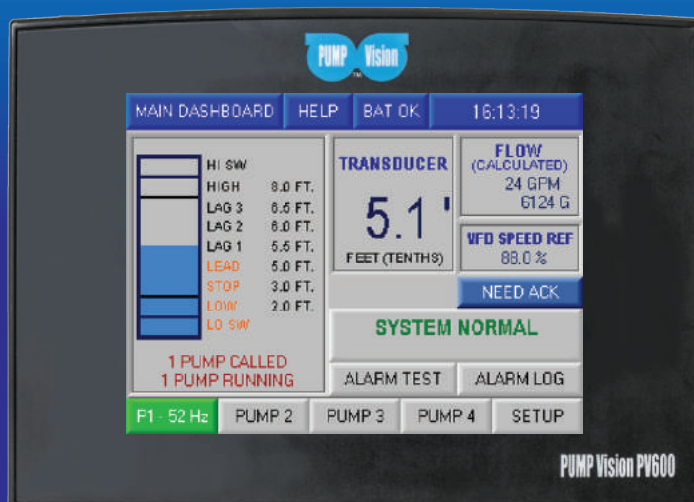


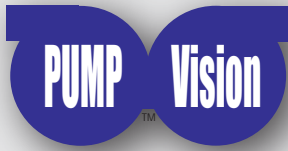
Pump Controls for Water and Wastewater



PUMP Vision™ PV600



UNIVERSAL PUMP CONTROLLER,
RTU, and DATA LOGGER



PUMP Vision PV600

UNIVERSAL PUMP CONTROLLER & RTU

For many years California Motor Controls has been producing touch screen pump controllers for the three largest water/wastewater pump applications - Level control, Pressure Booster control, and Well Pump control. In the past, these controllers have always been separate products, making continuous software development costly.

With our new PV600 Universal Pump Controller, we have combined these three applications into one easy to use, cost effective controller without compromising features or functions. All three operating modes (Level, Pressure, or Well) share much of the same program and offer full pump station management including PUMP Vision pump control, MOTOR Vision motor monitoring, SCADA Vision communication capability, and data logging.

MAIN DASHBOARD

When the PV600 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.

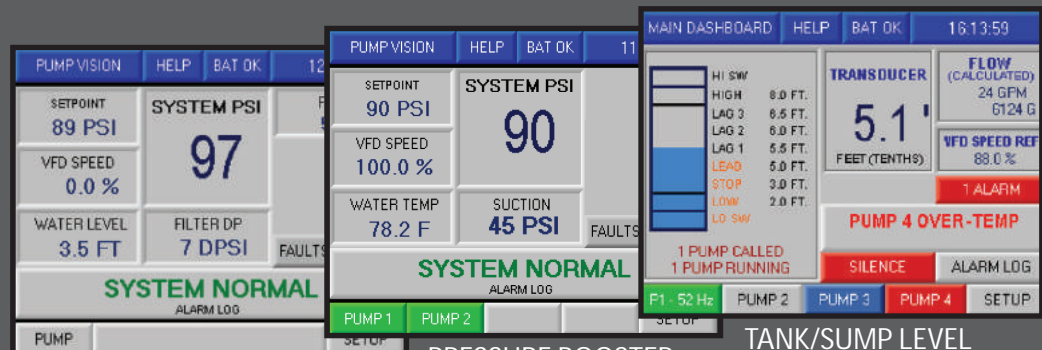
COMMON TO ALL MODES

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
- HELP SCREENS



WELL PUMP

WELL MODE INCLUDES:

- SYSTEM PRESSURE
- FILTER DP (user option)
- WATER LEVEL (user option)
- FLOW (user option)

PRESSURE BOOSTER

PRESSURE MODE INCLUDES:

- SYSTEM PRESSURE
- SYSTEM SET POINT
- SUCTION PRESSURE (user option)
- FLOW (user option)
- WATER TEMP (user option)

TANK/SUMP LEVEL

LEVEL MODE INCLUDES:

- GRAPHIC AND DIGITAL LEVEL
- NUMBER OF PUMPS CALLED
- NUMBER OF PUMPS RUNNING
- STATUS OF EACH SET POINT
- FLOW (metered or calculated)

PUMP DASHBOARD

The PV600 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 PV600 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.

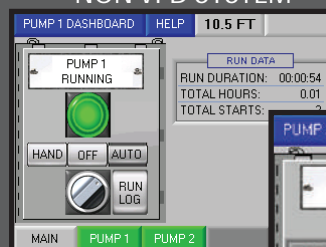
ALL SYSTEMS:

- "Soft" HOA SELETOR 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)
- k(m)Wh DISPLAY
- MOTOR CURRENT (running amps)
- VFD SPEED COMMAND AND FEEDBACK
- ACCESS TO VFD FAULT LOG

NON VFD SYSTEM



VFD SYSTEM



CONFIGURATION

MAIN CONFIGURATION MENU

Setting the PV600 up to your unique application is simple due to the easy and intuitive menu structure that is accessed through a three tier security system. All parameters, such as type of starters or VFD, sensor types and ranges, set points, sequencing, communications and more, are easy to find and modify without referring to a manual.

ALARM CONFIGURATION

A setup screen is provided for each alarm channel that allows for user configuration of the alarm's actions and set points making it simple for the user to set the system up for their specific needs.

RESTORE

BACKUP

Once your application is set, all parameters are backed up to Flash RAM in the controller and with the SD Card option installed, the backup can be used to restore the controller or another controller to the exact same setup, making replacement extremely easy.

DIAGNOSTIC SCREENS

There are many diagnostic screens, such as this TEST MODE for the Level Controller, and screens for I/O and communication monitoring.

HELP SCREENS

A HELP button is available on most screens that links to built in help guides.

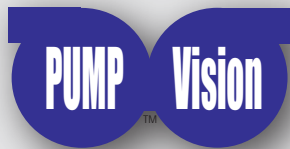
DATA COLLECTION

The PV600 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.



PUMP Vision PV600

LEVEL CONTROLLER MODE

The PV600 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 PV600 fills the task of pump station RTU. Add the extensive data logging capabilities and the PV1200 is a complete Pump Station Manager.

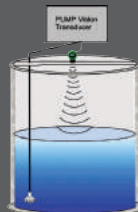


LEVEL CONTROLLER

In addition to the Main Dashboard, Pump Dashboards, and configuration screens, a set point overview page provides the status of the level controls at a glance, and gives easy password protected access to level set point, timer, and alternator modifications.

INPUTS

The PV600 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.



PUMP STATION RTU

The PV600 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



TRANSDUCER STATUS AND SETPOINTS			
LEVEL	FUNCTION	STATUS	SETPOINT
5.1 FT	HIGH LEVEL	UNDER	8.0 FT.
	START 3rd LAG PUMP	UNDER	6.5 FT.
	START 2nd LAG PUMP	UNDER	6.0 FT.
	START 1st LAG PUMP	UNDER	5.5 FT.
	START LEAD PUMP	OVER	5.0 FT.
	STOP PUMPS	OVER	3.0 FT.
	LOW LEVEL	OVER	2.0 FT.

SET POINT OVERVIEW

ACCESS TO ALL SETTINGS AND CONFIGURATION

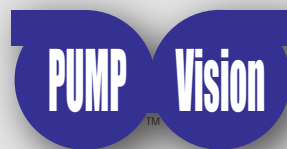
VFD CONTROL

Sump pumps are typically "across-the-line" or full voltage starters, though sometimes VFDs are needed. The PV600 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 PV600, the pump motor is very closely monitored for signs of trouble, especially important for submersible pumps.





PUMP Vision PV600

PRESSURE BOOSTER MODE

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 PV600 provides a solid performance under extreme swings in operating conditions.

PRESSURE BOOSTER CONTROLLER

The PV600 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.

SYSTEM SETTINGS		HELP	104 PSI
SYSTEM PRESSURE TARGET PRES. 90.0 PSI START PRES. 80 PSI		VFD LIMITS AUTOMATIC CONTROL MIN. SPEED 70.0 % MAX. SPEED 100.0 %	
SYSTEM ALARMS HIGH PRES. 120 PSI LOW PRES. 20 PSI		LAG PUMP FLOW (gpm) STOP START LAG 1 100 200 LAG 2 300 400 LAG 3 600 500	
SUCTION ALARMS HIGH PRES. 100 PSI LOW PRES. 10 PSI			
MAIN	TIMERS	ALT	MODIFY CONFIG

SET POINT OVERVIEW
ACCESS TO ALL SETTINGS AND CONFIGURATION

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

The PV600 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.

MAIN SEQUENCE SET UP

SEQUENCE CONFIG		HELP	104 PSI
SET UP THE STAGING			
STOP	LAG 1	LAG 2	LAG 3
LEAD	SPEED ON	ON	ON
FLOW SWITCH	PSI OFF	OFF	OFF
PSI	FLOW OFF	OFF	OFF
START	LAG 1	LAG 2	LAG 3
LEAD	SPEED ON	ON	ON
PRESSURE	PSI OFF	OFF	OFF
	FLOW OFF	OFF	OFF
RETURN			

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

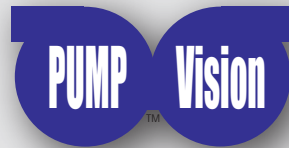
SYSTEM STOP BASED ON:

- 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.



PUMP Vision PV600 WELL PUMP MODE

The PV600 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 have a cost effective monitoring and control solution available for well pumps too!

WELL PUMP CONTROL

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

SET POINT OVERVIEW
ACCESS TO ALL SETTINGS AND CONFIGURATION

NOTE: THE LOOK AND ACCESS OF ALL SCREENS WILL BE ADJUSTED TO THE NEEDS OF THE APPLICATION.

TIMER FUNCTIONS

PUMP	ENABLE FUNCTION	CYCLE TIMER PRESET	DURATION	REM.
PUMP 1	ENABLED	99:59:56	15 SEC.	
PUMP 2	ENABLED	99:59:57	15 SEC.	
PUMP 3	ENABLED	99:59:57	15 SEC.	
PUMP 4	ENABLED	99:59:57	15 SEC.	

The PV600 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:

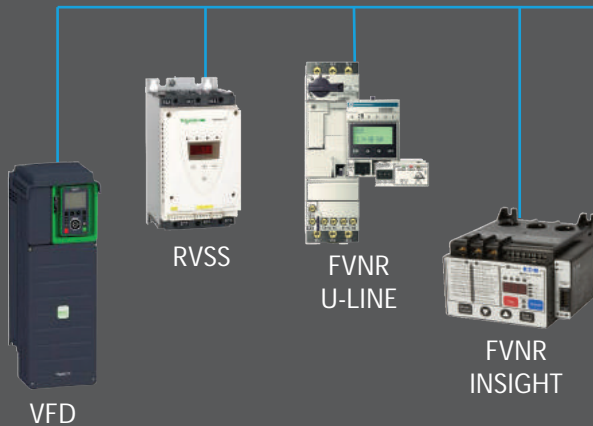
- Start Delay - "stagger start" the pumps
- Pump Down - periodic cleaning of the sump
- Exercise - periodic seize prevention
- Maximum Run - prevent excessive run time
- Flush - clear discharge at end of VFD run cycle
- Time Clock - run only during defined periods
- Purge Timer - for bubbler level sensing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



POWER MONITOR

PUMP 1 MOTOR Vision		HELP	2.5 ft.		
VOLTAGE		CURRENT	POWER		
A-B	240 V	A	8.8 A	Hz	59.99 Hz
B-C	240 V	B	8.8 A	Kw/	3.18
A-C	240 V	C	8.8 A	PF	0.87
AVG	240 V	AVG	8.8 A	GF	0.12 A
BAL	0 %	BAL	0 %		
MOTOR Vision Communication to starter is GOOD.					
RETURN		NORMAL - TOUCH FOR MORE DATA			

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

PUMP 3 MOTOR Vision		HELP	99.9 FT	999 PSI
FUNCTION	TRIP MODE	ENABLED	TRIP	WARNING
CONTACTOR	TRIP	YES	OK	OK
OVERLOAD	TRIP	YES	OK	OK
GROUND FAULT	TRIP	YES	OK	OK
SINGLE PHASE	TRIP	YES	OK	OK
REVERSE PHASE	TRIP	YES	OK	OK
OVERVOLTS	TRIP	YES	OK	OK
UNDERVOLTS	TRIP	YES	OK	OK
UNDER CURRENT	TRIP	YES	OK	OK
CURRENT IMBALANCE	TRIP	YES	OK	OK
VOLTAGE IMBALANCE	TRIP	YES	OK	OK
HIGH KW	TRIP	YES	OK	OK
LOW KW	TRIP	YES	OK	OK
MECHANICAL JAM	TRIP	YES	OK	OK
RETURN		SEND RESET COMMAND		

ALARM STATUS

PUMP STATION RTU



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

The PV600 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.



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



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

When the PV600 is connected to the Internet, it can send email and text message alarm alerts.

The PV600 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)

Power Supply	
Input voltage	24 VDC
Permissible range	20.4 VDC to 28.8VDC with
Max. current consumption	690 ma (with max. I/O)

Digital Inputs *	
Galvanically isolated	
Number of inputs	18
Input type	24VDC
Function	Pump 1-4 HOA in Auto Pump 1-4 run feedback Flow meter high speed pulse input
*Without expansion	Mode dependant alarm inputs

Digital Outputs *	
17	
Output type	Relay, 3A
Function	Run outputs Pump 1, 2, 3, 4 Fail outputs Pump 1, 2, 3, 4 Mode dependant alarm outputs
*Without expansion	General fault ind, contact, horn

Analog Inputs *	
Four	
Input type	(1) PT100, (3) 4-20mA
Function	Level, Backup Level, Flow, Discharge Pressure, Suction Pressure, Temperature, Well Level, Tank Level

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

Option I/O	
16 DI, 8 DO, 4 AI, 2 AO	
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	320 X 240 pixels
Viewing area	6" diagonal (nom.)
Colors	256
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	7.75" x 5.77" x 3.5"
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 Store event log, trend data (> 5 yrs)
SD Card back-up/Restore	All system configuration parameters are saved to SD Card for future restore.

System Configuration	
Password protected	3 level password (user selectable)
Number of pumps	One, two, three or four
Cascade control 8 pumps	Link two controllers for a Dual-quadplex
Type of starter	FVNR, VFD, or RVSS
Modbus connected VFDs	Allen-Bradley, ABB, Schneider, Danfoss, Trane, TECO Westinghouse, others.
Sequence	Full alt., Jockey, Dual-duplex, standby, slave

Level Controller Mode	
Operating direction	Pump up, pump down
Level transducer, Back tr	Zero and scale are user settable
VFD modes	Proportion, PID Level, PID Flow, combination

Pressure Booster Mode	
Sequencing	VFD Speed, and/or flow, and/or pressure
Suction sensing	Pressure/level transducer or switch
Sensorless no-flow shutdown	Yes

Alarm Configuration	
Each of the alarm conditions can be set to:	ALL SYSTEMS Pump failure VFD fault MOTOR Vision fault Transducer failure
Enable/disable Manual or auto reset Stop pump(s) Sound horn Illuminate general fault light Flash the general fault light Trigger fault contact Send e-mail Time delay	LEVEL SYSTEMS High level - transducer Low level - transducer High level - float switch Low level - float switch Seal failure High motor temperature
Optional alarms Intrusion Generator fault Power failure UPS failure More	BOOSTER SYSTEMS High system pressure Low system pressure High suction pressure/level Low suction pressure/level High water temperature
	WELL SYSTEMS High system pressure Low system pressure Dirty filter stage 1 Dirty filter stage 2 High motor temperature

Data Logging	
GENERAL FAULT LOG	1000 faults, FIFO memory All system faults are logged Controller screen, memory, SD card
VFD FAULT LOGS	250 faults, FIFO memory One log for each VFD, records all faults Controller screen, memory, SD card
PUMP RUN LOG	500 events, FIFO memory Records start time, stop time, run duration Controller screen, memory, SD card
FLOW LOGS	100 periods each, FIFO memory Separate daily, weekly, monthly flow totals Controller screen, memory, SD card

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