# CRE, CRIE, CRNE

Vertical, multistage centrifugal E-pumps
60 Hz

be
think
innovate

GRUNDFOS

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# 1. Product introduction

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**Fig. 1** CRE, CRIE and CRNE pumps

The CRE, CRIE and CRNE pumps are based on the CR, CRI and CRN pumps.

CRE, CRIE and CRNE pumps belong to the so-called E-pump family and are referred to as E-pumps.

The difference between the CR and CRE pump ranges is the motor. CRE, CRIE and CRNE pumps are fitted with an E-motor, i.e. a motor with built-in variable frequency drive.

The E-pump motor is a Grundfos MLE motor.

The built-in frequency converter enables continuously variable control of the motor speed. This means that the pump can be set to operate at any duty point. The purpose of continuously variable speed control of the motor speed is to adjust the performance to a given requirement.

CRE, CRIE, CRNE pumps are available with a pressure sensor enabling the control of the pressure on the discharge side of the pump.*

The purpose of supplying the E-pumps with a pressure sensor is to make the installation and commissioning simple and quick. All other E-pumps are supplied without sensor.

E-pumps without sensor are used when uncontrolled operation (open loop) is required or when there is a wish to fit a sensor at a later stage in order to enable:

- Pressure control
- flow control
- level control of liquid in a tank
- temperature control
- differential pressure control
- differential temperature control.

E-pumps without sensor are also used when a remote analog signal is connected to the setpoint input terminal.

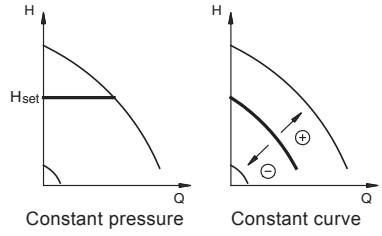


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**Fig. 2** CRE, CRIE, CRNE with sensor

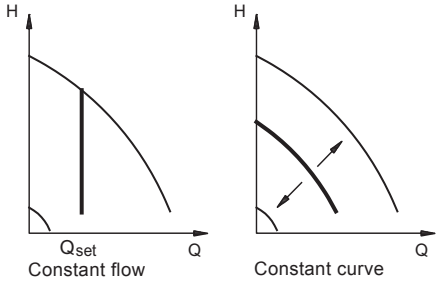


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**Fig. 3** E-pumps without sensor

The pump materials are identical to those of the CR, CRI and CRN pump ranges.

An E-pump is not just a pump, but a system which is able to solve application problems or save energy in a variety of pump installations. All that is required, is the power supply connection and the fitting of the E-pump in the pipe system, and the pump is ready for operation.

The pump has been tested and pre-configured from the factory. The operator only has to specify the desired setpoint (pressure) and the system is operational.

In new installations, the E-pumps provide a number of advantages. The integrated variable frequency drive has a built-in motor protection function which protects both motor and electronics against overload. This means that E-pump installations do not require a motor starter, but only a normal short-circuit protection for the cable.

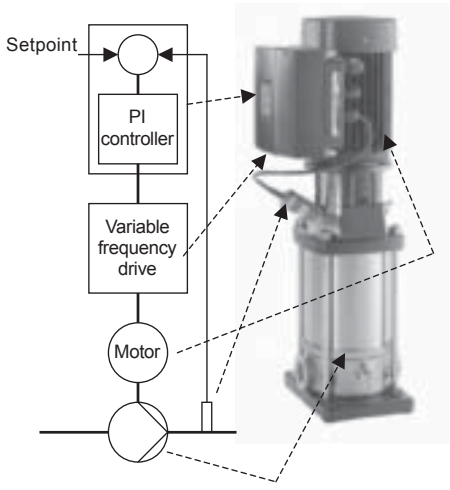


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**Fig. 4** Components of a Grundfos E-pump

## Selecting an E-pump

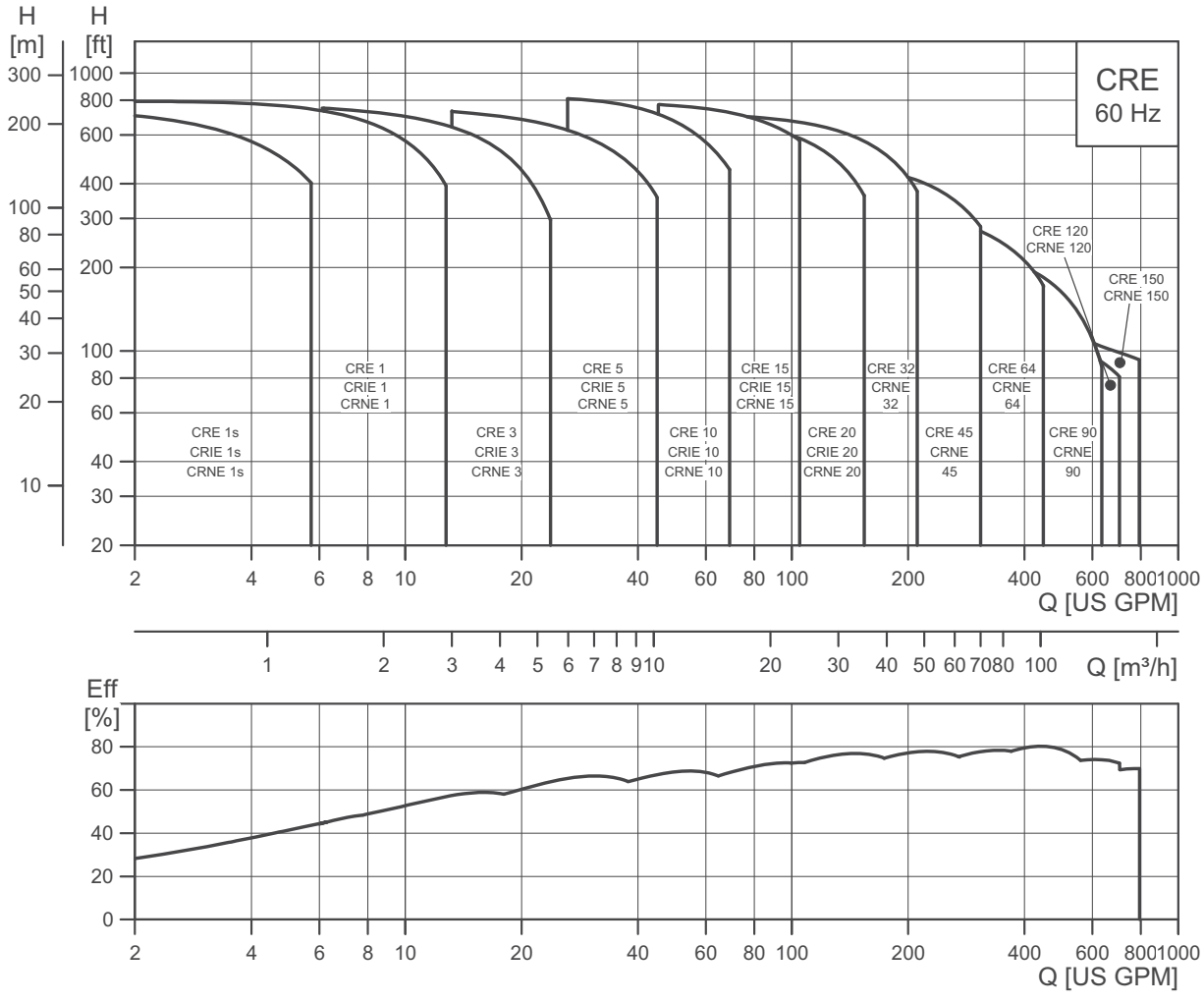
Select an E-pump if the following is required:

- controlled operation, i.e. the consumption fluctuates.
- constant pressure.
- communication with the pump.

Adaptation of performance through frequency-controlled speed control offers obvious benefits, such as:

- energy savings
- increased comfort
- control and monitoring of the pump performance.

## Performance range, CRE, CRIE, CRNE

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## Applications

| Application |
|---|
| **Water supply** |
| Filtration and transfer at waterworks |
| Distribution from waterworks |
| Pressure boosting in mains |
| Pressure boosting in high-rise buildings, hotels, etc. |
| Pressure boosting for industrial water supply |
| **Industry** |
| **Pressure boosting** |
| Process water systems |
| Washing and cleaning systems |
| Vehicle-washing tunnels |
| Firefighting systems |
| **Liquid transfer** |
| Cooling and air-conditioning systems (refrigerants) |
| Boiler feed and condensate systems |
| Machine tools (cooling lubricants) |
| Aquafarming |
| **Special transfer duties** |
| Oils and alcohols |
| Acids and alkalis |
| Glycol and coolants |
| **Water treatment** |
| Ultrafiltration systems |
| Reverse osmosis systems |
| Softening, ionizing, demineralizing systems |
| Distillation systems |
| Separators |
| Swimming baths |
| **Irrigation** |
| Field irrigation (flooding) |
| Sprinkler irrigation |
| Drip-feed irrigation |

For further information about which pump version to choose for a specific application or liquid, see section *Pumped liquids* on page 88.

## Application examples

As discussed earlier, speed control of pumps is an efficient way of adjusting pump performance to the system.

In this section, we will discuss the possibilities of combining speed-controlled pumps with PI controllers and sensors measuring system parameters, such as pressure, differential pressure and temperature. On the following pages, the different options will be presented through examples.

### Constant-pressure control

A pump supplies tap water from a break tank to various taps in a building.

The demand for tap water varies, and so does the system characteristic, according to the required flow. To achieve comfort and energy savings, a constant supply pressure is recommended.

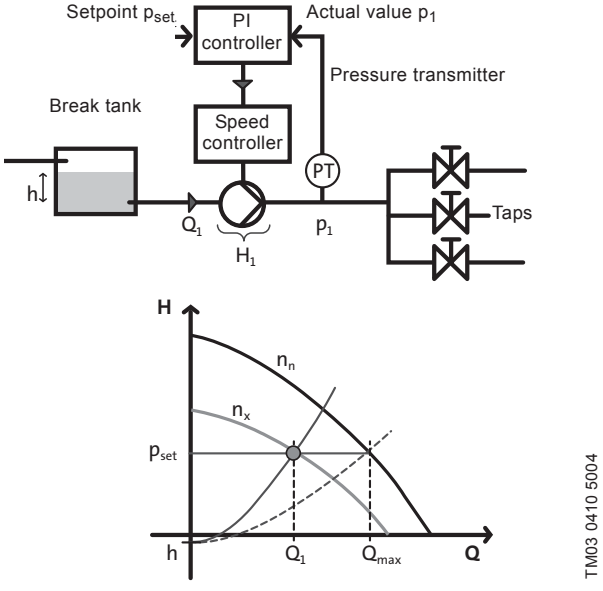



**Fig. 5** Constant-pressure control

As appears from fig. 5, the solution is a speed-controlled pump with a PI controller. The PI controller compares the required pressure, $p_{set}$, with the actual supply pressure, $p_1$, measured by a pressure transmitter PT.

If the actual pressure is higher than the setpoint, the PI controller reduces the speed and consequently the performance of the pump until $p_1 = p_{set}$. Figure 5 shows what happens when the flow is reduced from $Q_{max.}$ to $Q_1$.

The controller reduces the speed of the pump from $n_n$ to $n_x$ in order to ensure that the required discharge pressure is $p_1 = p_{set}$. The pump ensures that the supply pressure is constant in the flow range of 0 to $Q_{max.}$. The supply pressure is independent of the level (h) in the break tank. If h changes, the PI controller adjusts the speed of the pump so that $p_1$ always corresponds to the setpoint.

### Constant-temperature control

Performance adjustment by means of speed control is suitable for a number of industrial applications. Figure 6 shows a system with an injection molding machine which must be water-cooled to ensure high quality production.

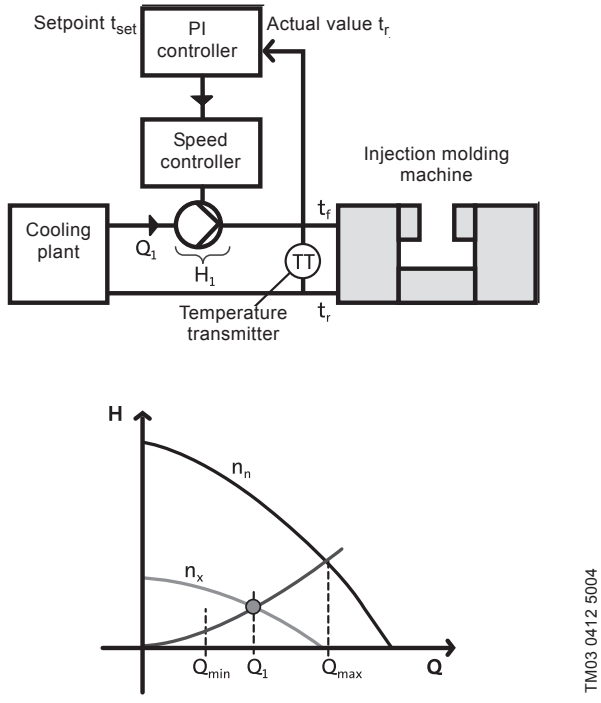



**Fig. 6** Constant-temperature control

The pump will be operating at a fixed system characteristic. The controller will ensure that the actual flow, $Q_1$, is sufficient to ensure that $t_r = t_{set}$.

The machine is cooled with water at 59 °F (15 °C) from a cooling plant. To ensure that the molding machine runs properly and is cooled sufficiently, the return-pipe temperature has to be kept at a constant level, $t_r$ = 68 °F (20 °C). The solution is a speed-controlled pump, controlled by a PI controller. The PI controller compares the required temperature, $t_{set}$, with the actual return-pipe temperature, $t_r$, which is measured by a temperature transmitter TT. This system has a fixed system characteristic, and therefore the duty point of the pump is located on the curve between $Q_{min}$ and $Q_{max}$. The higher the heat loss in the machine, the higher the flow of cooling water needed to ensure that the return-pipe temperature is kept at a constant level of 68 °F (20 °C).

## Product range, CRE

| Range | CRE 1s | CRE 1 | CRE 3 | CRE 5 | CRE 10 | CRE 15 | CRE 20 |
|---|---|---|---|---|---|---|---|
| Nominal flow rate [US gpm ($m^3h$)] | 4.5 (1.0) | 8.5 (1.9) | 15 (3.4) | 30 (6.8) | 55 (12.5) | 95 (21.6) | 110 (25.0) |
| Temperature range [°F (°C)] | -4 to +250 (-20 to +121) | | | | | | |
| Temperature range [°F (°C)] - on request | -40 to +356 (-40 to +180) | | | | | | |
| Max. working pressure [psi (bar)] | 362 (25) | | | | | | |
| Max. pump efficiency [%] | 35 | 49 | 59 | 67 | 70 | 72 | 72 |
| Flow range [US gpm ($m^3h$)] | 0 - 5.7 (0 - 1.3) | 0 - 12.8 (0 - 2.9) | 0 - 23.8 (0 - 5.4) | 0-45 (0 - 10.2) | 0-70 (0 - 15.9) | 0-125 (0 - 28.4) | 0-155 (35.2) |
| Max. pump pressure (H [ft (m)]) | 760 (230) | 790 (240) | 790 (240) | 780 (237) | 865 (263) | 800 (243) | 700 (213) |
| Motor power [Hp] | 1/3 to 2 | 1/3 to 3 | 1/3 to 5 | 3/4 to 7-1/2 | 3/4 to 15 | 2-25 | 3-25 |
| **Version** | | | | | | | |
| CRE: Cast iron and stainless steel AISI 304 | ● | ● | ● | ● | ● | ● | ● |
| CRIE: Stainless steel AISI 304 | ● | ● | ● | ● | ● | ● | ● |
| CRNE: Stainless steel AISI 316 | ● | ● | ● | ● | ● | ● | ● |
| CRTE: Titanium | - | - | (CRTE 2) | (CRTE 4) | (CRTE 8) | (CRTE 16) | - |

| Range | CRE 32 | CRE 45 | CRE 64 | CRE 90 | CRE 120 | CRE 150 |
|---|---|---|---|---|---|---|
| Nominal flow rate [US gpm ($m^3h$)] | 140 (32) | 220 (50) | 340 (77) | 440 (100) | 610 (139) | 750 (170) |
| Temperature range [°F (°C)] | -22 to +250 (-30 to +121)[1] | | | | -22 to +250 (-30 to +121)[1) & 2)] | |
| Temperature range [°F (°C)] - on request | -40 to +356 (-40 to +180) | | | | - | - |
| Max. working pressure [psi (bar)] | 435 (30) | | | | | |
| Max. pump efficiency [%] | 76 | 78 | 79 | 80 | 75 | 73 |
| Flow range [US gpm] | 14-210 (3.2 - 47.7) | 22-310 (5.0 - 70.0) | 34-450 (7.7 - 102.2) | 44-630 (10.0 - 143.1) | 61-700 (13.9 - 159.0) | 75-790 (17.0 - 179.4) |
| Max. pump pressure (H [ft (m)]) | 720 (220) | 490 (149) | 330 (101) | 230 (70) | 140 (43) | 150 (15) |
| Motor power [Hp] | 5-30 | 7-1/2 - 30 | 10-30 | 15-30 | 20-25 | 25-30 |
| **Version** | | | | | | |
| CRE: Cast iron and stainless steel AISI 304 | ● | ● | ● | ● | ● | ● |
| CRIE: Stainless steel AISI 304 | - | - | - | - | - | - |
| CRNE: Stainless steel AISI 316 | ● | ● | ● | ● | ● | ● |
| CRTE: Titanium | - | - | - | - | - | - |

● Available.

1) CRN 32 to CRN 90 with HQQE shaft seal: -4 to +250 °F (-20 to +121 °C).

2) CR, CRN 120 and 150 with 75 or 100 Hp motors with HBQE shaft seal: 0 °F to +250 °F (-17 to +121 °C).

## Pump

The CRE pumps are non-self-priming, vertical, multistage centrifugal pumps.

The pumps are available with a Grundfos standard motor (CR pumps) or a Grundfos frequency-controlled motor (CRE pumps).

The pump consists of a pump head and a base. The chamber stack and the sleeve are secured between the pump head and the base by means of staybolts. The base has suction and discharge ports on the same level (in line). All pumps are fitted with a maintenance-free mechanical shaft seal of the cartridge type.

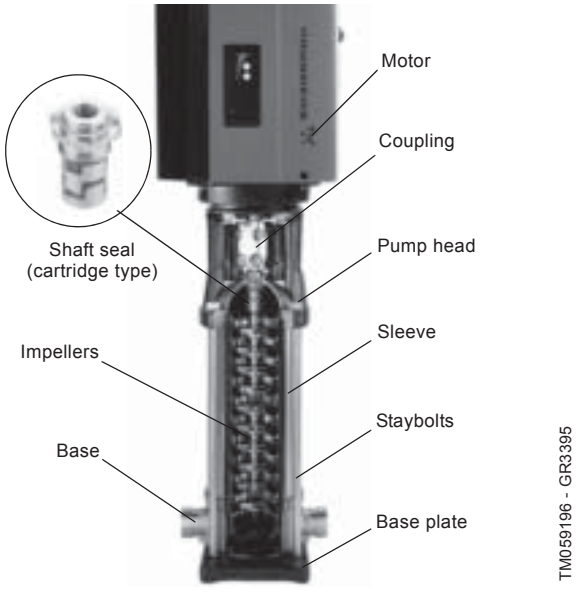



**Fig. 7** CR pump

CRE pump with ANSI/NSF 61 listing is available. See UL file MH26400 or contact Grundfos.

## Motor

### MLE motors

MLE motors incorporate thermal protection against slow overload and blocking.

CRE, CRIE and CRNE pumps require no external motor protection.

#### Frequency-controlled MLE motors

CRE, CRIE and CRNE pumps are fitted with a totally enclosed, fan-cooled, frequency-controlled MLE motor.

#### Permanent magnet motors

From 1/2 Hp to 2 Hp Grundfos offers CRE pumps fitted with single phase MLE motors (1 x 200-240 V).

From 1 Hp to 3 Hp Grundfos offers CRE pumps fitted with three phase MLE motors (3 x 440-480 V).

#### Asynchronous motors

From 5 Hp to 30 Hp Grundfos offers CRE pumps fitted with three phase MLE motors (3 x 460-480 V).

From 1 - 1/2 Hp to 7 - 1/2 Hp Grundfos offers CRE pumps fitted with three-phase MLE motors (3 x 208-230 V).

See Grundfos Product Center at www.grundfos.com.

#### Electrical data

| | **MLE motor CRE, CRIE, CRNE** |
|---|---|
| **Mounting designation** | NEMA |
| **Insulation class** | F |
| **Efficiency** | See section *Motor data* on page 87 |
| **Enclosure class** | TEFC (Totally Enclosed Fan Cooled) |
| **Supply voltage Tolerance: - 10 %/+ 10 %** | 1/2 Hp to 2 Hp<br>1 x 200-240 V<br><br>1 Hp to 3 Hp:<br>3 x 440-480 V<br><br>5 Hp to 30 Hp:<br>3 x 460-480 V<br><br>1-1/2 Hp to 7-1/2 Hp:<br>3 x 208-230 V |

## MLE 1/2 to 3 Hp permanent magnet motors

**Supply voltage:**
**1/2 to 2 Hp (1 x 200-240 V)**
**1 to 3 Hp (3 x 440-480 V)**

Advanced functional module (FM 300)

The FM 300 is the standard functional module in all MLE motors 1/2 to 3 Hp.

The module has a number of inputs and outputs enabling the motor to be used in advanced applications where many inputs and outputs are required.

The FM 300 has these connections:

- three analog inputs
- one analog output
- two dedicated digital inputs
- two configurable digital inputs or open-collector outputs
- Grundfos Digital Sensor input and output
- two Pt100/1000 inputs
- two LiqTec sensor inputs
- two signal relay outputs
- GENIbus connection.

### Connection terminals

CRE, CRIE, CRNE pumps have a number of inputs and outputs enabling the pumps to be used in advanced applications where many inputs and outputs are required.

Functional module 300 has been selected as standard for CRE, CRIE and CRNE pumps.

See fig. 8.

As a precaution, the wires to be connected to the following connection groups must be separated from each other by reinforced insulation in their entire lengths.

### Inputs and outputs

- Start/stop (digital input 1) (terminals 2 and 6)
- pressure sensor (analog input 1) (terminals 4 and 8)
- pressure switch (digital input 3) (terminals 10 and 6)
- external analog signal input (analog input 2) (terminals 7 and 23)
- GENIbus (terminals A, Y and B).

All inputs and outputs are internally separated from the power-conducting parts by reinforced insulation and galvanically separated from other circuits.

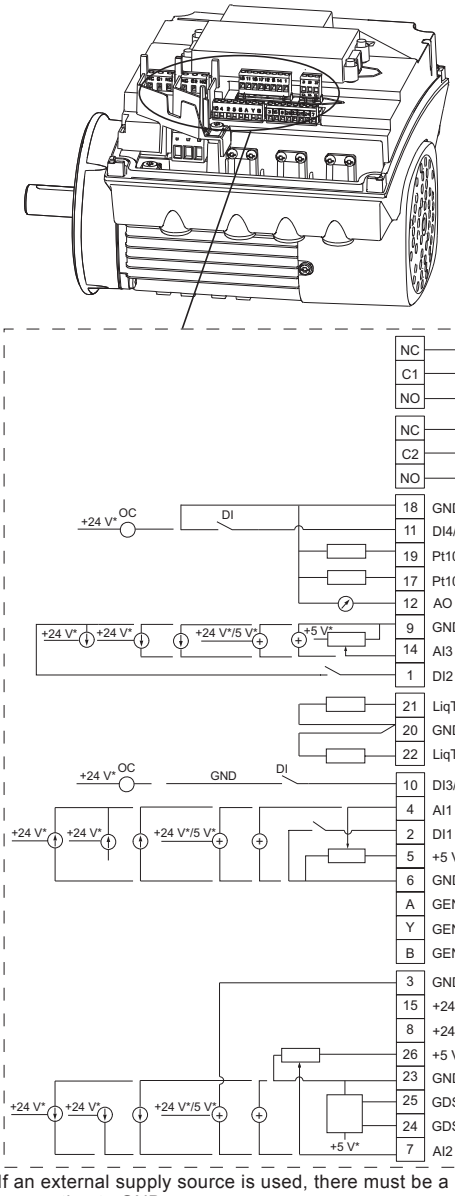
All control terminals are supplied by safety extra-low voltage (SELV), thus ensuring protection against electric shock.

### Signal relay outputs

– Signal relay 1:
LIVE:
Power supply voltages up to 250 VAC can be connected to this output.
SELV:
The output is galvanically separated from other circuits. Therefore, the supply voltage can be connected to the output as desired.

– Signal relay 2:
SELV:
The output is galvanically separated from other circuits. Therefore, the supply voltage can be connected to the output as desired.

- **Power supply** (terminals N, PE, L or L1, L2, L3, PE)




* If an external supply source is used, there must be a connection to GND.

**Fig. 8** Connection terminals, FM 300 functional module

## MLE 1-1/2 to 10 Hp asynchronous motors

**Supply voltage:**
**1 - 1/2 to 7 - 1/2 Hp (3 x 208-230 V)**
**5 to 10 Hp (3 x 460-480 V)**

### Advanced I/O module

The Advanced I/O module is the standard functional module in these MLE motors.

The module has a number of inputs and outputs enabling the motor to be used in advanced applications where many inputs and outputs are required.

The Advanced I/O module has these connections:

- start/stop terminals
- three digital inputs
- one setpoint input
- one sensor input
- one analog output
- GENIbus connection.

### Connection terminals

As a precaution, the wires to be connected to the following connection groups must be separated from each other by reinforced insulation in their entire lengths.

### Inputs and outputs

- Start/stop (terminals 2 and 3)
- digital inputs (terminals 1 and 9, 10 and 9, 11 and 9)
- setpoint input (terminals 4, 5 and 6)
- sensor input (terminals 7 and 8)
- GENIbus (terminals B, Y and A).

All inputs are internally separated from the power-conducting parts by reinforced insulation and galvanically separated from other circuits.

All control terminals are supplied with protective extra-low voltage (PELV), thus ensuring protection against electric shock.

### Output (relay signal, terminals NC, C, NO)

The output is galvanically separated from other circuits.

Therefore, the supply voltage can be connected to the output as desired.

- Analog output (terminal 12 and 13).

### Power supply (terminals L1, L2, L3)

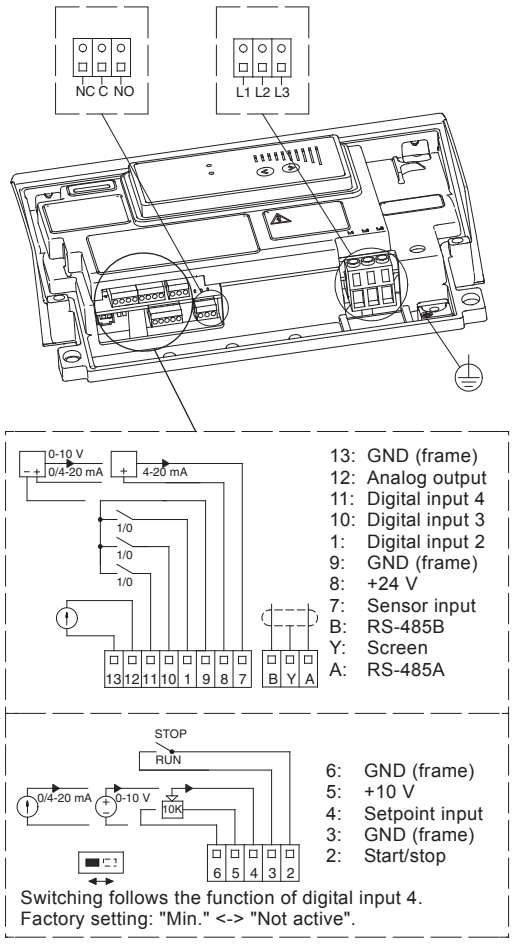



**Fig. 9** Connection terminals, Advanced I/O module

## MLE 15 to 30 Hp asynchronous motors

**Supply voltage:**
**15 to 30 Hp (3 x 460-480 V)**

### Advanced I/O module

The advanced I/O module is the standard functional module in these MLE motors.

The module has a number of inputs and outputs enabling the motor to be used in advanced applications where many inputs and outputs are required.

The Advanced I/O module has these connections:

- start/stop terminals
- three digital inputs
- one setpoint input
- one sensor input (feedback sensor)
- one sensor 2 input
- one analog output
- two Pt100 inputs
- two signal relay outputs
- GENIbus connection.

### Connection terminals

As a precaution, the wires to be connected to the following connection groups must be separated from each other by reinforced insulation in their entire lengths.

### Inputs and outputs

- Start/stop (terminals 2 and 3)
- digital inputs (terminals 1 and 9, 10 and 9, 11 and 9)
- sensor input 2 (terminals 14 and 15)
- Pt100 sensor inputs (terminals 17, 18, 19 and 20)
- setpoint input (terminals 4, 5 and 6)
- sensor input (terminals 7 and 8)
- GENIbus (terminals B, Y and A).

All inputs are internally separated from the power-conducting parts by reinforced insulation and galvanically separated from other circuits.

All control terminals are supplied with protective extra-low voltage (PELV), thus ensuring protection against electric shock.

### Output (relay signal, terminals NC, C, NO)

The output is galvanically separated from other circuits.

Therefore, the supply voltage can be connected to the output as desired.

- Analog output (terminal 12 and 13).

### Power supply (terminals L1, L2, L3)

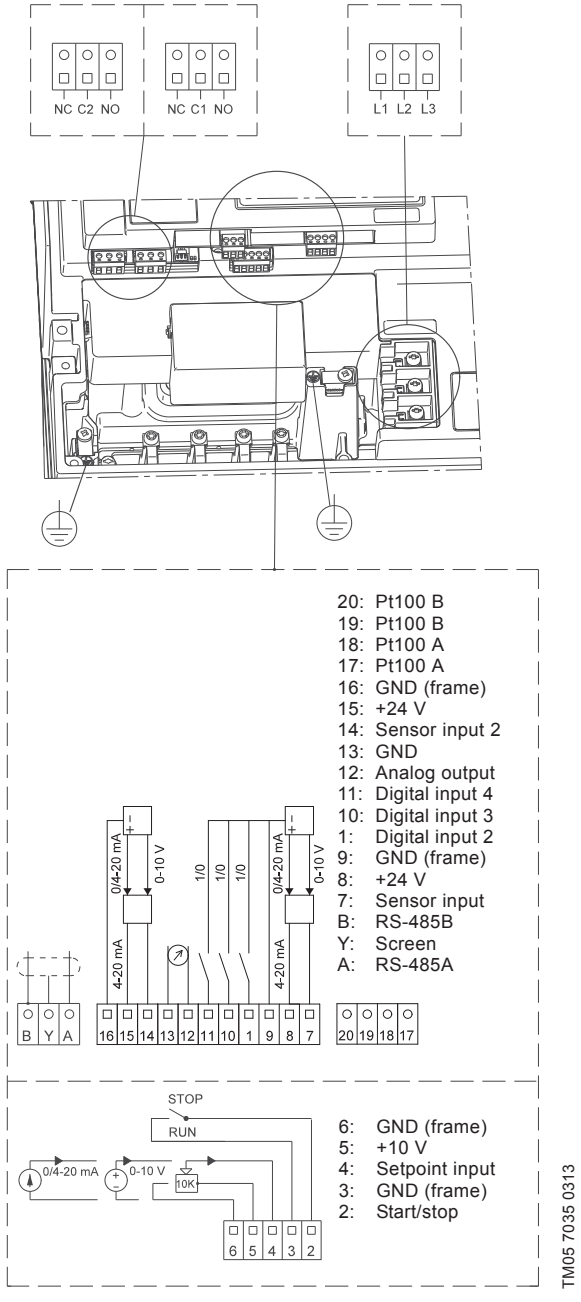



**Fig. 10** Connection terminals, Advanced I/O module

## Terminal box positions

As standard, the terminal box is fitted on the suction side of the pump.

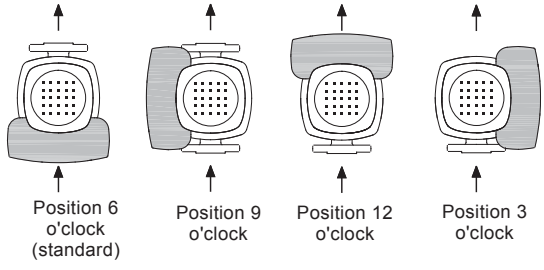



**Fig. 11** Terminal box positions

## Ambient temperature

| MLE motor power [Hp] | Motor make | Voltage [V] | Max. ambient temp. [°F (°C)] | Max. altitude above sea level [ft (m)] |
|---|---|---|---|---|
| 1/2 to 2 | MLE | 1 x 200-240 | 122 (50) | 3280 (1000) |
| 1 to 3 | MLE | 3 x 440-480 | 122 (50) | |
| 1 - 1/2 to 7 - 1/2 | MLE | 3 x 208-230 | 104 (40) | |
| 5 to 30 | MLE | 3 x 460-480 | 104 (40) | |

If the ambient temperature exceeds the above maximum ambient temperatures or the pump is installed at an altitude exceeding 3280 ft (1000 m), the motor must not be fully loaded due to the risk of overheating. Overheating may result from excessive ambient temperatures or high altitudes.

In such cases, it may be necessary to use a motor with a higher rated output.

### Viscosity

The pumping of liquids with densities or kinematic viscosities higher than those of water will cause a considerable pressure drop, a drop in the hydraulic performance and a rise in the power consumption.

In such situations, the pump should be fitted with a larger motor. If in doubt, contact Grundfos.

## Installation altitude

Installation altitude is the height above sea level of the installation site. Motors installed up to 3280 ft (1000 m) above sea level can be loaded 100 %.

Motors installed more than 3280 ft (1000 m) above sea level must not be fully loaded due to the low density and consequently low cooling effect of the air.

**MLE permanent magnet motors**
**1/2 to 2 Hp (1 x 200-240 V)**
**1 to 3 Hp (3 x 440-480 V)**

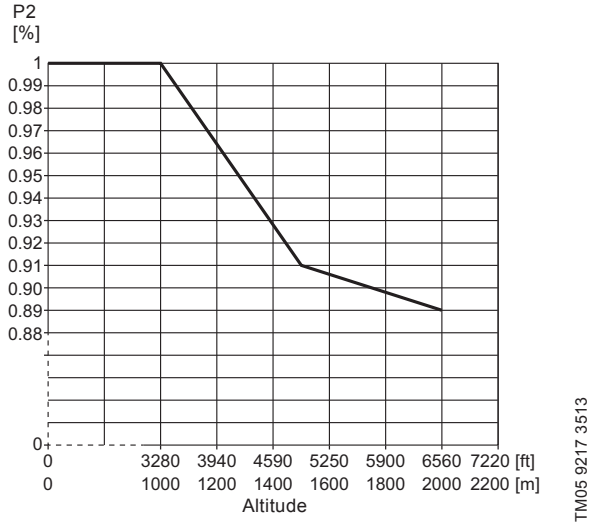



**Fig. 12** Derating of motor output (P2) in relation to altitude above sea level

**MLE asynchronous motors**
**1 - 1/2 to 7 - 1/2 Hp (3 x 208-230 V)**
**5 to 30 Hp (3 x 460-480 V)**

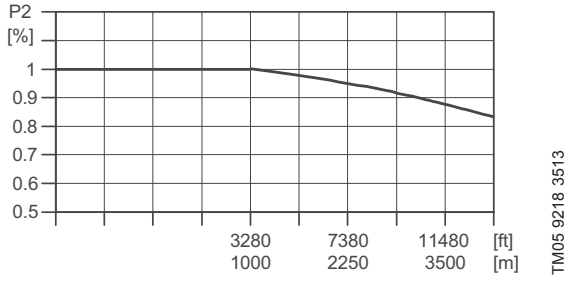



**Fig. 13** Derating of motor output (P2) in relation to altitude above sea level

# 2. MLE technical data

Grundfos MLE motors are equipped with NEMA standard C-face flanges.

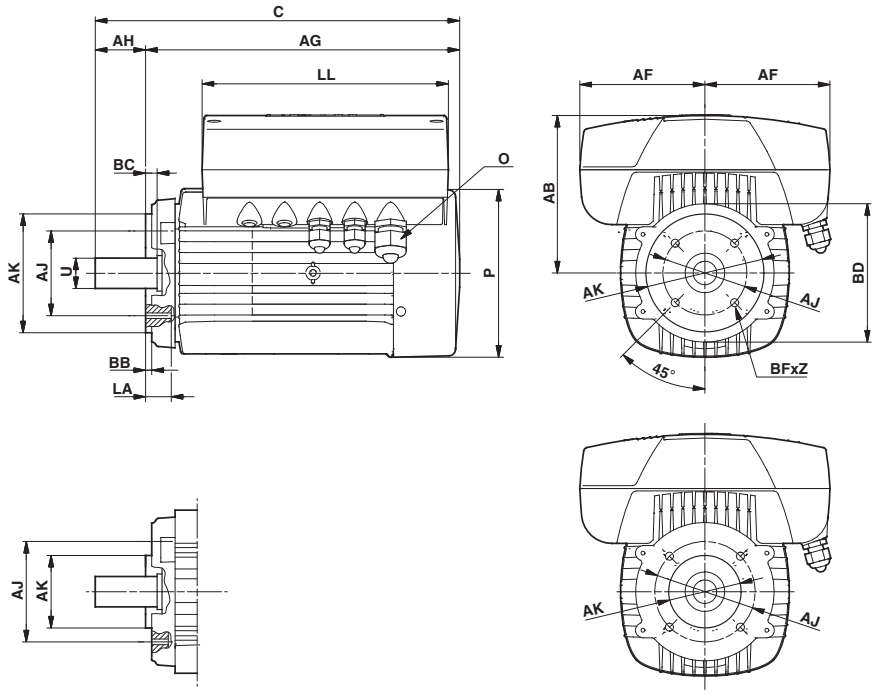
Grundfos MLE motors are recognized under the Component Recognition Program of Underwriters Laboratories Inc. for the United States and Canada.

MLE motors are equipped with a reinforced bearing system with locked bearings at the drive end, either a deep-groove ball bearing or an angular-contact bearing depending on the motor model.

This ensures an even uptake of the load in order to maximize the lifetime of the bearings, which are guaranteed for a minimum of 18,0000 hours service life. At the non-drive end, the motors are fitted with bearings with axial clearance in order to meet production tolerances while allowing for thermal expansion during motor operation. This ensures trouble-free operation and long life.

# MLE permanent magnet motors 1/2 - 2 Hp

## (2 pole) 1/60/200-240

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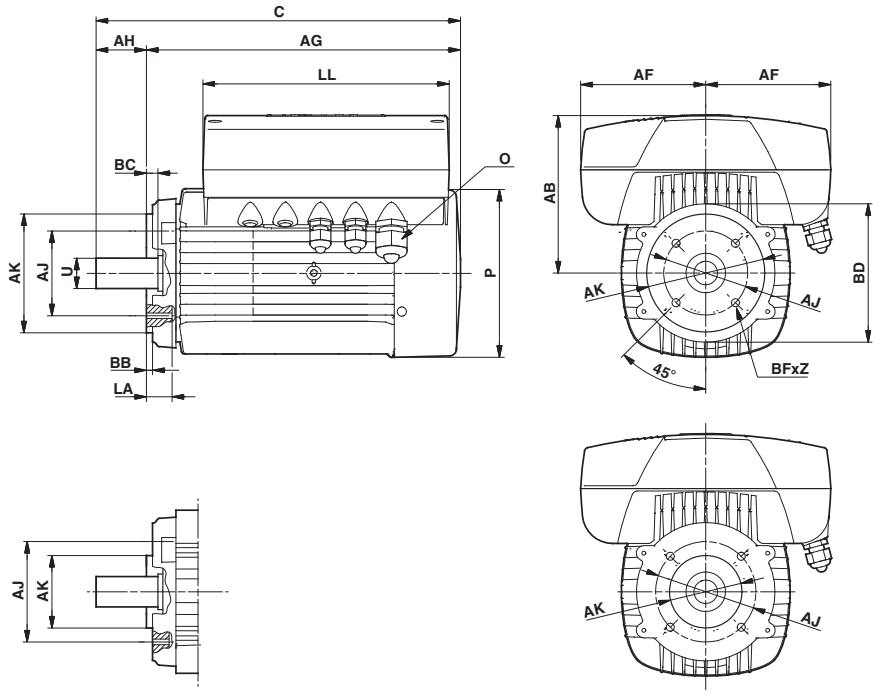
### 2-pole dimensional data

| Power [Hp] | Short type designation | Stator housing [inches (mm)] | | | | | | | Shaft end [inches (mm)] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | AB | AF | AF | C | AG | LL | U | AH |
| 0.50 | MLE071A2HA | 4.80 (122) | 6.22 (158) | 4.17 (106) | 4.17 (106) | 10.55 (268) | 8.46 (215) | 7.56 (192) | 0.63 (15.9) | 2.05 (52) |
| 0.75 | MLE071A2HA | | | | | | | | | |
| 1.00 | MLE080A2HA | 4.80 (122) | 6.22 (158) | 4.17 (106) | 4.17 (106) | 10.55 (268) | 8.46 (215) | 7.56 (192) | 0.63 (15.9) | 2.05 (52) |
| 1.50 | MLE080B2HA | | | | | | | | | |
| 2.00 | MLE090C2HA | 4.80 (122) | 6.22 (158) | 4.17 (106) | 4.17 (106) | 11.34 (288) | 9.25 (235) | 7.56 (192) | 0.63 (15.9) | 2.05 (52) |

| Power [Hp] | Short type designation | Flange [inches (mm)] | | | | | | Cable entries [mm] |
|---|---|---|---|---|---|---|---|---|
| | | LA | AJ | AK | BD | BF | BB | O |
| 0.50 | MLE071A2HA | 0.63 (16) | 5.87 (149.2) | 4.50 (114.3) | 6.50 (165) | 3/8" | 0.16 (4) | 4 x M20 |
| 0.75 | MLE071A2HA | | | | | | | |
| 1.00 | MLE080A2HA | 0.63 (16) | 5.87 (149.2) | 4.50 (114.3) | 6.50 (165) | 3/8" | 0.16 (4) | 4 x M20 |
| 1.50 | MLE080B2HA | | | | | | | |
| 2.00 | MLE090C2HA | 1.42 (36) | 5.87 (149.2) | 4.50 (114.3) | 6.50 (165) | 3/8" | 0.16 (4) | 4 x M20 |

# MLE permanent magnet motors 1-3 Hp

## (2 pole) 3/60/440-480




TM03 1674 2705

### Dimensional data

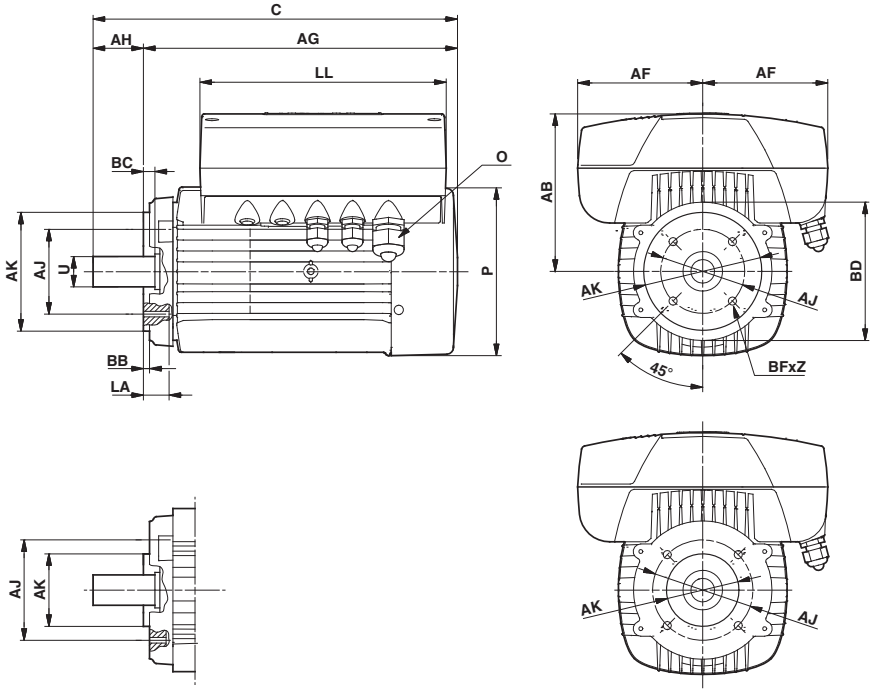
| P2 [Hp] | Short type designation | Stator housing [inches (mm)] | | | | | | | Shaft end [inches (mm)] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | AB | AF | AF | C | AG | LL | U | AH |
| 1.00 | MLE080A2IA | 4.8 (122) | 6.22 (158) | 5.28 (134) | 5.28 (134) | 12.13 (308) | 10.04 (255) | 9.13 (232) | 0.63 (15.9) | 2.06 (52.3) |
| 1.50 | MLE080B2IA | | | | | | | | | |
| 2.00 | MLE090C2IA | 4.80 (122) | 6.22 (158) | 5.28 (134) | 5.28 (134) | 12.91 (328) | 10.83 (275) | 9.13 (232) | 0.63 (15.9) | 2.06 (52.3) |
| 3.00 | MLE090D2IA | | | | | | | | | |

| P2 [Hp] | Short type designation | Flange [inches (mm)] | | | | | | | Cable entries [mm] |
|---|---|---|---|---|---|---|---|---|---|
| | | LA | AJ | AK | BD | BF | BB | Z | O |
| 1.00 | MLE080A2IA | 0.63 (16) | 5.87 (149.2) | 4.50 (114.3) | 6.50 (165) | 3/8" | - | 0.16 (4) | 4 x M20 |
| 1.50 | MLE080B2IA | | | | | | | | |
| 2.00 | MLE090C2IA | 1.42 (36) | 5.87 (149.2) | 4.50 (114.3) | 6.50 (165) | 3/8" | - | 0.16 (4) | 4 x M20 |
| 3.00 | MLE090D2IA | | | | | | | | |

# MLE asynchronous motors 1 1/2 - 10 Hp

## 1 1/2 - 7 1/2 Hp (2 pole) 3/60/208-230

## 5-10 Hp (2 pole) 3/60/460-480




TM03 1674 2705

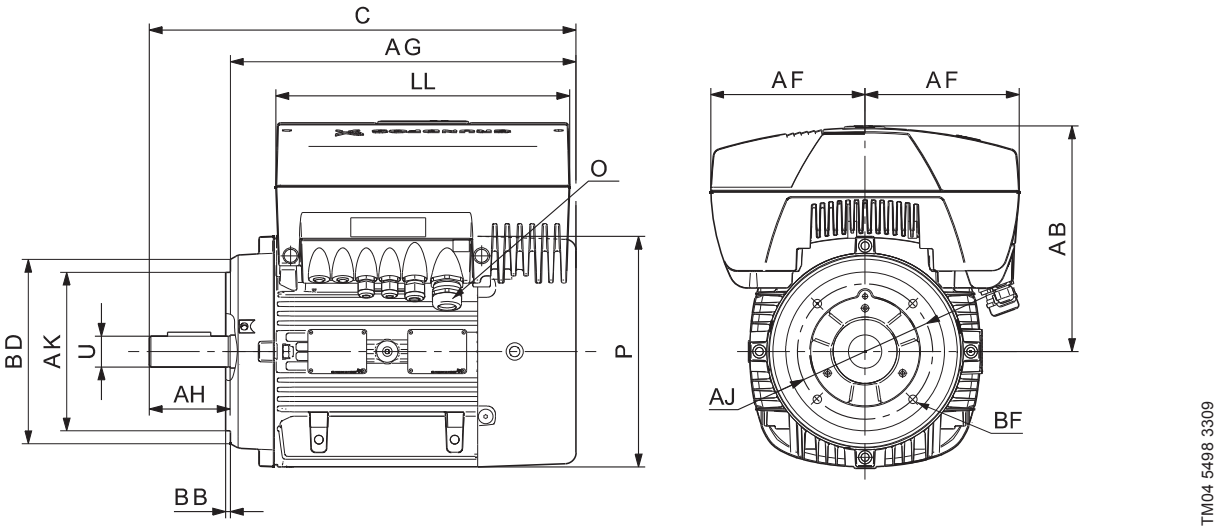
### Dimensional data

| P2 [Hp] | Short type designation | Stator housing [inches (mm)] | | | | | | | Shaft end [inches (mm)] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | AB | AF | AF | C | AG | LL | U | AH |
| 1.50 | MLE90CC-2-56C-G3 | 7.00 (178) | 6.57 (167) | 5.20 (132) | 5.20 (132) | 15.00 (381) | 12.95 (329) | 10.24 (260) | 0.62 (16) | 2.06 (52) |
| 2.00 | MLE90CC-2-56C-G3 | | | | | | | | | |
| 3.00 | MLE90FA-2-182TC-G3 | 7.00 (178) | 6.57 (167) | 5.20 (132) | 5.20 (132) | 16.05 (408) | 13.31 (338) | 10.24 (260) | 1.12 (28) | 2.62 (67) |
| 5.00 | MLE112CA-2-184TC-G3 | 8.66 (220) | 7.40 (188) | 5.71 (145) | 5.71 (145) | 18.25 (464) | 15.51 (394) | 11.81 (300) | 1.12 (28) | 2.62 (67) |
| 7.50 | MLE132DA-2-215TC-G3 | 8.66 (220) | 7.40 (188) | 5.71 (145) | 5.71 (145) | 18.75 (476) | 15.51 (394) | 11.81 (300) | 1.37 (35) | 3.12 (79) |
| 10.0 | MLE132FA2-215-TC-G3 | 10.24 (260) | 8.39 (213) | 5.71 (145) | 5.71 (145) | 18.07 (459) | 14.92 (379) | 11.81 (300) | 1.37 (35) | 3.12 (79) |

| P2 [Hp] | Short type designation | Flange [inches (mm)] | | | | | | | Cable entries [mm] |
|---|---|---|---|---|---|---|---|---|---|
| | | LA | AJ | AK | BD | BF | BB | Z | O |
| 1.50 | MLE90CC-2-56C-G3 | 0.59 (15) | 5.87 (149) | 4.5 (114) | 6.50 (165) | 3/8 "-16 | 0.16 (4) | 0.16 (4) | 2xM16 + 1xM25 +2xknock out M16 |
| 2.00 | MLE90CC-2-56C-G3 | | | | | | | | |
| 3.00 | MLE90FA-2-182TC-G3 | 0.75 (19) | 7.24 (184) | 8.50 (216) | 8.50 (216) | 1/2"-13 | - | 0.16 (4) | 2xM16 + 1xM25 + 2xknock out M16 |
| 5.00 | MLE112CA-2-184TC-G3 | 0.63 (16) | 7.24 (184) | 8.50 (216) | 8.50 (216) | 1/2"-13 | - | 0.16 (4) | 2xM16 + 1xM25 + 2xknock out M16 |
| 7.50 | MLE132DA-2-215TC-G3 | 0.63 (16) | 7.24 (184) | 8.50 (216) | 8.50 (216) | 1/2"-13 | - | 0.16 (4) | 2xM16 +1xM25 + 2xknock out M16 |
| 10.0 | MLE132FA2-215-TC-G3 | | | | | | | | |

# MLE asynchronous motors 15-30 Hp

## (2 pole) 3/60/460-480




TM04 5498 3309

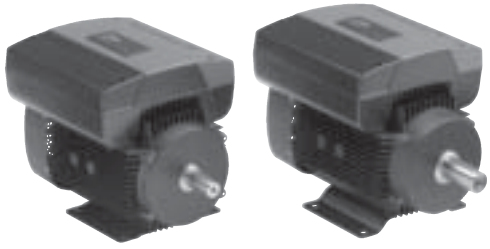
### Dimensional data

| P2 [Hp] | Short type designation | Stator housing [inches (mm)] | | | | | | | Shaft end [inches] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | AB | AF | AF | C | AG | LL | U | AH |
| 15 | MLE160 254TC | 13.39 (340) | 12.13 (308) | 8.27 (210) | 8.27 (210) | 22.56 (573) | 18.78 (477) | 15.75 (400) | 1.62 (41) | 3.75 (95) |
| 20 | MLE160 256TC | 13.39 (340) | 12.13 (308) | 8.27 (210) | 8.27 (210) | 22.56 (573) | 18.78 (477) | 15.75 (400) | 1.62 (41) | 3.75 (95) |
| 25 | MLE160 284TSC | 13.39 (340) | 12.13 (308) | 8.27 (210) | 8.27 (210) | 24.53 (623) | 22.72 (577) | 15.75 (400) | 1.62 (41) | 3.75 (95) |
| 30 | MLE180 286TSC | 13.39 (340) | 12.13 (308) | 8.27 (210) | 8.27 (210) | 24.53 (623) | 22.72 (577) | 15.75 (400) | 1.62 (41) | 3.75 (95) |

| P2 [Hp] | Short type designation | Flange [inches (mm)] | | | | | Cable entries [mm] |
|---|---|---|---|---|---|---|---|
| | | AJ | AK | BD | BF | BB | O |
| 15 | MLE160 254TC | 7.25 (184) | 8.50 (216) | 9.88 (251) | 1/2" | 0.26 (7) | 1xM40 + 1xM20 + 2xM16 + 2xknock out M16 |
| 20 | MLE160 256TC | 7.25 (184) | 8.50 (216) | 9.88 (251) | 1/2" | 0.26 (7) | 1xM40 + 1xM20 + 2xM16 + 2xknock out M16 |
| 25 | MLE160 284TSC | 9.00 (229) | 10.50 (267) | 10.75 (273) | 1/2" | 0.32 (8) | 1xM40 + 1xM20 + 2xM16 + 2xknock out M16 |
| 30 | MLE180 286TSC | 9.00 (229) | 10.50 (267) | 10.75 (273) | 1/2" | 0.32 (8) | 1xM40 + 1xM20 + 2xM16 + 2xknock out M16 |

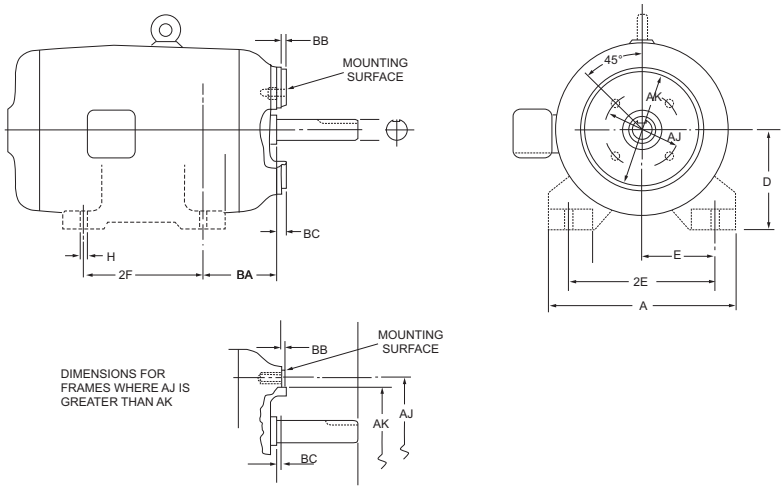
# MLE motors for CRE-H and CRNE-H

**(C-Face mounting with foot)**



GR9035

## Dimensional sketch




TM05 3012 0812

## Dimensional data

| Power [Hp] | Phase | NEMA frame size | Foot dimensions [inches] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | A | D | E | 2E | 2F | BA + BC | H |
| **1-phase 2-pole MLE motor with foot** | | | | | | | | | |
| 0.5 | 1 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| 0.75 | 1 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| 1 | 1 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| 1.5 | 1 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| 2 | 1 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| **3-phase 2-pole MLE motor with foot** | | | | | | | | | |
| 1 | 3 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| 1.5 | 3 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| 2 | 3 | 56C | 6.00 | 3.50 | 2.44 | 4.88 | 3.00 | 2.56 | 0.34 |
| 3 | 3 | 182TC | 8.90 | 4.50 | 3.75 | 7.50 | 4.50 | 2.87 | 0.41 |
| 5 | 3 | 184TC | 8.90 | 4.50 | 3.75 | 7.50 | 5.50 | 2.87 | 0.41 |
| 7.5 | 3 | 215TC | 9.96 | 5.25 | 4.25 | 8.50 | 7.00 | 3.75 | 0.41 |
| 10 | 3 | 215TC | 9.60 | 5.25 | 4.25 | 8.50 | 7.00 | 3.75 | 0.41 |
| 15 | 3 | 254TC | 11.30 | 6.25 | 5.00 | 10.00 | 8.25 | 4.50 | 0.53 |
| 20 | 3 | 256TC | 11.30 | 6.25 | 5.00 | 10.00 | 10.00 | 4.50 | 0.53 |
| 25 | 3 | 284TSC | 12.30 | 7.00 | 5.50 | 11.00 | 9.50 | 5.00 | 0.53 |
| 30 | 3 | 286TSC | 12.30 | 7.00 | 5.50 | 11.00 | 11.00 | 5.00 | 0.53 |

# 3. Control of E-pumps

## Examples of E-pump applications

CRE, CRIE and CRNE pumps are the ideal choice for a number of applications characterised by a demand for variable flow at constant pressure. The pumps are suited for water supply systems and pressure boosting as well as for industrial applications.

Depending on the application, the pumps offer energy savings, increased comfort and improved processing.

### E-pumps in the service of industry

The industry uses a large number of pumps in many different applications. Demands on pumps in terms of pump performance and mode of operation make speed control a must in many applications.

Some of the applications in which E-pumps are often used are listed below.

#### Constant pressure

- Water supply
- washing and cleaning systems
- distribution from waterworks
- humidifying systems
- water treatment systems
- process boosting systems, etc.

**Example:** Within industrial water supply, E-pumps with integrated pressure sensor are used to ensure a constant pressure in the piping system. From the sensor, the E-pump receives inputs about changes of pressure as a result of changes in the consumption. The E-pump responds to the input by adjusting the speed until the pressure is equalized. The constant pressure is stabilized once more on the basis of a preset setpoint.

#### Constant temperature

- Air-conditioning systems at industrial plants
- industrial cooling systems
- industrial freezing systems
- casting and molding tools, etc.

**Example:** In industrial freezing systems, E-pumps with temperature sensor increase comfort and lower operating costs compared with pumps without a temperature sensor.

An E-pump continuously adapts its performance to the changing demands reflected in the differences in temperature of the liquid circulating in the freezing system. Thus, the lower the demand for cooling, the smaller the quantity of liquid circulated in the system and vice versa.

#### Constant level

- Boiler feed systems
- condensate systems
- sprinkler irrigation systems
- chemical industry, etc.

**Example:** In a steam boiler, it is important to be able to monitor and control pump operation to maintain a constant level of water in the boiler.

By using an E-pump with level sensor in the boiler, it is possible to maintain a constant water level.

A constant water level ensures optimum and cost-efficient operation as a result of a stable steam production.

#### Dosing applications

- Chemical industry, i.e. control of pH values
- petrochemical industry
- paint industry
- degreasing systems
- bleaching systems, etc.

**Example:** In the petrochemical industry, E-pumps with pressure sensor are used as dosing pumps.

The E-pumps help to ensure that the correct mixture ratio is achieved when more liquids are combined.

E-pumps functioning as dosing pumps improve processing and offer energy savings.

### E-pumps in commercial building services

Commercial building services use E-pumps to maintain a constant pressure or a constant temperature based on a variable flow.

#### Constant pressure

Water supply in high-rise buildings, such as office buildings and hotels.

**Example:** E-pumps with pressure sensor are used for water supply in high-rise buildings to ensure a constant pressure even at the highest draw-off point.

As the consumption pattern and thus the pressure changes during the day, the E-pump continuously adapts its performance until the pressure is equalized.

#### Constant temperature

- Air-conditioning systems in hotels, schools, etc.
- building cooling systems, etc.

**Example:** E-pumps are an excellent choice for buildings where a constant temperature is essential. E-pumps keep the temperature constant in air-conditioned, high-rise glass buildings, irrespective of the seasonal fluctuations of the outdoor temperature and various heat impacts inside the building.

## Control options

It is possible to communicate with CRE, CRIE, CRNE pumps via the following:

- control panel on the pump
- Grundfos R100 remote control
- Grundfos GO Remote
- central management system.

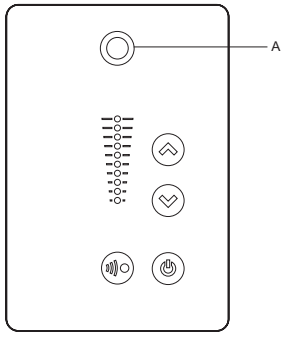
The purpose of controlling an E-pump is to monitor and control the pressure, temperature, flow and liquid level of the system.

### Control panel on pump

The control panel on the E-pump terminal box makes it possible to change the setpoint settings manually.

**MLE permanent magnet motors**
**1/2 to 2 Hp (1 x 200-240 V)**
**1 to 3 Hp (3 x 440-480 V)**

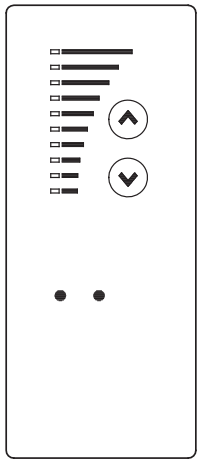
The operating condition of the pump is indicated by the Grundfos Eye on the control panel. See fig. 14, pos. A.




TM05 5993 4312

**Fig. 14** Control panel on CRE pump

**MLE asynchronous motors**
**1 - 1/2 to 7 - 1/2 Hp (3 x 208-230 V)**
**5 to 30 Hp (3 x 460-480 V)**

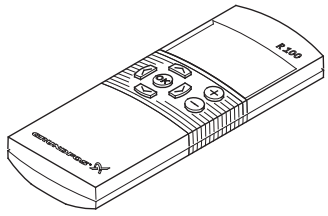


TM02 8513 0304

**Fig. 15** Control panel on CRE pump

### R100 remote control

The operator communicates with the E-pump by pointing the R100 at the control panel of the E-pump terminal box.




TM00 4498 2802

**Fig. 16** R100 remote control

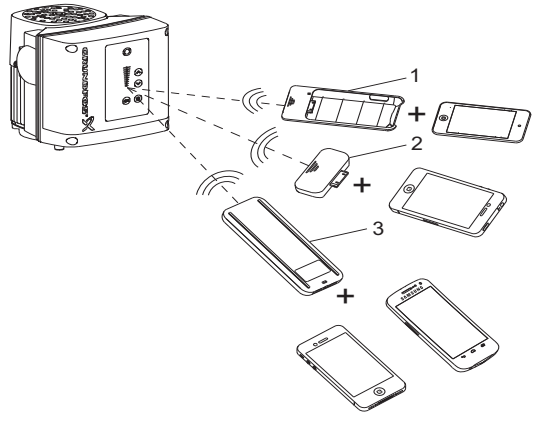
With the R100 it is possible to monitor and change control modes and settings of the E-pump.

### Grundfos GO Remote

The pump is designed for wireless radio or infrared communication with the Grundfos GO Remote.

The Grundfos GO Remote enables setting of functions and gives access to status overviews, technical product information and actual operating parameters.

The Grundfos GO Remote offers three different mobile interfaces (MI). See fig. 17.




TM05 5383 4312

**Fig. 17** Grundfos GO Remote communicating with the pump via radio or infrared light

| Pos. | Description |
|---|---|
| 1 | Grundfos MI 201:<br>Consists of an Apple iPod touch 4G and a Grundfos cover. |
| 2 | Grundfos MI 202:<br>Add-on module which can be used in conjunction with Apple iPod touch 4, iPhone 4G or later. |
| 3 | Grundfos MI 301:<br>Separate module enabling radio or infrared communication. The module can be used in conjunction with an Android or iOS-based Smartphone with Bluetooth connection. |

### Central management system

Communication with the E-pump is possible even if the operator is not present near the E-pump. Communication is enabled by connecting the E-pump to a central management system. This allows the operator to monitor the pump and to change control modes and setpoint settings.

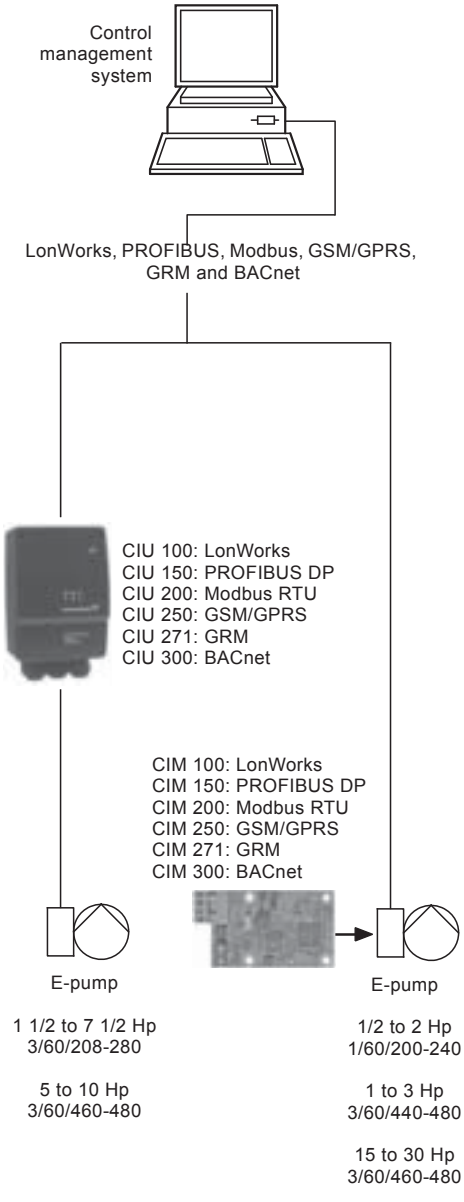



**Fig. 18** Structure of a central management system

## Control modes for E-pumps

Grundfos CRE, CRIE and CRNE pumps are available in two variants:

- CRE, CRIE and CRNE with integrated pressure sensor
- CRE, CRIE and CRNE without sensor.

### CRE, CRIE and CRNE with integrated pressure sensor

Use CRE, CRIE and CRNE pumps with integrated pressure sensor in applications where you want to control the pressure after the pump, irrespective of the flow. For further information, see section *Examples of E-pump applications* on page 20.

Signals of pressure changes in the piping system are transmitted continuously from the sensor to the pump. The pump responds to the signals by adjusting its performance up or down to compensate for the pressure difference between the actual and the desired pressure. As this adjustment is a continuous process, a constant pressure is maintained in the piping system.

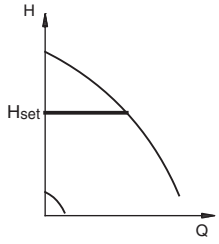

**Fig. 19** CRE, CRIE and CRNE pumps

A CRE, CRIE or CRNE pump with integrated pressure sensor facilitates installation and commissioning.

CRE, CRIE and CRNE pumps with integrated pressure sensor can be set to either of these control modes:

- constant pressure (factory setting)
- constant curve.

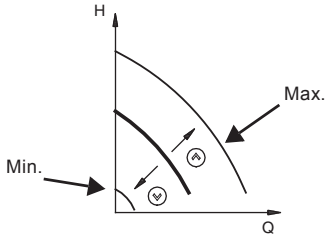
In constant-pressure mode, the pump maintains a preset pressure after the pump, irrespective of the flow. See fig. 20.




TM00 9322 4796

**Fig. 20** Constant-pressure mode

In constant-curve mode, the pump is not controlled. It can be set to pump according to a preset pump characteristic curve within the range from min. curve to max. curve. See fig. 21.




TM00 9323 1204

**Fig. 21** Constant-curve mode

## CRE, CRIE and CRNE without sensor

CRE, CRIE and CRNE pumps without sensor are suitable in these situations:

- Uncontrolled operation is required.
- Retrofit the sensor in order to control the flow, temperature, differential temperature, liquid level, pH value, etc. at some arbitrary point in the system.

**MLE permanent magnet motors**

**1/2 to 2 Hp (1 x 200-240 V)**

**1 to 3 Hp (3 x 440-480 V)**

These CRE, CRIE and CRNE pumps without sensor can be set to either of these control modes:

- Constant pressure
- constant differential pressure
- constant temperature
- constant differential temperature
- constant flow rate
- constant level
- constant curve
- constant other value.

**MLE asynchronous motors**

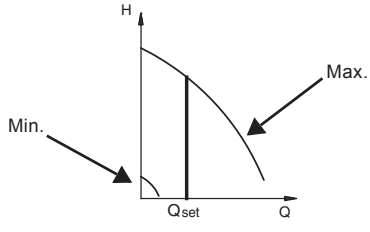
**1 - 1/2 to 7 - 1/2 Hp (3 x 208-230 V)**

**5 to 30 Hp (3 x 460-480 V)**

These CRE, CRIE and CRNE pumps without sensor can be set to either of these control modes:

- Controlled operation
- uncontrolled operation (factory setting).

In controlled-operation mode, the pump adjusts its performance to the desired setpoint. See fig. 22.




TM02 7264 2803

**Fig. 22** Constant-flow mode

In uncontrolled-operation mode, the pump operates according to a preset pump characteristic curve. See fig. 21.

# 4. Advanced use of MLE motors

## Introduction

Grundfos MLE motors have many features for the advanced user.

Grundfos three-phase MLE motors have features such as bearing monitoring, standstill heating, stop function, signal relays, analog sensors and limit exceeded. These features give a unique opportunity to customize the E-pumps.

The PC Tool E-products gives access to most of the settings available in the products, as well as the possibility of logging and viewing data.

All of these features are described below.

## Bearing monitoring

Bearing monitoring is a built-in function indicating the time to relubricate or replace the bearings of the MLE motor. The relubrication feature is only available for three-phase pumps of 15-30 Hp.

### Purpose and benefits

The purpose of this function is to give an indication to the user when it is time to relubricate or replace the motor bearings. This is important information for maintenance planning.

Bearing monitoring provides these benefits:

- The bearing can be relubricated at the right time according to the manufacturer's recommendations.
- Maximum life of the motor bearings is obtained.
- Maintenance intervals are determined by the pump itself.
- No worn-down or damaged bearings, and consequently no costly down-time, due to overseen maintenance.

### Description

When the bearing monitoring function determines that it is time to relubricate the bearings, the user will receive a warning via the R100, PC Tool E-products, bus or relay.

When the bearings have been relubricated, a certain number of times, the warning function will inform the user to replace the bearings.

The number of relubrications before bearing replacement is set up by Grundfos.

### Technical description

The bearing monitoring function is available on two levels for calculating the relubrication interval, basic and advanced:

**Bearing monitoring function**

**Basic level**

**Calculation of relubrication intervals based on motor revolutions.**
The basic level is a standard feature of the 15 - 30 Hp basic controller and no special functional module is required.

**Advanced level (only 15-30 Hp)**

**Calculation of relubrication intervals based on motor revolutions and bearing temperature.**

**Note:** The advanced-level function requires the following:
- The extended functional module is fitted in the MLE motor as standard.
- Temperature sensors are fitted at the drive end and at the non-drive end of the motor.

## Standstill heating

Standstill heating is a feature ensuring that even during standstill periods the motor windings have a certain minimum temperature.

### Purpose and benefits

The purpose of this function is to make the MLE motor more suitable for outdoor installation. During standstill periods, there is a need to keep the motor temperature higher than the ambient temperature to avoid condensation in and on the motor.

Traditionally this issue has been solved by using an anti-condensation heater on the stator coil heads. Now Grundfos provides this feature by means of a special function within the MLE motor and terminal box.

The MLE motor has standstill heating included. An external heater on the stator coil is not necessary.

### Applications

This function is especially suitable in outdoor applications and at installation sites with fluctuating temperatures.

### Description

The working principle is that AC voltage is applied to the motor windings. The applied AC voltage will ensure that sufficient heat is generated to avoid condensation in the motor. The terminal box is kept warm and dry by the heat generated via the power supply. However, it is a condition that the terminal box is not exposed to open air. It must be provided with a suitable cover to protect it from rain.

## Stop function

The stop function ensures that the pump is stopped at low or no flow. The function is also called low-flow stop function.

### Purpose and benefits

The purpose of the stop function is to stop the pump when low flow is detected.

The stop function provides these benefits:

- The energy consumption is optimized and the system efficiency is improved.
- Unnecessary heating of the pumped liquid which damages pumps.
- Wear of the shaft seals is reduced.
- Noise from operation is reduced.

### Applications

The stop function is used in systems with periodically low or no consumption thus preventing the pump from running against closed valve.

### Operating conditions for the stop function

A pressure sensor, a non-return valve, and a diaphragm tank are required for the stop function to operate properly.

**Note**: The non-return valve must always be installed before the pressure sensor. See fig. 23 and fig. 24.

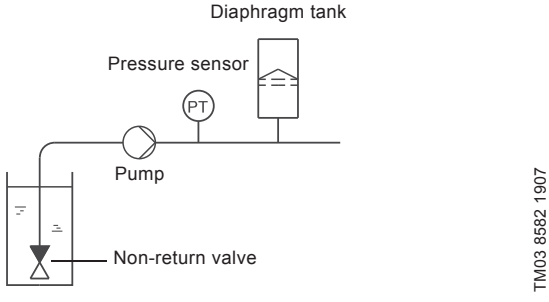



**Fig. 23** Position of the non-return valve and pressure sensor in system with suction lift operation

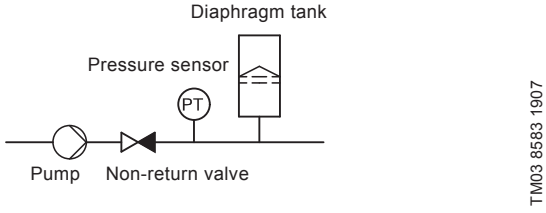



**Fig. 24** Position of the non-return valve and pressure sensor in system with positive inlet pressure

When low flow is detected, the pump is in on/off operation. If there is flow, the pump will continue operating according to the setpoint. See fig. 25.

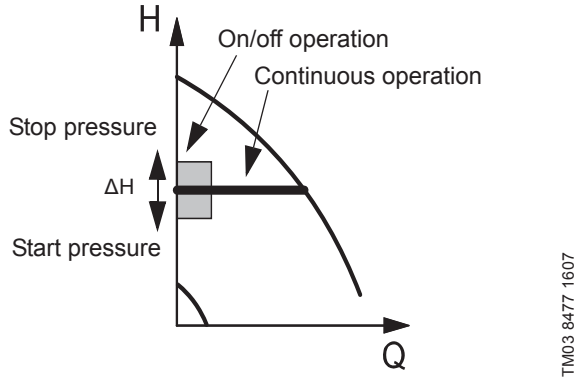



**Fig. 25** Constant pressure with stop function. Difference between start and stop pressures (ΔH)

### Diaphragm tank

The stop function requires a diaphragm tank of a certain minimum size. The tank must be installed near the discharge of the pump, and the precharge air pressure must be 0.7 x setpoint.

Recommended diaphragm tank size:

| Rated flow of pump [gpm ($m^3h$)] | CRE pump | Typical diaphragm tank size [gal (liter)] |
|---|---|---|
| 0-26 (0 - 5.9) | 1s, 1, 3 | 2 (7.6) |
| 27-105 (6.1 - 23.8) | 5, 10, 15 | 4.4 (16.7) |
| 106-176 (24.2 - 40) | 20, 32 | 14 (53.0) |
| 177-308 (40.2 - 70.0) | 45 | 34 (128.7) |
| 309-440 (70.2 - 99.9) | 64, 90 | 62 (234.7) |
| 441-750 (100-170) | 120, 150 | 86 (325.5) |

If a diaphragm tank of the above size is installed in the system, no additional adjustment should be necessary. If the tank installed is too small, the pump will start and stop often. Tank size will influence at which flow the system will go into start/stop operation.

### Description

The low-flow stop function can operate in two different ways:

- by means of an integrated "low-flow detection function"
- by means of an external flow switch connected to the digital input.

### Low-flow detection function

- The low-flow detection function will check the flow regularly by reducing the speed for a short time. A small change in pressure or no change in pressure means that there is low flow.

### Low-flow detection with flow switch

- When a flow switch detects low flow, the digital input will be activated.

Contact Grundfos for further information.

### Dry-running protection

This function protects the pump against dry running. When lack of inlet pressure or water shortage is detected, the pump will be stopped before being damaged.

Lack of inlet pressure or water shortage can be detected with a switch connected to a digital input configured to dry-running protection.

The use of a digital input requires an accessory, such as:

- a Grundfos Liqtec® dry-running switch (for more information on LiqTec, see section *Accessories* on page 91)
- a pressure switch installed on the suction side of the pump
- a float switch installed on the suction side of the pump.

The pump cannot restart as long as the digital input is activated.

## Temperature sensors 1 and 2

One or two Pt100 temperatures sensors may be connected to the input terminals 17, 18, 19, and 20.

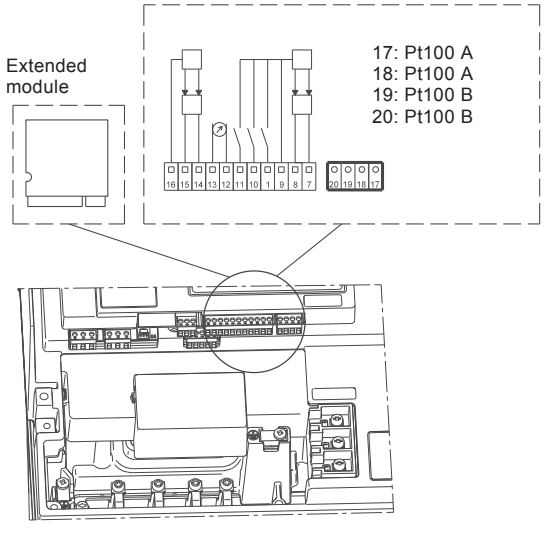



**Fig. 26** Temperature sensor connections in the extended functional module

### Purpose and benefits

The temperature sensor inputs 1 and 2 provide these benefits:

- The temperature sensor inputs can be used as input to the "limit exceeded" functions 1 and 2.
- In combination with the bearing monitoring function, the temperature sensors provide optimum monitoring of the motor bearings.
- A bearing warning or a bearing alarm can be indicated as the motor bearing temperature is measured.
- Status readings of the measured temperatures are available via the R100, PC Tool E-products and bus.
- The function has a built-in signal fault detection if the temperature sensors fail or a conductor is broken.

### Applications

The temperature inputs can be used in all applications where temperatures in the system or in the motor need to be monitored.

**Note:** The temperature sensor inputs are available on all MLE motors.

### Description

The temperature sensor inputs enable several functions.

- The temperature sensor inputs 1 and 2 can be used as input to the "limit exceeded" functions 1 and 2. If a limit is exceeded, this will be indicated. The indication will be in the form of outputs (relay) or alarms/warnings set up/defined in the "limit exceeded" functions 1 and 2.
- The temperature sensor inputs 1 and 2 can be set up to measure bearing temperature. The measured values of temperature sensor 1 and 2 are used in the calculation of relubrication intervals. Additionally, the measured value can activate the indication of a bearing warning or a bearing alarm. In case of high bearing temperature, a warning or an alarm can be logged and force the pump to stop.

## Signal relays

Signal relays are used to give an output indication of the current operational status of the MLE. The signal relay is a potential free contact (also called a dry contact). The output signals are typically transmitted to external control systems.

### Purpose and benefits

The signal relays offer these features:

- The signal relays can be remotely (via bus) or internally controlled.
- The signal relays can be set up to indicate several types of operational status.
- A relay delay can be defined to avoid activating the relay in case of periodic failures.

### Applications

Signal relays can be used in all applications involving a need to read out the operational status to e.g. a control room or to a superior control system.

### Description

The signal relays can be set up with these three parameters:

- relay control
- relay setup
- relay delay.

**Fig. 27** Signal relay parameters for 0.5 - 10 Hp pumps

**Fig. 28** Signal relay parameters for 15 - 30 Hp pumps

### Relay control

The relay time is 0 seconds and the signal relay is internally controlled.

The advanced relay control can only be set via the PC Tool E-products.

Relay control has these two setting options:

- **Internally controlled**
  The relay is internally controlled by the variable frequency drive software according to the setup of the relay [Ready, Fault, Operation].
- **Remotely controlled**
  The relay is controlled via commands from the GENIbus.

## Analog sensor inputs 1 and 2

The analog sensor inputs 1 and 2 are standardized inputs for measuring all types of analog parameters.

Sensor input 1 is the only sensor input set up for closed-loop operation. The input will be used as the sensor feedback input.

Sensor input 2 is referred to as the secondary sensor.

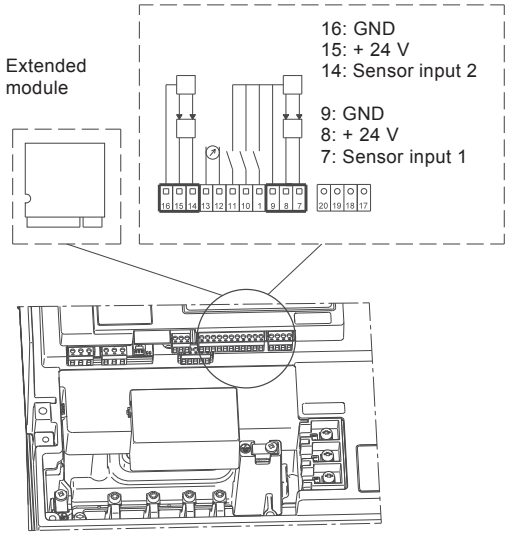



**Fig. 29** Sensor inputs 1 and 2 connections

### Purpose and benefits

The analog sensor inputs 1 and 2 provide these benefits:

- Sensor input 1 can be feedback input for the built-in PI controller.
- It is possible to monitor secondary parameters in the process, e.g. flow or liquid temperature.
- The secondary sensor can be set up as a redundant sensor.
- The sensors can give input to the "limit exceeded" functions 1 and 2.
- Status readings of the inputs are available via the R100 and PC Tool E-products.

### Applications

Analog sensor inputs 1 and 2 can be used in applications with a need for monitoring essential parameters.

### Description

The analog sensors 1 and 2 enable several functions.

- When the secondary sensor is set up as an input to the "limit exceeded" functions 1 and 2, defined outputs or warnings or alarms can be given when system parameters are outside defined system limits.
- Connecting a flow sensor.
  When sensor input 2 is set up with a flow sensor, the measured value can be used as input to the proportional-pressure function. The flow displayed in the R100 will be the measured flow instead of the estimated flow.
  The flow measurement can also be used in the low-flow stop function to detect low flow instead of estimating the flow by lowering the speed of the pump.
- Sensor reading via the R100 and PC Tool E-products.
  When sensors are set up. the user can get a status reading via the R100 and PC Tool E-products.

### Analog output

Analog output

The analog output (0-10 mA) can be set via the PC Tool to one of these indications:

- feedback value
- speed
- frequency
- motor current
- external setpoint input
- limit exceeded.

The analog output is default set to not active.

### Feedback value

The output signal is a function of the actual feedback sensor.

### Speed

The output signal is a function of the actual pump speed.

### Frequency

The output signal is a function of the actual frequency.

### Motor current

The output signal is a function of the actual motor current.

### External setpoint input

The output signal is a function of the external setpoint input.

### Limit exceeded

The output signal indicates whether the limit is exceeded:

- Minimum output = limit is not exceeded.
- Maximum output = limit is exceeded.

## Limit exceeded 1 and 2

Limit exceeded is a monitoring function monitoring one or two values/inputs. The function enables different **inputs** to activate various **outputs** and **alarms/ warnings** when the signal input has exceeded pre-determined limits.

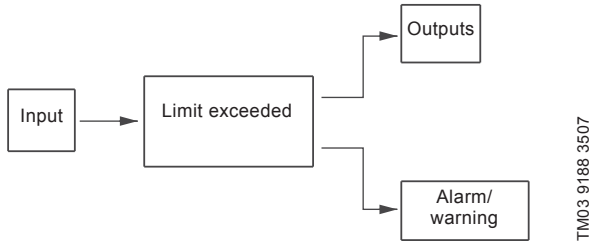



**Fig. 30** Example of a "limit exceeded" sequence

### Purpose and benefits

The purpose of this function is to monitor parameters which are central for the application. This will enable the controller to react to possible, abnormal operating conditions. This makes the E-pump a more important and integrated part of a system, and it can thus replace other existing monitoring units.

The liquid temperature can be monitored, and thus the E-pump can ensure that the system temperature does not exceed a maximum permissible level.

The minimum inlet pressure can be monitored, and thus the E-pump can prevent damage caused by a cavitation or dry run.

### Applications

The limit exceeded function is typically used for monitoring secondary parameters in the systems.

### Description

The figures below show two examples of setpoint monitoring by means of the limit exceeded function.

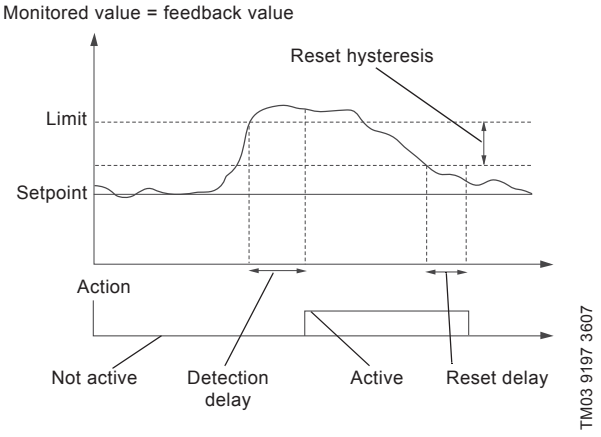



**Fig. 31** Limit exceeded sequence with the limit type "max. limit", for example monitoring of bearing temperature

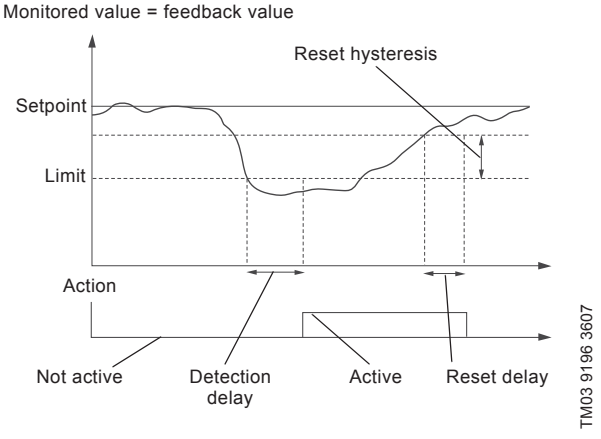



**Fig. 32** Limit exceeded sequence with the limit type "min. limit"

When the limit is exceeded, the signal input crosses the limit as an increasing or decreasing value, and the function can be set to cover both situations.

## Pump operating at power limit

When a pump in operation is running at maximum output power (P2) in the entire performance range from closed valve to maximum flow, it is said to be operating at power limit.

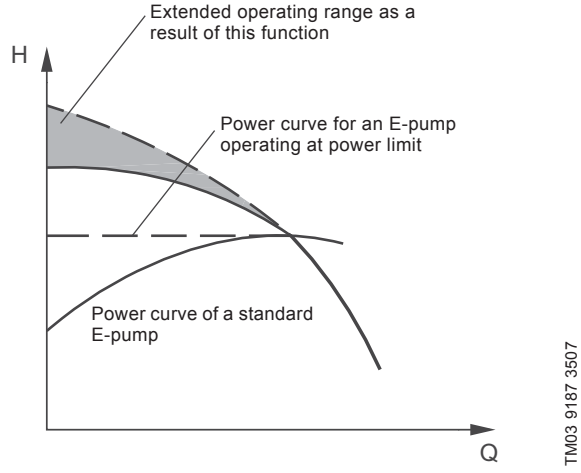



**Fig. 33** Power curves of a standard pump and a pump operating at power limit

### Purpose and benefits

This function utilizes the fact that often a standard E-pump does not load the MLE motor fully in the entire operating range. By controlling the MLE motor to always put out maximum power, irrespective of the load, it is now possible to extend the performance range of the pump without overloading the MLE motor. See fig. 33.

In practice, this function provides these benefits:

- The pressure range of the pump can be increased at low flows without using a bigger motor, provided that the pump construction can handle the pressure.
- In some cases, the pump can be fitted with a smaller motor than the corresponding standard pump when the E-pump has a fixed operating range at low flows.

### Applications

This function is most often used in applications with relatively low flow in relation to rated performance where at the same time the demanded maximum pressure corresponds to the maximum pressure that motor and pump can achieve.

Examples of application:

- washing and cleaning
- irrigation
- boiler feed.

### Description

As mentioned in section *Purpose and benefits* on page 29, there are two primary fields of application for this function:

### Increased pressure

Figure 34 illustrates the operating range of a standard 60 Hz E-pump with increased pressure range achieved by using the "pump operating at power limit" function.

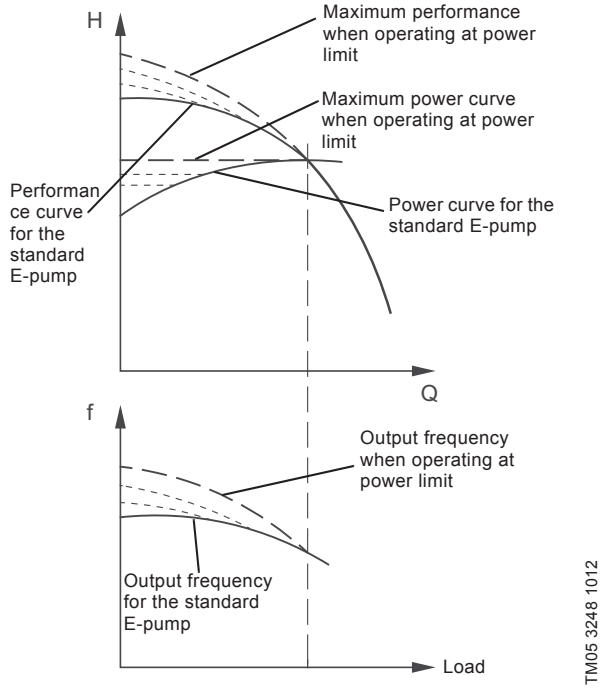



**Fig. 34** Standard performance curve vs a performance curve with the "pump operating at power limit" function

The MLE motor is set to a higher speed ($f_{max}$) than the rated speed of the pump. This leads to a higher pressure at closed valve and low flow.

The pump will operate at a speed corresponding to the set frequency ($f_{max}$) until the pump reaches the flow where the motor is loaded to its full rated power. If the flow is increased further, the motor will reduce its speed so as not to exceed its rated power.

**Note:** The pump will be running at oversynchronous speed in the low-flow area which may alter the sound level.

### Reduced motor size

Figure 35 shows the operating range of a standard 60 Hz pump where the "pump operating at power limit" function is used to optimize pump performance in relation to the motor size.

A pump operating at low flows and relatively high pressures (1) can be fitted with a smaller motor whose power matches this operating range. At higher flows and relatively lower pressures (2), the motor will reduce its speed when the power limit is exceeded and follow a steeper curve corresponding to the power available.

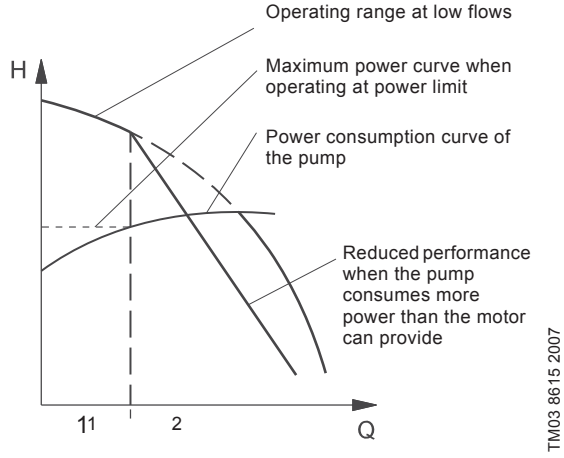



**Fig. 35** Standard performance curve vs a curve operated at reduced power limit

### Size of pump and MLE motor

No special considerations need to be taken when sizing pump and motor. If the pump is oversized for the motor, the MLE motor will just reduce its speed and thus the pump performance according to the illustration in fig. 35.

### Setup

The "pump operating at power limit" function can be set up via a configuration file downloaded to the product via the Grundfos PC Tool E-products.

# 5. Application example for constant differential pressure in a circulation system

Circulation systems (closed systems) are well-suited for speed-controlled pump solutions.

It is an advantage that circulation systems with variable system characteristic are fitted with a differential-pressure-controlled circulator pump. See fig. 36.

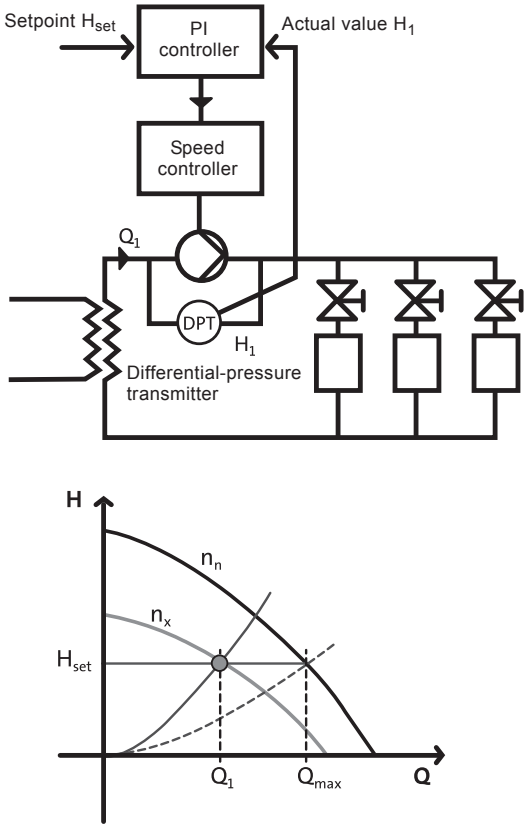



**Fig. 36** Constant differential-pressure control

Figure 36 shows a heating system consisting of a heat exchanger where the circulated water is heated and delivered to three radiators by a speed-controlled pump. A control valve is connected in series at each radiator to control the flow according to the heat requirement.

The pump is controlled according to a constant differential pressure measured across the pump. This means that the pump system offers constant differential pressure in the Q range of 0 to $Q_{max}$, represented by the horizontal line in fig. 36.

## Constant differential pressure, pump

The differential pressure of the pump is kept constant, independently of the flow rate. See fig. 37.

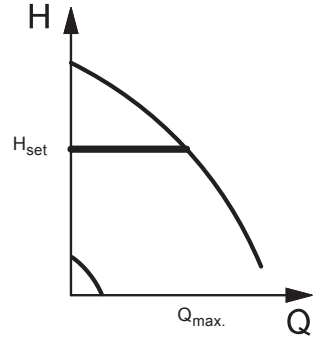



**Fig. 37** Constant differential pressure, pump

The pump is controlled according to a constant differential pressure measured across the pump. This means that the pump system offers constant differential pressure in the Q-range of 0 to $Q_{max.}$, represented by the horizontal line in the QH diagram.

## Proportional differential pressure

The differential pressure of the pump is reduced at falling flow rate and increased at rising flow rate. See fig. 38.

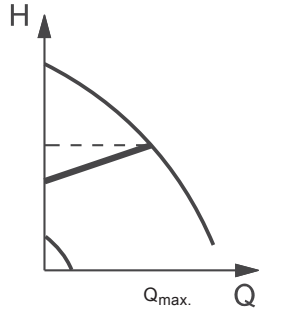



**Fig. 38** Proportional differential pressure

The pump is controlled according to a differential pressure measured across the pump. This means that the pump system offers a proportional differential pressure in the Q-range of 0 to $Q_{max.}$, represented by the sloping line in the QH diagram.

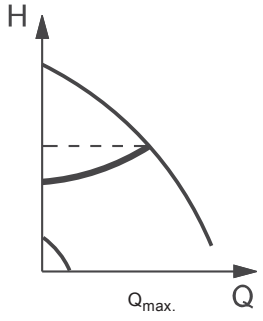
## Proportional differential pressure, parabolic (proportional differential pressure available on CRE-DP only)

Setting via PC Tool.

The proportional differential pressure can be selected with one of these flow dependencies:

- linear (setting via PC Tool).
- parabolic (setting via PC Tool).

When the flow dependency is selected as parabolic, the differential pressure of the pump will be reduced with a parabolic curve at falling flow rate and increased at rising flow rate. See fig. 39.



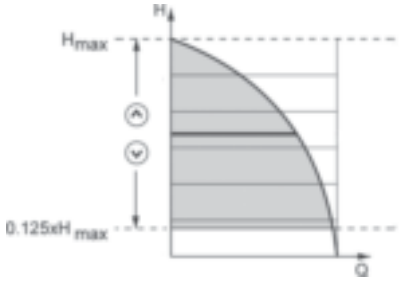

TM04 1695 0908

**Fig. 39** Proportional differential pressure, parabolic curve

The pump is controlled according to a differential pressure measured across the pump. This means that the pump system offers a flow-compensated differential pressure in the Q-range of 0 to $Q_{max.}$, represented by the parabolic curve in the QH diagram.

## Constant differential pressure

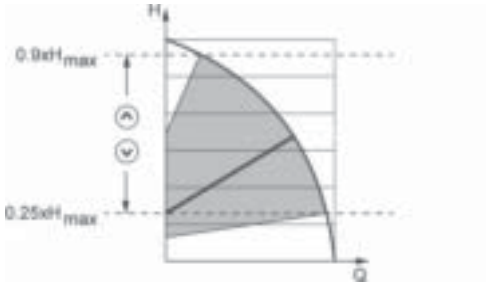
The setpoint range is between 12.5 % to 100 % of maximum head.




TM06 2408 1014

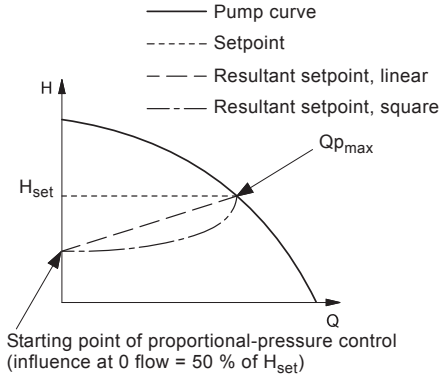
## Proportional differential pressure

The setpoint range is between 25 % to 90 % of maximum head.




TM06 2479 1014

To compensate for this excessive system pressure, the proportional-pressure function automatically adapts the setpoint to the actual flow rate.




TM03 8524 2212

**Fig. 40** Proportional-pressure control

The factory-fitted differential-pressure sensor is a variant. Contact Grundfos for additional details.


TM06 2478 1014

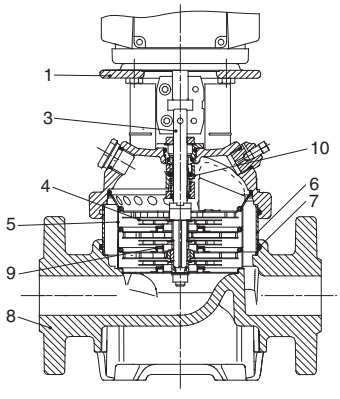
**Fig. 41** Proportional pressure

# 6. Construction

## CRE 1s, 1, 3, 5, 10, 15 and 20

TM05 9425 3813

### Sectional drawing




TM02 1194 1403

### Materials: CRE

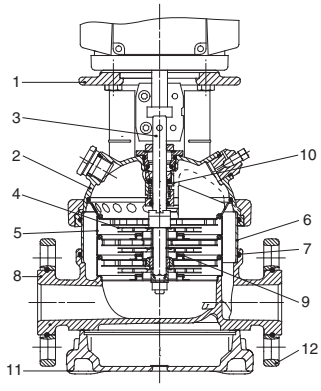
| Pos. | Designation | Materials | AISI/ASTM |
|---|---|---|---|
| 1 | Pump head | Cast iron | A 48-30 B |
| 3 | Shaft | Stainless steel | AISI 316[1)]<br>AISI 431[2)] |
| 4 | Impeller | Stainless steel | AISI 304 |
| 5 | Chamber | Stainless steel | AISI 304 |
| 6 | Outer sleeve | Stainless steel | AISI 304 |
| 7 | O-ring for outer sleeve | EPDM or FKM | |
| 8 | Base | Cast iron | A 48-30 B |
| 9 | Neck ring | PTFE | |
| 10 | Shaft seal | Cartridge type | |
| | Bearing rings | Silicon carbide | |
| | Rubber parts | EPDM or FKM | |
| 12 | FJG flange | Cast iron | A 48-30 B |

1) CR(E) 1s, 1, 3, 5
2) CR(E) 10, 15, 20
3) Stainless steel available on request.
4) CF 8M is cast equivalent of AISI 316 stainless steel.
5) CRI(E)/CRN(E) 1s, 1, 3, 5
6) CRN(E) 10, 15, 20
7) CRI(E) 10, 15, 20

## CRIE, CRNE 1s, 1, 3, 5, 10, 15 and 20

TM02 7399 2004

### Sectional drawing




TM03 2156 3805

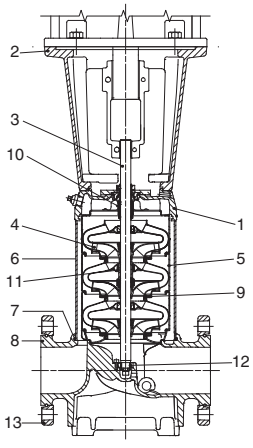
### Materials: CRIE, CRNE

| Pos. | Designation | Materials | AISI/ASTM |
|---|---|---|---|
| 1 | Pump head | Cast iron[3)] | A 48-30 B |
| 2 | Pump head cover | Stainless steel | CF 8M[4)] |
| 3 | Shaft | Stainless steel | AISI 316[5)]<br>AISI 329[6)]<br>AISI 431[7)] |
| 8 | Base | Stainless steel | CF 8M[4)] |
| 9 | Neck ring | PTFE | |
| 10 | Shaft seal | Cartridge type | |
| 11 | Base plate | Cast iron[3)] | A 48-30 B |
| | Bearing rings | Silicon carbide | |
| | Rubber parts | EPDM or FKM | |
| | **CRI(E)** | | |
| 4 | Impeller | Stainless steel | AISI 304 |
| 5 | Chamber | Stainless steel | AISI 304 |
| 6 | Outer sleeve | Stainless steel | AISI 304 |
| 7 | O-ring for outer sleeve | EPDM or FKM | |
| 12 | FGJ flange ring | Ductile iron[3)] | A 65-45-12 |
| | Oval flange | Stainless steel | AISI 316 |
| | **CRN(E)** | | |
| 4 | Impeller | Stainless steel | AISI 316 |
| 5 | Chamber | Stainless steel | AISI 316 |
| 6 | Outer sleeve | Stainless steel | AISI 316 |
| 7 | O-ring for outer sleeve | EPDM or FKM | |
| 12 | FGJ flange ring | Ductile iron[3)] | A 65-45-12 |

## CRE 32, 45, 64 and 90

TM05 9425 3813

### Sectional drawing




TM03 2157 3805

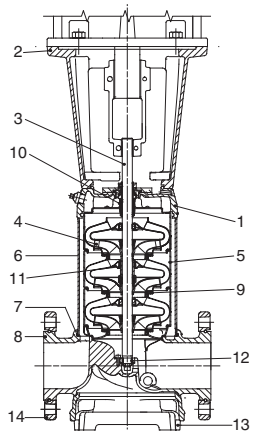
### Materials: CRE

| Pos. | Designation | Materials | AISI/ASTM |
|---|---|---|---|
| 1 | Pump head | Ductile iron | A 65-45-12 |
| 2 | Motor stool | Cast iron | A 48-30 B |
| 3 | Shaft | Stainless steel | AISI 431 |
| 4 | Impeller | Stainless steel | AISI 304 |
| 5 | Chamber | Stainless steel | AISI 304 |
| 6 | Outer sleeve | Stainless steel | AISI 304 |
| 7 | O-ring for outer sleeve | EPDM or FKM | |
| 8 | Base | Ductile iron | A 65-45-12 |
| 9 | Neck ring | Acoflon 215 | |
| 10 | Shaft seal | Cartridge type | |
| 11 | Bearing ring | Bronze | |
| 12 | Bottom bearing ring | Tungsten carbide / Tungsten carbide | |
| 13 | Flange ring | Ductile iron[2)] | A 65-45-12 |
| | Rubber parts | EPDM or FKM | |

## CRNE 32, 45, 64 and 90

TM02 7399 3403

### Sectional drawing




TM03 2158 3805

### Materials: CRNE

| Pos. | Designation | Materials | AISI/ASTM |
|---|---|---|---|
| 1 | Pump head | Stainless steel | CF 8M[1)] |
| 2 | Motor stool | Cast iron | A 48-30 B |
| 3 | Shaft | Stainless steel | SAF 2205 |
| 4 | Impeller | Stainless steel | AISI 316 |
| 5 | Chamber | Stainless steel | AISI 316 |
| 6 | Outer sleeve | Stainless steel | AISI 316 |
| 7 | O-ring for outer sleeve | EPDM or FKM | |
| 8 | Base | Stainless steel | CF 8M [1)] |
| 9 | Neck ring | Acoflon 215 | |
| 10 | Shaft seal | Cartridge type | |
| 11 | Bearing ring | Carbon-graphite filled PTFE | |
| 12 | Bottom bearing ring | Tungsten carbide / Tungsten carbide | |
| 13 | Base plate | Ductile iron[2)] | A 65-45-12 |
| 14 | Flange ring | Ductile iron[2)] | A 65-45-12 |
| | Rubber parts | EPDM or FKM | |

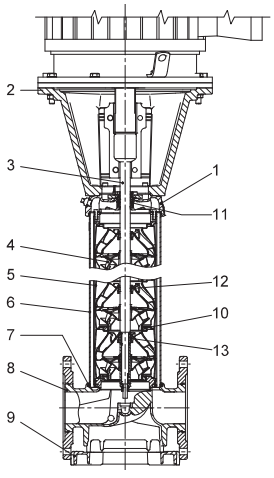
1) CF 8M is cast equivalent of AISI 316 stainless steel.

2) Stainless steel available on request.

## CRE 120 and 150

TM05 9425 3813

### Sectional drawing




TM03 8835 2607

### Materials: CRE

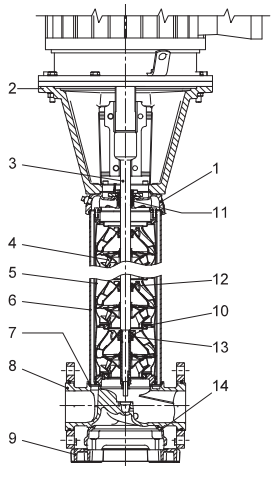
| Pos. | Designation | Materials | AISI/ASTM |
|---|---|---|---|
| 1 | Pump head | Ductile iron | A 536 65-45-12 |
| 2 | Motor stool (15-60 Hp) | Cast iron | A48-30 B |
| 3 | Shaft | Stainless steel | AISI 431 |
| 4 | Impeller | Stainless steel | AISI 304 |
| 5 | Chamber | Stainless steel | AISI 304 |
| 6 | Outer sleeve | Stainless steel | AISI 316 |
| 7 | O-ring for outer sleeve | EPDM or FKM | |
| 8 | Base | Ductile iron | A 536 65-45-12 |
| 9 | Base plate | Ductile iron | A 536 65-45-12 |
| 10 | Neck ring | PTFE | |
| 11 | Shaft seal[1)] | Cartridge type | |
| 12 | Support bearing | PTFE | |
| 13 | Bearing rings | Silicone carbide | |
| | Rubber parts | EPDM or FKM | |

1) ∅22 mm shaft, 15-60 Hp.

## CRNE 120 and 150

TM02 7399 3403

### Sectional drawing




TM03 8836 2607

### Materials: CRNE

| Pos. | Designation | Materials | AISI/ASTM |
|---|---|---|---|
| 1 | Pump head | Stainless steel | A 351 CF 8M |
| 2 | Motor stool (15-60 Hp) | Cast iron | A48-30 B |
| 3 | Shaft | Stainless steel | SAF 2205 |
| 4 | Impeller | Stainless steel | AISI 316 |
| 5 | Chamber | Stainless steel | AISI 316 |
| 6 | Outer sleeve | Stainless steel | AISI 316 |
| 7 | O-ring for outer sleeve | EPDM or FKM | |
| 8 | Base | Stainless steel | A 351 CF 8M |
| 9 | Base plate | Ductile iron[1)] | A 536 65-45-12 |
| 10 | Neck ring | PTFE | |
| 11 | Shaft seal[2)] | Cartridge type | |
| 12 | Support bearing | PTFE | |
| 13 | Bearing rings | Silicone carbide | |
| 14 | Base plate | Ductile iron[1)] | A 536 65-45-12 |
| | Rubber parts | EPDM or FKM | |

1) Stainless steel available on request.

2) ∅22 mm shaft, 15-60 Hp.

# 7. Type keys and codes

## Type keys

### CRE, CRIE, CRNE

| Example | CR | E | 32 | -4 | -2 | -A | -G | -G | -E | - | HQQE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Type range: CRE, CRIE, CRNE | | | | | | | | | | | |
| Pump with integrated frequency control | | | | | | | | | | | |
| Nominal flow rate [$m^3$/h] | | | | | | | | | | | |
| Number of impellers | | | | | | | | | | | |
| Number of reduced diameter impellers (CRE, CRNE 32, 45, 64, 90, 120, and 150) | | | | | | | | | | | |
| Code for pump version | | | | | | | | | | | |
| Code for pipe connection | | | | | | | | | | | |
| Code for materials | | | | | | | | | | | |
| Code for rubber parts | | | | | | | | | | | |
| Code for shaft seal | | | | | | | | | | | |

## Codes

| Example | A | -G | -A | -E | -H | QQ | E |
|---|---|---|---|---|---|---|---|

**Pump version**

| | |
|---|---|
| A | Basic version[1)] |
| B | Oversize motor |
| E | Certificate/approval |
| F | CR pump for high temperatures (air-cooled top assembly) |
| H | Horizontal version |
| HS | High-pressure pump with high speed MLE motor |
| I | Different pressure rating |
| J | Pump with different max speed |
| K | Pump with low NPSH |
| M | Magnetic drive |
| N | Fitted with sensor |
| P | Undersize motor |
| R | Horizontal version with bearing bracket |
| SF | High pressure pump |
| T | Over size motor (two flange sizes bigger) |
| U | NEMA version[1)] |
| X | Special version |

| Example | A | -G | -A | -E | -H | QQ | E |
|---|---|---|---|---|---|---|---|

**Pipe connection**

| | |
|---|---|
| A | Oval flange Rp thread |
| B | Oval flange NPT thread |
| CA | FlexiClamp (CRIE, CRNE 1, 3, 5, 10, 15, 20) |
| CX | Triclamp (CRIE, CRNE 1, 3, 5, 10, 15, 20) |
| F | DIN flange |
| G | ANSI flange |
| J | JIS flange |
| N | Changed diameter of ports |
| P | PJE coupling |
| X | Special version |

**Materials**

| | |
|---|---|
| A | Basic version |
| D | Carbon-graphite filled PTFE (bearings) |
| G | Wetted parts AISI 316 |
| GI | All parts stainless steel, wetted parts AISI 316 |
| I | Wetted parts AISI 304 |
| II | All parts stainless steel, wetted parts AISI 304 |
| K | Bronze (bearings) |
| S | SiC bearings + PTFE neck rings |
| X | Special version |

**Code for rubber parts**

| | |
|---|---|
| E | EPDM |
| F | FXM |
| K | FFKM |
| V | FKM |

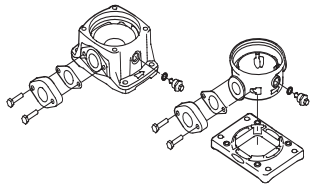
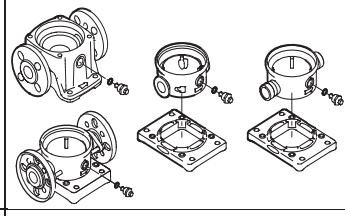
**Shaft seal**

| | |
|---|---|
| A | O-ring seal with fixed driver |
| B | Rubber bellows seal |
| E | Cartridge seal with O-ring |
| H | Balanced cartridge seal with O-ring |
| K | Metal bellows cartridge seal |
| O | Double seal, back-to-back |
| P | Double seal, tandem |
| X | Special version |
| B | Carbon, synthetic resin-impregnated |
| H | Cemented tungsten carbide, embedded (hybrid) |
| Q | Silicon carbide |
| U | Cemented tungsten carbide |
| X | Other ceramics |
| E | EPDM |
| F | FXM |
| K | FFKM |
| V | FKM |

[1)] In August 2003 the NEMA version pump code was discontinued for all material numbers created by Grundfos manufacturing companies in North America. The NEMA version pump code will still remain in effect for existing material numbers. NEMA version pumps built in North America after this change will have either an A or U as the pump version code depending on the date the material number was created.

# 8. Operating and inlet pressure

## Maximum operating pressure and temperature range

| | | | Oval flange | | ANSI, Clamp, PJE | |
|---|---|---|---|---|---|---|
| | | |  TM02 1379 1101 | |  TM02 8835 0904 | |
| | | | Max. permissible operating pressure | Liquid temperature range | Max. permissible operating pressure | Liquid temperature range |
| CRE, CRIE, CRNE 1 | | | 232 [psi] | -4 °F to +248 °F | 362 [psi] | -4 °F to +248 °F |
| CRE, CRIE, CRNE 3 | | | 232 [psi] | -4 °F to +248 °F | 362 [psi] | -4 °F to +248 °F |
| CRE, CRIE, CRNE 5 | | | 232 [psi] | -4 °F to +248 °F | 362 [psi] | -4 °F to +248 °F |
| CRE 10-1 | → | CRE 10-6 | 145 [psi] | -4 °F to +248 °F | - | - |
| CRIE, CRNE 10-1 | → | CRIE, CRNE 10-10 | 232 [psi] | -4 °F to +248 °F | - | - |
| CRE, CRIE 10-1 | → | CRE, CRIE 10-10 | - | - | 232 [psi] | -4 °F to +248 °F |
| CRE, CRIE 10-12 | → | CRE, CRIE 10-17 | - | - | 362 [psi] | -4 °F to +248 °F |
| CRNE 10 | | | - | - | 362 [psi] | -4 °F to +248 °F |
| CRE 15-1 | → | CRE 15-5 | 145 [psi] | -4 °F to +248 °F | - | - |
| CRIE, CRNE 15-1 | → | CRIE, CRNE 15-8 | 232 [psi] | -4 °F to +248 °F | - | - |
| CRE, CRIE 15-1 | → | CRE, CRIE 15-8 | - | - | 232 [psi] | -4 °F to +248 °F |
| CRE, CRIE 15-9 | → | CRE, CRIE 15-12 | - | - | 362 [psi] | -4 °F to +248 °F |
| CRNE 15 | | | - | - | 362 [psi] | -4 °F to +248 °F |
| CRE 20-1 | → | CRE 20-5 | 145 [psi] | -4 °F to +248 °F | - | - |
| CRIE, CRNE 20-1 | → | CRIE, CRNE 20-7 | 232 [psi] | -4 °F to +248 °F | - | - |
| CRE, CRIE 20-1 | → | CRE, CRIE 20-7 | - | - | 232 [psi] | -4 °F to +248 °F |
| CRE, CRIE 20-8 | → | CRE, CRIE 20-10 | - | - | 362 [psi] | -4 °F to +248 °F |
| CRNE 20 | | | - | - | 362 [psi] | -4 °F to +248 °F |
| CRE, CRNE 32-1-1 | → | CRE, CRNE 32-5 | - | - | 232 [psi] | -22 °F to +248 °F |
| CR, CRN 32-6-2 | → | CR, CRN 32-11-2 | - | - | 435 [psi] | -22 °F to +248 °F |
| CRE, CRNE 45-1-1 | → | CRE, CRNE 45-4-2 | - | - | 232 [psi] | -22 °F to +248 °F |
| CRE, CRNE 45-4-1 | → | CR, CRN 45-8-1 | - | - | 435 [psi] | -22 °F to +248 °F |
| CRE, CRNE 64-1-1 | → | CRE, CRNE 64-3 | - | - | 232 [psi] | -22 °F to +248 °F |
| CRE, CRNE 64-4-2 | → | CRE, CRNE 64-5-2 | - | - | 435 [psi] | -22 °F to +248 °F |
| CRE, CRNE 90-1-1 | → | CRE, CRNE 90-3 | - | - | 232 [psi] | -22 °F to +248 °F |
| CRE, CRNE 90-4-2 | → | CRE, CRNE 90-4-1 | - | - | 435 [psi] | -22 °F to +248 °F |
| CRE, CRNE 120-1-1 | → | CRE, CRNE 120-5-1 | - | - | 435 [psi] | -22 °F to +248 °F |
| CRE, CRNE 150-1-1 | → | CRE, CRNE 150-4-1 | - | - | 435 [psi] | -22 °F to +248 °F |

## Operating range of the shaft seal

The operating range of the shaft seal depends on operating pressure, pump type, type of shaft seal and liquid temperature. The following curves apply to clean water and water with anti-freeze liquids. For selecting the right shaft seal, see *List of pumped liquids* on page 88.

**CRE 1 - CRE 20**

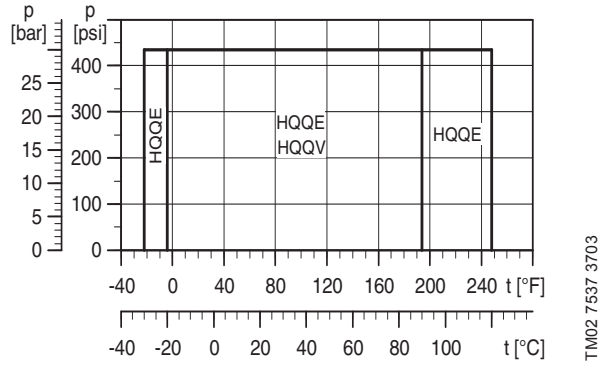



**Fig. 42** Operating range of standard shaft seals for CRE 1 - CRE 20

**CRE 32 - CRE 150 (3.0-60 Hp)**

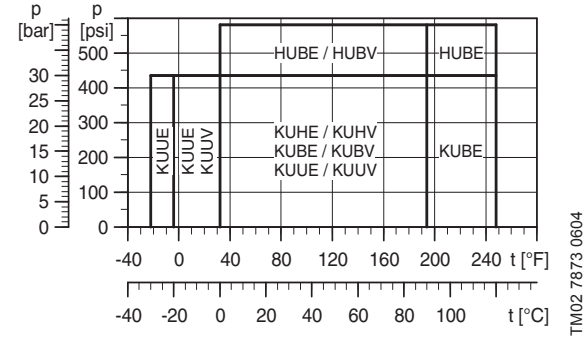



**Fig. 43** Operating range of standard shaft seals for CRE 32 - CRE 150 (3.0-30 Hp)

| Shaft seal | Description | Max. temp. range [ °F (°C)] |
|---|---|---|
| HQQE | O-ring (cartridge) (balanced seal), SiC/SiC, EPDM | -22 °F to +248 °F (-30 °C to +120 °C) |
| HBQE | O-ring (cartridge) (balanced seal), Carbon/SiC, EPDM | +32 °F to +248 °F (0 °C to +120 °C) |
| HQQV | O-ring (cartridge) (balanced seal), SiC/SiC, FKM | -4 °F to +194 °F (-20 °C to +90 °C) |
| HUBE | O-ring (cartridge) (balanced seal), TC/carbon, EPDM | +32 °F to +248 °F (0 °C to +120 °C) |
| HUBV | O-ring (cartridge) (balanced seal), TC/carbon, FKM | +32 °F to +194 °F (0 °C to +90 °C) |
| KUBE | Bellows, metal (cartridge), TC/carbon, EPDM | +32 °F to +248 °F (0 °C to +120 °C) |
| KUBV | Bellows, metal (cartridge), TC/carbon, FKM | +32 °F to +194 °F (0 °C to +90 °C) |
| KUHE | Bellows, metal (cartridge), TC/Carbon with embedded TC, EPDM | +32 °F to +194 °F (0 °C to +90 °C) |
| KUHV | Bellows, metal (cartridge), TC/Carbon with embedded TC, FKM | +32 °F to +194 °F (0 °C to +90 °C) |
| KUUE | Bellows, metal (cartridge), TC/TC, EPDM | -22 °F to +194 °F (-30 °C to +90 °C) |
| KUUV | Bellows, metal (cartridge), TC/TC, FKM | -4 °F to +194 °F (-20 °C to +90 °C) |

**Note:** TC= tungsten carbide

See section *Lists of variants - on request* on page 108, in case of extreme temperatures:

- low temperatures down to -40 °F (-40 °C) or
- high temperatures up to +356 °F (+180 °C).

## Maximum inlet pressure

The following table shows the maximum permissible inlet pressure. However, the current inlet pressure + the pressure against a closed valve **must** always be lower than the maximum permissible operating pressure.

If the maximum permissible operating pressure is exceeded, the conical bearing in the motor may be damaged and the life of the shaft seal reduced.

| | | | |
|---|---|---|---|
| **CRE, CRIE, CRNE 1** | | | |
| 1-2 | → | 1-27 | 145 [psi] |
| **CRE, CRIE, CRNE 3** | | | |
| 3-2 | → | 3-17 | 145 [psi] |
| 3-19 | → | 3-25 | 218 [psi] |
| **CRE, CRIE, CRNE 5** | | | |
| 5-2 | → | 5-9 | 145 [psi] |
| 5-10 | → | 5-24 | 218 [psi] |
| **CRE, CRIE, CRNE 10** | | | |
| 10-1 | → | 10-4 | 116 [psi] |
| 10-5 | → | 10-17 | 145 [psi] |
| **CRE, CRIE, CRNE 15** | | | |
| 15-1 | | | 116 [psi] |
| 15-2 | → | 15-12 | 145 [psi] |
| **CRE, CRIE, CRNE 20** | | | |
| 20-1 | | | 116 [psi] |
| 20-2 | → | 20-10 | 145 [psi] |
| **CRE, CRNE 32** | | | |
| 32-1-1 | → | 32-3-2 | 58 [psi] |
| 32-3 | → | 32-6 | 145 [psi] |
| 32-7-2 | → | 32-8-2 | 218 [psi] |
| **CRE, CRNE 45** | | | |
| 45-1-1 | → | 45-1 | 58 [psi] |
| 45-2-2 | → | 45-3 | 145 [psi] |
| 45-4-2 | → | 45-4 | 218 [psi] |
| **CRE, CRNE 64** | | | |
| 64-1-1 | | | 58 [psi] |
| 64-1 | → | 64-2 | 145 [psi] |
| 64-3-2 | | | 218 [psi] |
| **CRE, CRNE 90** | | | |
| 90-1-1 | → | 90-2-2 | 145 [psi] |
| 90-2-1 | | | 218 [psi] |
| **CRE, CRNE 120** | | | |
| 120-1-1 | → | 120-1 | 145 [psi] |
| **CRE, CRNE 150** | | | |
| 150-1-1 | | | 145 [psi] |
| 150-1 | | | 218 [psi] |

**Example of operating and inlet pressures**

The values for operating and inlet pressures shown in the tables must not be considered individually but must always be compared, see the following examples:

**Example 1:**

The following pump type has been selected: CRE 3-10 A-A-A

Max. operating pressure: **232 psi**

Max. inlet pressure: **145 psi**

Discharge pressure against a closed valve: **139.2 psi**, see page 49.

This pump is not allowed to start at an inlet pressure of 145 psi, but at an inlet pressure of 232.0 - 139.2 = **92.8 psi**.

**Example 2:**

The following pump has been selected: CRE 10-2 A-GJ-A

Max. operating pressure: **232 psi**

Max. inlet pressure: **116 psi**

Discharge pressure against a closed valve: **42 psi (97 ft)**, see page 57.

This pump is allowed to start at an inlet pressure of 116 psi, as the discharge pressure is only 42 psi, which results in an operating pressure of 116 + 42 = **158 psi**. On the contrary, the max. operating pressure of this pump is limited to 158 psi, as a higher operating pressure will require an inlet pressure of more than 116 psi.

In case the inlet or operating pressure exceeds the pressure permitted, see section *Lists of variants - on request* on page 108.

# 9. Selection and sizing

## Selection of pumps

Selection of pumps should be based on

- The duty point of the pump (see section 1)
- Sizing data such as pressure loss as a result of height differences, friction loss in the pipework, pump efficiency etc. (see section 2)
- Pump materials (see section 3)
- Pump connections (see section 4)
- Shaft seal (see section 5).

### 1. Duty point of the pump

From a duty point it is possible to select a pump on the basis of the curve charts in the section *Minimum flow rate* on page 44.

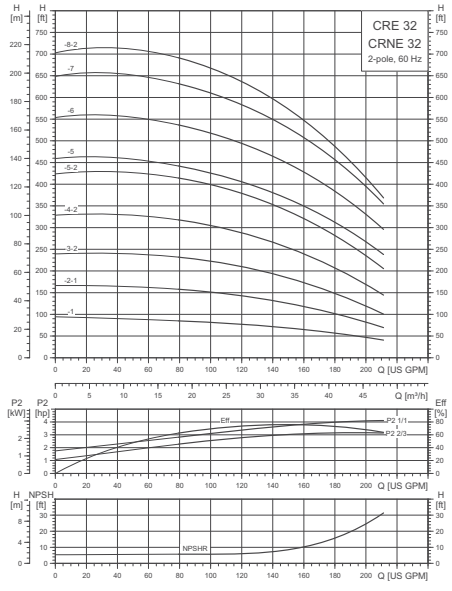



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**Fig. 44** Example of a curve chart

### 2. Sizing data

When sizing a pump the following must be taken into account.

- Required flow and pressure at the point of use.
- Pressure loss as a result of height differences ($H_{geo}$).
- Friction loss in the pipework ($H_f$).
  It may be necessary to account for pressure loss in connection with long pipes, bends or valves, etc.
- Best efficiency at the estimated duty point.
- NPSH value.
  For calculation of the NPSH value, see *Minimum inlet pressure - NPSHA* on page 43.

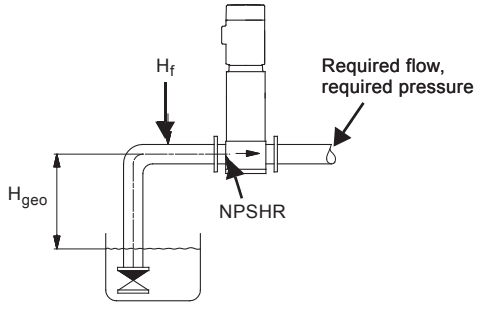


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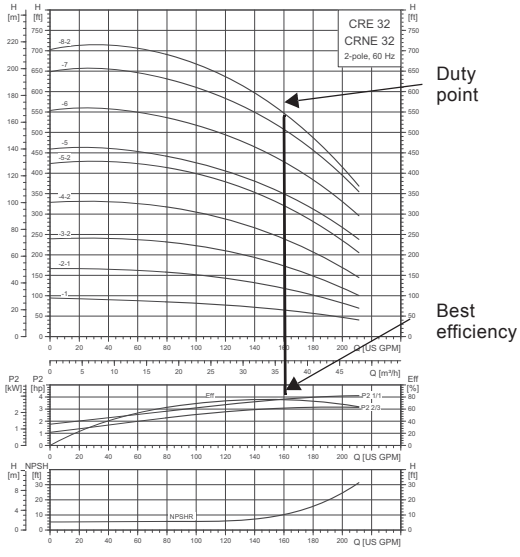
**Fig. 45** Sizing data

### Efficiency

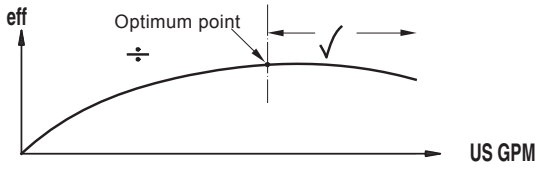
Before determining the point of best efficiency the operation pattern of the pump needs to be identified. Is the pump expected to operate at the same duty point, then select a CRE pump which is operating at a duty point corresponding with the best efficiency of the pump.




TM05 9418 4313

**Fig. 46** Example of a CR pump's duty point

As the pump is sized on the basis of the highest possible flow, it is important to always have the duty point to the right of the optimum efficiency point (see fig. 47, range with check mark). This must be considered in order to keep efficiency high when the flow drops.




TM02 8579 0504

**Fig. 47** Best efficiency

Normally, E-pumps are used in applications characterized by a variable flow. Consequently, it is not possible to select a pump that is constantly operating at optimum efficiency.

In order to achieve optimum operating economy, the pump should be selected on the basis of the following criteria:

- The max. required duty point should be as close as possible to the QH curve of the pump.
- The required duty point should be positioned so that P2 is close to the max. point of the 100 % curve.

Between the min. and max. performance curve E-pumps have an infinite number of performance curves each representing a specific speed. Therefore it may not be possible to select a duty point close to the 100 % curve.

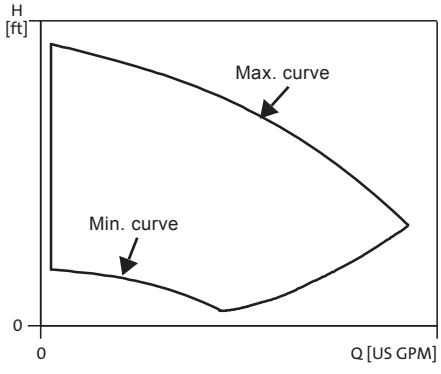



**Fig. 48** Min. and max. performance curves

In situations where it is not possible to select a duty point close to the 100 % curve the affinity equations to the right can be used. The head (H), the flow (Q) and the input power (P) are all the appropriate variables for the motor speed (n).

**Note:**

The approximated formulas apply on condition that the system characteristic remains unchanged for nn and nx and that it is based on the formula H = k x Q2, where k is a constant.

The power equation implies that the pump efficiency is unchanged at the two speeds. In practice this is **not** quite correct.

Finally, it is worth noting that the efficiencies of the frequency converter and the motor **must** be taken into account if a precise calculation of the power saving resulting from a reduction of the pump speed is wanted.

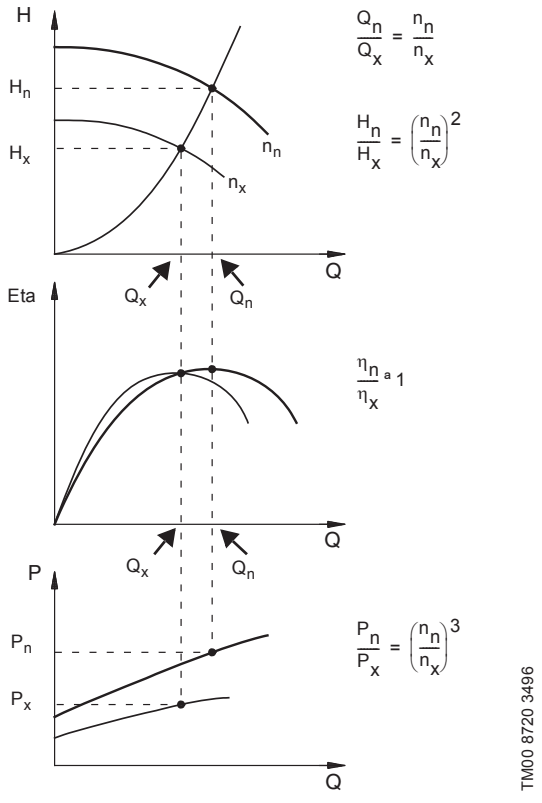



**Fig. 49** Affinity equations

**Legend**

| | |
|---|---|
| $H_n$ | Rated head in feet |
| $H_x$ | Current head in feet |
| $Q_n$ | Rated flow in US gpm |
| $Q_x$ | Current flow in US gpm |
| $n_n$ | Rated motor speed in $min^{-1}$ ($n_n$ = 3500 $min^{-1}$) |
| $n_x$ | Current motor speed in $min^{-1}$ |
| $\eta_n$ | Rated efficiency in % |
| $\eta_x$ | Current efficiency in % |

**Grundfos Product Center**

We recommend that you size your pump in the Grundfos Product Center, which is a selection program offered by Grundfos. For further information, See “Grundfos Product Center” on page 111.

The Grundfos Product Center features a user-friendly and easy-to-use virtual guide which leads you through the selection of the pump for the application in question.

### 3. Material

The material variant (CRE, CRIE, CRNE) should be selected based of the liquid to be pumped. The product range covers three basic types.

- The CRE, CRIE pump types are suitable for clean, non-aggressive liquids such as potable water, oils, etc.
- The CRNE pump type is suitable for industrial liquids and acids, see *List of pumped liquids* on page 88 or contact Grundfos.

For saline or chloride-containing liquids such as sea water, CRTE pumps of titanium are available.

### 4. Pump connection

Selection of pump connection depends on the rated pressure and pipework. To meet any requirement the CRE, CRIE and CRNE pumps offer a wide range of flexible connections such as:

- Oval flange (NPT) - fig. 51
- ANSI flange - fig. 51
- PJE coupling - fig. 51
- Clamp coupling
- Union (NPT[M])
- Other connections on request.

### 5. Shaft seal

As standard, the CRE range is fitted with a Grundfos shaft seal (Cartridge type) suitable for the most common applications, see fig. 52.

The following three key parameters **must** be taken into account, when selecting the shaft seal:

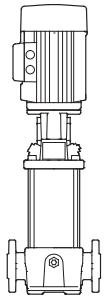
- Type of pumped liquid
- liquid temperature and
- Maximum pressure.

Grundfos offers a wide range of shaft seal variants to meet specific demands see *List of pumped liquids* on page 88.

### 6. Inlet pressure and operating pressure

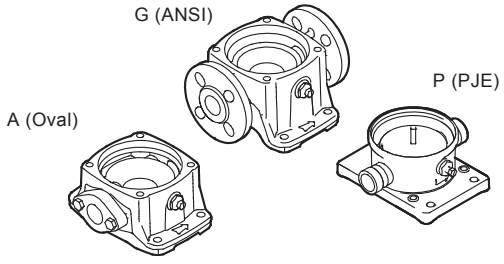
Do **not** exceed the limit values stated on page 39 and page 37 as regards these pressures:

- maximum inlet pressure and
- maximum operating pressure.



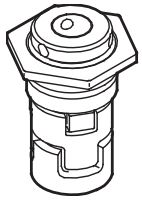
TM03 2155 3805

**Fig. 50** CR pump




TM02 1201 0601

**Fig. 51** Pump connections



TM02 0538 4800

**Fig. 52** Shaft seal (Cartridge type)

**Minimum inlet pressure - NPSHA**

Calculation of the inlet pressure "H" is recommended in these situations:

- The liquid temperature is high.
- The flow is significantly higher than the rated flow.
- Water is drawn from depths.
- Water is drawn through long pipes.
- Inlet conditions are poor.

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump. The maximum suction lift "H" in feet can be calculated as follows:

$H = p_b - NPSHR - H_f - H_v - H_s$.

$P_b$ = Barometric pressure in feet absolute. (Barometric pressure can be set to 33.9 feet. At sea level. In closed systems, pb indicates system pressure in feet.)

NPSHR = Net Positive Suction Head Required in feet. (To be read from the NPSHR curve at the highest flow the pump will be delivering).

$H_f$ = Friction loss in suction pipe in feet. (At the highest flow the pump will be delivering.)

$H_v$ = Vapor pressure in feet. (To be read from the vapor pressure scale. "$H_v$" depends on the liquid temperature "$T_m$").

$H_s$ = Safety margin = minimum 2.0 feet.

If the "H" calculated is positive, the pump can operate at a suction lift of maximum "H" feet.

If the "H" calculated is negative, an inlet pressure of minimum "H" feet is required.

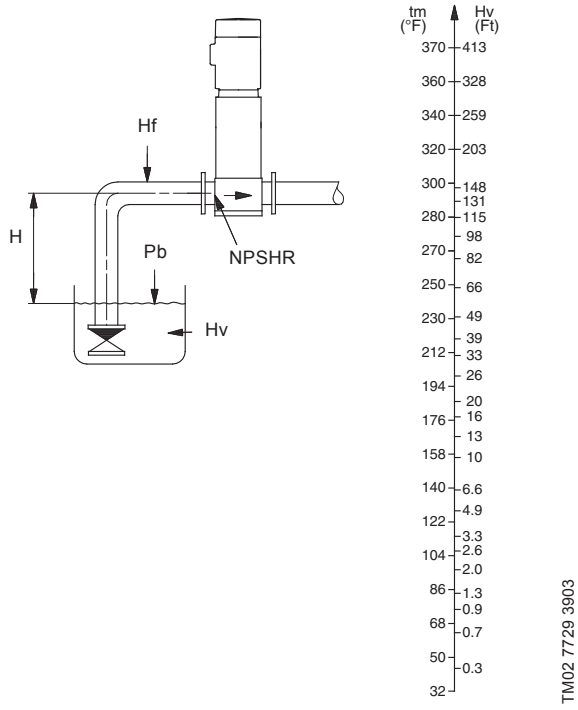



**Fig. 53** Minimum inlet pressure - NPSHR

**Note:** In order to avoid cavitation **never**, select a pump whose duty point lies too far to the right on the NPSHR curve.

Always check the NPSHR value of the pump at the highest possible flow.

In case a lower NPSHR value is required, see *Lists of variants - on request* on page 108.

## How to read the curve charts

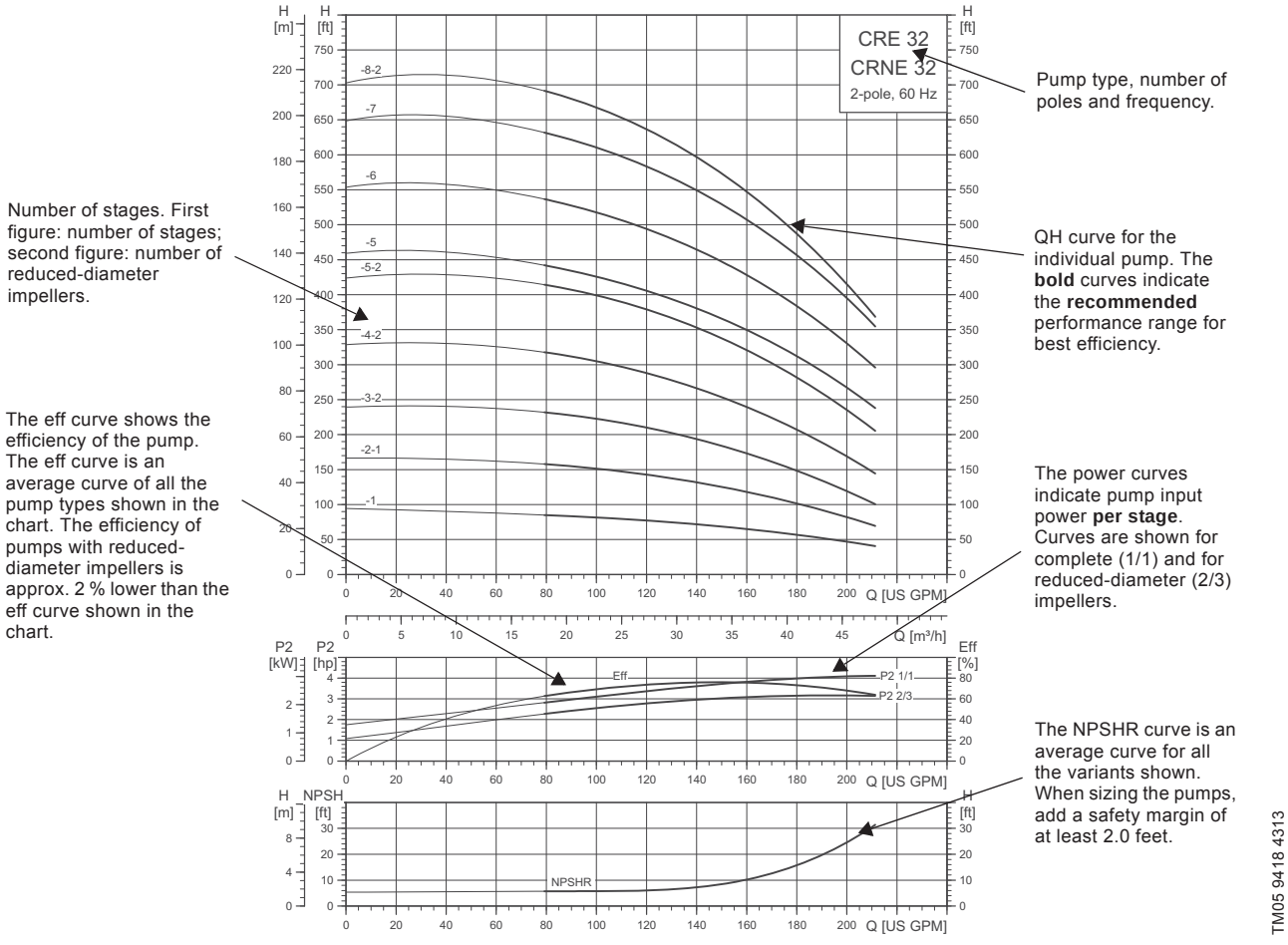



**Fig. 54** How to read the curve charts

## Guidelines to performance curves

The guidelines below apply to the curves shown on the following pages:

1. The motors used for the measurements are standard motors (ODP, TEFC or MLE).
2. Measurements have been made with airless water at a temperature of 68 °F (20 °C).
3. The curves apply to a kinematic viscosity of $\upsilon$ = 1 $mm^2/s$ (1 cSt).
4. Due to the risk of overheating, the pumps should not be used at a flow below the minimum flow rate.
5. The QH curves apply to actual speed with the motor types mentioned at 60 Hz.

The curve below shows the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature. The dotted line shows a CRE pump fitted with an air-cooled top assembly.

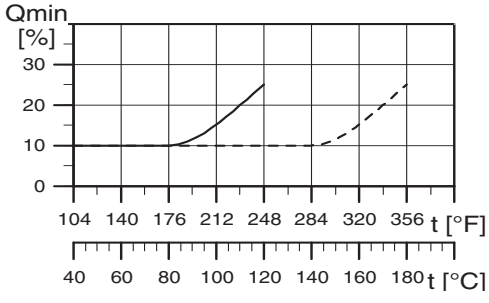
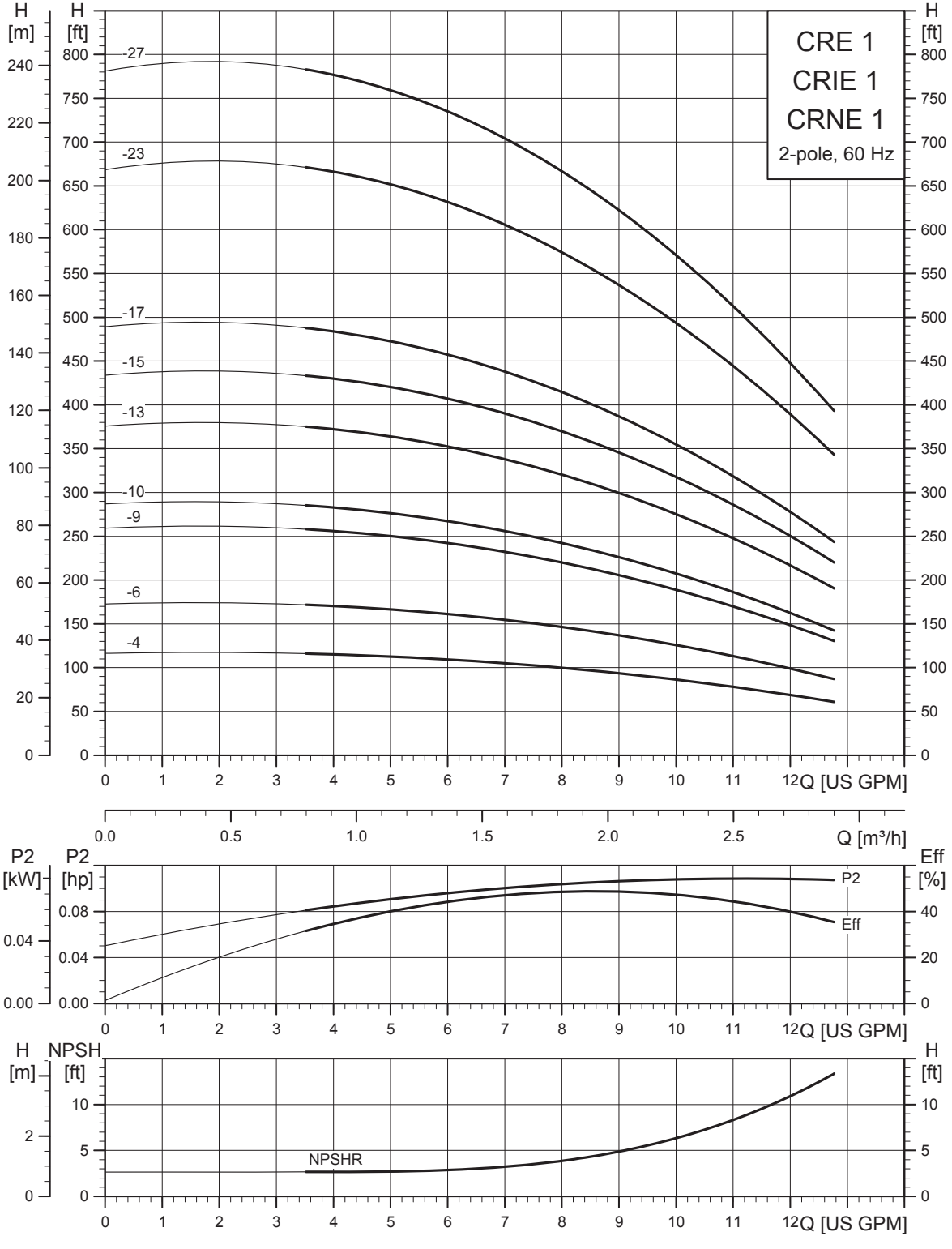



**Fig. 55** Minimum flow rate

# 10. Performance curves / Technical data

## CRE, CRIE, CRNE 1

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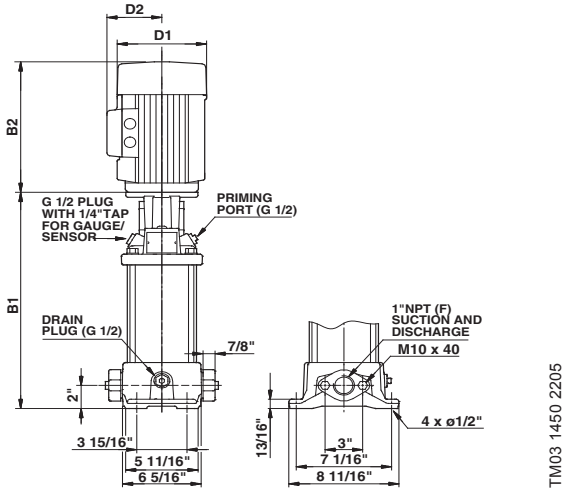
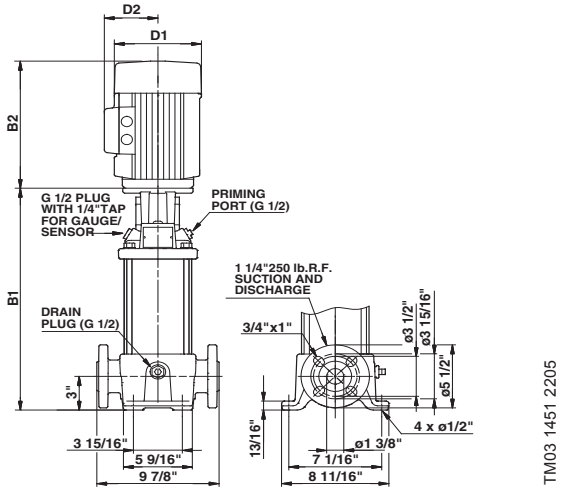
## CRE 1 dimensional data



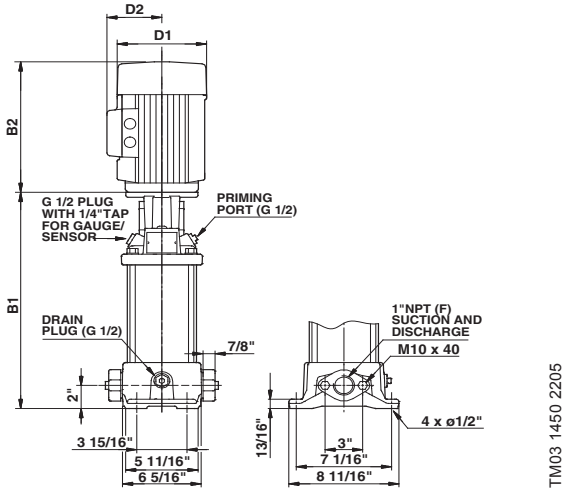

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRE 1-4 | 1/2 | 1 | 200-240 | 56C | * | 12.68 | 6.22 | 4.80 | 21.14 | 75 |
| CRE 1-6 | 3/4 | 1 | 200-240 | 56C | * | 14.09 | 6.22 | 4.80 | 22.55 | 77 |
| CRE 1-9 | 1 | 1 | 200-240 | 56C | * | 16.22 | 6.22 | 4.80 | 24.68 | 80 |
| | | 3 | 440-480 | 56C | * | 16.22 | 6.22 | 4.80 | 26.26 | 83 |
| CRE 1-10 | 1 1/2 | 3 | 208-230 | 56C | * | 16.93 | 6.57 | 7.00 | 29.72 | 97 |
| CRE 1-13 | 1 1/2 | 1 | 200-240 | 56C | * | 19.06 | 6.22 | 4.80 | 27.52 | 85 |
| | | 3 | 208-230 | 56C | * | 19.06 | 6.57 | 7.00 | 31.85 | 102 |
| | | 3 | 440-480 | 56C | * | 19.06 | 6.22 | 4.80 | 29.10 | 92 |
| CRE 1-15 | 2 | 3 | 208-230 | 56C | * | 20.47 | 6.57 | 7.00 | 33.26 | 109 |
| | | 3 | 440-480 | 56C | * | 20.47 | 6.22 | 4.80 | 31.30 | 98 |
| CRE 1-17 | 2 | 1 | 200-240 | 56C | * | 21.89 | 6.22 | 4.80 | 31.14 | 96 |
| | | 3 | 208-230 | 56C | * | 21.89 | 6.57 | 7.00 | 34.68 | 117 |
| | | 3 | 440-480 | 56C | * | 21.89 | 6.22 | 4.80 | 32.72 | 100 |
| CRE 1-23 | 3 | 3 | 208-230 | 182TC | - | 27.24 | 6.57 | 7.00 | 40.55 | 139 |
| | | 3 | 440-480 | 182TC | - | 27.24 | 6.22 | 4.80 | 38.07 | 117 |
| CRE 1-27 | 3 | 3 | 208-230 | 182TC | - | 30.08 | 6.57 | 7.00 | 43.39 | 142 |
| | | 3 | 440-480 | 182TC | - | 30.08 | 6.22 | 4.80 | 40.91 | 124 |

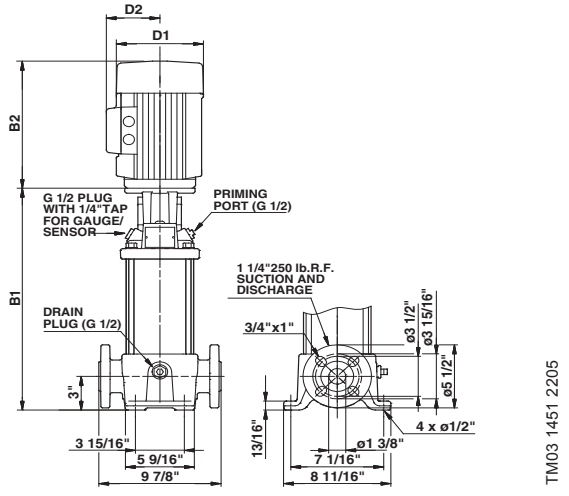
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRIE 1 dimensional data



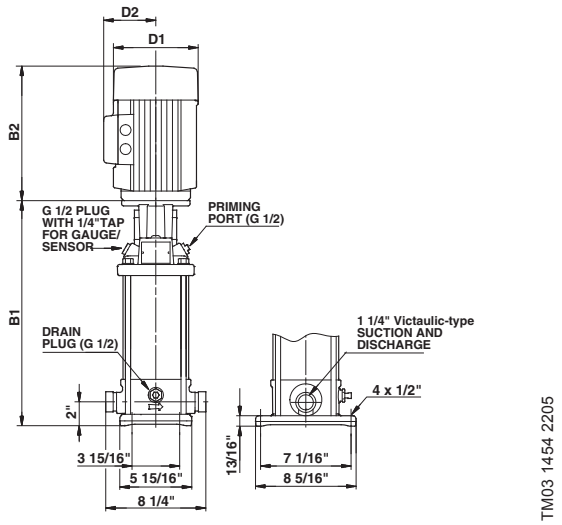

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRIE 1-4 | 1/2 | 1 | 200-240 | 56C | * | 12.8 | 6.22 | 4.80 | 21.26 | 69 |
| CRIE 1-6 | 3/4 | 1 | 200-240 | 56C | * | 14.21 | 6.22 | 4.80 | 22.67 | 71 |
| CRIE 1-9 | 1 | 1 | 200-240 | 56C | * | 16.34 | 6.22 | 4.80 | 24.80 | 74 |
| | | 3 | 440-480 | 56C | * | 16.34 | 6.22 | 4.80 | 26.38 | 78 |
| CRIE 1-10 | 1 1/2 | 3 | 208-230 | 56C | * | 17.05 | 6.57 | 7.00 | 29.84 | 92 |
| CRIE 1-13 | 1 1/2 | 1 | 200-240 | 56C | * | 19.17 | 6.22 | 4.80 | 27.63 | 79 |
| | | 3 | 208-230 | 56C | * | 19.17 | 6.57 | 7.00 | 31.96 | 97 |
| | | 3 | 440-480 | 56C | * | 19.17 | 6.22 | 4.80 | 29.21 | 83 |
| CRIE 1-15 | 2 | 3 | 208-230 | 56C | * | 20.59 | 6.57 | 7.00 | 33.38 | 112 |
| | | 3 | 440-480 | 56C | * | 20.59 | 6.22 | 4.80 | 31.42 | 92 |
| CRIE 1-17 | 2 | 1 | 200-240 | 56C | * | 22.01 | 6.22 | 4.80 | 31.26 | 91 |
| | | 3 | 208-230 | 56C | * | 22.01 | 6.57 | 7.00 | 34.80 | 114 |
| | | 3 | 440-480 | 56C | * | 22.01 | 6.22 | 4.80 | 32.84 | 85 |
| CRIE 1-23 | 3 | 3 | 208-230 | 182TC | - | 27.36 | 6.57 | 7.00 | 40.67 | 134 |
| | | 3 | 440-480 | 182TC | - | 27.36 | 6.22 | 4.80 | 38.19 | 109 |
| CRIE 1-27 | 3 | 3 | 208-230 | 182TC | - | 30.2 | 6.57 | 7.00 | 43.51 | 137 |
| | | 3 | 440-480 | 182TC | - | 30.2 | 6.22 | 4.80 | 41.03 | 116 |

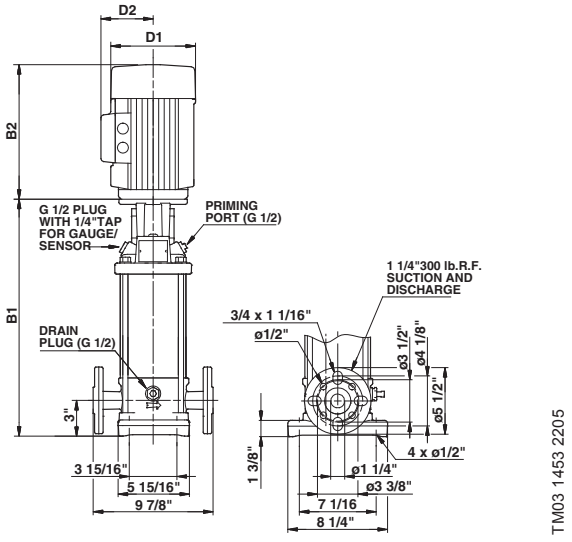
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 7 lbs. less.
* Available

## CRNE 1 dimensional data



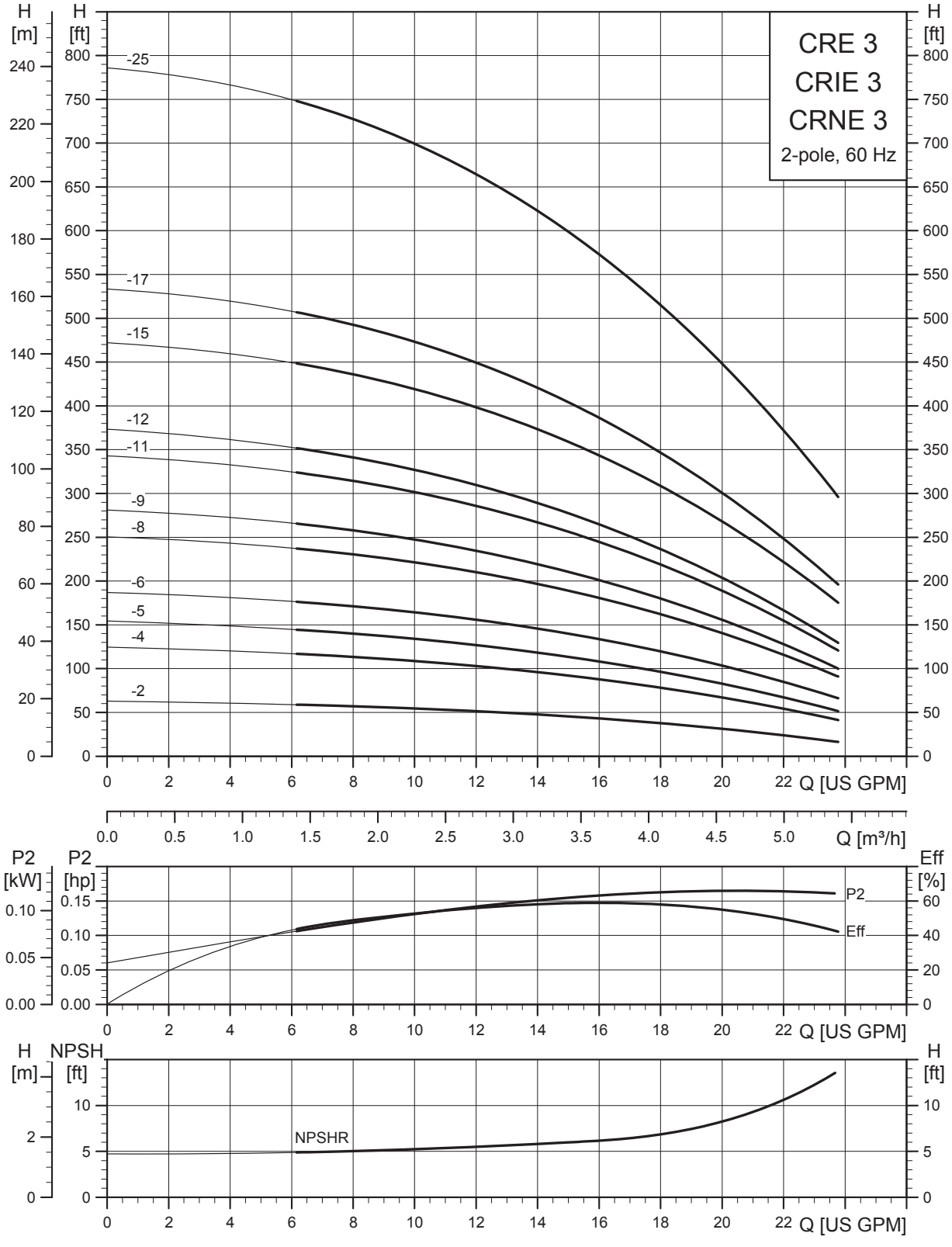

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | PJE* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRNE 1-4 | 1/2 | 1 | 200-240 | 56C | * | 12.8 | 6.22 | 4.80 | 21.26 | 69 |
| CRNE 1-6 | 3/4 | 1 | 200-240 | 56C | * | 14.21 | 6.22 | 4.80 | 22.67 | 71 |
| CRNE 1-9 | 1 | 1 | 200-240 | 56C | * | 16.34 | 6.22 | 4.80 | 24.80 | 74 |
| | | 3 | 440-480 | 56C | * | 16.34 | 6.22 | 4.80 | 26.38 | 78 |
| CRNE 1-10 | 1 1/2 | 3 | 208-230 | 56C | * | 17.05 | 6.57 | 7.00 | 29.84 | 92 |
| CRNE 1-13 | 1 1/2 | 1 | 200-240 | 56C | * | 19.17 | 6.22 | 4.80 | 27.63 | 79 |
| | | 3 | 208-230 | 56C | * | 19.17 | 6.57 | 7.00 | 31.96 | 97 |
| | | 3 | 440-480 | 56C | * | 19.17 | 6.22 | 4.80 | 29.21 | 87 |
| CRNE 1-15 | 2 | 3 | 208-230 | 56C | * | 20.59 | 6.57 | 7.00 | 33.38 | 105 |
| | | 3 | 440-480 | 56C | * | 20.59 | 6.22 | 4.80 | 31.42 | 92 |
| CRNE 1-17 | 2 | 1 | 200-240 | 56C | * | 22.01 | 6.22 | 4.80 | 31.26 | 90 |
| | | 3 | 208-230 | 56C | * | 22.01 | 6.57 | 7.00 | 34.80 | 114 |
| | | 3 | 440-480 | 56C | * | 22.01 | 6.22 | 4.80 | 32.84 | 94 |
| CRNE 1-23 | 3 | 3 | 208-230 | 182TC | * | 27.36 | 6.57 | 7.00 | 40.67 | 134 |
| | | 3 | 440-480 | 182TC | * | 27.36 | 6.22 | 4.80 | 38.19 | 109 |
| CRNE 1-27 | 3 | 3 | 208-230 | 182TC | * | 30.2 | 6.57 | 7.00 | 43.51 | 137 |
| | | 3 | 440-480 | 182TC | * | 30.2 | 6.22 | 4.80 | 41.03 | 116 |

All dimensions in inches unless otherwise noted.

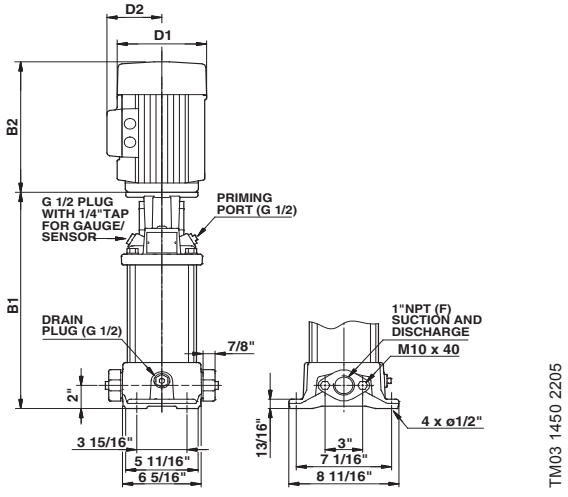
1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

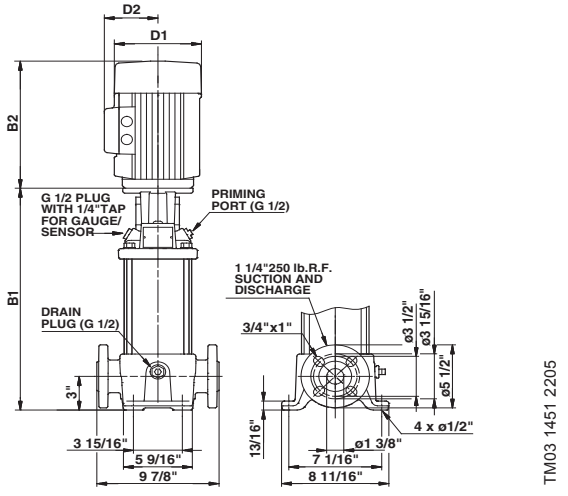
* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRE, CRIE, CRNE 3



## CRE 3 dimensional data



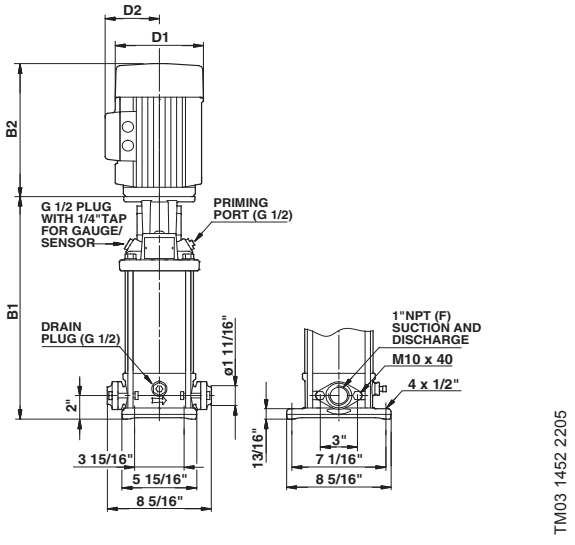

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRE 3-2 | 1/2 | 1 | 200-240 | 56C | * | 11.97 | 6.22 | 4.80 | 20.43 | 73 |
| CRE 3-4 | 3/4 | 1 | 200-240 | 56C | * | 12.68 | 6.22 | 4.80 | 21.14 | 75 |
| CRE 3-5 | 1 | 1 | 200-240 | 56C | * | 13.39 | 6.22 | 4.80 | 21.85 | 76 |
| CRE 3-6 | 1 1/2 | 3 | 208-230 | 56C | * | 14.09 | 6.57 | 7.00 | 26.88 | 90 |
| | 1 | 3 | 440-480 | 56C | * | 14.09 | 6.22 | 4.80 | 24.13 | 80 |
| CRE 3-8 | 1 1/2 | 1 | 200-240 | 56C | * | 15.51 | 6.22 | 4.80 | 23.97 | 80 |
| CRE 3-9 | 1 1/2 | 3 | 208-230 | 56C | * | 16.22 | 6.57 | 7.00 | 29.01 | 99 |
| | | 3 | 440-480 | 56C | * | 16.22 | 6.22 | 4.80 | 26.26 | 85 |
| CRE 3-11 | 2 | 1 | 200-240 | 56C | * | 17.64 | 6.22 | 4.80 | 26.89 | 87 |
| CRE 3-12 | 2 | 3 | 208-230 | 56C | * | 18.35 | 6.57 | 7.00 | 31.14 | 115 |
| | | 3 | 440-480 | 56C | * | 18.35 | 6.22 | 4.80 | 29.18 | 95 |
| CRE 3-15 | 3 | 3 | 208-230 | 182TC | * | 21.57 | 6.57 | 7.00 | 34.88 | 122 |
| | | 3 | 440-480 | 182TC | * | 21.57 | 6.22 | 4.80 | 32.40 | 110 |
| CRE 3-17 | 3 | 3 | 208-230 | 182TC | * | 22.99 | 6.57 | 7.00 | 36.30 | 130 |
| | | 3 | 440-480 | 182TC | * | 22.99 | 6.22 | 4.80 | 33.82 | 111 |
| CRE 3-25 | 5 | 3 | 208-230 | 182TC | - | 28.66 | 7.40 | 8.66 | 44.17 | 172 |
| | | 3 | 460-480 | 182TC | - | 28.66 | 7.40 | 8.66 | 44.17 | 172 |

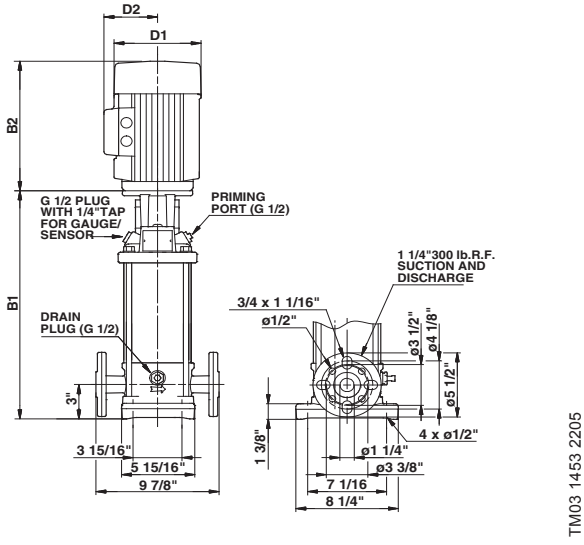
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRIE 3 dimensional data



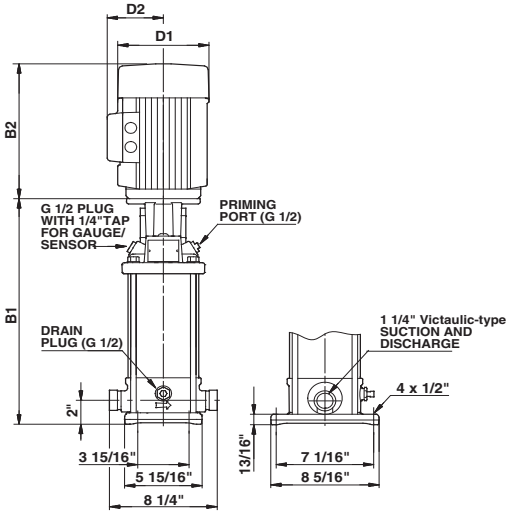

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRIE 3-2 | 1/2 | 1 | 200-240 | 56C | * | 12.09 | 6.22 | 4.80 | 20.55 | 68 |
| CRIE 3-4 | 3/4 | 1 | 200-240 | 56C | * | 12.80 | 6.22 | 4.80 | 21.26 | 69 |
| CRIE 3-5 | 1 | 1 | 200-240 | 56C | * | 13.50 | 6.22 | 4.80 | 21.96 | 71 |
| CRIE 3-6 | 1 1/2 | 3 | 208-230 | 56C | * | 14.21 | 6.57 | 7.00 | 27.00 | 85 |
| | 1 | 3 | 440-480 | 56C | * | 14.21 | 6.22 | 4.80 | 24.25 | 75 |
| CRIE 3-8 | 1 1/2 | 1 | 200-240 | 56C | * | 15.63 | 6.22 | 4.80 | 24.09 | 75 |
| CRIE 3-9 | 1 1/2 | 3 | 208-230 | 56C | * | 16.34 | 6.57 | 7.00 | 29.13 | 93 |
| | | 3 | 440-480 | 56C | * | 16.34 | 6.22 | 4.80 | 26.38 | 80 |
| CRIE 3-11 | 2 | 1 | 200-240 | 56C | * | 17.76 | 6.22 | 4.80 | 27.01 | 72 |
| CRIE 3-12 | 2 | 3 | 208-230 | 56C | * | 18.46 | 6.57 | 7.00 | 31.25 | 100 |
| | | 3 | 440-480 | 56C | * | 18.46 | 6.22 | 4.80 | 29.29 | 86 |
| CRIE 3-15 | 3 | 3 | 208-230 | 182TC | * | 21.69 | 6.57 | 7.00 | 35.00 | 114 |
| | | 3 | 440-480 | 182TC | * | 21.69 | 6.22 | 4.80 | 32.52 | 102 |
| CRIE 3-17 | 3 | 3 | 208-230 | 182TC | * | 23.11 | 6.57 | 7.00 | 36.42 | 124 |
| | | 3 | 440-480 | 182TC | * | 23.11 | 6.22 | 4.80 | 33.94 | 95 |
| CRIE 3-25 | 5 | 3 | 208-230 | 182TC | - | 28.78 | 7.40 | 8.66 | 44.29 | 165 |
| | | 3 | 460-480 | 182TC | - | 28.78 | 7.40 | 8.66 | 44.29 | 165 |

All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRNE 3 dimensional data

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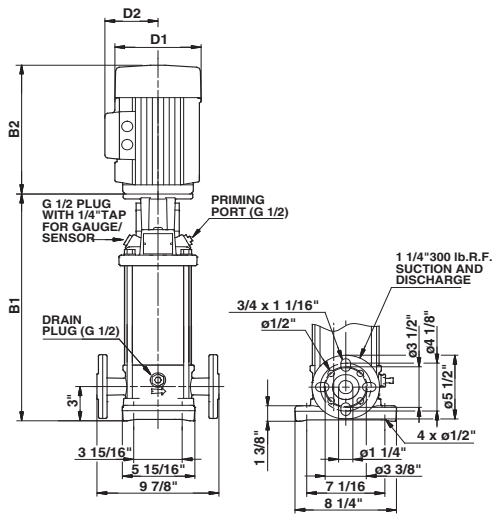



TM03 1453 2205

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | PJE* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRNE 3-2 | 1/2 | 1 | 200-240 | 56C | * | 12.09 | 6.22 | 4.80 | 20.55 | 68 |
| CRNE 3-4 | 3/4 | 1 | 200-240 | 56C | * | 12.80 | 6.22 | 4.80 | 21.26 | 69 |
| CRNE 3-5 | 1 | 1 | 200-240 | 56C | * | 13.50 | 6.22 | 4.80 | 21.96 | 70 |
| CRNE 3-6 | 1 1/2 | 3 | 208-230 | 56C | * | 14.21 | 6.57 | 7.00 | 27.00 | 85 |
| | 1 | 3 | 440-480 | 56C | * | 14.21 | 6.22 | 4.80 | 24.25 | 75 |
| CRNE 3-8 | 1 1/2 | 1 | 200-240 | 56C | * | 15.63 | 6.22 | 4.80 | 24.09 | 81 |
| CRNE 3-9 | 1 1/2 | 3 | 208-230 | 56C | * | 16.34 | 6.57 | 7.00 | 29.13 | 93 |
| | | 3 | 440-480 | 56C | * | 16.34 | 6.22 | 4.80 | 26.38 | 80 |
| CRNE 3-11 | 2 | 1 | 200-240 | 56C | * | 17.76 | 6.22 | 4.80 | 27.01 | 81 |
| CRNE 3-12 | 2 | 3 | 208-230 | 56C | * | 18.46 | 6.57 | 7.00 | 31.25 | 109 |
| | | 3 | 440-480 | 56C | * | 18.46 | 6.22 | 4.80 | 29.29 | 90 |
| CRNE 3-15 | 3 | 3 | 208-230 | 182TC | * | 21.69 | 6.57 | 7.00 | 35.00 | 116 |
| | | 3 | 440-480 | 182TC | * | 21.69 | 6.22 | 4.80 | 32.52 | 102 |
| CRNE 3-17 | 3 | 3 | 208-230 | 182TC | * | 23.11 | 6.57 | 7.00 | 36.42 | 124 |
| | | 3 | 440-480 | 182TC | * | 23.11 | 6.22 | 4.80 | 33.94 | 104 |
| CRNE 3-25 | 5 | 3 | 208-230 | 182TC | * | 28.78 | 7.40 | 8.66 | 44.29 | 165 |
| | | 3 | 460-480 | 182TC | * | 28.78 | 7.40 | 8.66 | 44.29 | 165 |

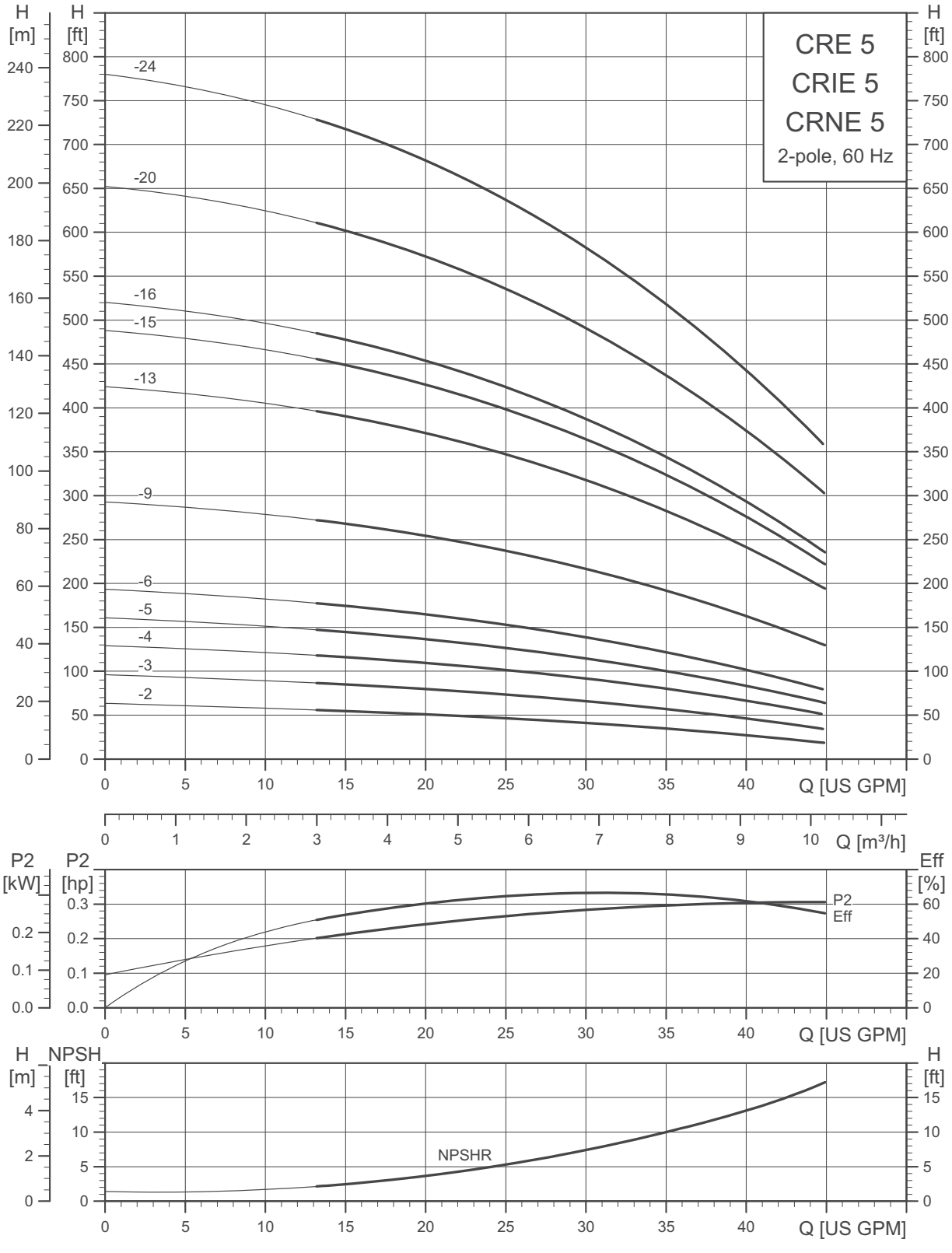
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.

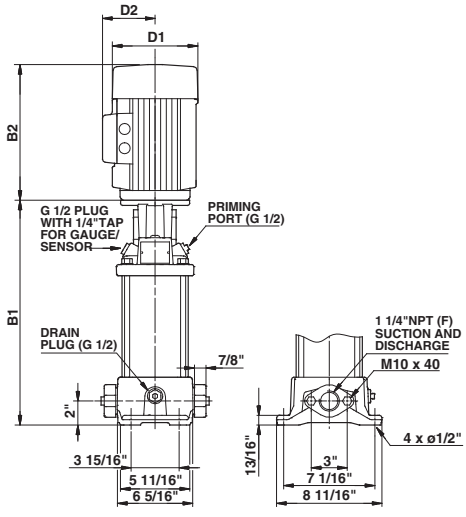
* Available

## CRE, CRIE, CRNE 5

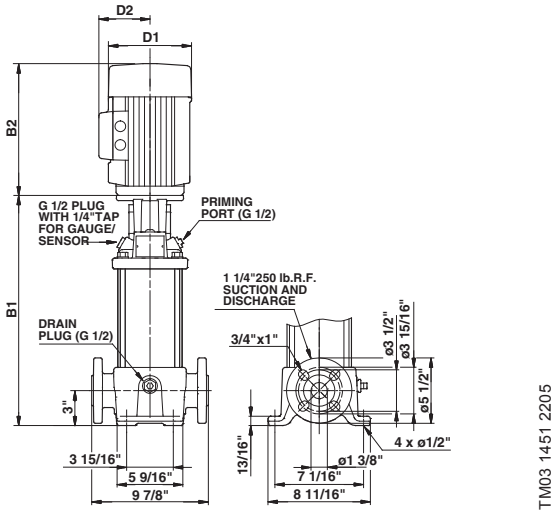



TM05 9414 4313

## CRE 5 dimensional data




TM03 1455 2205




TM03 1451 2205

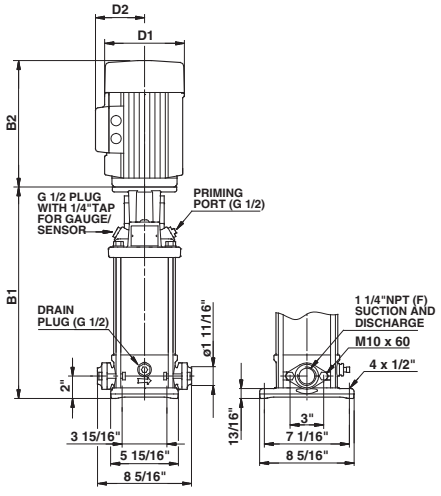
| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRE 5-2 | 3/4 | 1 | 200-240 | 56C | * | 11.97 | 6.22 | 4.80 | 20.43 | 74 |
| CRE 5-3 | 1 1/2 | 3 | 208-230 | 56C | * | 13.03 | 6.57 | 7.00 | 25.82 | 88 |
| | 1 | 3 | 440-480 | 56C | * | 13.03 | 6.22 | 4.80 | 23.07 | 79 |
| CRE 5-4 | 1 1/2 | 1 | 200-240 | 56C | * | 14.09 | 6.22 | 4.80 | 22.55 | 78 |
| | | 3 | 208-230 | 56C | * | 14.09 | 6.57 | 7.00 | 26.88 | 92 |
| | | 3 | 440-480 | 56C | * | 14.09 | 6.22 | 4.80 | 24.13 | 82 |
| CRE 5-5 | 2 | 1 | 200-240 | 56C | * | 15.16 | 6.22 | 4.80 | 24.41 | 83 |
| CRE 5-6 | 2 | 3 | 208-230 | 56C | * | 16.22 | 6.57 | 7.00 | 29.01 | 100 |
| | | 3 | 440-480 | 56C | * | 16.22 | 6.22 | 4.80 | 27.05 | 88 |
| CRE 5-9 | 3 | 3 | 208-230 | 182TC | * | 20.51 | 6.57 | 7.00 | 33.82 | 106 |
| | | 3 | 440-480 | 182TC | * | 20.51 | 6.22 | 4.80 | 31.34 | 107 |
| CRE 5-13 | 5 | 3 | 208-230 | 182TC | * | 24.76 | 7.40 | 8.66 | 40.27 | 166 |
| | | 3 | 460-480 | 182TC | * | 24.76 | 7.40 | 8.66 | 40.27 | 166 |
| CRE 5-15 | 5 | 3 | 208-230 | 182TC | * | 26.89 | 7.40 | 8.66 | 42.40 | 163 |
| CRE 5-16 | 5 | 3 | 460-480 | 182TC | * | 27.95 | 7.40 | 8.66 | 43.46 | 170 |
| CRE 5-20 | 7 1/2 | 3 | 208-230 | 213TC | - | 32.72 | 7.40 | 8.66 | 48.23 | 204 |
| | | 3 | 460-480 | 213TC | - | 32.72 | 7.40 | 8.66 | 48.23 | 204 |
| CRE 5-24 | 7 1/2 | 3 | 208-230 | 213TC | - | 36.97 | 7.40 | 8.66 | 52.48 | 303 |
| | | 3 | 460-480 | 213TC | - | 36.97 | 7.40 | 8.66 | 52.48 | 303 |

All dimensions in inches unless otherwise noted.

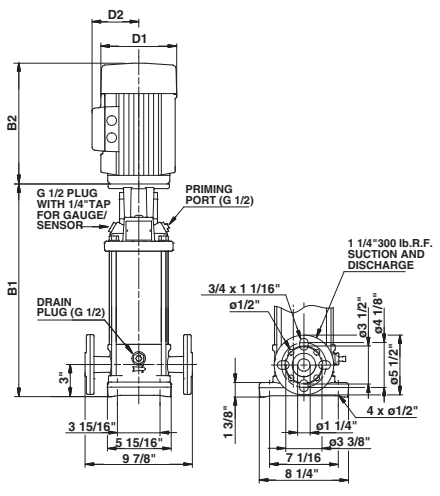
1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRIE 5 dimensional data




TM03 1456 2205




TM03 1453 2205

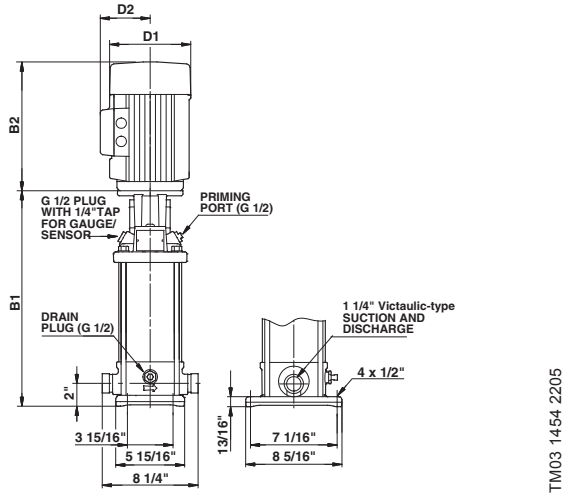
| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRIE 5-2 | 3/4 | 1 | 200-240 | 56C | * | 12.09 | 6.22 | 4.80 | 20.55 | 68 |
| CRIE 5-3 | 1 1/2 | 3 | 208-230 | 56C | * | 13.15 | 6.57 | 7.00 | 25.94 | 83 |
| | 1 | 3 | 440-480 | 56C | * | 13.15 | 6.22 | 4.80 | 23.19 | 74 |
| CRIE 5-4 | 1 1/2 | 1 | 200-240 | 56C | * | 14.21 | 6.22 | 4.80 | 22.67 | 73 |
| | | 3 | 208-230 | 56C | * | 14.21 | 6.57 | 7.00 | 27.00 | 85 |
| | | 3 | 440-480 | 56C | * | 14.21 | 6.22 | 4.80 | 24.25 | 77 |
| CRIE 5-5 | 2 | 1 | 200-240 | 56C | * | 15.28 | 6.22 | 4.80 | 24.53 | 78 |
| CRIE 5-6 | 2 | 3 | 208-230 | 56C | * | 16.34 | 6.57 | 7.00 | 29.13 | 93 |
| | | 3 | 440-480 | 56C | * | 16.34 | 6.22 | 4.80 | 27.17 | 83 |
| CRIE 5-9 | 3 | 3 | 208-230 | 182TC | * | 20.63 | 6.57 | 7.00 | 33.94 | 103 |
| | | 3 | 440-480 | 182TC | * | 20.63 | 6.22 | 4.80 | 31.46 | 100 |
| CRIE 5-13 | 5 | 3 | 208-230 | 182TC | * | 24.88 | 7.40 | 8.66 | 40.39 | 159 |
| | | 3 | 460-480 | 182TC | * | 24.88 | 7.40 | 8.66 | 40.39 | 159 |
| CRIE 5-15 | 5 | 3 | 208-230 | 182TC | * | 27.01 | 7.40 | 8.66 | 42.52 | 163 |
| CRIE 5-16 | 5 | 3 | 460-480 | 182TC | * | 28.07 | 7.40 | 8.66 | 43.58 | 163 |
| CRIE 5-20 | 7 1/2 | 3 | 208-230 | 213TC | - | 32.83 | 7.40 | 8.66 | 48.34 | 196 |
| | | 3 | 460-480 | 213TC | - | 32.83 | 7.40 | 8.66 | 48.34 | 196 |
| CRIE 5-24 | 7 1/2 | 3 | 208-230 | 213TC | - | 37.09 | 7.40 | 8.66 | 52.60 | 295 |
| | | 3 | 460-480 | 213TC | - | 37.09 | 7.40 | 8.66 | 52.60 | 295 |

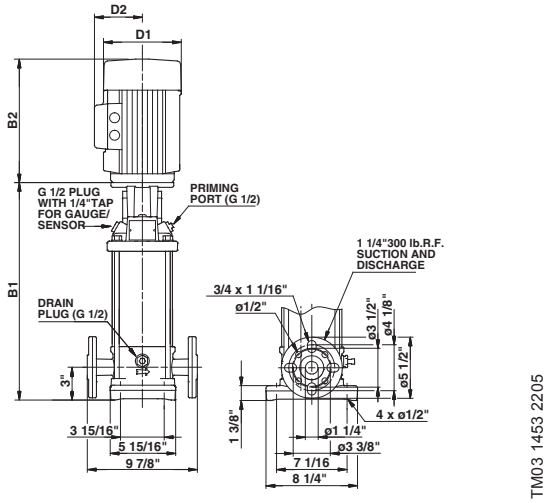
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRNE 5 dimensional data



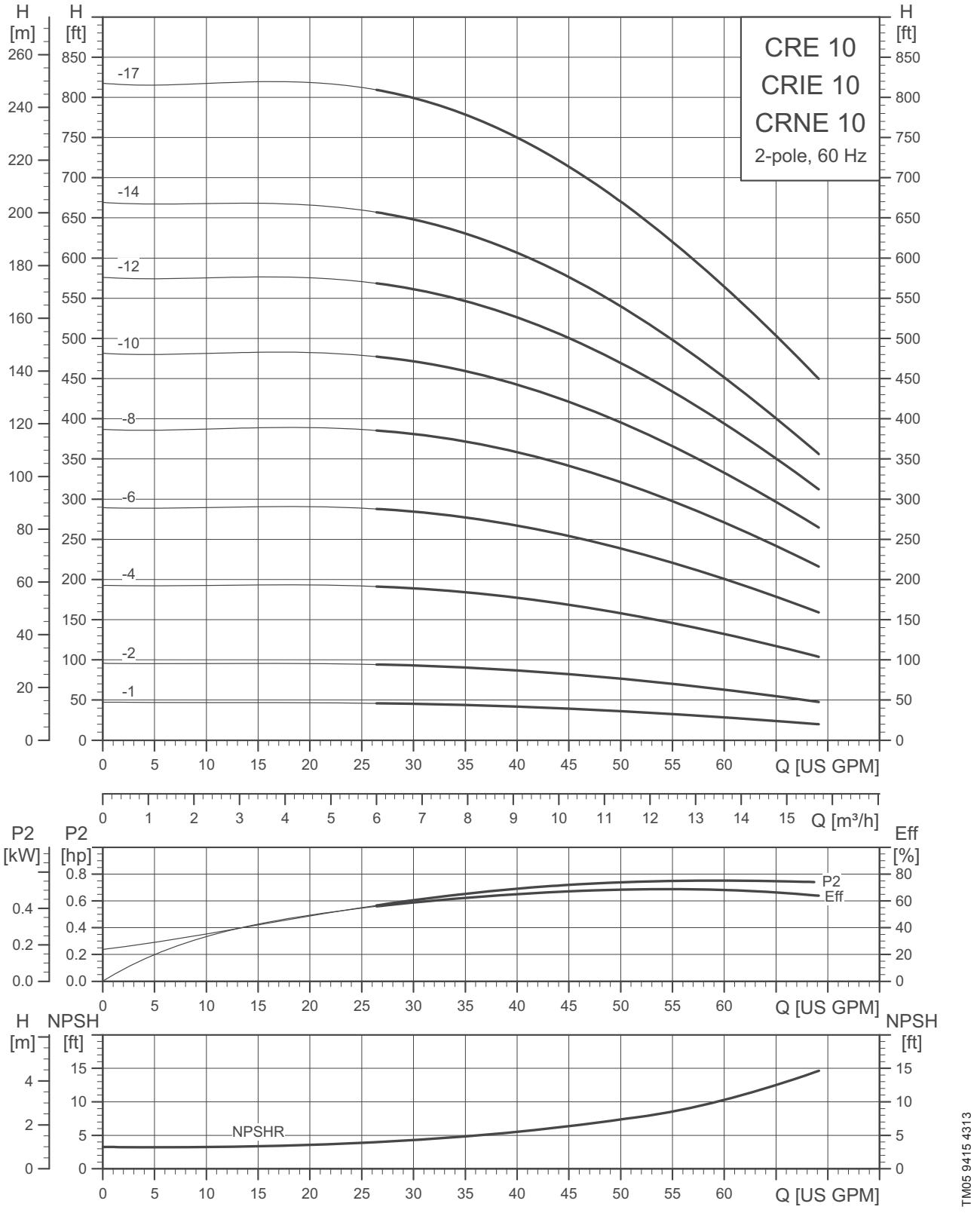

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRNE 5-2 | 3/4 | 1 | 200-240 | 56C | * | 12.09 | 6.22 | 4.80 | 20.55 | 68 |
| CRNE 5-3 | 1 1/2 | 3 | 208-230 | 56C | * | 13.15 | 6.57 | 7.00 | 25.94 | 83 |
| | 1 | 3 | 440-480 | 56C | * | 13.15 | 6.22 | 4.80 | 23.19 | 74 |
| CRNE 5-4 | 1 1/2 | 1 | 200-240 | 56C | * | 14.21 | 6.22 | 4.80 | 22.67 | 73 |
| | | 3 | 208-230 | 56C | * | 14.21 | 6.57 | 7.00 | 27.00 | 85 |
| | | 3 | 440-480 | 56C | * | 14.21 | 6.22 | 4.80 | 24.25 | 77 |
| CRNE 5-5 | 2 | 1 | 200-240 | 56C | * | 15.28 | 6.22 | 4.80 | 24.53 | 78 |
| CRNE 5-6 | 2 | 3 | 208-230 | 56C | * | 16.34 | 6.57 | 7.00 | 29.13 | 93 |
| | | 3 | 440-480 | 56C | * | 16.34 | 6.22 | 4.80 | 27.17 | 83 |
| CRNE 5-9 | 3 | 3 | 208-230 | 182TC | * | 20.63 | 6.57 | 7.00 | 33.94 | 103 |
| | | 3 | 440-480 | 182TC | * | 20.63 | 6.22 | 4.80 | 31.46 | 100 |
| CRNE 5-13 | 5 | 3 | 208-230 | 182TC | * | 24.88 | 7.40 | 8.66 | 40.39 | 159 |
| | | 3 | 460-480 | 182TC | * | 24.88 | 7.40 | 8.66 | 40.39 | 159 |
| CRNE 5-15 | 5 | 3 | 208-230 | 182TC | * | 27.01 | 7.40 | 8.66 | 42.52 | 163 |
| CRNE 5-16 | 5 | 3 | 460-480 | 182TC | * | 28.07 | 7.40 | 8.66 | 43.58 | 163 |
| CRNE 5-20 | 7 1/2 | 3 | 208-230 | 213TC | * | 32.83 | 7.40 | 8.66 | 48.34 | 196 |
| | | 3 | 460-480 | 213TC | * | 32.83 | 7.40 | 8.66 | 48.34 | 196 |
| CRNE 5-24 | 7 1/2 | 3 | 208-230 | 213TC | * | 37.09 | 7.40 | 8.66 | 52.60 | 295 |
| | | 3 | 460-480 | 213TC | * | 37.09 | 7.40 | 8.66 | 52.60 | 295 |

All dimensions in inches unless otherwise noted.

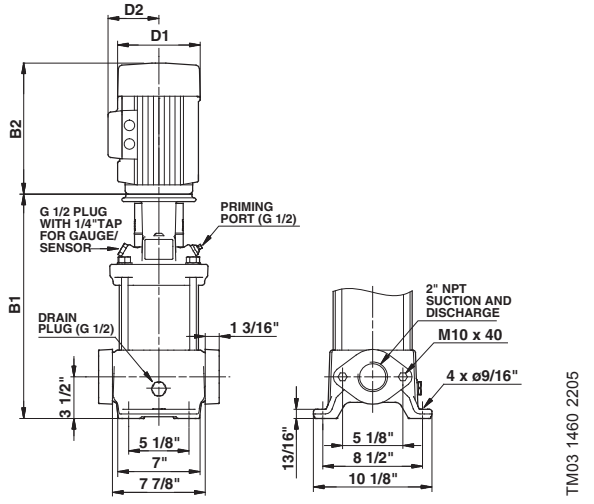
1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

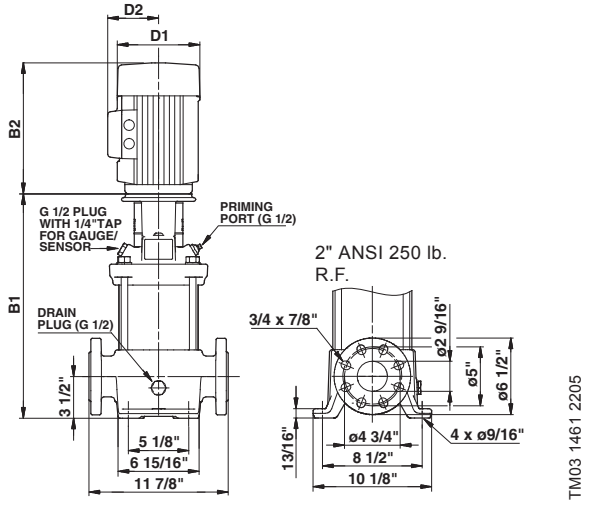
* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRE, CRIE, CRNE 10



## CRE 10 dimensional data



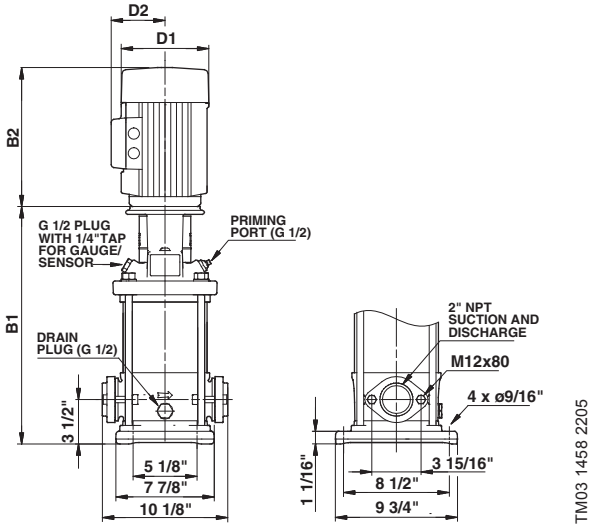

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRE 10-1 | 1 | 1 | 200-240 | 56C | * | 15.28 | 6.22 | 4.80 | 23.74 | 111 |
| | 1 1/2 | 3 | 208-230 | 56C | * | 15.28 | 6.57 | 7.00 | 28.07 | 121 |
| | 1 | 3 | 440-480 | 56C | * | 15.28 | 6.22 | 4.80 | 25.32 | 115 |
| CRE 10-2 | 2 | 1 | 200-240 | 56C | * | 15.28 | 6.22 | 4.80 | 24.53 | 117 |
| | 1 1/2 | 3 | 208-230 | 56C | * | 15.28 | 6.57 | 7.00 | 28.07 | 123 |
| | 1 1/2 | 3 | 440-480 | 56C | * | 15.28 | 6.22 | 4.80 | 25.32 | 117 |
| CRE 10-4 | 3 | 3 | 208-230 | 182TC | * | 18.39 | 6.57 | 7.00 | 31.70 | 163 |
| | | 3 | 440-480 | 182TC | * | 18.39 | 6.22 | 4.80 | 29.22 | 146 |
| CRE 10-6 | 5 | 3 | 208-230 | 182TC | * | 20.75 | 7.40 | 8.66 | 36.26 | 201 |
| | | 3 | 460-480 | 182TC | * | 20.75 | 7.40 | 8.66 | 36.26 | 201 |
| CRE 10-8 | 7 1/2 | 3 | 208-230 | 213TC | - | 23.43 | 7.40 | 8.66 | 38.94 | 236 |
| | | 3 | 460-480 | 213TC | - | 23.43 | 7.40 | 8.66 | 38.94 | 236 |
| CRE 10-10 | 7 1/2 | 3 | 208-230 | 213TC | - | 25.79 | 7.40 | 8.66 | 41.30 | 240 |
| | | 3 | 460-480 | 213TC | - | 25.79 | 7.40 | 8.66 | 41.30 | 240 |
| CRE 10-12 | 10 | 3 | 460-480 | 213TC | - | 28.15 | 8.39 | 10.24 | 43.07 | 253 |
| CRE 10-14 | 15 | 3 | 460-480 | 254TC | - | 33.06 | 13.39 | 12.13 | 51.84 | 504 |
| CRE 10-17 | 15 | 3 | 460-480 | 254TC | - | 37.80 | 13.39 | 12.13 | 56.58 | 519 |

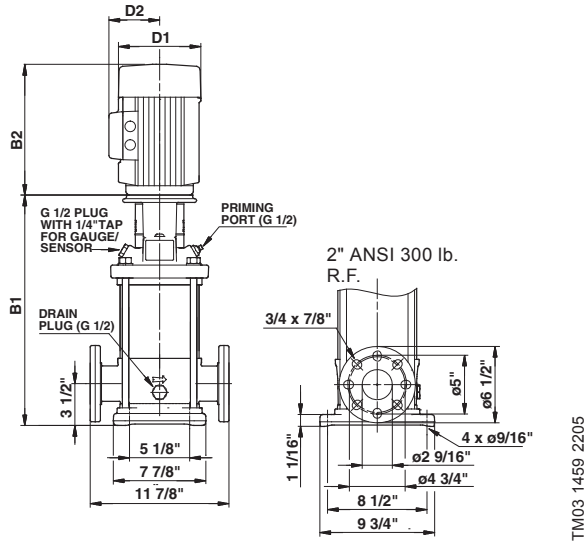
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 3 lbs. less.
* Available

## CRIE 10 dimensional data



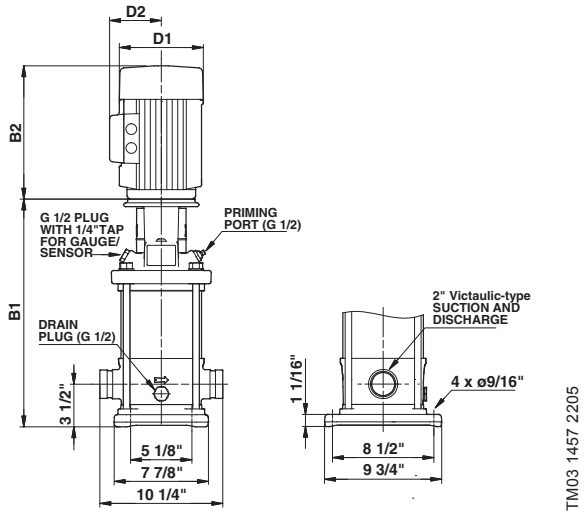

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRIE 10-1 | 1 | 1 | 200-240 | 56C | * | 15.20 | 6.22 | 4.80 | 23.66 | 104 |
| | 1 1/2 | 3 | 208-230 | 56C | * | 15.20 | 6.57 | 7.00 | 27.99 | 114 |
| | 1 | 3 | 440-480 | 56C | * | 15.20 | 6.22 | 4.80 | 25.24 | 106 |
| CRIE 10-2 | 2 | 1 | 200-240 | 56C | * | 15.20 | 6.22 | 4.80 | 24.45 | 111 |
| | 1 1/2 | 3 | 208-230 | 56C | * | 15.20 | 6.57 | 7.00 | 27.99 | 116 |
| | 1 1/2 | 3 | 440-480 | 56C | * | 15.20 | 6.22 | 4.80 | 25.24 | 109 |
| CRIE 10-4 | 3 | 3 | 208-230 | 182TC | * | 18.31 | 6.57 | 7.00 | 31.62 | 157 |
| | | 3 | 440-480 | 182TC | * | 18.31 | 6.22 | 4.80 | 29.14 | 137 |
| CRIE 10-6 | 5 | 3 | 208-230 | 182TC | * | 20.67 | 7.40 | 8.66 | 36.18 | 194 |
| | | 3 | 460-480 | 182TC | * | 20.67 | 7.40 | 8.66 | 36.18 | 194 |
| CRIE 10-8 | 7 1/2 | 3 | 208-230 | 213TC | * | 23.35 | 7.40 | 8.66 | 38.86 | 229 |
| | | 3 | 460-480 | 213TC | * | 23.35 | 7.40 | 8.66 | 38.86 | 229 |
| CRIE 10-10 | 7 1/2 | 3 | 208-230 | 213TC | * | 25.71 | 7.40 | 8.66 | 41.22 | 234 |
| | | 3 | 460-480 | 213TC | * | 25.71 | 7.40 | 8.66 | 41.22 | 234 |
| CRIE 10-12 | 10 | 3 | 460-480 | 213TC | - | 28.07 | 8.39 | 10.24 | 42.99 | 247 |
| CRIE 10-14 | 15 | 3 | 460-480 | 254TC | - | 32.95 | 13.39 | 12.13 | 51.73 | 497 |
| CRIE 10-17 | 15 | 3 | 460-480 | 254TC | - | 37.68 | 13.39 | 12.13 | 56.46 | 519 |

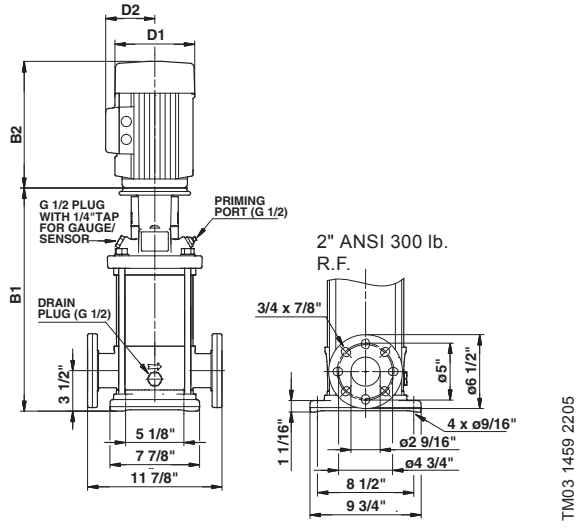
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 7 lbs. less.
* Available

## CRNE 10 dimensional data



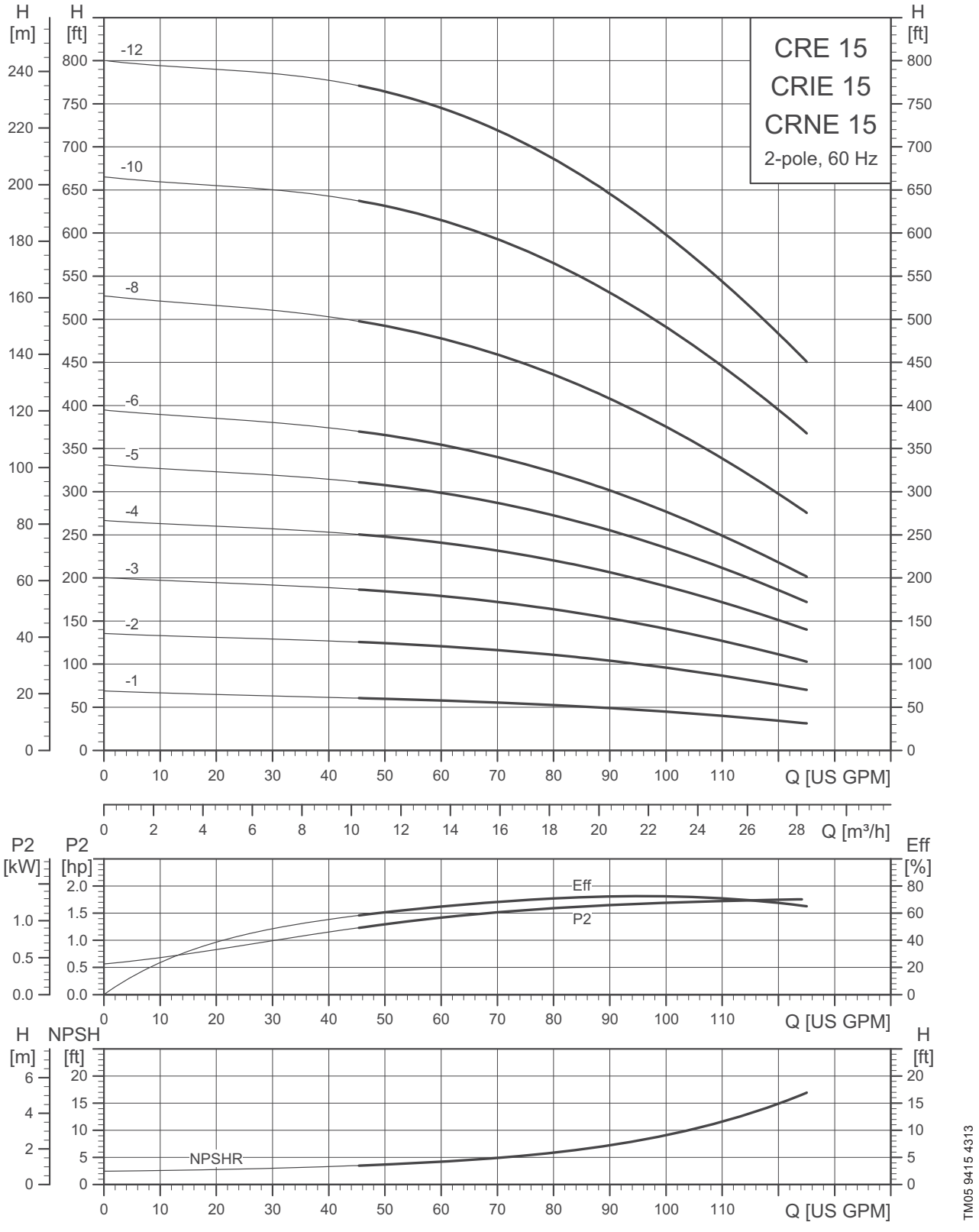

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRNE 10-1 | 1 | 1 | 200-240 | 56C | * | 15.20 | 6.22 | 4.80 | 23.66 | 104 |
| | 1 1/2 | 3 | 208-230 | 56C | * | 15.20 | 6.57 | 7.00 | 27.99 | 114 |
| | 1 | 3 | 440-480 | 56C | * | 15.20 | 6.22 | 4.80 | 25.24 | 109 |
| CRNE 10-2 | 2 | 1 | 200-240 | 56C | * | 15.20 | 6.22 | 4.80 | 24.45 | 111 |
| | 1 1/2 | 3 | 208-230 | 56C | * | 15.20 | 6.57 | 7.00 | 27.99 | 116 |
| | 1 1/2 | 3 | 440-480 | 56C | * | 15.20 | 6.22 | 4.80 | 25.24 | 111 |
| CRNE 10-4 | 3 | 3 | 208-230 | 182TC | * | 18.31 | 6.57 | 7.00 | 31.62 | 157 |
| | | 3 | 440-480 | 182TC | * | 18.31 | 6.22 | 4.80 | 29.14 | 137 |
| CRNE 10-6 | 5 | 3 | 208-230 | 182TC | * | 20.67 | 7.40 | 8.66 | 36.18 | 194 |
| | | 3 | 460-480 | 182TC | * | 20.67 | 7.40 | 8.66 | 36.18 | 194 |
| CRNE 10-8 | 7 1/2 | 3 | 208-230 | 213TC | * | 23.35 | 7.40 | 8.66 | 38.86 | 229 |
| | | 3 | 460-480 | 213TC | * | 23.35 | 7.40 | 8.66 | 38.86 | 229 |
| CRNE 10-10 | 7 1/2 | 3 | 208-230 | 213TC | * | 25.71 | 7.40 | 8.66 | 41.22 | 234 |
| | | 3 | 460-480 | 213TC | * | 25.71 | 7.40 | 8.66 | 41.22 | 234 |
| CRNE 10-12 | 10 | 3 | 460-480 | 213TC | * | 28.07 | 8.39 | 10.24 | 42.99 | 247 |
| CRNE 10-14 | 15 | 3 | 460-480 | 254TC | * | 32.95 | 13.39 | 12.13 | 51.73 | 497 |
| CRNE 10-17 | 15 | 3 | 460-480 | 254TC | * | 37.68 | 13.39 | 12.13 | 56.46 | 513 |

All dimensions in inches unless otherwise noted.

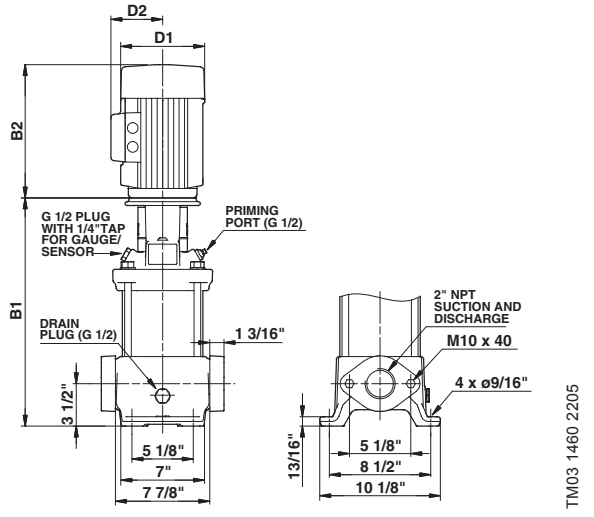
1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

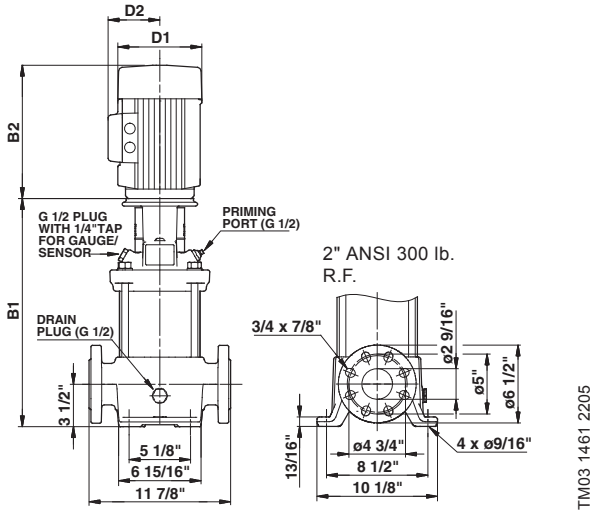
* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRE, CRIE, CRNE 15



## CRE 15 dimensional data



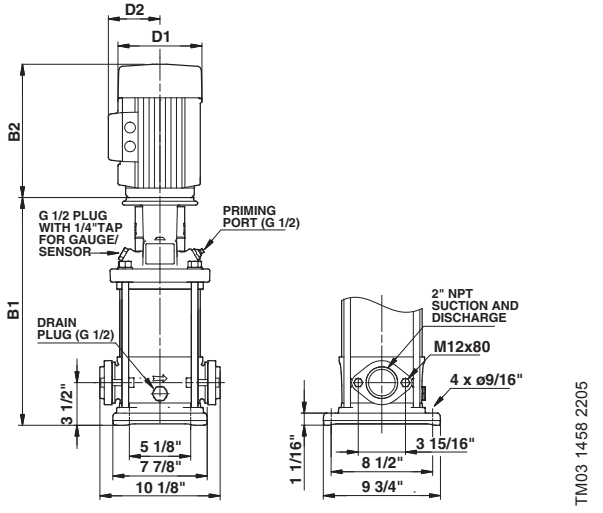

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRE 15-1 | 2 | 1 | 200-240 | 56C | * | 16.46 | 6.22 | 4.80 | 25.71 | 117 |
| | | 3 | 208-230 | 56C | * | 16.46 | 6.57 | 7.00 | 29.25 | 141 |
| | | 3 | 440-480 | 56C | * | 16.46 | 6.22 | 4.80 | 27.29 | 122 |
| CRE 15-2 | 5 | 3 | 208-230 | 182TC | * | 17.20 | 7.40 | 8.66 | 32.71 | 194 |
| | | 3 | 460-480 | 182TC | * | 17.20 | 7.40 | 8.66 | 32.71 | 194 |
| CRE 15-3 | 7 1/2 | 3 | 208-230 | 213TC | * | 19.29 | 7.40 | 8.66 | 34.80 | 207 |
| CRE 15-4 | 7 1/2 | 3 | 208-230 | 213TC | * | 21.06 | 7.40 | 8.66 | 36.57 | 227 |
| | | 3 | 460-480 | 213TC | * | 21.06 | 7.40 | 8.66 | 36.57 | 227 |
| CRE 15-5 | 10 | 3 | 460-480 | 213TC | * | 22.83 | 8.39 | 10.24 | 37.75 | 238 |
| CRE 15-6 | 15 | 3 | 460-480 | 254TC | - | 27.17 | 13.39 | 12.13 | 45.95 | 402 |
| CRE 15-8 | 15 | 3 | 460-480 | 254TC | - | 30.71 | 13.39 | 12.13 | 49.49 | 504 |
| CRE 15-10 | 20 | 3 | 460-480 | 254TC | - | 34.25 | 13.39 | 12.13 | 53.03 | 517 |
| CRE 15-12 | 25 | 3 | 460-480 | 284TSC | - | 37.17 | 13.39 | 12.13 | 59.89 | 552 |

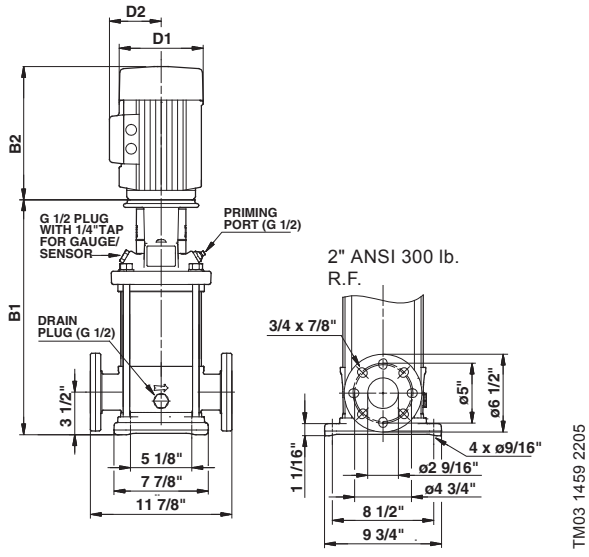
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 3 lbs. less.
* Available

## CRIE 15 dimensional data



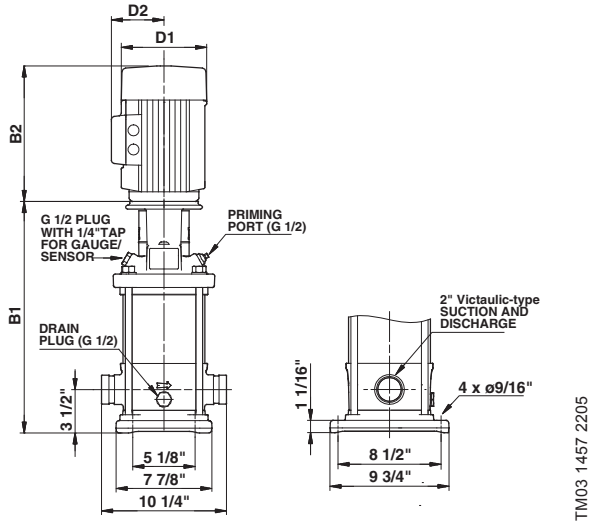

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRIE 15-1 | 2 | 1 | 200-240 | 56C | * | 16.38 | 6.22 | 4.80 | 25.63 | 111 |
| | | 3 | 208-230 | 56C | * | 16.38 | 6.57 | 7.00 | 29.17 | 135 |
| | | 3 | 440-480 | 56C | * | 16.38 | 6.22 | 4.80 | 27.21 | 115 |
| CRIE 15-2 | 5 | 3 | 208-230 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| | | 3 | 460-480 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| CRIE 15-3 | 7 1/2 | 3 | 208-230 | 213TC | * | 19.21 | 7.40 | 8.66 | 34.72 | 200 |
| CRIE 15-4 | 7 1/2 | 3 | 208-230 | 213TC | * | 20.98 | 7.40 | 8.66 | 36.49 | 221 |
| | | 3 | 460-480 | 213TC | * | 20.98 | 7.40 | 8.66 | 36.49 | 221 |
| CRIE 15-5 | 10 | 3 | 460-480 | 213TC | * | 22.76 | 8.39 | 10.24 | 37.68 | 232 |
| CRIE 15-6 | 15 | 3 | 460-480 | 254TC | * | 27.05 | 13.39 | 12.13 | 45.83 | 477 |
| CRIE 15-8 | 15 | 3 | 460-480 | 254TC | * | 30.59 | 13.39 | 12.13 | 49.37 | 495 |
| CRIE 15-10 | 20 | 3 | 460-480 | 254TC | - | 34.13 | 13.39 | 12.13 | 52.91 | 510 |
| CRIE 15-12 | 25 | 3 | 460-480 | 284TSC | - | 37.05 | 13.39 | 12.13 | 59.77 | 543 |

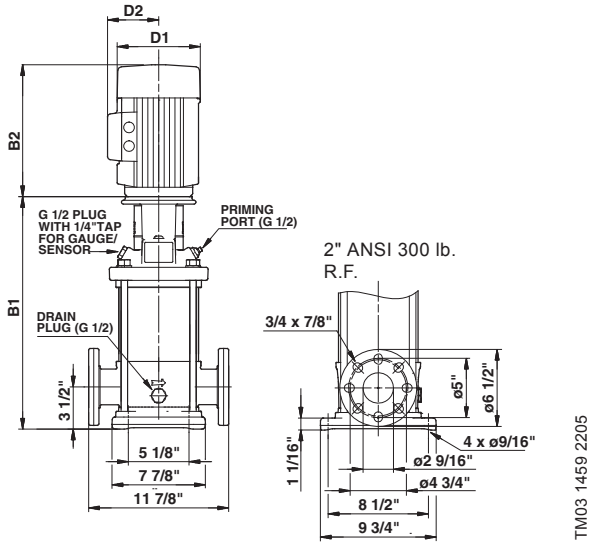
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 7 lbs. less.
* Available

## CRNE 15 dimensional data



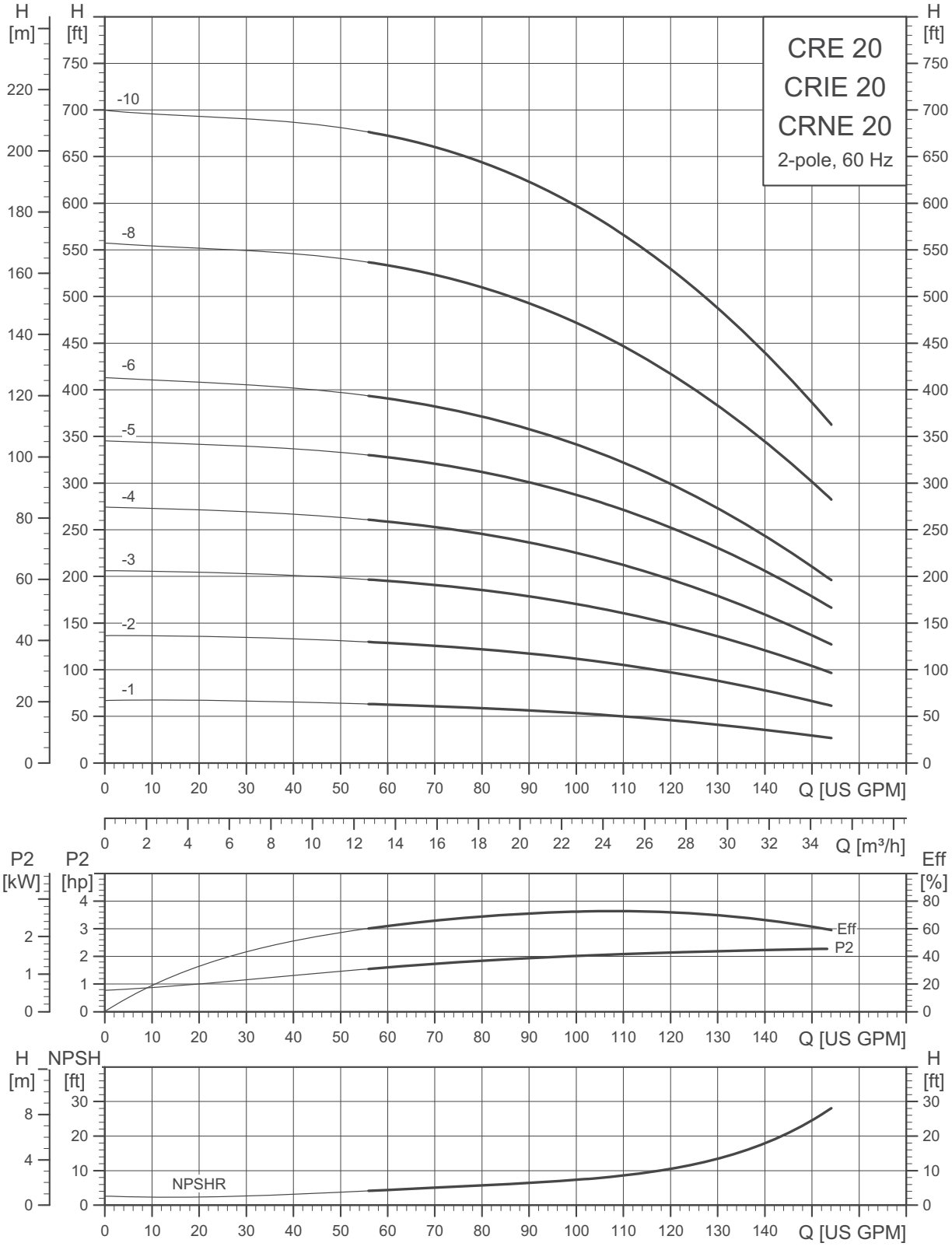

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | PJE* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRNE 15-1 | 2 | 1 | 200-240 | 56C | * | 16.38 | 6.22 | 4.80 | 25.63 | 111 |
| | | 3 | 208-230 | 56C | * | 16.38 | 6.57 | 7.00 | 29.17 | 135 |
| | | 3 | 440-480 | 56C | * | 16.38 | 6.22 | 4.80 | 27.21 | 115 |
| CRNE 15-2 | 5 | 3 | 208-230 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| | | 3 | 460-480 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| CRNE 15-3 | 7 1/2 | 3 | 208-230 | 213TC | * | 19.21 | 7.40 | 8.66 | 34.72 | 200 |
| CRNE 15-4 | 7 1/2 | 3 | 208-230 | 213TC | * | 20.98 | 7.40 | 8.66 | 36.49 | 221 |
| | | 3 | 460-480 | 213TC | * | 20.98 | 7.40 | 8.66 | 36.49 | 221 |
| CRNE 15-5 | 10 | 3 | 460-480 | 213TC | * | 22.76 | 8.39 | 10.24 | 37.68 | 232 |
| CRNE 15-6 | 15 | 3 | 460-480 | 254TC | * | 27.05 | 13.39 | 12.13 | 45.83 | 477 |
| CRNE 15-8 | 15 | 3 | 460-480 | 254TC | * | 30.59 | 13.39 | 12.13 | 49.37 | 495 |
| CRNE 15-10 | 20 | 3 | 460-480 | 254TC | * | 34.13 | 13.39 | 12.13 | 52.91 | 510 |
| CRNE 15-12 | 25 | 3 | 460-480 | 284TSC | * | 37.05 | 13.39 | 12.13 | 59.77 | 543 |

All dimensions in inches unless otherwise noted.

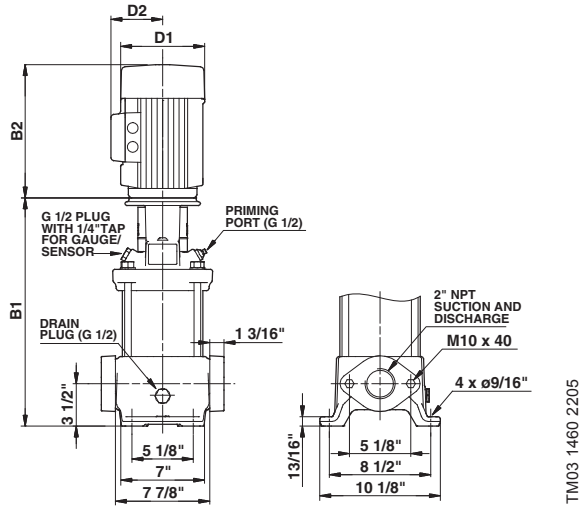
1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

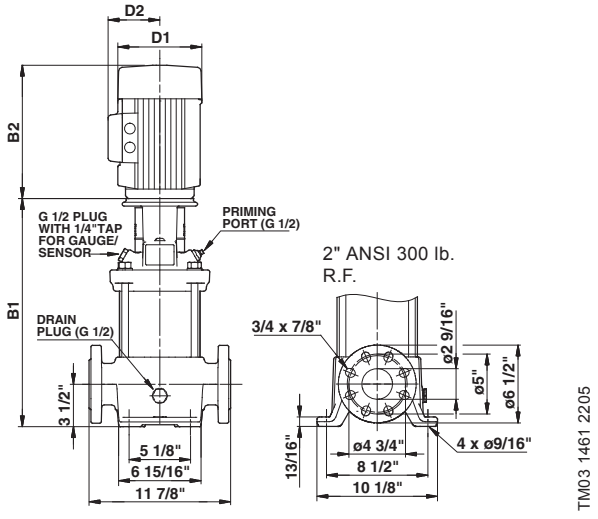
* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.
* Available

## CRE, CRIE, CRNE 20



## CRE 20 dimensional data



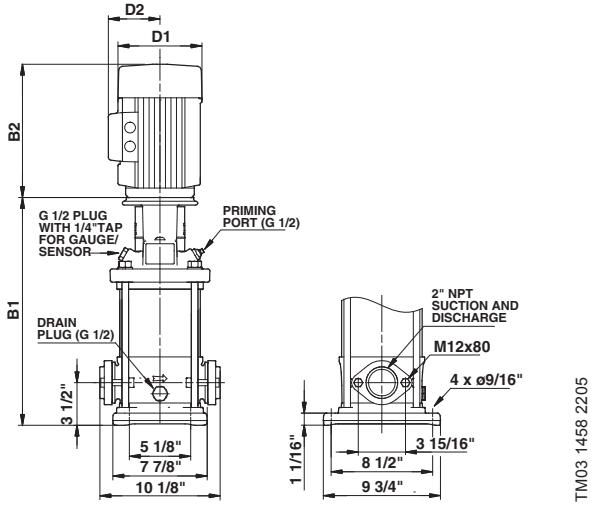

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRE 20-1 | 3 | 3 | 208-230 | 56C | * | 17.2 | 6.57 | 7.00 | 30.51 | 161 |
| | | 3 | 440-480 | 56C | * | 17.2 | 6.22 | 4.80 | 28.03 | 142 |
| CRE 20-2 | 5 | 3 | 208-230 | 182TC | * | 17.2 | 7.40 | 8.66 | 32.71 | 194 |
| | | 3 | 460-480 | 182TC | * | 17.2 | 7.40 | 8.66 | 32.71 | 194 |
| CRE 20-3 | 7 1/2 | 3 | 208-230 | 213TC | * | 19.29 | 7.40 | 8.66 | 34.80 | 223 |
| | | 3 | 460-480 | 213TC | * | 19.29 | 7.40 | 8.66 | 34.80 | 223 |
| CRE 20-4 | 10 | 3 | 460-480 | 213TC | * | 21.06 | 8.39 | 10.24 | 35.98 | 232 |
| CRE 20-5 | 15 | 3 | 460-480 | 254TC | * | 25.39 | 13.39 | 12.13 | 44.17 | 488 |
| CRE 20-6 | 15 | 3 | 460-480 | 254TC | - | 27.17 | 13.39 | 12.13 | 45.95 | 491 |
| CRE 20-8 | 20 | 3 | 460-480 | 254TC | - | 30.71 | 13.39 | 12.13 | 49.49 | 508 |
| CRE 20-10 | 25 | 3 | 460-480 | 284TSC | - | 33.62 | 13.39 | 12.13 | 56.34 | 543 |

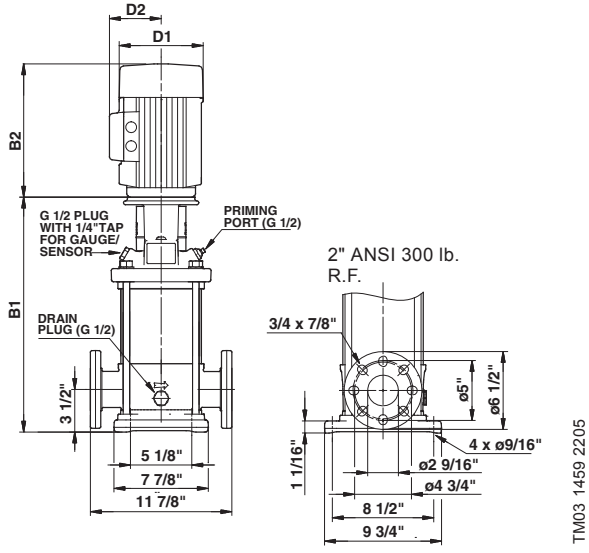
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 3 lbs. less.
* Available

## CRIE 20 dimensional data



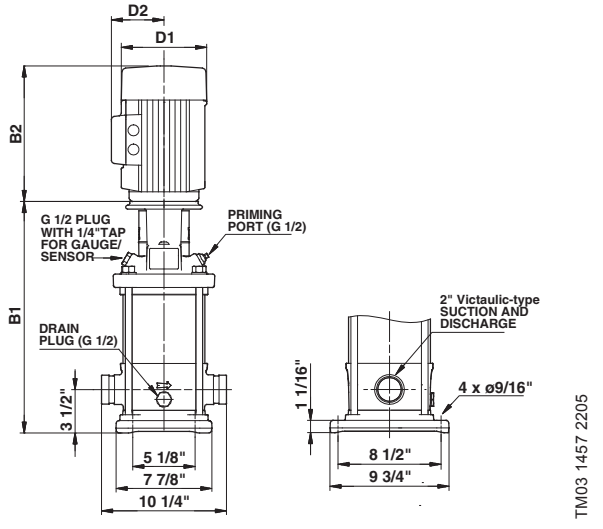

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | Oval* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRIE 20-1 | 3 | 3 | 208-230 | 56C | * | 17.13 | 6.57 | 7.00 | 30.44 | 154 |
| | | 3 | 440-480 | 56C | * | 17.13 | 6.22 | 4.80 | 27.96 | 135 |
| CRIE 20-2 | 5 | 3 | 208-230 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| | | 3 | 460-480 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| CRIE 20-3 | 7 1/2 | 3 | 208-230 | 213TC | * | 19.21 | 7.40 | 8.66 | 34.72 | 216 |
| | | 3 | 460-480 | 213TC | * | 19.21 | 7.40 | 8.66 | 34.72 | 216 |
| CRIE 20-4 | 10 | 3 | 460-480 | 213TC | * | 20.98 | 8.39 | 10.24 | 35.90 | 225 |
| CRIE 20-5 | 15 | 3 | 460-480 | 254TC | * | 25.28 | 13.39 | 12.13 | 44.06 | 480 |
| CRIE 20-6 | 15 | 3 | 460-480 | 254TC | * | 27.05 | 13.39 | 12.13 | 45.83 | 484 |
| CRIE 20-8 | 20 | 3 | 460-480 | 254TC | - | 30.59 | 13.39 | 12.13 | 49.37 | 501 |
| CRIE 20-10 | 25 | 3 | 460-480 | 284TSC | - | 33.50 | 13.39 | 12.13 | 56.22 | 537 |

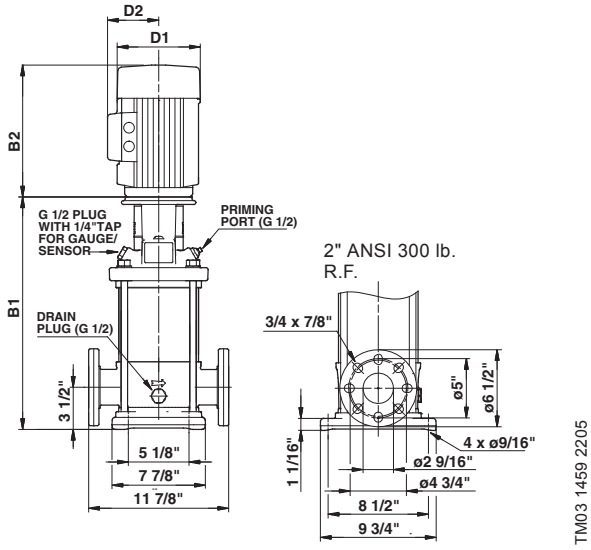
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 7 lbs. less.
* Available

## CRNE 20 dimensional data




| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame Size | PJE* | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|---|
| CRNE 20-1 | 3 | 3 | 208-230 | 56C | * | 17.13 | 6.57 | 7.00 | 30.44 | 154 |
| | | 3 | 440-480 | 56C | * | 17.13 | 6.22 | 4.80 | 27.96 | 135 |
| CRNE 20-2 | 5 | 3 | 208-230 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| | | 3 | 460-480 | 182TC | * | 17.13 | 7.40 | 8.66 | 32.64 | 185 |
| CRNE 20-3 | 7 1/2 | 3 | 208-230 | 213TC | * | 19.21 | 7.40 | 8.66 | 34.72 | 216 |
| | | 3 | 460-480 | 213TC | * | 19.21 | 7.40 | 8.66 | 34.72 | 216 |
| CRNE 20-4 | 10 | 3 | 460-480 | 213TC | * | 20.98 | 8.39 | 10.24 | 35.90 | 225 |
| CRNE 20-5 | 15 | 3 | 460-480 | 254TC | * | 25.28 | 13.39 | 12.13 | 44.06 | 480 |
| CRNE 20-6 | 15 | 3 | 460-480 | 254TC | * | 27.05 | 13.39 | 12.13 | 45.83 | 484 |
| CRNE 20-8 | 20 | 3 | 460-480 | 254TC | * | 30.59 | 13.39 | 12.13 | 49.37 | 501 |
| CRNE 20-10 | 25 | 3 | 460-480 | 284TSC | * | 33.50 | 13.39 | 12.13 | 56.22 | 537 |

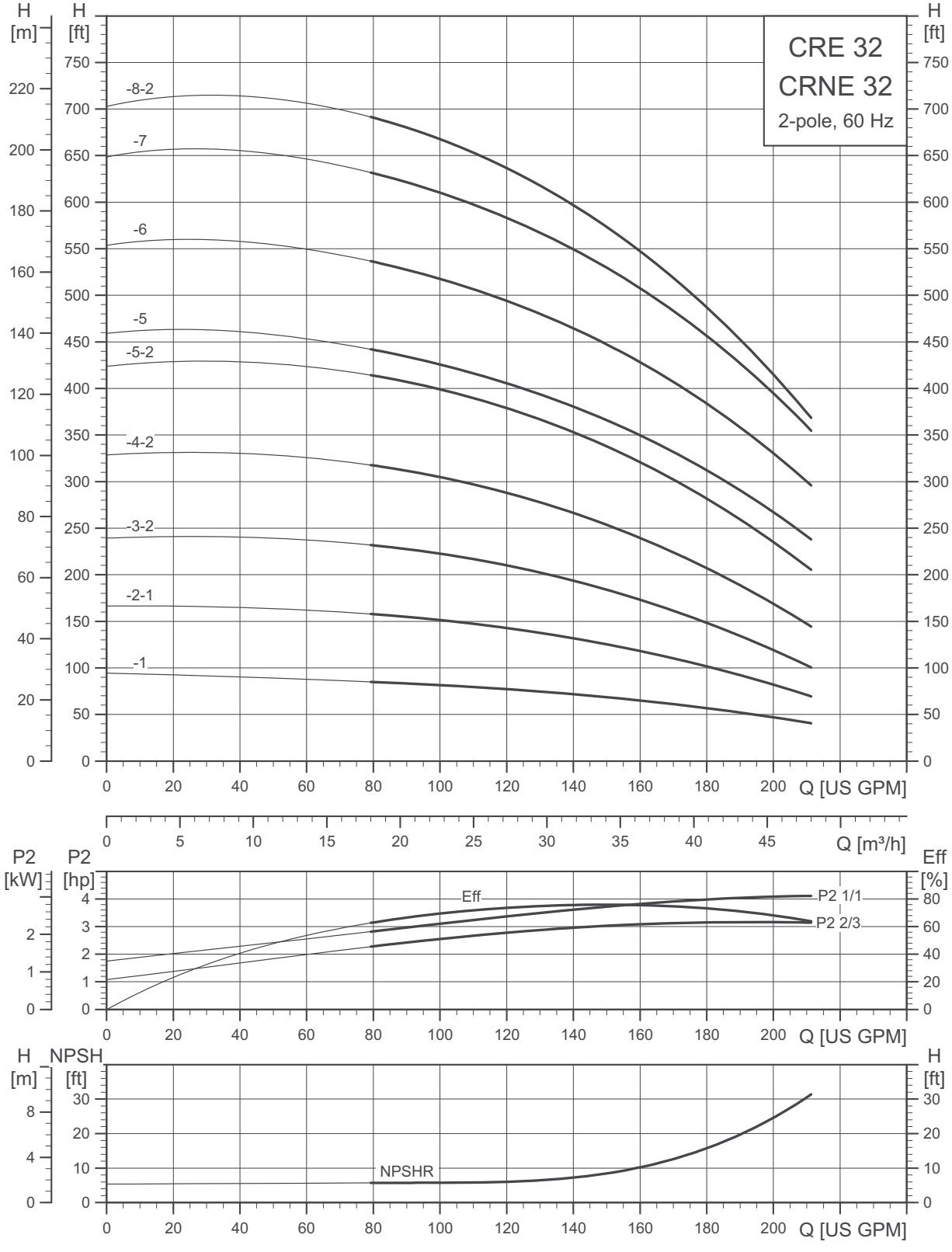
All dimensions in inches unless otherwise noted.

1 Weights and Volumes based on Pump with 3-phase ODP Motor (see price list for individual weights).

* Oval flanged pump B1 and B1+B2 dimension is one inch less than ANSI flanged pump and weight is approximately 9 lbs. less.

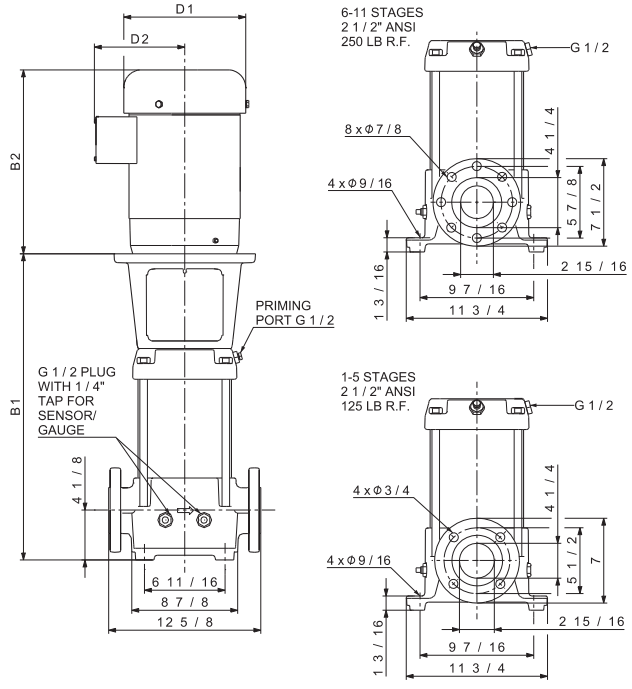
* Available

## CRE, CRNE 32




TM05 9418 4313

## CRE 32 dimensional data



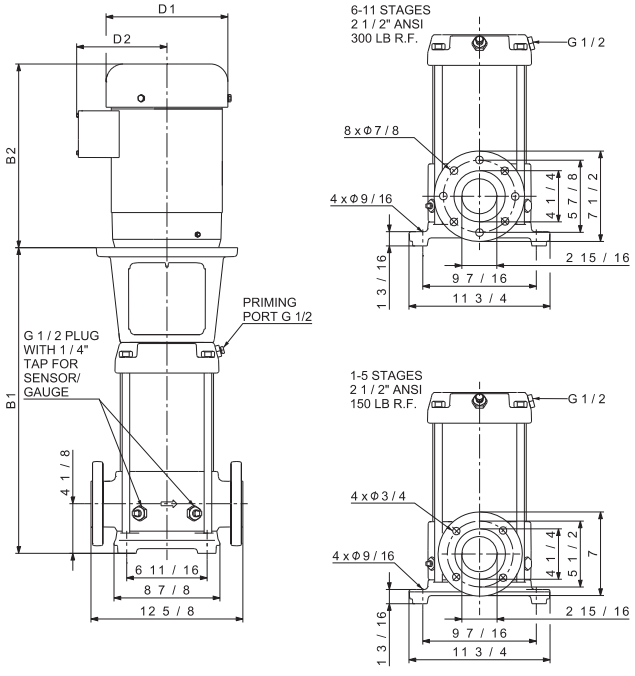

TM02 7699 1009

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRE 32-1 | 5 | 3 | 208-230 | 182TC | 19.88 | 7.40 | 8.66 | 35.39 | 236 |
| | | 3 | 460-480 | 182TC | 19.88 | 7.40 | 8.66 | 35.39 | 236 |
| CRE 32-2-1 | 7 1/2 | 3 | 208-230 | 213TC | 22.64 | 7.40 | 8.66 | 38.15 | 285 |
| | | 3 | 460-480 | 213TC | 22.64 | 7.40 | 8.66 | 38.15 | 285 |
| CRE 32-3-2 | 10 | 3 | 460-480 | 213TC | 25.39 | 8.39 | 10.24 | 40.31 | 314 |
| CRE 32-4-2 | 15 | 3 | 460-480 | 254TC | 32.48 | 13.39 | 12.13 | 51.26 | 541 |
| CRE 32-5-2 | 20 | 3 | 460-480 | 254TC | 35.24 | 13.39 | 12.13 | 54.02 | 552 |
| CRE 32-5 | 20 | 3 | 460-480 | 254TC | 35.24 | 13.39 | 12.13 | 54.02 | 552 |
| CRE 32-6 | 25 | 3 | 460-480 | 284TSC | 37.99 | 13.39 | 12.13 | 60.71 | 624 |
| CRE 32-7 | 30 | 3 | 460-480 | 284TSC | 40.75 | 13.39 | 12.13 | 63.47 | 657 |
| CRE 32-8-2 | 30 | 3 | 460-480 | 284TSC | 43.5 | 13.39 | 12.13 | 66.22 | 670 |

All dimensions in inches unless otherwise noted.

[1] Weights are based on pump with MLE motor (see price list for individual weights).

## CRNE 32 dimensional data



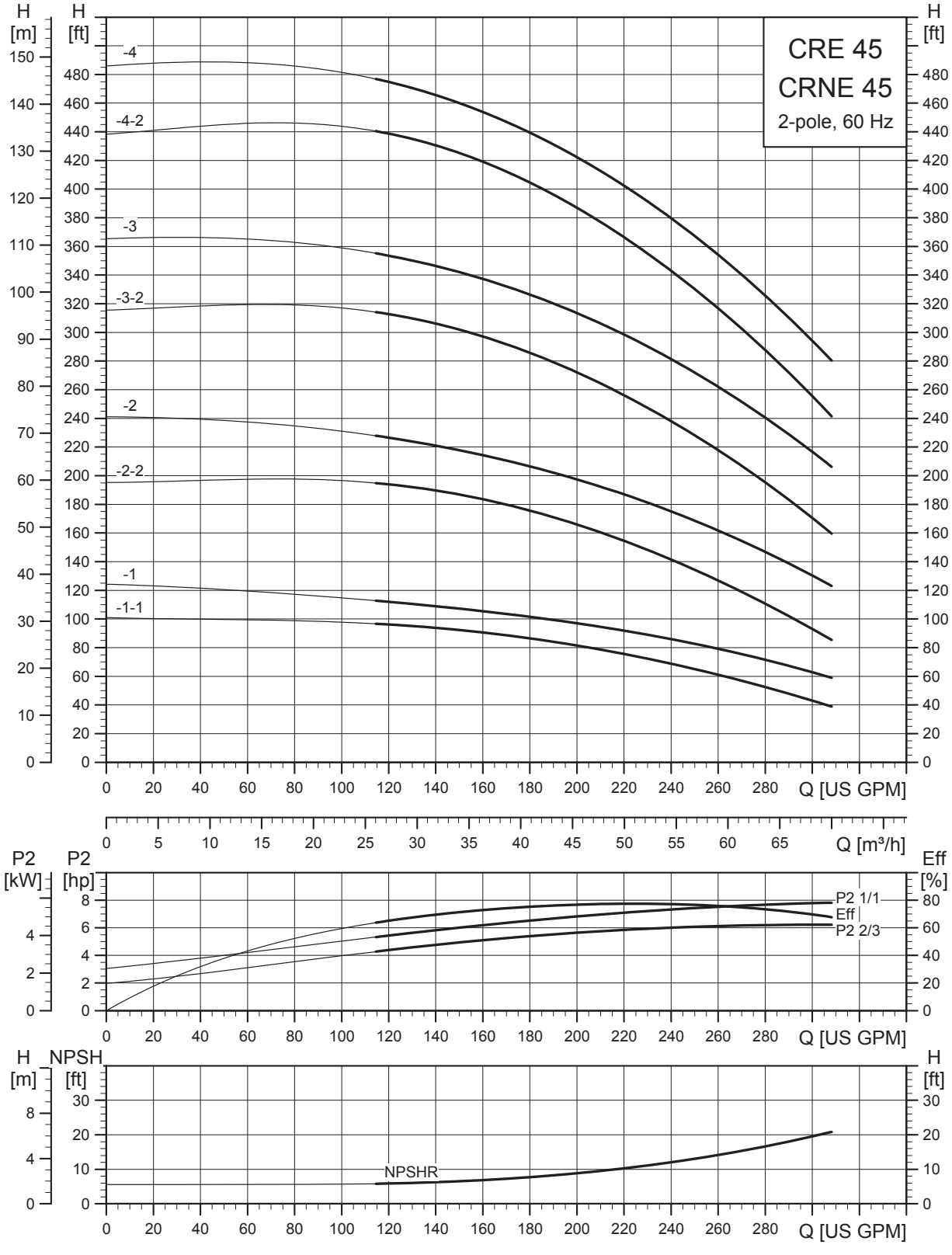

TM02 7703 1009

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRNE 32-1 | 5 | 3 | 208-230 | 182TC | 19.88 | 7.40 | 8.66 | 35.39 | 236 |
| | | 3 | 460-480 | 182TC | 19.88 | 7.40 | 8.66 | 35.39 | 236 |
| CRNE 32-2-1 | 7 1/2 | 3 | 208-230 | 213TC | 22.64 | 7.40 | 8.66 | 38.15 | 285 |
| | | 3 | 460-480 | 213TC | 22.64 | 7.40 | 8.66 | 38.15 | 285 |
| CRNE 32-3-2 | 10 | 3 | 460-480 | 213TC | 25.39 | 8.39 | 10.24 | 40.31 | 314 |
| CRNE 32-4-2 | 15 | 3 | 460-480 | 254TC | 32.48 | 13.39 | 12.13 | 51.26 | 546 |
| CRNE 32-5-2 | 20 | 3 | 460-480 | 254TC | 35.24 | 13.39 | 12.13 | 54.02 | 556 |
| CRNE 32-5 | 20 | 3 | 460-480 | 254TC | 35.24 | 13.39 | 12.13 | 54.02 | 556 |
| CRNE 32-6 | 25 | 3 | 460-480 | 284TSC | 37.99 | 13.39 | 12.13 | 60.71 | 628 |
| CRNE 32-7 | 30 | 3 | 460-480 | 284TSC | 40.75 | 13.39 | 12.13 | 63.47 | 661 |
| CRNE 32-8-2 | 30 | 3 | 460-480 | 284TSC | 43.5 | 13.39 | 12.13 | 66.22 | 674 |

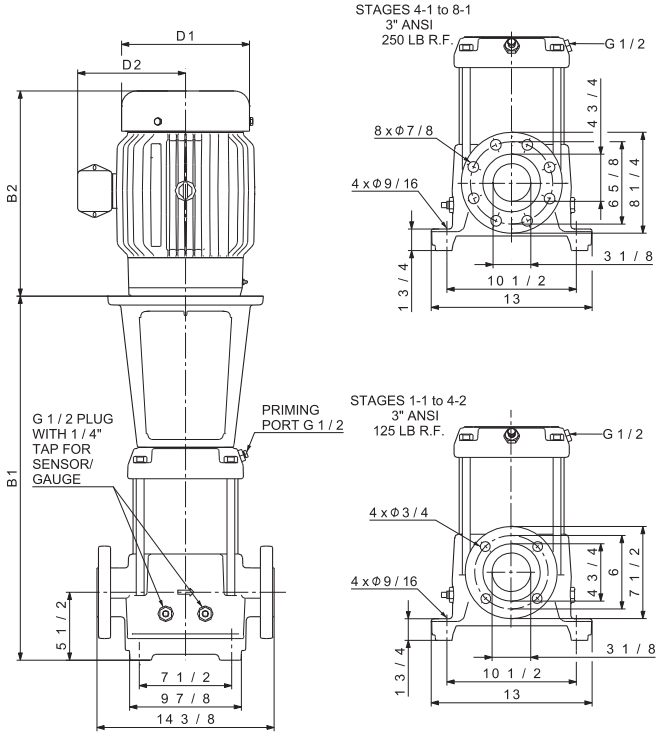
All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

## CRE, CRNE 45


CRE 45
CRNE 45
2-pole, 60 Hz
H [m]
H [ft]
-4
-4-2
-3
-3-2
-2
-2-2
-1
-1-1
Q [US GPM]
Q [m³/h]
P2 [kW]
P2 [hp]
Eff [%]
P2 1/1
Eff
P2 2/3
NPSH [ft]
NPSHR
TM05 9423 3813

## CRE 45 dimensional data



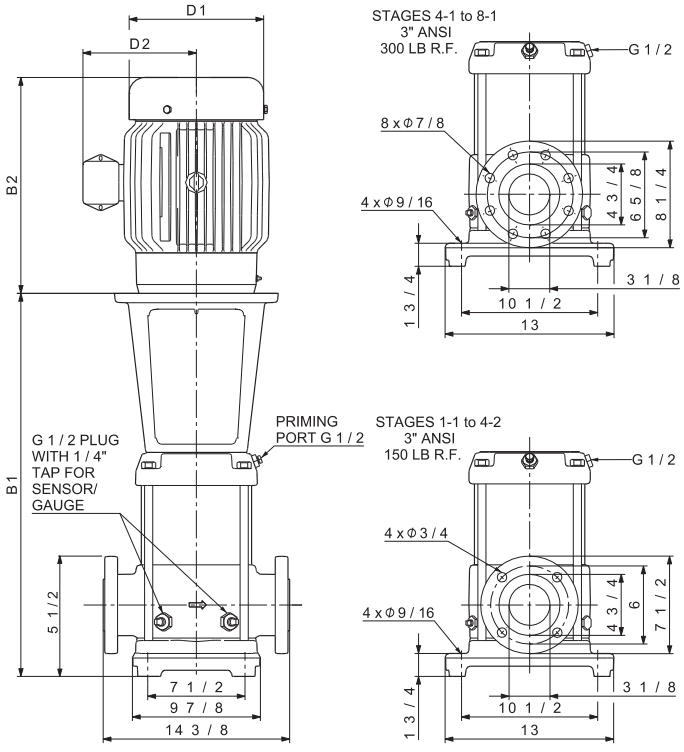

TM02 7700 1009

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRE 45-1-1 | 7 1/2 | 3 | 208-230 | 213TC | 22.01 | 7.40 | 8.66 | 37.52 | 311 |
| | | 3 | 460-480 | 213TC | 22.01 | 7.40 | 8.66 | 37.52 | 311 |
| CRE 45-1 | 10 | 3 | 460-480 | 213TC | 22.01 | 8.39 | 10.24 | 36.93 | 311 |
| CRE 45-2-2 | 15 | 3 | 460-480 | 254TC | 29.49 | 13.39 | 12.13 | 48.27 | 549 |
| CRE 45-2 | 15 | 3 | 460-480 | 254TC | 29.49 | 13.39 | 12.13 | 48.27 | 549 |
| CRE 45-3-2 | 20 | 3 | 460-480 | 254TC | 32.64 | 13.39 | 12.13 | 51.42 | 562 |
| CRE 45-3 | 25 | 3 | 460-480 | 284TSC | 32.64 | 13.39 | 12.13 | 55.36 | 589 |
| CRE 45-4-2 | 30 | 3 | 460-480 | 284TSC | 35.79 | 13.39 | 12.13 | 58.51 | 660 |
| CRE 45-4 | 30 | 3 | 460-480 | 284TSC | 35.79 | 13.39 | 12.13 | 58.51 | 666 |

All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

## CRNE 45 dimensional data



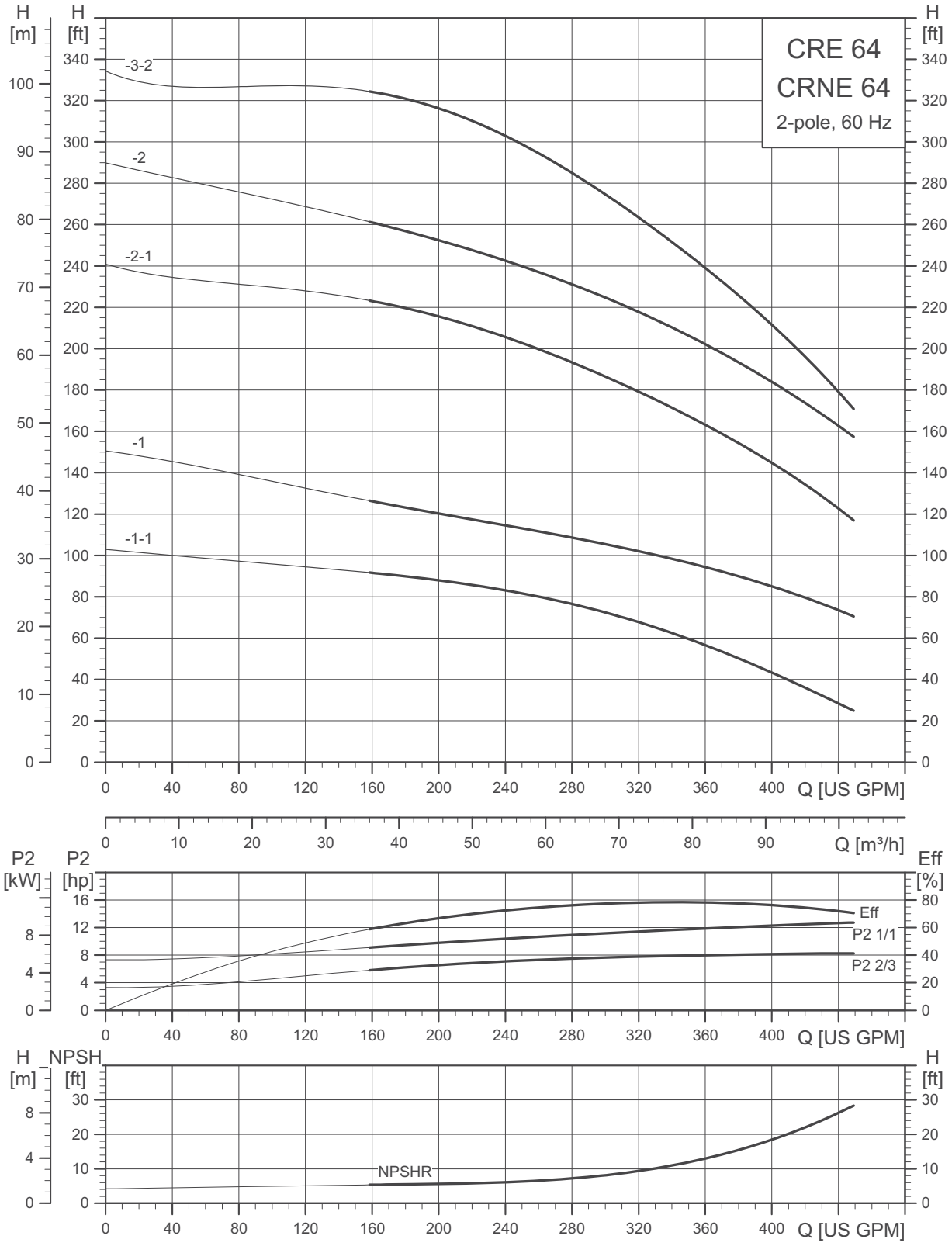

TM02 7704 4113

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRNE 45-1-1 | 7 1/2 | 3 | 208-230 | 213TC | 22.01 | 7.40 | 8.66 | 37.52 | 311 |
| | | 3 | 460-480 | 213TC | 22.01 | 7.40 | 8.66 | 37.52 | 311 |
| CRNE 45-1 | 10 | 3 | 460-480 | 213TC | 22.01 | 8.39 | 10.24 | 36.93 | 311 |
| CRNE 45-2-2 | 15 | 3 | 460-480 | 254TC | 29.49 | 13.39 | 12.13 | 48.27 | 550 |
| CRNE 45-2 | 15 | 3 | 460-480 | 254TC | 29.49 | 13.39 | 12.13 | 48.27 | 550 |
| CRNE 45-3-2 | 20 | 3 | 460-480 | 254TC | 32.64 | 13.39 | 12.13 | 51.42 | 562 |
| CRNE 45-3 | 25 | 3 | 460-480 | 284TSC | 32.64 | 13.39 | 12.13 | 55.36 | 590 |
| CRNE 45-4-2 | 30 | 3 | 460-480 | 284TSC | 35.79 | 13.39 | 12.13 | 58.51 | 661 |
| CRNE 45-4 | 30 | 3 | 460-480 | 284TSC | 35.79 | 13.39 | 12.13 | 58.51 | 664 |

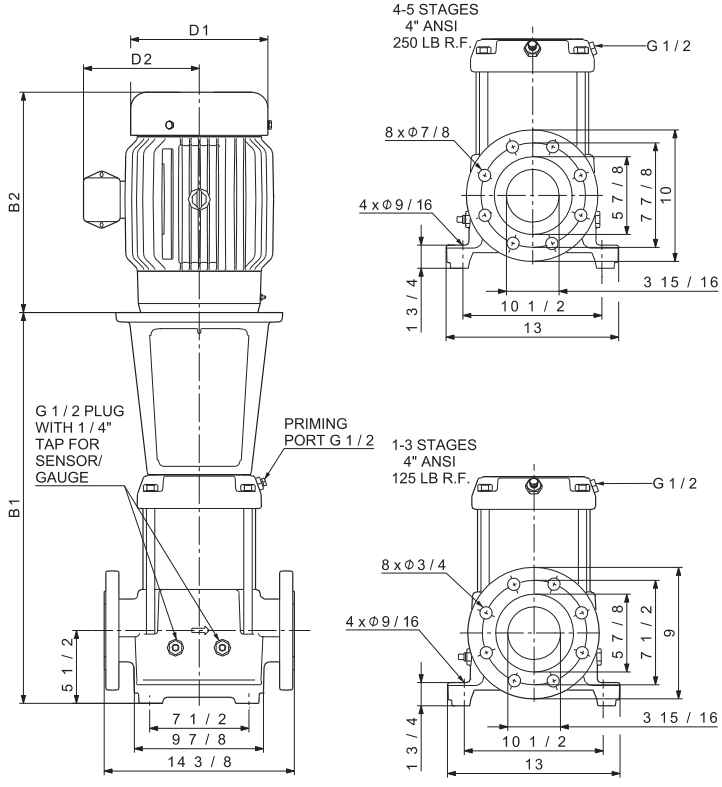
All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

## CRE, CRNE 64


CRE 64
CRNE 64
2-pole, 60 Hz
H [m]
H [ft]
-3-2
-2
-2-1
-1
-1-1
Q [US GPM]
Q [m³/h]
P2 [kW]
P2 [hp]
Eff [%]
Eff
P2 1/1
P2 2/3
H [m]
NPSH [ft]
NPSHR
TM05 9418 4313

## CRE 64 dimensional data



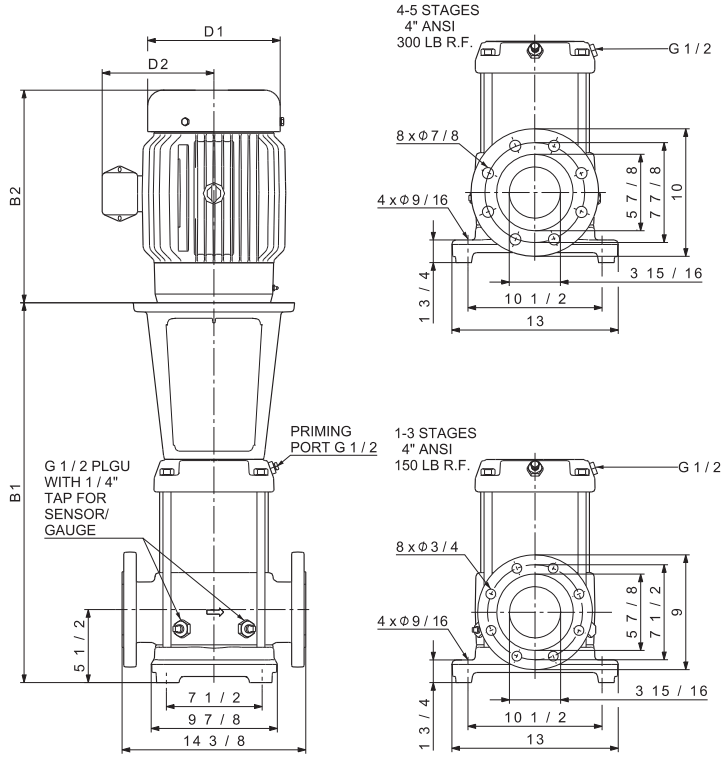

TM02 7701 1009

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRE 64-1-1 | 10 | 3 | 460-480 | 213TC | 22.09 | 8.39 | 10.24 | 37.01 | 307 |
| CRE 64-1 | 15 | 3 | 460-480 | 254TC | 26.42 | 13.39 | 12.13 | 45.20 | 533 |
| CRE 64-2-1 | 20 | 3 | 460-480 | 254TC | 29.69 | 13.39 | 12.13 | 48.47 | 564 |
| CRE 64-2 | 25 | 3 | 460-480 | 284TSC | 29.69 | 13.39 | 12.13 | 52.41 | 593 |
| CRE 64-3-2 | 30 | 3 | 460-480 | 284TSC | 32.91 | 13.39 | 12.13 | 55.63 | 664 |

All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

## CRNE 64 dimensional data



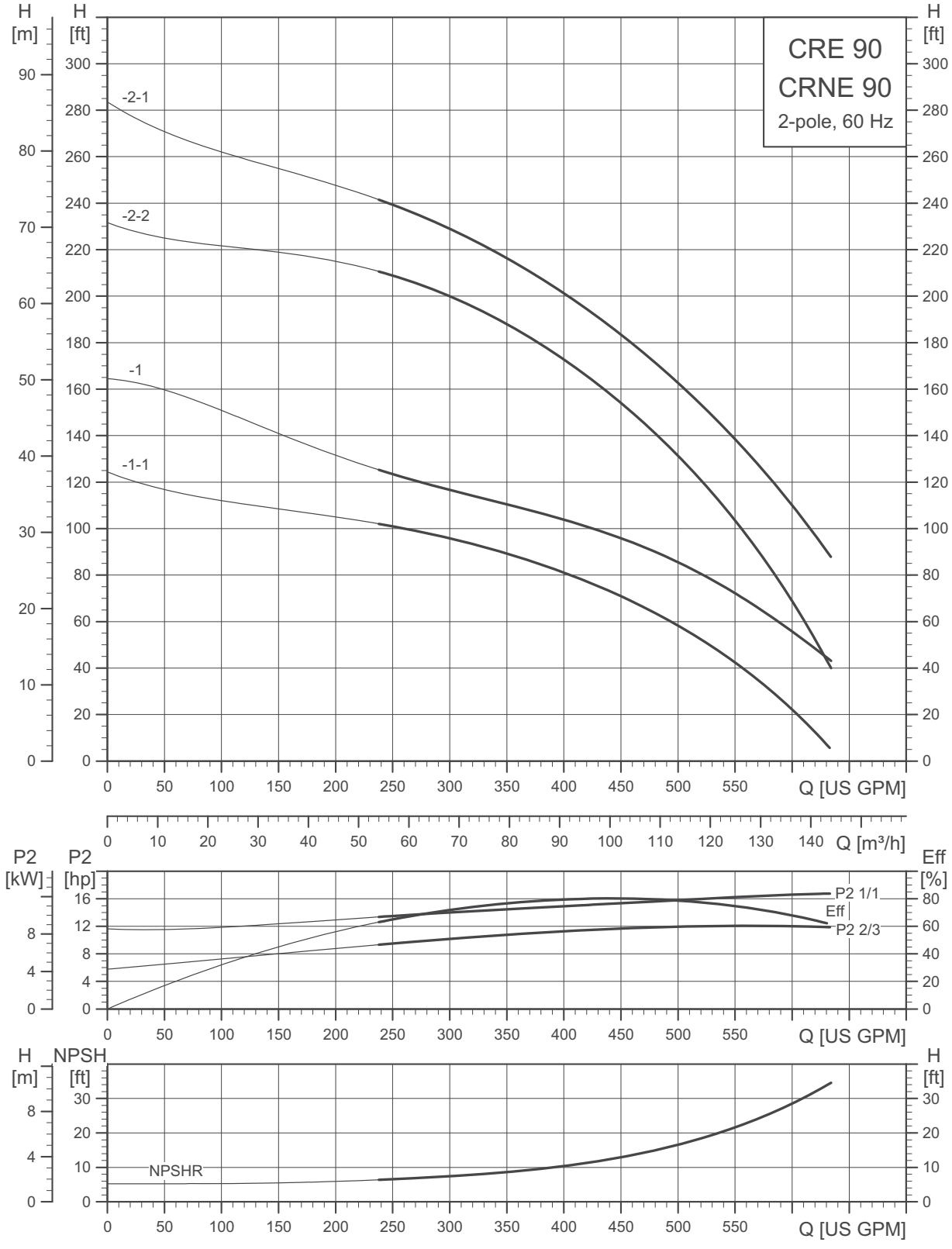

TM02 7705 1009

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRNE 64-1-1 | 10 | 3 | 460-480 | 213TC | 22.09 | 8.39 | 10.24 | 37.01 | 307 |
| CRNE 64-1 | 15 | 3 | 460-480 | 254TC | 26.42 | 13.39 | 12.13 | 45.20 | 535 |
| CRNE 64-2-1 | 20 | 3 | 460-480 | 254TC | 29.69 | 13.39 | 12.13 | 48.47 | 566 |
| CRNE 64-2 | 25 | 3 | 460-480 | 284TSC | 29.69 | 13.39 | 12.13 | 52.41 | 595 |
| CRNE 64-3-2 | 30 | 3 | 460-480 | 284TSC | 32.91 | 13.39 | 12.13 | 55.63 | 666 |

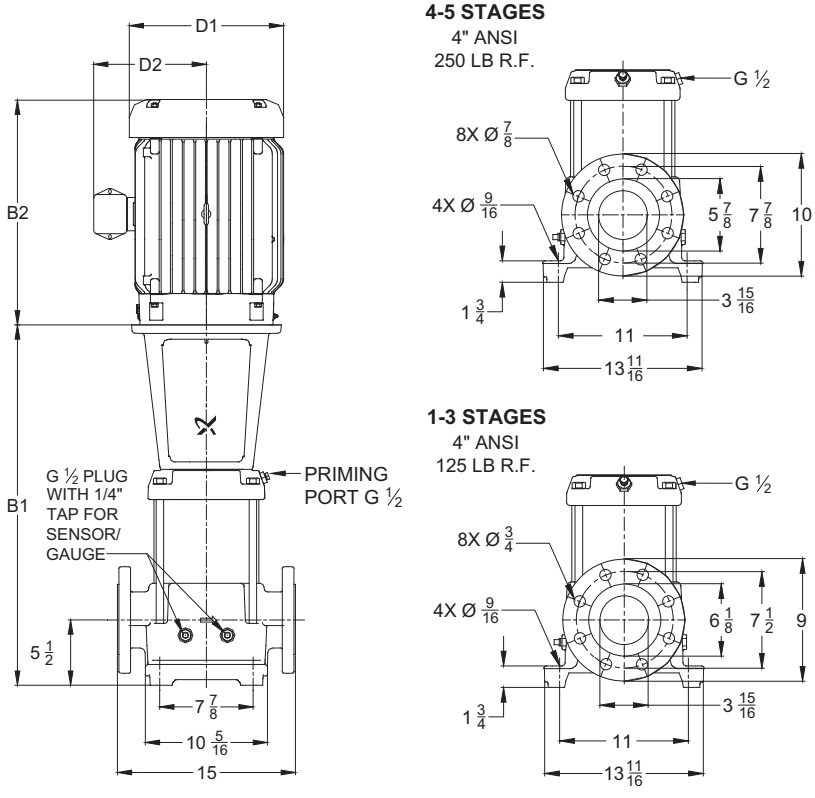
All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

## CRE, CRNE 90


CRE 90
CRNE 90
2-pole, 60 Hz
H [m]
H [ft]
-2-1
-2-2
-1
-1-1
Q [US GPM]
Q [m³/h]
P2 [kW]
P2 [hp]
Eff [%]
P2 1/1
Eff
P2 2/3
H [m]
NPSH [ft]
NPSHR
TM05 9420 4313

## CRE 90 dimensional data



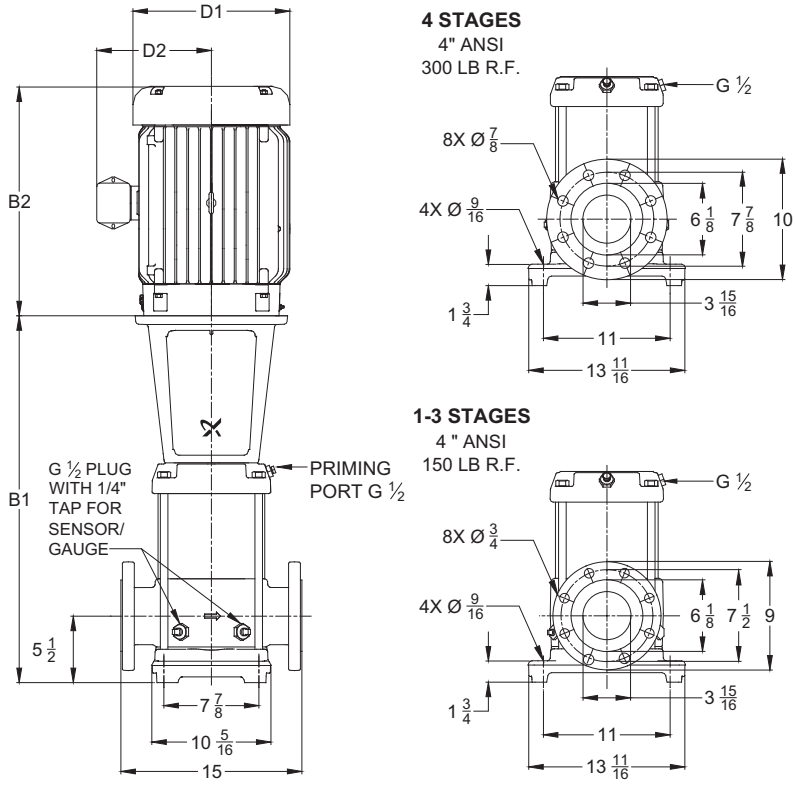

TM02 7702 3804

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRE 90-1-1 | 15 | 3 | 460-480 | 254TC | 26.81 | 13.39 | 12.13 | 45.59 | 544 |
| CRE 90-1 | 20 | 3 | 460-480 | 254TC | 26.81 | 13.39 | 12.13 | 45.59 | 548 |
| CRE 90-2-2 | 25 | 3 | 460-480 | 284TSC | 30.43 | 13.39 | 12.13 | 53.15 | 640 |
| CRE 90-2-1 | 30 | 3 | 460-480 | 284TSC | 30.43 | 13.39 | 12.13 | 53.15 | 666 |

All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

## CRNE 90 dimensional data



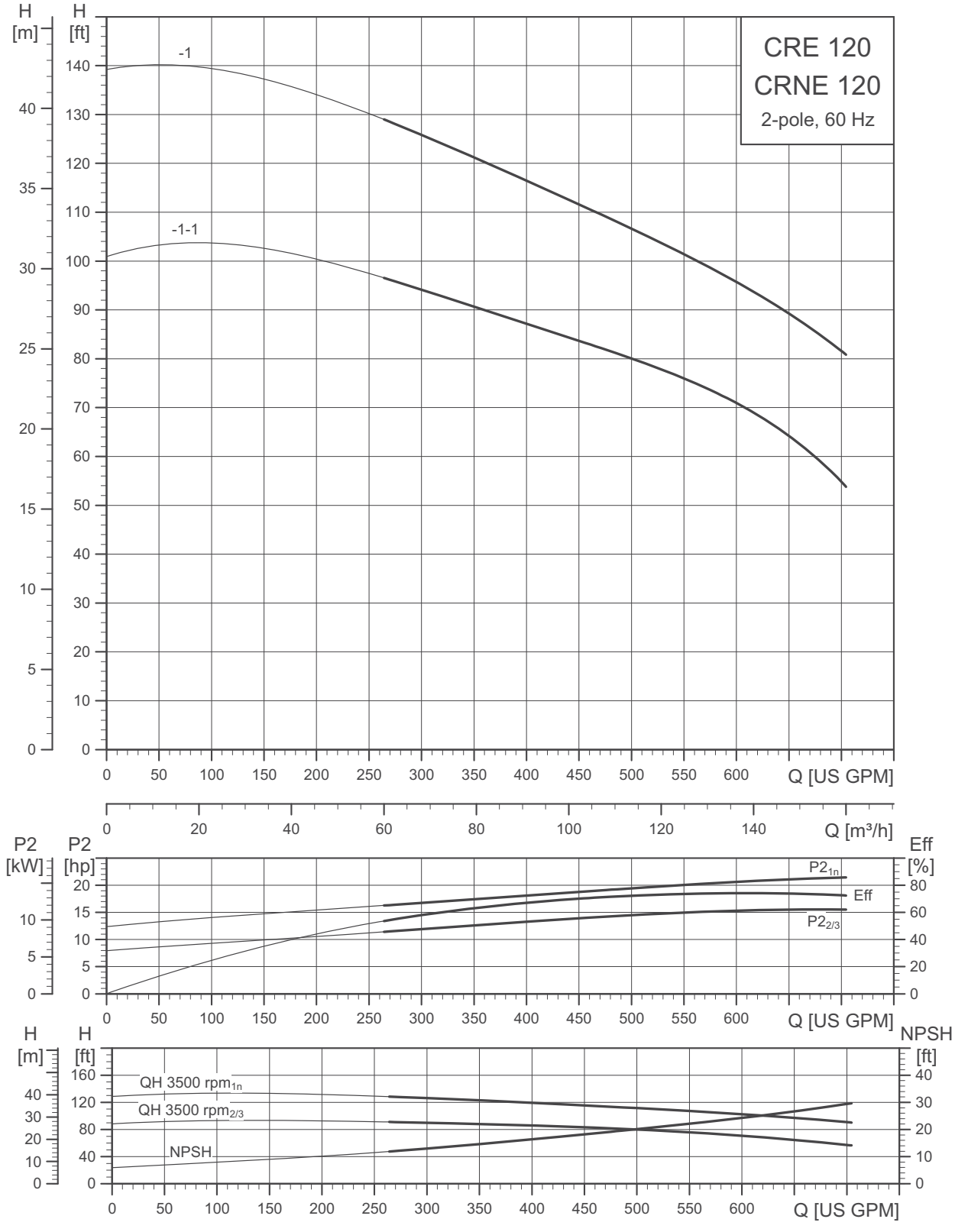

TM02 7706 3804

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRNE 90-1-1 | 15 | 3 | 460-480 | 254TC | 26.81 | 13.39 | 12.13 | 45.59 | 549 |
| CRNE 90-1 | 20 | 3 | 460-480 | 254TC | 26.81 | 13.39 | 12.13 | 45.59 | 553 |
| CRNE 90-2-2 | 25 | 3 | 460-480 | 284TSC | 30.43 | 13.39 | 12.13 | 53.15 | 645 |
| CRNE 90-2-1 | 30 | 3 | 460-480 | 284TSC | 30.43 | 13.39 | 12.13 | 53.15 | 671 |

All dimensions in inches unless otherwise noted.

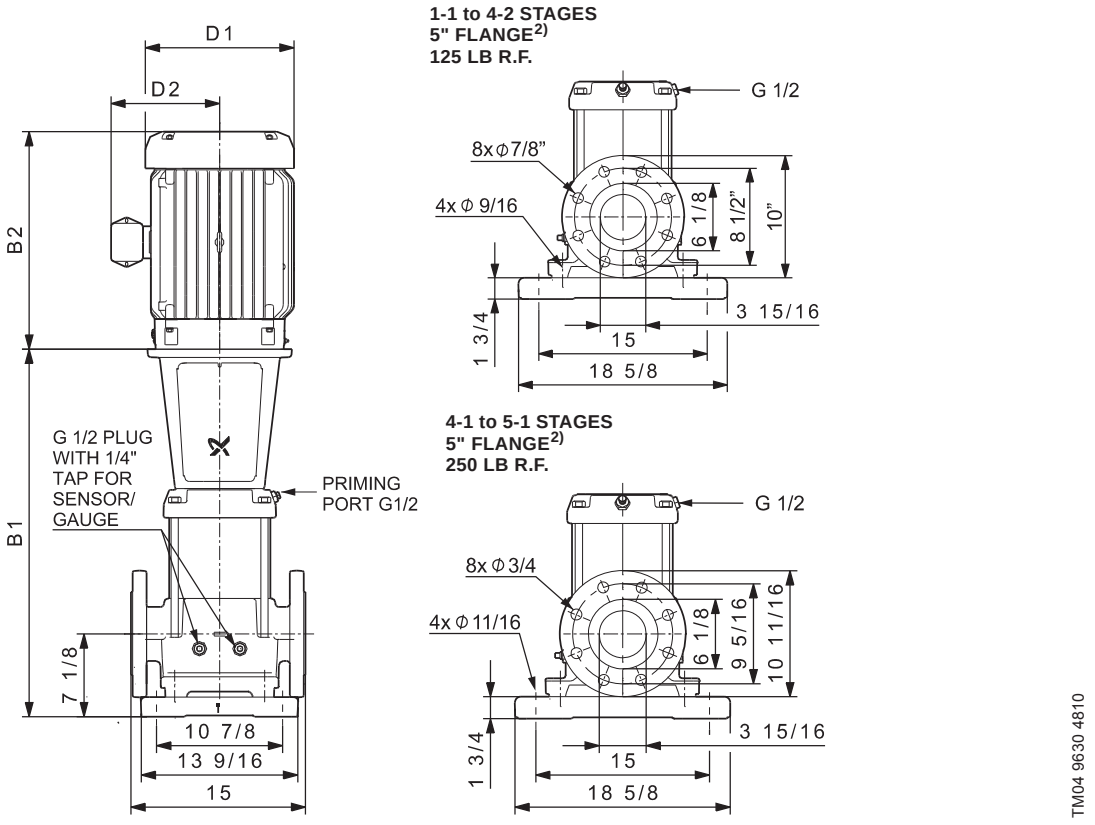
1 Weights are based on pump with MLE motor (see price list for individual weights).

## CRE, CRNE 120




TM05 9421 4313

## CRE 120 dimensional data



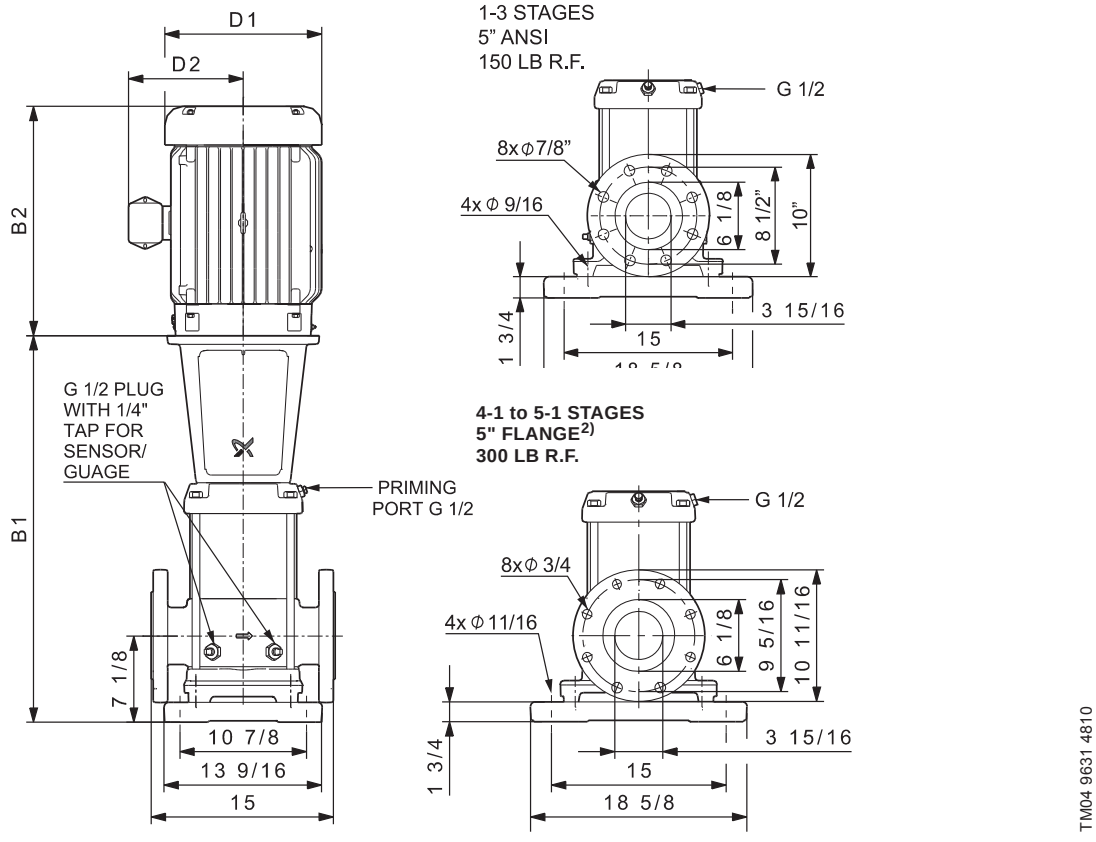

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRE 120-1-1 | 20 | 3 | 460-480 | 254TCZ | 32.83 | 13.39 | 12.13 | 51.61 | 534 |
| CRE 120-1 | 25 | 3 | 460-480 | 284TSCZ | 32.83 | 13.39 | 12.13 | 55.55 | 561 |

All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

2 CR 5" flange is not manufactured to ANSI specification. Gasket contact surface is approximately 0.25". CR 6" ANSI flange adapter is manufactured to ANSI B16.5 specification.

## CRNE 120 dimensional data



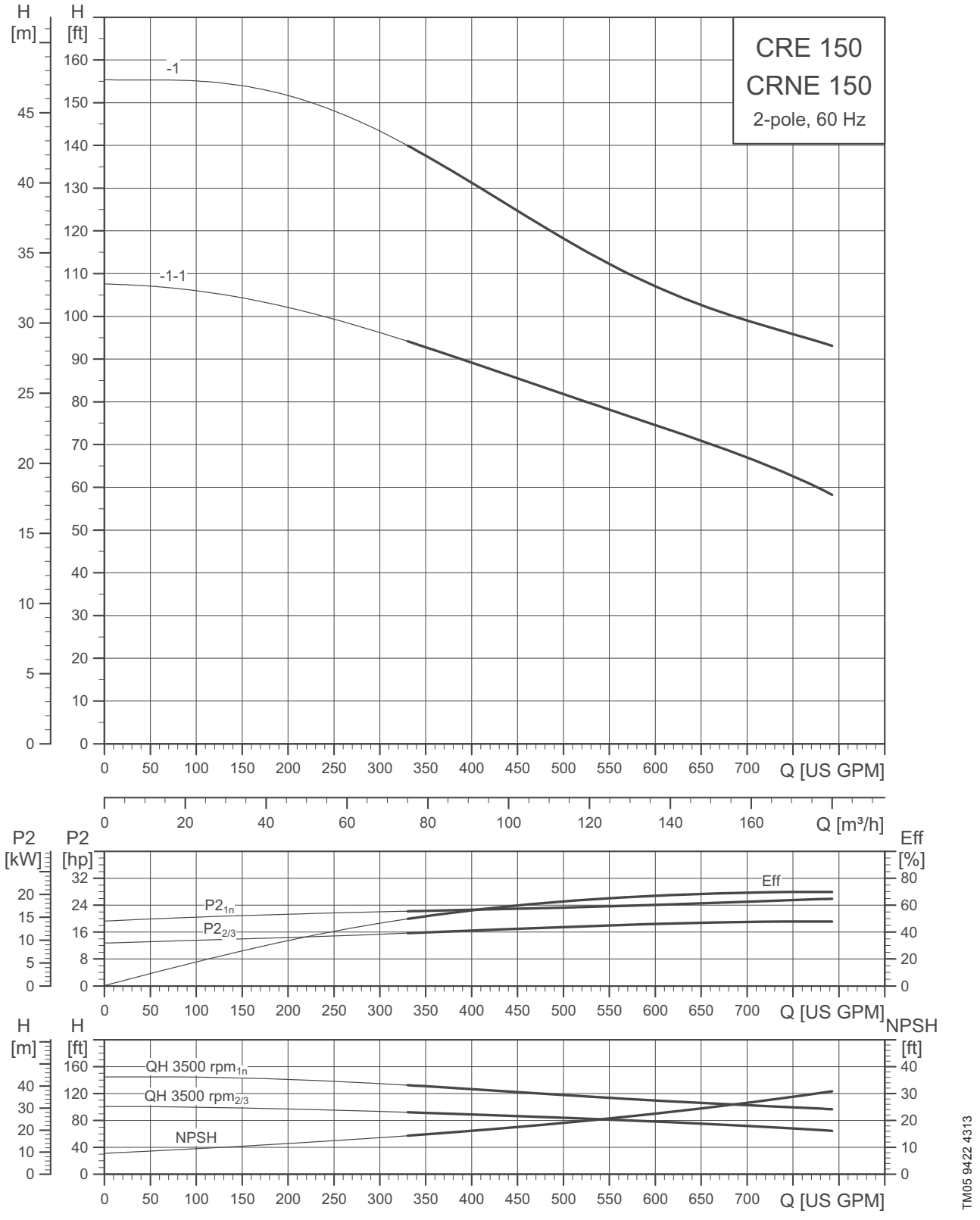

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRNE 120-1-1 | 20 | 3 | 460-480 | 254TCZ | 32.83 | 13.39 | 12.13 | 51.61 | 541 |
| CRNE 120-1 | 25 | 3 | 460-480 | 284TSCZ | 32.83 | 13.39 | 12.13 | 55.55 | 568 |

All dimensions in inches unless otherwise noted.

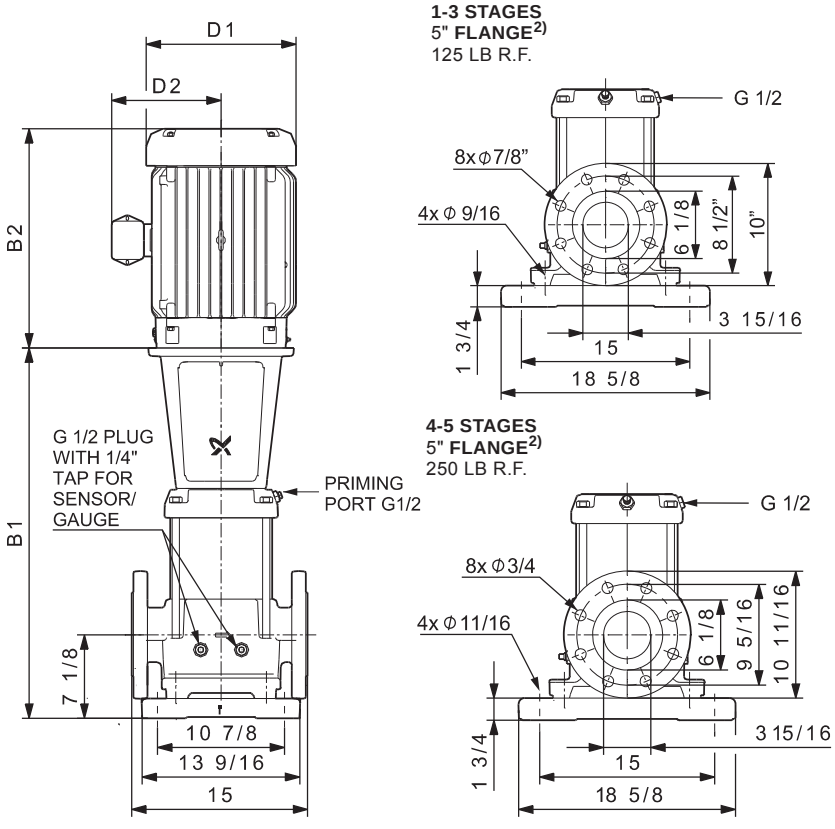
1 Weights are based on pump with MLE motor (see price list for individual weights).

2 CR 5" flange is not manufactured to ANSI specification. Gasket contact surface is approximately 0.25". CR 6" ANSI flange adapter is manufactured to ANSI B16.5 specification.

## CRE, CRNE 150


CRE 150
CRNE 150
2-pole, 60 Hz
H [m]
H [ft]
-1
-1-1
Q [US GPM]
Q [m³/h]
P2 [kW]
P2 [hp]
P2$_{1n}$
P2$_{2/3}$
Eff [%]
Eff
H [m]
H [ft]
QH 3500 rpm$_{1n}$
QH 3500 rpm$_{2/3}$
NPSH [ft]
NPSH
TM05 9422 4313

## CRE 150 dimensional data



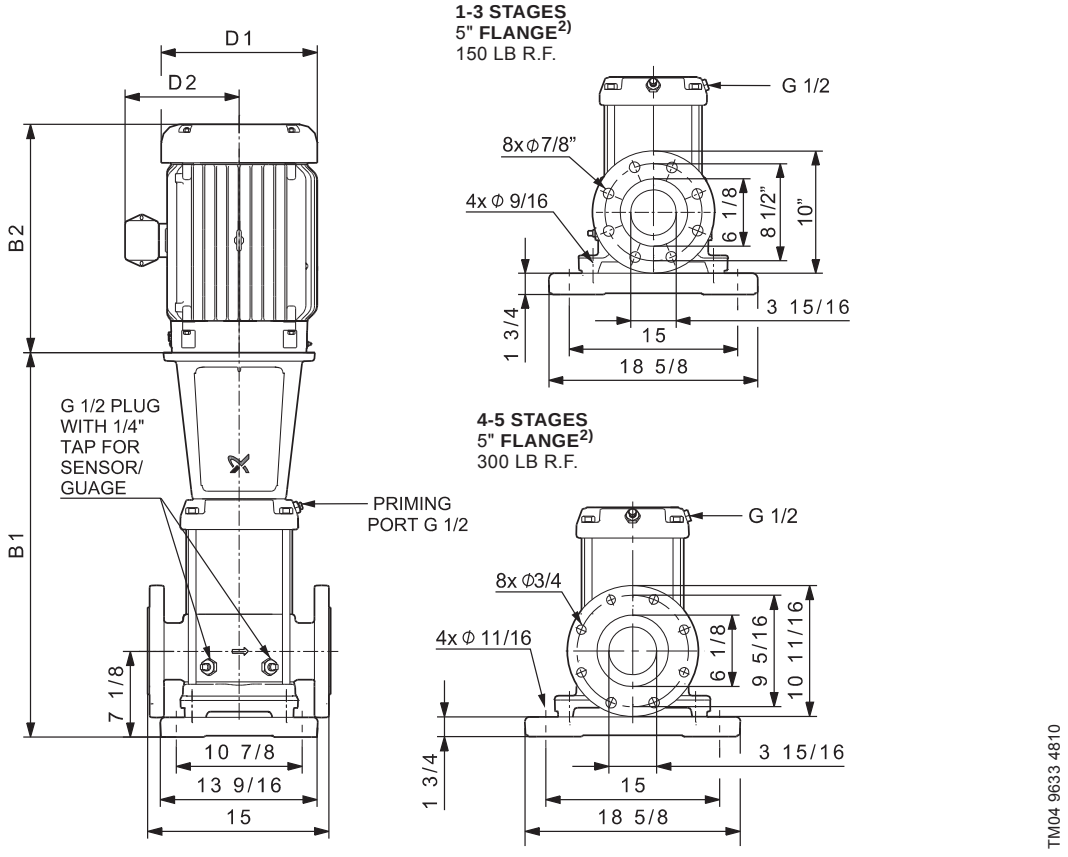

| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRE 150-1-1 | 25 | 3 | 460-480 | 284TSCZ | 32.83 | 13.39 | 12.13 | 55.55 | 561 |
| CRE 150-1 | 30 | 3 | 460-480 | 284TSCZ | 32.83 | 13.39 | 12.13 | 55.55 | 587 |

All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

2 CR 5" flange is not manufactured to ANSI specification. Gasket contact surface is approximately 0.25". CR 6" ANSI flange adapter is manufactured to ANSI B16.5 specification.

## CRNE 150 dimensional data




| Pump type | [Hp] | Ph | Voltage [V] | NEMA frame size | ANSI B1 [in] | MLE D1 [in] | MLE D2 [in] | ANSI MLE B1+B2 [in] | ANSI ship wt.[1] [lbs.] |
|---|---|---|---|---|---|---|---|---|---|
| CRNE 150-1-1 | 25 | 3 | 460-480 | 284TSCZ | 32.83 | 13.39 | 12.13 | 55.55 | 568 |
| CRNE 150-1 | 30 | 3 | 460-480 | 284TSCZ | 32.83 | 13.39 | 12.13 | 55.55 | 594 |

All dimensions in inches unless otherwise noted.

1 Weights are based on pump with MLE motor (see price list for individual weights).

2 CR 5" flange is not manufactured to ANSI specification. Gasket contact surface is approximately 0.25". CR 6" ANSI flange adapter is manufactured to ANSI B16.5 specification.

# 11. Motor data

## For CRE, CRIE, CRNE 60 Hz pumps

TM03 1712 2705

### 2 pole

| Hp | Short type designation | Voltage [V] | Ph | NEMA frame Size | Service Factor | Motor full load efficiency [%] | Full load current amps** [A] | Service factor current amps [A] | Power factor | Full load speed [rpm] | Sound pressure level [dB(A)] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/2[1)] | MLE071A2HA | 200-240 | 1 | 56C | 1 | 81.0 | 2.4 - 2.1 | - | 0.96 | 3400 | 58 |
| 3/4[1)] | MLE071A2HA | 200-240 | 1 | 56C | 1 | 84.0 | 3.4 - 2.9 | - | 0.98 | 3400 | 58 |
| 1[1)] | MLE080A2HA | 200-240 | 1 | 56C | 1 | 85.0 | 4.6 - 3.8 | - | 0.99 | 3400 | 58 |
| 1[1)] | MLE080A2IA | 440-480 | 3 | 56C | 1.25 | 86.0 | 1.40 | 1.75 | 0.82 | 3480 | 58 |
| 1 1/2[1)] | MLE080B2HA | 200-240 | 1 | 56C | 1 | 87.5 | 6.55 - 5.45 | - | 0.99 | 3400 | 58 |
| 1 1/2[2)] | MLE90CC-2-56C-G | 208-230 | 3 | 56C | 1 | 82.5 | 4.35 - 4.05 | - | 0.94 | 3480 | 65 |
| 1 1/2[1)] | MLE080B2IA | 440-480 | 3 | 56C | 1.15 | 88.5 | 1.90 | 2.10 | 0.85 | 3480 | 58 |
| 2[1)] | MLE090C2HA | 200-240 | 1 | 56C | 1 | 86.5 | 8.9 - 7.45 |  | 0.99 | 3400 | 64 |
| 2[2)] | MLE90CC-2-56C-G | 208-230 | 3 | 56C | 1 | 84 | 5.75 - 5.25 | - | 0.95 | 3460 | 70 |
| 2[1)] | MLE090C2IA | 440-480 | 3 | 56C | 1.15 | 88.0 | 2.60 | 2.90 | 0.87 | 3480 | 64 |
| 3[2)] | MLE90FA-2-182TC-G | 208-230 | 3 | 182TC | 1 | 85.5 | 8.3 - 7.6 | - | 0.95 | 3460 | 70 |
| 3[1)] | MLE090D2IA | 440-480 | 3 | 182TC | 1.15 | 89.0 | 3.70 | 4.25 | 0.89 | 3480 | 64 |
| 5[2)] | MLE112CA-2-184TC-G | 208-230 | 3 | 184TC | 1 | 87.5 | 13.8 - 13.3 | - | 0.94 | 3470 | 75 |
| 5[2)] | MLE112CA-2-184TC-G | 460-480 | 3 | 184TC | 1.15 | 88.5 | 6.1 | 7 | 0.92 | 3470 | 75 |
| 7 1/2[2)] | MLE132DA-2-215TC-G | 208-230 | 3 | 215TC | 1 | 88.5 | 20.0 - 18.5 | - | 0.94 | 3450 | 80 |
| 7 1/2[2)] | MLE132DA-2-215TC-G | 460-480 | 3 | 215TC | 1.15 | 88.5 | 8.9 | 10.3 | 0.94 | 3470 | 80 |
| 10[2)] | MLE132FA-2-215TC-G | 460-480 | 3 | 215TC | 1.15 | 89.5 | 11.6 | 13.4 | 0.93 | 3500 | 80 |
| 15[2)] | MLE160AA-2- 254TC-F | 460-480 | 3 | 254TC | 1.15 | 90.2 | 18 | 20.6 | 0.89 | 3500 | 68 |
| 20[2)] | MLE160AB-2- 256TC-F | 460-480 | 3 | 256TC | 1.15 | 90.2 | 24 | 27.5 | 0.89 | 3540 | 68 |
| 25[2)] | MLE160AC-2- 284TC-F | 460-480 | 3 | 284TC | 1.15 | 91 | 30.5 | 35 | 0.88 | 3540 | 70 |
| 30[2)] | MLE180AA-2- 286TC-F | 460-480 | 3 | 286TC | 1.15 | 91 | 36.5 | 42 | 0.88 | 3540 | 70 |

1) Permanent magnet motor

2) Asynchronous motor

** At 460 volts for 460-480 volt motors

# 12. Pumped liquids

## Pumped liquids

Thin, non-explosive liquids, not containing solid particles or fibers. The liquid must not chemically attack the pump materials. When pumping liquids with a density and/or viscosity higher than that of water, oversized motors must be used, if required.

Whether a pump is suitable for a particular liquid depends on a number of factors of which the most important are the chloride content, pH value, temperature and content of chemicals, oils, etc.

Please note that aggressive liquids (e.g. sea water and some acids) may attack or dissolve the protective oxide film of the stainless steel and thus cause corrosion. The CRE, CRIE, CRNE pump types are suitable for the following liquids:

**CRE, CRIE**

- Non-corrosive liquids.

For liquid transfer, circulation and pressure boosting of cold or hot clean water.

**CRNE**

- Industrial liquids.

In systems where all parts in contact with the liquid must be made of high-grade stainless steel.

**CRTE**

- Saline liquids
- hypochlorites
- acids.

For saline or chloride-containing liquids such as sea water or oxidizing agents such as hypochlorites, CRTE pumps of titanium are available. See separate product guide on CRT(E).

## List of pumped liquids

A number of typical liquids are listed on the following pages.

Other pump versions may be applicable, but those stated in the list are considered to be the best choices. The table is intended as a general guide only, and cannot replace actual testing of the pumped liquids and pump materials under specific working conditions.

The list should, however, be applied with some caution as factors such as the following may affect the chemical resistance of a specific pump version:

- Concentration of the pumped liquid
- liquid temperature
- pressure.

Safety precautions must be made when pumping dangerous liquids.

**Notes**

| | |
|---|---|
| **D** | Often with additives. |
| **E** | Density and/or viscosity differ from that of water. Allow for this when calculating motor output and pump performance. |
| **F** | Pump selection depends on many factors. Contact Grundfos. |
| **H** | Risk of crystallization/precipitation in shaft seal |
| **1** | The pumped liquid highly inflammable. |
| **2** | The pumped liquid is combustible. |
| **3** | Insoluble in water. |
| **4** | Low self-ignition point. |

| Pumped liquid | Note | Liquid concentration, liquid temperature | CRE, CRIE | | CRNE | |
|---|---|---|---|---|---|---|
| | | | 1, 3, 5, 10, 15, 20 | 32, 45, 64, 90, 120, 150 | 1, 3, 5, 10, 15, 20 | 32, 45, 64, 90, 120, 150 |
| Acetic acid $CH_3COOH$ | | 5 %, 68 °F | | | HQQE | HQQE/ HBQE |
| Acetone $CH_3COCH_3$ | 1, F | 100 %, 68 °F | | | HBQE | KUBE/ HBQE |
| Alkaline degreasing agent | D, F | | HQQE | KUHE/ HBQE | | |
| Ammonium bicarbonate $NH_4HCO_3$ | E | 20 %, 86 °F | | | HQQE | KUHE/ HBQE |
| Ammonium hydroxide $NH_4OH$ | | 20 %, 104 °F | HQQE | KUBE/ HBQE | | |
| Aviation fuel | 1, 3, 4, F | 100 %, 68 °F | HQBV | KUBV/ HBQV | | |
| Benzoic acid $C_6H_5COOH$ | H | 0,5 %, 68 °F | | | HQQV | KUBV/ HBQV |
| Boiler water | | < 248 °F | HQQE | KUBE/ HBQE | | |
| | F | 248 °F - 356 °F | - | - | | |
| Calcareous water | | < 194 °F | HQQE | KUHE | | |
| Calcium acetate (as coolant with inhibitor) $Ca(CH_3COO)_2$ | D, E | 30 %, 122 °F | HQQE | KUHE | | |
| Calcium hydroxide $Ca(OH)_2$ | E | Saturated solution, 122 °F | HQQE | KUHE | | |
| Chloride-containing water | F | < 86 °F, max. 500 ppm | | | HQQE | KUHE |
| Chromic acid $H_2CrO_4$ | H | 1 %, 68 °F | | | HQQV | HQQV/ HBQV |
| Citric acid $HOC(CH_2CO_2H)_2COOH$ | H | 5 %, 104 °F | | | HQQE | KUHE/ HBQE |
| Completely desalinated water (demineralized water) | | < 248 °F | | | HQQE | KUBE/ HBQE |
| Condensate | | < 194 °F | HQQE | KUHE/ HBQE | | |
| Copper sulfate $CuSO_4$ | E | 10 %, 122 °F | | | HQQE | KUHE |
| Corn oil | D, E, 3 | 100 %, 176 °F | HQQV | KUHV/ HBQV | | |
| Diesel oil | 2, 3, 4, F | 100 %, 68 °F | HQBV | KUBV/ HBQV | | |
| Domestic hot water (potable water) | | < 248 °F | HQQE | KUBE/ HBQE | | |
| Ethanol (ethyl alcohol) $C_2H_5OH$ | 1, F | 100 %, 68 °F | HQQE | KUBE/ HBQE | | |
| Ethylene glycol $HOCH_2CH_2OH$ | D, E | 50 %, 122 °F | HQQE | KUHE | | |
| Formic acid HCOOH | | 5 %, 68 °F | | | HQQE | KUBE/ HBQE |
| Glycerine (glycerol) $OHCH_2CH(OH)CH_2OH$ | D, E | 50 %, 122 °F | HQQE | KUHE/ HBQE | | |
| Hydraulic oil (mineral) | E, 2, 3 | 100 %, 212 °F | HQQV | KUBV/ HBQE | | |
| Hydraulic oil (synthetic) | E, 2, 3 | 100 %, 212 °F | HQQV | KUBV/ HBQE | | |
| Isopropyl alcohol $CH_3CHOHCH_3$ | 1, F | 100 %, 68 °F | HQBV | KUBV/ HBQV | | |
| Lactic acid $CH_3CH(OH)COOH$ | E, H | 10 %, 68 °F | | | HQQE | KUBE/ HBQE |
| Linoleic acid $C_{17}H_{31}COOH$ | E, 3 | 100 %, 68 °F | HQQV | KUBV/ HBQV | | |
| Methanol (methyl alcohol) $CH_3OH$ | 1, F | 100 %, 68 °F | HQQE | KUBE/ HBQE | | |
| Motor oil | E, 2, 3 | 100 %, 176 °F | HQQV | KUBV/ HBQV | | |
| Naphthalene $C_{10}H_8$ | E, H | 100 %, 176 °F | HQQV | KUHV/ HBQV | | |
| Nitric acid $HNO_3$ | F | 1 %, 68 °F | | | HQQE | HQQE/ HBQE |
| Oil-containing water | | < 212 °F | HQQV | KUBV/ HBQV | | |

| Pumped liquid | Note | Liquid concentration, liquid temperature | CRE, CRIE | | CRNE | |
|---|---|---|---|---|---|---|
| | | | 1, 3, 5, 10, 15, 20 | 32, 45, 64, 90, 120, 150 | 1, 3, 5, 10, 15, 20 | 32, 45, 64, 90, 120, 150 |
| Olive oil | D, E, 3 | 100 %, 176 °F | HQQV | KUHV/ HBQV | | |
| Oxalic acid $(COOH)_2$ | H | 1 %, 68 °F | | | HQQE | KUBE/ HBQE |
| Ozone-containing water ($O_3$) | | 1 PPM, < 105 °F | | | HQQE | KUBE/ HBQE |
| Peanut oil | D, E, 3 | 100 %, 194 °F | HQQV | KUHV/ HBQV | | |
| Petrol/gasoline | 1, 3, 4, F | 100 %, 68 °F | HQBV | KUBV/ HBQV | | |
| Phosphoric acid $H_3PO_4$ | E | 20 %, 68 °F | | | HQQV | KUBV/ HBQV |
| Propanol $C_3H_7OH$ | 1, F | 100 %, 68 °F | HQQV | KUBV/ HBQV | | |
| Propylene glycol $CH_3CH(OH)CH_2OH$ | D, E | 50 %, 194 °F | HQQE | KUHE | | |
| Potassium carbonate $K_2CO_3$ | E | 20 %, 122 °F | HQQE | KUHE | | |
| Potassium formate (as coolant with inhibitor) KOOCH | D, E | 30 %, 122 °F | HQQE | KUHE | | |
| Potassium hydroxide KOH | E | 20 %, 122 °F | | | HQQE | KUHE |
| Potassium permanganate $KmnO_4$ | | 5 %, 68 °F | | | HQQE | HQQE/ HBQE |
| Rape seed oil | D, E, 3 | 100 %, 176 °F | HQQV | KUHV/ HBQV | | |
| Salicylic acid $C_6H_4(OH)COOH$ | H | 0,1 %, 68 °F | | | HQQE | KUBE/ HBQE |
| Silicone oil | E, 3 | 100 % | HQQV | KUBV/ HBQV | | |
| Sodium bicarbonate $NaHCO_3$ | E | 10 %, 140 °F | | | HQQE | KUHE/ HBQE |
| Sodium chloride (as coolant) NaCl | D, E | 30 %, < 41 °F, pH > 8 | HQQE | KUHE | | |
| Sodium hydroxide NaOH | E | 20 %, 122 °F | | | HQQE | KUHE |
| Sodium hypochlorite NaOCl | F | 0,1 %, 68 °F | | | HQQE | HQQE |
| Sodium nitrate $NaNO_3$ | E | 10 %, 140 °F | | | HQQE | KUHE/ HBQE |
| Sodium phosphate $Na_3PO_4$ | E, H | 10 %, 140 °F | | | HQQE | KUHE |
| Sodium sulfate $Na_2SO_4$ | E, H | 10 %, 140 °F | | | HQQE | KUHE/ HBQE |
| Softened water | | < 248 °F | | | HQQE | KUBE/ HBQE |
| Soybean oil | D, E, 3 | 100 %, 176 °F | HQQV | KUHV/ HBQV | | |
| Sulfuric acid $H_2SO_4$ | F | 1 %, 68 °F | | | HQQV | KUHV/ KBQV |
| Sulfurous acid $H_2SO_3$ | | 1 %, 68 °F | | | HQQE | KUBE/ HBQE |
| Swimming pool water (low chloride) | | Max 5 ppm free chlorine ($Cl_2$) | HQQE | KUBE/ HBQE | | |

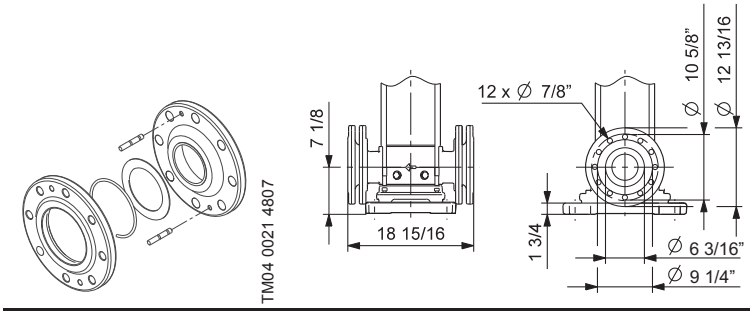
# 13. Accessories

## Pipework connection

For pipework connection, various sets of counter flanges and couplings are available.

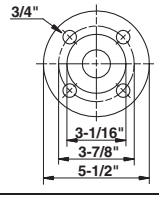
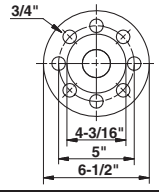
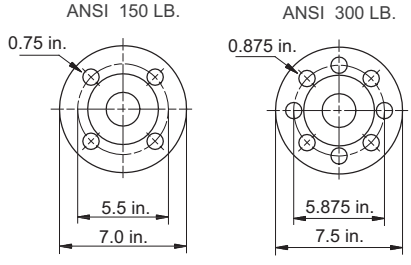
### Adapter kit

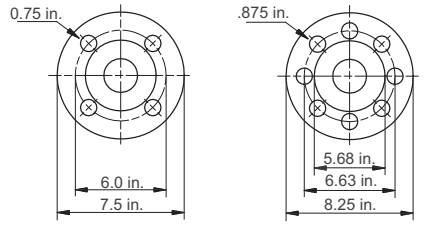
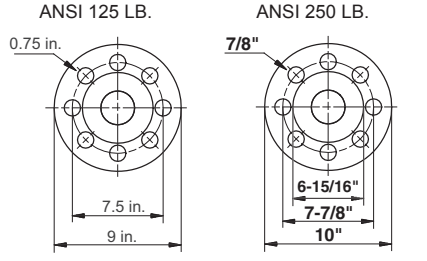
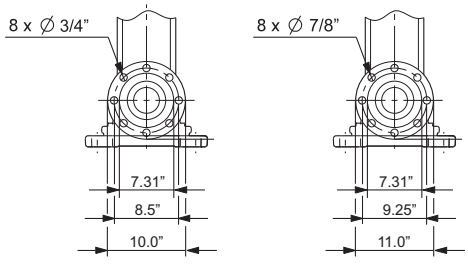
6" flanges are available for CRE, CRNE 120 and 150 pumps. To use 6" flanges, two adapter kits must be ordered per pump.

| Adapter kit | Pump type | Pipe connection | Number of flange kits needed | Product number |
|---|---|---|---|---|
|  | **CRE 120**<br>**CRE 150** | 6" RF<br>250 lb.<br>Ductile iron | 2 | 96638184 |
| | **CRNE 120**<br>**CRNE 150** | 6" RF<br>300 lb.<br>ANSI 316 SS | 2 | 96638186 |

### Counter flanges for CRE

A set consists of two counter flanges, two gaskets, bolts and nuts.

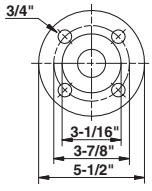
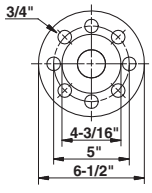
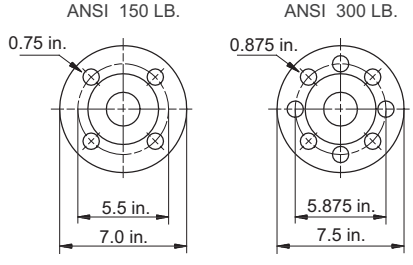
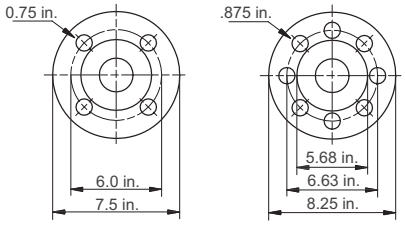
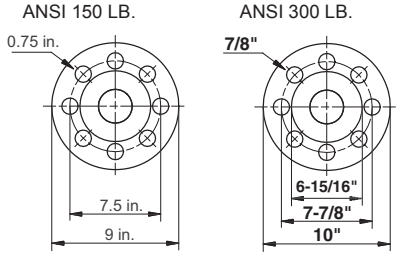
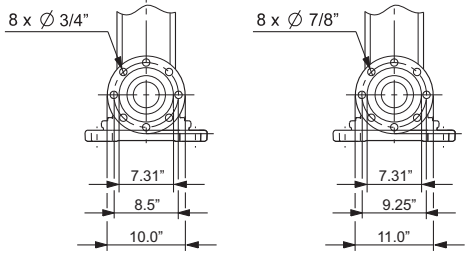
| Counter flange | | Pump type | Description | Pressure class | Pipework connection | Product number |
|---|---|---|---|---|---|---|
|  | TM02 5691 3802 | **CRE 1**<br>**CRE 3**<br>**CRE 5** | Threaded | ANSI 250 lb. | 1 1/4" NPT | 91122260 |
|  | TM02 5692 3802 | **CRE 10**<br>**CRE 15**<br>**CRE 20** | Threaded | ANSI 250 lb. | 2" NPT | 335021 |
|  | TM02 5693 3802 - TM02 5694 3802 | **CRE 32** | Threaded | ANSI 125 lb. | 2 1/2" NPT | 559601 |
| | | | Threaded | ANSI 250 lb. | 2 1/2" NPT | 345050 |

| Counter flange | Pump type | Description | Pressure class | Pipework connection | Product number |
|---|---|---|---|---|---|
|  TM02 5695 3802 - TM02 5696 3802 | **CRE 45** | Threaded | ANSI 125 lb. | 3" NPT | 569601 |
| | | Threaded | ANSI 250 lb. | 3" NPT | 91121952 |
|  TM02 5697 3802 - TM02 5698 3802 | **CRE 64**<br>**CRE 90** | Threaded | ANSI 125 lb. | 4" NPT | 579801 |
| | | Threaded | ANSI 250 lb. | 4" NPT | 3600028 |
|  | **CRE 120**<br>**CRE 150** | Threaded | ANSI 125 lb. | 5" NPT | 91121956 |
| | | Threaded | ANSI 250 lb. | 5" NPT | 91121957 |

### Counter flanges for CRNE

Counterflanges for CRNE pumps are made of stainless steel according to AISI 316.

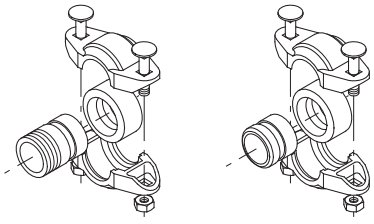
A set consists of two counter flanges, two gaskets, bolts and nuts.

| Counter flange | | Pump type | Description | Pressure class | Pipework connection | Product number |
|---|---|---|---|---|---|---|
|  | TM02 5691 3802 | **CRIE, CRNE 1, 3 and 5** | Threaded | ANSI 300 lb. | 1 1/4" NPT | 91129013 |
|  | TM02 5692 3802 | **CRIE, CRNE 10, 15, 20** | Threaded | ANSI 300 lb. | 2" NPT | 339919 |
|  | TM02 5693 3802 - TM02 5694 3802 | **CRNE 32** | Threaded | ANSI 150 lb. | 2 1/2" NPT | 91121951 |
| | | | Threaded | ANSI 300 lb. | 2 1/2" NPT | 0ID00138 |
|  | TM02 5695 3802 - TM02 5696 3802 | **CRNE 45** | Threaded | ANSI 150 lb. | 3" NPT | 91121953 |
| | | | Threaded | ANSI 300 lb. | 3" NPT | 91121954 |
|  | TM02 5697 3802 - TM02 5698 3802 | **CRNE 64 CRNE 90** | Threaded | ANSI 150 lb. | 4" NPT | 0ID00148 |
| | | | Threaded | ANSI 300 lb. | 4" NPT | 91121955 |
|  | | **CRNE 120 CRNE 150** | Threaded | ANSI 150 lb. | 5" NPT | 91121958 |
| | | | Threaded | ANSI 300 lb. | 5" NPT | 91121959 |

### PJE couplings for CRNE

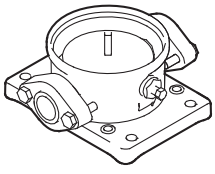
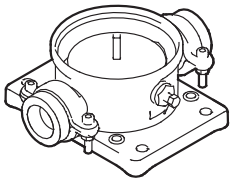
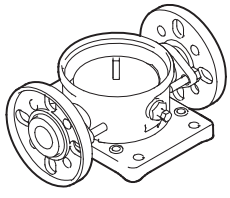
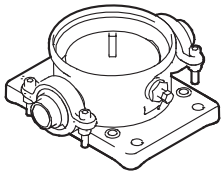
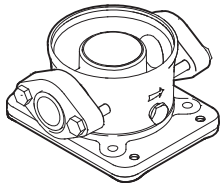
Couplings for CRNE pumps are made of stainless steel according to AISI 316.

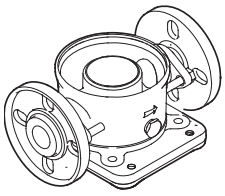
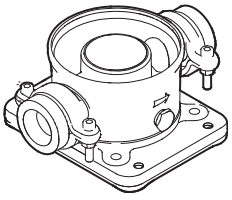
A set consists of two couplings, two gaskets, two pipe stub and bolts and nuts.

| Couplings | Pump type | Pipe stub | Rated pressure | Pipework connection | Rubber parts | Number of coupling sets needed | Product number |
|---|---|---|---|---|---|---|---|
|  TM00 3808 1094 | **CRIE, CRNE 1, 3 and 5** | Threaded | 1160 psi | 1 1/4" NPT | EPDM | 1 | 4013010 |
| | | | | | FKM | 1 | 0ID00118 |
| | **CRIE, CRNE 10, 15 and 20** | Threaded | 1015 psi | 2" NPT | EPDM | 1 | 331301 |
| | | | | | FKM | 1 | 0ID00128 |

### FlexiClamp base connections

All sets comprise the necessary number of bolts and nuts as well as a gasket/O-ring.

| Base connections | Pump type | Connection | Pipework connection | Rubber parts | Product number |
|---|---|---|---|---|---|
|  TM02 1144 0601 | **CRIE, CRNE 1, 3 and 5** | Oval (cast iron) | 1" NPT | Klingersil | 96468491 |
| | | | 1 1/4" NPT | Klingersil | 96470781 |
| | | Oval (stainless steel) | 1" NPT | Klingersil | 96480850 |
| | | | 1 1/4" NPT | Klingersil | 96480851 |
|  TM02 1145 0601 | **CRIE, CRNE 1, 3 and 5** | Union ext. threaded | 2" NPT | EPDM | 96480852 |
| | | | | FKM | 96480853 |
|  TM02 1146 0601 | **CRIE, CRNE 1, 3 and 5** | ANSI (FGJ) (stainless steel) | 1 1/4" NPT | EPDM | 96480858 |
| | | | | FKM | 96480859 |
|  TM02 1147 0601 | **CRIE, CRNE 1, 3 and 5** | Clamp, threaded pipe stub | 1" NPT | EPDM | 96480854 |
| | | | | FKM | 96480855 |
| | | | 1 1/4" NPT | EPDM | 96480856 |
| | | | | FKM | 96480857 |
|  TM02 7237 2803 | **CRIE, CRNE 10, 15 and 20** | Oval (cast iron) | 2" NPT | Klingersil | 96498838 |
| | | Oval (stainless steel) | 2" NPT | Klingersil | 96498839 |

| Base connections | Pump type | Connection | Pipework connection | Rubber parts | Product number |
|---|---|---|---|---|---|
|  TM02 7238 2803 | **CRIE, CRNE 10, 15 and 20** | ANSI (FGJ) (stainless steel) | 2" NPT | EPDM | 96511402 |
| | | | | FKM | 96511403 |
|  TM02 7239 2803 | **CRIE, CRNE 10, 15 and 20** | Clamp, threaded pipe stub | 1 1/2" NPT | EPDM | 96500271 |
| | | | | FKM | 96500272 |
| | | | 2" NPT | EPDM | 96500273 |
| | | | | FKM | 96500274 |
| | | | 2 " NPT | EPDM | 96508602 |
| | | | | FKM | 96508603 |

## Potentiometer for CRE, CRIE, CRNE

Potentiometer for setpoint setting and start/stop of the CRE, CRIE, CRNE pump.

| Product | Product number |
|---|---|
| External potentiometer with cabinet for wall mounting | 625468 |

# LiqTec

## Description

LiqTec features:

- Protects the pump against dry-running.
- Protects the pump against too high liquid temperature (+266 °F ± 9 °F (130 °C ± 5 °C)).
- Has a fail-safe design. If the sensor, sensor cable, electronic unit or power supply fails, the pump stops immediately.
- The LiqTec is **not** to be used with the MGFlex motor.

## Mounting the LiqTec sensor

The LiqTec can be fitted to a DIN rail to be incorporated in a control cabinet.

## Electrical connection

Example of electrical connection, see page 98.

## Calibration of sensor and controller

Follow the procedure on the next page.

## Functions

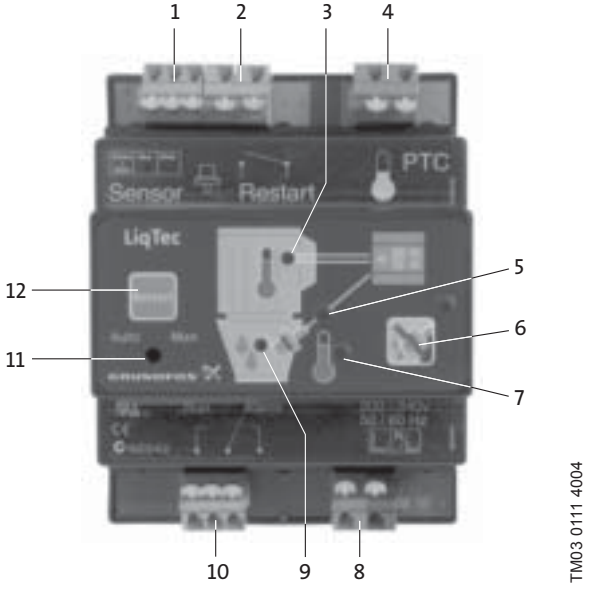



**Fig. 56** LiqTec functions

1. **Connection for dry-running sensor**
2. **Connection for external restarting**
3. **Motor PTC**
   Green light indicates OK or short-circuited terminals.
   Red light indicates too high motor temperature. The alarm relay is activated.
4. **Connection for PTC sensor**
   This input is not used in connection with E-pumps as the variable frequency drive protects the motor against overload.
5. **Sensor indicator light**
   Red light indicates defective sensor or cable. The alarm relay is activated.
6. **Deactivation of the dry-running monitoring function**
   Press the button to deactivate the dry-running monitoring function. Red flashing light. The PTC monitoring function is still active.
   Press [Restart] to reactivate the dry-running monitoring function.
7. **High liquid temperature indicator light**
   Red light indicates too high liquid temperature (+266 °F ± 9 °F (130 °C ± 5 °C)). The alarm relay is activated.
8. **Supply voltage**
   200-240 VAC, 50/60 Hz and 80-130 VAC 50/60 Hz.
9. **Dry-running indicator light**
   Green light indicates OK (liquid in pump).
   Red light indicates dry running (no liquid in pump). The alarm relay is activated.
10. **Alarm/Run relay output**
    Potential-free changeover contact.
    Maximum contact load: 250 V, 1 A, AC (inductive load).
11. **Auto/Man**
    Changeover between automatic and manual restarting.
    The default setting is "Man".
    Changeover is carried out by means of a small screwdriver.
    When "Auto" has been selected, the alarm indication will automatically be reset 10 to 20 seconds after detection of liquid.
12. **Restart**
    Press [Restart] to restart the pump. The button has no influence on the PTC monitoring.

## Calibration of sensor and controller

| Step | Action | Result |
|---|---|---|
| 1 | Connect the sensor to pos. 1 on Controller and connect the power supply to pos. 8 on the Controller. See page 98. | |
| 2 | Submerge the sensor into the pumped liquid. The pumped liquid and the air temperature are to be +70 °F.<br>**Note:** It is important that the pumped liquid is stagnant as the calibration will be misleading if the sensor is cooled by flowing water. | |
| 3 | Press the buttons at pos. 6 and pos. 12 on the Controller for approximately 20 seconds. | All red indicator lights (except pos. 7) start flashing. |
| 4 | When the green indicator lights at pos. 3 and pos. 9 on the Controller are constantly on, release the buttons at pos. 6 and pos. 12. | The calibration is completed. |

## Further information

Information related to IEC 60730-1:

- Software class A
- Pollution degree 2
- Type 1.

The LiqTec has been cURus-approved according to UL 508.

Maximum pressure: 580 psi (40 bar).

Maximum liquid temperature: (+266 °F ± 9 °F (130 °C ± 5 °C)).

Maximum ambient temperature: +131 °F (+55 °C).

Power consumption: 5 Watt.

Enclosure class: IPX0.

Maximum cable length: 65.6 ft (20 meters).

Standard cable: 16.4 ft (5 meters).

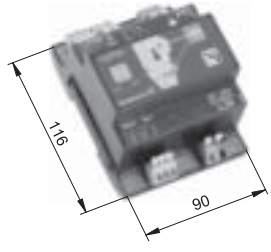
Extension cable: 49.2 ft (15 meters).

**Note:**

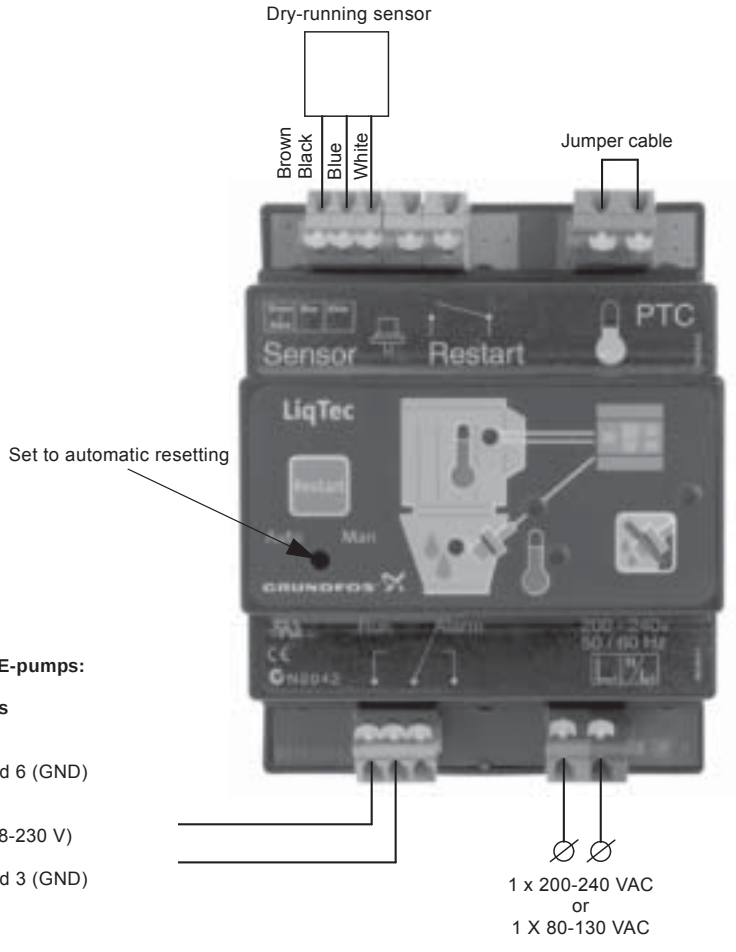
The LiqTec is not be connected to the PTC sensor. Assemble a jumper wire between the two terminals at pos. 4 on the Controller.

The MLE motor software provides protection against high motor temperature.

The LiqTec is designed for DIN rail mounting in a control cabinet.

| Dry-running protection | Single phase power supply | LiqTec | Sensor 1/2" | Cable 16.4 ft (5 m) | Extension cable 49.2 ft (15 m) | Product number |
|---|---|---|---|---|---|---|
|  TM02 1731 2001 | 200-240 VAC | • | • | • | - | 96556429 |
| | 80-130 VAC | • | • | • | - | 96556430 |
| | - | - | - | - | • | 96443676 |
| | - | - | • | • | - | 96556427 |

## Connection of E-pump to LiqTec




**Connection terminals on E-pumps:**

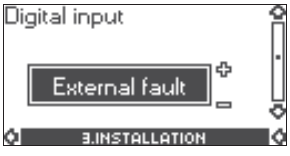
**Permanent magnet motors**
1/2 to 2 Hp (1 x 200-240 V)
1 to 3 Hp (3 x 440-480 V)
Terminals: 2 (Start/Stop) and 6 (GND)

**Asynchronous motors**
1 - 1/2 to 7 - 1/2 Hp (3 x 208-230 V)
5 to 30 Hp (3 x 460-480 V)
Terminals: 2 (Start/Stop) and 3 (GND)

**Fig. 57** Connection of E-pump to LiqTec

## Setting the digital input

The digital input must be set to "External fault" via the R100.




**Note:** After dry-running fault, the E-pump must be restarted manually.

## Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

# Pressure sensor

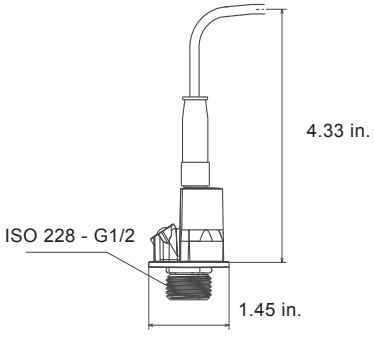
TM04 7865 2510

| Accessory | Supplier | Type | Pressure range [psi (bar)] | Product number EPDM | Product number FKM |
|---|---|---|---|---|---|
| **Pressure sensors** | Grundfos | RPI | 0-87 (0-6) | 97748922 | 97748953 |
| Pressure Transmitter with 6 ft screened cable | | | 0-145 (0-10) | 97748923 | 97748954 |
| Connection: 1/4" - 18 NPT | | | 0-232 (0-16) | 97748924 | 97748955 |
| | | | 0-362 (0-25) | 97748925 | 97748956 |

## Technical data

| **Pressure sensor** | | | | |
|---|---|---|---|---|
| Product number | 97748922<br>97748953 | 97748923<br>97748954 | 97748924<br>97748955 | 97748925<br>97748956 |
| Pressure range [psi (bar)] | 0-87 (0-6) | 0-145 (0-10) | 0-232 (0-16) | 0-362 (0-25) |
| Max. operating pressure [psi (bar)] | 870 (60) | | | |
| Supply voltage | 12.5 - 30 VDC | | | |
| Output signal [mA] | 4-20 | | | |
| Load Impedance | 60 Ω at 12.5 VDC | | | |
| | 100 Ω at 13.3 V | | | |
| | Max 900 Ω at 30 VDC | | | |
| Response time | 100 ms typical 50 ms | | | |
| Resolution | 1/1000 FS | | | |
| Accuracy | +32 to +176 °F +/- 2.0 % FS | | | |
| | -22 to +212 °F +/- 2.5% FS | | | |
| Operation temperature | -22 to +212 °F (-30 to +100 °C) | | | |
| Ambient temperature | -13 to +140 °F (-25 to 60 °C) | | | |
| Wetted parts material | AISI 316 L | | | |
| Housing material | AISI 316 L | | | |
| Enclosure | IP 67 | | | |
| Weight [lb (kg)] | 0.3 (14) | | | |
| EMC - | EN 61326-1 | | | |
| Pressure - mechanical connection | Adaptor solution for 1/2" and 1/4" NPT | | | |
| Markings | CE | | C SA US | |

### Dimensions




TM04 9237 1612

**Fig. 58** Dimensions RPI transmitter

# Pressure sensor

| Accessory | Supplier | Type | Pressure range [psi (bar)] | Product number |
|---|---|---|---|---|
| **Pressure sensors**<br><br>Pressure Transmitter<br>with 6 ft screened cable<br>Connection: 1/4" - 18 NPT | Danfoss | MBS3000 | 0-87 (0-6) | 91136169 |
| | | | 0-145 (0-10) | 91136170 |
| | | | 0-232 (0-16) | 91136171 |
| | | | 0-362 (0-25) | 91136172 |
| | | | 0-580 (0-40) | 91136173 |
| | | | 0-870 (0-60) | 91136174 |

## Technical data

| **Pressure sensor** | | | | | | |
|---|---|---|---|---|---|---|
| Product number | 91136169 | 91136170 | 91136171 | 91136172 | 91136173 | 91136174 |
| Pressure range [psi (bar)] | 0-87 (0-6) | 0-145 (0-10) | 0-232 (0-16) | 0-362 (0-25) | 0-580 (0-40) | 0-870 (0-60) |
| Max. operating pressure [psi (bar)] | 300 (20.1) | 300 (20.1) | 750 (51.7) | 1450 (100) | 2900 (200) | 2900 (200) |
| Supply voltage | 9-32 VDC | | | | | |
| Output signal [mA] | 4-20 | | | | | |
| Insulation resistance | > 100 MΩ at 100 V | | | | | |
| Accuracy, typical +/- FS [%] | 0.5 % | | | | | |
| Response time, max. [ms] | 4 ms | | | | | |
| Medium temperature range [°F (°C)] | -40 to +185 °F (-40 °C to +85 °C) | | | | | |
| Ambient temperature range [°F (°C)] | -40 to +185 °F (-40 °C to +85 °C) | | | | | |
| Wetted parts, material | AISI 316L | | | | | |
| Housing material | AISI 316L | | | | | |
| Enclosure rating | IP65 | | | | | |
| Weight [lb (kg)] | 0.3 (0.14) | | | | | |
| EMC - Emission | EN 61000-6-3 | | | | | |
| EMC Immunity | EN 61000-6-2 | | | | | |
| Pressure connection | NPT 1/4-18 | | | | | |
| CE-marked | EMC protected in accordance with EU EMC Directive | | | | | |

## Dimensions

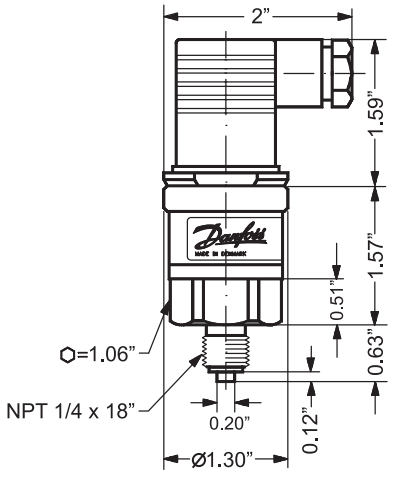



**Fig. 59** Dimensional sketch

## Grundfos differential-pressure sensor, DPI

| Grundfos differential-pressure sensor, DPI | Pressure range [psi (bar)] | Product number |
|---|---|---|
| • 1 sensor incl. 0.9 m screened cable (7/16" connections)<br>• 1 original DPI bracket (for wall mounting)<br>• 1 Grundfos bracket (for mounting on motor)<br>• 2 M4 screws for mounting of sensor on bracket<br>• 1 M6 screw (self-cutting) for mounting on 3 Hp and smaller<br>• 1 M8 screw (self-cutting) for mounting on 5 Hp - 10 Hp<br>• 1 M10 screw (self-cutting) for mounting on 15 - 25 Hp<br>• 1 M12 screw (self-cutting) for mounting on 30 Hp<br>• 3 capillary tubes (short/long)<br>• 2 fittings (1/4" - 7/16")<br>• 5 cable clips (black)<br>• Installation and operating instructions | 0 - 8.7 (0 - 0.6) | 96611522 |
| | 0 - 14.5 (0 - 1.0) | 96611523 |
| | 0-23 (0 - 1.6) | 96611524 |
| | 0-36 (0 - 2.5) | 96611525 |
| | 0-58 (0 - 4.0) | 96611526 |
| | 0-87 (0 - 6.0) | 96611527 |
| | 0-145 (0-10) | 96611550 |

Select the differential-pressure sensor so that the maximum pressure of the sensor is higher than the maximum differential pressure of the pump.

The sensor housing and parts in contact with the liquid are made of Inox DIN 1.4305 (pos. 3) with composite PA top (pos. 2). The connections (pos. 4) are DIN 1.4305, 7/16" UNF connection and gaskets are FKM.

A black and screened cable (pos. 1) goes through a screwed connection PG with M 12 x 1.5 connection.

The sensor is supplied with angular bracket for mounting on motor or bracket for wall mounting.

A specially coated silicon chip is used for greater accuracy.

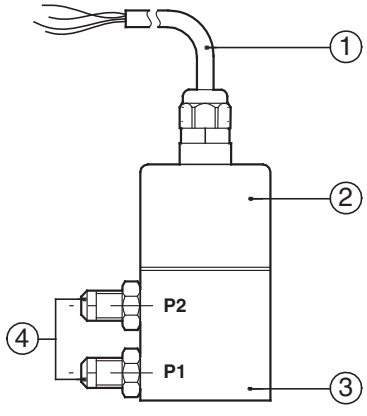
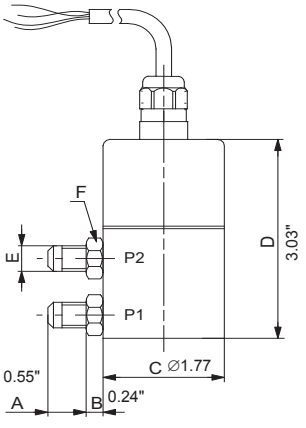



**Fig. 60** DPI sensor

## Technical data

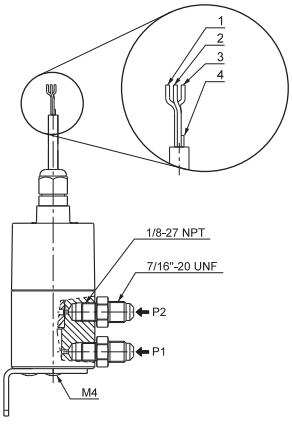
| Grundfos differential-pressure sensor, DPI | | | | | | | |
|---|---|---|---|---|---|---|---|
| Product number | 96611522 | 96611523 | 96611524 | 96611525 | 96611526 | 96611527 | 96611550 |
| Pressure ranges, differential pressure [psi (bar)] | 0 - 8.7 (0 - 0.6) | 0 - 14.5 (0 - 1.0) | 0-23 (0 - 1.6) | 0-36 (0 - 2.5) | 0-58 (0 - 4.0) | 0-87 (0 - 6.0) | 0-145 (0-10) |
| Supply voltage | 12-30 VDC | | | | | | |
| Output signal | 4-20 mA | | | | | | |
| Load [Ω] | 24 V: max. 500 [Ω], 16 V: max. 200 [Ω], 12 V: max. 100 [Ω] | | | | | | |
| Max. system pressure, P1 and P2 simultaneously [psi (bar)] | 232 (16) | | | | | | |
| Rupture pressure [bar] | 1.5 x system pressure | | | | | | |
| Measuring accuracy | 2.5 % BFSL | | | | | | |
| Response time | < 0.5 seconds | | | | | | |
| Liquid temperature range | +14 °F to +158 °F (-10 °C to +70 °C) | | | | | | |
| Storage temperature range | -40 °F to +176 °F (-40 °C to +80 °C) | | | | | | |
| Electrical connection | 26 GA, 3 ft cable - M12 x 1.5 in sensor top | | | | | | |
| Short-circuit-proof | Yes | | | | | | |
| Protected against reverse polarity | Yes | | | | | | |
| Over supply voltage | Yes | | | | | | |
| Materials in contact with liquid | DIN 1.4305 FKM and PPS | | | | | | |
| Enclosure class | IP55 | | | | | | |
| Weight [lb] | 1.2 | | | | | | |
| EMC (electromagnetic compatibility) | According to EN 60335-1 | | | | | | |
| Emission/immunity | According to EN 61800-3 | | | | | | |
| Connections | 7/16"-UNF | | | | | | |
| Sealing material | FKM | | | | | | |

## Dimensions




TM03 2059 3505

**Fig. 61** Dimensional sketch




TM03 2225 3905

**Fig. 62** Wiring

| | | |
|---|---|---|
| 1 | 12-30 V supply voltage | Brown |
| 2 | GND (earth lead) | Yellow |
| 3 | Signal lead | Green |
| 4 | Test lead (can be cut off during mounting). This lead must not be connected to the power supply. | White |

## Grundfos differential-pressure sensor, DPI g.2 version

TM04 7866 2410

| Grundfos differential-pressure sensor, DPI g.2 version | Pressure range [psi (bar)] | Product number |
|---|---|---|
| • 1 sensor<br>• 1 capillary tube short version<br>• 1 fitting for capillary tube<br>• 6 ft (1.8 m) cable<br>• 1 installation and operation instructions | 0 - 8.7 (0 - 0.6) | 97747194 |
| | 0 - 14.5 (0 - 1.0) | 97747195 |
| | 0-23 (0 - 1.6) | 97747196 |
| | 0-36 (0 - 2.5) | 97747197 |
| | 0-58 (0 - 4.0) | 97747198 |
| | 0-87 (0 - 6.0) | 97747199 |
| | 0-145 (0-10) | 97747200 |

Select the differential-pressure sensor so that the maximum pressure of the sensor is higher than the maximum differential pressure of the pump.

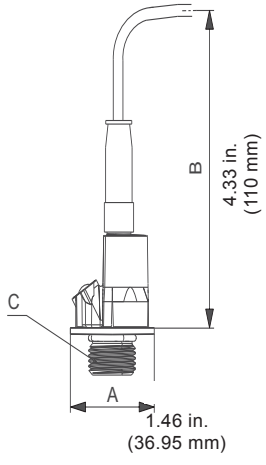
All materials used for DPI 2 are 316 L.

Fitting connection for capillary tube is 7/16" UNF.

Cable with M12 x 4 connector.

Sensor is supplied with fitting for capillary tubing.

Measuring technology is based on Coated Silicon Chip.



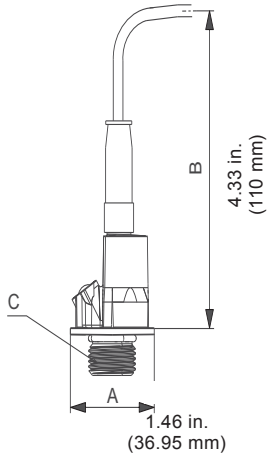

TM04 9237 3710

**Fig. 63** DPI sensor g.2 version

## Technical data

| Grundfos differential-pressure sensor, DPI g.2 version | | | | | | | |
|---|---|---|---|---|---|---|---|
| Product number | 97747194 | 97747195 | 97747196 | 97747197 | 97747198 | 97747199 | 97747200 |
| Pressure ranges, differential pressure [psi (bar)] | 0 - 8.7 (0 - 0.6) | 0 - 14.5 (0 - 1.0) | 0-23 (0 - 1.6) | 0-36 (0 - 2.5) | 0-58 (0 - 4.0) | 0-87 (0 - 6.0) | 0-145 (0-10) |
| Supply voltage | 12-30 VDC | | | | | | |
| Output signal | 4-20 mA | | | | | | |
| Load [Ω] | 30 V DC: max. 900 ohms [Ω], 1.3 V: max. 100 [Ω], 12.5 V: max. 60 [Ω] | | | | | | |
| Max. system pressure, P1 and P2 simultaneously [psi (bar)] | 870 (60) | | | | | | |
| Rupture pressure [bar] | 1.5 x system pressure | | | | | | |
| Measuring accuracy | 2.0 % FS | | | | | | |
| Response time | < 100 ms (typical 50 ms) | | | | | | |
| Liquid temperature range | -22 to +212 °F (-30 to +100 °C) | | | | | | |
| Storage temperature range | -67 to +158 °F (-55 to +70 °C) | | | | | | |
| Electrical connection | 27 ga , 6 ft (1.8) cable M 12 x 4 | | | | | | |
| Short-circuit-proof | Yes | | | | | | |
| Protected against reverse polarity | Yes | | | | | | |
| Over supply voltage | Yes | | | | | | |
| Materials in contact with liquid | AISI 316 L | | | | | | |
| Enclosure class | IP67 | | | | | | |
| Weight [lb] | 1.2 | | | | | | |
| EMC (electromagnetic compatibility) | According to EN 61326-1 | | | | | | |
| Connections | 7/16"-UNF | | | | | | |
| Sealing material | EPDM | | | | | | |

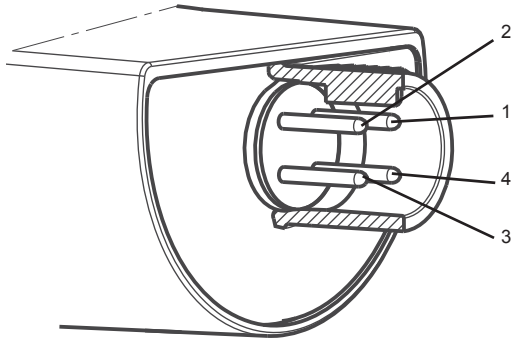
## Dimensions




TM04 9237 3710

**Fig. 64** DPI sensor g.2 version

## Electrical connections




TM04 7156 1610

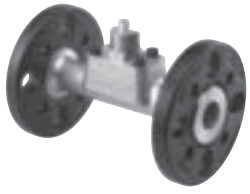
**Fig. 65** Electrical connections

| PIN | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **Wire color** | Brown | Grey | Blue | Black |
| **Output 4-20 mA** | + | not used | - | not used |
| **Output 2 x 0-10 V** | + | Pressure signal | -* | Temperature signal |

* Common ground for both pressure and temperature signal.
* Power supply (screened cable): SELV or PELV.

## Flow transmitters

- Flow tube in AISI 316 mounted with transmitter
- Transmitter AISI 316 L
- 4-20mA output signal
- 2 x flanges
- 15 ft cable free ends
- Quick Guide



TM04 7362 2210

| Type | Flow range [gpm] | Connection | O-ring | | Flange Material | | Product number |
|---|---|---|---|---|---|---|---|
| | | | EPDM | FKM | Cast Iron | Stainless | |
| VFI 0.3-6 | 1.3 - 26 | 3/4" | • | | • | | 97686127 |
| | 1.3 - 2.6 | 3/4" | • | | | • | 97688293 |
| VFI 0.6-12 | 2.6 - 53 | 1" | • | | • | | 97686129 |
| | 2.6 - 53 | 1" | • | | | • | 97688295 |
| VFI 1.3-25 | 5.7 - 110 | 1 - 1/4" | • | | • | | 97686141 |
| | 5.7 - 110 | 1 - 1/4" | • | | | • | 97688297 |
| VFI 2-40 | 8.8 - 176 | 1 - 3/4" | • | | • | | 97686143 |
| | 8.8 - 176 | 1 - 3/4" | • | | | • | 97688299 |
| VFI 3.2-64 | 14-282 | 2" | • | | • | | 97686145 |
| | 14-282 | 2" | • | | | • | 97688301 |
| VFI 5.2-104 | 23-458 | 2 - 1/2" | • | | • | | 96788476 |
| VFI 8-160 | 35-704 | 3" | • | | • | | 97788478 |
| VFI 8-160 | 53-1060 | 4" | • | | • | | 97788492 |

1) For more information about the VFI sensor, see the Grundfos Direct Sensors™ data booklet, publication number 97790189, on www.grundfos.com (Grundfos Product Center).

## Gauges for CRE, CRIE, CRNE

| Accessory | Measuring range | Product number |
|---|---|---|
| Liquid filled pressure gauge<br>• AISI 304/Copper | 30" Hg - 30 psi | 91123566 |
| | 0-60 psi | 00ID8562 |
| | 0-100 psi | 00ID8563 |
| | 0-160 psi | 00ID8564 |
| | 0-200 psi | 00ID8565 |
| | 0-300 psi | 00ID8566 |
| | 0-400 psi | 00ID8567 |
| | 0-600 psi | 00ID8568 |
| Liquid filled pressure gauge<br>• AISI 316 | 30" Hg - 30 psi | 91130835 |
| | 0-60 psi | 00ID8569 |
| | 0-100 psi | 00ID8570 |
| | 0-160 psi | 00ID8571 |
| | 0-200 psi | 00ID8572 |
| | 0-300 psi | 00ID8573 |
| | 0-400 psi | 00ID8574 |
| | 0-600 psi | 00ID8575 |
| | 0-200 psi | 00ID8576 |

# Remote controls

## Grundfos GO Remote

The Grundfos GO Remote is used for wireless infrared or radio communication with the pumps.

Various Grundfos GO Remote variants are available. The variants are described in the following.

### MI 201

The MI 201 is a complete solution, consisting of an Apple iPod touch 4G and a Grundfos cover for infrared and radio communication with Grundfos pumps or systems.

TM05 3886 1712

**Fig. 66** MI 201

Supplied with the product:

- Apple iPod touch 4G incl. accessories
- Grundfos MI 201 cover
- battery charger
- Quick Guide.

### MI 202

The MI 202 is an add-on module with built-in infrared and radio communication. The MI 202 can be used in conjunction with Apple iPod Touch 4 and iPhone 4.

TM05 3887 1712

**Fig. 67** MI 202

Supplied with the product:

- Grundfos MI 202
- Quick Guide.

### MI 301

The MI 301 is a module with built-in infrared and radio communication. The MI 301 must be used in conjunction with an Android or iOS-based Smartphone with a Bluetooth connection. The MI 301 has rechargeable Li-ion battery.

TM05 3890 1712

**Fig. 68** MI 301

Supplied with the product:

- Grundfos MI 301
- battery charger
- quick guide.

### Product numbers

| Grundfos GO Remote variant | Product number |
|---|---|
| Grundfos MI 201 | 98140638 |
| Grundfos MI 202 | 98046376 |
| Grundfos MI 301 | 98046408 |

### Supported units

| Make | Model | Operating system | MI 201 | MI 202 | MI 301 |
|---|---|---|---|---|---|
| Apple | iPod touch 4G | iOS 5.0 or later | ● | ● | ● |
| | iPhone 4G, 4GS | | - | ● | ● |
| HTC | Desire S | Android 2.3.3 or later | - | - | ● |
| | Sensation | Android 2.3.4 or later | - | - | ● |
| Samsung | Galaxy S II | | - | - | ● |

**Note:** Similar Android and iOS-based devices may work as well, but are not supported by Grundfos.

## CIU communication interface units

GrA 6118

**Fig. 69** Grundfos CIU communication interface unit

The CIU units enable communication of operating data, such as measured values and setpoints, between CRE, CRIE, CRNE pumps and a building management system. The CIU unit incorporates a 24-240 VAC/VDC power supply module and a CIM module. It can either be mounted on a DIN rail or on a wall.

We offer the following CIU units:

**CIU 100**

For communication via LonWorks.

**CIU 150**

For communication via PROFIBUS DP.

**CIU 200**

For communication via Modbus RTU.

**CIU 250**

For wireless communication via GSM/GPRS.

**CIU 271**

For communication via Grundfos Remote Management (GRM).

**CIU 300**

For communication via BACnet MS/TP.

| Description | Fieldbus protocol | Product number |
|---|---|---|
| CIU 100 | LonWorks | 96753735 |
| CIU 150 | PROFIBUS DP | 96753081 |
| CIU 200 | Modbus RTU | 96753082 |
| CIU 250* | GSM/GPRS | 96787106 |
| CIU 271* | GRM | 96898819 |
| CIU 300 | BACnet MS/TP | Contact Grundfos |

* Antenna not included. See below.

### Antennas for CIU 250 and 270

| Description | Product number |
|---|---|
| Antenna for roof | 97631956 |
| Antenna for desk | 97631957 |

For further information about data communication via CIU units and fieldbus protocols, see the CIU documentation available on www.grundfos.com (Grundfos Product Center).

## CIM communication interface modules

GrA 6121

**Fig. 70** Grundfos CIM communication interface module

The CIM modules enable communication of operating data, such as measured values and setpoints, between CRE, CRIE or CRNE pumps of 11-22 kW and a building management system. The CIM modules are add-on communication modules which are fitted in the terminal box of CRE, CRIE, CRNE pumps of 11-22 kW.

**Note:** CIM modules must be fitted by authorised personnel.

We offer the following CIM modules:

**CIM 100**

For communication via LonWorks.

**CIM 150**

For communication via PROFIBUS DP.

**CIM 200**

For communication via Modbus RTU.

**CIM 250**

For wireless communication via GSM/GPRS.

**CIM 271**

For communication via Grundfos Remote Management (GRM).

**CIM 300**

For communication via BACnet MS/TP.

| Description | Fieldbus protocol | Product number |
|---|---|---|
| CIM 100 | LonWorks | 96824797 |
| CIM 150 | PROFIBUS DP | 96824793 |
| CIM 200 | Modbus RTU | 96824796 |
| CIM 250* | GSM/GPRS | 96824795 |
| CIM 271* | GRM | 96898815 |
| CIM 300 | BACnet MS/TP | Contact Grundfos |

* Antenna not included. See below.

### Antennas for CIM 250 and 270

| Description | Product number |
|---|---|
| Antenna for roof | 97631956 |
| Antenna for desk | 97631957 |

For further information about data communication via CIM modules and fieldbus protocols, see the CIM documentation available on www.grundfos.com (Grundfos Product Center).

# 14. Variants

## Lists of variants - on request

Although the Grundfos CR(E), CRI(E), CRN(E) product range offers a number of pumps for different applications, customers require specific pump solutions to satisfy their needs.

Below please find the range of options available for customizing the CR(E) pumps to meet the customers' demands. Contact Grundfos for further information or for requests other than the ones mentioned below.

## Motors

| Variant | Description |
|---|---|
| **Explosion proof motors** | For operation in hazardous atmospheres, explosion-proof or dust-ignition-proof motors may be required. |
| **Motors with anti-condensation heating unit** | For operation in humid environments motors with built-in anti-condensation heating may be required. |
| **Premium efficient motors** | Grundfos offers motors from 1 to 100 Hp with a Premium efficiency class. |
| **Different motor brand** | If technically possible, Grundfos can fit the pump with a motor of a brand other than the standard. This will normally increase the time of delivery. Alternatively, the pump can be supplied without a motor (motor thrust rating must be checked). |
| **Oversized motor** | Ambient temperatures above 104 °F or installation at altitudes of more than 3280 ft above sea level require the use of an oversized motor (i.e. derating). |
| **4-pole motors** | Grundfos offers standard motors fitted with 4-poles. |

## Connections and other variants

| Variant | Description |
|---|---|
| **Pipe connections** | In addition to the wide range of standard flange connections, a 232 Psi DIN standard clamping flange is available.<br>Customized flanges are available according to specifications. |
| **TriClamp connections** | TriClamp connections are of a hygienic design with a sanitary coupling for use in the pharmaceutical and food industry. |
| **Electropolished pumps** | To substantially reduce the risk of corrosion of the materials.<br>For use in the pharmaceutical/food industry. |

## Shaft seals

| Variant | Description |
|---|---|
| **Shaft seal with FFKM O-ring material** | Shaft seals with FFKM or FXM o-ring material are recommended for applications where the pumped liquid may damage the standard O-ring material. |
| **Seal with flush, quench seal** | Recommended for applications involving crystallizing, hardening or sticky liquids. |
| **Cool-Top® shaft seal system** | Recommended for applications involving extremely high temperatures.<br>No conventional mechanical shaft seal can withstand liquid temperatures of up to 356 °F for any length of time.<br>For that type of application, Grundfos' unique air-cooled shaft seal system is recommended.<br>In order to ensure a low liquid temperature around the standard shaft seal, the pump is fitted with a special air-cooled shaft seal chamber.<br>No separate cooling is required. |
| **Double shaft seal with pressure chamber** | Recommended for applications involving poisonous or explosive liquids.<br>Protects the surrounding environment and the people working in the vicinity of the pump.<br>Consists of two seals mounted in a "back-to-back" arrangement inside a separate pressure seal chamber. As the pressure in the chamber is higher than the pump pressure, leakage is prevented. A dosing pump or a special pressure-intensifier generates the seal chamber pressure. |
| **CRN MAGdrive** | Magnetically driven pumps for industrial applications.<br>Key applications are industrial processes involving the handling of aggressive, environmental, dangerous or volatile liquids, e.g. organic compounds, solvents, etc. |

## Pumps

| Variant | Description |
|---|---|
| **Horizontally mounted pump** | For safety or height reasons, certain applications, for instance on ships, require the pump to be mounted in the horizontal position.<br>For easy installation the pump is equipped with brackets that support motor and pump. |
| **Low-temperature pump to -4 °F** | Exposed to temperatures down to -40 °F (-40 °C) coolant pumps may require neck-rings with a different diameter in order to prevent impeller drag. |
| **High-speed pump up to 681 psi** | For high-pressure applications, a unique pump capable of generating up to 681 psi pressure is available.<br>The pump is equipped with a high-speed motor, type MLE. The direction of rotation is the opposite of that of standard pumps, and the chamber stack is turned upside-down, as a result of which the pumped liquid flows in the opposite direction. |
| **High-pressure pump up to 696 psi** | For high-pressure applications, a unique double pump system capable of generating up to 696 psi (48 bar) pressure is available. |
| **Low-NPSH pump (improved suction)** | Recommended for boiler-feed applications where cavitation may occur due to poor inlet conditions. |
| **Belt-driven pumps** | Belt-driven pumps designed to operate in places with limited space or where no electrical power is available. |
| **Pumps for pharmaceutical and biotechnological applications** | CRN(E) pumps designed for applications requiring the sterilization and CIP capability of pipes, valves and pumps. (CIP = Cleaning-In-Place). |

**CRE, CRIE, CRNE**

**Vertical Multistage Centrifugal Pumps**

Company name:
Prepared by:
Phone number: ( )
Fax number: ( )
Date: Page 1 of:
Quote number:

## Client Information

Project title: Client name:
Reference number: Client number:
Client contact: Client phone number: ( )

## Location Information

For: Unit:
Site: Service:
Address: City: State: Zip Code:

## Application Information

**Operating Conditions**

| | Max. | Norm. | Min. |
|---|---|---|---|
| Capacity (gpm) | | | |
| Suction Pressure (psig) | | | |
| Discharge Pressure (psig) | | | |
| Differential Head (ft) | | | |
| Hydraulic Power (hp) at designated capacity | | | |
| NPSH Available (ft) | | | |

**Pumped Fluid**

Fluid type:

| | Rated | Max. | Norm. |
|---|---|---|---|
| Fluid Temperature (°F) | | | |
| at designated temperature | | | |
| Specific Gravity | | | |
| Vapor Pressure (psia) | | | |
| Viscosity (cp) | | | |

Fluid ph: Chlorides (ppm):
Hazardous: Corrosion/Erosion caused by:
Flammable:
Other:

### Service

Continuous
Intermittent (starts/day):

## Pump Information

Model Information from Type Key and Codes: ----> (Example: CRE 5-10 A-FGJ-A-E-HQQE )
Quantity Required:
Minimum required flow: NPSH required at duty point:

**Product Guide additional information pages**

Materials page number: Performance curve page number:
Technical data page number: Motor data page number:

## Motor Information

Hp: Phase: Voltage: Enclosure:

## Custom-built pump information (optional):

## Additional Information

# 15. Quotation text

## CRE, CRIE, CRNE

Vertical, non-self-priming, multistage, in-line, centrifugal pump for installation in pipe systems and mounting on a foundation.

The pump has the following characteristics:

- impellers and intermediate chambers are made of AISI _____ Stainless steel
- Pump head and base are made of _____
- Power transmission is via cast iron split coupling.
- pipework connections is via _____

The motor is a _____ -phase AC motor.

### Technical

Rated flow: _____ gpm
Rated head: _____ Feet
Minimum liquid temperature: _____ °F
Maximum liquid temperature: _____ °F
Type of shaft seal: _____

### Materials

Material, pump housing: _____
Material, shaft: AISI_____ Stainless Steel
Material, impeller: AISI_____ Stainless Steel
Material, sleeve: AISI_____ Stainless Steel
Material, seal metal: AISI_____ Stainless Steel
- seal face: _____
- seal face _____
- seal elastomer: _____

### Installation

Maximum ambient temperature: _____ °F
Max. pressure at stated temp.: _____ PSI/°F
Standard, pipe connection: _____
Size, pipe connection: _____
Rated pressure, pipe connection: _____ PSI
Frame size for motor: _____ NEMA

### Electrical data

Motor type: _____
Rated power (P2): _____ HP
Frequency: _____ Hz
Rated voltage: _____ V
Rated current: _____ A
Service factor: _____
Starting current: _____ A
Rated speed: _____ RPM
Full load motor efficiency: _____ %
Insulation class: _____

### Additional

Gross weight: _____ Lbs.
Shipping volume: _____
Model: _____

# 16. Grundfos Product Center

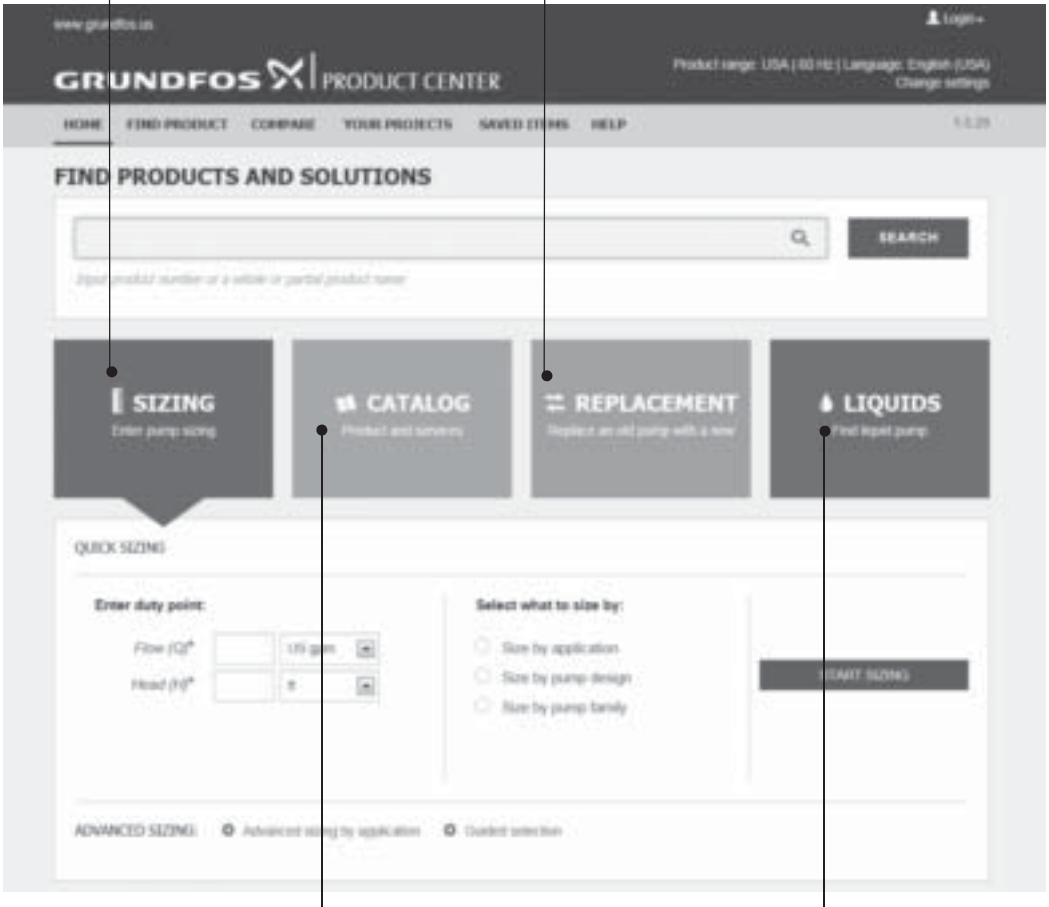
*Online search and sizing tool to help you make the right choice.*

*http://product-selection.grundfos.com*

"SIZING" enables you to size a pump based on entered data and selection choices.

"REPLACEMENT" enables you to find a replacement product.
Search results will include information on

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.




"CATALOG" gives you access to the Grundfos product catalog.

"LIQUIDS" enables you to find pumps designed for aggressive, flammable or other special liquids.

**All the information you need in one place**

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items — including complete projects — right on the main page.

**Downloads**

On the product pages, you can download Installation and Operating Instructions, Data Booklets, Service Instructions, etc. in PDF format.

Subject to alterations.

## Grundfos GO

**Mobile solution for professionals on the GO!**

Grundfos GO is the mobile tool box for professional users on the go. It is the most comprehensive platform for mobile pump control and pump selection including sizing, replacement and documentation. It offers intuitive, handheld assistance and access to Grundfos online tools, and it saves valuable time for reporting and data collection.

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