

Typical Engineering Specifications

I. Scope

The centrifugal pump controller shall be the Goulds Pumps Aquavar® or the Aquavar CPC variable speed pump controller. The Aquavar shall mount directly to a standard duty, NEMA design B or greater TEFC AC induction motor, class B or greater insulation. The drive shall be mounted via adjustable clamps to the TEFC motor fan cover. The Aquavar CPC version shall be wall mounted or floor mounted design up to 550 HP and shall include a minimum of 3% input impedance built into the drive. The Aquavar shall provide an adjustable carrier frequency with IGBT power switching and utilize PWM technology. The drive shall provide noiseless operation of the driving motor, short circuit and ground protection, and work with controlled sinusoidal current synthesis and dynamic over current limitations. The Aquavar shall be one complete integrated unit including the variable frequency drive, programmable pump specific control logic and include a NEMA 1 enclosure for the Aquavar CPC version or NEMA 4 enclosure for the Aquavar pump mounted version. Additional control panels, PLC's or other external devices, shall NOT be necessary to accomplish complete pump programming and variable speed control of pump and motor.

Multipump control is standard in each Aquavar program with lead-lag and automatic alternation of up to four drives as standard. Standard variable frequency drives that do not incorporate pump control logic as the primary control software; programming and features directly applicable to centrifugal pump applications shall not be considered equal.

Programming The Goulds Pumps Aquavar CPC shall provide a removable LCD display and programming keypad for data entry. The drive shall utilize user-friendly front panel programming in three languages that displays pump and motor language in clear text. The control panel shall have the ability to upload and download programming from drive to drive. The Aquavar CPC programming shall incorporate help "Wizards" and a real time clock for ease of programming centrifugal pump applications. Colored diodes shall signal 'power on', 'pump running' and 'fault'. Program settings shall be changeable and stored in non-volatile memory. Program settings shall be retained in memory in the event of loss of power to the controller, without the use of a backup battery. System operating pressure shall be clearly displayed in PSI or feet of head for ease of use and to provide an operator friendly interface. Additional parameters, where applicable, shall be displayed in units consistent with pumping systems. Generic control systems adapted from other applications shall not be considered equal.

Typical Engineering Specifications

The settings and program in whole or part may be locked out with the use of an operator selectable password. Standard system hydraulic settings shall include at a minimum the following functions: loss of suction, lack of NPSHa, pump run-out protection, dead head protection, constant pressure setting with variable flow capability, constant flow with variable TDH (pressure) capability, quadratic differential flow calculation, system curve compensation, multiple pump operation with alternation, pump starting point with allowable, adjustable pressure drop, minimum speed with time delay, pressure of flow sensor error, overpressure shutdown and low flow shutdown.

II. Interface

The control board unit shall contain analog and digital contacts for a host of sensors or dry relay terminals which can be connected to external devices for operation of:

- Remote start and stop.
- Low-pressure protection switch.
- Across the line start pump relay.
- Pump run relay.
- Pump fault relay.
- Analog output signal shall have two (4 – 20mA) signals.
- Analog input (4 – 20mA) sensor.
- Secondary analog input (4 – 20mA or 0 – 10 Vdc) offset signal.
- Multipump interface via RS485 with up to four pumps.
- Two pressure settings with one transducer (field programmable).

The integrated microprocessor shall provide automatic start and stop of up to four variable speed controlled pumps, and enable automatic changeover for lead and lag pump sequencing, without the use of external devices, PLC's or timers.

A stainless steel pressure transducer and cable assembly shall be included. All hardware and appropriate range transducer shall be provided by the pump control manufacturer to ensure complete compatibility with controller.

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The Goulds Pumps Aquavar shall provide a programmable automatic error reset of the pump system that will provide automatic restart capability, with a programmable time delay between each start. The pump controller shall provide a fault history with at least five previous fault codes. The pump controller shall provide programmable automatic test run of pumps during periods of down time, based on operating hours. The pump controller shall incorporate motor thermal protection and drive temperature protection as standard equipment. The pump controller shall be capable of monitoring and displaying total operating hours, and total motor run hours. The Aquavar unit shall protect the variable frequency drive and motor from:

- Overvoltage
- Undervoltage
- Input phase loss
- Phase imbalance
- Motor over-current
- Motor phase loss
- Ground fault and short circuit

The variable speed pump controller shall be UL listed.

IV. System Installation and Integration

A complete Aquavar pump controller instruction, operation, and programming manual shall be provided by the authorized supplier for the Aquavar. The instruction manual shall include a typical system design layout, installation instructions, pump programming instructions, and troubleshooting assistance.

The Goulds Pumps Aquavar variable speed pump control system shall include the following: variable frequency drive, microprocessor based PLC, pump specific control logic, pump, motor and transducer. The variable speed pump system and components, shall be provided, installed and integrated by a single source entity.

Complete system integration, setup, programming and warranty will be the responsibility of the factory-authorized representative.

Typical Engineering Specifications

V. Field Tests

A factory qualified service representative of G&L Pumps shall be present at initial startup of the system to ensure correct installation and rotation of the unit. Any deficiencies shall be noted and corrected prior to the commissioning of the pump. A minimum of 4 hours on-site service and training is required.

In the presence of the Engineer, field-testing of all equipment shall be performed to determine that operation is satisfactory and in compliance with the specifications. Testing shall be completed after the installation is complete, the equipment has been operated and all necessary adjustments have been made.

Each pumping unit will be operated for a suitable period during which time all possible loads, where conditions permit, shall be applied. All tests shall be completed with clear water.

During the field tests, readings for all the electrical data shall be recorded on approved log sheets and submitted to the engineer.

VI. Warranty

Each Aquavar and Aquavar CPC shall be covered under a factory warranty for two years from installation date not to exceed 30 months from date of drive manufacture date. Authorized installation by trained factory G&L Pumps representatives only. Warranty only covers workmanship and defects in product.