concentrations exceeding that in the atmosphere (over 21% by volume) occur, suitable operating means must be used.

Oxygen reacts with hydrocarbons. In connection with mineral oil based lubricants and most synthetic oils there exists an ignition risk. Oxygen can cause a self-ignition of oils and greases.

Even a slight oxygen enrichment may have the following effects:

- Increase in the rate of combustion
- Combustion temperature increase
- Decreased ignition temperature

For this reason any oxygen concentration above that of the atmosphere needs to be considered as hazardous.

In such cases a perfluoropolyether (PFPE) will be suitable as the operating agent.

Oerlikon Leybold Vacuum has in its product range special vacuum pumps specified for PFPE operation which are free of hydrocarbons.

Information for Smooth Operation

- Reactive or aggressive substances in the pumped flow can inadmissibly stress the operating oil or modify it and may even be incompatible with the materials of the pump
- Even small quantities of dust or particles can result in failures
- Pumping of liquids is not permissible
- Corrosion, deposits and severe oil cracking can cause a pump failure
- Avoid standstill corrosion of the pumps for all processes which involve condensable vapours
- Small quantities of water may be ejected safely by operating the pumps with their gas ballast
- Avoidance of oil modifying influences or increased number of oil change intervals adapted to the specific application
- Selection of the optimum lubricant type and optimum viscosity
- Regular checks on the oil condition and the filters
- Pump maintenance in regular intervals
- Keep thermal stresses low
- Oil cleaning by oil filters and separation of process media

Moreover, all safety regulations regarding explosion protection need to be observed.

Storage of LEYBONOL Oils and Greases

Important recommendations for **proper** storing all LEYBONOL lubricants are:

- Storage temperature +10 to +30 °C (+50 to +86 °F)
- The containers should be protected against direct sunlight
- Drums should be stored horizontally
- Storage in enclosed indoor rooms
- The storage rooms should be clean and dry

LEYBONOL Oils

When stored properly in sealed original containers, the following durability periods apply:

The product LEYBONOL LVO 240 exhibits a durability of two years.

For the PFPE products LEYBONOL LVO 4XX a durability of 20 years applies.

For the other LEYBONOL oils durability is at least 3 years.

LEYBONOL Greases

Durability of the LEYBONOL greases differs widely depending on their type. For this reason no general statement can be made.

Upon request we shall be pleased to send to you precise durability information on the individual LEYBONOL lubricants.

Restrictions

For sealed original containers: if the product is not stored properly, durability is reduced.

After the containers have been opened: Adequate precautions against the ingress of dust, dirt, water etc. need to be introduced and the contents must be used up speedily. After having opened the containers once, durability of the product is reduced.

Products

LEYBONOL Mineral Oils

Application Data

LVO 100

LVO 110

| | | |
|---|---|--|
| Type of oil | Mineral oil, free of additives | Hydrocracked mineral oil with additives |
| Properties | Low vapor pressure, low inclination to foaming very good water separation | Significantly increased oil change intervals, high thermal stability, low inclination to foaming |
| Application examples | Standard oil for low ultimate pressures. Pumping of air, chemically inert gases and water vapor | Backing pumps for mass spectrometers. Pumping of air or chemically inert gases |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | TRIVAC, E + DK, RUVAC | SOGEVAC (≤ SV 65 A and ≤ SV 120 BI (FC)) |

Technical Data

LVO 100

LVO 110

| | | | |
|--------------------------|--------------------|---------------|-----------|
| ISO viscosity grade | | ISO VG 100 | ISO VG 32 |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 95 | 32 |
| at 100 °C (212 °F) | mm ² /s | 10.5 | 5.5 |
| Flash point | °C (°F) | > 255 (> 491) | 238 (460) |
| Density at 15 °C (59 °F) | kg/m ³ | 880 | 841 |
| Pour point | °C (°F) | < -9 (< +16) | -33 (-27) |

Ordering Information

LVO 100

LVO 110

| | Part No. | Part No. |
|------------|----------|----------|
| 1 liter | L 100 01 | L 110 01 |
| 2 liters | - | L 110 02 |
| 5 liters | L 100 05 | - |
| 20 liters | L 100 20 | - |
| 208 liters | L 100 99 | - |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

Application Data**LVO 120****LVO 130**

| | | |
|---|---|---|
| Type of oil | Mineral oil with additives | Mineral oil with additives |
| Properties | Extended oil change intervals, low inclination to foaming, very good water separation | Extended oil change intervals, low inclination to foaming, very good water separation |
| Application examples | Standard oil for small SOGEVAC pumps ¹⁾ Pumping of air, chemically inert gases and water vapor | Standard oil for large SOGEVAC pumps ¹⁾ Pumping of air, chemically inert gases and water vapor |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ²⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | SOGEVAC A-series (\leq SV 65) and B-series (\leq SV 25, \leq SV 120 BI (FC)) | SOGEVAC A-series (\geq SV 100) and B-series (\geq SV 40 B) |

Technical Data**LVO 120****LVO 130**

| | | | |
|--------------------------|--------------------|-----------|-----------|
| ISO viscosity grade | | ISO VG 32 | ISO VG 68 |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 32 | 68 |
| at 100 °C (212 °F) | mm ² /s | 5.5 | 9 |
| Flash point | °C (°F) | 244 (471) | 248 (478) |
| Density at 15 °C (59 °F) | kg/m ³ | 875 | 885 |
| Pour point | °C (°F) | -27 (-17) | -21 (-6) |

Ordering Information**LVO 120****LVO 130**

| | Part No. | Part No. |
|------------|-----------------|-----------------|
| 0.5 liters | L 120 00 | - |
| 1 liter | L 120 01 | L 130 01 |
| 2 liters | L 120 02 | L 130 02 |
| 5 liters | L 120 05 | L 130 05 |
| 20 liters | L 120 20 | L 130 20 |
| 208 liters | - | L 130 99 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

- ¹⁾ LVO 120 is suited for the SOGEVAC SV 25 B and smaller pumps where the lower viscosity assists the starting process.
LVO 130 is suited for the SOGEVAC SV 40 B and larger pumps where the higher viscosity assists attaining of lower pressures.
However, all SOGEVAC pumps can be operated with both types of oil and moreover, LVO 120 and LVO 130 can be mixed with each other.
- ²⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

Application Data**LVO 140****LVO 150**

| | | |
|---|--|--|
| Type of oil | Mineral oil with additives | Mineral oil with additives |
| Properties | H1 registration by NSF. Constituents approved by the FDA under CFR 178.3570. In acc. with USDA-H1 | H1 registration by NSF. Constituents approved by the FDA under CFR 178.3570. In acc. with USDA-H1 |
| Application examples | Recommended for applications in the food industry | Recommended for applications in the food industry |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | SOGEVAC A-series (\leq SV 65) and B-series (\leq SV 25 B) | SOGEVAC A-series (\geq SV 100) and B-series (\geq SV 40 B) |

Technical Data**LVO 140****LVO 150**

| | | | |
|--------------------------|--------------------|------------|------------|
| ISO viscosity grade | | ISO VG 32 | ISO VG 68 |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 30 | 63 |
| at 100 °C (212 °F) | mm ² /s | 5 | 8 |
| Flash point | °C (°F) | 225 (437) | 253 (487) |
| Density at 15 °C (59 °F) | kg/m ³ | 860 | 870 |
| Pour point | °C (°F) | -18 (-0.4) | -18 (-0.4) |

Ordering Information**LVO 140****LVO 150**

| | Part No. | Part No. |
|-----------|-----------------|-----------------|
| 1 liter | L 140 01 | L 150 01 |
| 20 liters | – | L 150 20 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

Application Data

LVO 160

| | |
|---|---|
| Type of oil | Hydrocracked mineral oil with additives |
| Properties | Significantly increased oil change intervals, high thermal stability, low inclination to foaming |
| Application examples | Pumping of air or chemically inert gases |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | SOGEVAC A-series (≥ SV 100) and B-series (≥ SV 40 B) |

Technical Data

LVO 160

| | |
|--|---|
| ISO viscosity grade | ISO VG 68 |
| Viscosity at 40 °C (104 °F) at 100 °C (212 °F) | mm ² /s mm ² /s 68 9 |
| Flash point | °C (°F) 254 (489) |
| Density at 15 °C (59 °F) | kg/m ³ 862 |
| Pour point | °C (°F) 254 (489) |

Ordering Information

LVO 160

| | Part No. |
|---------|----------|
| 1 liter | L 160 01 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

LEYBONOL Ester Oils

Application Data

LVO 200

LVO 210

| | | |
|---|---|--|
| Type of oil | Synthetic oil (ester oil with additives) | Synthetic oil (ester oil with additives) |
| Properties | Very high thermal, oxidative and chemical stability, good deterging/dispersion characteristics, excellent wear protection | Very high thermal, oxidative and chemical stability, good deterging/dispersion characteristics, excellent wear protection |
| Application examples | Application at increased temperatures Starting of the pump between 0 and +12 °C (32 and 64 °F) Pumping of air, inert gases, carbon dioxide (dry), carbon monoxide, organic solvent vapours, resin vapours | Application at increased temperatures Pumping of air, inert gases, carbon dioxide (dry), carbon monoxide, organic solvent vapours, resin vapours |
| Remarks | Not for pumping of inorganic acids, free halogens or alkaline media | Not for pumping inorganic acids, free halogens or alkaline media |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | SOGEVAC A-series (≤ SV 65 A) and BI-series (≤ SV 120 BI (FC)) | TRIVAC B, SP-Line, E + DK, RUVAC, DRYVAC, SOGEVAC (≥ SV 100, ≥ SV 40 B) SV 40 Cat. 1 (i)/2 (o) IIB + H2 and SV 40 B to 630 B Cat. 2 (i)/2 (o) and 3 (i)/3 (o) |

Technical Data

LVO 200

LVO 210

| | | | |
|--------------------------|--------------------|---------------|------------|
| ISO viscosity grade | | ISO VG 32 | ISO VG 100 |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 28 | 97 |
| at 100 °C (212 °F) | mm ² /s | 5.5 | 9 |
| Flash point | °C (°F) | 258 (496) | 250 (482) |
| Density at 15 °C (59 °F) | kg/m ³ | 918 | 960 |
| Pour point | °C (°F) | < -45 (< -49) | -33 (-27) |

Ordering Information

LVO 200

LVO 210

| | Part No. | Part No. |
|------------|----------|----------|
| 1 liter | L 200 01 | L 210 01 |
| 2 liters | L 200 02 | L 210 02 |
| 5 liters | L 200 05 | L 210 05 |
| 20 liters | L 200 20 | L 210 20 |
| 208 liters | - | L 210 99 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

Application Data**LVO 220****LVO 240**

| | | |
|---|---|--|
| Type of oil | Synthetic oil (ester oil with additives) | Synthetic oil (special ester oil) |
| Properties | Very high thermal, oxidative and chemical stability, good deterging and dispersion characteristics, excellent wear protection | Excellent solubility for polymers |
| Application examples | Application in RUVAC WSLF for operation with gas lasers | Pumping of process media which have a tendency to polymerise (styrene and butadiene) |
| Remarks | | Do not use any chemical oil filters Strictly avoid any mixing with any other type of oil Not for pumping inorganic acids |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Unsuitable Unsuitable |
| Used in the pumps of series | RUVAC (WSLF) | TRIVAC B |

Technical Data**LVO 220****LVO 240**

| | | | |
|--------------------------|--------------------|------------|--------------------|
| ISO viscosity grade | | ISO VG 100 | Not classified |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 94 | 38 |
| at 100 °C (212 °F) | mm ² /s | 13 | 5 |
| Flash point | °C (°F) | 265 (509) | 225 (437) |
| Density at 15 °C (59 °F) | kg/m ³ | 915 | 1055 ²⁾ |
| Pour point | °C (°F) | -35 (-31) | -32 (-26) |

Ordering Information**LVO 220****LVO 240**

| | Part No. | Part No. |
|-----------|----------|----------|
| 1 liter | L 220 01 | – |
| 20 liters | – | L 240 20 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

²⁾ At 20 °C (68 °F)

Application Data**LVO 250****LVO 260**

| | | |
|---|--|--|
| Type of oil | Synthetic oil (ester oil with additives) | Synthetic oil (special ester oil) |
| Properties | High thermal and oxidative stability | Very high thermal and oxidative stability |
| Application examples | Bearing lubricant for turboradial blowers | Bearing lubricant for turboradial blowers |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | TURBOSTREAM | TURBOSTREAM |

Technical Data**LVO 250****LVO 260**

| | | | |
|--------------------------|--------------------|----------------|-------------------|
| ISO viscosity grade | | Not classified | Not classified |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 13 | 24 |
| at 100 °C (212 °F) | mm ² /s | 3.5 | 5 |
| Flash point | °C (°F) | > 185 (> 365) | 245 (473) |
| Density at 15 °C (59 °F) | kg/m ³ | 925 | 980 ²⁾ |
| Pour point | °C (°F) | < -57 (< -71) | -60 (-76) |

Ordering Information**LVO 250****LVO 260**

| | Part No. | Part No. |
|---|-----------------|-----------------|
| 0.3 liters | L 250 00 | L 260 00 |
| 300 ml Set (for TURBOSTREAM D 2500) | 896 101 | – |
| 600 ml Set (for TURBOSTREAM D 2500 / S 3500) | – | 896 112 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

²⁾ At 20 °C (68 °F)

LEYBONOL PAO Oils

Application Data

LVO 300

LVO 310

| | | |
|---|--|--|
| Type of oil | Synthetic oil (PAO with additives) | Synthetic oil (PAO with additives) |
| Properties | High thermal and oxidative stability | High thermal and oxidative stability |
| | H1 registration by NSF. Constituents approved by the FDA under CFR 178-3570. In acc. with USDA - H1 | |
| Application examples | Recommended for applications in the food industry Backing pumps for mass spectrometers Cleaning systems | Cold starting at low temperatures is possible Pumping of air, chemically inert gases, water vapor and small quantities of refrigerant R 717 (ammonia) |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | TRIVAC, SOGEVAC A-series (≥ SV 100) and B-series (≥ SV 40 B) | TRIVAC |

Technical Data

LVO 300

LVO 310

| | | | |
|--------------------------|--------------------|------------|---------------|
| ISO viscosity grade | | ISO VG 100 | ISO VG 32 |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 99 | 29 |
| at 100 °C (212 °F) | mm ² /s | 13.5 | 5.5 |
| Flash point | °C (°F) | 270 (518) | 230 (446) |
| Density at 15 °C (59 °F) | kg/m ³ | 840 | 820 |
| Pour point | °C (°F) | -54 (-65) | < -54 (< -65) |

Ordering Information

LVO 300

LVO 310

| | Part No. | Part No. |
|------------|----------|----------|
| 0.5 liters | L 300 00 | - |
| 1 liter | L 300 01 | L 310 01 |
| 20 liters | L 300 20 | - |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

LEYBONOL PFPE Oils

Application Data

LVO 400

LVO 410

| | | |
|---|---|---|
| Type of oil | Synthetic oil (perfluoropolyether PFPE, free of additives) | Synthetic oil (perfluoropolyether PFPE, free of additives) |
| Properties | Chemically inert Highest thermal stability | Chemically inert Highest thermal stability |
| Application examples | Pumping of strong oxidants like oxygen, ozone or nitrous oxides, as well as reactive substances like halogens, hydrogen halides and conditionally Lewis acids | Pumping of strong oxidants like oxygen, ozone or nitrous oxides, as well as reactive substances like halogens, hydrogen halides and conditionally Lewis acids |
| Remarks | Use only in pumps modified for PFPE Mixing with any type of other oil must be strictly avoided Avoid pumping of water vapor, in particular in connection with corrosive media (see above) The use of a chemical oil filter CF/CFS is strongly recommended When used in RUVAC: For use with PFPE we exclusively recommend pump types with a canned motor | Use only in pumps modified for PFPE Mixing with any type of other oil must be strictly avoided Avoid pumping of water vapor, in particular in connection with corrosive media (see above) The use of a chemical oil filter CF/CFS is strongly recommended When used in RUVAC: For use with PFPE we exclusively recommend pump types with a canned motor |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Suited Suited | Suited Suited Suited |
| Used in the pumps of series | TRIVAC BCS, SOGEVAC, E + DK, RUVAC, LEYVAC | RUVAC, E + DK, DRYVAC |

Technical Data

LVO 400

LVO 410

| | | | |
|--------------------------|--------------------|-----------------|-----------------|
| ISO viscosity grade | | Not classified | Not classified |
| Viscosity | | | |
| at 40 °C (104 °F) | mm ² /s | 49 | 89 |
| at 100 °C (212 °F) | mm ² /s | 7 | 11 |
| Flash point | °C (°F) | – ²⁾ | – ²⁾ |
| Density at 20 °C (68 °F) | kg/m ³ | 1890 | 1900 |
| Pour point | °C (°F) | -45 (-49) | -35 (-31) |

Ordering Information

LVO 400

LVO 410

| | Part No. | Part No. |
|-------------|----------|----------|
| 0.60 liters | – | L 410 00 |
| 0.75 liters | L 400 00 | – |
| 1 liter | L 400 01 | L 410 01 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

²⁾ **Caution:** in the case of thermal decomposition > 290 °C (> 554 °F) toxic and corrosive gases are released. When handling PFPE keep away from open fires.
Do not smoke in the work area

Application Data

LVO 420

| | |
|---|--|
| Type of oil | Synthetic oil (perfluoropolyether PFPE, free of additives) |
| Properties | Chemically inert Highest thermal stability |
| Application examples | Pumping of strong oxidants like oxygen, ozone or nitrous oxides, as well as reactive substances like halogens, hydrogen halides and conditionally Lewis acids |
| Remarks | Use only in pumps modified for PFPE Mixing with any type of other oil must be strictly avoided Avoid pumping of water vapor, in particular in connection with corrosive media (see above) The use of a chemical oil filter CF/CFS is strongly recommended |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Suited Suited |
| Used in the pumps of series | SOGEVAC BI-series with 1 ph motors ≤ SV 40 BI |

Technical Data

LVO 420

| | |
|--|-----------------|
| ISO viscosity grade | Not classified |
| Viscosity at 40 °C (104 °F) mm ² /s at 100 °C (212 °F) mm ² /s | 25 4.5 |
| Flash point °C (°F) | — ²⁾ |
| Density at 20 °C (68 °F) kg/m ³ | 1880 |
| Pour point °C (°F) | -50 (-58) |

Ordering Information

LVO 420

| | Part No. |
|----------|----------|
| 1 liter | L 420 01 |
| 2 liters | L 420 02 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

²⁾ **Caution:** in the case of thermal decomposition > 290 °C (> 554 °F) toxic and corrosive gases are released. When handling PFPE keep away from open fires.
Do not smoke in the work area

LEYBONOL Diffusion Pump Oils

Technical Data

LVO 500 (DIFFELEN normal)

LVO 510

| | | |
|---|--|--|
| Type of oil | White oil, free of additives | Mineral oil, free of additives |
| Properties | Good thermal stability | High thermal stability |
| Application examples | LVO 500 is the most frequently used pump fluid for applications in a high vacuum. The attainable ultimate total pressure is below 10^{-7} mbar | For applications in a high vacuum |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |
| Used in the pumps of series | DIP, LEYBOJET 630 | DIP, LEYBOJET 630 |

Technical Data

LVO 500 (DIFFELEN normal)

LVO 510

| | | | |
|---------------------------------|--------------------|--------------------|--------------------|
| Vapor pressure at 20 °C (68 °F) | mbar | 4×10^{-9} | 1×10^{-7} |
| Viscosity at 40 °C (104 °F) | mm ² /s | 100 | 60 |
| Flash point | °C (°F) | > 250 (> 482) | > 230 (> 446) |
| Density at 20 °C (68 °F) | kg/m ³ | 868 | 850 |

Technical Data

LVO 500 (DIFFELEN normal)

LVO 510

| | Part No. | Part No. |
|-----------|----------|----------|
| 1 liter | L 500 01 | L 510 01 |
| 5 liters | L 500 05 | L 510 05 |
| 20 liters | L 500 20 | – |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected. The technical data stated here do not entail any warranted characteristics.

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

Application Data**LVO 520****LVO 530**

| | | |
|---|--|--|
| Type of oil | Silicone oil (tetramethyl-tetraphenyltrisiloxane) | Silicone oil (Pentaphenyltrisiloxane) |
| Properties | Very high thermal stability and highly resistant against oxidation and decomposition | Very high thermal stability and high resistance against oxidation and decomposition |
| Application examples | For high vacuum and ultra-high vacuum applications | For high vacuum and ultra-high vacuum applications involving very high thermal loads |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Suited Suited | Suited Suited Suited |
| Used in the pumps of series | DIP, LEYBOJET 630 | DIP, LEYBOJET 630 |

Technical Data**LVO 520****LVO 530**

| | | | |
|---------------------------------|--------------------|----------------------------------|-----------------------------------|
| Vapor pressure at 20 °C (68 °F) | mbar | 7×10^{-9} ²⁾ | 4×10^{-10} ²⁾ |
| Viscosity at 40 °C (104 °F) | mm ² /s | 21 | 175 ²⁾ |
| Flash point | °C (°F) | 221 (430) | 245 (473) |
| Density at 20 °C (68 °F) | kg/m ³ | 1070 ²⁾ | 1090 ²⁾ |

Ordering Information**LVO 520****LVO 530**

| | Part No. | Part No. |
|----------|-----------------|-----------------|
| 1 liter | L 520 01 | L 530 01 |
| 5 liters | L 520 05 | – |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

²⁾ At 25 °C (77 °F)

Application Data

LVO 540

| | |
|---|---|
| Type of oil | Pump fluid based on hydrocarbons |
| Properties | High thermal stability and excellent resistance against oxidation and decomposition |
| Application examples | For oil vapor jet pumps |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Suited Unsuitable |
| Used in the pumps of series | OB |

Technical Data

LVO 540

| | | |
|---------------------------------|--------------------|--------------------|
| Vapor pressure at 20 °C (68 °F) | mbar | 6×10^{-6} |
| Viscosity at 40 °C (104 °F) | mm ² /s | 22 |
| Flash point | °C (°F) | 196 (385) |
| Density at 20 °C (68 °F) | kg/m ³ | 885 |

Ordering Information

LVO 540

| | Part No. |
|------------|----------|
| 20 liters | L 540 20 |
| 200 liters | L 540 99 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

LEYBONOL Special Lubricants

Application Data

LVO 700

DOT 4

| | | |
|---|---|--|
| Type of oil | Synthetic cyclic hydrocarbon | Brake fluid |
| Properties | H1 registration by NSF. Very high thermal stability and highly resistant against oxidation and decomposition. Very long lifetime. | High-quality brake fluid based on glycol ethers. Corresponds to FMVSS DOT 4 |
| Application examples | Chemically inert to gases of acidic nature. For long service intervals | Only for filling of brake fluid circuits in the automotive industry. |
| Remarks | – | Use only in pumps modified specifically for DOT 4. Mixing with any other type of oil must be strictly avoided |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM ²⁾ | Suited Conditionally suited Unsuitable | Unsuitable Unsuitable Conditionally suited |
| Used in the pumps of series | SOGEVAC BI-series ≤ SV 120 BI (FC) | TRIVAC, SOGEVAC |

Technical Data

LVO 700

DOT 4

| | | |
|--|---|------------------------------|
| ISO viscosity grade | 32 | Not classified ¹⁾ |
| Viscosity at 40 °C (104 °F) at 100 °C (212 °F) | mm ² /s mm ² /s 31 5 | Not applicable > 1.5 |
| Flash point | °C (°F) > 210 (> 410) | > 120 (248) |
| Density at 15 °C (59 °F) | kg/m ³ 904 | 1070 |
| Pour point | °C (°F) < -42 (< -44) | < -50 (< -58) |

Ordering Information

LVO 700

DOT 4

| | Part No. | Part No. |
|---------|----------|------------|
| 1 liter | L 700 01 | 200 10 037 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

²⁾ Not all EPDM materials are suited for contact with DOT 4

LEYBONOL Greases

Application Data

| | LVO 810 (LITHELEN) | LVO 870 (GLEITLEN) |
|---|---|--|
| Base oil type | Mineral oil | Special vaseline types |
| Thickener | Lithium soap | Natural rubber |
| Properties | Wide application range (0 to +150 °C (32 to 302 °F)), atmospheric pressure to 10 ⁻⁸ mbar | Usable down to 10 ⁻² mbar |
| Application examples | Lubrication of ground joints, taps and O-rings at low pressures and high operating temperatures | Lubrication of stirrer shafts (KPG-stirrer) |
| Remarks | Owing high vacuum processing, LVO 810 does not contain any shares exhibiting higher vapor pressures ¹⁾ | – |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ²⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |

Technical Data

| | | LVO 810 (LITHELEN) | LVO 870 (GLEITLEN) |
|---------------------------------|---------|------------------------------|------------------------------|
| Vapor pressure at 20 °C (68 °F) | mbar | 10 ⁻¹⁰ | 10 ⁻⁴ |
| Dropping point | °C (°F) | > 210 (441) | > 50 (> 122) |
| Max. operating temperature | °C (°F) | 150 (302) | 30 (86) |

Ordering Information

| | LVO 810 (LITHELEN) | LVO 870 (GLEITLEN) |
|-------------|------------------------------|------------------------------|
| | Part No. | |
| Tube 50 g | L 810 05 | – |
| Tin 50 g | – | L 870 05 |
| Bucket 2 kg | L 810 99 | L 870 99 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected. The technical data stated here do not entail any warranted characteristics

¹⁾ The product contains silicon dioxide

²⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

Application Data**LVO 871****LVO 872**

| | | |
|---|--|--|
| Base oil type | Special vaseline types | Special vaseline types |
| Thickener | Natural rubber | Natural rubber |
| Properties | Usable down to 10^{-2} mbar | Usable down to 10^{-2} mbar |
| Application examples | Lubrication of ground joints | Lubrication of taps |
| Elastomer compatibility FKM (FPM, Viton) NBR (Perbunan) ¹⁾ EPDM | Suited Conditionally suited Unsuitable | Suited Conditionally suited Unsuitable |

Technical Data**LVO 871****LVO 872**

| | | | |
|---------------------------------|---------|--------------|--------------|
| Vapor pressure at 20 °C (68 °F) | mbar | 10^{-4} | 10^{-4} |
| Dropping point | °C (°F) | > 56 (> 133) | > 56 (> 133) |
| Max. operating temperature | °C (°F) | 30 (86) | 30 (86) |

Ordering Information**LVO 871****LVO 872**

| | Part No. | Part No. |
|----------|-----------------|-----------------|
| Tin 50 g | L 871 05 | L 872 05 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

Application Data

High Vacuum Grease

| | |
|------------------------------|---|
| Base oil type | Silicone oil |
| Thickener | Inorganic |
| Properties | Low vapor pressure, high water and chemicals resistance |
| Application examples | Lubrication of ground joints, taps and O-rings at low pressures and high operating temperatures |
| Remarks | Wide operating range (-40 to +200 °C(-40 to +392 °F), atmospheric pressure down to 10 ⁻⁶ mbar) ²⁾ |
| Elastomer compatibility | |
| FKM (FPM, Viton) | Suited |
| NBR (Perbunan) ¹⁾ | Suited |
| EPDM | Suited |

Technical Data

High Vacuum Grease

| | | |
|---------------------------------|---------|--------------------|
| Vapor pressure at 20 °C (68 °F) | mbar | 10 ⁻⁷ |
| Dropping point | °C (°F) | None ³⁾ |
| Max. operating temperature | °C (°F) | 200 (392) |

Ordering Information

High Vacuum Grease

| | Part No. |
|-----------|-----------|
| Tube 50 g | E 210 502 |

Please note that the technical data stated are typical characteristics only. Slight variations from batch to batch must be expected.
The technical data stated here do not entail any warranted characteristics

¹⁾ Resistance is dependent on the level of the acrylonitrile content in the NBR

²⁾ This product is unsuitable if also hot-cathode ionization vacuum gauges e.g. IONIVAC ITR 90/200 are installed in the process

³⁾ Above 200 °C (392 °F) polymerisation of the silicone greases discharges gas

Miscellaneous

Services

We are offering a number of different services under the product designation LEYBONOL LVO 9XX.

These include oil analysis sets and application assessments.

Oil Analyses for Your Safety

An analysis of vacuum oils provides information on influences from the side of the process and can be an important component for quality assurance and process optimisation.

The mandatory reference analysis with a fresh oil sample completes the evaluation.

With the utilisation of LEYBONOL, no additional costs are incurred for this.

Please note that the oil samples must not be contaminated with explosive, microbiological or radioactive substances. When requiring the analysis of lubricants which are contaminated with toxic or corrosive media, you must first

discuss this with our partner OELCHECK.

Oil Analysis Standard, Set 2

You receive from us one Analysis Set 2. You fill this set according to the instructions (minimum oil quantity is 60 ml) and send the oil sample and the consignment note directly to our partner OELCHECK. You will then receive the results directly from OELCHECK.

Application Data

LVO 900 Set 2

Oil Analysis Standard

| | |
|-------------------|--|
| Performance scope | Measurement of viscosity TAN (ageing) Wearing metals and additives in ppm Water in % Simple infrared measurement |
| Remark | Not applicable to PFPE oils |

Ordering Information

LVO 900 Set 2

Oil Analysis Standard

| | Part No. |
|------------------------------|----------|
| Oil Analysis Standard, Set 2 | L 900 01 |

Enhanced Oil Analysis, Set 5

You receive from us Analysis Set 5. You fill this according to the instructions (minimum oil quantity is 70 ml) and send the oil sample and the consignment note directly to our partner OELCHECK.

You will then receive the results directly from OELCHECK.

Especially recommended for trend analyses. Please order the corresponding number of sets.

Application Data

LVO 900 Set 5 Enhanced Oil Analysis

| | |
|-------------------|--|
| Performance scope | Measurement of viscosity TAN (ageing) Wearing metals and additives in ppm Water in % Simple infrared measurement Optical particle analysis and particle count |
| Remark | Not applicable to PFPE oils |

Ordering Information

LVO 900 Set 5 Enhanced Oil Analysis

| | Part No. |
|-----------------------|----------|
| Enhanced Oil Analysis | L 900 02 |

Application Assessment

Application Assessment, Standard

You send to us the results of the analysis by our partner OELCHECK and complete the information on the laboratory order supplement. We will then compare this information with the information contained in our application database. Thereafter you will receive a condition report and recommendations on how to handle and optimally use this type of oil in the desired process.

Ordering Information

LVO 900

Application Assessment, Standard

| | Part No. |
|----------------------------------|------------|
| Application Assessment, Standard | ASL 900 03 |

Trend Analysis

You fill in the laboratory order supplement once and order three analysis, Part No. L 900 01 or L 900 02. You then take the oil samples in cycles according to the recommendation from Oerlikon Leybold Vacuum yourself. After completion of the analysis series you send all analysis results to us. We will then compare these results with the information in our application database. Thereafter you will receive a condition report and recommendations on how to handle and optimally use this type of oil in the desired process.

Ordering Information

LVO 900

Trend Analysis

| | Part No. |
|----------------|------------|
| Trend Analysis | ASL 900 04 |

Forms are available on www.leybonol.com.

All recommendations on oil performance are based upon the information provided by the customer. Standard Oerlikon Leybold Vacuum terms and conditions for services apply.

Glossary

Additives

Additives are oil soluble substances which can be added in low concentrations to the lubricants so as to improve certain properties. Frequently additives serve the purpose of improving, respectively avoiding oxidation, wear, corrosion, fluidity and foaming. Not all additives are suited for vacuum applications. Some additives exhibit a high vapor pressure thereby having a negative influence on the attainable ultimate pressure.

BAM

Some products from the LEYBONOL line have been registered at the Bundesanstalt für Materialforschung und -prüfung. (i.e. the Federal Institute for Materials Research and Testing in Germany.)

CFR (Code of Federal Regulations) in the USA.

Colour

For this refer to "Visual appearance".

Density

The density of a substance is defined as the ratio between its mass and its volume at a certain temperature. It depends on the chemical composition of a product.
International unit of measurement: kg/m^3

Dropping point

The dropping point designates the temperature at which a lubricating grease begins to flow.

Elastomers

Elastomers are cross-linked polymers capable of reversibly absorbing significant deformations. Elastomers are used as the sealing material for shaft sealing rings or O-rings, for example.

The following belong among others to the group of elastomers:

EPDM

Ethylene propylene diene monomer rubber EPDM

Usable up to 150 °C (302 °F), partly suited for glycol ether based brake fluids, not suited for mineral oils and ester oils.

FKM

Fluor rubber FKM (trade name VITON®, for example)

Usable up to 200 °C (392 °F), suited for mineral oils and ester oils, not suited for glycol ether based brake fluids.

NBR

Acrylonitrile-butadiene rubber NBR (trade name PERBUNAN®, for example)

Usable up to 100 °C (212 °F), only NBR with a high share of acrylonitrile is suited for mineral oils and ester oils, not suited for glycol ether based brake fluids.

FDA (Food and Drug Administration)

Food and Drug Administration in the USA responsible for the approval of substances on the US American market.

Flash point

Flash point is the lowest temperature at which a liquid which is to be tested develops vapours in an open, respectively sealed crucible to such an extent that this vapor/air mixture above the liquid level can be briefly ignited by an external ignition.

Foaming

It is normal for oils in vacuum pumps to foam slightly upon the ingress of air through the gas ballast, for example. Under normal conditions this will not have any effect on the pump's performance.

Infrared measurement (IR)

Through the natural vibrations of the atoms of certain groups of organic molecules, the energy of the emitted infrared light is absorbed to different extents.

Based on an infrared spectrum it is possible to assess the following criteria among others:

- Detection of the type of oil (mineral oil, ester oil, PFPE, for example) by comparison against reference spectra
- Detection of contaminants in comparison with the fresh oil spectrum

ISO viscosity grade

Classification of liquid industrial lubricants in 20 viscosity grades based on the kinematic viscosity at 40 °C (104 °F) in the range of 2 mm^2/s to 3200 mm^2/s .

Abbreviation: ISO VG

See Table 1.

Neutralisation number

The neutralisation number indicates the quantity of potassium hydroxide (KOH) required to neutralise the free acid constituents contained in 1 g of a lubricant. Through the neutralisation number it is possible to determine the relative changes for used lubricants suffering from oxidative ageing. The increase in the neutralisation number in combination with the viscosity change are needed to assess the oil quality.
See also "TAN".

NSF (National Sanitation Foundation/ Nonfood Compounds Registration Program)

Nonfood components registration program for all substances used in the food industry like lubricants, for example.

Odour

Lubricants when new exhibit a mild odour. Mineral oils will usually develop a more intensive odour compared to synthetic oils. Contamination with foreign substances or lubricant reactions can cause a significant odour change.

Oil ageing

Common lubricants cannot be used for an unlimited time.

Lubricants worsen during use, i.e. they age. This ageing is caused, among other things, by temperature, oxidation, chemical and physical reactions with process media. This can result in the formation of sludge, resins or acids (for this see also Chapter "General information and Recommendations for Oils", paragraph "Oil check").

Pour point

The pour point is the lowest temperature at which oil is still capable of flowing.

RoHS (Restriction of (the use of certain) hazardous substances)

Directive on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment.

TAN

The designation TAN (Total Acid Number) is frequently used instead of the designation neutralisation number.

For details see "Neutralisation number".

Thickener

A thickener binds the oil in the lubricating grease and may increase lubricity or thermal stability of the grease.

Thickeners are roughly categorised in soap thickeners like lithium and non-soap thickeners like polyurea or PTFE.

USDA

United States Department of Agriculture (in charge of food safety among other things).

Vapor pressure

The vapor pressure is the ambient pressure below which a liquid begins to change into the gaseous state with the temperature being constant.

Viscosity

Viscosity is a measure of the amount of inner friction within a fluid. The development of hydrodynamically supporting films of oil, optimum oil conveying, sealing and lubricating and also the supply of heat require optimum viscosities. These need to be within certain ranges depending on the specific purpose of the application.

Viscosity is much temperature dependent.

At increasing temperatures viscosity reduces, i.e. the lubricant substance is less viscous.

When the oil is too thick at operating temperature it will no longer flow through the oil lines resulting in inadequate lubrication thereby causing damage. The result is a rapid increase in wear and an impaired ultimate pressure.

During operation the viscosity may change owing to:

- Lubricant ageing
- Ingress of foreign substances
- Reaction of the lubricant substance with the process media

a) Dynamic viscosity

The Newtonian definition of viscosity relates to the true viscosity. It is also termed dynamic viscosity.

International unit of measurement:

mPas

This value corresponds to the former unit of measurement: cP

b) Kinematic viscosity

The ratio between dynamic viscosity and density is defined as kinematic viscosity. Generally kinematic viscosity is measured at 40 °C (104 °F) and 100 °C (212 °F).

International unit of measurement: mm²/s.

This value corresponds to the former unit of measurement: cSt.

Visual appearance

The visual appearance of the lubricant should be clear and clean. The colour of the new lubricant substances will normally range from colourless to amber. Changes in colour and turbidity can be indicative of a contamination with foreign substances or oxidation. Turbidity, for example, may indicate the presence of water. However, the colour alone is not conclusive as to the condition of the lubricant.

VOC

Volatile Organic Compound.

Water

A high water content can impair the lubricity of the lubricant being used and may have a negative influence on the attainable ultimate pressure. Should the oil/water emulsion remain in the pump then this can lead to corrosion.

Wearing metals

Wearing materials like iron, aluminum copper can be detected by measurements. Wearing metals present in the oil allow conclusions as to abrasive or corrosive wear.

LEYBONOL Oil Analysis

Laboratory Order Supplement

Please cross as appropriate

- ☐ Application assessment: Standard
- ☐ Application assessment: Trend analysis
- ☐ Condition assessment
- ☐ Matching the oil selection to the application
- ☐ Optimisation of oil change intervals
- ☐ Review of accessories, effectiveness of filtering devices, for example (for trend analysis/Set 5)

Customer

Company * _____

Name * _____

Street address/number * _____

Postal code/city * _____

Phone * _____

E-mail * _____

Oil sample

Oil designation * _____

Oil manufacturer or supplier * _____

Used in pump type/size * _____

Total oil sample operating hours * _____

Total pump operating hours _____

Oil change interval _____

Oil temperature _____

Pump accessories * _____

Application * _____

Process media * _____

**Reason/problem/aim
of the investigation ***

Please fill in all fields marked with an *.

Please note that in the instance of missing information, in particular in the case of a missing description of the problem, an optimal assessment will not be possible.

Please return the filled-in laboratory order supplement to:

analysis.leybonol@oerlikon.com

Forms are available from our homepage www.leybonol.com.

We provide our service on the basis of the information submitted by you. Our general sales terms for services apply.

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oerlikon
leybold vacuum

www.oerlikon.com/leyboldvacuum

Table 1

| ISO viscosity grade | Centre point for the kinematic viscosity (mm²/s at 40 °C (104 °F)) | Limit values for the viscosity grades (mm²/s at 40 °C (104 °F)) min. / max. |
|----------------------------|--|---|
| ISO VG 2 | 2.2 | 1.98 / 2.42 |
| ISO VG 3 | 3.2 | 2.88 / 3.52 |
| ISO VG 5 | 4.6 | 4.14 / 5.06 |
| ISO VG 7 | 6.8 | 6.12 / 7.48 |
| ISO VG 10 | 10 | 9.00 / 11.0 |
| ISO VG 15 | 15 | 13.5 / 16.5 |
| ISO VG 22 | 22 | 19.8 / 24.2 |
| ISO VG 32 | 32 | 28.8 / 35.2 |
| ISO VG 46 | 46 | 41.4 / 50.6 |
| ISO VG 68 | 68 | 61.2 / 74.8 |
| ISO VG 100 | 100 | 90.0 / 110 |
| ISO VG 150 | 150 | 135 / 165 |
| ISO VG 220 | 220 | 198 / 242 |
| ISO VG 320 | 320 | 288 / 352 |
| ISO VG 460 | 460 | 414 / 506 |

In acc. with DIN ISO 3448, as of February 2010

Contents

Services

| | |
|--|------|
| Advanced Vacuum Services | 1008 |
| Workshop Service and After Sales Service | 1009 |
| Center of Competence | 1010 |
| Service Center. | 1011 |

Advanced Vacuum Services

Partner for Your Success

For sustained success, optimisation of productivity, system uptime and overall costs is a challenge you are permanently facing as a manufacturing vendor or system manufacturer. To this end, you need to keep an eye on all influencing factors.

Our Service: Pioneering

Here Oerlikon Leybold Vacuum is available to you as a reliable and competent production partner with the largest service network of the branch and with a broad range of servicing and consultancy services.

We consider ourselves as part of your value chain. For this reason, we are lined up to respond flexibly to market changes. And we continue to constantly develop ourselves further in order to be jointly successful with you.

Our Services

| Product cycle | Setup | Operation | Maintenance | Optimization | Dismantling |
|----------------------|---|---|---|--|---|
| After Sales Services | <ul style="list-style-type: none"> Installation Implementation Warranty extension Calibration | <ul style="list-style-type: none"> Training Vacuum audit Remote servicing Condition monitoring Hotline and telediagnosis Rental equipment Operator model | <ul style="list-style-type: none"> After sales services Refurbishing Decontamination Leak detection Original spare parts and wearing parts Exchange and replacement devices | <ul style="list-style-type: none"> Upgrade Retrofit Modernisation Expanding Calibration | <ul style="list-style-type: none"> Disassembly Decontamination Old device waste disposal Replacement Buyback |

Workshop Service and After Sales Service

At your disposal all over the world

How to reach us



When you need a workshop repair or our after sales service you can reach us simply by dialling:

Dial +49 221 347 1000

Our staff is prepared for comprehensive consulting and will define together with you the details of the service you require.

- Workshop repair
Please include with your returning vacuum component under all circumstances a filled-in Declaration of Contamination.
We will then take care of everything else within the agreed time span.
- After sales service
At the agreed time our service technician will come for the arranged work to your full satisfaction.

Headquarter Germany

Oerlikon
Leybold Vacuum GmbH
Bonner Strasse 498
D-50968 Cologne

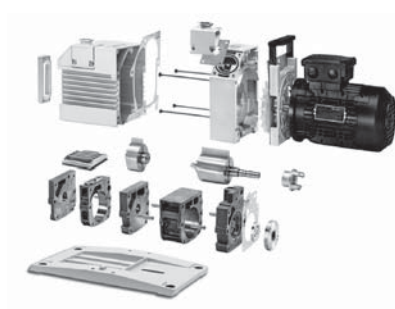
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F +49 221-347-1250

info.vacuum@oerlikon.com

www.oerlikon.com

Original Spare Parts



Your pump is delivering top performance day in and day out. Full functionality demands precise matching and accurate coordination between each individual component.

For this reason, demand the original spare parts so that you can be sure to attain optimum performance and top-quality.

Through our original spare parts we are offering more than only a supply of repair components:

Practice Oriented

For well-defined maintenance and repair work we have put together functional spare parts kits. Through these you have at your disposal all the necessary materials for the corresponding repair.

Quality

Our consumables as well as original spare parts for maintenance, repairs and refurbishing are subject to the highest quality requirements only the original manufacturer can offer.

Availability

Through our global service and sales network we are offering to you locally our original spare parts worldwide with the highest possible level of availability.

Service Centres



Oerlikon Leybold Vacuum maintains throughout the world 30 service centres and support bases in order to ensure the shortest possible door-to-door time for pump repairs:

- Germany: Cologne, Dresden, Berlin, Hamburg, Hanau, Hannover, Karlsruhe, Stuttgart, Munich, Nuremberg
- BeNeLux: Zaventem (B), Utrecht (NL)
- Brazil: Jundiaí
- France: Orsay, Valence
- Great Britain: London
- India: Bangalore, Pune
- Italy: Milano
- Japan: Tsukuba
- Malaysia: Kulim
- P.R. China: Tianjin, Shanghai, Guangzhou
- Singapore: Singapore
- South Korea: Cheonan
- Spain: Barcelona
- Switzerland: Zurich
- Taiwan: Hsin-Chu, Tainan
- USA: Export, PA

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The Tasks of a Center of Competence

- Rapid, professional and high quality repairs processing in accordance with customer requirements
- Support during development and testing of service processes, documentation, training and equipment before further marketing, application or implementation in our service centres
- Running of service training for defined products
- Review and support for the area of quality assurance

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TRIVAC, SOGEVAC, E & DK, DIVAC,
LEYVAC, SCROLLVAC, SCREWLINE,
DRYVAC, CHEMROVAC, RUVAC,
DURADRY

Turbomolecular pumps,
TURBOSTREAM

Cryo pumps, Cryogenics, Cold heads,
Compressor units

Diffusion pumps and Pump systems

Leak detectors, Total pressure
gauges, Valves, Vacuum components,
Calibration

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Our service centers are your point of contact for

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- Commissioning and training
- Maintenance contracts and Customer Care Program
- After sales service and on-site repairs
- Second hand equipment, replacement pumps and backup pool
- Original spare parts
- Decontamination
- Calibration of measuring instruments in our certified laboratories

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Product Index

A

Accessories

| | |
|---|----------|
| for CF Components | 855 |
| for Compressor Units COOLPAK. | 504 |
| for Cryo Pumps / Cryogenics | 508 |
| for E + DK Pumps | |
| Global Versions | 212 |
| Versions for the North and South American Continents | 219 |
| for Feedthroughs | 898 |
| for High Vacuum Pump Systems TMP | 624 |
| for Leak Detecting Instruments. | 798 |
| for Oil Diffusion Pumps. | 458 |
| for oil sealed and dry compressing Pump Systems | 592 |
| for Roots Vacuum Pumps | 289 |
| for SOGEVAC Pumps | |
| Global Versions | 170 |
| Versions for the North and South American Continents | 185 |
| for Serial Interfaces (Turbomolecular Pumps). | 441 |
| for the Electropneumatically Operated Valves with ISO-KF / ISO-K Flange. | 942 |
| for TRIVAC B, BCS and E Pumps | |
| Global Versions | 76 |
| Versions for the North and South American Continents | 96 |
| for Turbomolecular Pumps | 424 |
| for Turboradial Blowers. | 942 |
| for UNIVEX High Vacuum Experimentation Systems | 646 |
| General Accessories. | 660 |
| Process Accessories | 648 |
| for VACVISION | 772 |
| Active Sensors / Transmitters. | 686 |
| Adapter Set for Seal Gas and Venting Valve for the SL Turbomolecular Pumps. | 440 |
| Adaptors | 822 |
| (US version) | 824 |
| Additional Sensors | 736 |
| Adsorption Traps | |
| FH/RF | 86 |
| with Aluminium Oxide Insert | 464 |
| | 625 |
| Advanced Vacuum Services | 1008 |
| Air Cooling Unit | 436 |
| ANSI Fittings | 843 |
| Astrotorus Baffles | 458 |
| ATEX Inquiry | Appendix |

B

| | |
|---|-----|
| Backing Pumps DIVAC for Turbomolecular Pumps, Dry Compressing | 224 |
| Ball Valves | 940 |
| for SOGEVAC | 188 |
| Bellows with Vibration Absorbers | 596 |

| | |
|---|-----|
| Bourdon Vacuum Gauges | 190 |
| | 677 |
| Bus Interfaces for Monitoring | 597 |

C

| | |
|--|-----|
| Calibrated Leaks (for Vacuum and Sniffer Applications) | 800 |
| Calibration Service from Oerlikon Leybold Vacuum | 766 |
| Calibration Systems CS. | 664 |
| Capsule Vacuum Gauges | 678 |
| CART 300 (for PHOENIXL 300) | 793 |
| Center of Competence | 987 |
| CENTER ONE | 726 |
| CENTER TWO / THREE | 728 |
| Central Vacuum Supply Systems | 546 |
| (US version) | 550 |
| CERAVAC Transmitters CTR | 686 |
| CF Components | 852 |
| CF Feedthroughs | |
| electrical | 896 |
| liquid | 900 |
| mechanical | |
| Linear Motion Feedthrough | 892 |
| CF Flanges Fittings and Components. | 864 |
| Checklist for Inquiries (Fax Form for Vacuum Pump Systems) | 598 |
| CHEMROVAC, Dry Vacuum Pumps (US version) | 272 |
| Clamp Flange Fittings and Components (ISO-K) | 826 |
| (US version) | 835 |
| Coarse Variable Leak Valves without Isolation Valves | 934 |
| Cold Heads COOLPOWER | |
| mechanically driven | |
| Dual Stage | 494 |
| pneumatically driven | |
| Dual Stage | 492 |
| Single Stage. | 490 |
| Cold Trap TK 4-8 | 87 |
| Combination Filter, Vacuum Pump Inlet Filter | 212 |
| COMBIVAC CM. | 730 |
| Compact Oil Mist Exhaust Filter. | 98 |
| Components | |
| for Electron-Beam Evaporation. | 650 |
| for Film Thickness Measurements | 653 |
| for Glow Discharge Cleaning | 652 |
| for Sputtering | 651 |
| for Thermal Evaporation | |
| of High Melting Point Materials (metals) | 648 |
| of Low Melting Point Materials (organic) | 650 |

| | |
|--|-----|
| Compressor Units | |
| for Cold Heads and Pumps | |
| mechanically driven | |
| with water cooling | |
| COOLPAK HMD | 502 |
| Compressor Units | |
| for Cold Heads and Pumps | |
| pneumatically driven | |
| with air cooling | |
| COOLPAK A | 496 |
| with water cooling | |
| COOLPAK | 498 |
| Condensate Separators AK | |
| for E and DK Pumps | 219 |
| (US version) | 224 |
| for TRIVAC Pumps | 84 |
| Condensate Traps AK | |
| for TRIVAC Pumps | 76 |
| Condensers SEPC | 180 |
| Connection Accessories for Small Flanges | 676 |
| Connection Cables for Active Sensors | 720 |
| Connection Components (for Leak Detecting Instruments) | 808 |
| Connection Fittings (for SOGEVAC) | 192 |
| Connection Flanges (for Leak Detecting Instruments) | 808 |
| Connectors (for Feedthroughs) | |
| atmospheric side. | 899 |
| vacuum side | 898 |
| Controllers and Monitoring Units for Cryopumps | 508 |
| Control Unit for Turbomolecular Pump Systems | 624 |
| Cryogenics | 490 |
| Cryopumps COOLVAC | |
| Standard, BasicLine | |
| BL. | 474 |
| with Fully Automatic Control, ClassicLine | |
| CL. | 476 |
| System Configuration | 511 |
| Current Feedthroughs. | 884 |

D

| | |
|--|-----|
| Diaphragm Pressure Regulators MR | 764 |
| Diaphragm Vacuum Pumps for the Chemical Laboratory | |
| Dual-Stage, DIVAC L. | 220 |
| Three-Stage, DIVAC HV .. C. | 222 |
| Diaphragm Vacuum Gauge DIAVAC | |
| DV 1000 | 190 |
| | 680 |
| E | 682 |
| Diffusion Pump Oils | 992 |

| | |
|---|-----|
| DIP, Oil Diffusion Pumps, water-cooled | 458 |
| DISPLAY ONE | 722 |
| DISPLAY TWO / THREE | 724 |
| DIVAC, Diaphragm Vacuum Pumps. | 217 |
| DRYVAC, Screw Vacuum Pumps | 256 |
| Double Inlet Filter and Roots Adapter TwinFilter 500 | 170 |
| Dry Compressing Backing Pumps DIVAC for Turbomolecular Pumps. | 232 |
| Dry Compressing Vacuum Pumps | 215 |
| Diaphragm Vacuum Pumps DIVAC. | 217 |
| Screw Vacuum Pumps DRYVAC. | 256 |
| Screw Vacuum Pumps LEYVAC | 239 |
| Screw Vacuum Pumps SCREWLINE. | 245 |
| Scroll Vacuum Pumps SCROLLVAC | 232 |
| Dry Vacuum Pumps for Chemical and Pharmaceutical Applications | |
| CHEMROVAC TRV (US version). | 272 |
| Dust Filters | |
| FH/DF | 85 |
| FS | 221 |
| Dust Filters F-xxx-C | 594 |
| Dust Filters (Suction Side) | |
| for SOGEVAC | 174 |
| F (US version) | 176 |
| Dust Separators AS | |
| for E and DK Pumps. | 222 |
| for RUTA Pump Systems. | 592 |
| for TRIVAC Pumps | 88 |

E

| | |
|--|-----|
| Electric Controller. | 592 |
| Electronic Frequency Converters | |
| for Turbomolecular Pumps | |
| with Magnetic Rotor Suspension | 430 |
| with Mechanical Rotor Suspension | 424 |
| Ester Oils | 986 |
| Exhaust Filter Box AFK2 | 217 |
| Exhaust Filter Drain Tap. | 82 |
| Exhaust Filters | |
| AF | |
| for E and DK Pumps | 220 |
| (US version) | 225 |
| for TRIVAC Pumps | 76 |
| | 78 |
| AF-DOT | 78 |
| with Lubricant Return | |
| AR. | 80 |
| ARP. | 80 |
| ARS. | 81 |
| Exhaust Filter Gauge | 185 |

| | |
|--|-----|
| External Carbon Exhaust Filter | 191 |
|--|-----|

F

| | |
|---|-----|
| Feedthroughs | 883 |
| Fine Filter | 438 |
| Fixed Flange Fittings and Components | |
| DIN EN 1092-1 | 861 |
| ISO-F | 857 |
| ISO-F and DIN EN 1092-1, ND6 | 856 |
| (US version) | 862 |
| Flange and Fittings | 809 |
| Flange Components | 99 |
| Flange Fittings and Components | |
| CF | 864 |
| ISO-K | 842 |
| (US version) | 855 |
| ISO-KF | 816 |
| (US version) | 835 |
| Flange Heaters for CF High Vacuum Flanges | 437 |
| Frequency Converters | |
| RUVATRONIC | |
| RT 5 | 289 |
| | 592 |
| VT 100 | 289 |

G

| | |
|---|-----|
| Gas Ballast Valve | 182 |
| Gas Filter to G 1/4" for Purge Gas and Venting Valve. | 440 |
| Gate Valves with ISO-KF, CF or ISO-F Flange. | 941 |
| Greases. | 971 |
| | 996 |

H

| | |
|--|-----|
| Handheld Measurement Instruments | 684 |
| Helium Leak Detectors | |
| PHOENIX L300i | 786 |
| PHOENIX L300i DRY. | 788 |
| PHOENIX L300i MODUL. | 790 |
| PHOENIX L500i | 794 |
| Special Versions | 796 |
| Helium Sample Probes (Sniffers) | 806 |
| High Current Feedthroughs | 888 |
| High Vacuum Experimentation Systems UNIVEX | |
| Box Coating Systems | 629 |
| Glove Box Systems | 638 |
| Cluster Tool Systems. | 644 |
| Dactyloscopy Systems. | 646 |

| | |
|--|-----|
| Space Simulation Systems | 648 |
| UNIVEX-Questionnaire | 662 |
| High Vacuum Pumps | 317 |
| High Vacuum Pump Systems TMP | |
| with dry compressing Forevacuum Pumps. | 608 |
| with oil sealed Forevacuum Pumps | 600 |
| HV Gate Valves, ISO-F | |
| Electropneumatically Operated | 958 |
| Manually Operated | 956 |

I

| | |
|--|----------|
| Inert Gas System IGS. | 93 |
| Inquiry Forms | Appendix |
| Interference Suppression Kit - Illuminated | 931 |
| IONIVAC Transmitter ITR | 710 |
| IONIVAC Sensors IE (Extractors) | 742 |
| IONIVAC IM 540 | 738 |
| Isolation against Vibrations | 588 |
| ISO-F Fixed Flange Fittings and Components | 856 |
| (US version) | 862 |
| ISO-K Clamp Flange Fittings and Components | 842 |
| (US version) | 855 |
| ISO-KF Flange Fittings and Components | 816 |
| (US version) | 835 |

L

| | |
|---|-----|
| Leak Detecting Instruments. | 777 |
| LEYBOJET, Oil Diffusion Pump, water-cooled. | 462 |
| LEYBONOL, Oils / Greases / Lubricants | 971 |
| LEYVAC, Screw Vacuum Pumps | 239 |
| Limit Switch System LSS | 94 |
| Linear Motion Feedthroughs | 892 |
| Linear Pressure Sensors DI/DU | 744 |
| Liquid Feedthroughs | 891 |
| Liquid Traps SL | 178 |
| Low Pressure Safety Switch PS 113 A. | 758 |
| Low Temperature Controller MODEL 9700 | 514 |
| Low Temperature Measurement Instrument MODEL 211S | 515 |
| Lubricants | 971 |

M

| | |
|--|-----|
| Mechanical Gauges (Vacuum Gauges Analog Readout) | 677 |
| Mineral Oils | 982 |
| Miniature Gate Valves, ISO-KF, Manually Operated | 950 |

| | |
|--|-----|
| Miniature UHV Gate Valves, ISO-KF and CF | |
| Manually Operated (Handwheel) | 952 |
| Electropneumatically Operated | 954 |
| Mobile Base Frame | 184 |
| Molecular Filters MF | 88 |
| Monitoring Instruments | 461 |
| Mounting Accessories for SOGEVAC Pumps | 186 |

N

| | |
|-----------------|-----|
| Noise Enclosure | 185 |
|-----------------|-----|

O

| | |
|--|-----|
| Observation Windows for Vacuum Systems | 878 |
| CF | 880 |
| ISO-KF / ISO-K | 879 |
| Oil Analyses | 981 |
| Oil Boosters OB | 456 |
| Oil Control Unit | 218 |
| Oil Diffusion Pumps, Water-Cooled | |
| DIP | 450 |
| LEYBOJET | 454 |
| Oil Drain Kit | 82 |
| Oil Drain Tap | 82 |
| Oil Filter Unit | 218 |
| Oil Filters | |
| CF, Chemical | 90 |
| CFS, Chemical, with Safety Isolation Valve | 92 |
| OF, Mechanical | 90 |
| Oils | 971 |
| for Diffusion Pumps | 445 |
| for DRYVAC Pumps | 257 |
| for E + DK Pumps | 211 |
| for RUVAC Pumps | 281 |
| for SOGEVAC Pumps | 106 |
| for TRIVAC Pumps | 26 |
| Oil Sealed Vacuum Pumps | 21 |
| Oil Suction Facility | |
| AR-M, Manually Operated | 83 |
| AR-V, Controlled by Solenoid Valve | 83 |
| Operating Units | |
| for Active Sensors | 714 |
| for Passive Sensors | 722 |
| for Turboradial Blowers | 942 |
| Over-temperature Protection Switch | 460 |

P

| | |
|--|-----|
| PAO Oils | 989 |
| PFPE Oils | 990 |
| PENNINGVAC Sensors PR | 736 |
| PENNINGVAC Transmitters PTR | 702 |
| Pilot Valves | 942 |
| Power Controller | 462 |
| Power Failure Venting Valves | |
| for Turbomolecular Pumps | 438 |
| electromagnetically actuated | 933 |
| Pressure Control | 593 |
| Pressure Control System Move | 750 |
| Pressure Sensors DI/DU, linear | 744 |
| Pressure Switches | 312 |
| PS | 760 |
| Pressure Switches and Control Instruments | 750 |
| Purge Gas and Venting Valve | 439 |
| for ClassicLine and SL Turbomolecular Pumps. | 440 |

R

| | |
|---|-----|
| Refrigerator Cryostats | |
| based on the RDK 6-320 | 505 |
| optical, based on the RDK 6-320 | 506 |
| Refillable Traps RST | 96 |
| Remote Control Units RC 310 for Leak Detectors | 798 |
| Replacement Sensors | 748 |
| Roots Pump Adaptor for TRIVAC Pumps. | 95 |
| Roots Vacuum Pumps RUVAC | |
| for Laser Gas Systems, WSLF | 310 |
| with Canned Motors, WS/WSU (Air-Cooled) | 296 |
| with Flange-Mounted Motors, WA/WAU (Air-Cooled). | 290 |
| with Hermetically Sealed Motors, WH/WHU (Water-Cooled) | 302 |
| with Pre-Admission Cooling, RAV | 584 |
| Roots Vacuum Pumps RUVAC RAV with Pre-Admission Cooling | 588 |
| Rotary Feedthroughs | 890 |
| Rotary Motion Feedthroughs | 892 |
| Rotary Piston Vacuum Pumps, oil sealed | |
| Single-Stage, E | 212 |
| Two-stage, DK | 214 |
| Rotary Vane Vacuum Pumps | |
| SOGEVAC, Single-Stage | |
| SV. | 148 |
| SV .. ATEX | 162 |
| SV .. B | 112 |
| SV .. BI | 142 |
| SV .. D | 156 |
| SV (prepared with PFPE for use with oxygen) | 160 |

| | |
|---|-----|
| TRIVAC, Two-Stage | |
| B | 34 |
| DOT | 50 |
| Ex (Explosion Protected and Pressure Burst Resistant) | 56 |
| ³ He | 54 |
| BCS | 58 |
| PFPE | 64 |
| E | 30 |
| RUTA Vacuum Pump Systems | 523 |

S

| | |
|---|------|
| Safety Valve | 517 |
| | 932 |
| Screw-in Calibrated Leaks | 802 |
| Screw Vacuum Pump, Dry Compressing | |
| DRYVAC DV | 256 |
| LEYVAC LV .. C | 239 |
| SCREWLINE SP | 245 |
| Scroll Vacuum Pumps SCROLLVAC SC .. D | 232 |
| Sealing Valves | 938 |
| Securing Collar for Octal Socket Plugs (for Turbomolecular Pumps) | 438 |
| SECUVAC Vacuum Safety Valves | 931 |
| Sensors | |
| active | 686 |
| additional. | 744 |
| old / replacement | 748 |
| passive | 730 |
| Separators SEP | 180 |
| Services | 1007 |
| for LEYBONOL | 1000 |
| for Roots Pumps | 314 |
| for TRIVAC Pumps | 100 |
| for Turbomolecular Pumps | 442 |
| Service Center | 1011 |
| Servicing Packages (Tailor-made) for your Vacuum Technology | 985 |
| Small Compact Pump S 1,5 | 28 |
| Small Valves "micro" | 907 |
| Smoke Eliminator SE | 97 |
| SOGEVAC, Oil Sealed Vacuum Pumps | 105 |
| Solenoid Coils | 943 |
| Solenoid Venting Valve | 438 |
| Sound Proofing | 592 |
| Special Lubricants | 995 |
| Special Valves | |
| for Turbomolecular Pumps | 944 |
| with ISO-KF, CF or ISO-K Flange. | 928 |
| Nominal width DN 10 ISO-KF to 40 ISO-KF or ISO-K | 929 |
| Nominal width DN 16 to 63 CF | 946 |

| | |
|---|-----|
| Spiral Tube | 718 |
| Substrate Manipulation Solutions | 654 |
| Switching Amplifier SV 110 | 762 |
| Switching Components for Automatic Pump System Control, temperature dependent | 460 |

T

| | |
|--|-----|
| Tank Mounted Medical Vacuum Systems (US version) | 554 |
| Temperature Sensor (Silicon Diode) | 516 |
| Temperature Sensor Pt100 | 460 |
| Thermal Switch | 312 |
| Thermal Switch | 182 |
| THERMOVAC Sensors | |
| TM | 684 |
| TR | 734 |
| THERMOVAC Transmitters TTR | 690 |
| with Fieldbus Interface Profibus or DeviceNet | 698 |
| with Fieldbus Interface Profibus or DeviceNet | 694 |
| TMP High Vacuum Pump Systems | 599 |
| Transmitters, active | 686 |
| TRIVAC, Oil Sealed Vacuum Pumps | 24 |
| Turbomolecular Pump Systems (Global versions) | |
| with dry compressing Forevacuum Pumps | 608 |
| with oil-sealed Forevacuum Pumps | 600 |
| Turbomolecular Pump Systems (US versions) | |
| PT-Flex DRY | 616 |
| Turbomolecular Pumps TURBOVAC / TURBOVAC MAG | |
| Special Pumps | 344 |
| with Hybrid (magnetic/mechanical) Rotor Suspension | 328 |
| with Magnetic Rotor Suspension | |
| MAG INTEGRA | |
| with integrated Frequency Converter | |
| with Compound Stage | 382 |
| MAG DIGITAL | |
| with separate Frequency Converter | |
| with Compound Stage | 396 |
| with Mechanical Rotor Suspension | |
| without Compound Stage | 346 |
| with or without Compound Stage | |
| with Frequency Converter for Attaching or Separate | 370 |
| with Compound Stage | |
| with integrated Frequency Converter | 374 |
| without integrated Frequency Converter | 378 |
| TurboPump Controller TPC (US version) | 624 |
| Turboradial Blowers | |
| TURBOSTREAM Classic, with mechanical bearings | |
| TST D (two-stage) | 967 |
| TST S (single-stage) | 967 |

| | |
|--|-----|
| TURBOSTREAM MAG, magnetically levitated | |
| MAG TST S (single-stage) | 967 |
| TurboSystem Controller TSC (US version). | 922 |
| TVD Pump Systems for Drying, Evaporation and Distillation Applications | 590 |

U

| | |
|---|-----|
| UHV Gate Valves | |
| Electropneumatically Operated | |
| CF Flange | 964 |
| ISO-F Flanges | 962 |
| Manually Operated | 960 |
| UHV Valves, All-Metal | |
| Right-Angle Valves | 946 |
| Variable Leak Valves | 947 |
| Ultra-High Vacuum Operating Units and Passive Sensors | 730 |
| UNIVEX High Vacuum Experimentation Systems | 627 |

V

| | |
|--|-----|
| Vacuumcontroller VACVISION | 768 |
| Vacuum Locks | 938 |
| Vacuum Pump Systems | |
| TVD for Drying, Evaporation and Destillation Application | 590 |
| Vacuum Pump Systems RUTA | |
| Dry Compressing | |
| with SCREWLINE Backing Pump | |
| Adapter Version. | 568 |
| without palette | 556 |
| with palette | 558 |
| Frame Version | 562 |
| SP Close-Coupled Pump Systems (US version). | 570 |
| Dry Compressing Vacuum Pump System RUTA | |
| Adaptor Version | |
| with DRYVAC DV 650 Backing Pump | 574 |
| Frame Version | |
| with DRYVAC DV 650 Backing Pump | 576 |
| with DRYVAC DV 1200 Backing Pump | 578 |
| DRYVAC Pump Systems | |
| Adaptor Version | |
| Load Lock Pump Systems. | 580 |
| Process Pump Systems | 582 |
| with RUVAC WH Backing Pump | 584 |
| enclosed | 588 |
| Oil-Sealed | |
| HTS Close-Coupled Pump Systems (US version) | |
| with Single-Stage SOGEVAC Backing Pumps | 542 |
| RBS - B/BCS (US version) | |
| with Two-Stage TRIVAC Backing Pumps | 538 |
| Three-Stage | |

| | |
|---|-----|
| with Two-Stage TRIVAC Backing Pumps | |
| Adapter Version | 526 |
| Frame Version | 528 |
| Two-Stage | |
| with Single-Stage SOGEVAC Backing Pumps | |
| Adapter Version | 524 |
| Frame Version | 528 |
| with Pre-Admission Cooling | 588 |
| Vacuum Safety Valves SECUVAC | 903 |
| VACVISION | 768 |
| Valves | 901 |
| for E + DK Pumps | 216 |
| for SOGEVAC Pumps | 188 |
| for TRIVAC Pumps | 99 |
| Right-Angle Valves, Bellows-Sealed | |
| Manually Operated ISO-K | 912 |
| Electropneumatically Operated ISO-K | 924 |
| (Electro)magnetically Operated ISO-KF | 914 |
| Right-Angle and Straight Through Valves | |
| Bellows-Sealed | |
| Various Drives „micro“ | 908 |
| Electropneumatically Operated ISO-K | 918 |
| | 926 |
| Straight Through Valves, Bellows-Sealed | |
| Manually Operated | |
| ISO-K | 922 |
| ISO-KF | 913 |
| (Electro)magnetically Operated ISO-KF | 916 |
| Special | 928 |
| with ISO-K Flanges. | 921 |
| Nominal Width DN 63 to 160 ISO-K. | 922 |
| Nominal Width DN 250 ISO-K. | 926 |
| with ISO-KF Flanges | 911 |
| Nominal Width DN 16 to 50 ISO-KF. | 912 |
| Variable-Leak Valves without Isolation Valve. | 934 |
| Venting Valves | |
| Electromagnetically Operated | 937 |
| Manually Operated | 936 |
| Vibration Absorber | 223 |
| | 436 |

W

| | |
|--|------|
| White Oils | 968 |
| Workshop Service and After Sales Service | 1009 |

TELEFAX Inquiry

To

Oerlikon Leybold Vacuum

Telefax (0221) 347-12 50

e-mail: sales.vacuum@oerlikon.com

Name:

For online enquiries please visit our

Company:

Online Catalog on the Internet:

www.oerlikon.com/leyboldvacuum

Position:

Street:

Code/City:

Phone:

Fax:

e-mail:

Please send me an offer for the following products

Place / date

Signature

Company stamp



TELEFAX Inquiry

To

Oerlikon Leybold Vacuum
(for USA)

Fax 1-724-325-3577

e-mail: info.vacuum.ex@oerlikon.com

Name:

.....

Company:

.....

Position:

.....

Street:

.....

Code/City:

.....

Phone:

.....

Fax:

.....

e-mail:

.....

For online enquiries please visit our
Online Catalog on the Internet:
www.oerlikon.com/leyboldvacuum

Please send me an offer for the following products

| Part No. | Quantity | Brief Designation |
|----------|----------|-------------------|
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| | | |
| | | |
| | | |
| | | |

Place / date

Signature

Company stamp



ATEX TELEFAX Inquiry

oerlikon
leybold vacuum



Necessary information for flame proof vacuum pumps to EC ATEX-directive

Thank you for your interest in our vacuum pumps certified to the ATEX-directive. In order to select a vacuum pump best suited for your application and for legal reasons Oerlikon Leybold Vacuum needs the following information.

Please answer the questions with care and completely. Please fill in the required information or mark the answers as appropriate. Send the questionnaire by fax or E-Mail to your contact person in Oerlikon Leybold Vacuum or to your local sales representative. In case of uncertainties or questions please use the following contact data:

Phone: +49 (0)221 347 1112

Fax: +49 (0)221 347 1245

E-Mail: sales.vacuum@oerlikon.com

Information on the required pump

Please select the required pump type and the needed pumping speed first:

- | | | |
|--|-------|-------------------|
| <input type="checkbox"/> TRIVAC - two stage rotary vane pump | _____ | m ³ /h |
| <input type="checkbox"/> SOGEVAC - single stage rotary vane pump | _____ | m ³ /h |
| <input type="checkbox"/> SCREWLINE - dry compressing screw type pump | _____ | m ³ /h |
| <input type="checkbox"/> RUVAC - roots pump | _____ | m ³ /h |

Information on operating conditions

For this information please refer to your explosion protection document. According to the ATEX-directive 137 (99/92/EC) the user of a plant is obliged to create such a document. In this the zoning has to be specified. Please consider that zoning has to be made separately for the outer environment (installation location) (o) and also for the inside (i) of your plant.

The pump will be installed in an outer environment (o) which is for gases specified as

- | | | | |
|---|---------------------------------|---------------------------------|---------------------------------|
| <input type="checkbox"/> non potentially explosive atmosphere | | | |
| <input type="checkbox"/> potentially explosive atmosphere of | <input type="checkbox"/> zone 0 | <input type="checkbox"/> zone 1 | <input type="checkbox"/> zone 2 |
| <input type="checkbox"/> In addition a certification for dust in zone 2 (cat. 22) is required | | | |

Inside the pump (i) the gas atmosphere is specified as

- | | | | |
|---|---------------------------------|---------------------------------|---------------------------------|
| <input type="checkbox"/> non potentially explosive atmosphere | | | |
| <input type="checkbox"/> potentially explosive atmosphere of | <input type="checkbox"/> zone 0 | <input type="checkbox"/> zone 1 | <input type="checkbox"/> zone 2 |
| <input type="checkbox"/> In addition a certification for dust in zone 2 (cat. 22) is required | | | |

please turn over ...



ATEX TELEFAX Inquiry

oerlikon
leybold vacuum



Information on pumped products and pump environment

For this information please refer also the Material Safety Data Sheets of the relevant substances. The temperature class means the auto-ignition temperature of the relevant product. For mixtures of products please mark for outside (o) and inside (i) the highest gas class and the lowest auto-ignition temperature.

The pump will be installed in an outer environment (o) with the following gas and temperature classes:

| | | | |
|------------|-------------------------------|--------------------|--|
| Gas class: | <input type="checkbox"/> IIA | Temperature class: | <input type="checkbox"/> T1 to max. 450 °C |
| | <input type="checkbox"/> IIB1 | | <input type="checkbox"/> T2 to max. 300 °C |
| | <input type="checkbox"/> IIB2 | | <input type="checkbox"/> T3 to max. 200 °C |
| | <input type="checkbox"/> IIB3 | | <input type="checkbox"/> T4 to max. 135 °C |
| | <input type="checkbox"/> IIB | | <input type="checkbox"/> T5 to max. 100 °C |
| | <input type="checkbox"/> IIC | | <input type="checkbox"/> T6 to max. 85 °C |

With the pump the following gases (i) will be pumped.

(Name and/or chemical formula - also CAS-No., if available):

The products have a maximum classification of:

| | | | |
|------------|-------------------------------|--------------------|--|
| Gas class: | <input type="checkbox"/> IIA | Temperature class: | <input type="checkbox"/> T1 to max. 450 °C |
| | <input type="checkbox"/> IIB1 | | <input type="checkbox"/> T2 to max. 300 °C |
| | <input type="checkbox"/> IIB2 | | <input type="checkbox"/> T3 to max. 200 °C |
| | <input type="checkbox"/> IIB3 | | <input type="checkbox"/> T4 to max. 135 °C |
| | <input type="checkbox"/> IIB | | <input type="checkbox"/> T5 to max. 100 °C |
| | <input type="checkbox"/> IIC | | <input type="checkbox"/> T6 to max. 85 °C |

Please check if the material of construction of the pump is compatible with the pumped products. This is very important for aggressive, corrosive, toxic or radioactive media. It is also important for the outer environment of the pump. Please refer for material of construction in contact with pumped products to the actual Oerlikon Leybold Vacuum catalog, pump data sheets and information in the quotation.

Sender: _____

Date: _____

Name: _____

Phone: _____

Company: _____

Fax: _____

Dep.: _____

E-Mail: _____

ZIP/City: _____

Street: _____

City, sign, company stamp