



# **Elite Pump Controller**

## **Duplex Controller, Remote Monitoring, and Automatic Notification System Specifications**

The pump controller shall be microprocessor based and have the capability to control 2 pumps in an alternating or simple lead/lag configuration. The controller shall support operation using a set of five (5) float switches, an analog sensor proportional to level or a combination of analog sensor and floats.

The controller shall monitor pump conditions for failure and shall be capable of initiating alarm notification via phone, pager or fax when a failure occurs. The controller shall have a battery backup that is automatically engaged when power is lost and initiate an alarm notification sequence to inform designated personnel.

The controller shall have the ability to have pumps turn on/off remotely via a phone and PC connection over a modem. The controller shall log all pump starts and stops and keep track of the total elapsed pump run times and total number of pump starts. Pump run times and complete pump status must be available from the web.

The controller shall support expansion of up to a total of 16 additional analog or digital points in the controller enclosure.

### **1.0 CONSTRUCTION**

**A. Enclosure:** Minimum rating should be NEMA 4X

**B. Environmental Limits:**

Temperature: Electronics: -40 to 185°F (-40 to 85°C) Humidity: 0-90% non-condensing @ 104°F

**C. Power Requirements:** 115 VAC 10% or 230 VAC 10%; 50 to 60 Hz; 25 watts, UL rated  
Maximum current draw on DC power: 850 mA at 15 VDC

**D. Current Loop Supply:** 24VDC provided on each analog input card. 240 ohm loop resistance.

**E. Relay Output Rating:** 8A at 125VAC, 6A at 277VAC, 5A at 30VDC

**F. Dimensions:** 10.5"W x 12.5"H x 7.00"D (258mm W x 307mm H x 172mm D)

**G. Weight:** 10.5 lbs. (4.9kg)

**H. Printer Port:** Controller shall have a Centronics parallel – DB25 (female) connection for printing reports, pump run events and all programming.

**I. Serial Port:** Controller shall have a 38.4Kbaud – DB9 (male) connection for support of radio modems, direct connection to SCADA software or connections to PLCs.

**J. Electrical Protection:** Transient voltage/surge protection shall be provided on power line, telephone and all input channels. Solid state surge protection provided on digital input, analog input, serial port, parallel port, telephone and AC power circuitry. All fuses shall be solid-state automatic resettable such that the user is never required to manually change a fuse.

**K. Field Wiring:** I/O wiring shall use quick-disconnect pluggable connectors accepting wires up to 14 AWG.

**L. Digital Inputs:** Dry Contact/Digital Input cards shall be capable of interfacing directly to dry contacts or digital input signals with voltages up to 24VDC. No switches shall be required to select any Digital Input options.

- M. Analog Inputs:** Analog Input cards shall be capable of interfacing directly to 4-20ma, 0-20ma, 0-5V, or 1-5V, signals. Each channel shall be programmable for range independently from any other channel on the same board. All channel range programming shall be via the keypad, phone or PC with no switches or resistors required. All channels shall be internally converted and presented to the user in engineering units.

Automatic calculation of totalized flow when using flow rate engineering units.

All analog input cards shall have a 24VDC power supply on the card.

## **2.0 LIFT or PUMP STATION CONTROL**

### **A. Level-based control**

1. The controller shall monitor the level in the lift station via an analog input signal from a level or pressure transducer. There shall be 5 sets of limits specified in engineering units for the following control/alarm settings:

Low level	Alarm
Off	Turn active pumps off
Lead On	Turn on lead pump
Lag On	Turn on lag pump
High level	Alarm

### **B. Float-based control**

1. The controller shall monitor 3 float switches to control the running of the pumps and up to 2 additional floats for Low and High Alarm.

### **C. Control operation**

1. When a pump is selected for Automatic operation (HOA in Auto mode), the pump shall be started and stopped by the controller.
2. When the Lead On condition exists, the controller shall attempt to start the Lead pump. If the Lag On condition exists indicating additional pumping capacity is needed, the controller shall start the Lag pump.
3. If the Lead or Lag pumps do not respond, the Controller should sense this through a Motor Starter failure input specific to each pump and provide an alarm signal and call out.
4. The Controller shall display the number of pump starts and the total elapsed run time for each pump on a text display.
5. The Controller shall support separate total elapsed run times and daily run times for each pump.
6. The Controller shall support 2 modes of pump operation: automatic alternation of pumps and specifying a specific pump to always be the lead pump.
7. A pump shall be able to be started from the keypad manually if configured for Automatic operation.
8. Once a pump is turned off, the controller shall keep it off for a predetermined period of time before it is permitted to restart. This period of time shall be operator adjustable from the local keypad.
9. If the High Level float switch becomes active, the controller shall turn the next pump in the sequence on/off regardless of the level indicated by a level transmitter or other float switch. The pump shall run until either an Off or Low/High Level condition exists.  
  
If the High Level float became active and neither pump was already running, then the controller shall turn both pumps on/off, waiting a predetermined period of time between the pump starts. This period of time shall be operator adjustable from the local keypad.
10. Both pumps shall have independent maximum on timers so that the pumps will shut off in the event that no Off or Low/High Level condition exists. Timer values shall be operator adjustable from the keypad.
11. If a Lag On float switch becomes active and the Lead On float switch was not active, the controller shall turn both pumps on, waiting a predetermined period of time between the pump starts.
12. If an over temperature input on the controller is activated, then that pump will be shut off and not run again until the over temperature condition clears. During the over temperature a unique alarm condition

for that pump will exist, an LED will illuminate and an alarm callout will be enabled.

13. If a motor starter failure input on the controller is activated, then that pump will be shut off and not run again until the motor starter failure condition clears. During the motor starter failure a unique alarm condition for that pump will exist, an LED will illuminate and an alarm callout will be enabled.
14. If the phase monitor input on the controller is activated, then both pumps will be shut off and not run again until the phase monitor condition clears. During the phase monitor failure a unique alarm condition exists for the station, an LED will illuminate and an alarm callout will be enabled.
15. If a seal failure input on the controller is activated, then the pump will continue to run, an LED will illuminate and an alarm callout will be enabled.

#### **D. Local Display**

1. The Lead Pump shall be displayed.
2. The current status (running or off), of each pump shall be displayed.
3. The Automatic or Lead/Lag mode shall be displayed.
4. If float switches are used for control, then the current condition (on or off) of each float switch shall be displayed.
5. If a level sensor is used for control, then the current level of the tank and the setpoints for Lead On, Lag On and Off shall be displayed.
6. The current settings of the HOA switches for each pump shall be displayed.
7. The current settings of the High and Low alarm floats (if present) shall be displayed.
8. The total run time and total number of pump starts shall be displayed for each pump.
9. There shall be independent LED indications for:

Pump 1 running	Pump 2 running
HOA 1 in Automatic	HOA 2 in Automatic
Pump 1 Over temperature	Pump 2 Over temperature
Pump 1 Seal failure	Pump 2 Seal failure
Pump 1 Motor starter failure	Pump 2 Motor starter failure
Low alarm	High alarm
Phase monitor fault (if used)	Controller in Run or Programming mode
Controller running on primary power	Controller running on battery backup

#### **E. Local Keypad Operations**

1. The operator shall be able to modify the level setpoints, pump start, pump restart, and maximum pump run time settings from the local keypad.
2. The operator shall be able to start or stop a pump from the local keypad.
3. The operator shall be able to call the manufacturers customer service from the keypad if a working phone or cell phone line is connected to the controller.
4. The operator shall be able to acknowledge any alarm conditions to prevent further callouts with the pressing of a single key.
5. The operator shall be able to disarm the controller from making any callouts or turning pumps on or off by pressing a single key.

#### **F. Monitoring and Alarming**

1. The controller shall continually monitor all failures and when one occurs log that event to the internal event log. The event log can be locally printed out the printer port, remotely accessed via modem or remotely accessed via the Internet.
2. When any failure occurs, the controller shall have the ability to callout to a series of phone numbers to notify personnel of the specific failure. The controller must support calling to phones, cell phones, pagers, alphanumeric pagers, fax machines and modems.

3. The controller shall have the capability of issuing a fax report indicating the current status of all input and relay conditions when any failure occurs or on a predetermined periodic basis. The report shall include the following:

Total pump run time	Total pump starts
Primary power voltage	Backup battery voltage
Current loop supply voltage	Temperature in the controller
Current tank level (if using level sensor)	State of all float switches
State of all pump monitoring signals	

4. The controller shall speak user-recorded messages to the called party describing its location and the alarm conditions that are present. The controller shall then verbally request that an acknowledgment be given. The called party shall acknowledge the call by momentarily depressing the '8', '9' or '\*' key on their telephone keypad. If the controller is not acknowledged during the call, it shall hang up, wait from 1 to 3600 seconds and then dial the next number in its phone list. If a successful acknowledgment occurs, the controller shall give a sign-off message, hang up and then wait a user-programmed period of time for the alarm conditions to be corrected. If this period of time elapses and the alarm condition(s) still exist, the controller shall begin the alarm notification cycle again.
5. The controller shall initiate a callout sequence upon loss of primary power.
6. If the controller is calling out when a High or Low Level alarm condition exists and a level sensor is used for control, the current level of the tank shall be reported in engineering units.
7. The controller shall record all events to an internal date/time stamped event log including:

Failures	Alarm calls	Alarm acknowledgements
Pump starts and stops	Programming changes	Arming and disarming

**G. Wireless Operations**

1. The controller shall support monitoring the level in a tank and controlling pumps that are remote from each other using either radio telemetry or cellular telemetry.
2. The controller shall support communications from the tank to the pumps that do not have direct line of sight.

**3.0 ALARM NOTIFICATION CAPABILITY**

- A. Telephone Number Capacity:** 16 lists of 16 numbers, each number containing up to 50 digits
- B. Recorded Speech Capacity:** 8 seconds per input channel message and System Identification message
- C. Monitoring Capacity:** Up to 48 inputs in any combination of digital (4 or 8/board) or analog (8/board)
- D. Speech Technology:** Digitally recorded voice messages plus permanent library.
- E. Message Requirements:** 8 second messages for, power loss, low battery message, user selectable via keypad or remotely for 1 or 2 alarm/normal messages for each input channel, 1 channel identification message per channel.
- F. Telephone Numbers:** Up to 512 available numbers up to 50 digits each. Numbers may include '\*', '#', delays, and detection of dial tone.
- G. Types of Alarms:** The controller shall have the following alarm types:
  - System –
    - loss of primary power,
    - low battery,
    - phone fault that can drive any relay
  - Digital –
    - on or off

- number of times in a condition – pulse totalization that can be multiplied by a scale factor and reported in engineering units (e.g. Flow totalization)
- accumulated time in a condition – total run time reported in Days Hours Minutes Seconds. (e.g. Pump run times)
- Analog –
  - a user-specified high or low limit for a specified period of time,
  - a user-specified positive or negative rate of change.

All alarms shall be recorded with date/time in the event log.

- H. Alarm Prioritization:** The controller shall have the capability to prioritize alarms by the telephone list designated to each alarm channel. Additionally, alarms shall be prioritized by time of day to different phone lists.
- I. Alarm Acknowledgment:** The controller shall provide acknowledgement of alarms from:
- the front panel,
  - a phone that is called with an alarm condition,
  - a dial-in from a remote location with appropriate access codes.
- All acknowledgements will be recorded in the event log with the date/time, the method of acknowledgement and the Caller ID if from a remote location.
- J. Status Notification:** A report of all current conditions of the remote monitor shall be available on a predefined schedule from every 15 minutes to 1/day. The report shall be delivered in voice over phone, via fax or to the internet.
- K. Event Reporting:** The controller shall have the capability of documenting all alarms, dial-out, dial-in, and alarm acknowledgement activities with date/time to a standard parallel printer or over a modem connection to a PC or to the internet.
- The status report shall contain the last 1000 events. Each event shall have the date/time of the event and the action performed.
- L. Alarm Notification:** The system shall be capable of notifying of alarm conditions by:
- |                          |               |                    |
|--------------------------|---------------|--------------------|
| telephone and cell phone | digital pager | alphanumeric pager |
| modem call-out           | modem call-in | fax                |
| parallel printer         | LEDs          | relay activation   |
| display                  | radio         |                    |
- Each alarm channel shall be programmable to continue alarm notification if the condition returns to the normal condition.
- M. Arming and Disarming:** The controller shall be capable of being armed or disarmed locally and remotely. Arming or disarming shall be recorded to the event log.
- N. Battery Backup:** The controller shall have internal battery back-up capacity sufficient for an 8-channel monitoring/alarm system to perform its alarm call-out function for a minimum of 48 consecutive hours upon loss of primary power.
- O. Customer Service:** The controller manufacturer shall have a toll-free number for customer service calls. The controller shall have a 2-key sequence that can be entered from the local keypad that will place an automatic speaker phone call to the manufacturer's customer service facility.
- P. Certifications:** The controller shall meet:
- FCC Part 15, Class A and Part 68 requirements with valid registration

## **4.0 WARRANTY**

Five year of warranty shall be standard with the purchase of a new unit.