AQUAVAR®
Intelligent Pump Controller
150 HP - 600 HP
INTRODUCTION

The Aquavar® Intelligent Pump Controller (IPC) is designed to provide variable frequency pumping control of speed, pressure, flow and level over a wide range of submersible and above ground applications. This Technical Brochure contains information for sizing and selection of the NEW Aquavar IPC extension to include sizes from 150HP - 600HP. The higher horsepower extension includes the same software, programming, and troubleshooting procedures as the lower horsepower range. Here are just a few of the features and benefits of this versatile product:

• Application specific “Start-Up Genie” guides you through quick and easy commissioning
• Removable, graphical control panel with display
• Fully backlit display with large text makes the control pad easy to read
• Info key activates on board parameter and fault descriptions
• My Personal Menu allows user to focus on specific user selected and saved parameters
• Alarm Log key for quick access to alarms and maintenance events
• Alarm Log records the last 5 alarms
• Hand on, Auto on, and Off buttons for easy pump operation at the keypad - No toggling between local and remote operation!
• Modbus® RTU included in standard drive - Other communications available with option cards
• Duplex variable speed pumping control with auto lead/lag and alternate
• USB Connectivity - Commission and monitor through PC software
• Transducer assembly (0-300 psi) and 16’ foot shielded cable
• Standard dual DC-link reactors - Reduces the level of harmonics similar to a 5% AC line reactor without the voltage drop across the full load range!
• EMC/RFI filters designed to reduce drive noise emissions and interference to strict standards.
• Automatic Motor Adaption - For optimized performance and efficiency
• Automated Energy Optimization - Regulates output voltage to improve system efficiency as loads change
• Protects the pump from damage due to cavitation, dead head and blocked suction.
• Helps protect the motor from short circuit, phase loss, overload, undervoltage, overvoltage
• Large connection area allows more space for incoming power and motor wiring

TRANSDUCER

Includes: 4-20mA, 300psi transducer and 16’ cable

Used for: Pressure transducer for constant pressure applications. Transducer will be delivered with your drive when you use the “1” Transducer character.

NOTE: 9K515 - Repair part number for the transducer
9K391 - Repair part number for the transducer and 16’ cable
Residential Water Systems

**KEYPAD LAYOUT**

- **Real Time Drive Status**
- **Actual System Pressure and Setpoint Pressure Display**
- **Quick access to Start-Up Genie, Personal Menu and drive parameters**
- **Info button provides on-board descriptions of parameters**
- **4-way directional buttons for scrolling parameters**
- **LEDs for On, Warning and Alarm**
- **Easily accessible Hand/Off/Auto Buttons**
- **Alarm Reset**
Residential Water Systems

NOMENCLATURE

Example Product Code

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- **Transducer**
  1 = Transducer
  2 = No Transducer

- **Motor Mounting Options**
  X = No Accessories

- **Coating Options**
  3 = 3C3 Board Coating with H2 EMC Filter
  (Standard RFI Filter)
  4 = 3C3 Board Coating with H3 EMC Filter
  5 = 3C3 Board Coating with H1 EMC Filter

- **Disconnect Options**
  X = No Disconnect (Open Chassis and NEMA 3R Only)
  D = Fused Disconnect (NEMA 1 and NEMA 12 Only)

- **Backup Options**
  0 = No Backup
  4 = 24VDC Backup
  (Requires External Power)

- **Input/Output Options**
  X = No Additional I/O
  A = Analog I/O and
  Real-time Clock
  B = General Purpose I/O

- **Communications Options**
  0 = Standard Communication
  1 = Modbus TCP
  2 = Profibus
  3 = DeviceNet
  4 = LonWorks
  5 = Profinet
  6 = Ethernet IP

- **Enclosure**
  A = NEMA 1 (IP21)
  B = NEMA 12 (IP55)
  C = NEMA 3R (IP54 drive - Separate 3R Cover Required)
  E = IP20 / IP00 (Chassis)

- **Nominal HP**
  1500 2500 3500 4500 5500**
  2000 3000 4000* 5000 6000

- **Phase/Voltage**
  4 = 3/460
  5 = 3/575

- **Type**
  B = Basic Drive

- **Model**
  AV

* Available on 575V only.
** Available on 460V only.
### PRODUCT CHART - IP20/IP00 CHASSIS

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* With Switching Frequency (Parameter 14-10) set to 2 kHz.
** Nominal HP values are for reference only. Size Aquavar by maximum output amps of the motor.

### PRODUCT CHART - NEMA 1

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* With Switching Frequency (Parameter 14-10) set to 2 kHz.
** Nominal HP values are for reference only. Size Aquavar by maximum output amps of the motor.
### PRODUCT CHART - NEMA 12

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<th>NOMINAL SURFACE MOTOR HP**</th>
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* With Switching Frequency (Parameter 14-10) set to 2 kHz.

** Nominal HP values are for reference only. Size Aquavar by maximum output amps of the motor.

### PRODUCT CHART - NEMA 3R

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* With Switching Frequency (Parameter 14-10) set to 4 kHz.

** Nominal HP values are for reference only. Size Aquavar by maximum output amps of the motor.

*** NEMA 3R Cover Kit is required to be used with the base model number for NEMA 3R outdoor protection.

**** dv/dt filter recommended for applications with motor leads longer than 50'.
**SPECIFICATIONS**

**Ratings and Enclosures**  
- IP20/IP00 Chassis, TYPE 1, TYPE 12, TYPE 3R
- 150 - 600 HP (frame D - E) wall or floor mounted
- Relative humidity lower than 95% without condensation.
- Ambient temperature 14° F - 113° F (-10°C - 45°C). Higher temperatures can be achieved by derating the output amperage of the drive for up to 122° F (50°C).
- At altitudes from 0 to 1000 meters (0 to 3300 feet) rated current is available. For altitudes above 1000 meters (3300 feet) use table listed below. Maximum 3000 meters (9900 feet). (Consult factory above 3000 meters (9900 feet)). See chart below for derate in % of output current.

**Electrical Characteristics**

**INPUT POWER**  
- 3 phase 380 V to 480 V ±10%
- 3 phase 525 V to 690 V ±10%
- Frequency 50 or 60 Hz, ±2Hz

**OUTPUT POWER**  
- 3 phase from 0 to Vsupply
- 0 to 120 Hz frequency

![Graph showing the relationship between altitude and output current derate.](chart.png)
BUILT-IN CONTROL CONNECTIONS

- Analog input: 2, voltage or current, direct or inverse
- Programmable digital inputs: 6, 2 can be used as digital outputs
- Programmable analog outputs: 1, 0-10vdc or 4 - 20 mA
- Programmable relay outputs: 2, standard Form C, 240 VAC, 2 A
- Auxiliary voltage: +24 V DC, maximum 200 mA

PUMP AND MOTOR PROTECTIONS

**Motor Protections**
- Ground Fault
- Motor Stall
- Motor Over Temperature (Predictive and Sensor Based)
- Motor Condensation (Motor Preheat Circuit)
- Motor Overload (Programmable Action)

**Pump Protections**
- Pump No-Flow
- Under Pressure
- No Water / Loss of Prime
- Short-Cycle
- Vibration (Programming Automated)

NEMA 3R COVER KIT

The NEMA 3R Cover Kits are designed for NEMA 3R base model drives with AVBXXXXXC... part numbers. These kits add a cover to the outside vents of the IPC and provides NEMA 3R compliant protection against weather and hosed water. The kit is used only with IPC drives that have the enclosure code "C".

The NEMA 3R Cover Kit includes:
- Top Plate
- Gland plate with attached gasket
- NEMA 3R Cover
- Adhesive label
- Installation hardware

**Cover Kit Selection:**

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>Ordering Number</th>
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<tbody>
<tr>
<td>D1</td>
<td>9K715</td>
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<tr>
<td>D2</td>
<td>9K716</td>
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</tbody>
</table>

Aquavar expansion cards can be included in the drive using the smart part number on page 4. Expansion cards can also be ordered as a field installable option using the "K" part numbers listed.

COMMUNICATION OPTIONS (Repair Part Number)

- Modbus TCP (9K667)
- DeviceNet (9K669)
- Profinet (9K671)
- Profibus (9K668)
- LonWorks (9K670)
- Ethernet IP (9K672)
INPUT/OUTPUT OPTIONS (Repair Part Number)

ANALOG I/O CARD (9K653)

Includes:  3 Analog IN for 0 - 10VDC
          OR
          0-20mA*
          4-20mA*
          Ni1000 Temperature Sensor
          Pt1000 Temperature Sensor
          3 Analog OUT for 0 - 10VDC
          Battery backup for real-time clock

Used for:  Providing battery backup of clock function during loss of power (real-time clock is native to the drive, and will reset to zero during power outage without Analog I/O card.)
          Extension of analog I/O on control card (multi zone with 3 sensors)
          Extended PID controllers with I/O’s (set point inputs, sensor inputs and outputs)

* Requires 510Ω resistor

GENERAL I/O CARD (9K654)

Includes:  3 Digital IN, 2 Digital OUT, 2 Analog IN (voltage), 1 Analog OUT (current)

Used for:  Extension of number of digital and analog inputs and outputs
INPUT/OUTPUT OPTIONS (continued)

PTC THERMISTOR CARD (9K656)

Includes: Twelve terminal PTC card

Used for: Monitor temperature of electric motor with PTC thermistor input (PTC Thermistor Card option is Certified for ATEX for use with motors in potentially explosive atmospheres.)

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<td>T2</td>
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<td>Reference for 10, 12</td>
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<tr>
<td>10</td>
<td>20-28 VDC</td>
<td>10 mA</td>
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<tr>
<td>12</td>
<td>20-28 VDC</td>
<td>60 mA</td>
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PT100 SENSOR INPUT CARD (9K657)

Includes: Twelve terminal PTC100 card

Used for: Sensor Input for PT100 and PT1000 temperature sensors for motor bearing temperatures

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<td>GND</td>
<td>TEMP</td>
<td>WIRE</td>
<td>GND</td>
<td>TEMP</td>
<td>WIRE</td>
<td>GND</td>
<td>TEMP</td>
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</tbody>
</table>

4-20mA
2 or 3 wire

2 or 3 wire
2 or 3 wire
2 or 3 wire
INPUT/OUTPUT OPTIONS (continued)

**RELAY CARD (9K658)**

Includes: 3 standard Form C, 240 VAC, 2 A
Used for: Extension of the number of output relays

![Relay Card Diagram]

**BACKUP OPTIONS**

**24VDC BACKUP (9K659)**

Includes: Pos and Neg Terminals for 24VDC
Used for: Interface to external 24 VDC auxiliary power supply
(Enables full LCP operation without line voltage supplied.)

![Backup Options Diagram]
Residential Water Systems

COATING/EMC FILTER OPTIONS

3C3 BOARD COATING
Includes:  Additional protection for printed circuit board (PCB) above the standard protection to 3C2.
Used for:  Aggressive environments where drive may be subject to corrosive gases.

NOTE: THIS IS NOT A SUBSTITUTE FOR SIZING THE PROPER ENCLOSURE. ENCLOSURE SHOULD BE SELECTED BASED UPON ENVIRONMENT.

EMC OPTIONS
Includes:  H2 filter (EN 55011 Class A2) standard on all models except 575V and single phase, 10, 20 and 30 HP. 575V and single phase, 10, 20 and 30 HP drives are not available with EMC filter.
Options:  H1 or H3 (EN 55011 Class A1/B)
Used for:  Increased level of EMC and RFI noise dampening

DV/DT FILTERS* (ORDER SEPARATELY)
Includes:  NEMA 3R dv/dt filter
Used for:  Provides motor protection by limiting voltage spikes below 1,000 volts for long lead (submersible) applications.

FEATURES:
• 2 - 130 amps; 240V - 600V; 2 - 125HP
• NEMA 3R Enclosure
• Carrier Frequency: 1 - 12 kHz
• Fundamental Frequency: 0 - 60Hz
• Efficiency: > 98%
• Insulation Rating 600V Class
• Agency Approvals: UL, cUL
• Maximum Altitude: 6,000 feet
  • (Derate for applications above 6,000 feet)

* dv/dt filters are recommended on all pumping applications with Motor leads longer than 50’

DV / DT filters have been sized in the outdoor rated Product Charts (Page 8). DV / DT filters to be ordered separately to mount near the drive.
DIMENSIONS

D1 ENCLOSURE, CABINET MOUNT  - Dimensions in mm (in.)

D2 ENCLOSURE, CABINET MOUNT  - Dimensions in mm (in.)
DIMENSIONS

EXTERIOR DIMENSIONS FOR D1H WITH NEMA 3R KIT (9K715) - Dimensions in mm (in.)
Please note airflow directions

EXTERIOR DIMENSIONS FOR D2H WITH NEMA 3R KIT (9K716) - Dimensions in mm (in.)
Please note airflow directions
DIMENSIONS

D3 ENCLOSURE, CABINET MOUNT - Dimensions in mm (in.)

D4 ENCLOSURE, CABINET MOUNT - Dimensions in mm (in.)

IP00/IP21/IP54 – ALL SIZES
Please note airflow directions
DIMENSIONS

D5 ENCLOSURE - Dimensions in mm (in.)

D7 ENCLOSURE - Dimensions in mm (in.)
DIMENSIONS

E1 ENCLOSURE, FLOOR- OR CABINET-MOUNT - Dimensions in mm (in.)

E2 ENCLOSURE, FLOOR- OR CABINET-MOUNT - Dimensions in mm (in.)
Xylem |ˈzɪləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We’re a global team unified in a common purpose: creating innovative solutions to meet our world’s water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to www.xyleminc.com