
Typical Engineering Specifications

I. Scope

The pump controller shall be the Goulds AQUAVAR or AQUAVAR II variable speed pump controller, directly coupled to a standard duty, NEMA design B or greater TEFC AC induction motor, class F or greater insulation. AQUAVAR II version shall be wall mounted. 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 12 or NEMA 4 enclosure. 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. 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 AQUAVAR shall provide an LCD two line display with 16 characters per line and programming keypad for data entry. Unit(s) shall utilize user-friendly front panel programming in three languages that displays pump and motor language in clear text. Three 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.

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.

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II. Interface

The control board unit shall contain dry relay terminals which can be connected to external devices for operation of:

- Remote start and stop.
- Low-pressure protection switch.
- Pump run relay.
- Pump fault relay.
- Analog output signal (0 – 10 Vdc) actual pressure.
- Analog input (4 – 20mA) sensor.
- Secondary analog input (4 – 20mA or 0 – 10 Vdc) offset signal.
- Multipump interface via RS485.
- 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 or timers.

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

III. System Protection

The Goulds AQUAVAR shall provide a programmable automatic error reset of the pump system that will provide up to five restarts, 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 for programmable automatic test run of pumps during periods of down time, based on frequency and 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, phase loss, phase imbalance, motor overcurrent, ground fault and short circuit. The variable speed pump controller shall be UL, cUL, CE listed.

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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, installation instructions, programming instructions, and troubleshooting assistance.

The Goulds 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.

V. Field Tests

A factory qualified service representative 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.

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