Pump Controls for Water and Wastewater

PUMP Vision™ PV1200

UNIVERSAL PUMP CONTROLLER, RTU, and DATA LOGGER
When the PV1200 is initialized, the system type is user selected and the controller configures itself for the application. A “Main Dashboard”, specific for either Level, Pressure, or Well pump control, provides complete system status on one easy to operate screen.

COMMON TO ALL MODES
DISPLAYS STATUS OF:
• ALL PROCESS PARAMETERS
• STATUS OF EACH PUMP
• ALARM CONDITIONS
• CLOCK
• BATTERY STATUS

PROVIDES ACCESS TO:
• PUMP DASHBOARDS
• ALARM LOG
• TREND GRAPHS
• SYSTEM SET POINTS
• SYSTEM CONFIGURATION

WELL PUMP
WELL MODE INCLUDES:
• SYSTEM PRESSURE
• PUMP MINI-DASHBOARD
• SYSTEM AND ALARM SET POINTS
• TANK LEVEL (user option)
• FILTER DP (user option)
• WATER LEVEL (user option)
• FLOW (user option)

PRESSURE BOOSTER
PRESSURE MODE INCLUDES:
• SYSTEM PRESSURE
• SYSTEM AND ALARM SET POINTS
• SUCTION PRESSURE (user option)
• FLOW (user option)
• WATER TEMP (user option)

TANK/SUMP LEVEL
LEVEL MODE INCLUDES:
• LEVEL DISPLAY (SUMP OR TANK)
• PUMP MINI-DASHBOARD
• NUMBER OF PUMPS CALLED
• NUMBER OF PUMPS RUNNING
• LEVEL SET POINTS
• FLOW (metered or calculated)

NON VFD SYSTEM

VFD SYSTEM

The PV1200 is user configured to operate simplex, duplex, triplex, and quadplex systems with numerous sequencing possibilities. A “Pump Dashboard” is provided for each pump in the system that gives full control of the pumps. The PV1200 can operate FVNR, RVSS, or VFD starters, and since the Pump Dashboard provides such complete control of the VFD there is no need for a separate door mounted VFD keypad.

ALL SYSTEMS:
• “Soft” HOA SELECTOR SWITCH (user or RTU operated)
• STATUS INDICATION
• RUN DURATION
• NUMBER OF STARTS
• TOTAL HOURS (ETM)
• ACCESS TO RUN LOG

VFD SYSTEMS:
• MANUAL SPEED CONTROL (with direct or ramped input)
• kWh DISPLAY
• MOTOR CURRENT (running amps)
• VFD SPEED COMMAND AND FEEDBACK
• ACCESS TO VFD FAULT LOG
DATA COLLECTION

The PV1200 records operating conditions with data logs and trend charts that are viewable on the controller screen and are stored on an SD card for permanent record. Separate logs exist for system faults, pump faults, and pump run times. Trend charts are provided for level, pressure, flow, VFD speed, number of pumps running, and temperature.

With the SD Card option installed, the PV1200 can store over five years of data at one second intervals. This data can be displayed on the controller or exported to be evaluated on a PC.

The PV1200 can log flow rates and totals to provide daily, weekly, and monthly flow total reports. And in the Level Control mode, the PV1200 can provide calculated flow rates without a flow meter installed.

NOTE: THE LOOK AND ACCESS OF ALL SCREENS ARE ADJUSTED TO THE NEEDS THE APPLICATION.
The PV1200 is more than just a level controller. Not only does it operate just about any lift station application known, with MOTOR Vision it can closely monitor power conditions of the motors and preempt failures by alerting maintenance personnel of impending problems. And because of the built in communication and email capabilities, and the ability to monitor pump station peripherals such as intrusion, generator status, and more, the PV1200 fills the task of pump station RTU. Add the extensive data logging capabilities and the PV1200 is a complete Pump Station Manager.

**INPUTS**
The PV1200 can be configured to work with almost any level sensor, including 4-20 mA submersible transducers, ultrasonic, radar, standard float switches, and even ten segment probes. For redundancy, a total of two transducers and two backup float switches can be connected.

**ALARMS**
- HIGH LEVEL - (transducer)
- LOW LEVEL - (transducer)
- TRANSDUCER FAILURE/FLOAT FAIL
- HIGH LEVEL FLOAT
- LOW LEVEL FLOAT
- PUMP FAILURE (each pump)
- MOTOR VISION FAULT (each pump)
- MOTOR TEMPERATURE (each pump)
- MOISTURE (each pump)
- VFD FAULT (each pump)
- PLUS 10 SYSTEM ALARM OPTIONS

**LEVEL TANK FILL MODE - MAIN DASHBOARD**

**PUMP STATION RTU**
The PV1200 not only sounds a local alarm upon a fault condition, it can email or text message an alert. The following alarms can be monitored:

**ALARMS**
- HIGH LEVEL - (transducer)
- LOW LEVEL - (transducer)
- TRANSDUCER FAILURE/FLOAT FAIL
- HIGH LEVEL FLOAT
- LOW LEVEL FLOAT
- PUMP FAILURE (each pump)
- MOTOR VISION FAULT (each pump)
- MOTOR TEMPERATURE (each pump)
- MOISTURE (each pump)
- VFD FAULT (each pump)
- PLUS 10 SYSTEM ALARM OPTIONS

**VFD CONTROL**
Sump pumps are typically “across-the-line” or full voltage starters, though sometimes VFDs are needed. The PV1200 can operate the VFDs in either PID or Proportional modes. In PID mode, the VFDs can pace either level or flow (or a combination of both).

**MOTOR Vision**
When the MOTOR Vision option is connected to the PV1200, the pump motor is very closely monitored for signs of trouble, especially important for submersible pumps.
The Pressure Booster controller is designed to provide a constant pressure with variable flow conditions. By incorporating all of the latest energy saving technologies such as variable speed drives, sensorless no flow shutdown, and seamless sequencing of multiple pumps, the PV1200 provides a solid performance under extreme swings in operating conditions.

Pressure Booster Mode:

The PV1200 is simple to navigate, setup, and can be configured to operate all of the more than 1,000 booster control systems that we have built in the past 10 years. Every system is a little different in its control requirements and we have put every feature and function that we have ever used into one controller that is easily setup to your needs.

The PV1200 can stage pumps on and off when the pressure drops, the flow increases, the VFD(s) speed reaches a preset speed, or combinations of these sensor inputs by simply selecting the choice for each stage. Slave and standby mode options, along with the alternation sequencer, make virtually any staging need possible.

Pump Station RTU

Fault conditions monitored in the Pressure Booster Mode:

Alarms:
- High Discharge Pressure
- Low Discharge Pressure
- Transducer Failure
- Pump Failure
- High Suction Pressure
- Low Suction Pressure
- VFD Fault
- High Water Temperature
- Motor Vision
- Plus 10 System Alarm Options

Each pump in the system can be individually set to stage on and off based on various combinations of conditions.

System Start Based On (all user configured):
- BMS Signal
- Hardwired Enable Switch
- Pressure

System Stop Based On:
- Minimum Run Time
- Max Run Time
- Flow Switch
- Sensorless No-Flow Shutdown
- Pressure
- BMS Signal
- Alarm Shutdowns

Pump Staging (lag pumps) Based On:
- Pressure
- VFD Speed
- Flow GPM
- Minimum and Maximum Run Times

Note: The look and access of all screens will be adjusted to the needs of the application.
The PV1200 brings all of the operation and protection capabilities typically reserved for municipal pump stations to the agricultural and domestic well market that has historically had “bare bones” controls at remote installations and no communication to the outside world.

We now a cost effective monitoring and control solution available for well pumps too!

The Well Pump mode operates a single pump and provides complete station management with the ability to monitor and control all of the motor functions, filter status, and provide system alarm and RTU functions for the agricultural and domestic well market.

Fault conditions monitored in the Well Pump Mode:

ALARMS
- HIGH DISCHARGE PRESSURE
- LOW DISCHARGE PRESSURE
- TRANSDUCER FAILURE
- PUMP FAILURE
- DIRTY FILTER STAGE 1
- DIRTY FILTER STAGE 2
- HIGH TANK LEVEL
- LOW TANK LEVEL
- VFD FAULT
- LOW WATER LEVEL
- PLUS 10 SYSTEM ALARM OPTIONS

The PV1200 includes a number of timer functions that when enabled by the user, provide important features that can further reduce maintenance and operator oversight. These include:

- Start Delay - “stagger start“ the pumps
- Pump Down - periodic cleaning of the sump
- Exercise - periodic seize prevention
- Maximum Run - prevent excessive run time
- Flush - clear discharge at end of VFD run cycle
- Time Clock - run only during defined periods
- Purge Timer - for bubbler level sensing
- Maintenance - monitors pump run hours
**MOTOR Vision**

“SMART” MOTOR STARTERS NETWORK CONNECTED TO PUMP Vision TO MONITOR PUMP OPERATING CONDITIONS.

MOTOR Vision starters can be across-the-line, VFD, or RVSS. They connect to PUMP Vision with a Modbus network and provide important motor operation data that is displayed on the screen and also fed to the RTU for remote monitoring.

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**POWER MONITOR**

THE DATA:
- (depending on the starter)
- AMPS
- VOLTS
- FREQUENCY
- POWER FACTOR
- GROUND FAULT
- KILOWATTS

ALARMS:
- (depending on the starter)
  - THERMAL OVERLOAD
  - SHORT-CIRCUIT
  - GROUND FAULT
  - LOW OR HIGH VOLTAGE
  - LOW CURRENT
  - MECHANICAL JAM
  - LONG START
  - PHASE FAILURE
  - REVERSE PHASE
  - CONTACTOR FAILURE

ALARM STATUS

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**PUMP STATION RTU**

The PV1200 pump controller is also a Remote Terminal Unit (RTU) which means that it can be connected by private network connection through wire, radio, WiFi, or cellular to a remote monitoring and control site or SCADA system. The RTU can also be connected to the Internet through a firewall allowing authorized access from anywhere.

The PV1200 comes with a serial port that is user configurable for station number, baud rate, and parity, with Modbus RTU protocol. An optional Ethernet port provides Modbus IP protocol and possible Internet connection.

Additional protocols such as Ethernet IP, Metasys N2, BACnet, Lon, and many others are available with our optional protocol converter.

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**SCADA Vision**

COMMUNICATION SYSTEMS CONNECTED TO PUMP Vision TO REMOTELY MONITOR SYSTEM OPERATING CONDITIONS.

The PV1200 has 10 System Alarms that are monitored for the RTU, in addition to the alarms specific to each mode. 5 are pre-labeled for common alarms and five are “open channels” that are available for customer definition.

CONTROL POWER FAILURE
UPS FAILURE
GENERATOR FAULT
INTRUSION ALARM
HIGH DRYWELL LEVEL
(5) USER DEFINED
(These alarms require optional input expansion)

A free app allows users to securely log into the PUMP Vision products with a PC to monitor and control the station.

When the PV1200 is connected to the Internet, it can send email and text message alarm alerts.

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Ask about our “SCADA Vision” SCADA software. A ready to go SCADA package optimized for use with PUMP Vision.

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The PV1200 comes with a serial port that is user configurable for station number, baud rate, and parity, with Modbus RTU protocol. An optional Ethernet port provides Modbus IP protocol and possible Internet connection.
**Technical Specifications**

### Power Supply
- **Input voltage:** 24 VDC
- **Permissible range:** 20.4 VDC to 28.8 VDC
- **Max. current consumption:** 910 mA (with max. I/O)

### Digital Inputs *
- **Number of inputs:** 18
- **Input type:** 24VDC
- **Function:**
  - Pump 1-4 HOS in Auto
  - Pump 1-4 run feedback
- **Without expansion:** Mode dependent alarm inputs

### Digital Outputs *
- **Output type:** Relay, 3A
- **Function:**
  - Run outputs Pump 1, 2, 3, 4
  - Fall outputs Pump 1, 2, 3, 4
  - Mode dependent alarm outputs
- **Without expansion:** General fault ind, contact, horn

### Analog Inputs *
- **Input type:**
  - (1) PT100, (3) 4-20mA
- **Function:**
  - Level, Backup Level, Flow, Discharge Pressure, Suction Pressure, Temperature, Well Level, Tank Level
- **Option I/O:**
  - 16 DI, 8 DO, 4 AI, 2 AO

### Analog Outputs *
- **Output type:** 4-20 ma
- **Function:**
  - Pump 1, 2, 3, 4, VFD speed reference (Only for non-network VFDs)
- **Without expansion:** Pressure, Flow, Level

### Option I/O
- **Output type:** 24VDC, Relay, 4-20 ma, 4-20 ma
- **Optional Functions:**
  - Generator & Power monitoring, Remote set point adjust, Intrusion, float switch level sensing, UPS fail, and more.

### Graphic Display Screen
- **Screen type:** TFT, touch resistive analog
- **Illumination backlight:** White LED, software-controlled
- **Display resolution:** 800 x 600 pixels
- **Viewing area:** 12” diagonal (nom.)
- **Colors:** 65,536
- **Touch indication:** Via buzzer
- **Keypad:** Displays virtual keyboard when the application requires data entry.
- **Screen Saver:** 1-99 min adjustable time delay

### Environment
- **Operational temperature:** 0 to 50°C (32 to 122°F)
- **Relative humidity:** 10% to 95% (non-condensing)
- **Environmental rating:** IP65/NEMA4X

### Dimensions
- **Size:** 12.62” x 9.62” x 2.75”
- **Weight:** 2 lb. 4 oz. (1029 grams)

### Miscellaneous
- **Battery back-up:** 7 years typical at 25°C, battery back-up for RTC and system data, incl. variable data
- **Battery replacement:** Yes. Coin-type 3V, lithium battery, CR2450

### Communication Ports
- **Port 1, Port 2:** 2 channel, RS232/RS485
- **Port 3 (optional):** Ethernet

### Removable Memory
- **SD card:** Optional - Up to 16GB
- **SD Card back-up/Restore:** All system configuration parameters are saved to SD Card for future restore.

### Alarm Configuration
- **Each of the alarm conditions can be set to:** Enable/disable, VFD fault, Manual or auto reset, MOTOR Vision fault, Stop pump(s), Transducer failure, Sound horn, Illuminate general fault light, Low level - float switch, High level - float switch, Send e-mail, Low level - float switch, Time delay, Seal failure, High motor temperature

### VFD Fault Logs
- **Optional alarms:**
  - High system pressure
  - Low system pressure
  - Generator fault
  - High suction pressure/level
  - Power failure
  - Low suction pressure/level
  - UPS failure
  - High water temperature
  - More

### Data Logging
- **GENERAL FAULT LOG:** 1000 faults, FIFO memory
- **VFD FAULT LOGS:** 250 faults, FIFO memory
- **PUMP RUN LOG:** 500 events, FIFO memory
- **FLOW LOGS:** 100 periods each, FIFO memory

### Trend Graph
- **Battery back-up:** 7 years typical at 25°C, battery back-up for RTC and system data, incl. variable data
- **With optional SD card:** 63 months of data stored every second

### Event Log
- **Store event information to SD Card:** All event and fault logs record to SD card. Depending on the size of the SD, many years of data can be stored.

### E-mail
- **Send alarm notification, E-mail or text message:** Send to SMTP server, 6 recipient numbers, Ethernet port option required