

CentriPro™

CentriGuard™

Fixed Speed Pump Starter and Controller Panel

Installation and Operation Manual

Owner's Information

Pump Model Number: _____

Pump Serial Number: _____

Control Model Number: _____

Dealer: _____

Dealer Phone No.: _____

Date of Purchase: _____ Installation: _____

Current Readings at Startup:

| 1Ø | 3Ø | L1-2 | L2-3 | L3-1 |
|--------------|--------------|-------|-------|-------|
| Amps: _____ | Amps: _____ | _____ | _____ | _____ |
| Volts: _____ | Volts: _____ | _____ | _____ | _____ |

Motor Information

HP _____ RPM _____

Volts _____ Service Factor _____

Frequency _____ Phase _____

Enclosure _____

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CentriPro



ITT Industries

SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.



This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

⚠ DANGER Warns of hazards that **WILL** cause serious personal injury, death or major property damage.

⚠ WARNING Warns of hazards that **CAN** cause serious personal injury, death or major property damage.

⚠ CAUTION Warns of hazards that **CAN** cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

⚠ WARNING All electrical work must be performed by a qualified technician. Always follow the National Electrical Code (NEC), or the Canadian Electrical Code, as well as all local, state and provincial codes. Code questions should be directed to your local electrical inspector. Failure to follow electrical codes and OSHA safety standards may result in personal injury or equipment damage. Failure to follow manufacturer's installation instructions may result in electrical shock, fire hazard, personal injury or death, damaged equipment, provide unsatisfactory performance, and may void manufacturer's warranty.

⚠ WARNING See specific pump and motor nameplates for all agency Listings.

⚠ WARNING Check motor nameplate and CentriGuard nameplate for all electrical ratings.

⚠ DANGER The CentriGuard fixed speed pump starter and controller has safety devices that will stop the motor in the event of electrical, mechanical load or external faults. This does not remove power to the panel.

⚠ DANGER CentriGuard has an auto reset feature in the event of faults, which can result in the pump motor restarting unexpectedly. You must remove all main power to the pump and motor before attempting a repair.

⚠ WARNING **PRE-INSTALLATION CHECKS**

Open all cartons and inspect for shipping damage. Report any damage to your supplier or shipping carrier immediately.

Verify that all equipment is the correct voltage and phase. Warranty does not cover damage caused by connecting pumps and controls to an incorrect power source (voltage/phase supply).

Record the model numbers and serial numbers from the pumps and control panel on the front of this instruction manual for future reference. Give it to the owner or place it in the plastic protective pocket inside the panel cabinet when finished with the installation.

⚠ WARNING PUMP CONTROL PANELS AND WIRING

NOTE: CONSULT MOTOR AND PUMP MANUALS FOR SPECIFIC WIRING INSTRUCTIONS.

MOTOR PROTECTION

Thermal (High Temperature) Protection System: Motors may have a built-in "Thermal Protection System". If this system is based on a normally closed relay, it should be connected to the external alarm, normally closed dry contacts, terminal block pins X1 and 14A on the panel.

Overload (Over Current) Protection: The panel provides for quick-trip, overload protection. The overload protection is to protect against over current as opposed to the over temperature protection that may be provided as a Thermal Protection Circuit included in the motor.

Moisture Detector: If the pump and motor have a moisture detection system, an external alarm dry contact is provided for use by normally open moisture detection control circuits. Use terminal block pins X1 and 13A on the panel for this purpose. For special low or high control voltage requirements, an auxiliary control circuit package can be field installed as an accessory. These are available through your panel distributor or from Charles Warrick Co., in Royal Oak, MI.

⚠ WARNING WIRING AND GROUNDING

Important notice: Read Safety Instructions before proceeding with any wiring.

⚠ Use only stranded copper wire to pump/motor and ground. The ground wire must be at least as large as the power supply wires. Wires should be color coded for ease of maintenance and troubleshooting.

⚠ Install wire and ground according to the National Electrical Code (NEC), or the Canadian Electrical Code, as well as all local, state and provincial codes.

⚠ Disconnect and lockout electrical power before performing any service or installation.

⚠ All splices must be waterproof. If using splice kits follow manufacturer's instructions.

⚠ Seal all panel connections tightly from gases or moisture present which may damage electrical components.

⚠ WARNING **FAILURE TO PERMANENTLY GROUND THE PUMP, MOTOR AND CONTROLS BEFORE CONNECTING TO POWER CAN CAUSE SHOCK, BURNS OR DEATH.**

⚠ WARNING SELECTING CONTROL PANELS

MATCH EQUIPMENT TO POWER SUPPLY:

Important: Always match the pump motor voltage, phase and HP ratings to your control panel and power supply. Record the motor nameplate HP, voltage and phase. Refer to the panel model number designator listed in pages 16-17. Write down the panel rated HP, voltage and phase in the start-up record on page 23. Make sure that the power supply, motor nameplate and panel nameplate data match. Incorrect voltage or phase can cause fire, motor and control damage and voids the warranty.

⚠ WARNING WIRING PUMP CONTROL PANELS AND SWITCHES

It is important to use the wiring diagrams furnished in the manual and to wire all connections as indicated. Please refer to Figure 1 on page 4 and pages 9-12.

Motor Lead Connections: Locate the terminal block labeled T₁, T₂, T₃ and ground screw. Connect wires to terminal block and route wires through one of the knock out ports on the bottom of the panel. There is room allowed to wire with service loops to avoid wire strain.

Input Power Cable Installation: The main power cable is connected to the terminal block labeled L3, L2 and L1. Room is allowed in the panel to wire with service loops to avoid wire strain.

External On/Off: If used to turn the CentriGuard controller on or off from an external panel or controller, (single stop/start), connect to terminal block pin numbers X1 and 12A.

Control from Independent Devices: If an independent device such as a level switch is used to turn the pump on and off, connect the start wires to terminal block pins X1 and 10A and connect the stop wires to terminal block pins X1 and 11A.

Remote Fault Output: Pump fault remote indication devices such as lights or alarms may be wired to terminal block pin numbers 16A and 16B.

External Fault Output (normally open contact): CentriGuard has provision for an external fault input that will engage the safety logic to stop the pump. Connect normally open fault contact to terminal block pins X1 and 13A. Multiple normally open external fault inputs must be wired in parallel.

External Sensor Fault Input (normally closed contact): CentriGuard provides a dry contact to accept an external fault input from a normally closed contact. A motor thermistor would be a typical application. Sensing a fault will engage the safety logic and stop the pump. Connect normally closed external fault contact to terminal block contacts X1 and 14A.
Important: Remove the jumper if this connection is made. Multiple normally closed external fault inputs must be wired in series.

Remote Fault Reset: A normally closed dry contact is required to enable resetting a fault condition from a remote location. Wire remote fault reset connections to terminals X1 and 15A.
Important: Remove the jumper if this connection is made.

Analog Output: A self-powered, scalable 4-20 mA or 0-20 mA analog output signal proportion to shaft HP is available by wiring to connection locations 3 and 4 on the power monitor. This signal can be taken to a SCADA system and used for condition monitoring or as a positive indication that the pump is running.

⚠ WARNING ALARMS

A local red light/combo reset push-button is provided on the panel cover to indicate an alarm situation. The red light will flash at different rates to indicate an overload or underload fault or external normally open contact or external normally closed contact fault. A sticker on the front of the panel shows the flash rate corresponding to the cause of fault.

Upon sensing a fault condition, the controller will de-energize the motor. For a preset period of time, the controller will sense if the fault condition has cleared. Upon sensing a clearing of the fault condition within the preset time, the controller will automatically restart the pump. If the controller auto restarts and experiences three fault sensed shut downs within a preset period of time, the pump motor will remain de-energized until the panel reset push-button or a remote reset is engaged.

Alarm Reset can be done with the local reset push-button on the panel cover and additionally, there are contacts for wiring of a remote reset.

If the controller senses a fault condition, the red panel light will be lit RED until the reset push-button or remote reset is engaged. This is to alert the operator that a fault has occurred, even though the condition has cleared and the pump has automatically restarted.

PANEL OPERATION

Operation is with a Manual/Stop/Auto three position switch and combination green "RUN" light on the panel cover. The pump may be started and stopped at the panel cover with the Manual/Stop positions of the switch. When the three position switch is in the "AUTO" position, start and stopping will be by the wired remote contact or control device. When the pump is energized, the green light on the panel cover will be lit.

CHECK ROTATION

Always verify correct rotation. Correct rotation is usually indicated on the pump casing. Motor direction is reversible. Consult pump and motor manuals for specific instructions.

THREE PHASE POWER UNBALANCE

A full three phase supply consisting of three individual transformers or one three phase transformer is recommended. "Open" delta or wye connections using only two transformers can be used, but are more likely to cause poor performance, overload tripping or early motor failure due to current unbalance.

Check the current in each of the three motor leads and calculate the current unbalance as explained below.

If the current unbalance is 2% or less, leave the leads as connected.

If the current unbalance is more than 2%, current readings should be checked on each leg using each of the three possible hook-ups. Roll the motor leads across the starter in the same direction to prevent motor reversal.

To calculate percent of current unbalance:

A. Add the three line amp values together.

B. Divide the sum by three, yielding average current.

C. Pick the amp value which is furthest from the average current (either high or low).

D. Determine the difference between this amp value (furthest from average) and the average.

E. Divide the difference by the average. Multiply the result by 100 to determine percent of unbalance.

Current unbalance should not exceed 5% at service factor load or 10% at rated input load. If the unbalance cannot be corrected by rolling leads, the source of the unbalance must be located and corrected. If, on the three possible hookups, the leg farthest from the average stays on the same power lead, most of the unbalance is coming from the power source.

Contact your local power company to resolve the imbalance.

| | Hookup 1 | | | Hookup 2 | | | Hookup 3 | | |
|-------------------|----------|----|----|----------|----|----|----------|----|----|
| Starter Terminals | L1 | L2 | L3 | L1 | L2 | L3 | L1 | L2 | L3 |
| | ⊥ | ⊥ | ⊥ | ⊥ | ⊥ | ⊥ | ⊥ | ⊥ | ⊥ |
| Motor Leads | T3 | T1 | T2 | T2 | T3 | T1 | T1 | T2 | T3 |

Example:

| | | |
|-------------------------|-------------------------|-------------------------|
| T3 = 51 amps | T2 = 50 amps | T1 = 50 amps |
| T1 = 46 amps | T3 = 48 amps | T2 = 49 amps |
| T2 = 53 amps | T1 = 52 amps | T3 = 51 amps |
| Total = <u>150</u> amps | Total = <u>150</u> amps | Total = <u>150</u> amps |
| ÷ 3 = 50 amps | ÷ 3 = 50 amps | ÷ 3 = 50 amps |
| — 46 = 4 amps | — 48 = 2 amps | — 49 = 1 amps |
| 4 ÷ 50 = .08 or 8% | 2 ÷ 50 = .04 or 4% | 1 ÷ 50 = .02 or 2% |

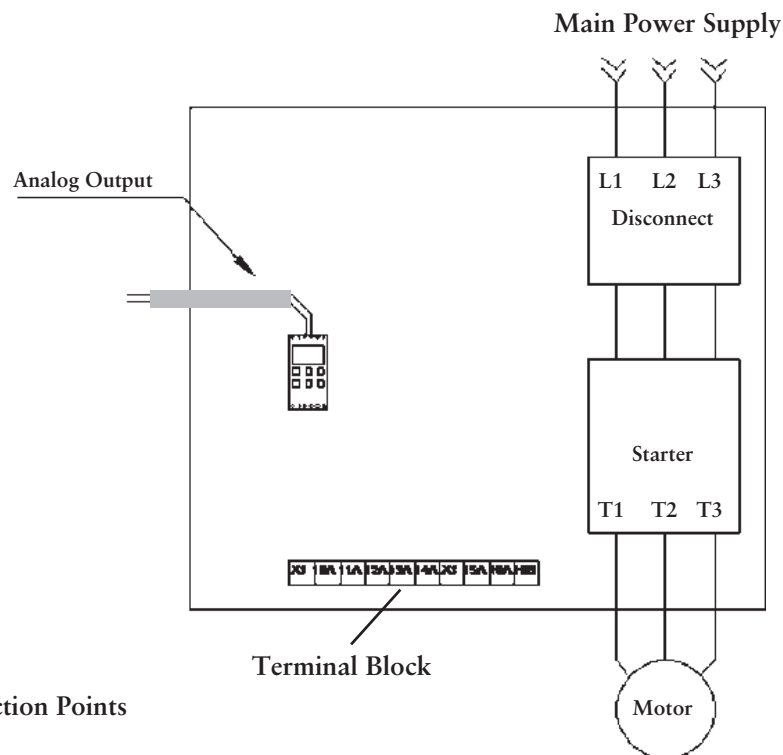


Figure 1
Panel Connection Points

PANEL FEATURES

POWER MONITOR

The CentriGuard panel is provided with a power monitor for pump and motor protection. The power monitor will sense motor overload and underload, and electrical overvoltage and undervoltage.

Most of the settings for the power monitor are preset at the factory. Setting the load point trips must be done in the field with the pump and motor running in normal operation.

This procedure must only be done by a qualified technician with protective gear.

First, view the inset below to get familiar with the power monitor windows and keys. Record all field settings on page 23 of the manual.

Overview

Control terminals:

- 1 S1 Current transformer input
- 2 S2 Current transformer input
- 3 + Analog output
- 4 - Analog output
- 5 DIG External RESET or AUTO SET or Block Pre-Alarm
- 6 C Common: RELAY, DIG
- 7 R1 Main Alarm Relay 1
- 8 R2 Pre-Alarm Relay 2

LCD display:

- 12 Function (window) number
- 123 Function Value
- ▲ Warning signal
- Ⓞ Start-, response delay or block timer active
- Ⓞ Parameter locked
- V Voltage indicator
- A Current indicator
- mA Milliamp indicator
- kW Kilowatt indicator
- S Second indicator
- % Per cent indicator

AUTO SET key:

Press for 3 seconds during normal and stable load to apply the automatic setting of the alarm levels. Not available if Parameter Locked.

NEXT key:

Proceeds to next window. If no key is pressed for 1 minute the display returns to window 01 automatically.

RESET key:

To reset ALARM

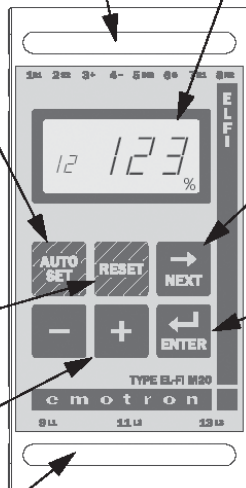
ENTER key:

Confirm (save) changes.

+/- keys:
Increasing and decreasing value

Motor terminals:

- 9 L1 Motor phase
- 11 L2 Motor phase
- 13 L3 Motor phase



After Power up window 01 appears. It shows the actual load value. Default view (example shows 54% load):



Use the NEXT key to scroll through the function menu.

Figure 2 Power Monitor Window

CALIBRATING POWER MONITOR TO MOTOR

In order to calibrate the power monitor to the specific motor it is connected to, it is necessary to program the motor's nameplate values for Full Load Amps (FLA) and HP.

Using the "NEXT" key, index to Window 41. Press the +/- arrows to enter the motor's HP value and then press the "ENTER" key to confirm. Repeat this procedure at Window 42 to program the motor's FLA.

SETTING THE TRIP POINTS

The power monitor's trip points are initially set by using an "AUTO SET" procedure; manual trimming of the parameters

may be done, if subsequently required, using the manual trim procedure. The monitor's default Window 01 will display the motor's load as a percentage of the rated shaft power of the motor. A reading of 100% will equate to the full HP rating of the motor.

The "AUTO SET" procedure will establish two set points; one for overload and one for underload. Turn on the pump motor and let the motor run for a few minutes for the system to fill and the load to stabilize. With the power monitor showing Window 01, press and hold down the "AUTO SET" key for three seconds until the display shows the word "SET". The power monitor has automatically set trip points at 15% above and 30% below this normal load.

USING MANUAL TRIM SET POINTS

Throttle the pump to the lowest normal flow rate anticipated. Keep in mind that all centrifugal pumps have a minimum flow point for safe operation. Consult pump manufacturer if in doubt. Operate the pump in the low flow condition. Index to Window 01 using the "NEXT" key. Read and record the percentage motor nameplate horsepower. Using the "NEXT" key, index to Window 13 for setting underload. Use the +/- arrow keys to select a value that is 5-10% below the recorded percentage HP reading at minimum flow. Press "ENTER" to confirm the underload set point. The Window 13 range is 0-125%.

Now operate the pump at the maximum anticipated flow condition. Index to Window 01 using the "NEXT" key. Read and record the percentage motor nameplate HP. Index to window 11 using the "NEXT" key. Use the +/- arrows to enter a HP value 5-10% higher than the recorded HP at maximum flow. Press enter to confirm the overload set point. The allowable range for window 11 is 0-125%. To avoid nuisance trips, the underload set point should be 30% or more below the overload set point. Run the pump over the entire range to test for power monitor protective operation.

SETTING START UP DELAY OF TRIP FUNCTION

(For self-priming pumps and other special conditions.)

For some applications, such as self-priming pumps, it is appropriate to delay the power monitoring protective trip function until the pump is primed and running in a steady state condition. The power monitor has a built in default of a 2-second start up delay to allow for normal inrush current during starting.

To extend the start up delay, use the "NEXT" key on the power monitor to index to Window 31. Use the +/- arrow keys to adjust the start-up delay period shown in seconds in the window. The adjustment range is 1-999 seconds. Press the "ENTER" key to confirm the value. Note that some self-priming pumps may take several minutes to prime. Consult pump instructions for prime times.

SETTING RESPONSE DELAY

The factory set default for response delay to an underload or overload condition is .5 seconds. This may be adjusted by indexing using the "NEXT" key to Window 32. Use the +/- keys to adjust the response delay. Response delay can be adjusted between .1 seconds and 90 seconds. Press the "ENTER" key to confirm the value.

VIEWING POWER MONITOR STATUS WINDOWS

The following windows may be indexed using the "NEXT" key to view operating conditions:

Window 01: Actual Load, the factory setting is for a readout of percentage HP and is relative to the motor's rated HP.

Window 02: Actual Line Voltage

Window 03: Actual Line Current

SETTING ANALOG OUTPUT

Using the "NEXT" key, index to Window 91. Use the arrow keys to select 0-20 mA, 4-20 mA, 20-0 mA or 20-4 mA. Note that the output analog signal is wired to terminal numbers 3 and 4 on the top of the power monitor. The terminals are labelled by number. Please refer to Figure 9 on page 12.

VIEWING ALARM STATUS

In an alarm condition, Window 01 will appear automatically. The alarm status indications will be:

"F" = Overload

"Fu" = Underload

"LU" = Undervoltage

"OU" = Overvoltage

PARAMETER LOCK

Use the "NEXT" key to index to Window 04. Use the arrow keys to display "369" and then press "ENTER". This will lock the settings. Operating status windows 1, 2 and 3 and alarm status can be viewed when the parameters are locked. "AUTO SET" is disabled. To unlock, reverse the process, entering "369" in Window 04.

FUSIBLE DISCONNECT SWITCH

A door mounted fusible disconnect switch is provided. The disconnect switch is supplied with a key lock for the purpose of locking out power. The key lock may be used for tag out and lock out procedures. At time of panel installation, it is suggested to operate the disconnect switch using the panel mounted handle to verify operation.

TIMER AND ALARM CONTROL

CentriGuard incorporates a timer and alarm control device that is programmed to offer adaptive intelligence for the purpose of distinguishing between nuisance trips and true faults that can damage the pump and/or motor. Upon sensing a fault from either the power monitor or from a wired external device, the control device will de-energize the motor. After a built-in time delay, the control device will check and see if the fault has cleared and attempt to reenergize the motor. If a fault condition is detected a second time, the control device will de-energize the motor. After another delay, the control device will again check to see if the fault has cleared and attempt to restart the motor. If the fault condition causes a third motor shutdown, the motor will remain de-energized until the alarm push-button or remote alarm input clears and resets the panel.

If the fault is a transient condition and the pump maintains operation for a preset period of time, the control device will reset the clock on counting for a fault condition. If a temporary fault condition occurred that shutdown the pump, the red

panel light will remain lit until an operator engages the alarm push-button to clear the alarm and reset the panel. This is for the purpose of notifying the operator that there was a transient or temporary fault condition that took the pump off line briefly. The factory setting for the time delay is 40 seconds and the number of restart attempts is 3. The time delay and number of restart attempts is field adjustable per the instructions on pages 13-14.



Figure 3 Auto Restart Timer and Alarm Control Device

COMBINATION STARTER AND OVERLOAD RELAY

CentriGuard is furnished with a combination starter and overload relay to protect the motor from overload during start-up or operation. Panels designed for use on three phase power also incorporate circuitry that will protect motors from phase loss or phase imbalance, in addition to overload during start-up or operation.

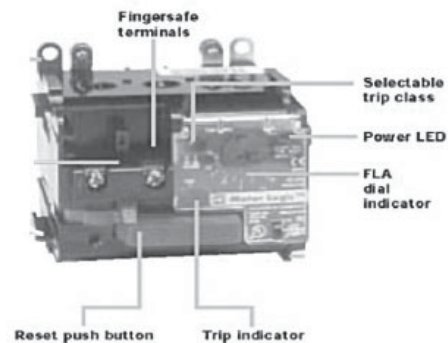


Figure 4 Starter/Overload Relay

The following are field adjustments and indications are available and can be referenced from Figure 4 above:

Setting Based on Motor Service Factor: For continuous-rated motors having a service factor (SF) of 1.0, set the current adjustment dial to 90% of the motor's full-load current (MFLC). For continuous-rated motors having a service factor of 1.15 to 1.25, set the FLA dial indicator current to the MFLC.

Visible Trip Indication: A viewing window on the front of the solid state overload relay provides visible trip indication. A yellow marker appears when the device is tripped.

When the overload relay detects motor current in excess of 125% of the current adjustment dial setting, the overload contacts open and the optional auxiliary contacts change state (N.O. contacts close and N.C. contacts open). The time required for the overload relay to trip depends upon:

- Current value.
- Time elapsed since last trip.

The phase loss/phase imbalance circuitry can detect a phase loss and initiate a trip within three seconds. Phase loss detection extends to a phase loss in either the primary or the secondary of a wye-delta or delta-wye transformer. The circuitry also detects a phase imbalance and initiates a trip when any phase current drops 25% below or rises 25% above the average of the three phase currents.

Reset Bar: The overload relay is reset by depressing the reset bar on the front of the device. Since the overload relay trip function is of the "trip-free" design, it cannot be overridden by holding down the reset bar.

Overload Relay Power On Light: A red LED indicates that the power necessary to operate the overload relay protective circuitry is present. This power is derived from the current flowing in the motor leads. When sufficient power is extracted to enable normal operation, the LED blinks. It blinks faster as the current being monitored increases.

Functional Test: To test for proper operation of the overload contacts, de-energize the starter and disconnect the control circuit power. With a small, flat-blade screwdriver, slide the TEST switch located on the bottom of the overload relay to the right. This operates the trip mechanism, opening the N.C. overload contacts at terminals 95 and 96. Verify proper operation of the overload contacts, then reset the device by depressing the red RESET bar. Reconnect the control circuit power and reenergize the starter as required.

Inspecting and Replacing Contacts: Discoloration and slight pitting do not harm contacts. Do not file contacts; this wastes contact material. Replace contacts only when worn thin. To inspect or replace contacts, disconnect all power. Do not remove any wiring. Loosen the four captive screws holding the contact actuator to the contact block. Lift the contact actuator to expose the contacts. Manually operate the contactor or starter with a screwdriver by pushing down the contact carrier. There is a step on the outside of the contact carrier suitable for this use. Replacement starter contacts may be obtained from a local electrical supply house.

INTEGRATION OF OVERLOAD RELAY AND POWER MONITOR

It should be noted that power monitor is more sensitive and reacts quicker than the overload relay. The power monitor will be the primary device for detecting and deenergizing the motor on overload. The power monitor is reset with the combination/alarm push-button on the front of the panel. Generally, the only time it should be necessary to reset the overload relay is in the event of phase loss, serious phase imbalance or serious undervoltage.

TROUBLESHOOTING GUIDE

REPAIR OF FAULTS AND ERRORS

Power Monitor Overload: Panel red alarm light will flash on for .2 seconds and then off for .2 seconds (latched on until manually reset).

Display "F^" in Window 01 of power monitor (momentary).

First, check overload setting on the power monitor to be sure that an appropriate alarm margin has been set. If alarm margin is correct, the most likely cause of overload is the pump running out on the curve. If this happens upon start-up of an empty system, the pump should be started up against a partially closed discharge valve until the system is filled with liquid. A check valve should be placed on the pump discharge side to keep the system filled with liquid during periods when the pump is off.

If overload tripping continues after these measures, check the pump curve and pump and motor sizing against the actual conditions. Other possible causes are pump jamming because of obstructions caught in the pump, substantially higher than anticipated solids content, substantially higher than anticipated viscosity or a damaged motor winding. Investigate and correct the cause of the overload condition. After correction, press the reset button. Restart the pump.

Power Monitor Underload: Panel red alarm light will flash on for 1 second and then off for 1 second (latched on until manually reset).

Display "Fu" in Window 01 of the power monitor (momentary).

First, check power monitor underload alarm setting to be sure that an appropriate alarm margin has been set. If alarm margin is correct, the most likely cause of underload condition is run dry. Check the supply tank to be sure that there is adequate level. Second likely cause is serious cavitation. This can be due to a clogged strainer or suction line. Serious cavitation can also be due to an inadequate margin of suction pressure above what is required for proper operation of the pump. Running the pump at or close to shut-off (dead heading) will also result in an underload condition. Investigate and correct the cause of the underload condition. After correction press the alarm/reset button. Restart the pump.

Power Monitor Overvoltage: Display "OU" in Window 01 of the power monitor.

The CentriGuard controller can tolerate up to 10% overvoltage in normal operation. Voltage spikes beyond this range can cause the alarm display. High voltage switching in the main line can cause such a spike to occur. If this tripping continues, a main line reactor may be installed in the panel on the line side of the starter. To reset CentriGuard after correcting for overvoltage, press the alarm/push-button. Restart the pump.

Power Monitor Undervoltage: Display "LU" in Window 01 of the power monitor.

The CentriGuard controller can tolerate up to 10% undervoltage in normal operation. Voltage dips beyond this range can cause the unit to shutdown. Check the actual voltage or check for a blown fuse or tripped overload relay. After correcting the problem, press the alarm/reset push-button. Restart the pump.

Earth Fault (Short Circuit): The overload relay in the combination starter is designed to protect against an earth fault or short circuit in the system. Possible causes include frayed or faulty wiring and possible moisture inside the enclosure. Disconnect the unit from the main power supply and check the wiring and for possible moisture. Reset the overload relay with the reset bar on the front of the device and restart the pump.

Loss of Phase/Phase Imbalance: The overload relay has phase loss and phase imbalance monitoring circuitry. Loss of phase or a phase imbalance of 25% or more of the average of the

three phases will result in a trip. Disconnect the unit from the main power supply, find and correct cause for phase loss of phase imbalance. Possible causes would be blown fuse(s) or loose wiring connections. Reset the overload relay with the reset bar on the front of the combination starter. Restart the pump.

External Fault: The red alarm light on the panel will flash on for 3 seconds and off for 3 seconds for a normally closed remote fault. The red alarm light will flash on for 2 seconds and off for 2 seconds for a normally open remote fault. These are faults sensed by external devices or controls wired into CentriGuard. If there are multiple fault inputs of the same type (N.C. or N.O.), the flashing rate will only indicate the class of remote fault (N.C. or N.O.) and not the individual fault. Find and correct the cause of fault. Reset the panel by pressing the alarm/reset push-button. Restart the pump.

CONTROLLER FUNCTIONS

CentriGuard is designed to accept a variety of inputs to function as a pump controller. Outputs are provided for monitoring pump/motor status and performance. The following pages offer a listing of the various terminal inputs and outputs and some sample scenarios on how these inputs and outputs may be used and connected.

TERMINALS – HOW TO APPLY

X1 10A (start) 11A (stop) **INDIVIDUAL START and STOP:** When using two independent switches to start and stop the motor from running.

Application 1: Using two float switches, in a wet well, to pump down the liquid to an acceptable level. *Application 2:* Using two pressure switches, to maintain a pressure range, such as a boost application.

X1 12A **SINGLE START/STOP:** When using one switch to start and stop the motor from running. *Application 1:* Using a differential pressure switch to maintain a pressure range, such as an elevated storage tank. (Caution should be applied, due to possible pump cycling if not properly applied.) *Application 2:* Using a remote dry contact from a SCADA system. *Application 3:* Using an electro-mechanical time clock. **CAUTION: When using terminals 10A and 11A, for starting and stopping, do not use 12A. When using terminal 12A, for starting and stopping, do not sure terminals 10A and 11A.**

X1 13A **FAULT IN (NO):** Any type of normally open contact device may be applied. More than one fault condition may be wired into this location. If multiple faults are required, wire the normally open contacts in parallel with each other to operate correctly. *Application 1:* A float switch that would close upon a high liquid level. *Application 2:* A pressure switch that would close upon detecting an abnormal (high or low) condition. *Application 3:* An integrated seal fail switch within a pump. *Application 4:* A remote SCADA contact.

X1 14A **FAULT IN (NC):** Any type of normally closed contact device may be applied. More than one fault condition may be wired into this location. If multiple faults are required, wire the normally closed contacts in series with each other to operate correctly. *Application 1:* A float switch that is being used to detect a low liquid level. This switch must be a normally open switch that is held closed during normal operation. *Application 2:* A pressure switch that would open upon detecting an abnormal (high or low) condition. *Application 3:* An integrated temperature switch within a pump. *Application 4:* A remote SCADA contact. **IMPORTANT! : When using this feature an integrated jumper between these two terminals would need to be removed.**

X1 15A **FAULT RESET:** A normally closed push-button or switch may be applied, to reset a fault condition that has occurred. **IMPORTANT! : When using this feature an integrated jumper between these two terminals would need to be removed.**

X1 16A 16B **FAULT INDICATION:** A normally open dry contact has been provided for remote monitoring of the pump panel. (all power and hardware provided by the end user) *Application 1:* Remote mounted alarm light. *Application 2:* SCADA system. *Application 3:* Used to close a valve or enable a back up pump system to come online.

X2 17A **SPACE HEATER:** These contacts are not intended for customer use. They are provided for manufacturing and service only. The enclosure heater is used to reduce the risk of condensation within the electrical cabinet and to try and maintain the environmental requirements of the components installed. **DO NOT** connect additional heating devices to these terminals.

Power Monitor Terminals 3-4 **ANALOG OUTPUT :** A 0-20mA or 4-20mA signal can be obtained directly from the power monitor. This analog signal is a direct representation of the output power of the motor, in HP or KW.

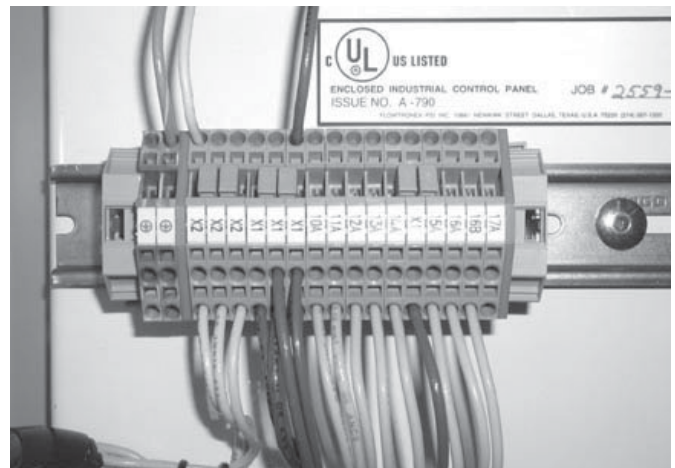
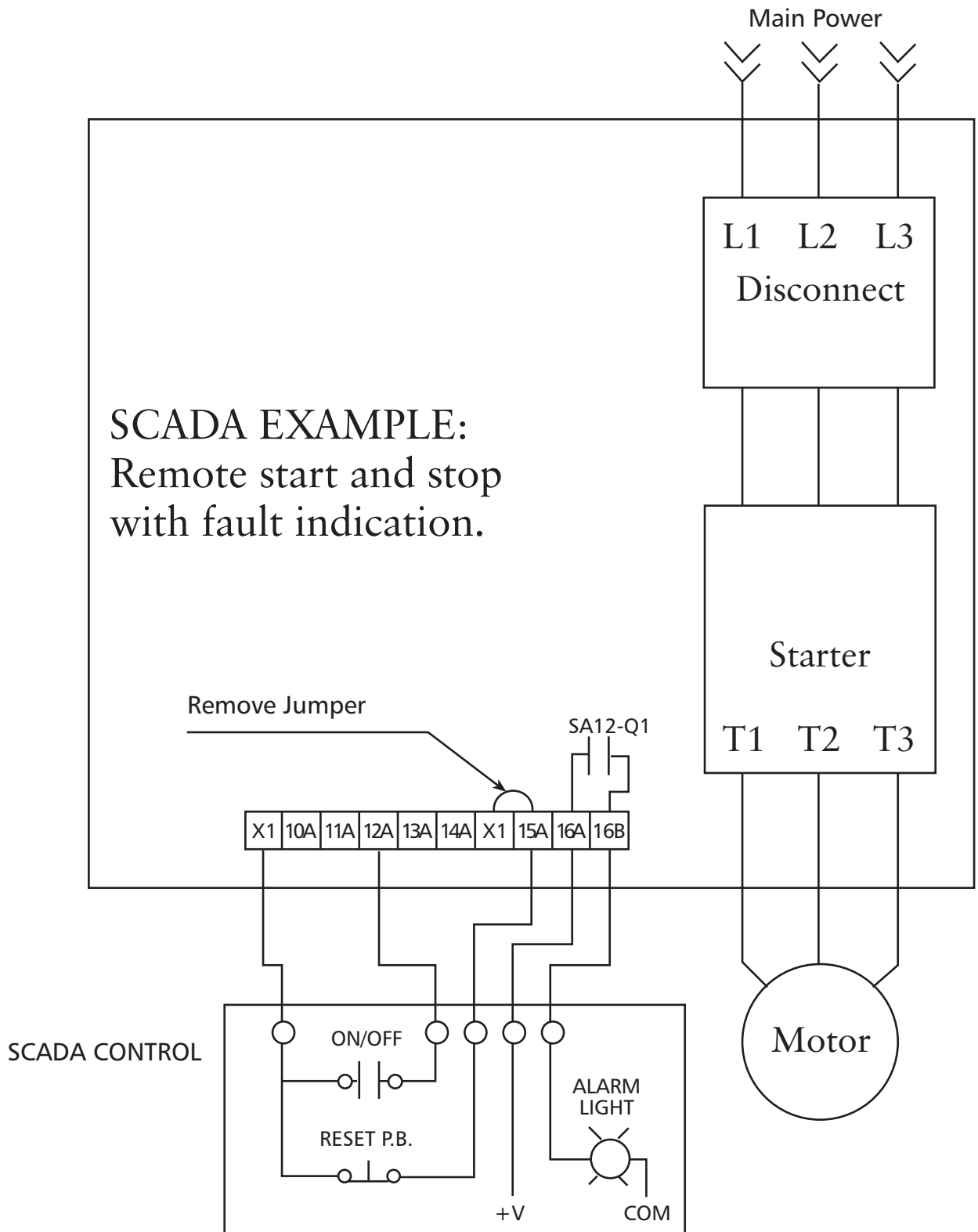


Figure 5 Terminal Bus Bar

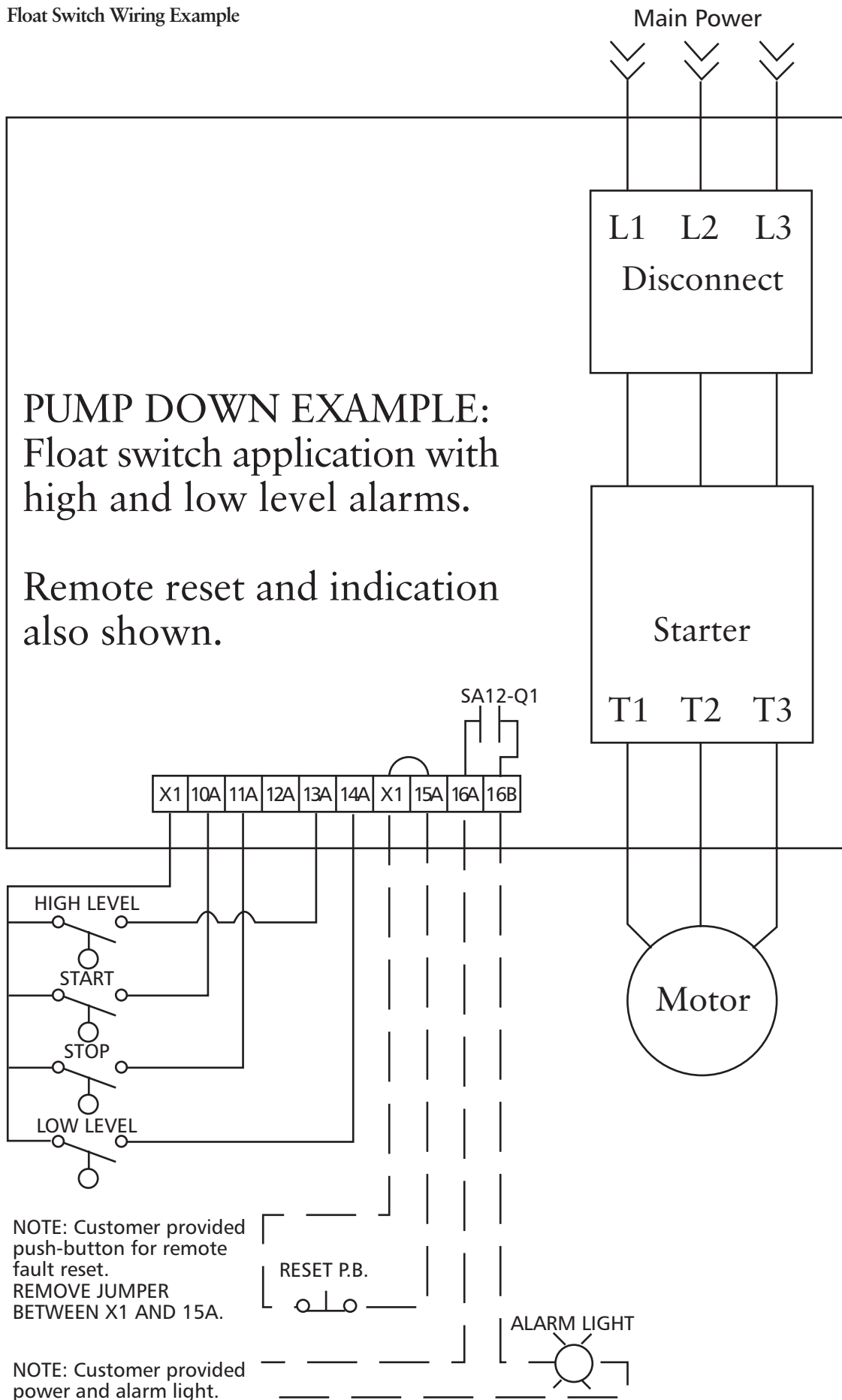
Figure 6 SCADA Wiring Example



NOTES: 1) Customer supplied on/off switch and reset push-button (remove jumper between X1 and 15A if remote push-button is used).

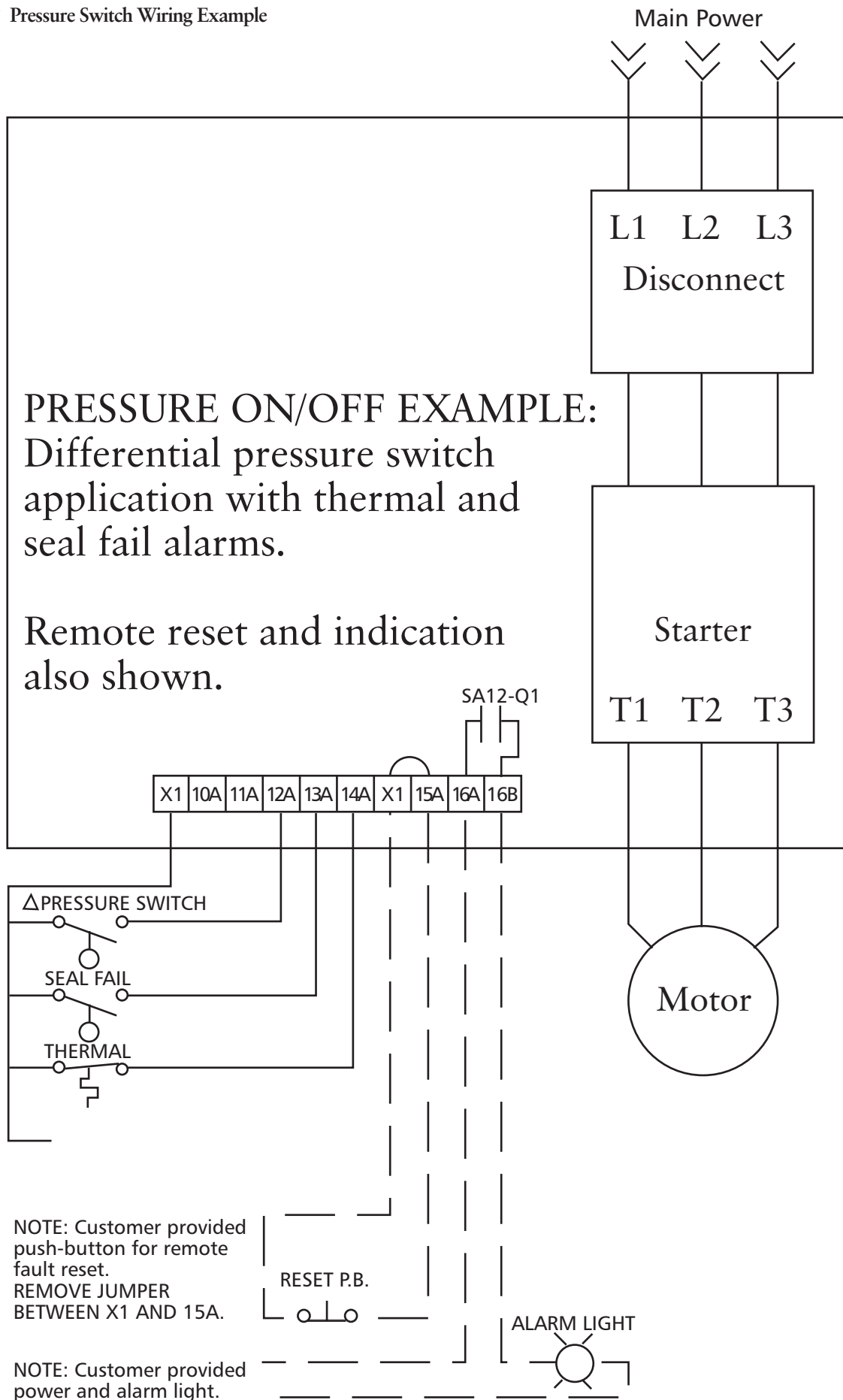
2) Customer supplied power and alarm light.
Refer to page 8 for further details.

Figure 7 Float Switch Wiring Example



Refer to page 8 for further details.

Figure 8 Pressure Switch Wiring Example



Refer to page 8 for further details.

POWER MONITOR DETAILS

Figure 9 Power Monitor Terminals 3 and 4 for analog output of 4-20mA signal proportional to shaft horsepower



Power Monitor Window Status and Adjustable Set Points

| Window | Description | Function | Range | Value | Symbol |
|--------|--------------------|--|---|---------|--------|
| 00 | | Alarm Indication | | view | |
| 01 | % of Horse Power | Measured shaft power in % rated power. | 0-125 | view | % |
| 02 | Line Voltage | Measured line voltage | 90-760 V | view | V |
| 03 | Actual Motor Amps | Measured current | 0.00-999 A | view | A |
| 04 | | Parameter lock | 0-999 | | |
| 05 | | Monitor function | OVER- and UNDER-LOAD, OVERLOAD, UNDERLOAD | - | |
| 11 | Over demand | MAX Main Alarm (relay R1) | 0-125 | | % |
| 12 | | MAX Pre-Alarm (relay R2) | 0-125 | * 125 * | % |
| 13 | Under demand | MIN Pre-Alarm (relay R2) | 0-125 | | % |
| 14 | | MIN Main Alarm (relay R1) | 0-125 | * 0 * | % |
| 21 | | MAX Main Alarm margin | 0-100 | 15 | % |
| 22 | | MAX Pre-Alarm margin | 0-100 | 100 | % |
| 23 | | MIN Pre-Alarm margin | 0-100 | 30 | % |
| 24 | | MIN Main Alarm margin | 0-100 | 100 | % |
| 31 | | Start delay | 1-999 | 2 | s |
| 32 | | Response delay | 0.1-90 | 0.5 | s |
| 33 | | Hysteresis | 0-50 | 0 | % |
| 41 | Motor HP | Rated motor power | 0.13-999 | | HP |
| 42 | Motor Amps | Rated current | 0.01-999 | | A |
| 43 | Motor Phase | Number of phases | 1 PH/3 PH | | |
| 61 | | Main alarm latch | on/OFF | OFF | |
| 62 | | Alarm at no motor current | on/OFF | OFF | |
| 63 | Over Demand Relay | Main Alarm relay R1 | nc/no | no | |
| 64 | Under Demand Relay | Pre-Alarm relay R2 | nc/no | no | |
| 81 | | Digital input | Res/AU/bLo | rES | |
| 82 | | Block Timer | 0.0-90 | 0.0 | s |
| 91 | | Analog output | 0.20/4.20/20.0/20.4 | 0.20 | |
| 99 | | Factory defaults | dEF/Usr | dEF | |

* NOTE: Windows 11-14 will change values when an "Auto Set" is performed.

DEFAULT SETTINGS AND FIELD ADJUSTMENTS AVAILABLE FOR THE TIMER AND ALARM CONTROL DEVICE

PANEL RED ALARM LIGHT FLASHING RATE INDICATION:

Visual Fault Indication: (Flash Rate)

1. Remote Fault (NC)

- Block Number: B62
- On = 030 (3 seconds)
- Off = 030 (3 seconds)

2. Remote Fault (NO)

- Block Number: B31
- On = 020 (2 seconds)
- Off = 020 (2 seconds)

3. Under Demand Fault

- Block Number: B52
- On = 010 (1 second)
- Off = 010 (1 second)

4. Over Demand Fault

- Block Number: B29
- On = 002 (0.2 seconds)
- Off = 002 (0.2 seconds)

TIMER DELAY SETTINGS AND WINDOWS:

Start, Stop, Cycle Timers:

5. Individual Start

- Block Number: B25
- On = 020 (2 seconds)
- Off = 000 (0 seconds)

6. Individual Stop

- Block Number: B49
- On = 020 (2 seconds)
- Off = 020 (2 seconds)

7. Single Start Stop

- Block Number: B60
- On = 020 (2 seconds)
- Off = 050 (5 seconds)

8. 24-Hour — 7-Day Time Clock

- Block Number: B23

Pump Protection Timers:

9. Cycle Start Timer (keeps the pump from cycling)

- Block Number: B40
- On = 000 (0 seconds)
[Always leave at 0.0 seconds.]
- Off = 400 (40 seconds)

10. Fault Confirmation (used to make sure a fault condition exists)

- Block Number: B10
- On = 010 (1 second)
- Off = 010 (1 second)

11. Fault Count

- Block Number: B37
- Upcounting Preset = 3
- Cycle = Single

12. Clear Fault Count

- Block Number: B66
- On = 3000 (5 minutes) [Maximum value of 32767]
- Off = 3000 (5 minutes) [Maximum value of 32767]

NOTE: Press the "A" push-button on the face of the Millennium II timer and alarm control device or the red push-button on the face of the control panel to reset a fault message and disable the light from flashing. Press the "B" push-button on the face of the Millennium II Smart Relay to enable the back light on the LCD display.




Figure 10 Adjustable Timer and Alarm Control Device

All of the variables listed on page 14 can be field adjusted using the window and keys on the timer and alarm control device. Block numbers and the factory preset is provided on page 13 for each of the variables.

⚠ DANGER THIS PROCEDURE MUST ONLY BE DONE BY A QUALIFIED TECHNICIAN WITH PROTECTIVE GEAR.

Modifying Pump Restart Delay after Sensing a Fault

To go into the configuration menu, press OK or ESC. Once in the menu, select PARAMETERS. To do this, press the  key until PARAMETERS is the flashing item. This screen will then appear:



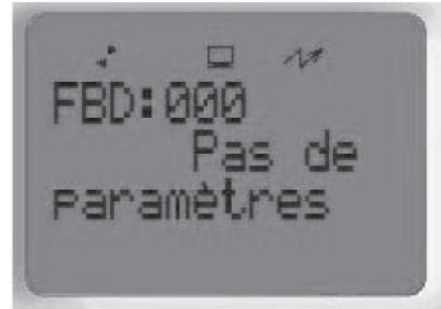
Now press OK to confirm.


The black text flashes to indicate that a value has been selected. To modify it, press OK.

The value flashes when it is possible to modify it.

The OK key switches from one mode to the other.

NOTE: No parameters means there is no block corresponding to the number or the block is not configurable.



In the example, the FBD name is BOO so you should select 000. Should you wish to select another configurable block, press . When the required number is reached, confirm with the OK button.

The same process may be used to field adjust the number of restart attempts before latching out in the faulted state.

Specifications:

| | |
|-----------------------|--|
| Enclosure Type | NEMA 4 Suitable for Outdoor Use with optional sun shield |
| Operating Temperature | 4° F to 122° F |
| Storage Temperature | 20° F to 149° F |
| Humidity | 0-95% non-condensing |

Electrical:

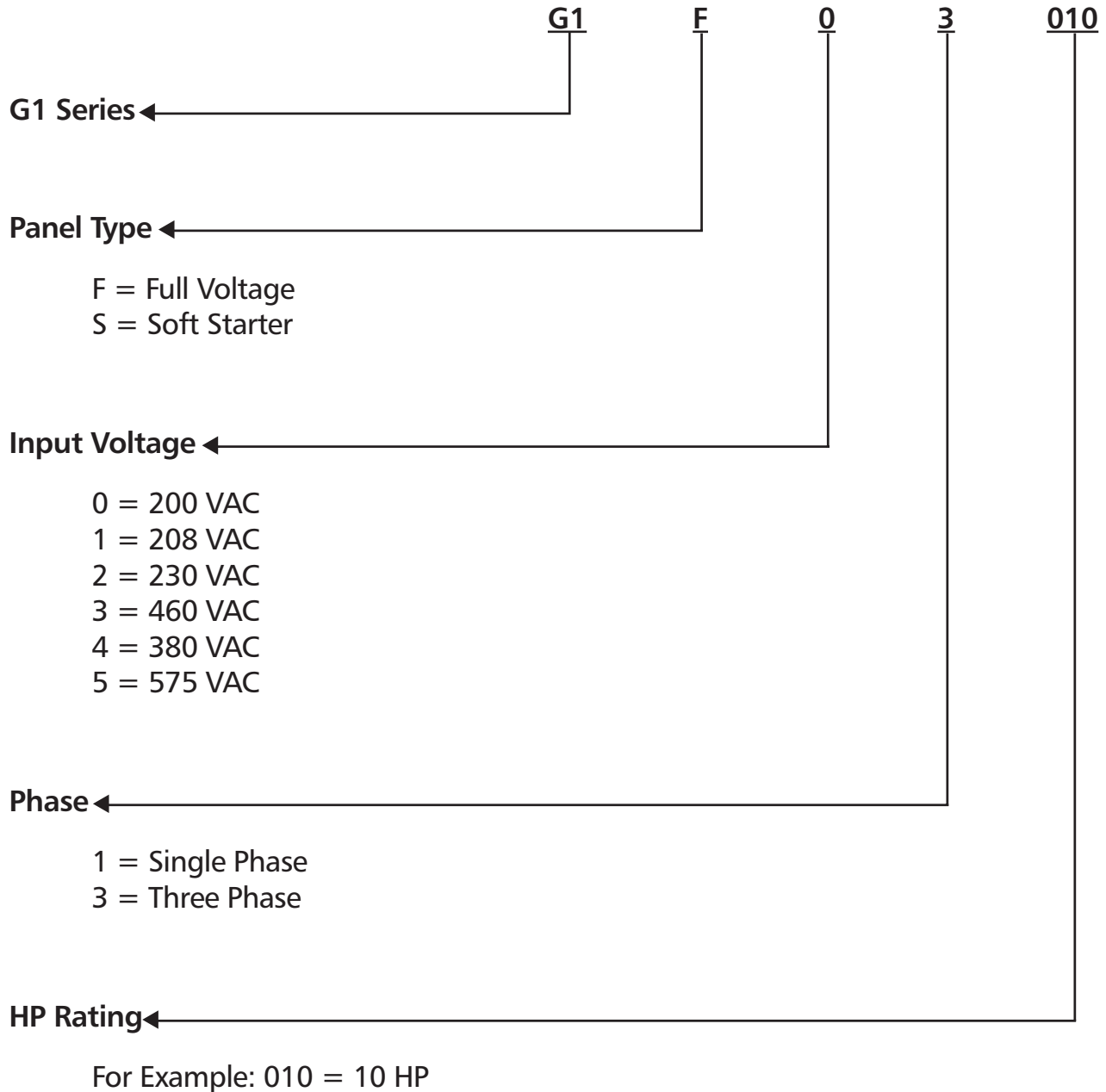
| | |
|----------------------|--|
| Voltage Input | +/- 10% Rated Panel Voltage |
| Input Line Frequency | 50/60 Hz +/- 2 Hz |
| Control Voltage | 115 volts AC |
| Overload Capacity | 125% of rated RMS current for 60 seconds |
| Overload Class | Adjustable for 10, 20 or 30. |
| Time Overload | Adjustable setting for 125% of rated motor current |
| Agency Listing | UL, cUL |

Control Features:

| | |
|-----------------------------|--|
| Pump Protection Features: | Underload (Run dry, cavitation, dead heading, running below minimum flow, run out conditions). |
| | Overload (Pump jamming, excessive solids or viscosity, run out). |
| Motor Protection Features: | Overload, short circuit, undervoltage, phase loss and phase imbalance. |
| System Protection Features: | Dry contact for external sensor faults normally open. |
| | Dry contact for external sensor faults normally closed. |

Interpreting Model Numbers

The model number of the **CentriGuard** appears on the shipping carton label and on the technical data label affixed to the model. The information provided by the model number is shown below:



NOTE: Not all combinations may be available.

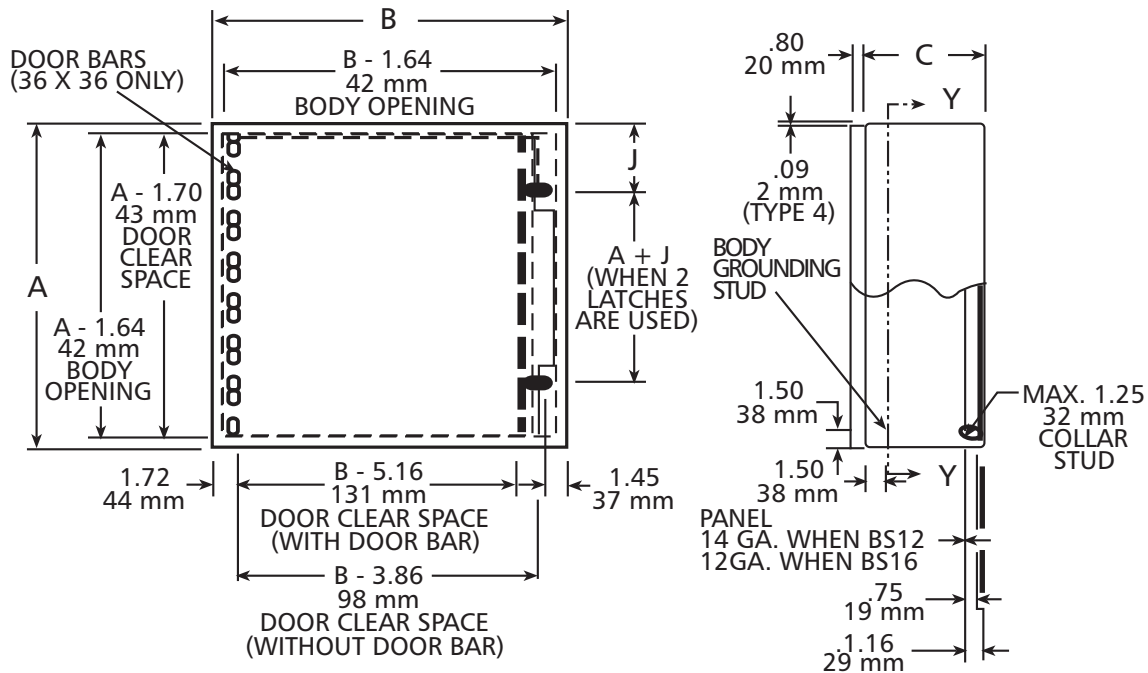
MODEL NUMBER RATINGS

| Model Number | HP | Voltage | Starter Size | Overload Class ① | Disconnect Size ② | Enclosure Size | Net Weight |
|--------------|----|---------|--------------|------------------|-------------------|----------------|------------|
| G1F03003 | 3 | 200 | 0 | 10 | 30 | 24"Hx20"Wx8"D | 62 |
| G1F13003 | 3 | 208 | 0 | 10 | 30 | 24"Hx20"Wx8"D | 62 |
| G1F23003 | 3 | 230 | 0 | 10 | 30 | 24"Hx20"Wx8"D | 62 |
| G1F03005 | 5 | 200 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F13005 | 5 | 208 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F23005 | 5 | 230 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F33005 | 5 | 460 | 0 | 10 | 30 | 24"Hx20"Wx8"D | 62 |
| G1F03007 | 7½ | 200 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F13007 | 7½ | 208 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F23007 | 7½ | 230 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F33007 | 7½ | 460 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F03010 | 10 | 200 | 2 | 20 | 60 | 30"Hx20"Wx10"D | 84 |
| G1F13010 | 10 | 208 | 2 | 20 | 60 | 30"Hx20"Wx10"D | 84 |
| G1F23010 | 10 | 230 | 2 | 20 | 60 | 30"Hx20"Wx10"D | 84 |
| G1F33010 | 10 | 460 | 1 | 20 | 60 | 24"Hx20"Wx8"D | 65 |
| G1F03015 | 15 | 200 | 3 | 20 | 100 | 30"Hx20"Wx10"D | 93 |
| G1F13015 | 15 | 208 | 3 | 20 | 100 | 30"Hx20"Wx10"D | 93 |
| G1F23015 | 15 | 230 | 2 | 20 | 100 | 30"Hx20"Wx10"D | 86 |
| G1F33015 | 15 | 460 | 2 | 20 | 60 | 30"Hx20"Wx10"D | 84 |
| G1F03020 | 20 | 200 | 3 | 20 | 100 | 30"Hx20"Wx10"D | 93 |
| G1F13020 | 20 | 208 | 3 | 20 | 100 | 30"Hx20"Wx10"D | 93 |
| G1F23020 | 20 | 230 | 3 | 20 | 100 | 30"Hx20"Wx10"D | 93 |
| G1F33020 | 20 | 460 | 2 | 20 | 60 | 30"Hx20"Wx10"D | 84 |
| G1F03025 | 25 | 200 | 3 | 20 | 200 | 30"Hx20"Wx10"D | 107 |
| G1F13025 | 25 | 208 | 3 | 20 | 200 | 30"Hx20"Wx10"D | 107 |
| G1F23025 | 25 | 230 | 3 | 20 | 200 | 30"Hx20"Wx10"D | 107 |
| G1F33025 | 25 | 460 | 2 | 20 | 60 | 30"Hx20"Wx10"D | 84 |
| G1F03030 | 30 | 200 | 4 | 20 | 200 | 36"Hx30"Wx12"D | 158 |
| G1F13030 | 30 | 208 | 4 | 20 | 200 | 36"Hx30"Wx12"D | 158 |
| G1F23030 | 30 | 230 | 3 | 20 | 200 | 30"Hx20"Wx10"D | 107 |
| G1F33030 | 30 | 460 | 3 | 20 | 100 | 30"Hx20"Wx10"D | 93 |
| G1F33040 | 40 | 460 | 3 | 20 | 100 | 30"Hx20"Wx10"D | 93 |
| G1F33050 | 50 | 460 | 3 | 20 | 200 | 30"Hx20"Wx10"D | 107 |
| G1F33060 | 60 | 460 | 4 | 20 | 200 | 36"Hx30"Wx12"D | 158 |

① Overloads are adjustable for Class 10, 20 or 30. The table sets the recommended class according to NEC.

② Disconnect sized fuses are per NEC, Bussman Class "J", dual element (time delay).

CENTRIGUARD PANEL DIMENSIONS



| Voltage | Motor Nameplate HP | "A" Height (in.) | "B" Width (in.) | "C" Depth (in.) |
|------------|--------------------|------------------|-----------------|-----------------|
| 200 to 208 | 3 to 7½ | 24 | 20 | 8 |
| 200 to 208 | 10 to 25 | 30 | 20 | 10 |
| 200 to 208 | 30 | 36 | 30 | 12 |
| 230 | 3 to 7½ | 24 | 20 | 8 |
| 230 | 10 to 30 | 30 | 20 | 10 |
| 460 | 3 to 10 | 24 | 20 | 8 |
| 460 | 15 to 50 | 30 | 20 | 10 |
| 460 | 60 | 36 | 30 | 12 |

SUGGESTED FUSE, WIRE AND CONDUIT SIZES

208 Volt

| HP | Fuse | Wire | Conduit |
|----|------|------|---------|
| 3 | 17.5 | 14 | 0.50 |
| 5 | 30 | 10 | 0.50 |
| 7½ | 40 | 8 | 0.75 |
| 10 | 50 | 8 | 0.75 |
| 15 | 80 | 6 | 1.00 |
| 20 | 100 | 4 | 1.00 |
| 25 | 125 | 3 | 1.25 |
| 30 | 150 | 2 | 1.25 |

230 Volt

| HP | Fuse | Wire | Conduit |
|----|------|------|---------|
| 3 | 15 | 14 | 0.50 |
| 5 | 25 | 12 | 0.50 |
| 7½ | 35 | 10 | 0.50 |
| 10 | 45 | 8 | 0.75 |
| 15 | 70 | 6 | 1.00 |
| 20 | 90 | 4 | 1.00 |
| 25 | 110 | 4 | 1.00 |
| 30 | 125 | 3 | 1.25 |

460 Volt

| HP | Fuse | Wire | Conduit |
|----|------|------|---------|
| 5 | 12 | 14 | 0.50 |
| 7½ | 17.5 | 14 | 0.50 |
| 10 | 25 | 12 | 0.50 |
| 15 | 35 | 10 | 0.50 |
| 20 | 45 | 8 | 0.75 |
| 25 | 60 | 8 | 0.75 |
| 30 | 70 | 6 | 1.00 |
| 40 | 90 | 6 | 1.00 |
| 50 | 110 | 4 | 1.00 |
| 60 | 125 | 3 | 1.25 |

NOTE: Fuses are for main disconnect. Bussman Class "J" dual element, time delay type.

Wire is copper, type "THW", 75° C.

All sizes are recommended only and are not a substitute for hiring a local electrician to properly size according to NEC and local codes.

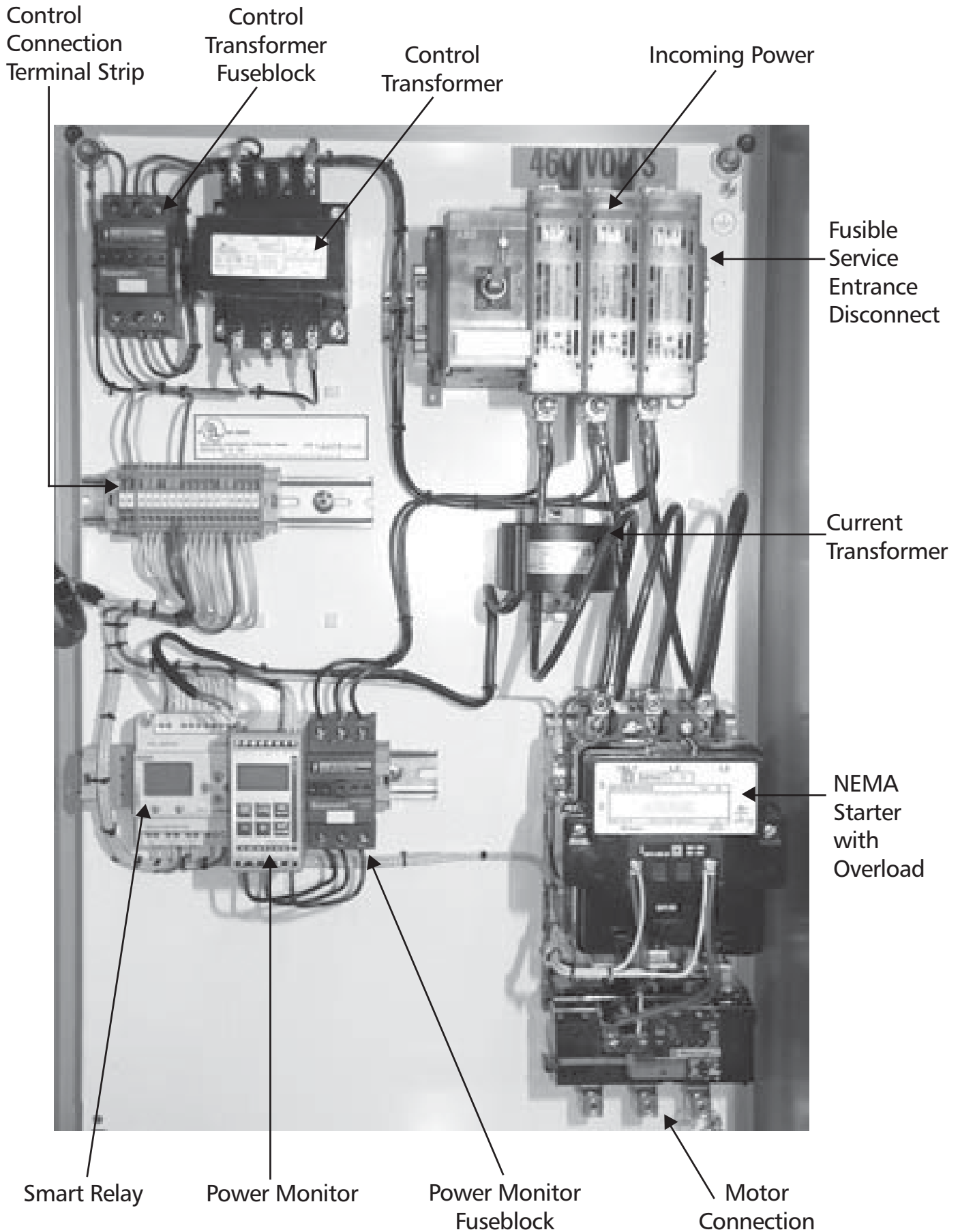


Disconnect Switch

LED alarm light and manual reset push-button.

Three position hand/off/auto switch with green LED run light.

CENTRIGUARD PANEL INTERIOR LAYOUT



Where checked below, the following options are included in the panel to be supplied:

- A door-mounted mechanical reset push-button will 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 will be furnished.
- A non-resettable elapse time meter is to be mounted on the door to record the accumulated running time for each pump.
- A cabinet door stop kit is to be provided.
- Flange-Style mounting brackets will 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 will be provided. The lightning arrester is designed to protect control equipment from damage due to lightning strikes on the incoming power supply line.
- A NEMA 4 rated door mounted window will be provided to allow the user to view and change parameters on the power monitor without opening the panel door.

RECOMMENDED SPARE PARTS FOR FIVE YEARS OF OPERATION

- A set of spare main and control voltage fuses.
- A set of replacement contactors for the starter.

CENTRIGUARD START-UP

Date _____

Technician _____

Technician Company _____

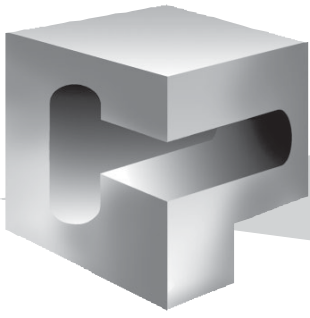
Technician Phone Number _____

| Record Data | HP | Voltage | Phases | Rated Amps |
|--------------------|-----------|----------------|---------------|-------------------|
| Motor Nameplate | | | | |
| CentriGuard | | | | N/A |

| Manually Set Trip Points | % HP | Window |
|---------------------------------|-------------|---------------|
| Low Flow Operating % HP | | 1 |
| Low Flow Alarm Point % HP | | 13 |
| Maximum Flow Operating % HP | | 1 |
| Maximum Flow Alarm Point % HP | | 11 |

| Field Adjusted Delays | SEC. | |
|------------------------------|-------------|----|
| Response Delay | | 32 |
| Start-Up Delay | | 31 |

| Motor Data Set Fields | Start-Up Setting | Window |
|------------------------------|-------------------------|---------------|
| Number of Phases | | 43 |
| Rated Motor Full Load Amps | | 42 |
| Rated Motor HP | | 41 |



CentriPro™

CENTRIPRO LIMITED WARRANTY

This warranty applies to all water systems pumps manufactured by CentriPro.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized CentriPro distributor from whom the pump was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the CentriPro Customer Service Department.

The warranty excludes:

- (a) Labor, transportation and related costs incurred by the dealer;
- (b) Reinstallation costs of repaired equipment;
- (c) Reinstallation costs of replacement equipment;
- (d) Consequential damages of any kind; and,
- (e) Reimbursement for loss caused by interruption of service.

For purposes of this warranty, the following terms have these definitions:

- (1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between CentriPro and the dealer in purchases, consignments or contracts for sale of the subject pumps.
- (2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing pumps to customers.
- (3) "Customer" means any entity who buys or leases the subject pumps from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

THIS WARRANTY EXTENDS TO THE DEALER ONLY.

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