



CentriPro™

CentriGuard™

Fixed Speed Pump Controller

TYPICAL ENGINEERING SPECIFICATIONS

I. Scope

The pump controller shall be the CentriGuard fixed speed pump protection, monitoring and control panel. The CentriGuard controller shall be one complete integrated unit that provides three functions: 1) pump and motor protection, 2) pump and motor status monitoring and 3) interfacing with external control devices and systems. The pump panel shall include a door handle operated fusible service entrance disconnect, a NEMA rated combination starter with solid state overload relay, three position green lighted HAND/OFF/AUTO Switch, with green light for pump running indication, flashing red push-button light for alarm indication and reset, power monitor with Auto-Set capability, programmable condition specific control logic for pump protection and monitoring, step down control transformer, terminal blocks for external wiring connections and NEMA 4 water tight and dust tight enclosure. A 50W space heater with thermostat control shall be provided to prevent condensation and to help maintain environmental conditions required by the components. Additionally, primary fuses shall be supplied, and independent fusing shall be provided for all line side and control voltage devices.

The intent of this specification is to obtain comprehensive pump and motor protection, monitoring and control with one panel. Additional control panels, or PLC's, shall not be necessary to accomplish the intended pump and motor monitoring and protection functions. The panel shall operate to protect the pump in the event of: 1) loss of adequate suction pressure, 2) running dry, 3) running dead headed, 4) running out on the curve, 5) running below minimum flow and 6) locked rotor. The panel will also protect the motor from serious undervoltage, motor overcurrent, short circuit, loss of phase and phase imbalance.

Additionally, the controller shall be capable of accepting two unpowered (dry) contacts for external fault signal indication. One fault signal indication point shall be for a normally open contact. The second fault signal indication point shall be for a normally closed contact. The panel shall be capable of producing a 0-20 mA or 4-20 mA signal for remote monitoring of shaft horsepower. The panel shall provide for control interfacing with devices such as timers or switches. Standard panels that do not incorporate pump and motor protection, monitoring, control interfacing, control logic and field programming capability, shall not be considered equal.

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II. Operation

The CentriGuard panel can be operated locally to start (hand) and stop (off) the pump with a HAND-OFF-AUTO Switch located on the panel door. Alternately, the switch may be set in the "Auto" mode for automatic starting and stopping from a local or remote location. A green run light on the panel door will indicate that the pump is running in normal operation. The pump protection power monitor is programmed to initiate a fault condition. A red light mounted on the panel door will indicate pump fault conditions for underload and overload, and there shall be a provision for remote fault indication. The red fault indication light shall be programmed to flash at different rates corresponding to the type of faults: 1) underload, 2) overload, 3) remote fault (NO) and 4) remote fault (NC). There is provision for three auto-resets within an adjustable time period, when a fault has occurred. If three fault conditions have occurred before the set time period, the pump/motor shall remain in a faulted condition until manually reset by pressing the reset push-button or from the remote reset input. The panel will also provide for pump on/off control from an external device such as a pressure switch(es) or float switch(es). The panel will also accept external fault signals such as a high temperature alarm, or a moisture detector."

III. Programming

The CentriGuard fixed speed pump controller shall have mounted, on the inside of the panel, an LCD alphanumeric display and user interface for programming and providing status and diagnostic information. The display information shall include alarm status, motor load % HP, line voltage, and phase current. Motor operating shaft load must be clearly displayed in the form of per cent motor nameplate HP. Additional alphanumeric display information shall include: actual line voltage, actual line current and input power to the motor. The system shall provide the owner the opportunity to automatically set the protection parameters with a minimum of user intervention (ideally, via a single control push-button). The system shall also provide for field programmable alarm outputs for detecting underload and overload conditions. Program settings shall be changeable and stored in nonvolatile 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. The system must provide the user the ability to "lock" all set parameters, to prevent tampering. The "lock" function should comprise of input of a security code to access the adjustable parameters.

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IV. Interface

Terminal blocks for wiring external connections shall be provided for independent start and stop signals, a single start/stop signal, a normally open contact for external fault input, a normally closed contact for external fault input, a normally closed contact for remote fault reset, and normally open contact for remote fault indication. Additionally, to facilitate expanded plant wide monitoring and analysis, i.e., a SCADA system, the CentriGuard pump control panel shall include a self-powered, 2-wire, 4-20mA output signal that is proportional to the load on the pump. The user shall further have the ability to scale the 4-20mA output signal to 20-4mA, 0-20 mA and 20-0 mA output signal that is proportional to load on the pump.

V. Primary Panel Inputs and Outputs

A. Power Connections to be provided:

- 200,208,230, or 460 VAC three phase

B. Local Control and Indication to be provided

- H-O-A Selector Switch, green lighted LED
- Red lighted LED for fault indication and reset
 - Fault reset for all latched fault conditions.
 - Light flashing at different rates corresponding to type of fault.
- Local reset of overload relay
(Inside panel or optional door mounted reset)

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C. Control Input Functions to be Provided:

External Wiring Contact & Function	Purpose/ Potential Uses
Single Start / Stop	Remote Start – Stop SCADA Pressure Switch with ΔP Time Clock, Flow Switch
Independent Start / Stop signal	Float Switches, Level Control Pressure Switches SCADA
External Fault Input (Normally open, close on fault)	Emergency Pressure Switch External Safety Float Switch Temperature Sensor, High Temp. shut off switch Moisture Detection System Mechanical Seal Auxiliaries (lack of barrier fluid or barrier fluid pressure, level or pressure switch) Leak Detector
External Fault Input (Normally closed, open on fault)	Motor thermostat or thermistor
Remote Fault Reset (Normally closed, open to reset)	Clears all fault signals Notes: 1. Overload relay must be reset in panel (or from panel door with door mounted overload relay reset push-button option) 2. Local fault indication flashes at different rates by cause for overload, underload, normally open external fault and normally closed external fault.

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D. Monitoring Output Functions to be Provided:

- Remote Fault indication
- Analog output signal (0-20 mA or 4-20 mA) proportional to shaft output power for remote indication of operating HP or KW.

VI. System Protection

In the HAND/AUTO mode of operation, all safeties will act to de-energize the pump/motor upon detection of a fault condition and auto-reset once the fault condition has returned to a normal state of operation. Additionally, CentriGuard fixed speed pump controller shall provide a programmable automatic fault reset of the pump system that will provide up to three restarts, with a programmable time delay between each start. A red light on the panel door shall continue to indicate a fault condition has occurred, even after a fault has auto reset and shall only be de-energized upon pressing the reset push-button or initiating the remote fault reset input. The CentriGuard panel shall protect the motor from: undervoltage, phase loss, phase imbalance, motor overcurrent and short circuit. When there is a fault taking the pump and motor off-line, for diagnostic purposes, there shall be provided on the inside of the panel or on the panel door, an alphanumeric alarm display window indicating as a minimum alarm status the following conditions: overload, underload, overvoltage and undervoltage. The pump protection and monitoring panel shall be UL listed.

VII. Safety and Personnel Protection

To facilitate tag out and lock out procedures, a handle shall be provided that is capable of accepting a padlock for disabling operation and locking the unit in the OFF position. Service loops shall be provided between the fusible disconnect and the starter to facilitate amp readings with a clamp on ammeter.

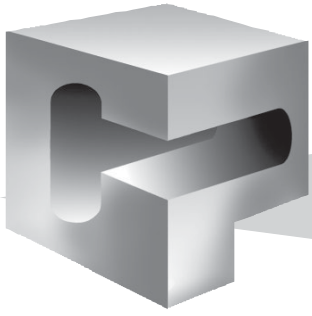
VIII. Design Specifics

The CentriGuard fixed speed pump controller shall be supplied with a minimum of 20% internal free space to allow for future expansion or the field addition of devices such as timers, or control and signal devices. The panel door shall be secured with quarter turn closures.

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IX. Instruction Manuals and Documentation

Each CentriGuard fixed speed pump controller shall include an instruction, operation, and programming manual provided by the authorized supplier for the CentriGuard. The instruction manual shall include wiring schematics, installation instructions, programming instructions and troubleshooting assistance. A plastic pocket shall be provided inside the panel for keeping a copy of the instructions with the controller at all times. Legible connection wiring diagrams and control schematics shall be affixed to the inside panel door.

X. Factory Testing

The CentriGuard pump controller shall be designed, assembled and integrated by a single source entity. Each pump protection and monitoring panel shall be factory tested at full rated voltage and tested for wiring and functionality, according to U.L. requirements.

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XI. Options

Where checked below, the following options shall be incorporated as an integral part of this specification:

- A door mounted mechanical reset push-button shall be furnished. The push-button will enable resetting the motor starter overload without opening the panel door.
- A padlocking handle for securing the cabinet door shall be furnished.
- A non-resettable elapse time meter shall be mounted on the door to record the accumulated running time for each pump.
- A cabinet door stop kit shall be provided.
- Flange Style mounting brackets shall be furnished for mounting to a wall from outside the panel perimeter.
- A solid state lightning arrester connected to the incoming supply power at the main line lugs or power distribution block shall be provided. The lightning arrester shall be designed to protect control equipment from damage due to lightning strikes on the incoming power supply line.
- A NEMA 4 rated door mounted window shall be provided to allow the user to view and change parameters on the power monitor without opening the panel door.

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