

# PUMP Vision™ PV2



## Lift Station Level Controller Installation and Operation Manual

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## PRODUCT OVERVIEW

The PUMP Vision PV2 is a digital level controller with an easy to use 3.5" color touch screen operator interface designed to operate two pumps with a 4-20 ma level sensor.

The PV2's simple yet informative "Main Dashboard" provides status of both pumps, all alarm conditions, alarm reset button and alarm silence button, making it a simple to install and simple to use solution. The individual "Pump Dashboards" provide important High Temperature, Seal Failure, Start Counter and Hour Meter information, further reducing the need for extraneous components, simplifying wiring requirements and improving the ease of use and reliability of the overall system.

### Overview of Standard Features

#### Main Dashboard

- 1/2" Text display of liquid level in 1/10 ft resolution
- Status indicators for each pump  
Off, Running, Called, Failed, Out-of-service
- Any alarm condition in 30 character 1/4" text display
- Number of active alarms
- Horn Silence button
- Alarm Reset button
- Menu button access to Setup, Alternation, Alarm Log, Pump Dashboards

#### Pump 1, Pump 2 Dashboard

- Status indicators for the pump  
Off, Running, Called, Failed, Out-of-service
- High Motor Temperature Indicator (user enabled)
- Seal Failure Indicator (user enabled)
- Run Time Meter (ETM) - 1/100 hour resolution
- Start counter
- Disable button (take the pump out of service)

## PRODUCT OVERVIEW

### Setpoints

- Setpoint control of the level input with:
  - Stop lead pump
  - Start lead pump
  - Start lag pump
  - High level alarm
  - Low level alarm

### Alarms

- User definable fault handling of the following alarm conditions:
  - High level—transducer
  - High level—redundant float
  - Low level—transducer
  - Low level—redundant float
  - Seal failure
  - High temperature
- Factory preset fault handling of:
  - Pump failure
  - Transducer failure
- Fault logging with date and time stamp
  - Date
  - Time
  - Duration
  - User acknowledgement

### Alternation

- Alternation mode selector
  - Automatic — alternates with each pumping cycle
  - Time clock — alternates daily
  - Manual — any pump can be set as the lead pump

## PRODUCT OVERVIEW

### Other features

- Automatic transfer to standby pump on pump failure
- Start delay timers to prevent simultaneous starting of pumps after power failure
- Ability to accept any 4-20 ma level signal with user scaling and offset
- Modbus RS485 communications port (or optional Ethernet) for connection of SCADA, dialers and other remote monitoring devices

### Access Security

There are three levels of access to the menus, designed to allow any user access to the normal operation modes and qualified personnel to have access to the setpoints. The final level of access is reserved for the higher level setup of the system.

- No password protection  
Level display, Pump Control, Alternation, Time, Alarms
- 1st level password protection  
All set points—Stop, start, alarms, timers, alarm handling
- 2nd level password protection  
Setup transducer, ETM reset, start counter reset, and network configuration

### Optional features

The PUMP Vision can be ordered with a second communication port, either Ethernet or serial. With a wide variety of methods, this port can be connected to a LAN or WLAN. With such a connection, the following integral features can be accessed:

- Remote Access Program  
Provides a virtual PUMP Vision on a PC—completely control the PV2  
Access to the data log

A network “gateway” option can be purchased separately that will connect the PV2 controller to most any network including BACnet MS/TP or TCP, Metasys, Modbus IP, Ethernet IP, and more.

# PUMP Vision™ PV2

## Construction

The PUMP Vision PV2 is housed in a rugged 4.29" x 4.29" case that can be door mounted with NEMA 4X or IP65 protection, or DIN rail mounted on a back panel. All wiring is terminated at pull out terminals, making it simple to replace the unit should the need arise.

The backlit 320 x 240 pixel TFT, LCD display is graphical and can display any font type, bitmap images, and animated graphics.

A 7 year battery is provided to retain the Real Time Clock memory.

The PUMP Vision PV2 unit includes 12 digital inputs, 2 analog inputs and 8 relay type outputs.

## Communication

The PV2 comes standard with one RS232C port configured as a Modbus slave. A separate network gateway product is available to convert the Modbus protocol to others if needed.

## Remote Access

One of the remote control options available for the PUMP Vision is our Remote Access software. Once connected to the PUMP Vision, either directly through the COM port, or through a remote connection method such as dial-up modem (land-line or GSM cellular), Internet, or radio, a user can open the Remote Access software program that provides a "virtual" PUMP Vision on the screen of the PC. This software can be downloaded from our Website

Operation of the system is identical to being there. The user simply uses the mouse to press the "buttons" of the on-screen version of the PUMP Vision. All of PUMP Vision information and setpoint screens can be accessed. The pumps can be started and stopped. Alarm messages can be read, setpoints can be changed, data and trends can be viewed.



### SAFETY CONSIDERATIONS

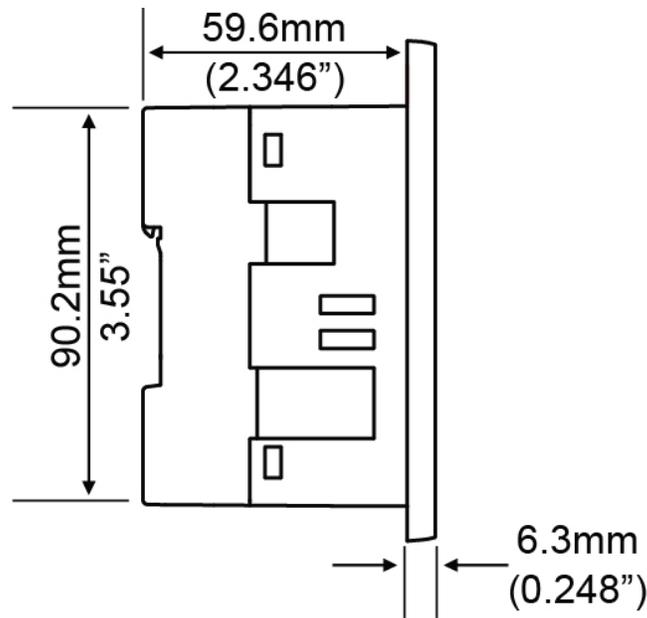
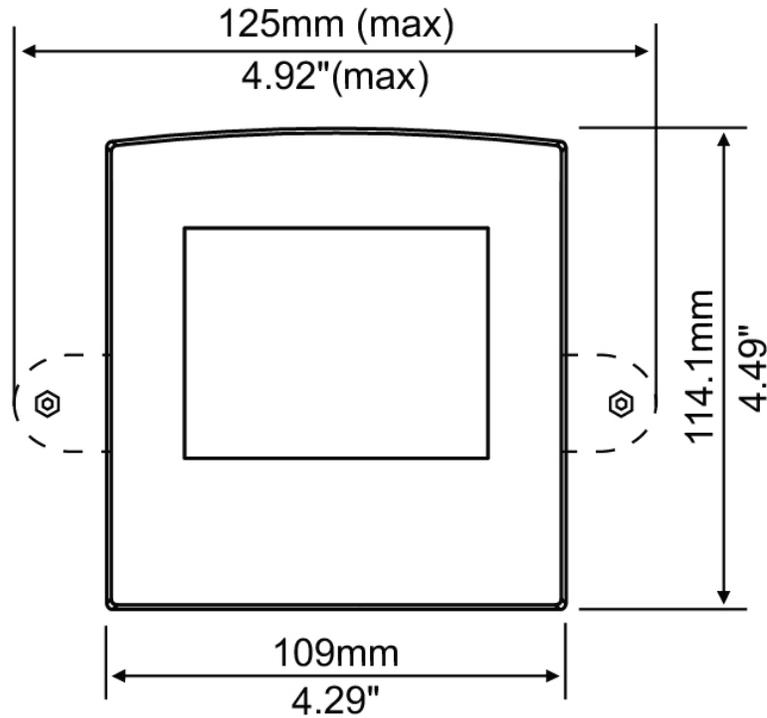


- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.
- Do not attempt to use the controller with voltage exceeding permissible levels. Permissible voltage levels are listed in the technical specifications provided in this manual.
- Install an external circuit breaker or fuse and take all appropriate safety measures against short-circuiting in external wiring.
- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.
- Do not place in water or let water leak onto the controller.
- Do not allow debris to fall inside the unit during installation.
- Double-check all the wiring before turning on the power supply.
- Ascertain that terminal blocks are properly secured in place.
- Do not touch live wires.
- Stay as far as possible from high-voltage cables and power equipment..
- Leave a minimum of 10mm space for ventilation between the top and bottom edges of the controller and the enclosure walls.



- A non-isolated power supply can be used provided that a 0V signal is connected to the chassis.
- Standard safety considerations require that metal cabinet panels be grounded to avoid electrocution.
- Do not connect either the Neutral or Line signal of the 120VAC circuit to the device's 0V terminal.
- In the event of voltage fluctuations, or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.
- The wiring of this device is specifically designed to be safe and easy. A technician or engineer trained in the local and National Electric Code should perform all tasks associated with the electrical wiring of the device.

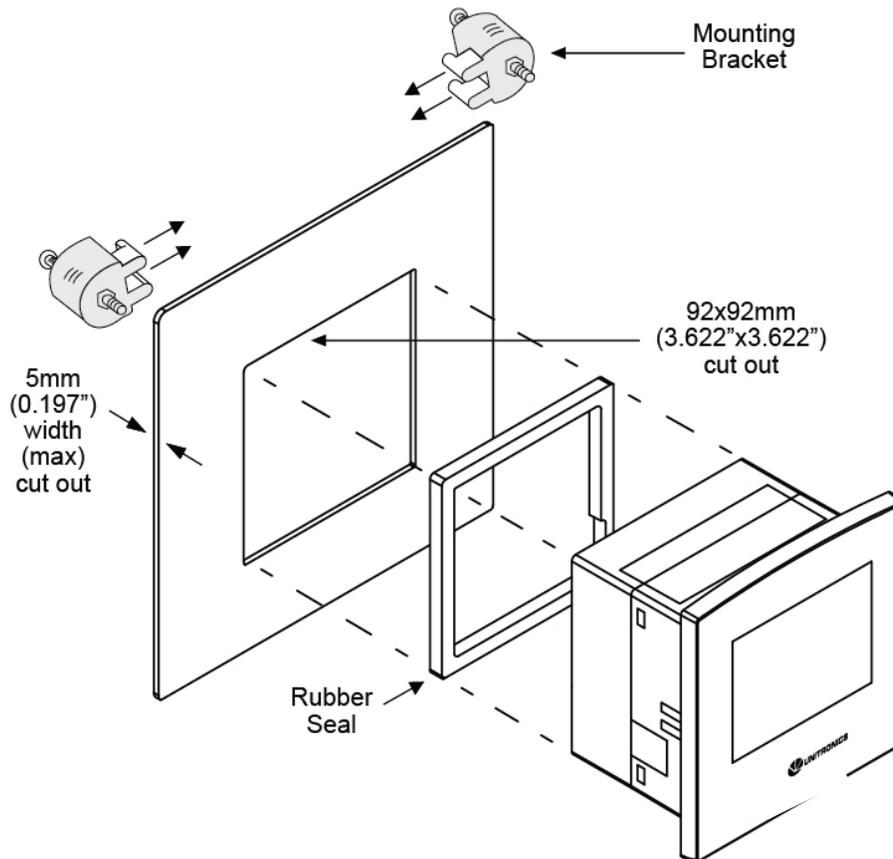
## DIMENSIONS



### PANEL MOUNTING

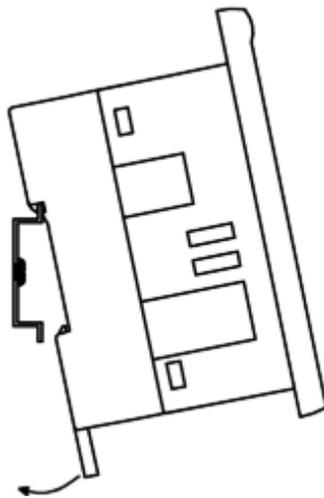
Before you begin, note that the panel itself cannot be more than 0.197" thick.

1. Make a panel cut-out that measures 92 x 92mm (3.622" x 3.622").
2. Check the seal that is placed over the back of the unit. The seal must fit snugly against the back rim of the operating panel.
3. Slide the controller into the cut-out.
4. Push the two black plastic mounting brackets into their slots on the sides of the controller as shown.
5. Tighten the bracket screws against the panel as shown.



## DIN RAIL MOUNTING

Snap the controller onto the DIN rail as shown.



When properly mounted, the controller is squarely situated on the DIN rail.

## WIRING

### Wiring Considerations



- A technician or engineer trained in the local and National Electric Code should perform all tasks associated with the electrical wiring of the controller.

- Input or output cables should not be run through the same multicore cable or share the same wire.

- Do not lay input or output cables near high voltage power cables.

- Allow for voltage drop and noise interference with input and output lines used over an extended distance. Use wire that is properly sized for the current load.



- Double-check all the wiring before turning on the power supply.

- Unused I/O terminals should not be connected. Ignoring this directive may damage the controller.

### On-board I/O

I/O connection points are provided by external connectors at the top and bottom of the controller. The connectors plug in, enabling quick and easy removal. They provide screw-type connection points for the power source, inputs and outputs. The connection points are clearly labeled on the controller itself.

The top generally provides connections for the power supply, analog inputs and digital inputs. The bottom connector provides terminals for the relay outputs.

### Connections to the Controller

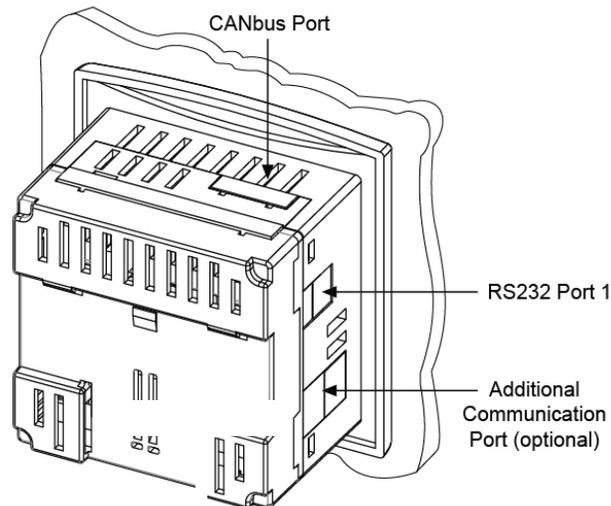
1. Strip the wire to a length of 0.250-0.300 inches.
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure a proper connection.
4. Tighten enough to keep the wire from pulling free.
5. Use 14 gauge to 26 gauge wire.
6. Do not exceed 1 inch pounds of torque.
7. We recommend crimp connectors (ferrules) in the wire ends.

## COMMUNICATION PORT

The PUMP Vision PV2 has one RS232 serial port as standard and is configured as a Modbus Slave, 9600 Baud, 8 data bits, even parity, 1 stop bit.

PUMP Vision is connected directly to the PC with a standard RJ11 type cable which should not be longer than 10' when using RS232. An RJ11 to 9 pin D connector is used to connect to the PC.

An optional Ethernet port can be added to allow Remote Access to connect the controller through the Internet.

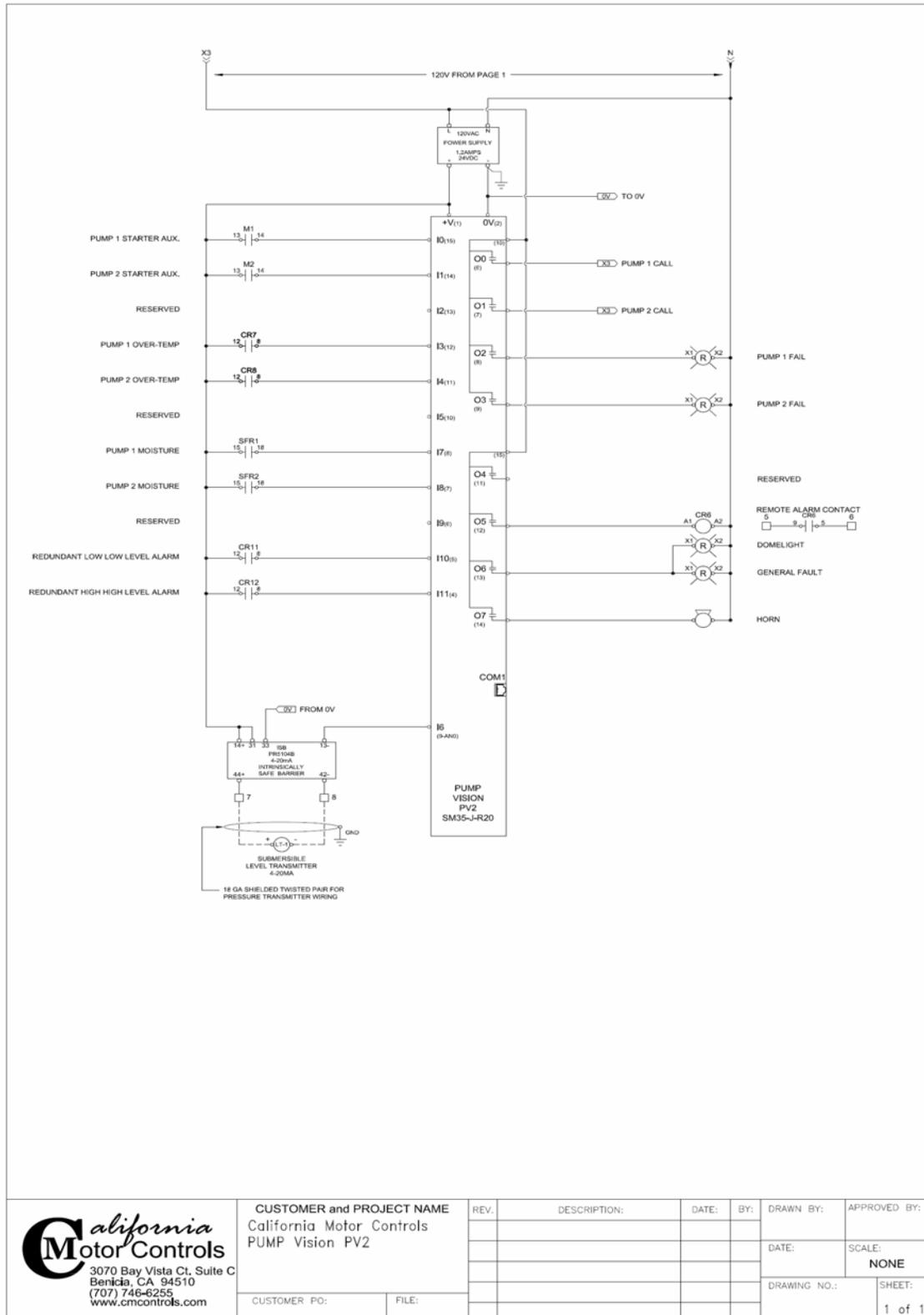


**Table 1: RS232: Pinout**

Diagram	Pin Number	RS232: Function
	1	DTR signal
	2	0V reference
	3	TxD signal
	4	RxD signal
	5	0V reference
	6	DSR signal

# PUMP Vision™ PV2

## Typical Wiring Diagram



<p>California Motor Controls 3070 Bay Vista Ct, Suite C Benicia, CA 94510 (707) 746-6255 www.cmcontrols.com</p>	<b>CUSTOMER and PROJECT NAME</b> California Motor Controls PUMP Vision PV2		REV.	DESCRIPTION:	DATE:	BY:	DRAWN BY:	APPROVED BY:
	CUSTOMER PO:	FILE:					DATE:	SCALE:
							DRAWING NO.:	SHEET:
								1 of 1

### IO LIST

Connect input and output devices as needed.

#### Inputs

I0	Pump 1 starter auxiliary contact (run confirmation)
I1	Pump 2 starter auxiliary contact (run confirmation)
I2	Reserved
I3	Pump 1 high motor temperature
I4	Pump 2 high motor temperature
I5	Reserved
I6	4-20ma transducer input
I7	Pump 1 seal failure
I8	Pump 2 seal failure
I9	Reserved
I10	Low level alarm - redundant float switch
I11	High level alarm - redundant float switch

#### Outputs

O0	Pump 1 run
O1	Pump 2 run
O2	Pump 1 fail
O3	Pump 2 fail
O4	Reserved
O5	Alarm contact
O6	Alarm light
O7	Alarm horn

### **Manual Operation**

It is recommended that the control system include an H-O-A selector switch. When the H-O-A is placed into the HAND position, the PUMP Vision will be bypassed and the pump should run..

### **Automatic Operation**

The pumps are available for automatic run when the selector switch is in the AUTO mode.

The analog level signal is converted to tenths of feet and that value is compared to the start and stop set points that are entered into the system by the user.

On rising level, when the level is equal to or greater than the lead pump start set point, the lead pump will start. If the level continues to rise beyond the start lag pump set point, the lag pump will start.

On falling level, the pumps will shut off as the level drops below the stop set point.

The start and stop sequence is reversed when the controller is configured for pump up (fill).

### **Alternation of the Pumps**

The pump alternation mode is set by the user. Automatic, time clock and manual modes are available.

- Automatic mode—the pumps will alternate after each pumping cycle.
- Time clock—the pumps will alternate daily at the time set by the user.
- Manual—the pumps will not alternate. The lead pump is selected by the user

### Alarm Conditions

All alarm conditions will operate according to the way they are configured in SETUP ->ALARM SETUP. Each alarm can optionally be configured to:

- Be enabled or disabled
- Stop the pumps
- Require manual reset
- Sound the horn
- Light the alarm light
- Flash the alarm light
- Close the alarm contact

All enable alarm conditions will be logged into the alarm handler.

For all alarm conditions, touching the screen of the PUMP Vision will silence the horn output.

Inputs are provided for the following alarm conditions:

- High level—transducer
- Low level—transducer
- High level—redundant float
- Low level—redundant float
- High motor temperature for each pump
- Seal failure for each pump
- Pump failure for each pump

NOTE: There is a factory preset time delay of 10 seconds for each alarm.

### Pump Failure

This condition is determined by the motor starter failing to close an input to the controller within a preset time period of 10 seconds. If a pump fails to start, the pumping duty is automatically transferred to the next available pump in sequence.

The pump can be taken “Out-of-service” and this failure alarm is prevented, by touching the Enable/Disable Pump button in Pump Dashboard. This allows maintenance of the pump without generating an alarm condition. As with a pump failure condition, the pumping duty is automatically transferred to the remaining pump.

### Transducer Scaling

The PUMP Vision PV2 is designed to allow nearly any type of 4-20 ma level sensing device to be connected, with any range.

To scale the range of the PUMP Vision PV2 to match the range of the transducer, go to SET-UP->TRANSDUCER. The scale is entered with four parameters.

First, the transducer type is entered by selecting either 4-20 ma TRANSDUCER or 4-20 ma ULTRASONIC/RADAR.

If 4-20 ma TRANSDUCER is selected a choice between PSI or INCHES appears. Select the appropriate one.

Next, the range of the measurement is entered (example: 0 -15 PSI, or 0-120 INCHES. water). For 4 -20 ma ULTRASONIC/RADAR type, only inches is available.

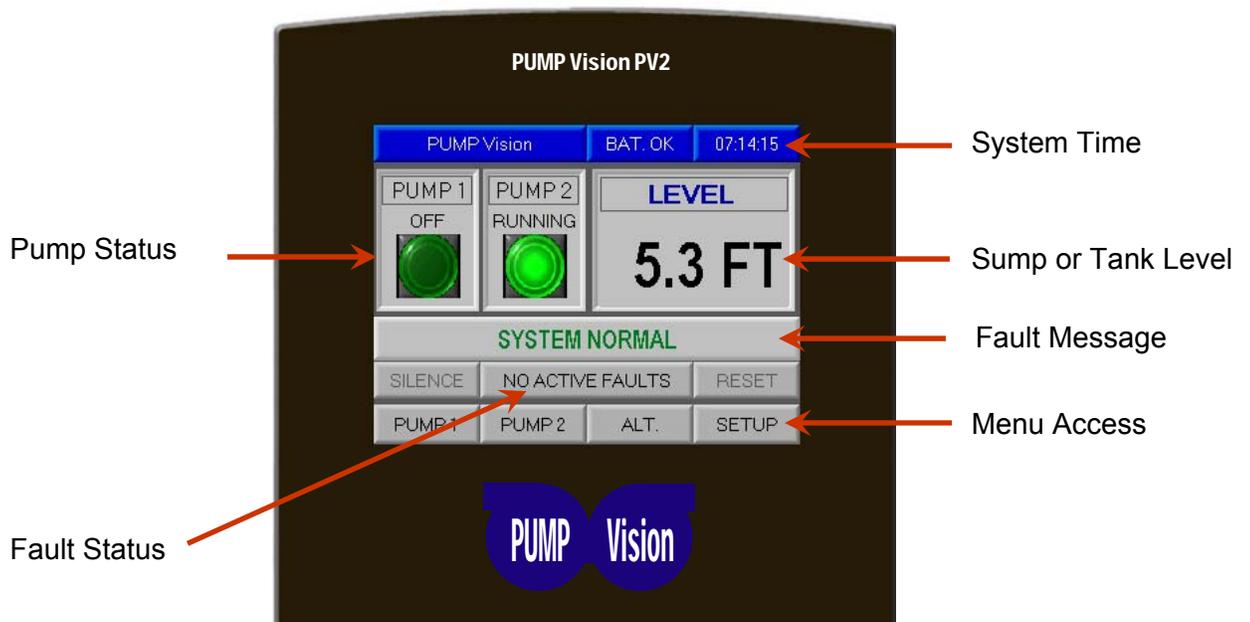
Next, an offset can be programmed. The offset adds or subtracts value to the level transducer value in the PV2. This is useful when the transducer or bubbler tube is positioned off of the tank floor, to prevent the buildup of debris from interfering with the reading from the transducer. The resulting display will be an actual liquid depth.

In 4-20 ma ULTRASONIC/RADAR mode, a choice appears between DIRECT and REVERSE sensing. Since many ultrasonic transducers come with a default mode of measuring the *air space*, rather than the water level, the PV2 can be set in REVERSE mode to invert the reading coming from the sensor to prevent having to reprogram the device.

### MAIN DASHBOARD

#### NAVIGATING CONTROLLER

The PUMP Vision PV2 is an easy to use touch screen controller with a menu driven display. Each display includes intuitive buttons to navigate through the controller.



**Sump or Tank Level** - Displays the level of the sump or tank, digitally in tenths of a foot.

**System Time** - The system time is used to provide a date and time stamp to the alarm handler and also to set the time of day that the system alternates if time clock alternation mode is selected.

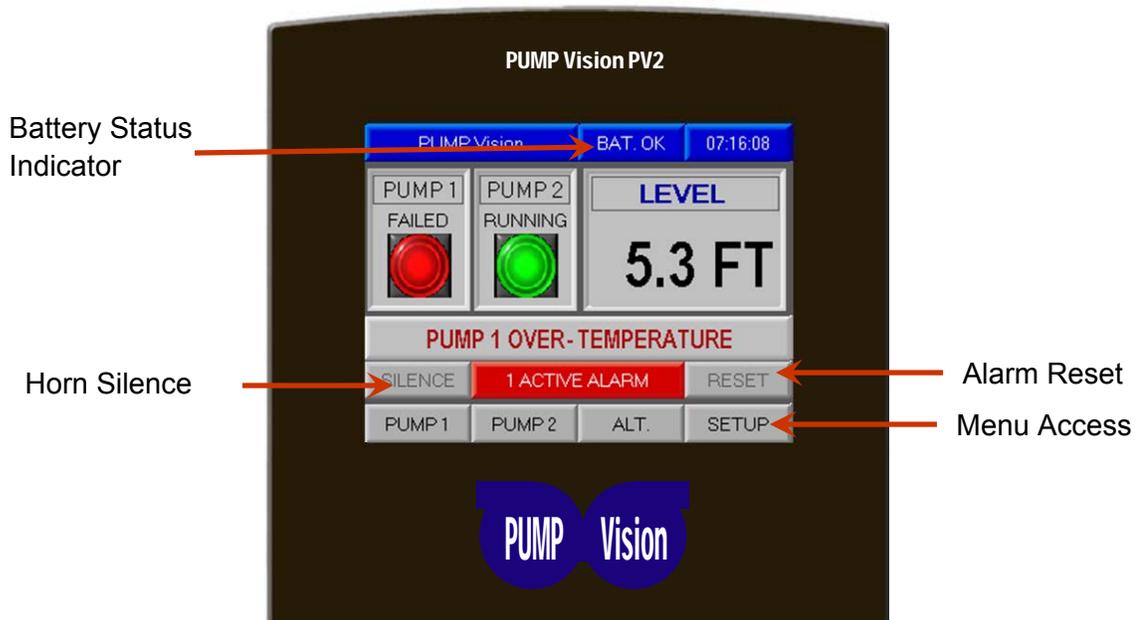
**Menu Access** - Touch these buttons to navigate to the four menu choices.

**Alarm Silence** - If an alarm horn is connected to the controller, touch the screen anywhere to silence the horn.

**Fault Status** - Displays “NO ACTIVE FAULTS” or “*n* ACTIVE FAULTS” (*n* is the number of active faults). Touch this button to access alarm message handler.

**Fault Message** - Displays all active alarm conditions or SYSTEM NORMAL when there are none. Touch this text to scroll through all active fault conditions.

## MAIN DASHBOARD



### Menu Buttons

**PUMP 1** - Touch to go to PUMP 1 DASHBOARD

**PUMP 2** - Touch to go to PUMP 2 DASHBOARD

**ALT** - Touch to go to alternation status and setup screen

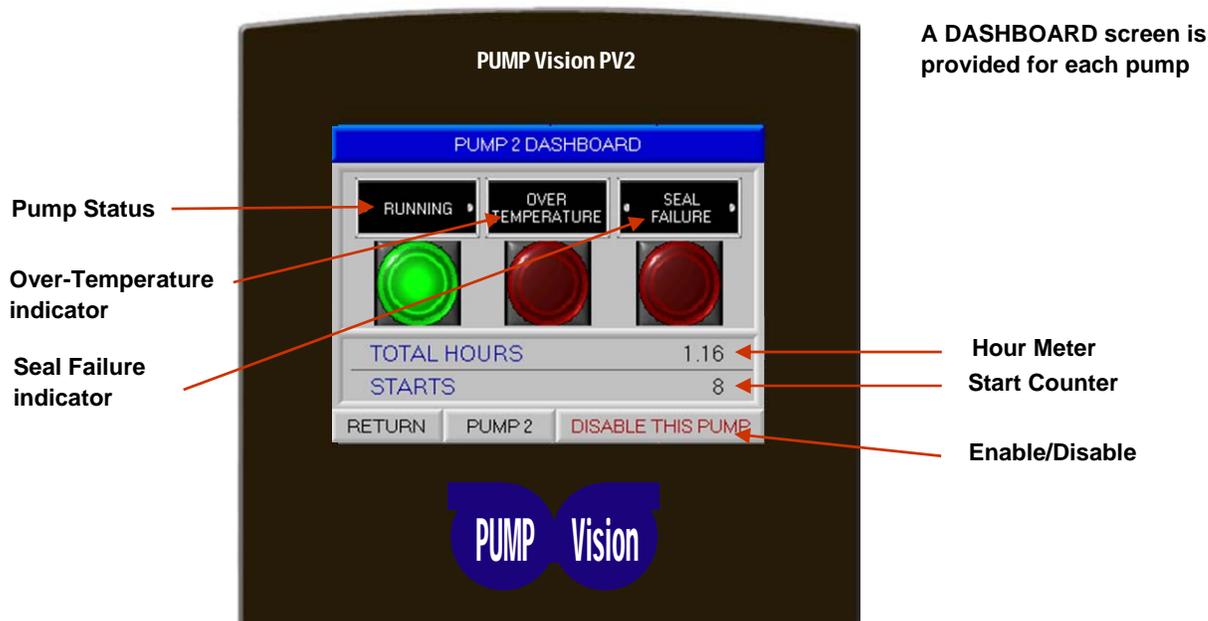
**SETUP** - Touch to go to start the system setup including start/stop setpoints, alarm configuration

**Alarm RESET** - Touch this button to reset any alarm condition that has been configured to require manual reset. This button is red when there is an active alarm that has been configured for manual reset.

**Horn SILENCE** - Touch to silence the alarm horn. This button is red when the horn output is energized.

**Battery Status** - Displays BAT OK or BAT LOW. The PV2 uses a lithium battery with a 10 year life span. The battery is needed to retain setpoints and the clock time in the event of power failure. When the BAT LOW indicator lights, the battery should be replaced.

## PUMP DASHBOARD SCREEN



**Pump Status** - Indicates pump RUNNING, STOPPED, FAILED, OUT OF SERVICE, CALLED

The PUMP Vision PV2 has an input for an auxiliary contact of the motor starter to be wired to. It monitors the status of that input to determine if the pump is running or stopped. When the PUMP Vision PV2 output energizes the motor starter, the status is CALLED. When the input goes high, the status is RUNNING. If the input does not go high, the status is FAILED. The status is OUT OF SERVICE if the pump is disabled by the user.

**Hour Meter** - Displays the total run time of the pump. The display is in hundredths of an hour and will display over 40 million hours. This can be reset in the advanced setup wizard.

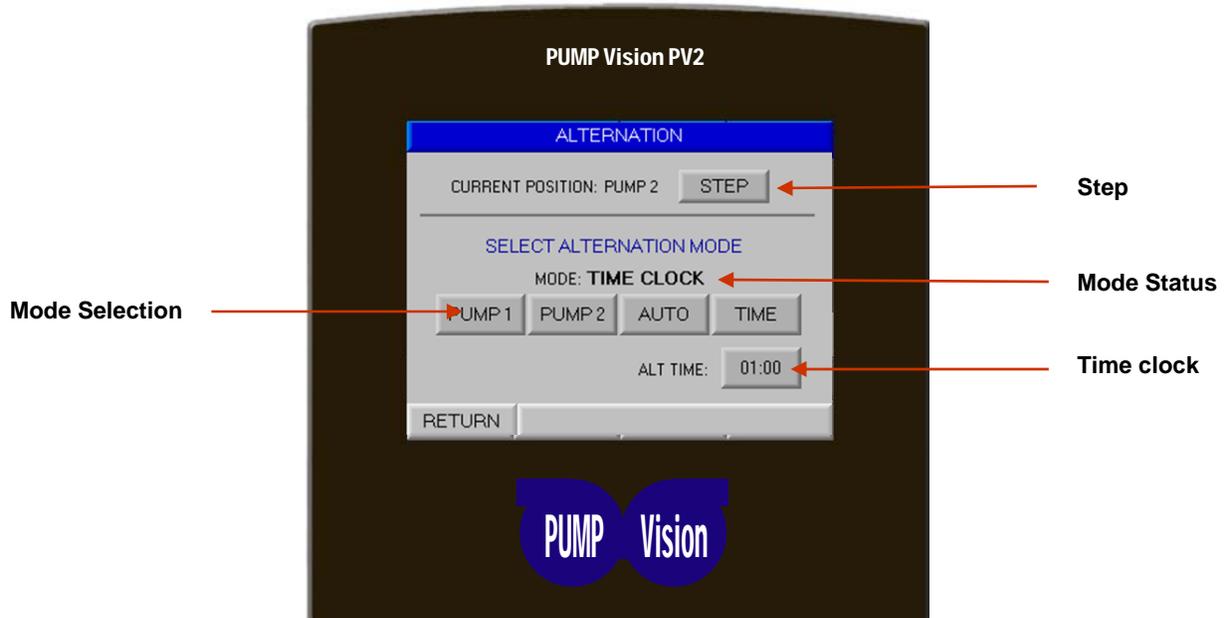
**Start Counter** - Displays the total number of pump starts. This counter can count to over 32,000 starts. This can be reset in the advanced setup wizard.

**Over-Temperature Indicator** - Lights up when there is an active high motor temperature condition. This indicator does not appear if the alarm is disabled by configuration.

**Seal Failure Indicator** - Lights up when there is an active seal failure (moisture in the motor) condition. This indicator does not appear if the alarm is disabled by configuration.

**Enable/Disable** - Touch this button to set this pump's mode to "OUT OF SERVICE". The pump can be taken "Out-of-service" and this failure alarm is prevented, by touching the Enable/Disable Pump button in Pump Dashboard. This allows maintenance of the pump without generating an alarm condition. As with a pump failure condition, the pumping duty is automatically transferred to the remaining pump.

## ALTERNATION SCREEN



**Mode Status** - Indicates the alternation mode that has been selected.

**Mode Selection** - Touch these buttons to select the alternation mode.

Automatic – alternation after each pump cycle

Time clock – alternation once a day at the time set in Alt time.

Pump 1 – Pump 1 is always the lead pump

Pump 2 – Pump 2 is always the lead pump

**Step** - The lead pump can be manually stepped to the next pump in sequence by touching the step button. Note that this can be done while the pumps are running and will occur instantly

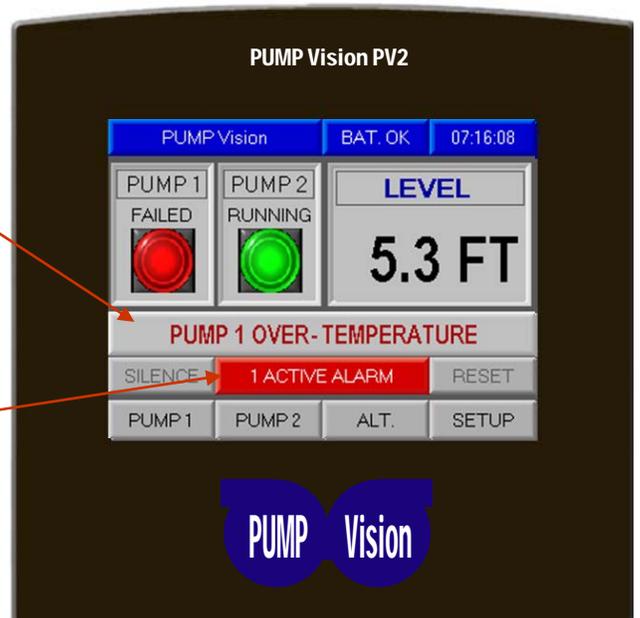
**Time Clock** - Indicates the time of day that the system will alternate when in time clock alternation mode. Touch this button to change the alternation time.

## ALARM MESSAGE HANDLER

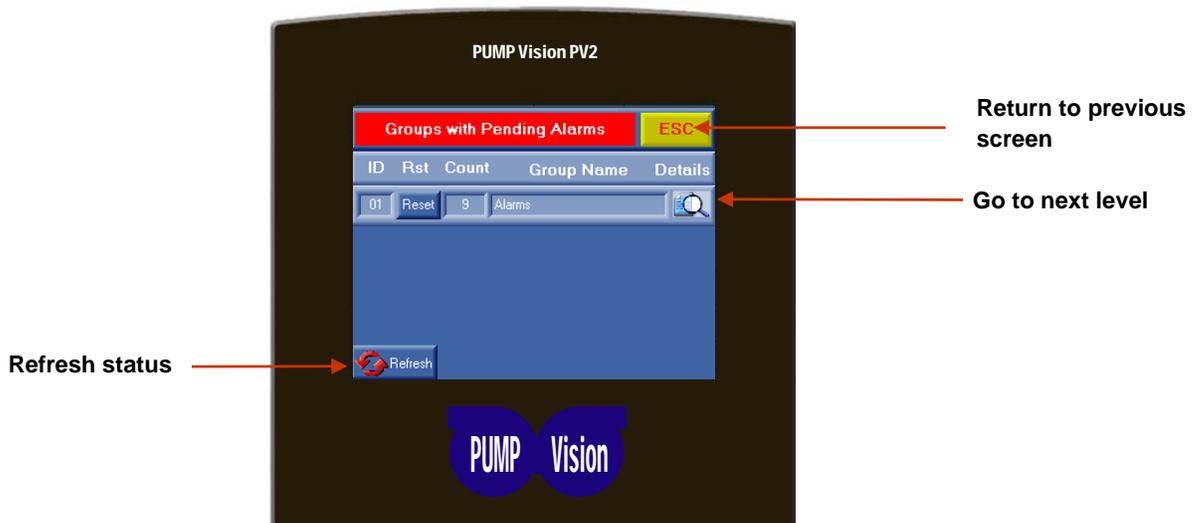
In the event of an alarm condition, two indications will appear on the main screen.

A text message will be displayed indicating the nature of the alarm condition. If multiple conditions exist, touching the text will scroll through all active events. A System Normal message is displayed when there is no active alarm.

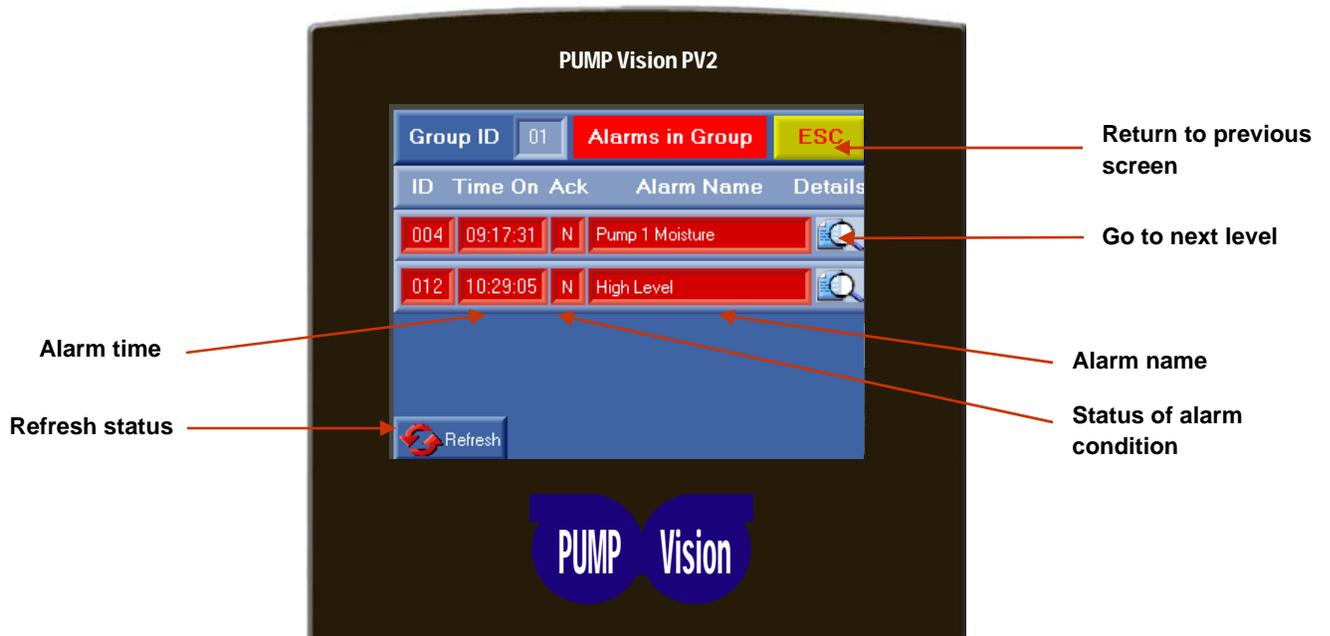
At the bottom of the screen, if there is an alarm, a bold red message indicating how many active alarm conditions exist appears. Touching the Active Alarm button provides access to the alarm handler.



The alarm handler is a series of screens that provides access to active and non-acknowledge alarm conditions. The handler displays information about each alarm condition. This is the first screen that appears when entering the alarm handler and the user must touch the “magnifying glass” button to go to the alarm display page.



## ALARM HANDLER SCREEN 2



The second level of the alarm handler is list of all alarm conditions that are either still active, or are inactive but have not been acknowledged by the operator. Once an alarm is no longer active and it has been acknowledged, it is removed from the list.

**Alarm Name** - This shows what the alarm condition is.

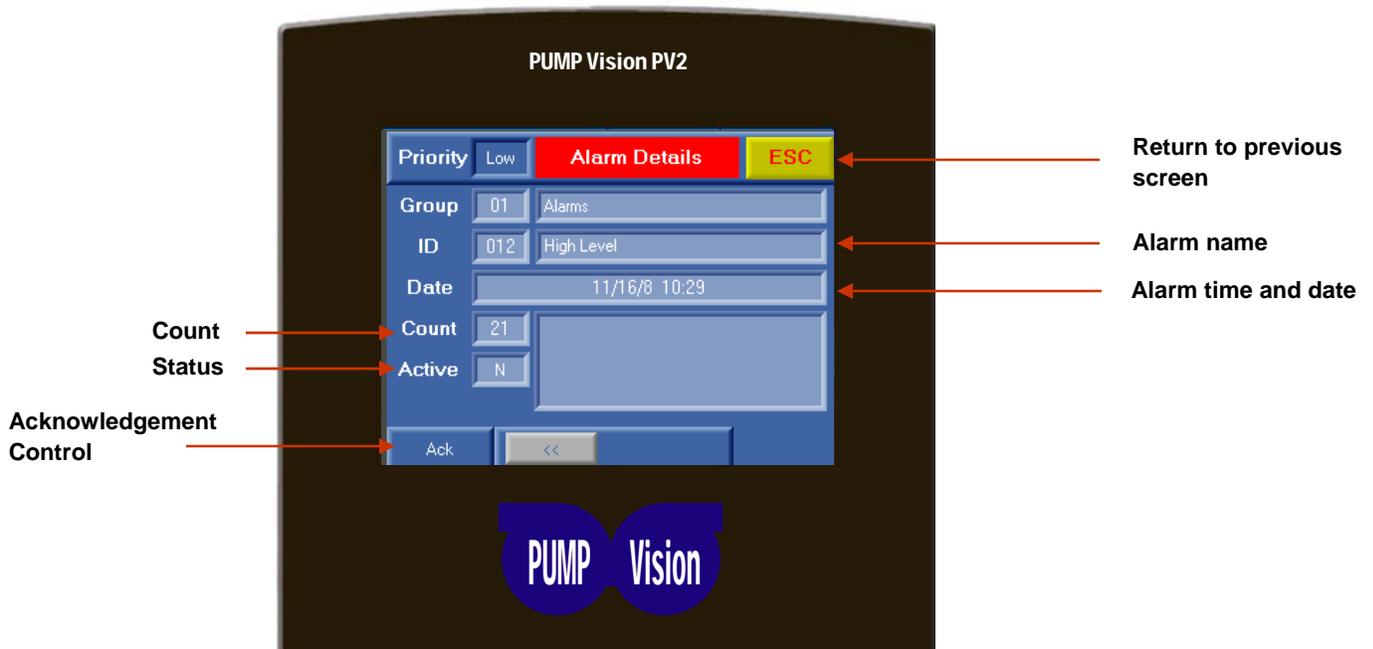
**Status of Alarm** - This shows if the alarm has been acknowledged or not.

**Refresh Status** - Touch this to refresh the list.

**Alarm Time** - This shows what time the alarm condition occurred.

**“Magnifying Glass”** - Touch this to go to the next level screen. Each alarm condition has one of these buttons to give access to the level 3 screens and specific information on the alarm status and condition.

## ALARM HANDLER SCREEN 3



The third level of the alarm handler is detailed information about the specific alarm condition.

**Alarm Name** - This shows what the alarm condition is.

**Status** - This shows if the alarm has been acknowledged or not.

**Count** - This shows how many times the alarm condition has occurred.

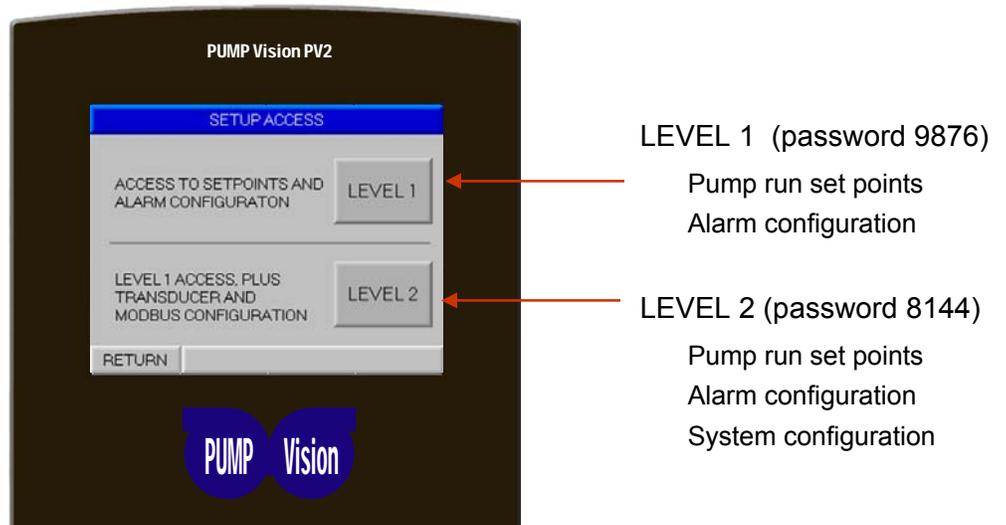
**Alarm Time and Date** - This shows what time the alarm condition occurred.

**Acknowledgement Control** - Touch the Ack button to acknowledge this alarm. Touch the << or >> buttons to scroll through the other unacknowledged alarms.

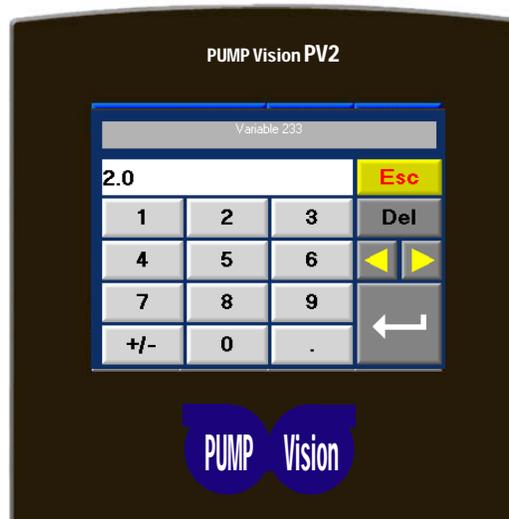
## SETUP MENU

Accessing the Setup Menu requires that a password be entered. Touch the LEVEL 1 or the LEVEL 2 button and the keypad will appear. Enter the password to proceed.

Two levels of access are provided so that the higher level configuration functions can be protected from some users.



## DATA ENTRY



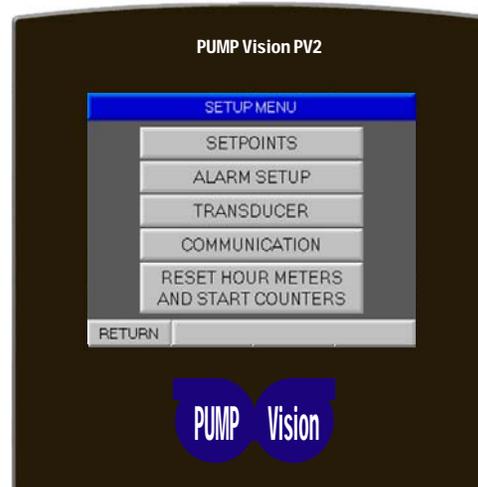
The data entry screen will pop up whenever any set point or data entry field is touched. The screen is intuitive. Touch the number buttons to enter a value, touch the ↵ button to enter the value. Touch the Esc button to leave the data entry screen.

## SETUP MENU

### Level 1



### Level 2



The Setup Menu provides access to:

- **SETPOINTS** —Lead Pump Start, Lag Pump Start, Pumps Stop, Lead and Lag start delay timers.
- **ALARM SETUP**—Enable and configure each alarm function

These are available only in Level 2

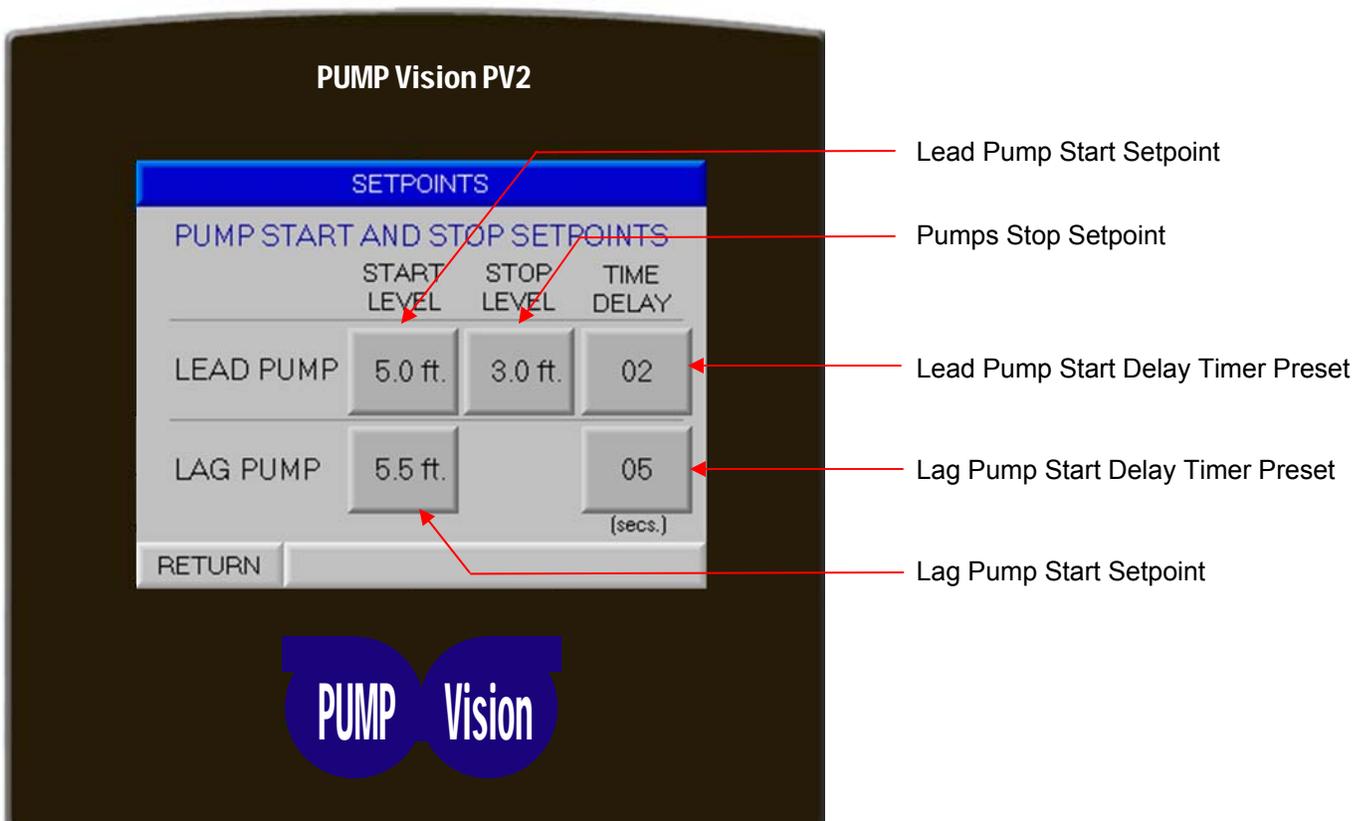
- **TRANSDUCER**—Configure the level transducer
- **COMMUNICATION**—Set the network node number
- **RESET HOURS/COUNTERS**—Touching this button resets the hour meters and start counters for both pumps.

## SETPOINTS

**Pump Control Setpoints:** On rising level, when the level is equal to or greater than the lead pump start set point, the lead pump will start. If the level continues to rise beyond the start lag pump set point, the lag pump will start.

On falling level, the pumps will shut off as the level drops below the stop set point.

All of the pump control setpoints are located on the SETPOINTS screen. The factory default settings are shown in the screen shot below. In the event that the PV2's battery failed and power to the unit was lost, the system will run with these setpoints. As long as the battery is good, the user setpoints will be retained.



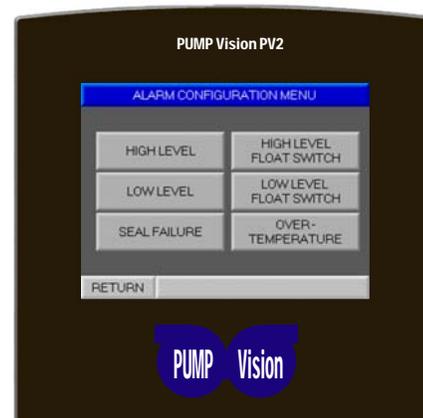
**Start Delay Timers:** There are separate start delay timers for the lead and lag pumps. The primary purpose of these timers is to stagger the start of the pumps after a power failure. This helps reduce load on the electrical service.

The other purpose of these timers is to prevent false starting of the pumps in the event of the momentary spike in the 4-20 ma level signal. For this reason, the minimum setpoint for the time delays is one second.

## ALARM CONFIGURATION

A screen is provided for each type of alarm:

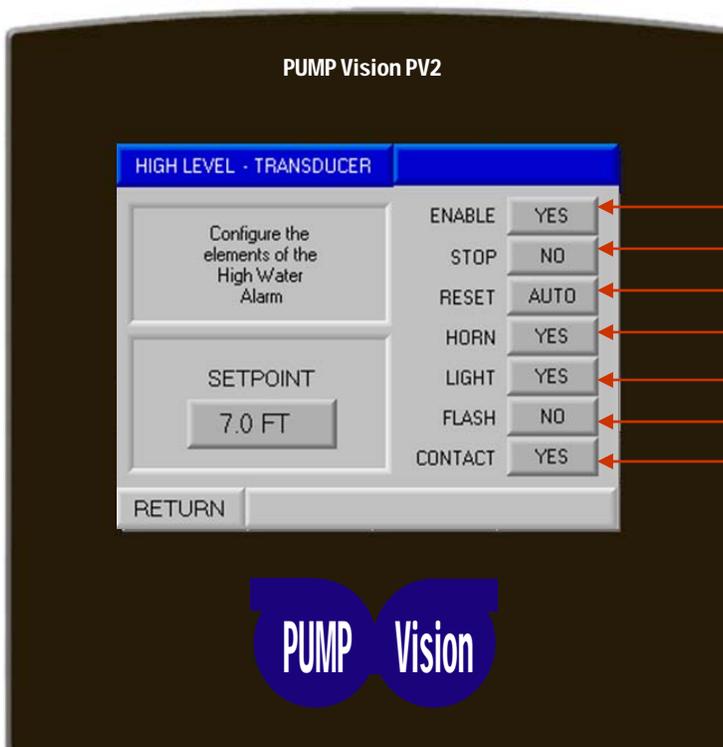
- High level—transducer
- Low level—transducer
- High level—redundant float
- Low level—redundant float
- High motor temperature
- Seal failure



Alarm Configuration Menu

Pump failure and transducer failure are pre-configured.

NOTE: Each alarm has a 10 second delay time that is factory set.



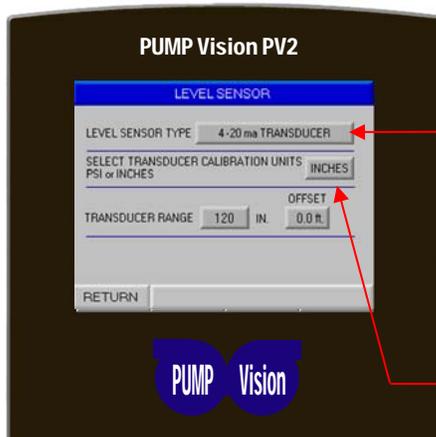
- Alarm function enabled or disabled
- Will this alarm stop the pumps?
- Will this alarm be manual reset or auto?
- Will this alarm sound the horn?
- Will this alarm light the alarm light?
- If above is yes, will it flash the light?
- Will this alarm close the alarm contact?

If the alarm is not enabled, the input and condition will be ignored by the controller. No alarm handling or logging will occur.

If the alarm is set for manual reset, the alarm must be reset by touching the ALARM RESET button on the main menu screen.

## TRANSDUCER CONFIGURATION

### TRANSDUCER TYPE

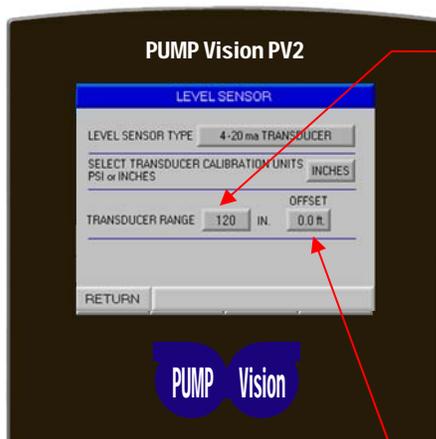


**UNIT TYPE**—Touch this button to toggle between the two types of 4-20 ma transducers:

- 4-20 ma TRANSDUCER
- 4-20 ma ULTRASONIC/RADAR

**UNITS**—When the transducer type is not Ultrasonic, the units of measurement must be selected and match the transducer scale.

### TRANSDUCER SCALING



**RANGE**—Touch this button to set the transducer range (maximum reading).

Transducers are typically manufactured with a fixed range, although they are also available with a programmable range. The value entered here must match the range or the transducer. If the system has a programmable transducer, set the range on it first and then set the range here.

Allowable range is 1 - 9999

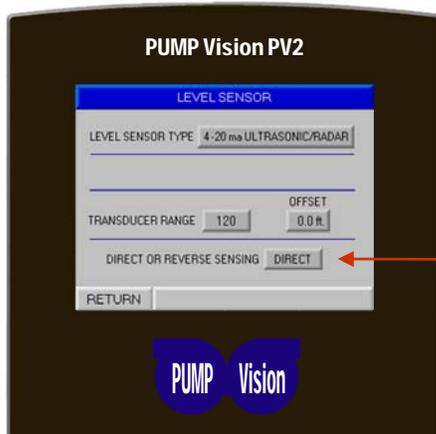
**OFFSET**—Touch this button to set how far the transducer (or bubbler tube) is from the bottom of the tank or sump.

This offset is added to the level reported by the transducer so that the displayed level is accurate.

Allowable setting range is from 0.0 to 99.9 feet.

**Note: Do not enter any pump start/stop or alarm level setpoints for a value less than the offset value as the operating level cannot drop below the offset.**

### REVERSE MODE

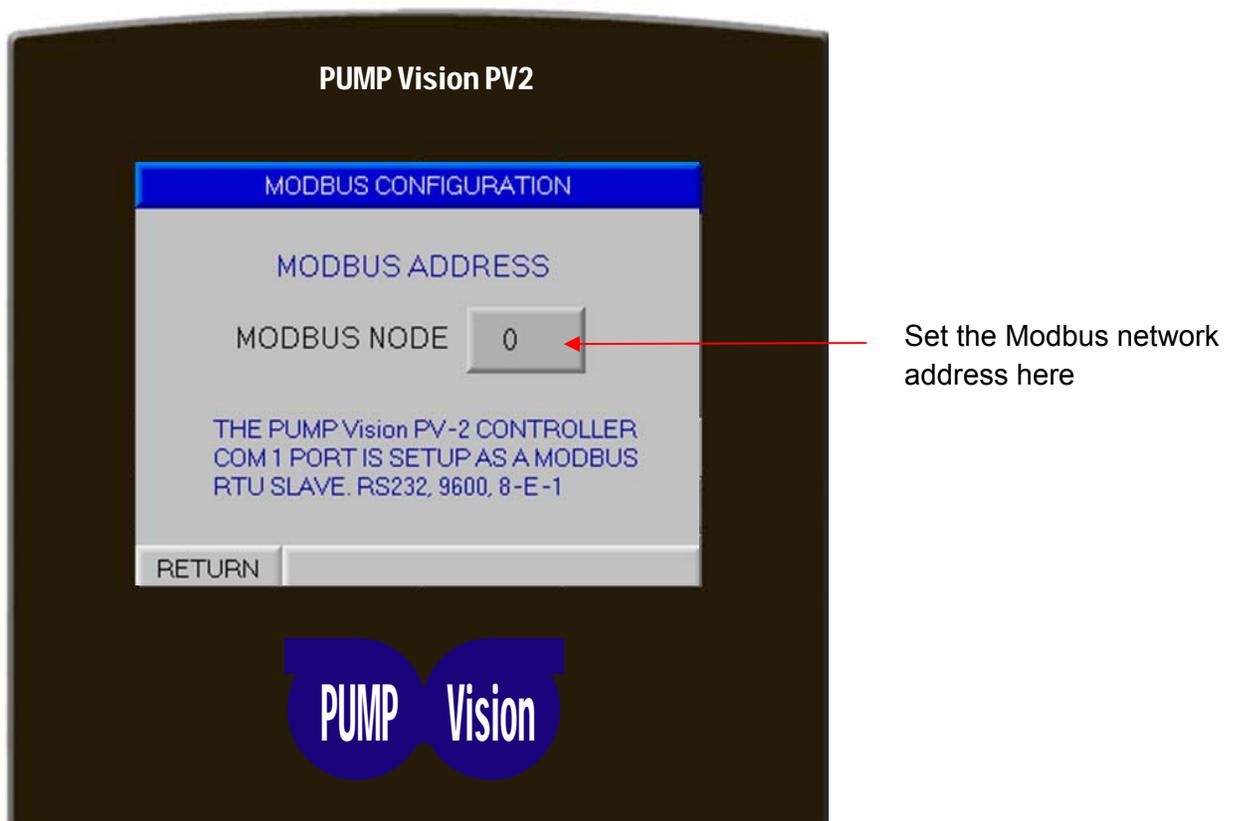


**REVERSE MODE**—Some ultrasonic transducers are scaled from the factory to output a 4-20 ma signal proportional to the distance from the transducer to the water. This is the air space, not the water level. Setting the mode to REVERSE will convert this reading to water level.

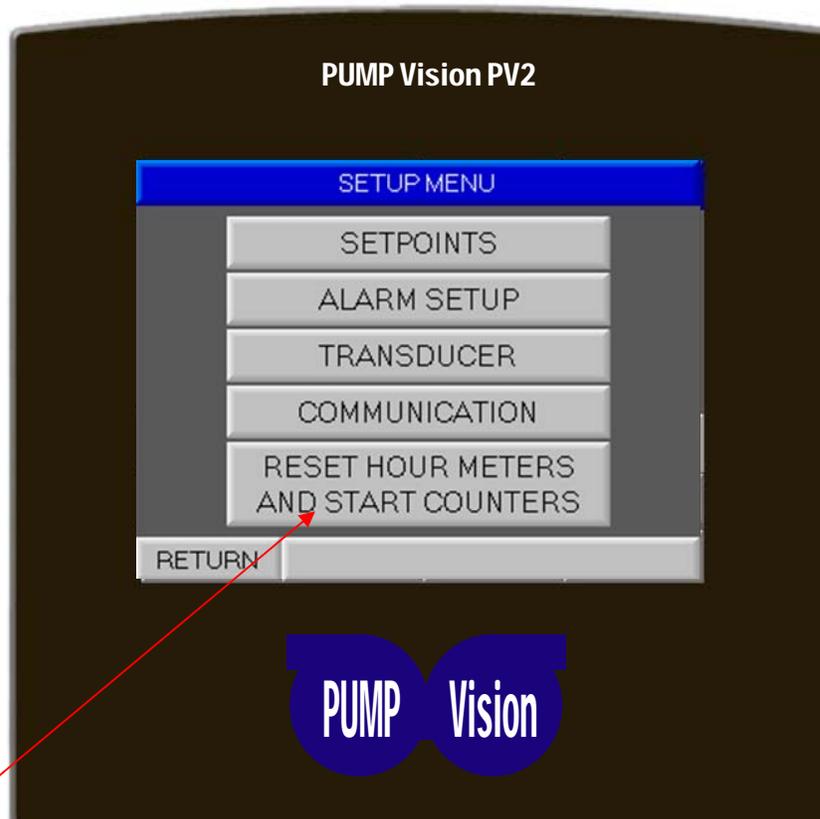
# PUMP Vision™ PV2

## MODBUS

The PUMP Vision PV2 has an RS232 serial port that is configured as a Modbus RTU Server (Slave) with 9600 Baud, 8-E-1 parameters. Once a connection has been made, the PV2 can be monitored by SCADA or BMS. If protocols other than Modbus are desired, the optional Data Station Plus protocol converter can connect to most networks.



## ETM and COUNTER RESET



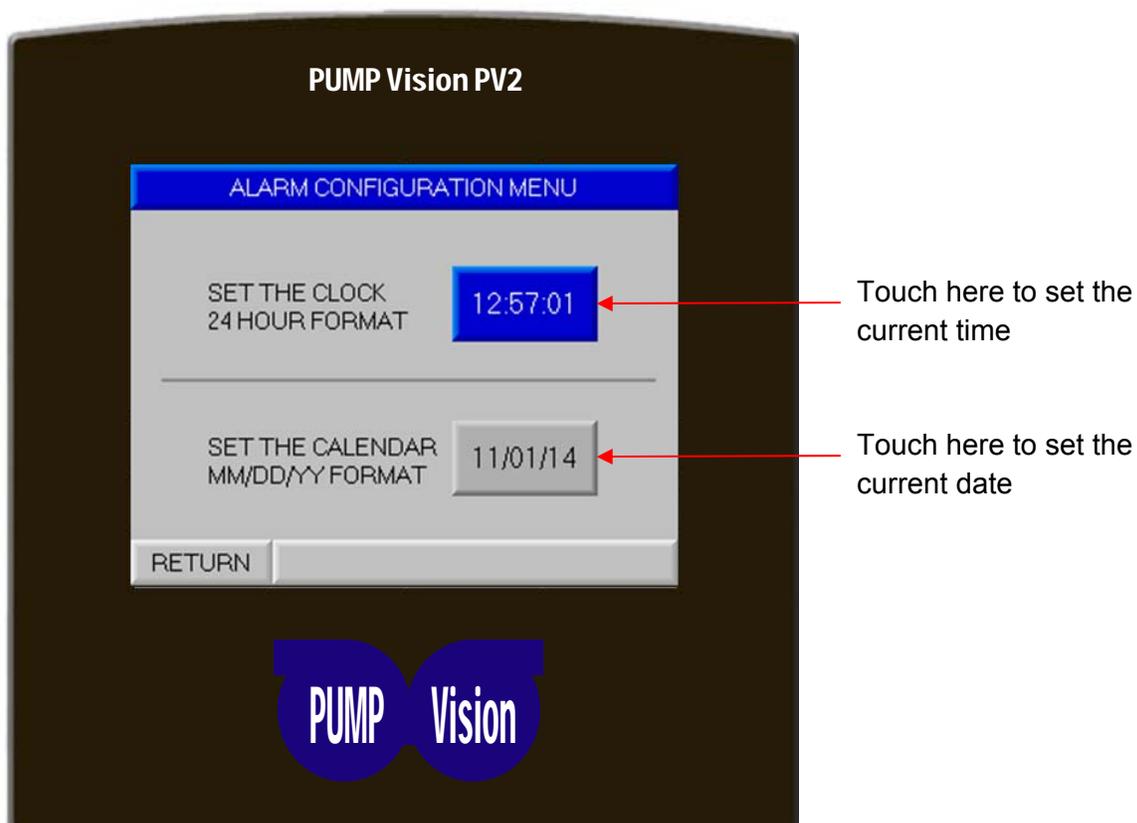
**RESET HOURS/COUNTERS**—Touching this button resets the hour meters and start counters for both pumps.

**NOTICE! TOUCHING THE BUTTON IMMEDIATELY RESETS THE COUNTERS AND METERS.**

## CLOCK

The PUMP Vision PV2 has real time clock built in. This clock provides a date and time stamp to the alarm handler so that alarm events can be logged.

Touch the clock display on the Main Dashboard to access this screen.



## Technical Specifications

Power Supply	
Input voltage	24 VDC
Permissible range	20.4 VDC to 28.8VDC with less than 10% ripple
Max. current consumption	195 ma

Digital Inputs	
Number of inputs	11
Input type	PNP
Galanic isolation	None
Nominal input voltage	24VDC
Input voltage pnp (source)	0-5VDC for Logic ' 0 ' 17-28.8VDC for Logic ' 1 '
Input current	3.7mA@24VDC
Input impedance	6.5KΩ
Response time	10mS typical, when used as normal digital inputs
Input cable length	Up tp 100 meters, unshielded
Minimum pulse width	40µs

Digital Outputs	
Number of outputs	10 relay (in 2 groups)
Output type	SPST-NO (Form A)
Isolation	By relay
Output current (resistive load)	3A maximum per output 8A maximum total per common
Output current	3A maximum (resistive load)
Rated voltage	250VAC/30VDC
Minimum load	1mA, 5VDC
Life expectancy	100k operations at maximum load
Response time	10mS (typical)
Contact protection	External precautions required (see Increasing Contact Life Span in the product's Installation Guide)

Graphic Display Screen	
LCD Type	TFT, LCD display
Illumination backlight	White LED, software-controlled
Display resolution	320x240 pixels
Viewing area	3.5"
Colors	65536 (16-bit)
Touchscreen	Resistive, analog
Keypad	Displays virtual keyboard when the application requires data entry.

Analog Inputs	
Number of inputs	1
Input type	4-20mA
Input impedance	243Ω
Maximum input rating	25mA, 6V
Galvanic isolation	None
Conversion method	Successive approximation
Resolution (at 4-20mA)	204 to 1023 (820 units)
Conversion time	Input is updated per scan
Precision	0.9%

Communication Ports	
Port 1	1 channel, RS232
Galvanic isolation	No
Baud rate	9600
RS232 Input Voltage Cable length	±20VDC absolute maximum 15m maximum (50')
Port 2 (optional)	Available port types: RS232/RS485 isolated/non-isolated, Ethernet A CANbus port

Miscellaneous	
Clock (RTC)	Real-time clock functions (date & battery back-up for 7 years typical at 25°C, battery back-up for RTC and system data, incl. variable
Battery replacement	Yes. Coin-type 3V, lithium battery, CR2450

Dimensions	
Size	109x114.1x68mm (4.29x4.49x2.67")
Weight	220g (8 oz)

Environment	
Operational temperature	0 to 50°C (32 to 122°F)
Storage temperature	-20 to 60°C (-4 to 140°F)
Relative Humidity (RH)	10% to 95% (non-condensing)
Mounting method	Panel mounted (IP65/NEMA4X) DIN-rail mounted (IP20/NEMA1)