

MN150009EN

PXM 1000 User Manual



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Powering Business Worldwide

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Please read this manual carefully before installation, operation, and maintenance of PXM 1000 meter.

The following symbols in this manual and on PXM 1000 meters are used to provide warning of danger or risk during the installation and operation of the meters.

Safety Precautions

All safety codes, safety standards, and/or regulations must be strictly observed in the installation, operation, and maintenance of this device.

 WARNING

The warnings and cautions included as part of the procedural steps in this document are for personnel safety and protection of equipment from damage. An example of a typical warning call-out is shown above. This will help to ensure that personnel are alert to warnings that may appear throughout the document. In addition, cautions are all upper case and boldfaced as shown below.

 WARNING

Completely read and understand the material presented in this document before attempting installation, operation, or application of the equipment. Only qualified persons should be permitted to perform any work associated with the equipment. The wiring, installation and application use instructions presented in this document must be followed precisely. Failure to do so could cause permanent equipment damage, bodily injury, or death.

 WARNING

Do not attempt to install or perform maintenance on equipment while it is energized. Death, severe personal injury, or substantial property damage can result from contact with energized equipment. Always verify that no voltage is present before proceeding with the task, and always follow generally accepted safety procedures.

Eaton is not liable for the misapplication or misinstallation of its products.

Congratulations!

You have purchased an advanced, versatile, multifunction power meter. This meter can work as a remote terminal unit (RTU) that contributes to your system’s stability and reliability by providing real-time power quality monitoring and analysis.

When you open the package, you will find the following items.

	QTY
1. PXM 1000 Meter	1
2. Terminal Blocks	3
3. Installation clips	4
4. Rubber Gasket	1
5. Product Disk (Manual, Warranty, Software)	1
6. Additional documentation (Quick Setup Guide, Calibration Certificate)	2

To avoid complications, please read this manual carefully before installation and operation of the PXM 1000 meter.

1. Introduction

1.1 Meter Overview

Powerful Multifunction Power Meter

The PXM 1000 multifunction digital power meter is designed using modern MCU and DSP technology. It integrates three-phase energy measurement and display, energy accumulation, power quality analysis, malfunction alarms, data logging, and network communication. A vivid LCD display with large characters and time-of-use programmable backlight provides a clear real-time data readout.

Ideal for Electric Automation SCADA Systems

The PXM 1000 meter is the ideal choice for replacing traditional, analog electric meters. In addition to providing clear real-time readings on the front of the meter, it can also be used as a remote terminal unit (RTU) for monitoring and controlling for a SCADA system. Users can access all measurement parameters via the standard RS-485 communication port.

Energy Management

The PXM 1000 meter is able to measure bidirectional, four quadrants kWh and kvarh. It provides maximum/minimum records for power usage and power demand parameters. All power and energy parameters can be viewed remotely via software in order to easily monitor various parameters. In addition, measurement tables can be viewed from the free PXM 1000 software.

Remote Power Control

The PXM 1000 is designed for measuring and monitoring power quality parameters. Since different I/O modules can be added to the meter, this expands the capabilities and provides a very flexible platform for using the meter as a distributed RTU, for metering, monitoring, and remote controlling, all in one unit.

Power Quality Analysis

Utilizing digital signal processing (DSP) technology, the PXM 1000 meter provides high accuracy power quality analysis and supports remote monitoring via the Ethernet module. The meter continuously updates metering results and allows the users to access the meter online to monitor parameters such as voltage and current THD, harmonics up to the 31st (63rd for PXM 1100/1200/1300), voltage crest factor, current K factor, and voltage and current unbalance factor, etc.

Data Logging

The PXM 1100/1200/1300 meters contain eight megabytes of onboard memory for data logging and historical trending. Since each meter contains a real-time clock, all events and logged data will be time stamped.

Time of Use (TOU - PXM 1200)

The user can assign up to four different tariffs (sharp, peak, valley, and normal) to different time periods within a day according to the billing requirements. The meter will calculate and accumulate energy to different tariffs, according to the meter's internal clock timing and TOU settings.

Power Quality Event Logging

When a power quality event happens, such as voltage sag and swell, etc., the PXM 1300 will record the timestamp and the triggering condition of the event. It can save up to 50,000 power quality events.

1. Introduction

Waveform Capture

The PXM 1300 contains another eight megabytes of onboard memory for power quality event logging and waveform capture. The PXM 1300 can record eight groups of voltage and current waveforms. It logs at 32 points per cycle. It provides the waveform record of eight cycles before and after the triggering point. It also supports a configurable triggering condition.

1.2 Areas of Application

Power Distribution Automation Electric Switch Gear and Control Panels

Industry Automation..... Building Automation

Energy Management Systems Marine Applications

Renewable Energy

1.3 Functionality

Multifunction

PXM 1000 meters provide powerful data collecting and processing functions. In addition to measuring various parameters, the meter is able to perform demand metering, harmonic analysis, max/min statistic recording, out-of-limit alarms, energy accumulation, and data logging.

High Accuracy

Accuracy of Voltage and Current is 0.2%, True-RMS.

Accuracy of Power and Energy is 0.5%, while monitoring all four quadrants.

Compact and Easy to Install

This meter can be installed into a standard ANSI C39.1 (4" Round) or an IEC 92 mm DIN (Square) cut out. With the 51 mm (2") depth after mounting, the PXM 1000 meter can be installed in a small cabinet. Note that I/O modules add 19.5 mm (0.77in) depth (see Figure 57). Maximum of three modules can be installed. Mounting clips are used for easy installation and removal.

Easy to Use

All metering data and setting parameters can be accessed using the front panel keys or via the communication port. Settings parameters are stored in the EEPROM so that content will be preserved when the meter is powered off.

Multiple Wiring Modes

The PXM 1000 series meter can be used in medium voltage (with PTs), low voltage, three-phase three-wire, three-phase four-wire, and single-phase systems using different wiring mode settings.

High Safety, High Reliability

PXM 1000 series meter was designed according to industrial standards. It can run reliably under high power disturbance conditions. This meter has been fully tested for EMC and safety compliance in accordance with UL and IEC standards.

Table 1. Function Comparison of PXM 1000 Series Meters.

• Function; ◉ Option; Blank NA

Category		Item	Parameters	1000	1100	1200	1300
Metering	Real-time Metering	Phase Voltage	V1, V2, V3, Vlnavg	●	●	●	●
		Line Voltage	V12, V23, V31, Vllavg	●	●	●	●
		Current	I1, I2, I3, In, Iavg	●	●	●	●
		Power	P1, P2, P3, Psum	●	●	●	●
		Reactive Power	Q1, Q2, Q3, Qsum	●	●	●	●
		Apparent Power	S1, S2, S3, Ssum	●	●	●	●
		Power Factor	PF1, PF2, PF3, PF	●	●	●	●
		Frequency	For 800 Hz type, this function is not available	●	●	●	●
		Load Features	Load Features	●	●	●	●
		Four Quadrant Powers	Four Quadrant Powers	●	●	●	●
	Energy & Demand	Energy	Ep_imp, Ep_exp, Ep_total, Ep_net	●	●	●	●
		Reactive Energy	Eq_imp, Eq_exp, Eq_total, Eq_net	●	●	●	●
		Apparent Energy	Es	●	●	●	●
		Demand	Dmd_P, Dmd_Q, Dmd_S, Dmd_I1, Dmd_I2, Dmd_I3	●	●	●	●
TOU	Time of Use	Energy/Max Demand	TOU, 4 Tariffs, 12 Seasons, 14 Schedules			●	
	Daylight Saving Time	Two Formats Adjust	Month/Day/Hour/Minute; Month/Week/First few weeks/Hour/Minute			●	
Monitoring	Waveform Capture (Function not available for 400 Hz and 800 Hz type.)	Voltage and Current Waveform	Trigger, Manual, DI change, Sag/Dips, Swell, Over Current				●
	Power Quality Function not available for 400 Hz and 800 Hz type	Voltage Unbalance Factor	U_unbl	●	●	●	●
		Current Unbalance Factor	I_unbl	●	●	●	●
		Voltage THD	THD_V1,THD_V2,THD_V3, THD_Vavg	●	●	●	●
		Current THD	THD_I1, THD_I2, THD_I, THD_Iavg	●	●	●	●
		Individual Harmonics	Harmonics 2nd to 31st (63rd for PXM 1100/1200/1300)	●	●	●	●
		Voltage Crest Factor	Crest Factor	●	●	●	●
		TIF	THFF	●	●	●	●
		Current K factor	K Factor	●	●	●	●
	Statistics	MAX with Time Stamp MIN with Time Stamp	Each Phase of V & I; Total of P, Q, S,PF & F; Demand of P,Q & S; Each Phase THD of V & I; Unbalance factor of V & I	●	●	●	●

Note: This manual uses U and V interchangeably for voltage.

1. Introduction

Table 1. Function Comparison of PXM 1000 Series Meters (continued).

• Function; ◉ Option; Blank NA

Category		Item	Parameters	1000	1100	1200	1300	
Others	Alarm	Over/Under Limit Alarm	V,I,P,Q,S,PF,V_THD & I_THD Each Phase and Total or Average; Unbalance Factor of V & I; Load Type; Analog Input of Each Channel	●	●	●	●	
	Power Quality Event Logging (Function not available for 400 Hz and 800 Hz type)	SAG/DIPS,SWELL	Voltage				●	
	Data Logging	Data Logging 1 Data Logging 2 Data Logging 3	F, V1/2/3/Inavg, V12/23/13/lavg, I1/2/3/n/avg, P1/2/3/sum, Q1/2/3/sum, S1/2/3/sum, PF1/2/3, PF, U_unbl, I_unbl, Load Type, Ep_imp, Ep_exp, Ep_total, Ep_net, Eq_imp, Eq_exp, Eq_total, Eq_net, Es, THD_V1/2/3/avg, THD_I1/2/3/avg, Harmonics 2 nd to 63 rd , Crest Factor, THFF, K Factor, Sequence and Phase Angles, DI Counter, AI, AO, Dmd P/Q/S, Dmd I1/2/3		●	●	●	
	Onboard Memory Size	Memory	Bytes		4MB	4MB	8MB	
	Communication	RS485 Port,Half Duplex, Optical Isolated	Modbus®-RTU Protocol	●	●	●	●	
	Time	Real Time Clock	Year, Month, Date, Hour, Minute, Second	●	●	●	●	
	400Hz Type:	Only Supports Full-wave (True RMS) Energy, Supports 2 nd ~ 15 th Individual Harmonics.		●	●	●		
Option Module	I/O Option	Switch Status (DI)	Digital Input (Wet)	○	○	○	○	
		Power Supply for DI	24 Vdc	○	○	○	○	
		Relay Output (RO)	NO, Form A	○	○	○	○	
		Digital Output (DO)	Photo-MOS	○	○	○	○	
		Pulse Output (PO)	By using DO	○	○	○	○	
		Analog Input (AI)	0(4)~20mA, 0(1)~5V	○	○	○	○	
		Analog Output (AO)	0(4)~20mA, 0(1)~5V	○	○	○	○	
	Communication	Ethernet	Modbus TCP, HTTP, SMTP, SNTP		○	○	○	○
		BACnet/IP	BACnet/IP		○	○	○	○
		RS485 Module	Modbus-RTU Protocol		○	○	○	○
		RS485 Module	Additional Modbus RTU		○	○	○	○

Note: This manual uses U and V interchangeably for voltage.

2. Installation

CAUTION

Installation of the meter must only be performed by qualified personnel, who follow standard safety precautions through the installation procedures. The personnel should have appropriate training and experience with high voltage devices. Appropriate safety gloves, safety glasses, and protective clothing are recommended. Follow NFPA 70E guidelines for protective equipment.

The meter and its I/O output channels are NOT designed as primary protection devices and shall NOT be used as primary circuit protection or in an energy-limiting capacity. The meter and its I/O output channels can only be used as secondary protection. AVOID using the meter under situations where failure of the meter may cause injury or death. AVOID using the meter for any application where risk of fire may occur.

WARNING

During normal operation, hazardous voltages will be present. This includes terminals and any connected current transformers (CTs) and potential transformers (PTs), input and output (I/O) modules, and their circuits. All primary and secondary circuits can, at times, produce lethal voltages and currents.

WARNING

Do not attempt to install or perform maintenance on equipment while it is energized. Death, severe personal injury, or substantial property damage can result from contact with energized equipment. Always verify that no voltage is present before proceeding with the task, and always follow generally accepted safety procedures.

Eaton is not liable for the misapplication or misinstallation of its products.

WARNING

All meter terminals should be inaccessible after installation.

DO NOT perform Dielectric (HIPOT) test to any inputs, outputs, or communication terminals. High voltage testing may damage electronic components of the meter.

Applying more than the maximum voltage to the meter and/or its modules will permanently damage the product. Please refer to the specifications for all devices before applying voltages.

When removing the meter for service, use shorting blocks and fuses for voltage leads and power supply to prevent hazardous voltage conditions or damage to the CTs. CT grounding is optional.

2. Installation

NOTE

The PXM1000 components are maintenance free once properly commissioned. There are no user serviceable components or features.

Cleaning of the various PXM1000 device housings should only be done with power and mains disconnected. A clean dry rag can be used to remove dust. No liquids should be used.

CAUTION

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CAUTION

No preventive maintenance or inspection is required for safety. Any maintenance or repair should be performed by the factory.

WARNING

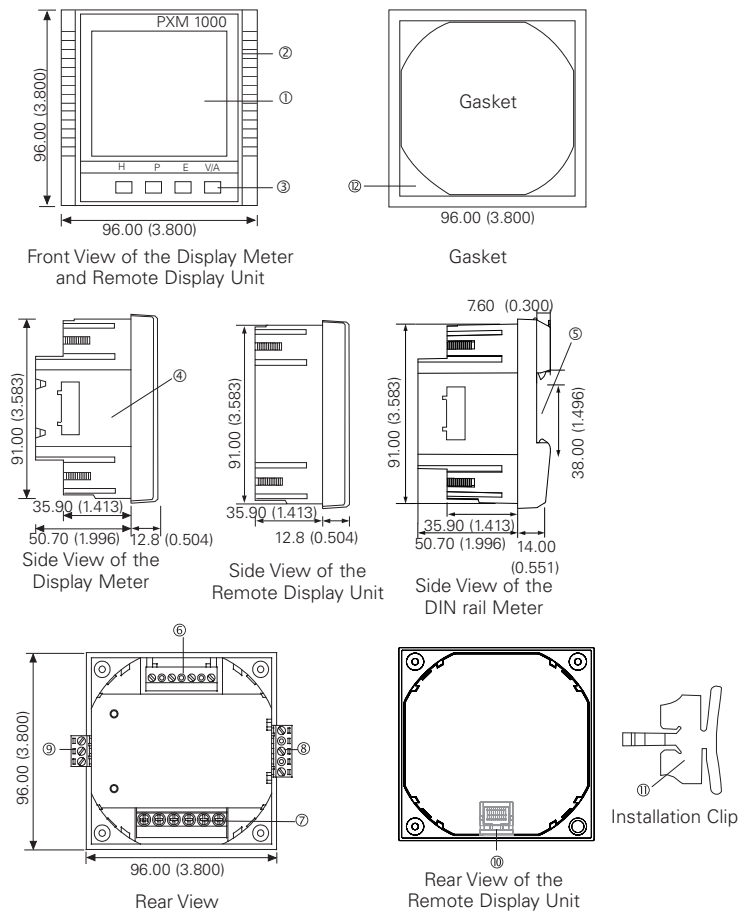
DISCONNECT DEVICE: The following part is considered the equipment disconnect device.

A switch or circuit-breaker shall be included in the installation. The switch shall be in close proximity to the equipment and within easy reach of the operator. The switch shall be marked as the disconnecting device for the equipment.

The installation method is introduced in this chapter. Please read this chapter carefully before beginning installation.

2.1 Appearance and Dimensions

Figure 1. Appearance and Dimensions of the PXM 1000 Meter.



Note: Unit: mm (inches).

Table 2. Part Name of the PXM 1000 Meter.

Part Name	Description
① LCD Display	Large, bright white backlight LCD display.
② Front Casing	Visible portion (for display and control) after mounting onto a panel.
③ Key	Four keys are used to interact with the meter.
④ Enclosure	The PXM 1000 meter enclosure is made of high strength, non-combustible plastic.
⑤ DIN rail	Used for Installation - 35 mm rail of the DIN rail meter.
⑥ Voltage Input Terminals	Used for voltage input.
⑦ Current Input Terminals	Used for current input.
⑧ Power Supply Terminals	Used for control power input.
⑨ Communication Terminals	Communication output.
⑩ Interface	Used to link the remote display unit and the DIN rail meter.
⑪ Installation Clip	Used for mounting the meter to the panel.
⑫ Gasket	Insert the gasket in between the meter and the cutout to cover up gaps from the round hole.

2. Installation

2.2 Installation Methods

Environmental

Before installation, please check the environment, temperature, and humidity to ensure optimum placement of the PXM 1000 for performance.

Temperature

Operation: -25°C to 70°C (-13°F to 158°F).

Storage: -40°C to 85°C (-40°F to 185°F).

Humidity

5% to 95% non-condensing.

The PXM 1000 meter should be installed in a dry and dust free environment. Avoid exposing the meter to excessive heat, radiation, and high electrical noise sources.

Installation Steps

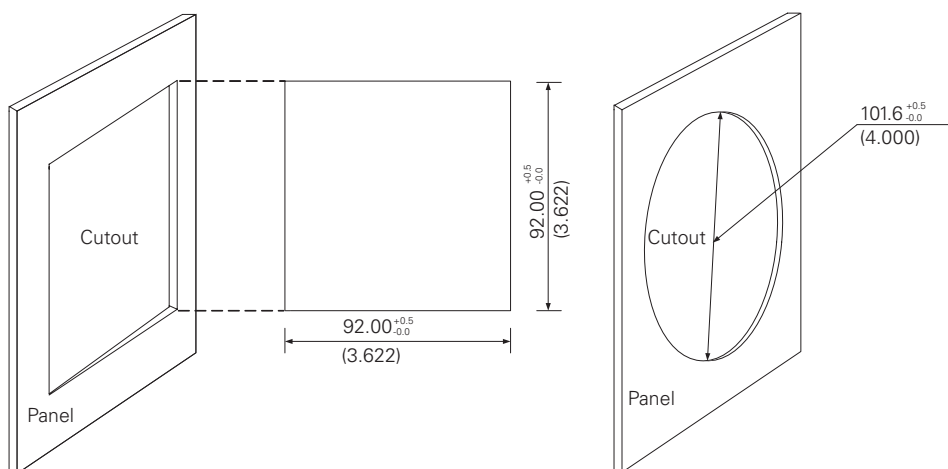
CAUTION

Before drilling or cutting, take the appropriate steps to ensure that drill shavings or metal chips from drilling and cutting do not fall onto or into any components mounted to the enclosure door or within the enclosure. Drill shavings and metal chips can cause short circuits and damage to the components within the enclosure.

The PXM 1000 meter can be installed into a standard ANSI C39.1 (4" round) or an IEC 92 mm DIN (square) form.

Step 1. Cut a square or round hole on the panel of the switch gear. The cutout size is shown in Figure 2.

Figure 2. Panel Cutout.

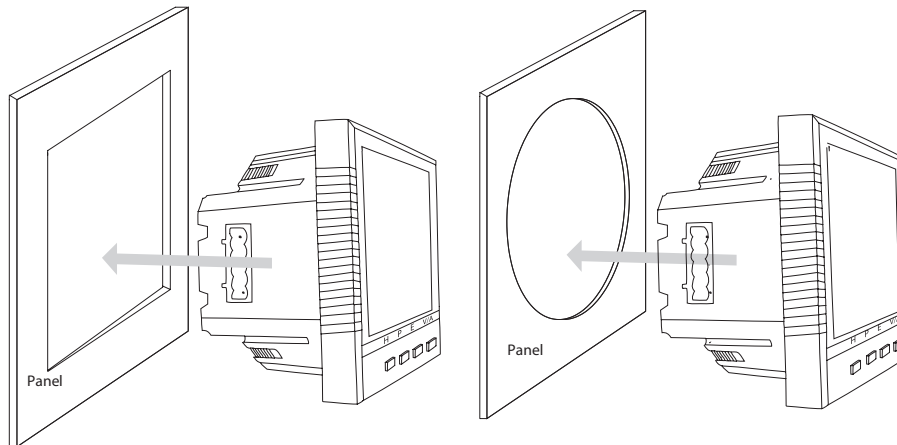


Units: mm (inches).

Step 2. Remove the clips from the meter and insert the meter into the square hole from the front side.

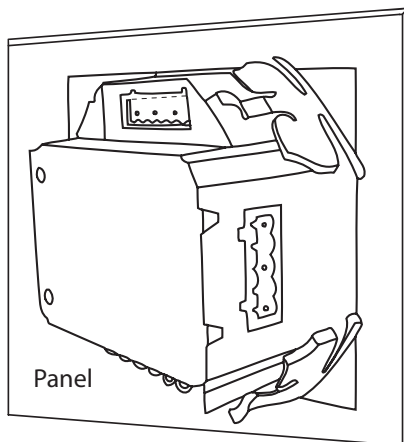
Note: Optional rubber gasket should be installed on the meter before inserting the meter into the cut out to cover up gaps from the round hole and to ensure IP ratings.

Figure 3. Installing Meter Into Cutout.



Step 3. Install clips on the back side of the meter and secure tightly to ensure the meter is tightly clamped to the panel.

Figure 4. Use the Clips to Mount the Meter on the Panel.



Note: The display meter and the remote display unit have the same installation method. The DIN rail meter is simply installed on a 35 mm DIN rail.

2.3 Wiring

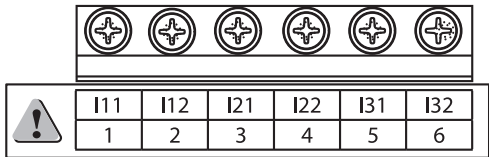
2.3.1 Terminal Strips

There are four terminal strips at the back of the PXM 1000 meter. The three-phase voltage and current are represented by 1, 2, and 3 respectively. These numbers have the same meaning as A, B, and C, or R, S, and T used in other literature.

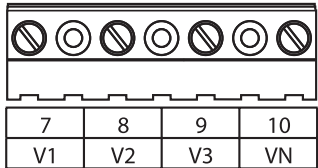
2. Installation

Figure 5. Terminal Strips of PXM 1000 Meter.

Current Input Terminal Strip



Voltage Input Terminal Strip



Power Supply Terminal Strip - Communication Terminal Strip



WARNING

Do not attempt to install or perform maintenance on equipment while it is energized. Death, severe personal injury, or substantial property damage can result from contact with energized equipment. Always verify that no voltage is present before proceeding with the task, and always follow generally accepted safety procedures.

WARNING

Switch main power off and wait five (5) minutes before making any connection or disconnection on the device. Danger of explosion!

Eaton is not liable for the misapplication or misinstallation of its products.

Safety Earth Connection

Before setting up the meter's wiring, please make sure that the switchgear has an earth ground terminal. Connect the meter's earth ground terminal to that of the switchgear.. The following ground terminal symbol is used in this user manual.

Figure 6. Safety Earth Symbol.



2.3.2 Power Requirement

Control Power

There are two options for the Control Power of the PXM 1000 meter:

1. Standard: 100~415 Vac (50/60 Hz) or 100-300 Vdc.
2. Low Voltage DC Option: 20-60 Vdc.

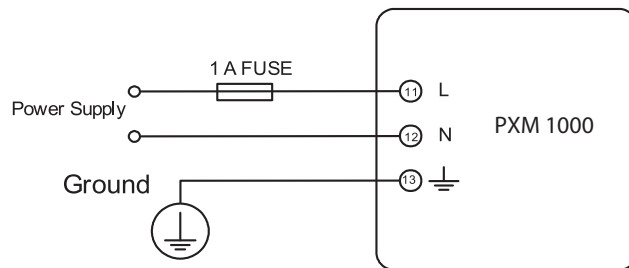
The correct option must be chosen for the application. Please see the ordering information appendix for further details.

The meter's typical power consumption is very low and can be supplied by an independent source or by the measured load line. If the control power source is not reliable, an uninterruptible power supply (UPS) should be considered. Terminals for the control power supply are 11, 12, and 13 (L, N, and Ground). A switch or circuit-breaker shall be included in a building installation. It shall be in close proximity to the equipment, within easy reach of the operator, and shall be marked as the disconnecting device for the equipment.

Note: Make sure the control power ground terminal 13, is connected to earth ground.

Note: Make sure the control power supplied to the meter matches the meter's power supply ratings.

Figure 7. Power Supply.



A fuse (typical 1 A/250 Vac) should be used in the auxiliary power supply loop. Terminal 13 must be connected to the ground terminal of the switchgear. In very rare applications where a power quality problem exists in the power supply, an isolated transformer or EMC filter should be used in the control power supply loop.

Meter power supply input accepts AWG 14 maximum wire size.

2. Installation

Voltage Input

Maximum input voltage for the PXM 1000 meter shall not exceed 400LN/690LL VAC rms for three-phase or 400LN VAC rms for single-phase.

A potential transformer (PT) must be used for medium voltage systems. A typical secondary output for PTs is 100 or 120 V. Note that the PT secondary voltage setting defaults to 220. Make sure to change this to the appropriate PT setting when setting up the meter. Please make sure to select an appropriate PT to maintain the measurement accuracy of the meter. When connecting using the star configuration wiring method, the PT's primary side rated voltage should be approximately equal to the phase to neutral voltage of the system to utilize the full range of the PT. When connecting using the delta configuration wiring method, the PT's primary side rated voltage should be approximately equal to the line to line voltage of the system. A fuse (typical 1 A/250 Vac) should be used in the voltage input loop. The wire for voltage input is AWG 16-12 or 1.3-2.0 mm².

Note: In no circumstance should the secondary of the PT be shorted. The secondary of the PT should be grounded. Please refer to the wiring diagram section for further details.

Current Input

Current transformers (CTs) are required in most engineering applications. A typical current rating for the secondary side of the CT is 5 A (standard) or 1 A (optional). Please refer to the ordering information appendix for further details. CTs must be used if the system rated current is over 5 A. A CT with 0.5% accuracy or better, with a rating over 2.5 VA is recommended to ensure the meter's accuracy. The wire length between the CTs and meter shall not exceed the burden rating of the CT to insure accuracy.

Meter Current inputs accept AWG 15-10 or 1.5-2.5 mm².

WARNING

When power is on, the secondary side of the CT should not be open circuit in any circumstance. There should not be any fuse or switch in the CT loop. One end of the CT loop should be connected to Ground.

Vn Connection

Vn is the reference point of the PXM 1000 meter voltage input. Low wire resistance helps to improve the measurement accuracy. Different system wiring modes require different Vn connection methods. Please refer to the wiring diagram section for more details.

3-Phase Wiring Diagram

This meter can satisfy almost any kind of three-phase wiring diagrams. Please read this section carefully before choosing the optimum wiring configuration for your power system.

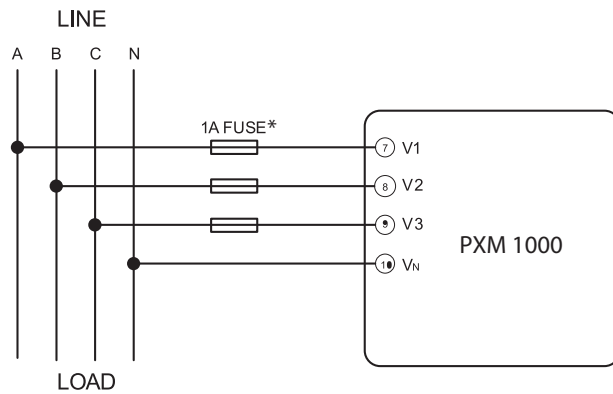
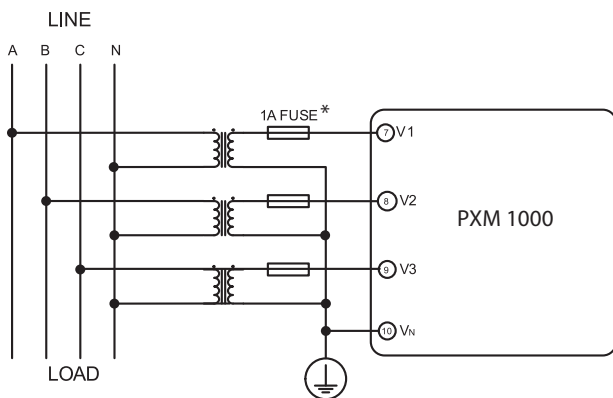
The voltage and current input wiring mode can be set separately in the meter parameter setting process. The voltage wiring mode can be set as 3-phase 4-wire Wye (3 LN), 3-phase 3-wire direct connection (3 LL), 3-phase 3-wire open delta (2 LL), single-phase 2-wire (1 LN), and single-phase 3-wire (1 LL). The current input wiring mode can be set as 3 CT, 2 CT, and 1 CT. The voltage mode can be grouped with the current mode as 3 LN-3 CT (3 CT or 2 CT), 3 LL-3 CT, 2 LL-3 CT, 2 LL-2 CT, 1 LL-2 CT, 1 LN-1 CT.

2.3.3 Voltage Input Wiring

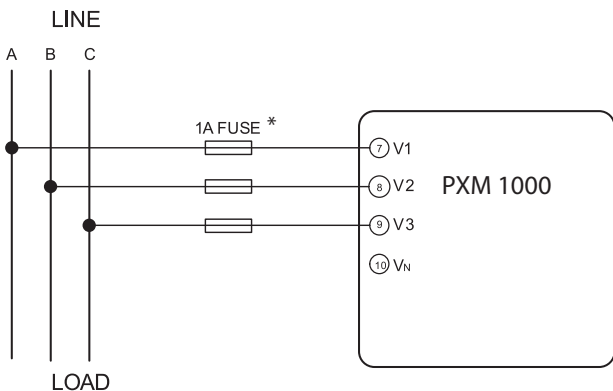
3-Phase 4-Wire Wye Mode (3 LN)

The 3-phase 4-wire wye mode is commonly used in low voltage electric distribution power systems. For voltage lower than 400 LN/690 LL Vac, a power line can be connected directly to the meter's voltage input terminal as shown in Figure 8.

For high voltage systems (over 400 LN/690 LL Vac), PTs are required as shown in Figure 9. The meter should be set to 3 LN for both voltage levels.

Figure 8. 3 LN Direct Connection.**Figure 9. 3 LN with 3 PT.****3-Phase 3-Wire Direct Connection Mode (3 LL)**

In a 3-phase 3-wire system, power line A, B, and C are connected to V1, V2, and V3 directly. Leave Vn disconnected. The voltage input mode of the meter should be set to 3 LL.

Figure 10. 3 LL 3-Phase 3-Line Direct Connection.

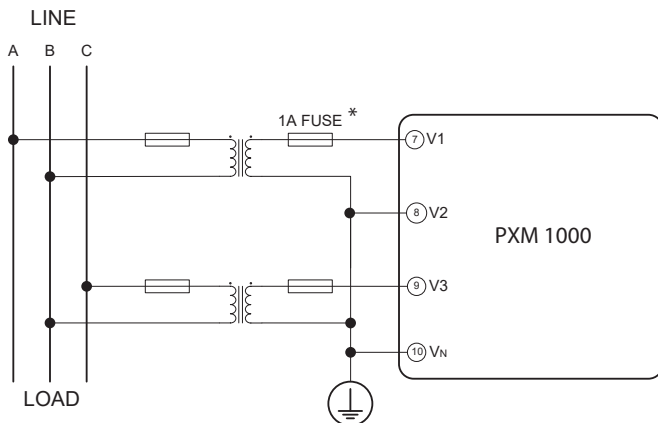
* 1A fuse typical

2. Installation

3-Phase 3-Line open Delta Mode (2 LL)

The open delta wiring mode is often used in high voltage systems. V2 and Vn are connected together in this mode. The voltage input mode of the meter should be set to 2 LL for this voltage input wiring mode.

Figure 11. 2 LL with 2PTs.



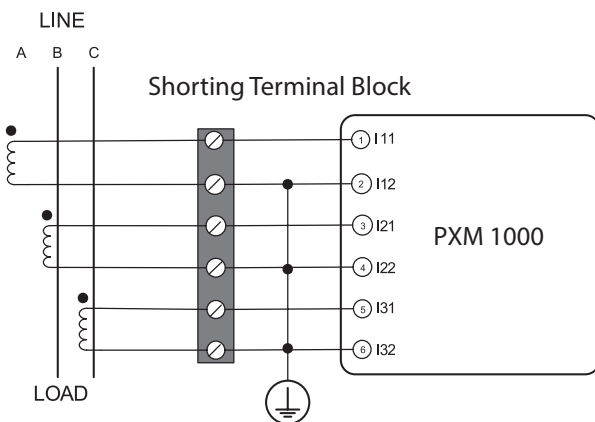
* 1A fuse typical

2.3.4 Current Input Wiring

3 CT

The 3CT current wiring configuration can be used when either 3 CTs are connected (as shown in Figure 12) or 2 CTs are connected (as shown in Figure 13) to the system. In either case, there is current flowing through all three current terminals.

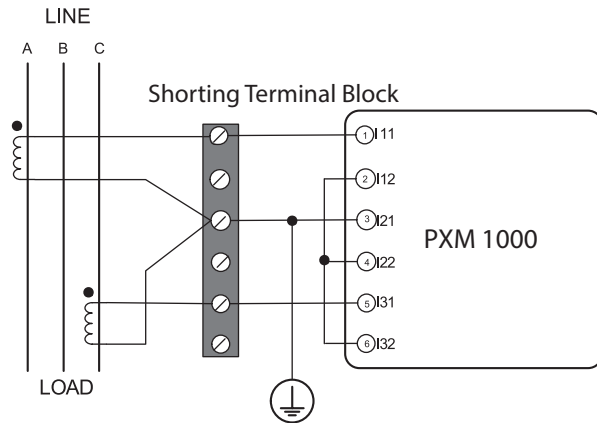
Figure 12. 3 CTs A.



Note: For meters used with voltage input current sensors, unused channels need to be tied to ground as shown in the figures. If meters are used with amperage input current sensors, then the unused channels do not need to be tied to ground. This note applies to Figures 12, 14, and 15.

Shorting terminal block not required when used with voltage input current sensors.

Figure 13. 3 CTs B.



Note: Shorting terminal block not required when used with voltage input current sensors.

This applies to all figures on this page

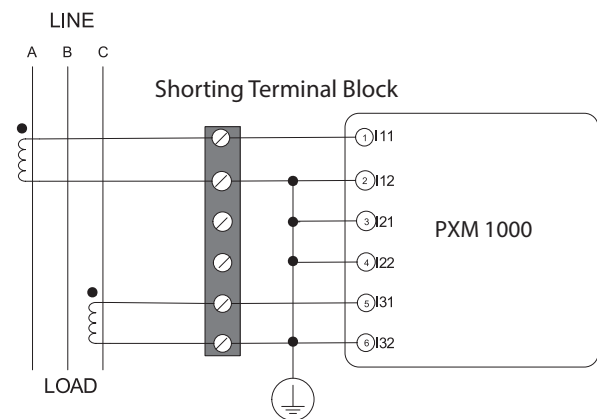
2 CT

For Figures 14 and 15, the meter should be set to the I2 value which is calculated from formula:

$$i1 + i2 + i3 = 0.$$

The current input mode of the meter should be set to 2CT .

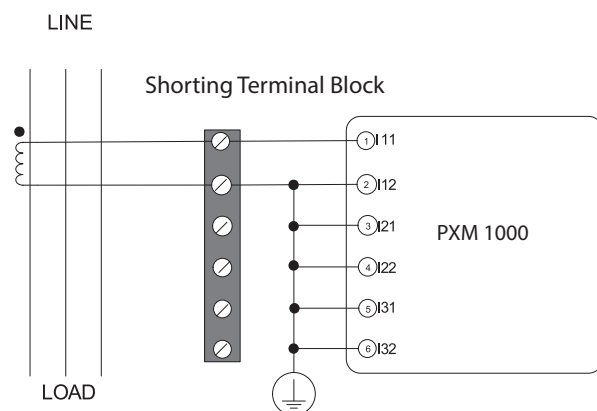
Figure 14. 2 CT.



See Note in Figure 12.

1CT

Figure 15. 1 CT.



See Note in Figure 12.

2. Installation

2.3.5 Frequently Used Wiring Configurations

In this section, the most common voltage and current wiring combinations are shown in different diagrams. In order to display measurement readings correctly, please select the appropriate wiring diagram for your setup and application.

1. 3 LN, 3 CT with 3 CTs.

Figure 16. Three-phase, Three-wire (3LL, 3CT)

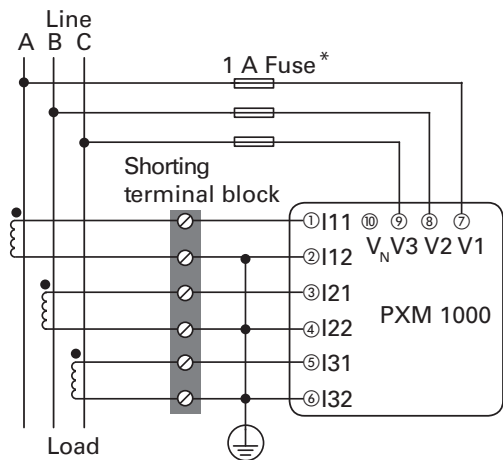
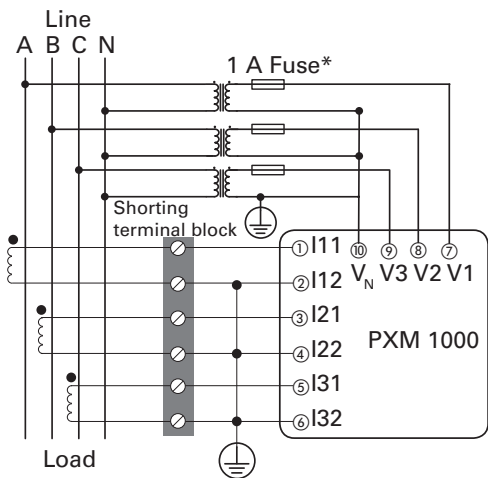
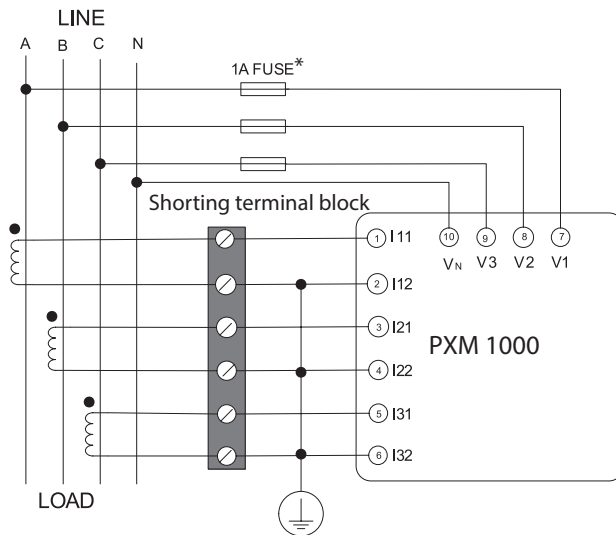


Figure 17. Three-phase, Four-wire with PT (3LN, 3CT)



* 1A fuse typical.

Figure 18. 3 LN, 3 CT.

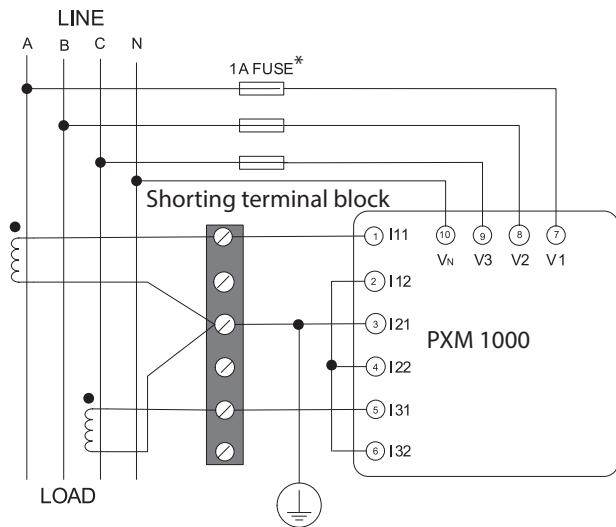
Note: Shorting terminal block not required when used with voltage input current sensors.

This applies to all figures on this page

2. 3 LN, 3 CT with 2 CTs.

Figure 19. 3 LN, 3 CT with 2 CTs.

Note: The sum of I1 and I3 is used as I2 input.



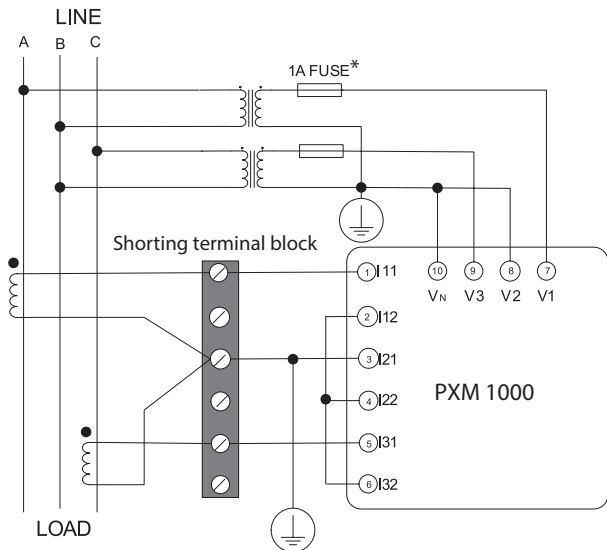
Note: For meters used with voltage input current sensors, unused channels need to be tied to ground as shown in the figures. If meters are used with amperage input current sensors, then the unused channels do not need to be tied to ground.

* 1A fuse typical.

2. Installation

3.2 LL, 3 CT

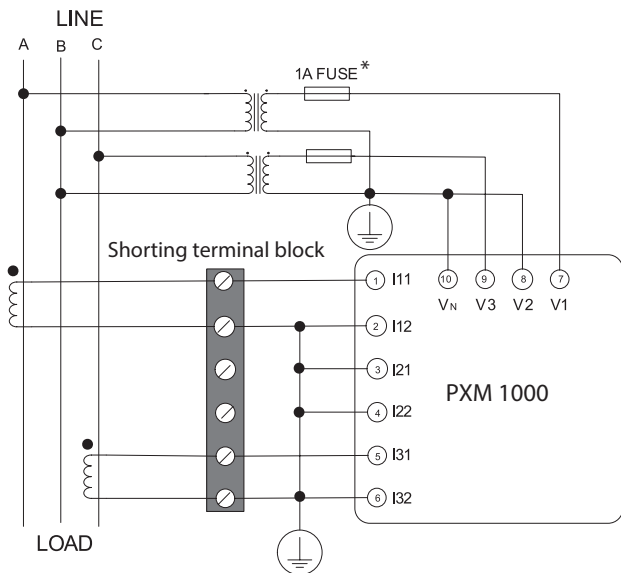
Figure 20. 2 LL, 3 CT.



Note: For meters used with voltage input current sensors, unused channels need to be tied to ground as shown in the figures. If meters are used with amperage input current sensors, then the unused channels do not need to be tied to ground.

4.2 LL, 2 CT

Figure 21. 2 LL, 2 CT.



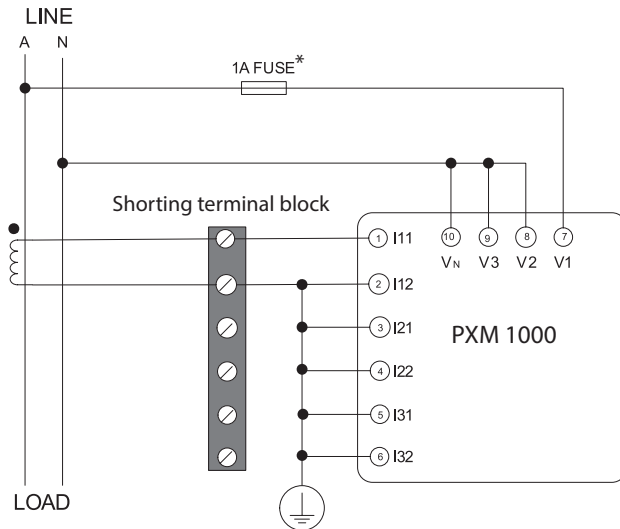
Note: Shorting terminal block not required when used with voltage input current sensors.

This applies to all figures on this page

* 1A fuse typical.

5. 1 LN, 1 CT (Wiring Mode Setting 1 LN, 1 CT).

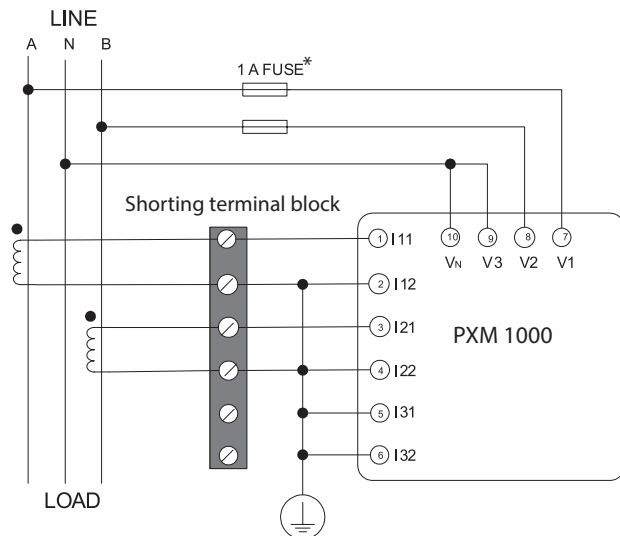
Figure 22. Single Phase 2 Lines.



Note: For meters used with voltage input current sensors, unused channels need to be tied to ground as shown in the figures. If meters are used with amperage input current sensors, then the unused channels do not need to be tied to ground.

6. 1 LL, 2 CT (Wiring Mode Setting 1 LL, 2 CT)

Figure 23. Single Phase 3 Lines.



Note: Shunting terminal block not required when used with voltage input current sensors.

This applies to all figures on this page

* 1A fuse typical.

2. Installation

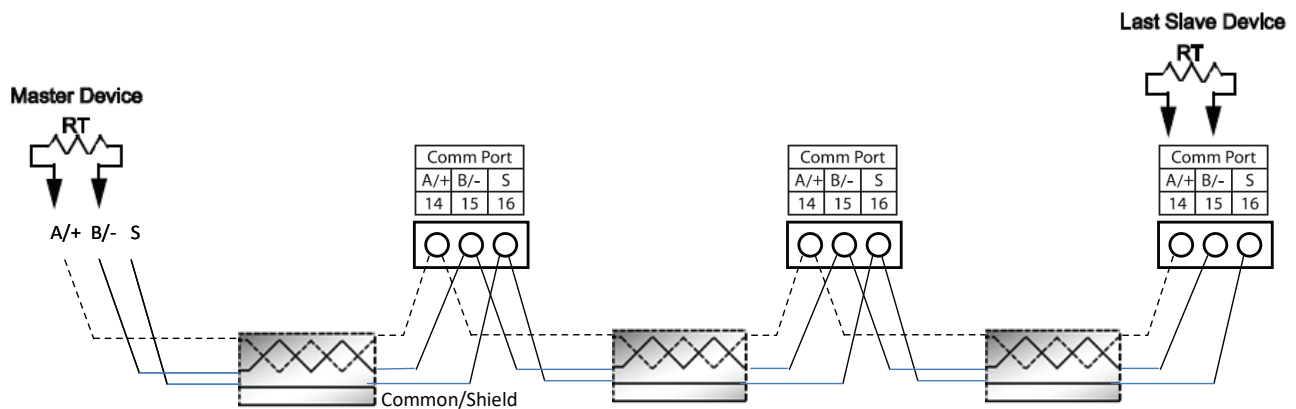
2.3.6 Communication

PXM 1000 meter uses RS-485 serial communication and the Modbus-RTU protocol. The terminals for communication are A, B, and S (14, 15, and 16). A is differential signal +, B is differential signal -, and S is connected to the shield of the twisted pair cables. Up to

32 devices can be connected on a RS-485 bus. Use good quality shielded twisted pair cable, AWG 22 (0.5 mm²) or higher. The overall length of the RS-485 cable connecting all devices should not exceed 1200 m (4000 ft). The PXM 1000 meter is used as a slave device for masters such as a PC, PLC, Data Collector or RTU.

If the master does not have a RS-485 communication port, a converter (such as a RS-232/RS-485 or a USB/RS-485 converter) will be required. Do not use "Star" and "Tee" connections, daisy chain only. The shield of each segment of the RS-485 cable must be connected to the ground at one end only.

Figure 24. RS485 Daisy Chain Connection.



Avoid branching in a "T" configuration. Branches should begin at the source where possible.

Keep communication cables away from sources of electrical noise whenever possible.

When using a long communication cable to connect several devices, an anti signal reflecting resistor (typical value 120 Ω -300 Ω /0.25 W) is normally added to the end of the cable next to the last meter if the communication quality is distorted.

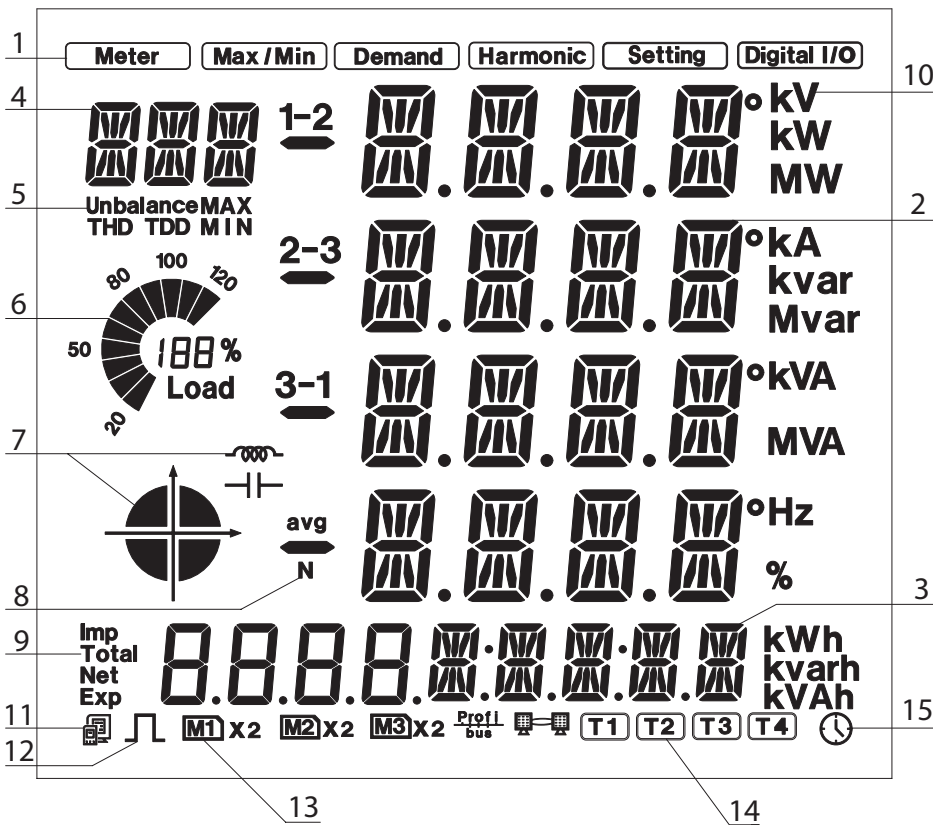
3. Meter Display and Parameter Settings

Details of the human-machine interface (HMI) of the meter will be described in this chapter. This includes viewing real-time metering data and setting parameters using different key combination.

3.1 Display Panel and Keys

The front of the PXM 1000 meter consists of an LCD screen and four control keys. All the display segments are illustrated in Figure 25. Users should note that under normal conditions, all segments will never be displayed simultaneously.

Figure 25. All Display Segments.



3. Meter Display and Parameter Settings

SN	Display	Description
1	Display mode indication	Shows different modes on the display area. "Meter" for real-time measurement; "Max/Min" to indicate maximum and minimum readings; "Demand" for power demand data; "Harmonic" for harmonic data; "Setting" for parameters setting; and "Digital I/O" for expanded IO module data.
2	Four lines of "0000" digits in the metering area	Main display area: displays metering data such as voltage, current, power, power factor, frequency, unbalance, phase angle, etc. Displays statistics such as maximum and minimum, demand data, display settings, and expanded I/O data.
3	Four "8888" and five "00000" digits	Displays energy data and real-time clock. Also used for the setting mode and digital I/O mode display.
4	Three "000" digits	Item Icons: "U" for voltage; "I" for current; "P" for active power; "Q" for reactive power; "S" for apparent power; "PF" for power factor; "F" for frequency; "∠" for phase angles; "DMD" for demand; "Mxx" for expanded IO module type; and display setting page number.
5	Unbalance, THD, TDD, MAX, MIN	Item Icons: "Unbalance" for unbalance of the voltage and current; "THD" for total harmonics distortion; "TDD" for total demand distortion; "MAX" for maximum, and "MIN" for minimum.
6	Load rate 	Displays the percentage of load current to the nominal current.
7	Four quadrant icon  Load type icon 	 : quadrant of the system power.  : inductive load;  : capacitive load.
8	1-2, 2-3, 3-1, avg, N	1, 2, 3 for 3-phase A, B, C; 1-2, 2-3, 3-1 for 3-phase line-to-line AB, BC, CA; avg for average, and N for neutral.
9	Energy icon: Imp, Total, Net, Exp	Imp: import energy. Exp: export energy. Total: absolute sum of Imp and Exp energy. Net: algebraic sum of Imp and Exp energy.
10	Units measured	Voltage: V, kV; Current: A, kA; Active power: kW, MW; Reactive power: kvar, Mvar; Apparent power: kVA, MVA; Frequency: Hz; Active energy: kWh; Reactive energy: kvarh; Apparent energy: kVAh; Percentage: %; Phase angle: °.
11	Communication icon 	No icon: no communication. One icon: query sent. Two icons: query sent and response received.
12	Energy pulse output indicator 	No icon: no pulse output. With icon: icon blinks when sending pulse output.
13	Expanded I/O module indicator   	M1: one PXM1K-1 connected. M1x2: two PXM1K-1 connected. None: no PXM1K-1 connected. M2: one PXM1K-2 connected. M2x2: two PXM1K-2 connected. None: no PXM1K-2 connected. M3: one PXM1K-3 connected. M3x2: two PXM1K-3 connected. None: no PXM1K-3 connected.
14	Ethernet module indicator	No icon: Ethernet module not connected. With icon: Ethernet module connected, when the Second Communication Protocol is setting as Others. BACnet module connected, when the Second Communication Protocol is setting as BACnet.
15	   	Current tariff.
16	Time icon 	Time display .

There are four keys on the front panel, labeled H, P, E, and V/A from left to right. Use these four keys to read real-time metering data, set parameters, and navigate the meter.

Note: If the LCD backlight is off, pressing any key will turn the backlight on.

3.2 Metering Data

Pressing H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor right or left. To enter the metering mode, move the cursor to "Meter" then press V/A.

In the metering mode, pressing P and E simultaneously will access the TOU mode.

In metering mode, the meter displays measurements such as voltage, current, power, power factor, phase angle, unbalance, etc.

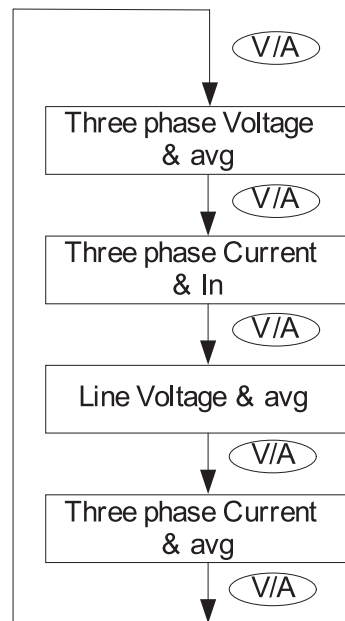
In the TOU mode, the meter displays the energy, maximum demand, and time in different tariffs.

A. Voltage and Current:

Press V/A to read the voltage and current in the metering area. Pressing V/A again will take the user to the next screen in the sequence.

The Figure 26 shows the sequence:

Figure 26. Voltage and Current Sequence.



Notes: When the meter is set to "2LL" or "3LL", there is no phase voltage or neutral current display. Therefore, only the third screen (line voltage & avg) and the fourth screen (three phase current & avg) will be displayed.

When the meter is set to "1LN", only phase A voltage and phase A current will be displayed, without line voltages or other displays.

When the meter is set to "1LL", phase C voltage and phase C current will not be displayed.

3. Meter Display and Parameter Settings

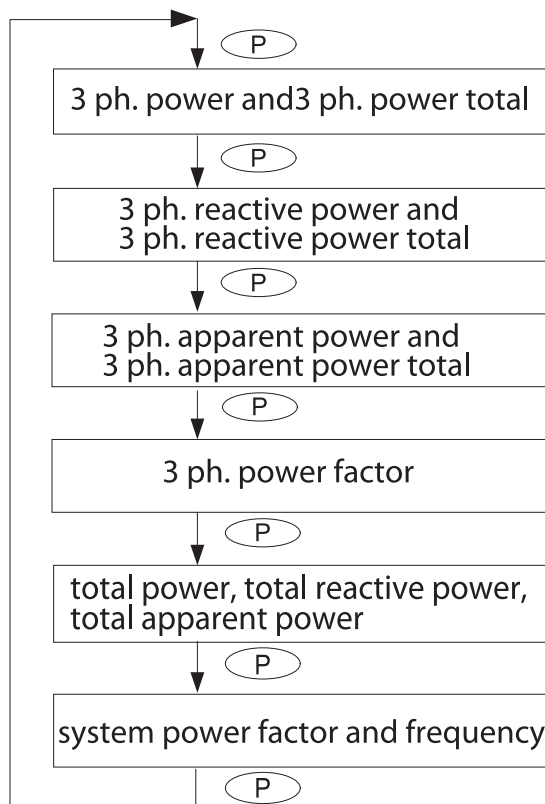
B. Power, Power Factor and Frequency:

Press P to display power related data.

Pressing P again will take the user to the next screen in the sequence.

The Figure 27 shows the sequence.

Figure 27. Power, Power Factor, and Frequency Sequence.



Notes: When the meter is set to “2LL” or “3LL”, only the fifth screen (system power) and the sixth screen (system power factor & frequency) will be displayed.

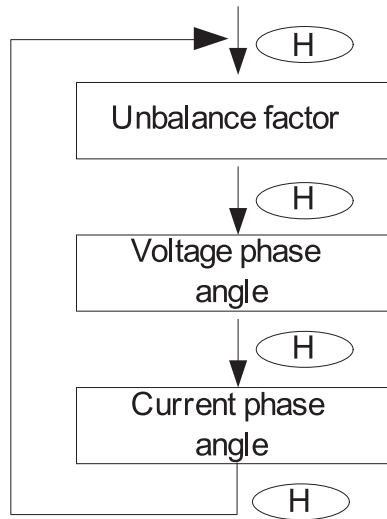
When the meter is set to “1LN”, only phase A power and phase A power factor will be displayed.

When the meter is set to “1LL”, no phase C power and phase C power factor will be displayed.

C. Phase Angles and Unbalance:

Press H to display phase angles and unbalance data. Pressing H again will take the user to the next screen in the sequence.

The Figure 28 shows the sequence:

Figure 28. Phase Angles and Unbalance Sequence.

When using “2LL” or “3LL” wiring setting mode, voltage stands for line to line voltage. Otherwise, voltage stands for line-to-neutral voltage.

When the meter is set to “1LN”, there is only phase A current to phase A voltage angle display.

When the meter is set to “1LL”, there is no phase C voltage or current to phase A voltage angle factor display.

D. Energy:

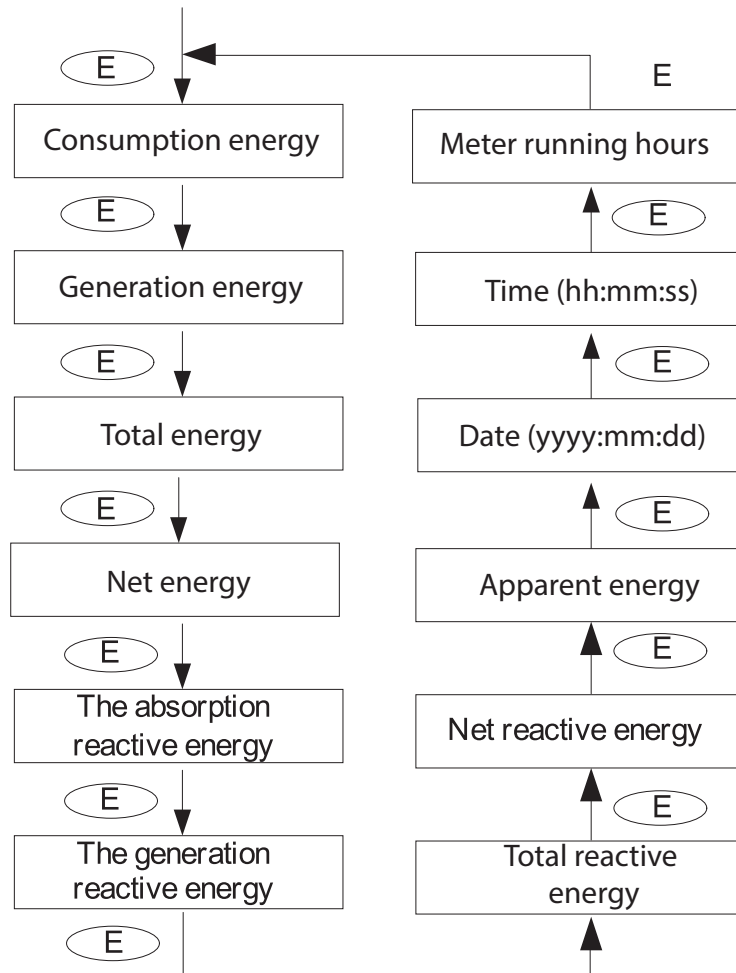
Press the E key to display energy and real time clock. Pressing E again will take the user to the next screen in the sequence.

The PXM 1000 meter can be set to record primary energy or secondary energy. The unit of energy is kWh for active energy, kvarh for reactive energy, and kVAh for apparent energy. The running time has a resolution of 0.01h. The meter begins accumulating energy upon initial power-up of the unit. The accumulated data is stored in the non-volatile memory. It can be reset via communication or from the front of the meter.

The Figure 29 shows the sequence:

3. Meter Display and Parameter Settings

Figure 29. Energy Sequence.

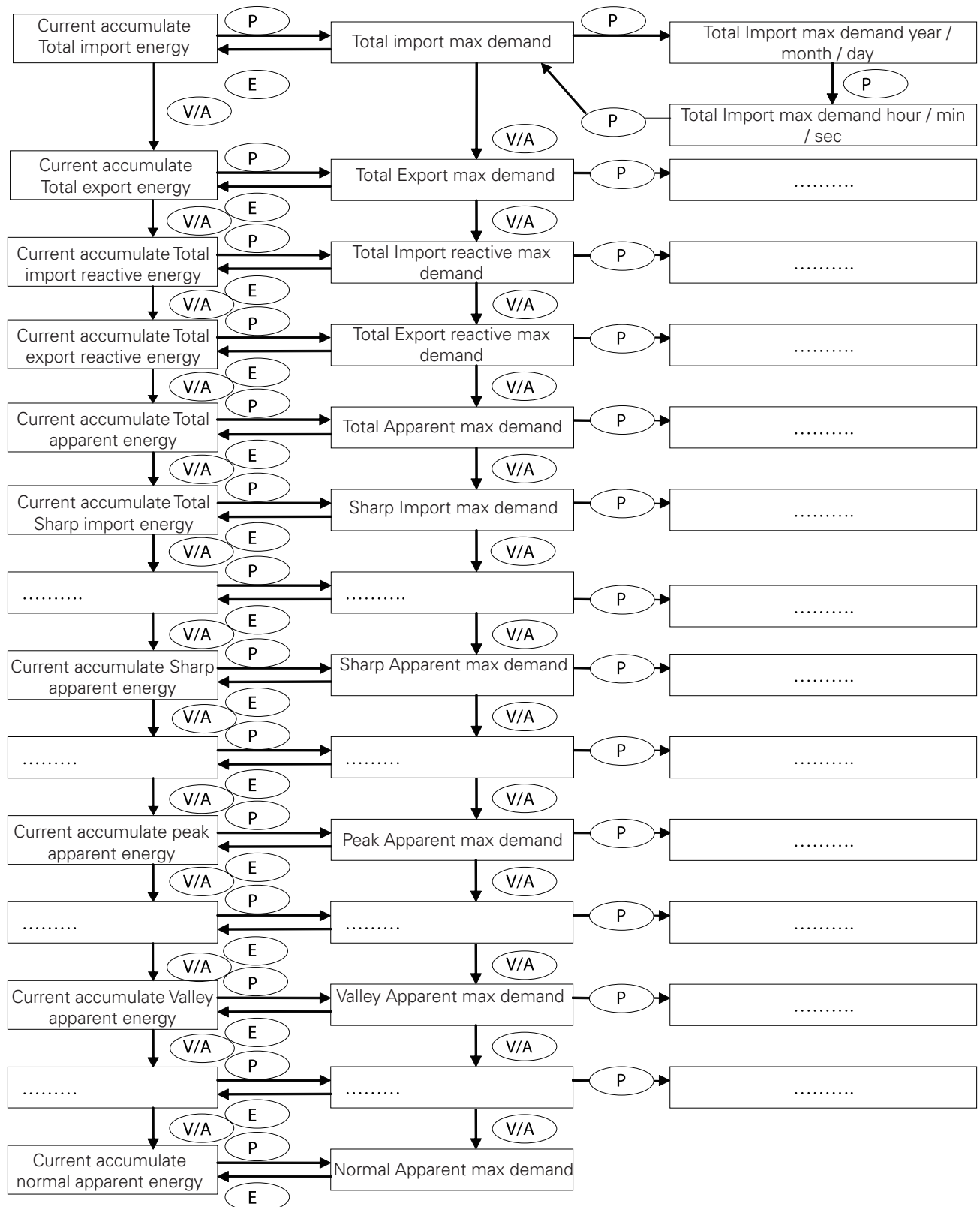


E. TOU display

Press "P" and "E" simultaneously to enter the TOU energy and maximum demand page. Press "E" to display the TOU energy. Press "P" to display the TOU maximum demand. Pressing "P" again from this screen takes users to the TOU maximum demand year, month, and date. Pressing "P" for a second time takes users to the TOU maximum demand hour, minute, and second. Pressing "H" takes users to the tariffs screen. It displays energy under different tariffs in the energy page. It also displays demand under different tariffs in the maximum demand page. Pressing "V/A" will display the different types of energy and maximum demand. Press "P" and "E" simultaneously to exit the current page and return to metering mode.

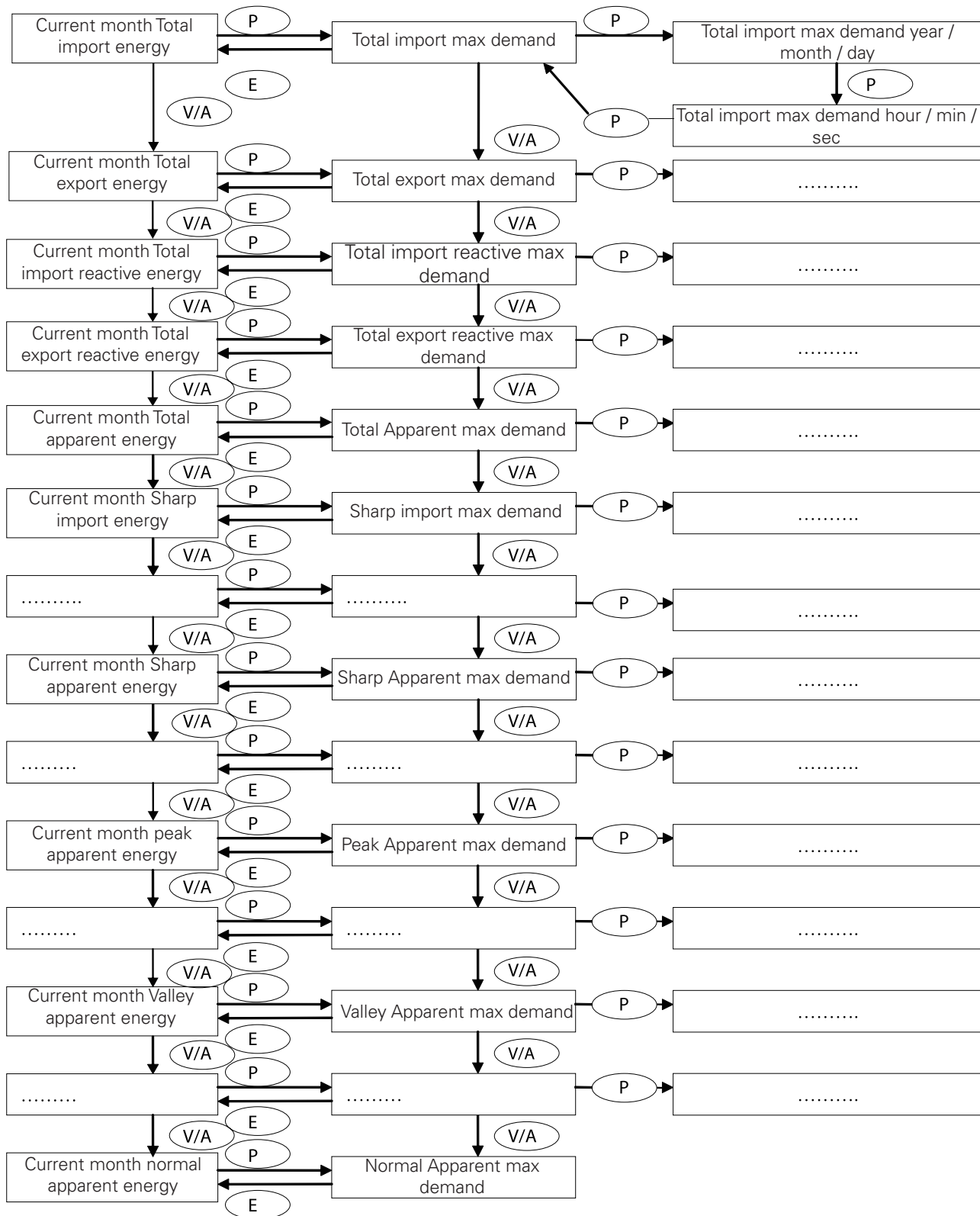
Figure 30 shows the sequence:

Figure 30. TOU Sequence.



3. Meter Display and Parameter Settings

Figure 30. TOU Sequence (Continued).



3.3 Max/Min Data

Pressing H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor right or left. To enter the statistics data mode, scroll the cursor to "Max/Min" then press V/A.

In max/min data mode, the meter displays the maximum values and minimum values for voltage, current, power, power factor, unbalance, demand, THD, etc. The user should note that time stamp for the parameters can be viewed only from the software through communication. No commands are associated with the H key in "Max/Min" display mode.

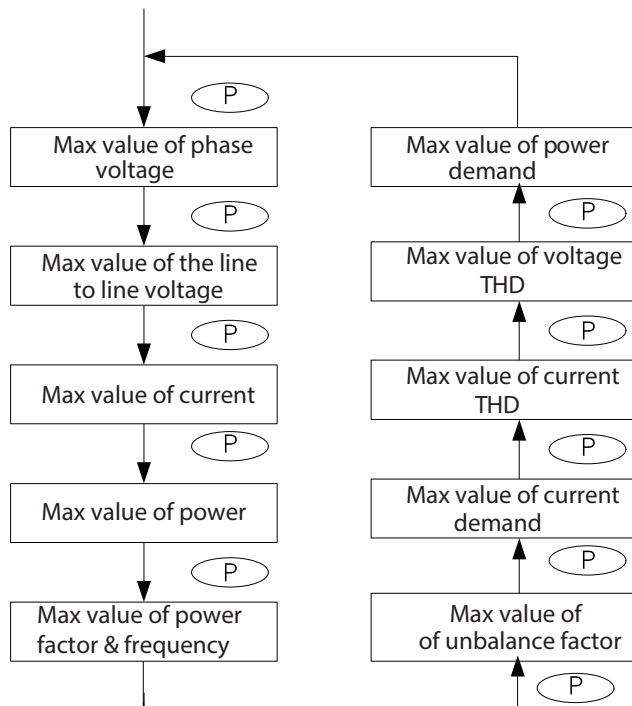
Pressing P will take the user to the next screen in the sequence.

Pressing E will take the user to the previous screen in the sequence.

Pressing V/A will toggle the displayed parameter between maximum and minimum. For example, if the current display is the maximum phase voltage value, when V/A is pressed, the display will show the minimum phase voltage value. If V/A is pressed again, the display will switch back to show the maximum phase voltage value.

Figure 31 shows the sequence:

Figure 31. Max/min Data Sequence.



Notes: The figure shows the rolling sequence when pressing P. The sequence will be reversed when pressing E.

When the meter is set to "2LL" or "3LL", the first screen (max value of phase voltage) will not be displayed.

When the meter is set to "1LL", there are no such displays as phase C voltage, U_{bc} and U_{ca} line voltage, phase C current, three phase voltage and current unbalance factor, U_c and I_c THD, phase C current demand, etc.

When the meter is set to "1LN", there is only phase A display of phase voltage and current, only U_a and I_a THD display, only demand display of phase A. And there are no such displays as three-phase voltage and current unbalance factor, line voltage, etc.

3. Meter Display and Parameter Settings

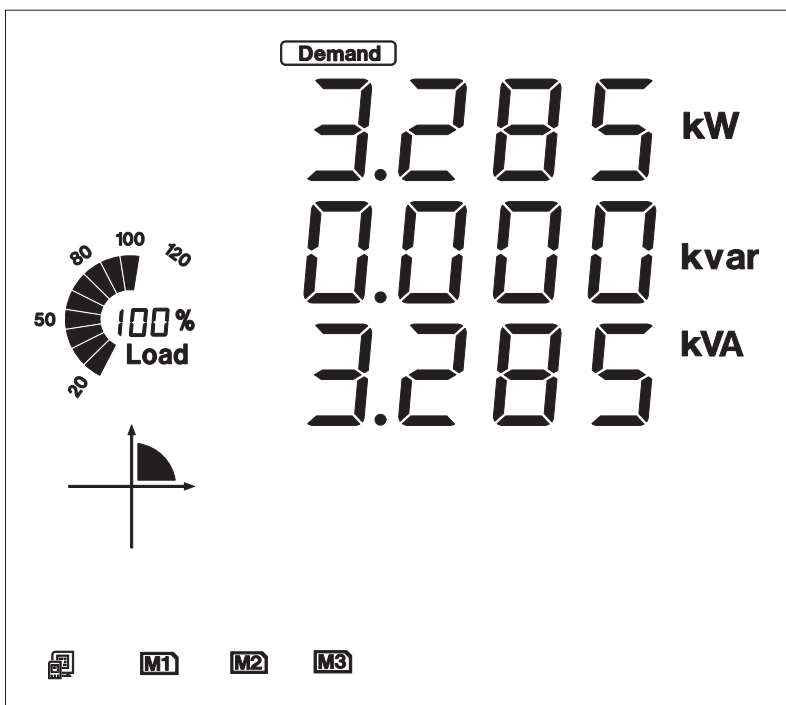
3.4 Demand Data

Pressing H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor right or left. To enter the demand mode, move the cursor to "Demand" then press V/A.

In the demand data mode, the first screen displays the demand of active power, reactive power, and apparent power, and the second screen displays the current demand of phase A, phase B, and phase C. When the meter is set to "1 LL", the current demand for phase C is not available. When the meter is set to "1 LN", phases B and C for current demand display are not available.

As shown in the Figure 32, system active power demand is 3.285 kW, system reactive power demand is 0 kvar, and system apparent power demand is 3.285 kVA.

Figure 32. Demand Data.



3.5 Harmonic Data

Pressing H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor right or left. To enter harmonic mode, move the cursor to "Harmonic" then press V/A.

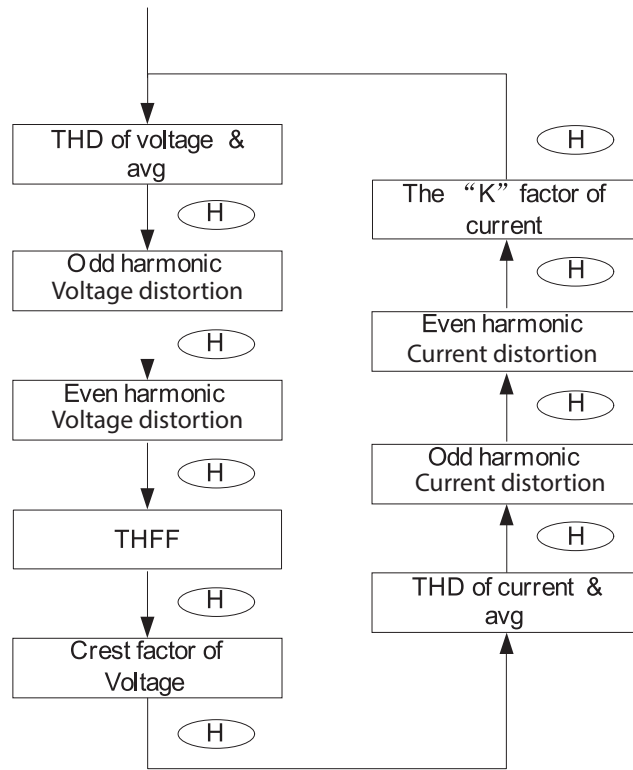
In the harmonic data mode, the meter displays the harmonic ratio of voltage and current, THD, odd HD, even HD, THFF, CF, and KF.

A. Power Quality Data:

Press H to display the power quality data. Pressing H again will take the user to the next screen in the sequence.

The P and E keys have no functionality in this mode.

Press V/A to switch to harmonic ratio data display.

Figure 33. Power Quality Data Sequence.

Notes: When the meter is set to "1LN", there is only phase A display for voltage THD, voltage odd HD, voltage even HD, THFF, voltage crest factor, current THD, current odd HD, current even HD, and current K factor.

When the meter is set to "1LL", there is no phase C display.

B. Harmonic Ratio Data

Press H to switch to power quality data display.

Pressing P increases the harmonic order by one until the user reaches the 63rd harmonic. The user will then be returned to the 2nd harmonic.

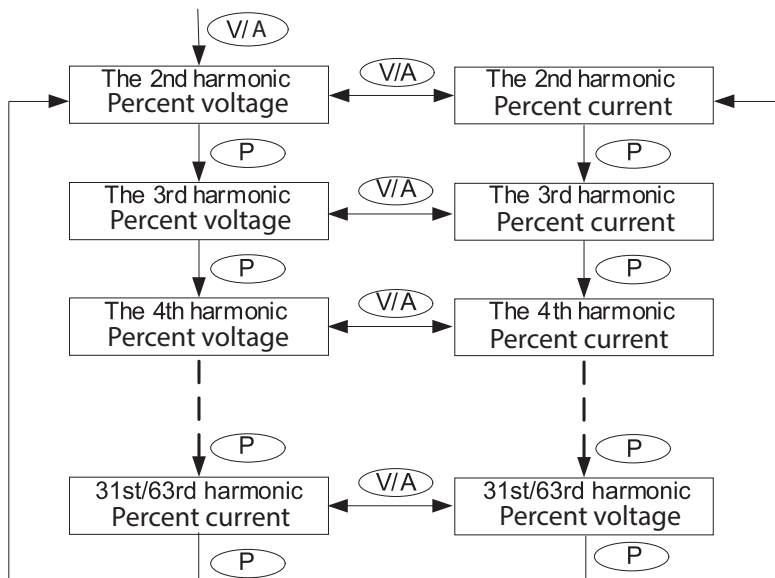
Pressing E decreases the harmonic order by 1 until the user reaches the 2nd harmonic. The user will then be returned to the 63rd harmonic.

Press V/A to switch display between voltage harmonics and current harmonics.

Figure 34 shows the sequence:

3. Meter Display and Parameter Settings

Figure 34. Individual Harmonic Data.



Notes: The figure shows the rolling sequence when pressing P. If E is pressed, the sequence will reverse.

Harmonic is 2nd ~ 63rd.

When the meter is set to "1LN", there is only phase A display for voltage and current harmonic magnitude.

When the meter is set to "1LL", there is no phase C display for voltage and current harmonic magnitude.

3.6 Expanded I/O Module Data

Pressing H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor right or left. To access data from the expanded I/O modules, move the cursor to "Digital I/O" then press V/A to enter the expanded I/O module data mode.

In the expanded I/O module data mode, the meter displays the data from expanded I/O modules, such as DI status, pulse counter number, relay status, analog input, analog output, etc.

In this mode, the first page is module selection. You can choose to view the available modules that are attached to the meter. If no expanded I/O modules are connected, the screen will display "NO IO".

A. Module Selection:

The H key has no functionality on this screen.

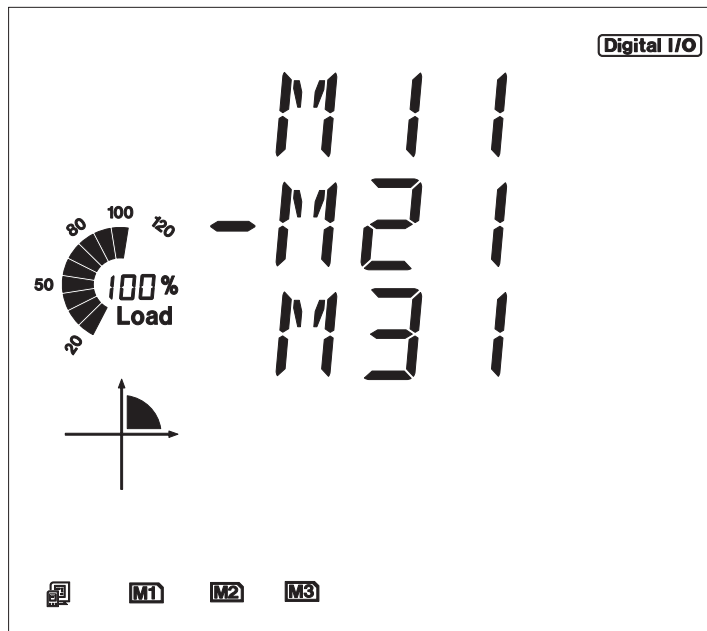
If more than one module is connected, pressing P will allow the user to select the module listed below. When the bottom of the list is reached, the cursor will return to the top.

If more than one module is connected, pressing E will allow the user to select the module listed above. When the top of the list is reached, the cursor will return to the bottom.

Press V/A to select the module and enter the I/O module data selection mode.

As shown in Figure 35, three modules are connected, PXM1K-11, PXM1K-21, PXM1K-31, which are indicated by M11, M21, M31 respectively. The cursor points to M21, which indicates that PXM1K-21 is chosen now.

Figure 35. Three Connected Modules Shown.



B. I/O Module Data Selection:

Press H to return to module selection screen.

Press P to move the cursor downwards; the cursor will return to the top when it reaches the bottom. Please note that there are three parameters for PXM1K-1, three parameters for PXM1K-1, and four parameters for PXM1K-3.

Press E to move the cursor upwards; the cursor will return to the bottom when it reaches the top.

Press V/A to select the parameter and take the user to the data display screen.

C. I/O Module Data Display

Pressing H returns the user to the I/O module data selection screen.

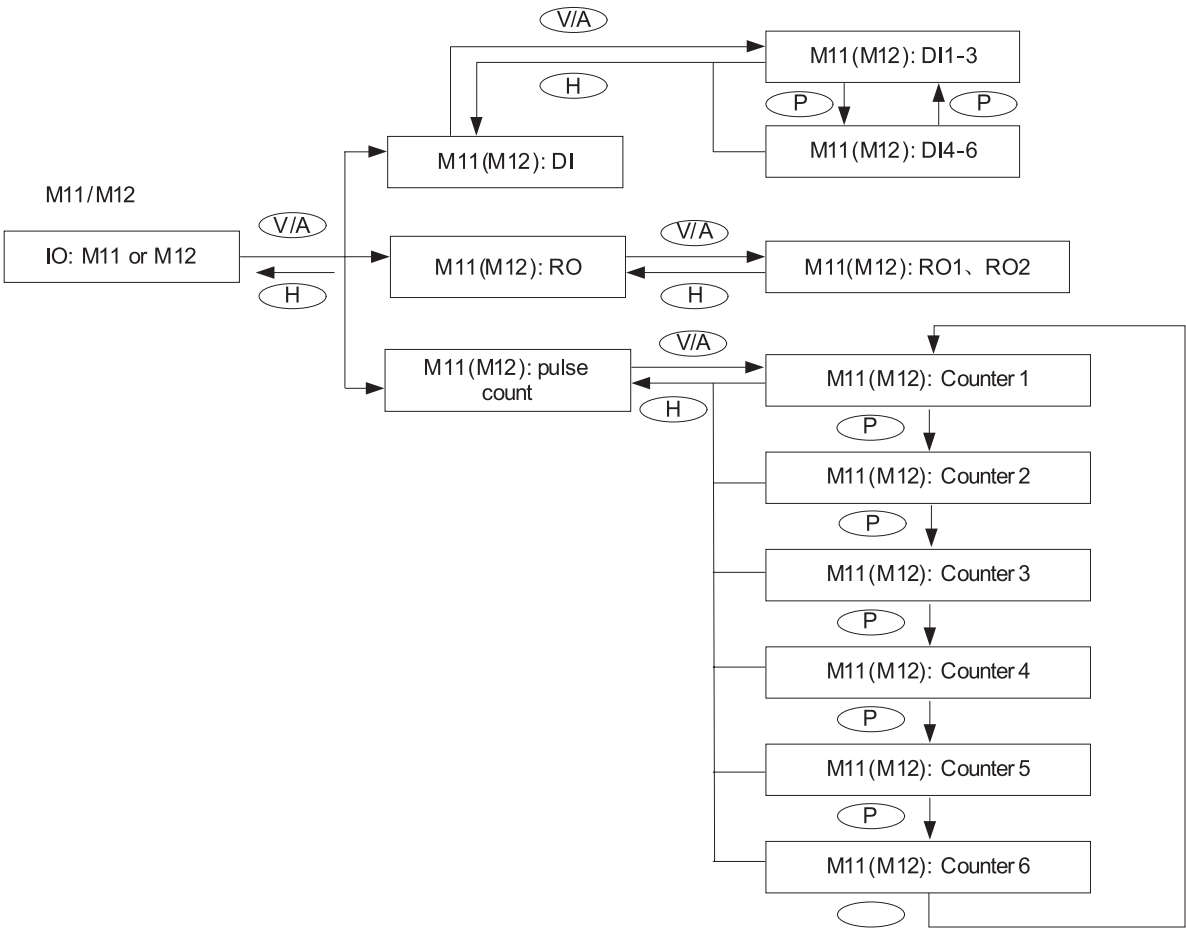
If more than one page is available, pressing P will take the user to the next screen in the sequence. Pressing E will take the user to the previous screen in the sequence.

The V/A key has no functionality on these screens.

Figure 36 shows the sequence:

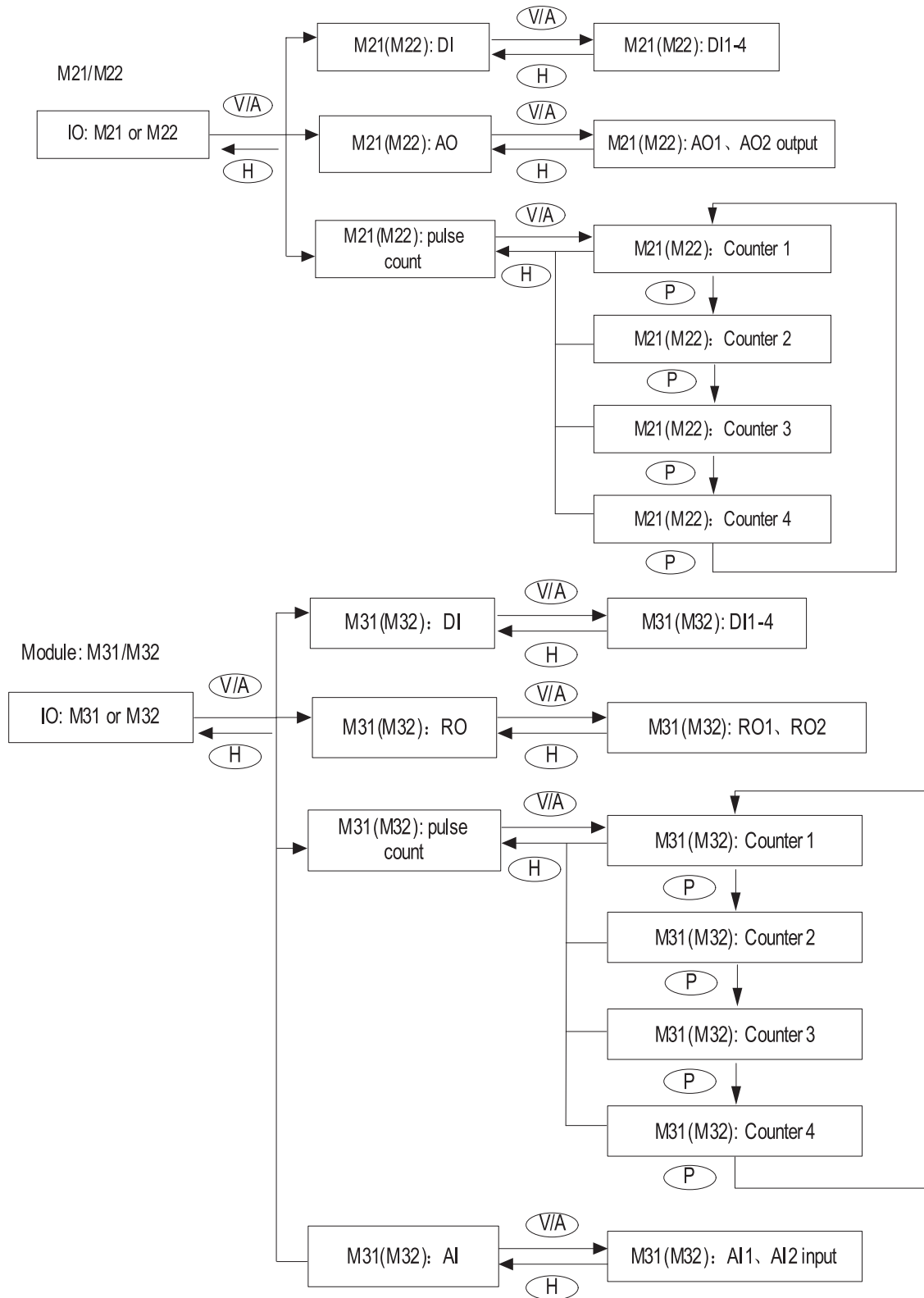
3. Meter Display and Parameter Settings

Figure 36. I/O Module Data Display Sequence.



Note: The Figure 36 shows the scrolling sequence for using the P key. If using the E key for scrolling the page, the sequence will be reversed.

Figure 36. I/O Module Data Display Sequence (continued).



3. Meter Display and Parameter Settings

3.7 Parameter Setting Mode

Pressing H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor right or left. To enter parameter setting mode, move the cursor to "Setting" then press V/A.

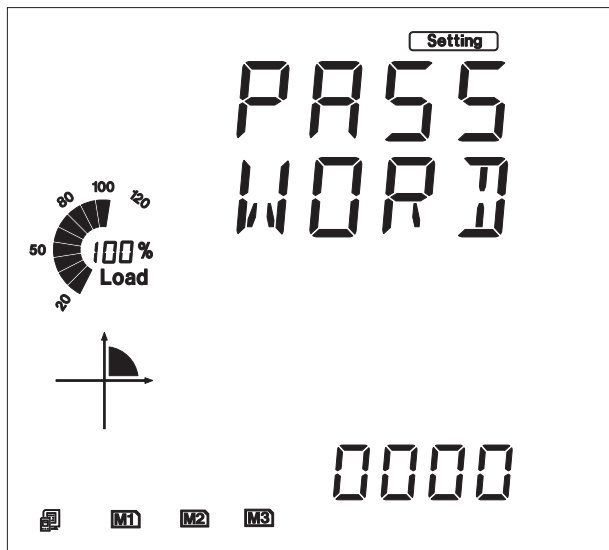
In the parameter setting mode, parameters such as system parameters, expanded I/O module parameters, alarm parameters, and Ethernet module parameters can be read and modified.

A. Password Entry

Parameter setting mode is password protected. Before entering the password and getting into the parameter setting mode, the meter's device communication address will display for three seconds. A four digit password (0000 to 9999) is required every time before accessing the parameter setting mode. The default password is 0000. After entering the password, press V/A to go to the parameter selection page. The meter will be still in the password entry page if a wrong password is entered.

Figure 37 shows the password entry page.

Figure 37. Password Entry Page.



To input password:

1. Press H to move the flashing cursor to the next position.
2. Press P to increase the number by 1.
3. Press E to decrease the number by 1.
4. Press V/A to confirm the password.

B. Parameter Selection Mode

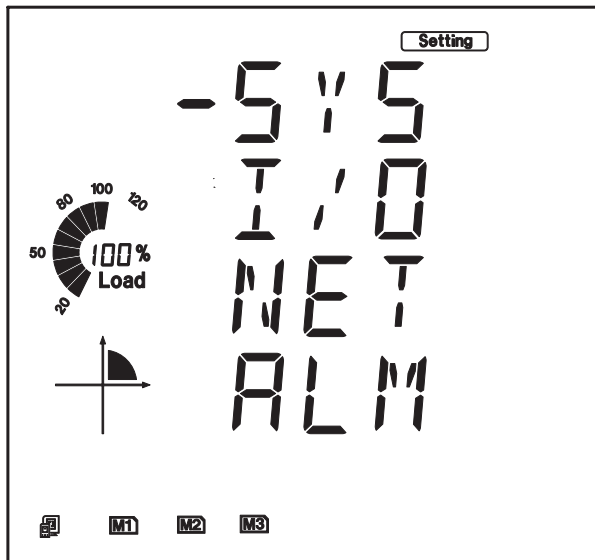
There are four parameters to choose from in the parameter selection manual: system, expanded I/O module, Ethernet module, and alarm.

The H key has no functionality in this mode.

Press P to move the cursor downwards. The cursor will return to the top when it reaches the bottom.

Press E to move the cursor upwards. The cursor will return to the bottom when it reaches the top.

Figure 38. Parameter Selection Mode Page.



Press V/A to select and modify the parameter. Figure 38 shows the parameter selection page. “SYS” stands for system parameter, “I/O” stands for expanded I/O module parameter, “NET” stands for Ethernet module parameter or BACnet module parameter, and “ALM” stands for alarm parameter. As shown in the figure, the cursor points to the “SYS”, which means system parameter is selected.

C. System Parameter Setting

Users can select and modify system parameter in the system parameter setting mode.

Key functions for selecting a parameter:

Press H to return to the parameter selection mode.

Pressing P will take the user to the next screen in the sequence.

Pressing E will take the user to the previous screen in the sequence.

Press V/A to modify the selected parameter.

Key functions for modifying the parameter:

Press H to move the flashing cursor to the next position.

Press P to increase the number by 1.

Press E to decrease the number by 1.

Press V/A to confirm the modification and return to parameter selection mode.

3. Meter Display and Parameter Settings

Figure 39 shows the sequence:

Figure 39. System Parameter Setting Sequence.

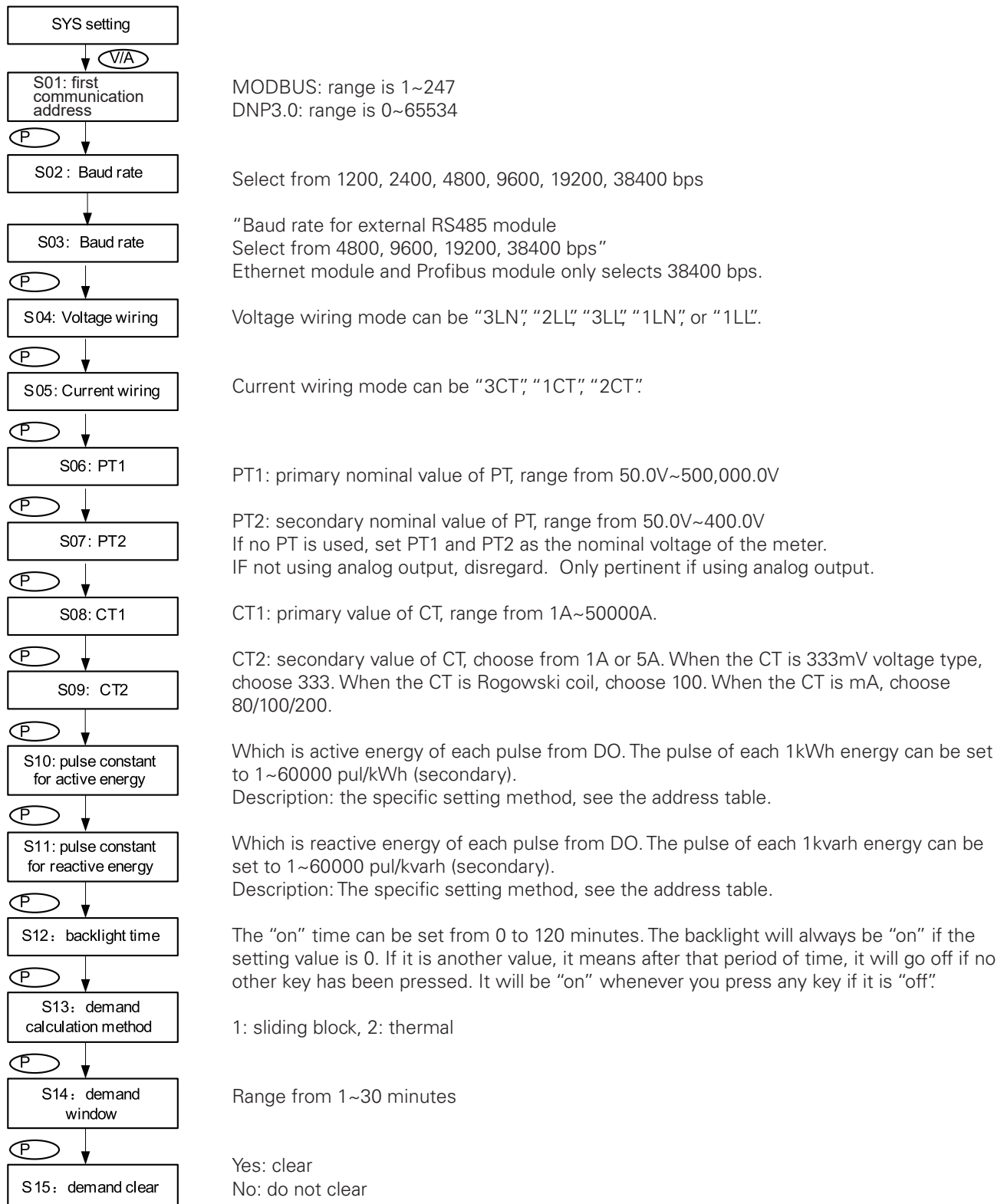
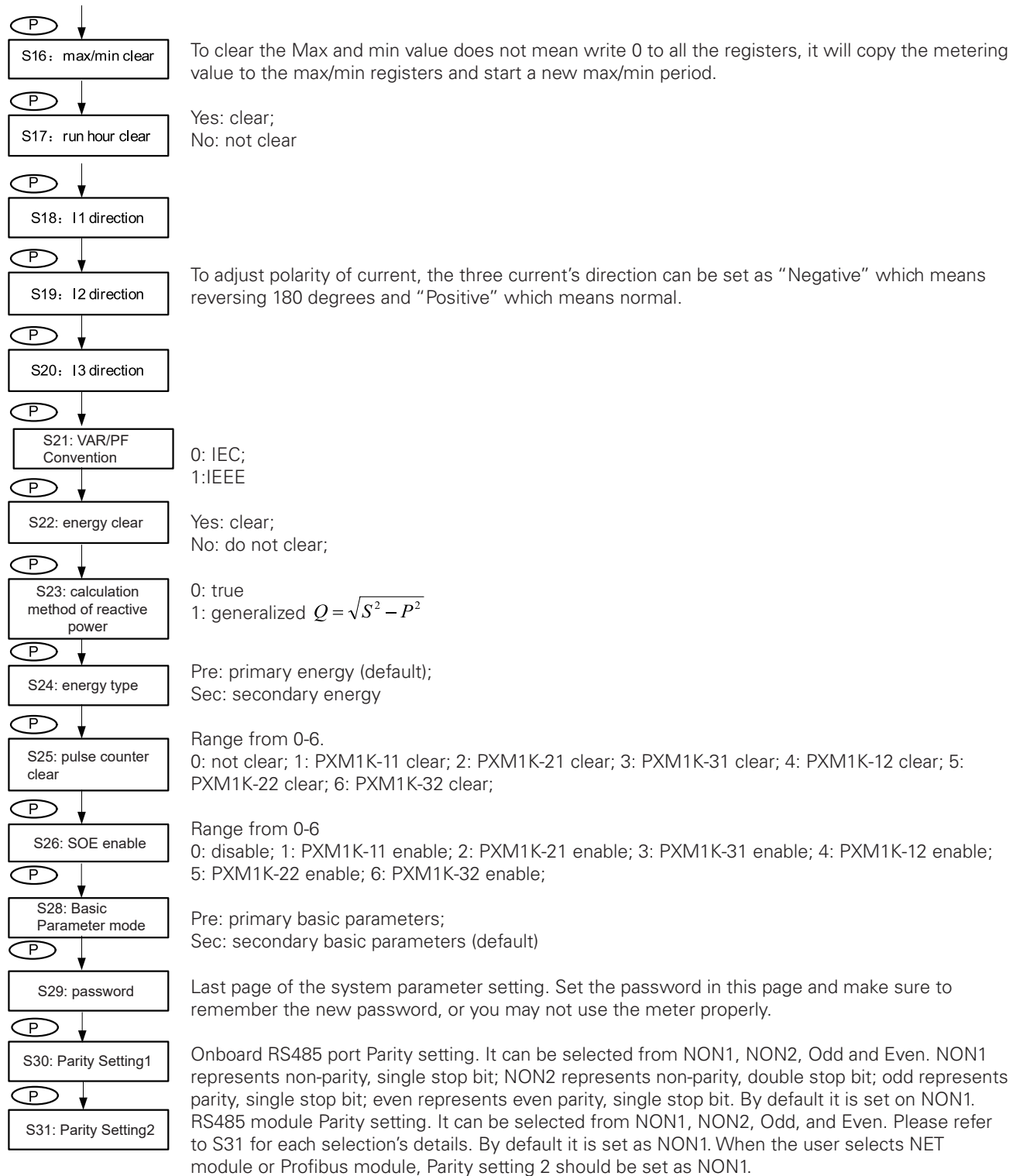
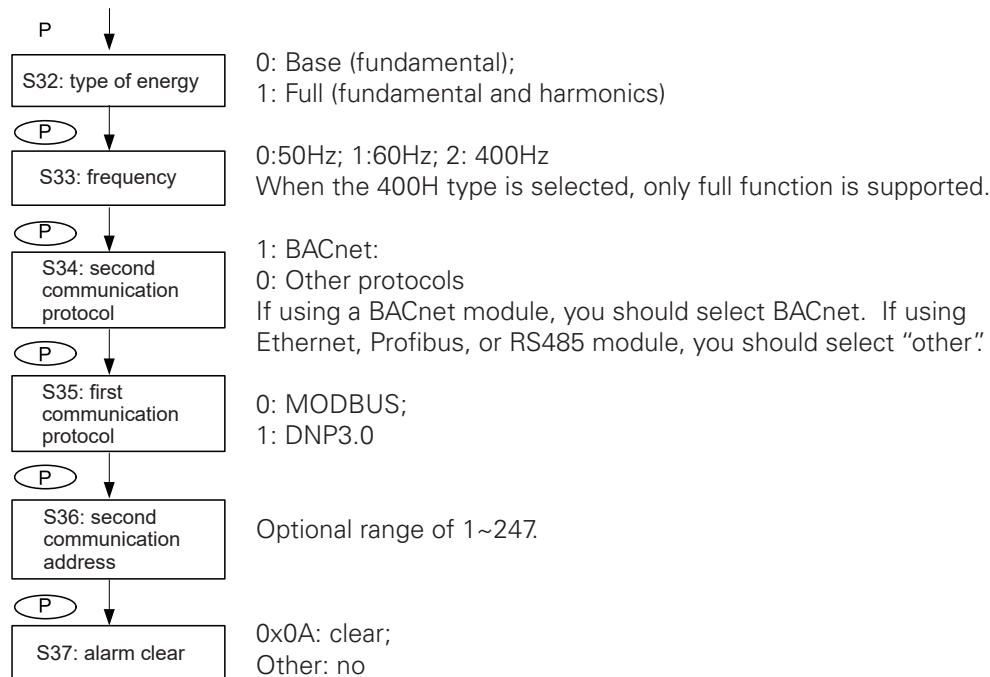


Figure 39. System Parameter Setting Sequence (continued).



3. Meter Display and Parameter Settings

Figure 39. System Parameter Setting Sequence (continued).



Note: The figure shows the sequence for using the P key. If using the E key to change the page, the sequence will reverse.

D. Expanded I/O Module Parameter

In the expanded I/O module parameter mode, the user can choose to view the available modules that are attached to the meter and modify their parameters. If no expanded I/O modules are connected, the screen will display "NO IO". To return to system parameter setting mode main menu, press H (no other keys have functionality on this screen).

Key functions for I/O module selection:

Press H to return to parameter selection mode.

If more than one module is connected, pressing P moves the cursor downwards. The cursor will return to the top after it reaches the bottom. Pressing E will move the cursor back upwards.

Press V/A to select the module and enter the I/O module parameter setting mode.

Key functions for setting the I/O module parameter:

Press H to return to I/O module selection mode.

Pressing P will take the user to the next screen in the sequence.

Pressing E will take the user to the previous screen in the sequence. Press V/A to modify the selected parameter

Key functions for modifying the parameter:

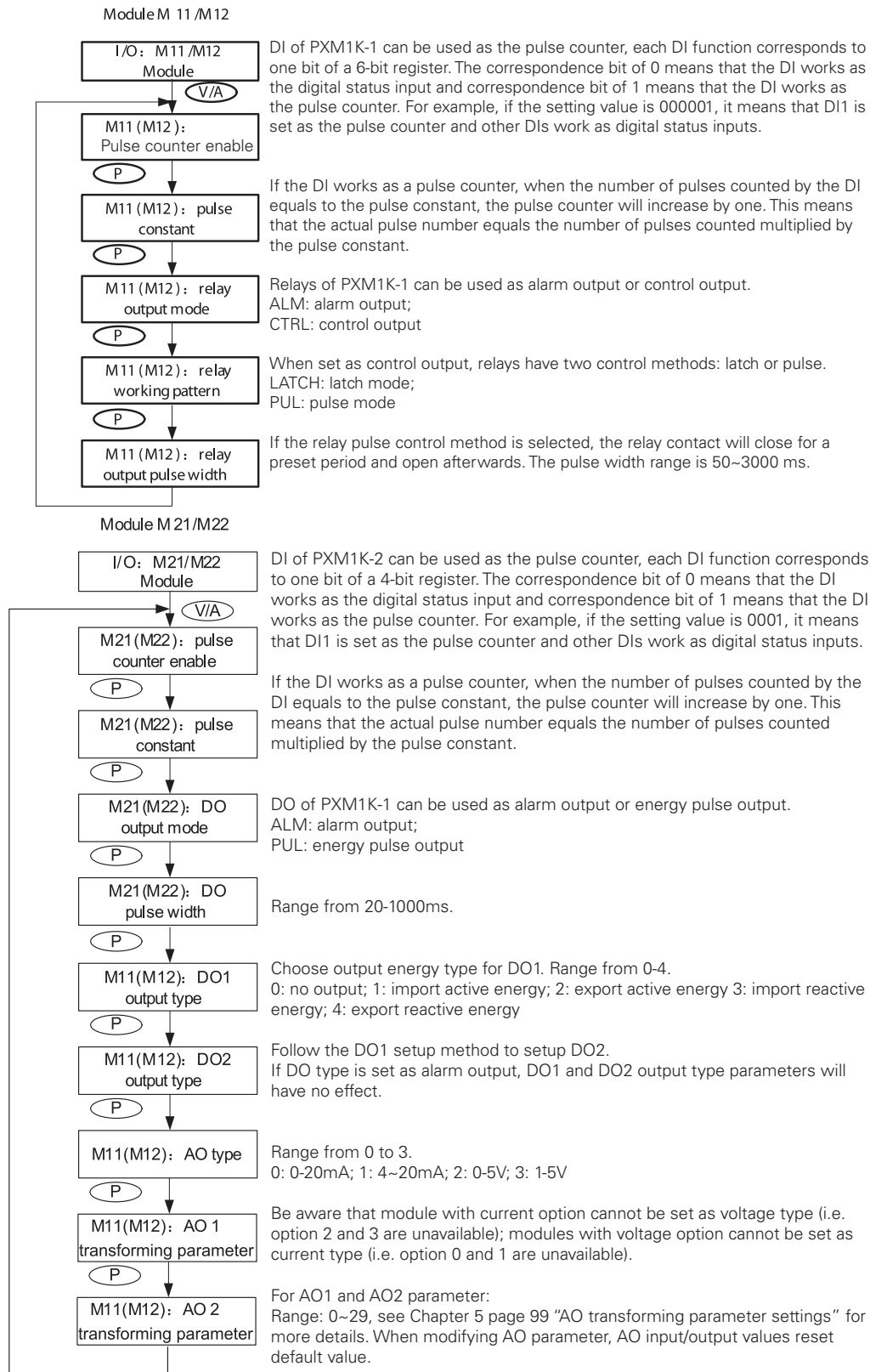
Press H to move the flashing cursor to the next position.

Press P to increase the number by 1.

Press E to decrease the number by 1.

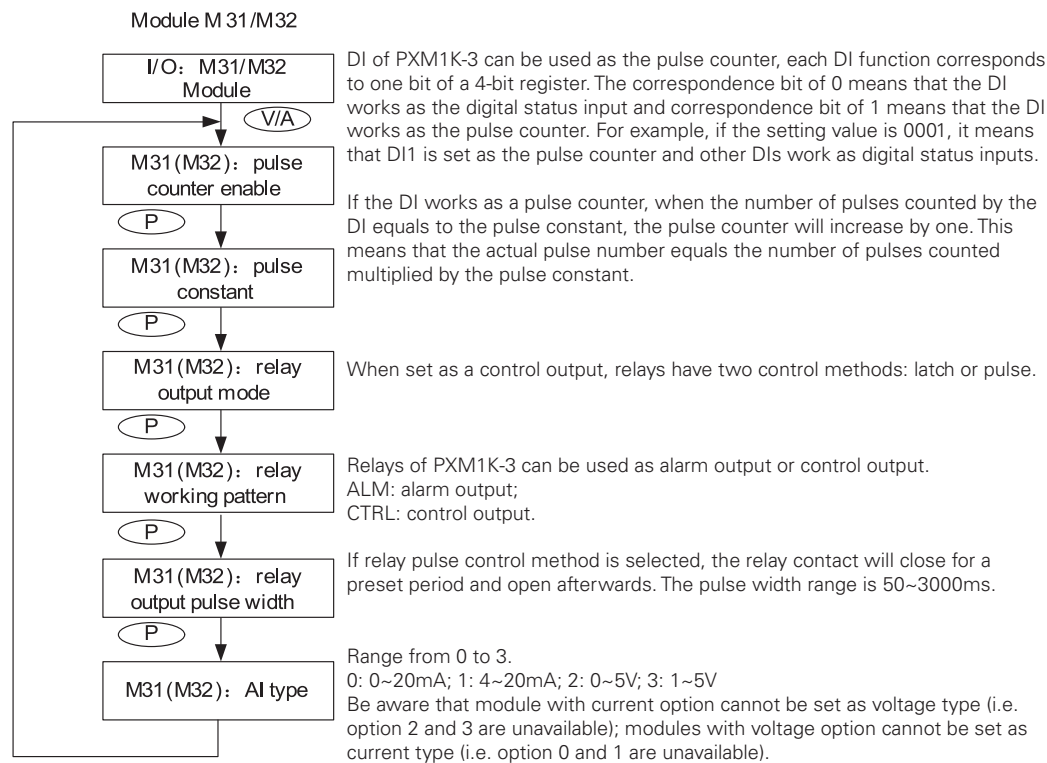
Press V/A to confirm the modification and return to parameter selection mode.

Table 3 shows the sequence:

Table 3. Expanded I/O Module Parameter Sequence.

3. Meter Display and Parameter Settings

Table 3. Expanded I/O Module Parameter Sequence (continued).



Note: Table 3 shows the sequence for using the P key. If using the E key to change, the sequence will be reversed.

E. BACnet and Ethernet Module Parameter

When the second communication protocol is set to BACnet, BACnet parameters are shown once a module is detected. If meter does not detect any modules, the display will show “LOADING” page. Each parameter can be selected for modification. These settings will only be saved if a BACnet module is connected. They will be discarded otherwise.

When second communication protocol is “Other Protocol,” there are parameters displayed that are related to the Ethernet. As described above, settings are only saved if the appropriate module is connected.

Key functions for finding the Ethernet module parameter:

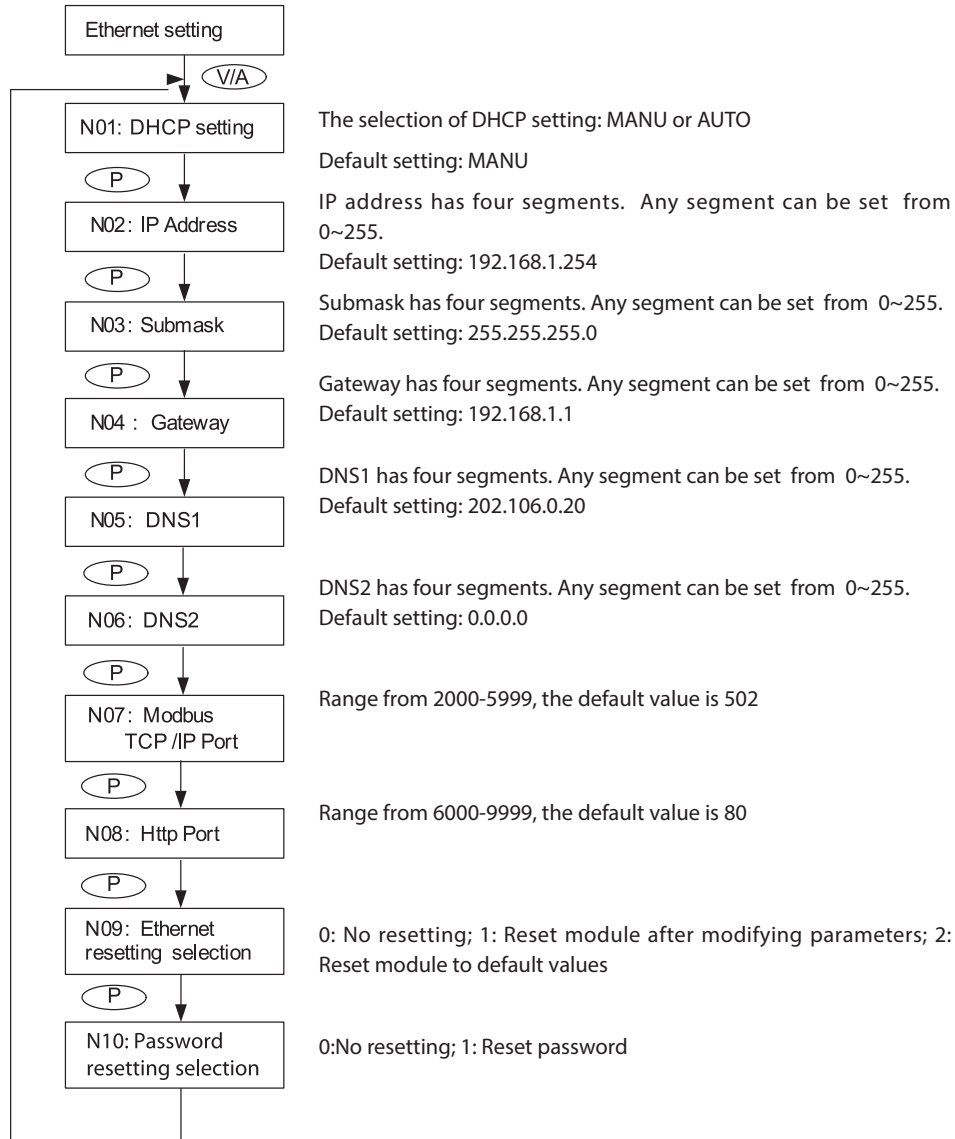
- Press H to return to parameter selection mode.
- Pressing P will take the user to the next screen in the sequence.
- Pressing E will take the user to the previous screen in the sequence.
- Press V/A to modify the selected parameter.

Key functions for modifying the parameter:

- Press H to move the flashing cursor to the next position.
- Pressing P will take the user to the next parameter in the sequence.
- Pressing E will take the user to the previous parameter in the sequence.
- Press V/A to confirm the modification and return to parameter selection mode.

Figure 40 shows the sequence of Ethernet module.

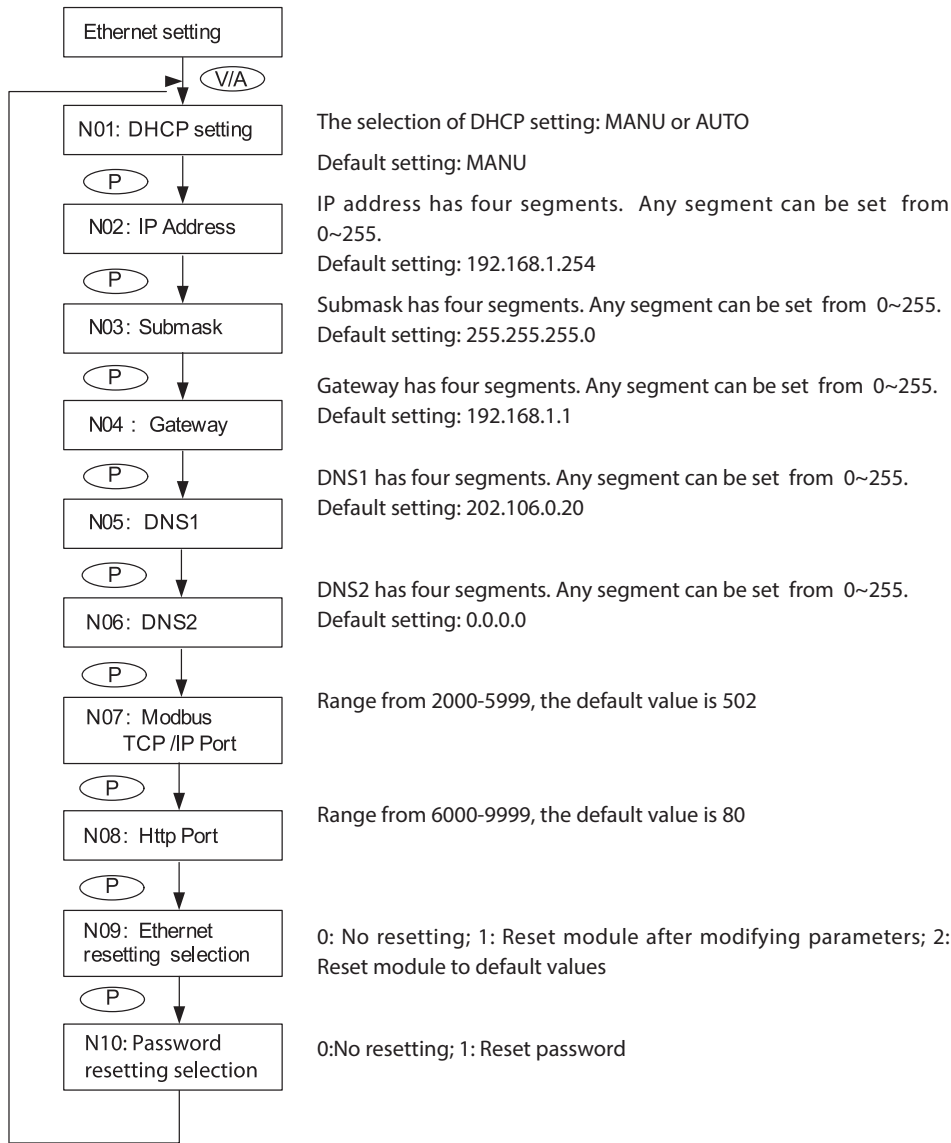
Figure 40. System Parameter Setting Sequence.



3. Meter Display and Parameter Settings

Note: Figure 41 shows the sequence for using key P. If using E key to change the page, the sequence will be reversed.

Figure 41. BACnet IP Module Rolling Sequence.



F. Alarm Parameter

In the alarm parameter mode, the user can view and modify the parameters.

Key functions for finding the alarm parameter:

Press H to return to parameter selection mode.

Pressing P will take the user to the next page in the sequence.

Pressing E will take the user to the previous page in the sequence.

Press V/A to modify the selected parameter.

Key functions for modifying the parameter:

Press H to move the flashing cursor to the next position.

Press P to increase the number by one.

Press E to decrease the number by one.

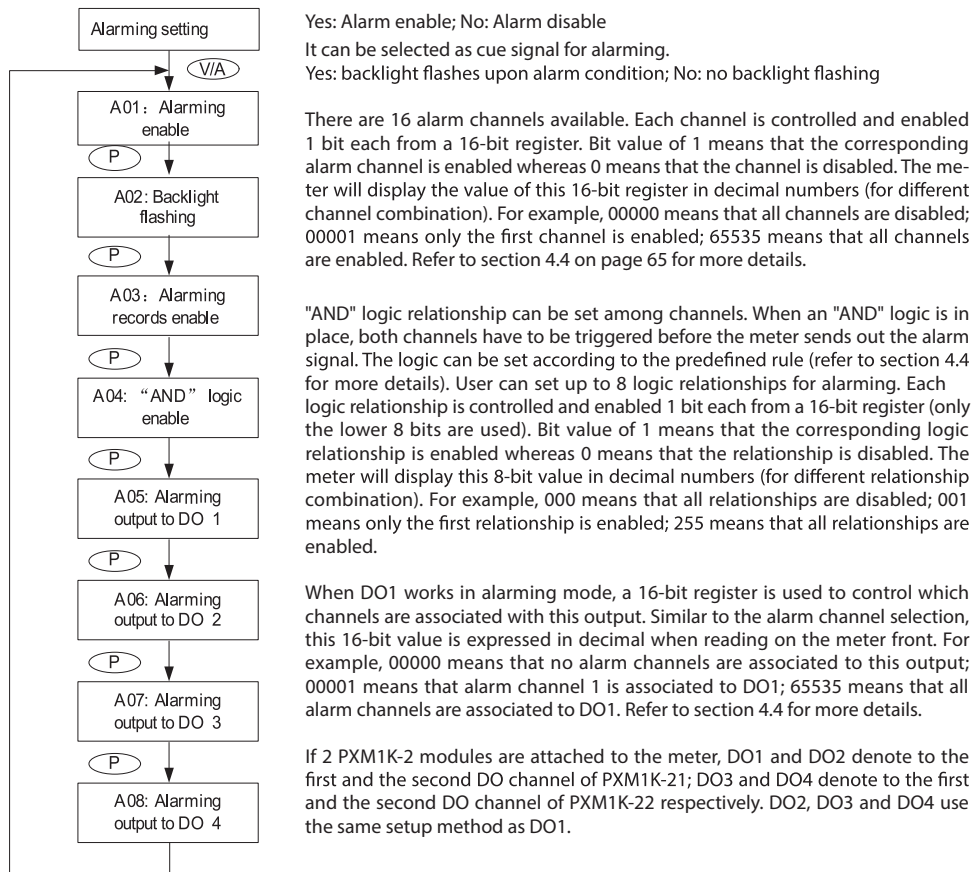
Press V/A to confirm the modification and return to parameter selection mode.

Figure 40 shows the sequence:

Note: The figure shows the scrolling sequence for using key P. If using E for scrolling the page, the sequence will reverse.

3. Meter Display and Parameter Settings

Figure 42. Alarm Parameter Rolling Sequence.



3.8 Page Recovery Function

The PXM 1000 meter has a page recovery function. This means that the meter stores the current display page in the non-volatile memory upon power loss and reloads the page when power recovers. If power is lost while in parameter setting mode, the meter will show voltage display when power recovers. If power is lost while in expanded I/O module data mode, but this module is no longer connected when power is recovered, the meter will return to the voltage display page instead.

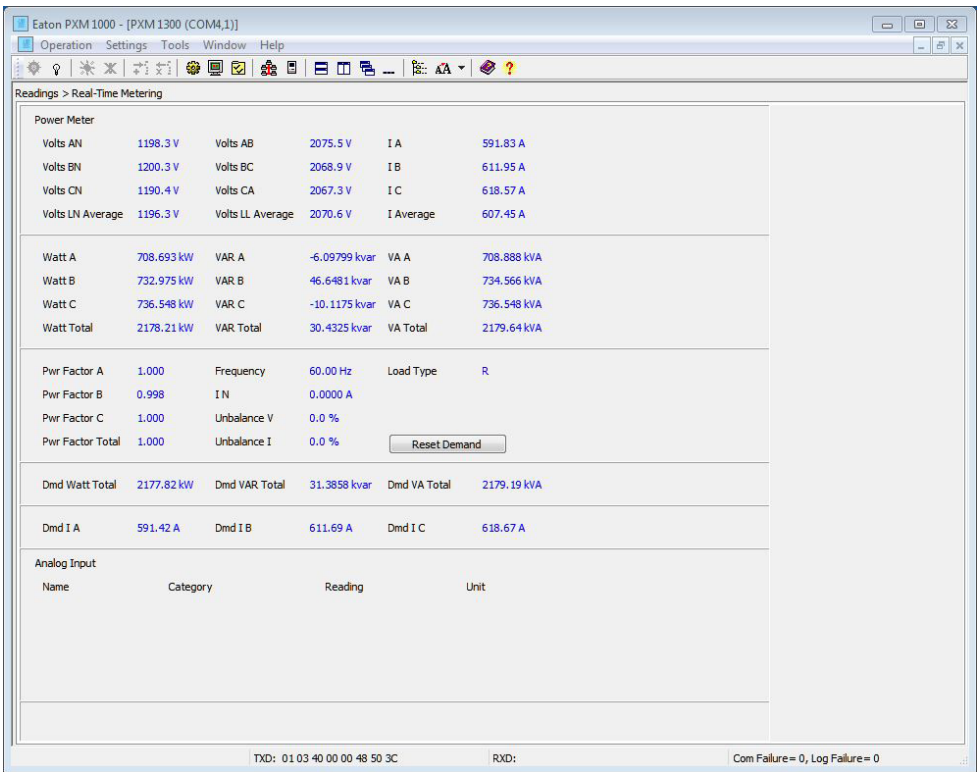
4. Detailed Functions and Software

The PXM 1000 meter contains advanced metering tools and is able to measure a multitude of power, energy, and power quality parameters. Some advanced functions may not be accessible directly from the front of the meter; therefore, every meter comes with a software that helps access the information. This chapter introduces these functions and the software.

4.1. Basic Analog Measurements

The PXM 1000 meter can measure voltage, current, power, frequency, power factor, demand, etc., with high accuracy via the software shown below.

Figure 43. Real-time Metering.



Demand:

This meter has the capability to calculate several types of demand: total active power demand, total reactive power demand, total apparent power demand, phase A current demand, phase B current demand, and phase C current demand. When demand is reset, demand memory registers are set as 0.

The user can configure the demand calculation mode to sliding window or thermal. Figure 49 shows how it works.

When using the sliding window interval mode, the user defines an interval between 1 and 30 minutes (which is the period of calculation). The demand is updated once a minute as the window slides.

Thermal demand mode calculates the demand based on a thermal response (mimicking a thermal demand meter). The user defines the period for the calculation and the demand is updated at the end of each period.

4. Detailed Functions and Software

Energy:

This meter measures and accumulates energy in different directions (import and export). For real-time energy monitoring, it accumulates energy in kWh, kvarh, and kVAh continuous (since its last reset).

Calculation Mode

- 1. The user can select different energy calculation, fundamental-based (not applicable to PXM 1100/1200/1300) or true RMS based. This selection can be made from the front of the meter or via communication. Fundamental-based calculations are used to accumulate energy without taking harmonics into consideration while true RMS based calculations are used to accumulate energy including fundamental and harmonics.

Note: When fundamental-based calculation mode is selected, PF calculation will be based on the fundamental wave.

Note: When 400 Hz is the selected type, only true RMS calculations are supported.

- 2. There are two ways to calculate reactive energy (power):

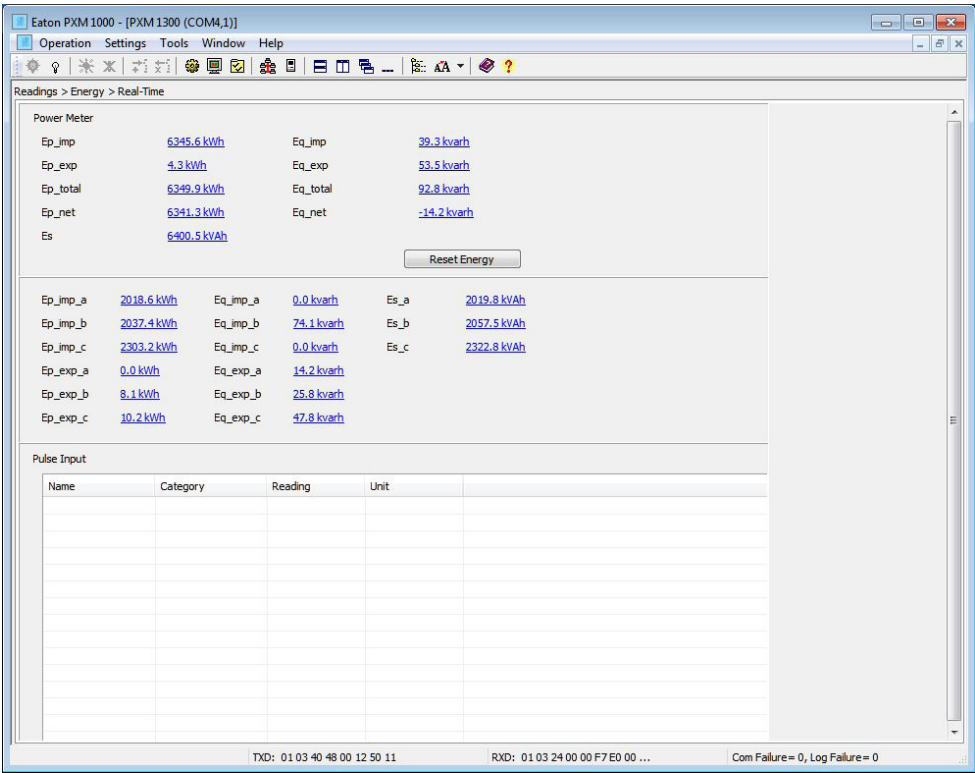
Mode 0: Real reactive energy $Q = \sqrt{S^2 - P^2 - D^2}$

Mode 1: General reactive energy $Q = \sqrt{S^2 - P^2}$

- 3. The user can choose primary energy or secondary energy, either by pressing keys on the front of the meter or via communication as shown in Figure 49.

Note: PXM 1100/1200/1300 is able to display either primary energy or secondary energy on the LCD screen. However, it is only able to send out pulses based on secondary energy via the PXM1K-2 module.

Figure 44. Energy and Power Quality Parameters.



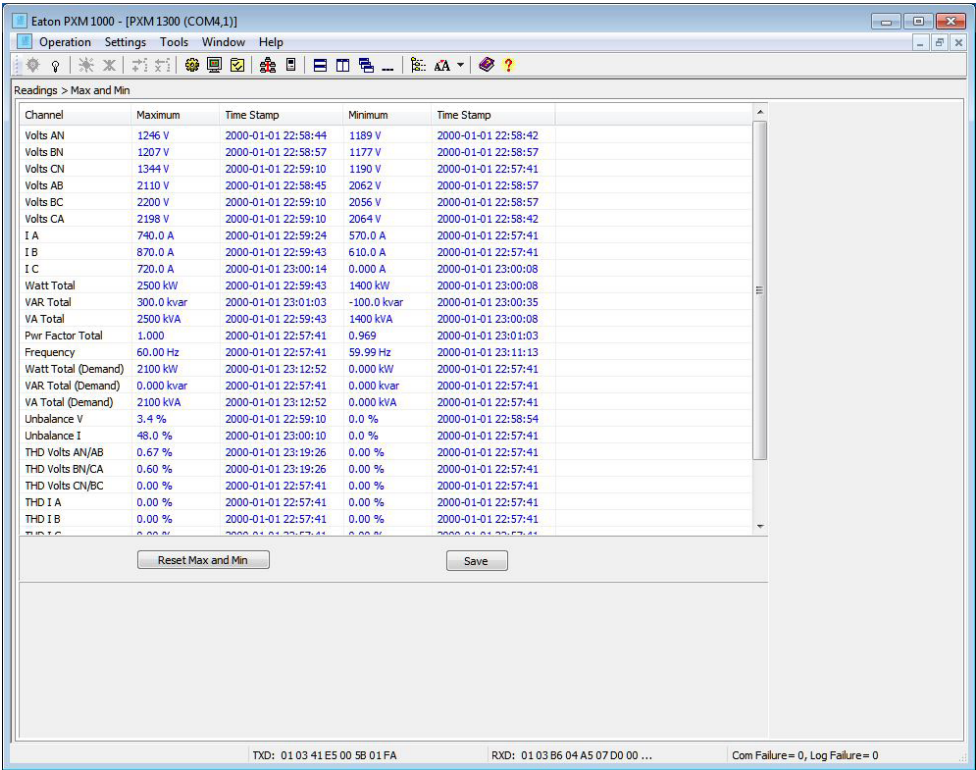
Current Direction Adjustment:

Under normal circumstances, current flows from input terminal 1 to terminal 2 (i.e. from I11 to I12 for phase A current). However, current may flow in the opposite direction due to incorrect wiring. In this scenario, users may reverse the polarity of the current by 180 degrees by setting the current direction to “negative.” By default, the current direction is set as “positive.” Refer to Figure 49 for more details.

4.2 Max/Min

The PXM 1000 meter logs maximum and minimum value statistics for phase/line voltages, current, power, reactive power, apparent power, power factor, frequency, demand, unbalance factor, and THD as well as the time they occur. All data is stored in non-volatile memory so that max/min information can be preserved even when the meter is powered off. All maximum and minimum data can be accessed via communication or from the front of the meter, but time stamps can only be accessed via communication. Max/min can be cleared either via communication or from the front of the meter.

Figure 45. Max/Min.



4. Detailed Functions and Software

4.3 Harmonics and Power Quality Analysis

1. Harmonics:

The PXM 1000 meter can measure and analyze THD, calculate 2nd to 63rd order harmonics, even HD, odd HD, crest factor, THFF, K factor etc. They are shown in Figure 44.

Note: When 400 Hz type is selected, only 2nd~15th harmonics are supported.

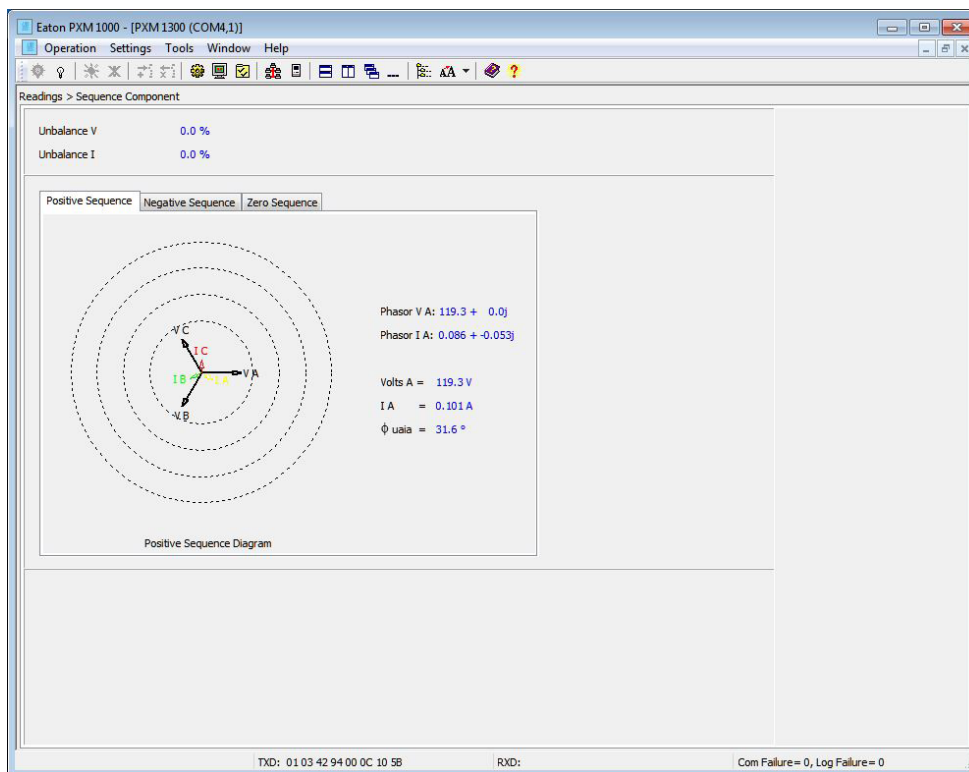
2. Phase Angle:

The term “phase angle” refers to angle of voltage/current parameters with respect to Phase A voltage. Angles ranges from 0 to 360 degrees. This function is to help users find the relationship between all input signals and avoid incorrect wiring. When the mode is set to “2 LL” or “3 LL” it gives the phase angles of u23, u31, i1, i2, i3 corresponding to u12. When it is set to “3 LN”, it gives the phase angles of u2, u3, i1, i2, and i3 corresponding to u1. When it is set to “1 LL” it gives the phase angles of u2, i1, i2, corresponding to u1. They are shown in Figure 46.

3. Sequence Component and Unbalance Analysis:

The PXM 1000 meter is able to perform sequence analysis on the input signal. It looks at the positive sequence, negative sequence, and zero sequence of the fundamental frequency and performs unbalance analysis for voltage and current. Sequence components are shown in Figure 46, unbalance of voltage and current are shown in Figure 43.

Figure 46. Sequence Component and Phase Angle.

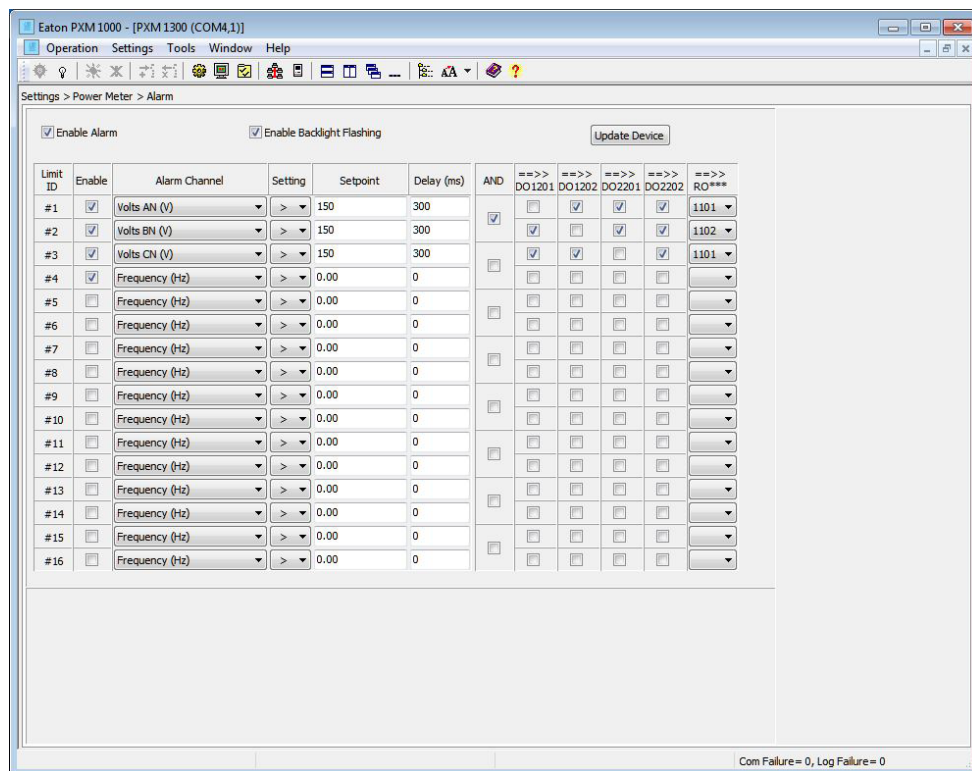


4.4 Out-of-limits Alarms

The PXM 1000 meter has configurable alarms for out-of-limits conditions. The alarm is triggered when the monitored parameter exceeds the set limit for some duration (delay, given in ms). The event is recorded in the alarms log with the parameter value and time stamp. The meter stores up to 16 triggers. When extended I/O modules are used, alarms can be used to trigger digital outputs (DO) and relay outputs (RO) in order to activate downstream devices such as a beacon light or a buzzer.

Before alarms can be used, alarm conditions such as logic dependency, target setpoint, time delay, etc., must be set correctly. Settings can be accessed and modified from the software via communication connection as shown in Figure 47.

Figure 47. Alarm Setting.



1. Single Alarms Settings Groups:

Table 4 indicates the first group of settings. There are 16 groups in total with the same format.

Table 4. First Group of Alarming Settings.

Address	Parameter	Range	Property
104eH	First group: parameter code	0-50	R/W
104fH	First group: comparison mode	1: larger, 2:equal, 3:smaller	R/W
1050H	First group: setpoint value	Related with parameters	R/W
1051H	First group: delay time	0-3000(*10ms)	R/W
1052H	First group: output to relay	0: none, 1-8: related relay	R/W

4. Detailed Functions and Software

Parameter code: select the target parameter for alarm monitoring. For example: 0-frequency, 44-AI4 sampling data.

Comparison mode: set alarm condition 1: greater than, 2: equal to, 3: less than. For example, if you choose the target parameter to be "frequency", condition to be "greater than" and setpoint to be "50", an alarm will be triggered when the frequency is greater than 50 Hz.

Note: Setpoint value is the same as the actual value of the selected parameter.

Delay time: If the alarm condition lasts for the configured time period, the alarm signal will be triggered. The delay range is from 0 to 3000 (unit: 10 ms). When it is set to 0, there is no delay. An alarm will be triggered as soon as the alarm condition is met. If it is set to 20, there will be a 200 ms (20 x 10 ms) delay.

Output to relay: 0-alarm signal will not be sent to RO. If it is set as 1 and PXM1K-11 is connected, it will output to RO1 when the alarm is triggered. RO1 will be turned off when the alarm output to RO1 is cleared. Relays RO2 - RO8 work in the same way.

Note: If an alarm is sent to RO, it can only work in "latch" mode.

Note: If the parameter code is set with a value between 51 and 79, please refer to Chapter 6 for detailed description of parameter and usage.

In addition to configuring an individual alarm, users must also configure global alarm settings in order to use alarms

2. Global Settings:

Register addresses for global alarm settings are from 1046H~104dH.

"Global alarming enable" enables alarms across the meter. Alarms are enabled when this register is set to 1, and disabled when set to 0.

Setting "Alarming flash enable" to 1 will cause the backlight to flash when an alarm is triggered.

The "Alarming channel enable setting" is a 16-bit register that controls the different alarm groups. There are a total of 16 groups, each is controlled by one bit of the register. An alarm channel is activated when the corresponding bit is set to 1.

Logical AND between pairs of alarm triggers: The 16 alarm triggers can be considered in 8 pairs (with two alarm groups in each). If the logical AND check box is selected, the two triggering conditions are considered together. An alarm will only occur if both conditions are met. If the logical AND check box for a pair remains unchecked, the two alarm channels will work independently.

The 8 "AND" logic pairs are arranged as follows: 1st, 2nd channel form Pair 1; 3rd, 4th channel form Pair 2; 5th, 6th channel form Pair 3; 7th, 8th channel form Pair 4; 9th, 10th channel form Pair 5; 11th, 12th channel form Pair 6; 13th, 14th channel form Pair 7; 15th, 16th channel form Pair 8.

This functionality is controlled by the lower 8 bits of this 16-bit register with each bit corresponding to a pair. "1" means this function is enabled and "0" means disabled.

"Alarm output to DO1 setting": "Digital output mode" allows DO1 to be used as an alarming output. This is controlled by a 16 bit register. Each bit in the register corresponds to one of the 16 groups. When the appropriate I/O module is connected and alarms are enabled, the corresponding bit will be set to 1. When the alarm is triggered, the signal will be sent to DO1 until the alarm is cleared. Setting the corresponding bit to 0 disables this functionality. Outputs DO2-DO4 work the same way.

3. Setting Example:

Here is an example showing how to apply the logic “AND” function for a pair of alarm channels.

The conditions are as follows: I1 greater than 180 A, delay 5s for the 1st alarm channel; U1 less than 9,980 V, delay 10 s for the 2nd alarm channel. No alarm signals will be sent to outputs. The CT has a primary value of I1 is 200 A, and CT2 is 5 A. The PT ratio for U1 is 10000:100. The following shows how all the related registers are to be set.

Table 5. Register Settings.

Trigger Threshold	I1 (current)	Greater than 180 A	Delay 5s for the 1st alarm channel	Output none
	U1 (voltage)	Less than 9,980 V	Delay 10 s for the 2nd alarm channel	Output none
CT Primary	CT1	200A		
CT Secondary	CT2	5A		
PT Primary	PT1	10000		
PT Secondary	PT2	100		
Secondary Value	Rx			

Settings of first group:

- “Parameter code (104eH)” is set to 9, which represents I1.
- “Comparison mode (104fH)” is set to 1, which represents “greater than”.
- “Setpoint value (1050H)” is set to 4500 since the 4.5 is represented as an integer . $Rx = (I/(CT1/CT2)) * 1000$.
- “Delay time (1051H)” is set to 500, so the actual delay time is $500 * 10 \text{ ms} = 5 \text{ s}$.
- “Output to relay (1052H)” is set to 0, because there is no output to RO.

Settings of second group:

- “Parameter code (1053H)” is set to 1, which represents U1.
- “Comparison mode (1054H)” is set to 3, which represents “smaller than”.
- “Setpoint value (1055H)” is set to 998, since the 9980 is represented as an integer . $Rx = (U/(PT1/PT2)) * 10$.
- “Delay time (1056H)” is set to 1000, so the actual delay time is $1000 * 10 \text{ ms} = 10 \text{ s}$.
- “Output to relay (1057H)” is set to 0, because there is no output to RO.

Global settings:

- “Alarming channel enable setting (1048H)” set to 0003H to enable the first and the second channel.
- “Logic “AND” between alarming setting (1049H)” set to 0001H to enable logic “AND” in Pair 1.
- “Alarming output to DO1 setting (104aH)” set to 0, since no output to DO1.
- “Alarming output to DO2 setting (104bH)” set to 0.
- “Alarming output to DO3 setting (104cH)” set to 0.
- “Alarming output to DO4 setting (104dH)” set to 0.
- “Alarming flash enable (1047H)” set to 0 to disable backlight flashing when alarming occurs.
- “Global alarming enable (1046H)” set to 1 to enable over/under limit alarming.

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4. Records of Alarming Event:

The PXM 1000 meter has built in alarm logging capabilities. A total of 16 entries can be recorded. The record sequence of these entries does not depend on the sequence of the 16 alarm channels. The meter begins logging alarm status starting from the first record location to the last one. Alarm logs are recorded in a “FIFO” fashion which means the latest event will overwrite the oldest record. When out-of-limit parameters return to normal, its value and time stamp will be recorded as well. Therefore, users can determine the out-of-limit duration by checking the time difference.

Table 6 shows the first group of records. Other groups of records have the same format.

Table 6. Alarming Status of the 1st Group of Records.

Address	Parameter	Range
42a9H	First group: alarming status	0~65535
42aaH	First group: parameter code	0~79
42abH	First group: over/under limit or reset value	Related with parameters
42acH~42b2H	First group: occur time: yyyy:mm:dd:hh:mm:ss:ms	Time

“Alarm status” indicates information of the current alarm status. It is a 16-bit unsigned integer. The Parameter code is stored in the higher 8 bits. Bit1 indicates whether logic “AND” is enabled or not. 1 means enabled and 0 means not enabled. Bit0 indicates whether the alarm has occurred or recovered. 1 means occurred and 0 means recovered. Undefined bits are 0.

“Parameter code” specifies the monitored parameter.

“Value” shows the recorded value of the selected parameter when an alarm is triggered and when it recovers.

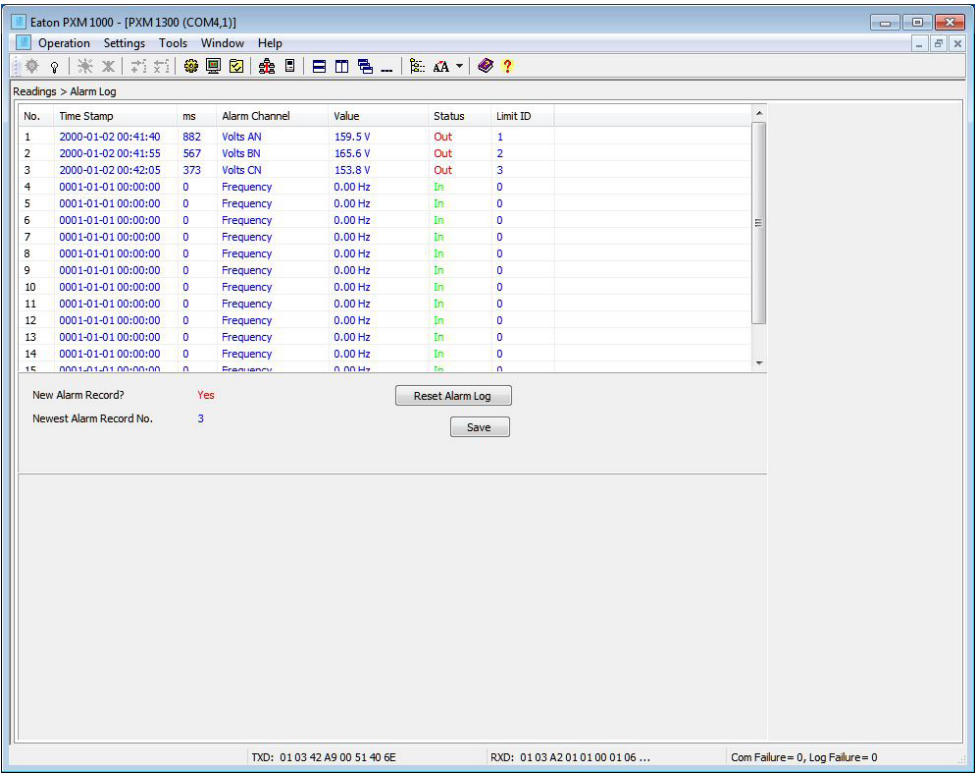
“Time” indicates the time stamp with the precision in milliseconds (ms).

An alarm event will set bit0 of the “system status (102eH)” to be 1. When the software sends clear alarm command, bit0 of “system status (102eH)” will be set to 0.

Alarm group number (1032H): the range is 0~16, 0 is no alarm record, and 1~16 identify the records from newest alarm to oldest. The alarm group number can be saved during meter power off.

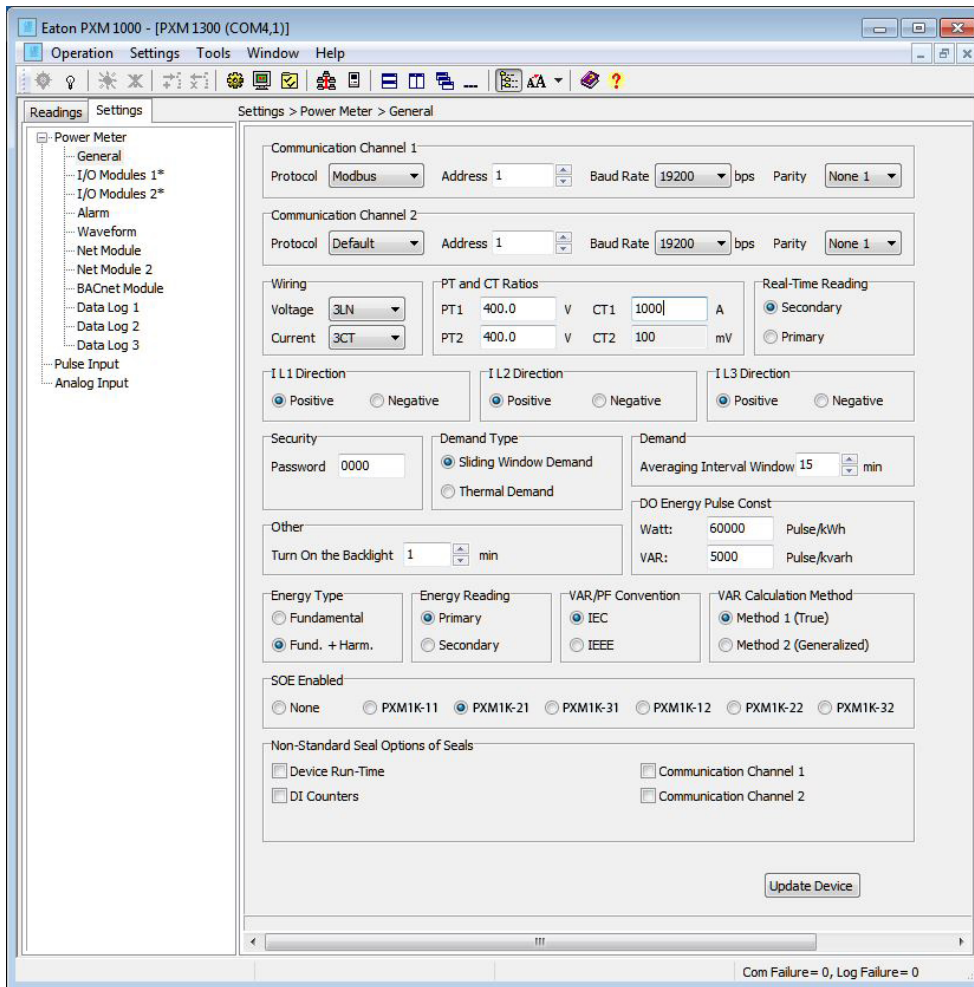
Here is an example:

Figure 48. Alarming Records.



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Figure 49. Basic Settings.



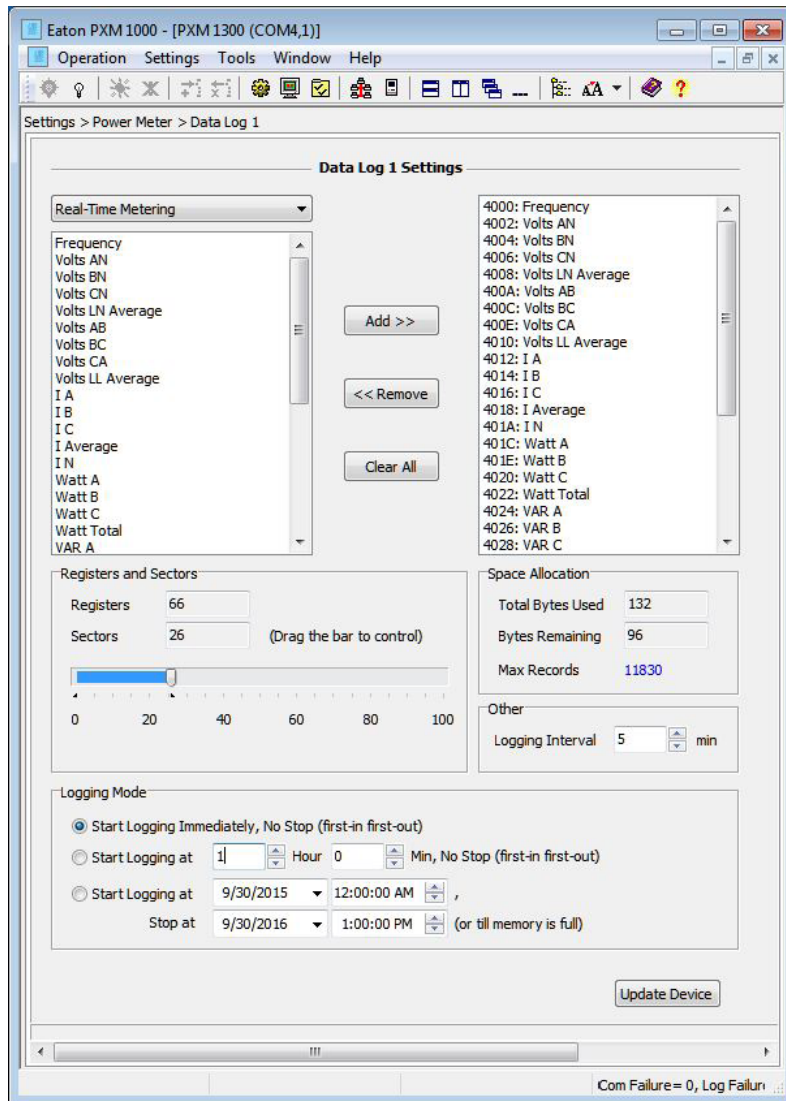
4.5 Data Logging

The PXM 1100/1200/1300 meters provide data logging that records the data at a set interval. This meter has four megabytes of memory which gives it extensive data-logging capabilities. It has a real-time clock that allows logs to be time-stamped when log events are created.

1. Data Log Settings:

The PXM 1100/1200/1300 meters have three sets of historical data logs. Each log can be independently programmed with individual settings, meaning that each can be used to monitor different parameters. The user can program up to 117 parameters per log. The user also has the ability to allocate available system resources among the three logs, to increase or decrease the size of the individual historical logs. The total size is no more than 63 sectors that have 64 k-bytes. The data log 1 setting is shown in Figure 50.

Figure 50. Data Log 1 Setting.



Having three sets of historical logs provides the user with the option of programming each log with unique parameters. For example, you can program historical log 1 to record measured values parameters (for example, frequency, voltage, current), log 2 to record energy values parameters, and log 3 to record power quality parameters. Historical log parameters can be selected from the following 13 groups:

- Real-Time Metering (Frequency; Instantaneous Voltage; Instantaneous Current; Total and Per Phase Power and Power Factor; Neutral Current ; Unbalance V/I; load type; Current demand; and Per Phase/Total Power demand)
- Energy (Ep_imp; Ep_exp; Ep_total; Ep_net; Eq_imp; Eq_exp; Eq_total; Eq_net; Es; Epa_imp; Epa_exp; Epb_imp; Epb_exp; Epc_imp; Epc_exp; Eqa_imp; Eqa_exp; Eqb_imp; Eqb_exp; Eqc_imp; Eqc_exp; Esa; Esb; Esc).
- THD Volts AN/AB (THD, 2nd -63rd Harmonic Magnitudes, ODD, EVEN, CF and THFF of Volts AN/AB).
- THD Volts BN/BC (THD, 2nd -63rd Harmonic Magnitudes, ODD, EVEN, CF and THFF of Volts BN/BC).

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- THD Volts CN/CA (THD, Average THD, 2nd-63rd Harmonic Magnitudes, ODD, EVEN, CF and THFF of Volts CN/CA).
- THD IA (THD, 2nd -63rd Harmonic Magnitudes, ODD, EVEN, KF of IA).
- THD IB (THD, 2nd -63rd Harmonic Magnitudes, ODD, EVEN, KF of IB).
- THD IC (THD, average THD, 2nd -63rd Harmonic Magnitudes, ODD, EVEN, KF of IC).
- Sequence Component (positive, negative, and zero sequence).
- Phase Angles(the angle between U1 and other voltage and current parameters).
- DI Counter (the DI numbers of the IO modules).
- AO/AI Raw Value (the AO output register values and the AI sample register values).
- AO/AI Value(the AO output values and the AI sample values)

The following procedures show how to select and store parameters in historical log 1. The Group field determines the items that are available for selection.

1. Select a Group. The possible selections are: Real-Time Metering, Energy, THD Volts AN/AB, THD Volts BN/BC , THD Volts CN/CA , THD IA , THD IB , THD IC, Sequence Component, Phase Angles, DI Counter, AO/AI Raw Value, and AO/AI Value.
2. Select items for your log:
 - A. Highlight the parameter(s) you want to log into the meter's memory.
 - B. Click Add to add the parameter to the Selected Parameter Area.
 - C. To remove parameter(s), highlight them in the Selected Parameter Area and click Remove.
3. Set the logging interval (in minutes). Interval can be set from 0 - 1444 minutes according to different applications.

The logging interval determines when the meter takes a snapshot. When the interval is set as 0, the set of historical data log is disabled.
4. There are 100 sectors in total for the 3 historical data logs. The user can assign a different sector size to each log according to different applications (as long as the total sector sizes of the 3 logs do not exceed 100).
5. Three Modes of historical log:

Mode 1: The historical log can record, even if date and time are not set. The log is first-in first-out, so earlier entries are replaced as the log fills.

Mode 2: With date and time set, the historical log can record for the duration. Recording will stop once the buffer fills.

Mode 3: With the hour and minute set, the historical log can record, starting at that set time. This log is also first-in first-out.

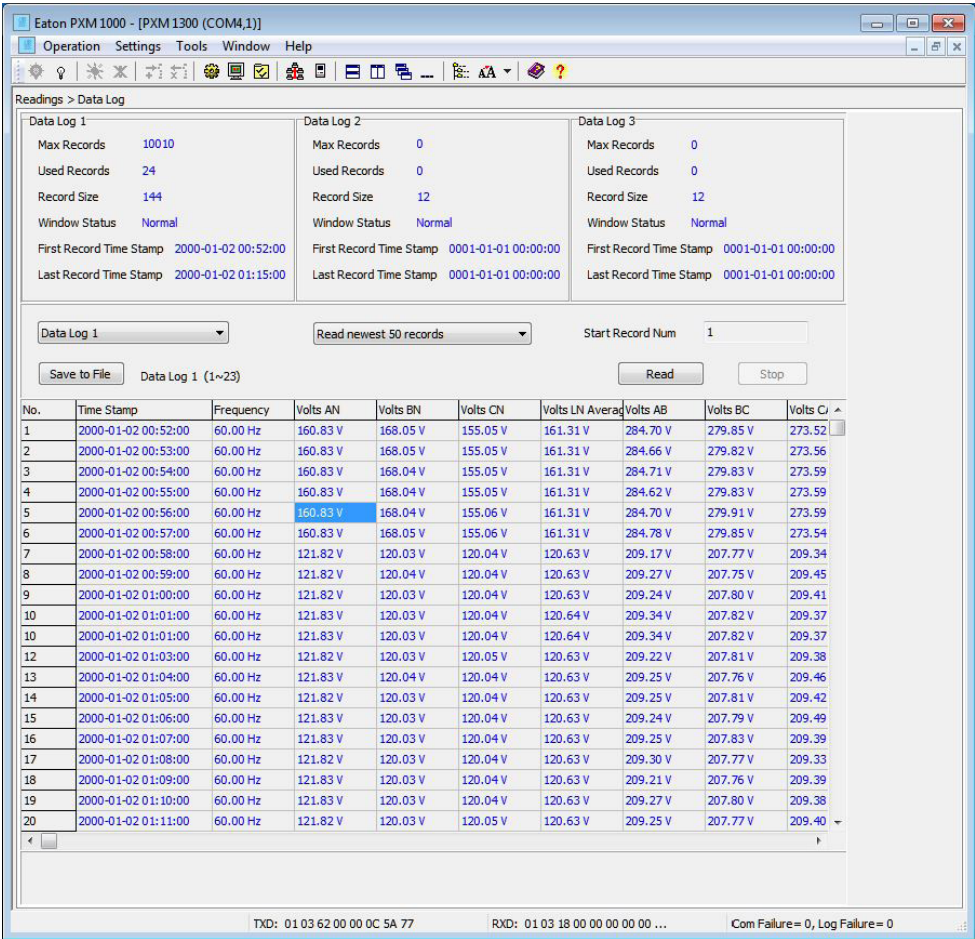
Note: If the memory of the historical data log is full, the meter will erase the first sector in which the memory size is 65536 bytes (64kb). The following sector (the second sector) will become the first sector and the data from the erased sector will not be recoverable. Therefore, the user should save the whole log before memory is full to maintain all the data.

Note: There are two display fields at the bottom of the data log setting screen. They show the registers in the logs, the total bytes used, and the bytes remaining for this historical log. These fields are updated as you make selections on the screen. The total number of bytes available per log record is approximately 234.

2. Retrieving Logs:

There are two ways of retrieving the logs: “read one window” and “read all.” The retrieval screen is shown in Figure 51.

Figure 51. Retrieval Screen.



The “read one window” method allows the user to access and read a specific log location at an offset from the first log. The “window record num” is the maximum number of record entries the software can read at a time. It is calculated by:

$$246 / \text{record size.}$$

The larger this number is, the faster data can be retrieved. “Log type” is used to retrieve the logs the user wants to retrieve. For example, log type 0 is data logging 1, log type 1 is data logging 2, and log type 2 is data logging 3.

The “read all” method accesses and reads the historical data log automatically. The offset increases automatically until all the logs are retrieved.

The data logs contents are shown on the bottom section of the screen.

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4.6 Time of Use (TOU)

The user can assign up to four different tariffs (sharp, peak, valley, and normal) to different time periods within a day depending on the billing requirements. The meter will calculate and accumulate energy to different tariffs according to the meter's internal clock timing and TOU settings.

The user can set a maximum of 12 TOU seasons. Each season can be assigned to a TOU schedule (a maximum of 14 TOU schedules are available). Each schedule can be divided up into 14 segments (in which each segment can have its own tariff). The user can customize the TOU calendar (including its tariffs, seasons, schedules, and segments) according to different applications. To make sure that the TOU calendar is setup correctly, the meter will check the TOU settings according to the predefined rules (see below for "TOU Setting Format Requirements" for details). The TOU function will be disabled if the TOU calendar is configured incorrectly. If no errors are found in the calendar and the TOU function is enabled, TOU energy accumulation will begin.

TOU Setting Format Requirements:

1. Season setting parameter: The calendar year will be divided into different seasons depending on the season setting parameter. The parameter can be selected from any integer between 1 and 12. The user must enter the correct value for the season setting parameter in accordance with the TOU season table. If the season setting parameter is set as 2, the first 2 slots of the TOU season table must be set. Otherwise it will be considered as an invalid input (TOU function will be disabled).
2. TOU season format: Enter the start date into the TOU season table slot following this format "MM-DD ID" (MM stands for the month; DD stands for the day; and ID stands for the TOU schedule ID [available from 01 to 14]). The dates should be organized so that they are in sequence according to the calendar year (the earlier date comes first and the later date comes last). For example, if 3 seasons are selected, the date parameters are January 1, June 6, and September 7, and TOU schedule 02, 01, 03 will be used. The first TOU season table slot will enter 01-01 02, the second slot will enter 06-06 01, and the third slot will enter 09-07 03. Entering 01-01 02 for the first slot, 09-07 03 for the second slot, and 06-06 01 for the third slot is considered invalid.
3. Schedule setting parameter: The number of available TOU schedules depends on the schedule setting parameter. The parameter can be selected from any integer between 1 and 14. This parameter determines the number of TOU schedules available for the TOU calendar setting. A maximum of 14 TOU schedules (from TOU Schedule #1 to TOU Schedule #14) can be used.
4. Segment setting parameter: Each TOU schedule consists of various timing segments. The number of segments depends on the segment setting parameter configured. The parameter can be selected from any integer between 1 and 14 (inclusively). The user must enter the correct value for the segment setting parameter in accordance to the TOU schedule table. If the segment setting parameter is set as 3, the first 3 slots of the TOU schedule table must be set. Otherwise, it will be considered as an invalid input (TOU function will be disabled).
5. TOU schedule format: Each TOU schedule represents a 24 hour cycle. Similar to the TOU season format, enter the start time into the TOU schedule table slot following this format "HH:MM ID" (HH stands for hour [in 24 hr format]; MM stands for minutes; and ID stands for tariffs [available from 00 to 03]). The time should be organized according to the hour sequence. For example, if 3 segments are selected, timing parameters are 01:00, 15:30, 22:45, the order of the 3 segments should be one of the following: 01:00, 15:30, 22:45 or 15:30, 22:45, 01:00, or 22:45, 01:00, 15:30. Entering time information in a wrong sequence (for example, entering 15:30, 01:00, 22:45) is considered as an invalid operation and the TOU function will be disabled.
6. Tariff setting parameter: This parameter corresponds to the number of tariffs available for the TOU calendar and can be selected from any integer from 0 to 3. The four tariffs: sharp, peak, valley, and normal are represented by four integers: 0, 1, 2, and 3 respectively. If the tariff setting parameter is set to 3, all of the 4 tariffs will be available for the TOU calendar. If the parameter is set to 1, only the first 2 tariffs (sharp and peak) will be available.

7. Holiday setting parameter: This parameter can be set from any integer between 1 and 30, meaning a maximum of 30 holidays can be programmed to the TOU calendar. If the holiday setting parameter is set as 3, the first 3 slots of the holiday schedule must be set. Otherwise it will be considered as an invalid input (TOU function will be disabled).

Note: User can either customize the TOU calendar factory settings or use the default factory settings. The user can reset the TOU calendar to its default value either via communication or from the front of the meter.

8. Holiday schedule: The holiday schedule uses the same format as the TOU seasons "MM-DD ID". The user can select which TOU schedule to be used for the holiday. The dates of the holiday schedule do not need to be organized in a sequential order (i.e.: the first slot can be January 1, the second slot can be December 26 and the third slot can be December 25).
9. Daylight saving time (DST): Daylight saving time can be enabled in one of two formats: 1. the fixed date option, or 2. a fixed day of one of the weeks in the month (also named as the non-fixed date option). If the user choose a fixed date option for the DST switch, set the format according to a fixed date. The format is month / day / hour / minute / adjust time (in minutes). If the user selects the non-fixed date option, DST will be implemented by which day of which week. The format is month/which day (i. e. Tuesday)/which week (i. e. 1st week)/hour/minute/adjust time (in minutes)

By using this function, the user can cause the instrument to automatically switch to and from DST. When the clock starts to run to daylight saving time, the meter will automatically adjust the clock to a time period in advance. While the clock is running to the end of daylight saving time, the meter will automatically adjust the clock, pushing it back to a time period, as shown in Figure 52.

Figure 52. Daylight Saving Time Setting Interface.

Daylight Saving Time

☒ DST Enable DST Format: Format 1

Format 1

DST Start
 Apr 1 Day 12 Hour 25 Min Adjust Time 5 Minutes

DST Ending
 Jul 2 Day 0 Hour 12 Min Adjust Time 45 Minutes

Format 2

DST Start
 Mar 2nd Thu at 11:23 Adjust Time 2 Minutes

DST Ending
 Apr 2nd Sun at 23:35 Adjust Time 60 Minutes

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10. Ten-Year Holiday setting: Users can preset holidays of the next decade via the meter software. The holiday format is month/day/year; holiday code; holiday schedule. After the format setup, click on “Make Holiday Settings (10 year)”;
- then a holiday table for the next decade will be generated.

Holiday Auto Switch: When Ten-Year Holiday is enabled, if the current year of the meter falls into the Ten-Year Holiday setting, it automatically loads the Ten-Year Holiday settings into the current TOU settings. If the current year of the meter does not fall into the Ten-Year Holiday setting, it retains the current TOU settings.

Figure 53. Ten-Year Holiday Settings.

☒ Enable Holidays Years Settings

Start Year

2010

Ending Year

2019

1st Year Holidays

1	01-01 1	02-01 2	03-01 3	04-01 4	05-01 5	00-00 00	6
7	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	12
13	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	18
19	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	24
25	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	30

Settings Year

2010

Holiday Number

5

2nd Year Holidays

1	01-01 1	02-01 2	03-01 3	04-01 4	05-01 5	06-01 6	6
7	07-01 7	08-01 8	09-01 9	10-01 10	00-00 00	00-00 00	12
13	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	18
19	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	24
25	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	00-00 00	30

Settings Year

2011

Holiday Number

10

11. Weekend Schedule: Weekend Setting (bit0 : Sunday; bit1 ~ bit6: Monday to Saturday; bit 0 means not effective, bit 1 means effective). For example, when the Weekend Setting bit0 is 1, it means Sunday is effective. When the Weekend Setting bit1 is 1, it means Monday is effective. If a user wants to set Saturday and Sunday effective, he should put 65 (1000001) into the Weekend Setting field. When the meter clock is within the preset Weekend schedule, the energy will accumulate under the tariff that corresponds to the schedule.

Note: The Holiday schedule has the highest priority among all the schedules. Weekend schedule’s priority is followed by Holiday schedule. When Holiday schedule is not enabled, Weekend schedule has the highest priority, overriding the normal (weekday) schedule.

The PXM 1200 can record maximum power and current demand under different tariffs, as well as the time stamp of the maximum value. It can also clear the maximum demand under different tariffs.

Except normal energy parameter readings, the PXM 1200 has four separate logs: 1. Current Accumulation Month TOU; 2. Prior Accumulation Month TOU; 3. Current Month TOU; and 4. Prior Month TOU. When setup appropriately and when TOU is enabled, energy will be accumulated in a month-to-month basis. The current energy usage will be stored under Current Month TOU (or Current Accumulation Month TOU) and is divided up into different tariffs. When the next month (or counting period) starts, all Current Month TOU values will be moved to Prior Month TOU (or Prior Accumulation Month TOU).

There are two ways of automatic resetting of current month TOU.

1. End of Month: This is the default method. All values from Current Accumulation Month TOU will be copied over to Prior Accumulation Month TOU at the very beginning of each month (the first day of each month at time 00:00:00). Current Accumulation Month TOU will continue to accumulate. All values from Current Month TOU will be copied over to Prior Month TOU at the beginning of each month (the first day of each month at time 00:00:00) will be cleared and reset to 0.
2. Assigned Clock: The user can select when the values from Current Accumulation Month TOU or Current Month TOU would be copied over to Prior Accumulation Month TOU or Prior Month TOU. The user can set the time in the following format: "DD HH:MM:SS": DD stands for day; HH stands for hour; MM stands for minute; and SS stands for second. Similar to the previous method, once the Current Accumulation Month TOU is transferred to Prior Accumulation Month TOU, Current Accumulation Month TOU will continue to accumulate. Once the Current Month TOU is transferred to Prior Month TOU, Current Month TOU will be cleared and reset to 0.

4.7 Power Quality Event Logging and Waveform Capture

Power Quality Event Logging:

When a power quality event happens, such as voltage sag and swell, the PXM 1300 will record the event timestamp and the triggering condition. It can save up to 50,000 events.

1. Event Logging Data Format
Timestamp (4 words) + Triggering Condition (1 word) + Rated Value (1 word) + Threshold (1 word) + Half Cycle Count (1 word)

Each event has 8 words in total.

Event Time: W1: Year-High Byte; Month-Low Byte; W2: Day-High Byte, Hour-Low Byte; W3: Minute-High Byte; Second-Low Byte; W4: Millisecond Triggering Condition; W5: Voltage Sags or Voltage Swells; 0: Logging Disabled;

Bit0: 1 – u1 voltage sag, 0 – no u1 voltage sag;

Bit1: 1 – u2 voltage sag, 0 – no u2 voltage sag;

Bit2: 1 – u3 voltage sag, 0 – no u3 voltage sag;

Bit3: 1 – u1 voltage swell, 0 – u1 no voltage swell;

Bit4: 1 – u2 voltage swell, 0 – u2 no voltage swell;

Bit5: 1 – u3 voltage swell, 0 – u3 no voltage swell;

Rated Value: W6 - voltage rated value; threshold:

W7 - threshold for voltage sag and swell, (expressed in secondary volts when PT's are used).

Half cycle count: W8 (voltage swell: 0; voltage sag: 4-200).

2. Logging Events

The event logging feature can log 50,000 events. If the 50,000 events are full, no more events will be logged even if the triggering condition happens. The user must clear the event log, and then the logging feature will log the new event. When the log is cleared, the new event will be logged from the first event that happens. There will be no data loss after the power is off.

3. Event Logging Triggering Conditions

A. Voltage Sag

When any phase of the three-phase voltage is lower than the set value (voltage rated value x threshold %), there will be a voltage sag event. When one phase voltage sag happens, the other phase will not respond to voltage sag event logging. A new voltage sag event will be responded to only when all of the phase voltages are restored to normal.

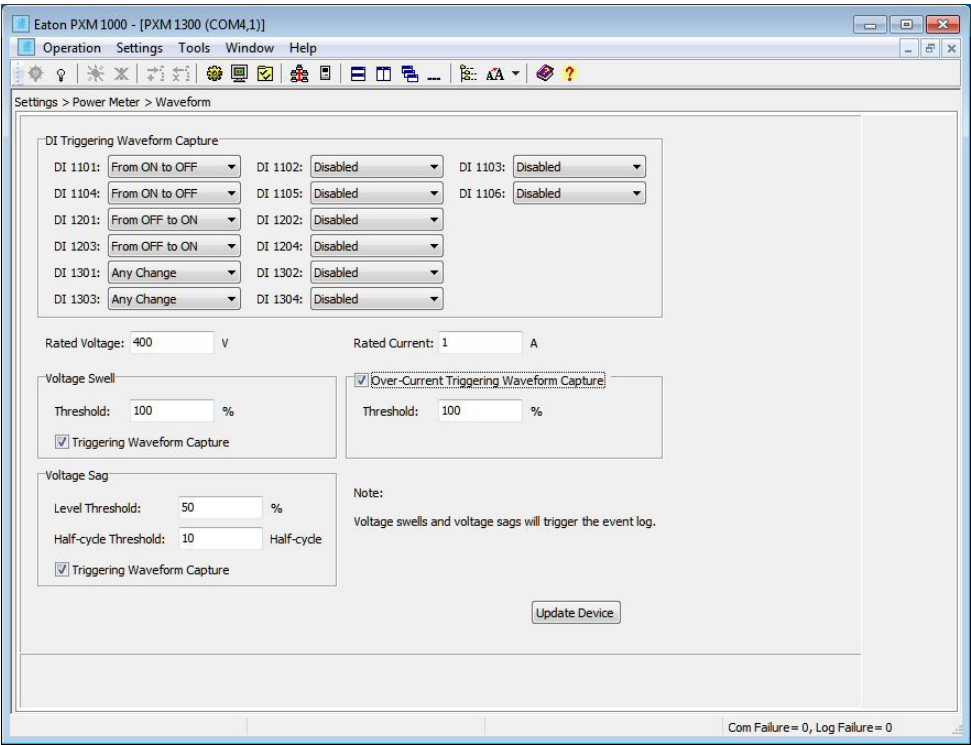
4. Detailed Functions and Software

B. Voltage Swell

When any phase of the three-phase voltage is higher than the set value (voltage rated value x threshold %), there will be a voltage swell event. When a voltage swell happens on one phase, the other phase will not respond to the voltage swell event logging. A new voltage swell event will be responded to only when all of the phase voltages are restored to normal.

Note: Figure 54 demonstrates how to set the parameters for Power Quality Event Logging and Waveform Capture. In the parameter settings, voltage sag and voltage swell share the same voltage rated value. The parameters for event logging includes: voltage rated value, voltage sag threshold, voltage sag half cycle count, and voltage swell threshold. Those parameters also fit the voltage sag waveform capture. The other triggering conditions for waveform capture can be set when necessary. When the waveform capture triggering by voltage sag and voltage swell is enabled, the corresponding event log and waveform will be recorded when voltage sag or voltage swell happens.

Figure 54. Event Triggering Conditions.



4. Event Log Retrieve

When a new event log starts, the newest event number address (0X8CFDH) contains the newest event number. When the log is being retrieved, the starting event log number (0X8CFEH) and the event quantity for each retrieve (0X8CFF) must be set correctly. It must be ensured that the starting number of event log should equal or be smaller than the newest log number. When setup is correct, reading registers 0X8D00H-0X8D4FH will acquire the event log data. Each time, a maximum of ten logged events can be retrieved. The event log retrieve page is shown in Figure 55. The Modbus register address of the event log is shown in the Table 7 (see details in Chapter 6).

Figure 55. Event Log Retrieve Page.

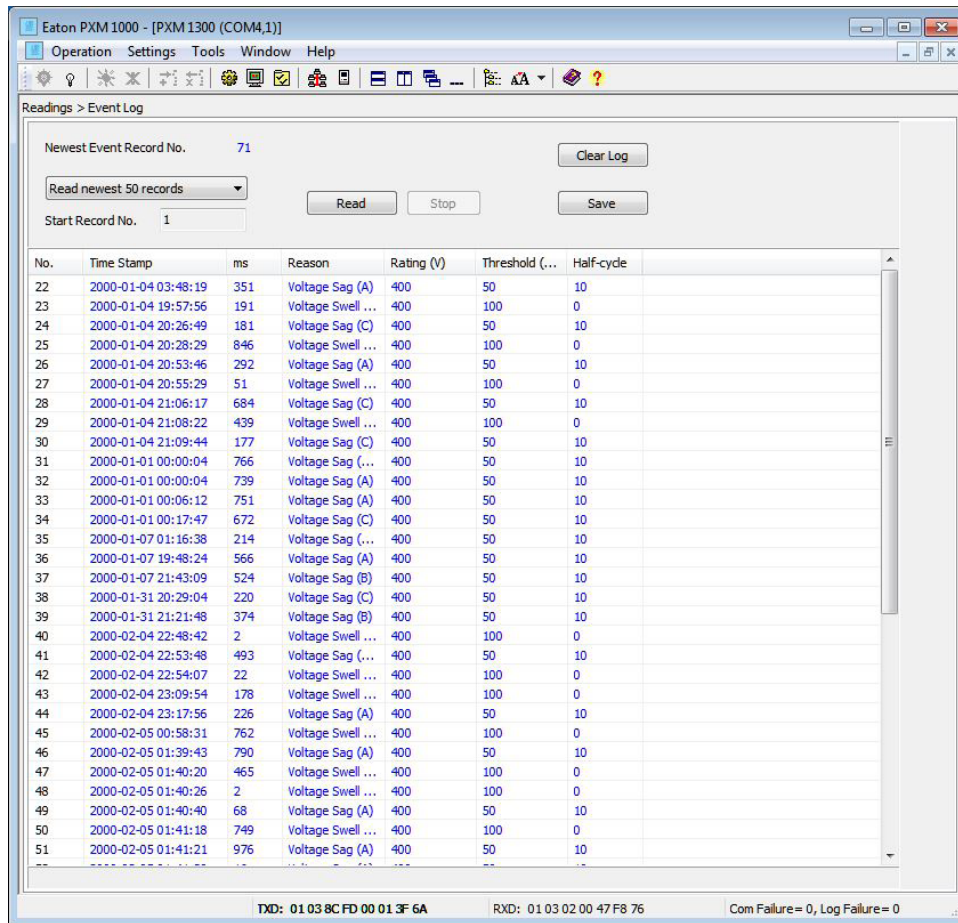


Table 7. Modbus Register Address of the Event Log.

8CFDH	The newest event number	word	R	Range: 1~50000; 0: No event
8CFEH	The starting event log number	word	R/W	Range: 1-50000 Note: smaller than or equal to the newest event number.
8CFFH	The event quantity of each time retrieve	word	R/W	1-10

Waveform Capture:

The PXM 1300 can record eight groups of voltage and current waveform data at a sampling rate of 32 points per cycle. It provides the captured waveform of ten cycles before and after the triggering point (including U1, U2, U3, I1, I2, and I3). The triggering condition is configurable.

1. Waveform Capture Data Format

Timestamp (7 words) + triggering condition (9 words) + kept data storage (48 words)
+ U1, U2, U3, I1, I2, I3 (Before triggering point 10 waveforms $64 \times 10 \times 6$ words) + U1,
U2, U3, I1, I2, I3 (After triggering point 10 waveforms $64 \times 10 \times 6$ words).

Timestamp: Year (W1), month (W2), day (W3), hour (W4), minute (W5), second (W6),
millisecond (W7).

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Triggering Condition:

W8 - Manual triggering (0: disable; 1: enable);

W9 - PXM1K-11 DI triggering (bit1 bit0: DI1[bit3 bit2: DI2] bit5 bit4: DI3; bit7 bit6: DI4; bit9 bit8: DI5; bit11 bit10: DI6);

W10 - PXM1K-21 DI triggering (bit1 bit0: DI7; bit3 bit2: DI8; bit5 bit4: DI9; bit7 bit6: DI10);

W11 - PXM1K-31 DI triggering (bit1 bit0: DI11; bit3 bit2: DI12; bit5 bit4: DI13; bit7 bit6: DI14);

(Two bits meaning: 00: No DI triggering; 01: DI triggering from OFF to ON; 10: DI triggering From On to OFF)

W12 - Voltage sag triggering (0: disabled;

Bit0: 1 - u1 voltage sag waveform, 0 - no u1 waveform;

Bit1: 1 - u2 voltage sag waveform, 0 - no u2 waveform;

Bit2: 1 - u3 voltage sag waveform, 0 - no u3 waveform)

W13 - Voltage swell triggering (0: disabled;

Bit0: 1 - u1 voltage swell waveform, 0 - no u1 waveform;

Bit1: 1 - u2 voltage swell waveform, 0 - no u2 waveform;

Bit2: 1 - u3 voltage swell waveform, 0 - no u3 waveform;)

W14 - Over-current triggering (0: disabled;

Bit0: 1 - I1 voltage over-current waveform, 0 - no I1 waveform;

Bit1: 1 - I2 voltage over-current waveform, 0 - no I2 waveform;

Bit2: 1 - I3 voltage over-current waveform, 0 - no I3 waveform;)

W15, W16 - 0 (Reserved)

Waveform Order:

Before triggering point: 10 U1 cycles, 10 U2 cycles, 10 U3 cycles, 10 I1 cycles, 10 I2 cycles, 10 I3 cycles.

After triggering point: 10 U1 cycles, 10 U2 cycles, 10 U3 cycles, 10 I1 cycles, 10 I2 cycles, 10 I3 cycles.

2. Waveform Capture Group

Waveform Capture can log up to 100 groups of waveform data. When the 100 group data is full, it does not respond to any waveform triggering condition. Only when all the waveform data is reset / emptied, will the waveform capturing function return to normal. When the waveform data is emptied, new waveform data starts from the first group. The waveform data will not be lost when the power is off. Waveform Capture only responds to one triggering condition at one time.

3. Waveform Capture Triggering Condition

A. Manual Triggering

Manually trigger one group waveform capture.

B. DI Triggering

DI Triggering must fulfill the following two conditions at the same time.

- IO modules with the logical address of 1 (PXM1K-11, PXM1K-21, PXM1K-31).
- DI channel type is set as "State".

The Modbus address assigns two bits for the DI channel. When they are set as "00", it means DI Triggering Disabled. "01" means DI Triggering will take place when DI state changes from OFF to ON. "10" means DI Triggering will take place when the DI state changes from ON to OFF. "11" means DI Triggering will take place when the DI state has any change.

C. Voltage Sag Triggering

As mentioned in Voltage Sag Event Logging, when the Voltage Sag Triggering Waveform is enabled, both event logging and waveform capture will take place at the same time once a voltage sag occurs.

D. Voltage Swell Triggering

As mentioned in Voltage Swell Event Logging, when Voltage Swell Triggering Waveform is enabled, both event logging and waveform capture will take place at the same time once a voltage swell occurs.

E. Over-current Triggering

When Over-current Triggering is enabled, if any phase of the three-phase current is higher than the set value (rated value x threshold %), the waveform capture will take place. If one phase is over-current, any other phase over-current cannot trigger the waveform capture. Waveform capture will respond only when all of the phase currents are restored to normal.

4. Waveform Capture Retrieve

Because of the large quantity of saved waveforms, the waveform retrieving window uses 64 addresses to make retrieving data easier. This keeps the recording points consistent for one period. There are two retrieving methods, one is to retrieve waveform record reasons, the other is to retrieve all data from one group waveform. The two methods are shown below.

First retrieving method is only retrieving waveform record reasons.

When 0x8E01H (waveform group number) is set to 0, the waveform record reason can be retrieved from the data retrieving window by changing the Waveform Group Number for Retrieving (8E00H). The waveform record reason is 16 bytes and data window are 64 bytes. That is the reason why each retrieving access includes four group records.

For example, if the total number of the Waveform Group Number for Retrieving is 19, then by this method, through five retrievals, all 20 group waveforms can be retrieved. Before retrieving, the user should write 0 to 8E01H and 1 to 8E00H for the first time retrieval of addresses from 8E00 to 8E43. These windows of data are the reasons of waveform group 1, 2, 3, 4. After retrieval, Waveform Group Number for Retrieving (8E00H) will automatically update to 5. For the second time retrieval of addresses from 8E00 to 8E43, these windows data are the reasons of waveform group 5, 6, 7, and 8. Waveform Group Number for Retrieving (8E00H) will stop increasing after the value reaches 17.

Note: Unless the user retrieves all data from 8E00H to 8E43H at one time, Waveform Group Number for Retrieving (8E00H) will automatically add 4, otherwise Waveform Group Number for Retrieving (8E00H) will keep its present value if only retrieving partial data. Waveform Group Number for Retrieving (8E00H) will stop increasing while value reaches the newest Waveform Group Number. If the value added 4, the value will be larger than Newest Waveform Group Number.

The second retrieving method is retrieving data for all waveforms. When 0x8E01H (Waveform Group Number) is set to 1~121, each time only one group of data for each number will be retrieved, then Waveform Group Number for Retrieving (8E01H) will automatically add 1 after retrieving. The next time, the new Waveform Group Number will be retrieved. The Waveform Group Number will stop increasing after the value reaches 121.

Note: If the range of 0x8E01H is 0~121, within the setting range, then windows (8E04H~8E43H) are corresponding to the waveform data.

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0: Only retrieving waveform record reasons.

1: Time and reasons of waveforms.

2~11: Each waveform number of ten cycles before U1 waveform is triggered.

12~21: Each waveform number of ten cycles before U2 waveform is triggered.

22~31: Each waveform number of ten cycles before U3 waveform is triggered.

32~41: Each waveform number of ten cycles before I1 waveform is triggered.

42~51: Each waveform number of ten cycles before I2 waveform is triggered.

52~61: Each waveform number of ten cycles before I3 waveform is triggered.

62~71: Each waveform number of ten cycles after U1 waveform is triggered.

72~81: Each waveform number of ten cycles after U2 waveform is triggered.

82~91: Each waveform number of ten cycles after U3 waveform is triggered.

92~101: Each waveform number of ten cycles after I1 waveform is triggered.

102~111: Each waveform number of ten cycles after I2 waveform is triggered.

112~121: Each waveform number of ten cycles after I3 waveform is triggered.

Note: Unless the user retrieves all data from 8E00H to 8E43H at one time, Waveform Group Number for Retrieving (8E01H) will automatically add 1, or Waveform Group Number for Retrieving (8E01H) will keep its present value if only partial data is retrieved.

Table 8. Waveform Group Number Information.

8E00H	Waveform Group Number for Retrieving	1~100 Note: When the value is smaller than or equal to the newest waveform record group number, this value is valid.
8E01H	Waveform Group Number	Waveform number; 0~121
8E02H	Waveform Record Window Status	0x0BH: window data is valid. 0xFF: window data is invalid. 0xAA: waveform record memory is clearing (data is invalid)
8E03H	Newest Waveform Group Number	1~100; 0=no record
8E04H - 8E43H	Waveform Record Data Retrieving Window	-32768~ 32767

Relationship between Voltage or Current Waveform Value and Real Value

The relationship between the voltage waveform value and real value is:

Real Value (Unit: V) = Waveform Value / 37.59105.

The relationship between the current waveform value and real value is:

A. 5A, 1A: Real Value (Unit: A) = Waveform Value/1683.153;

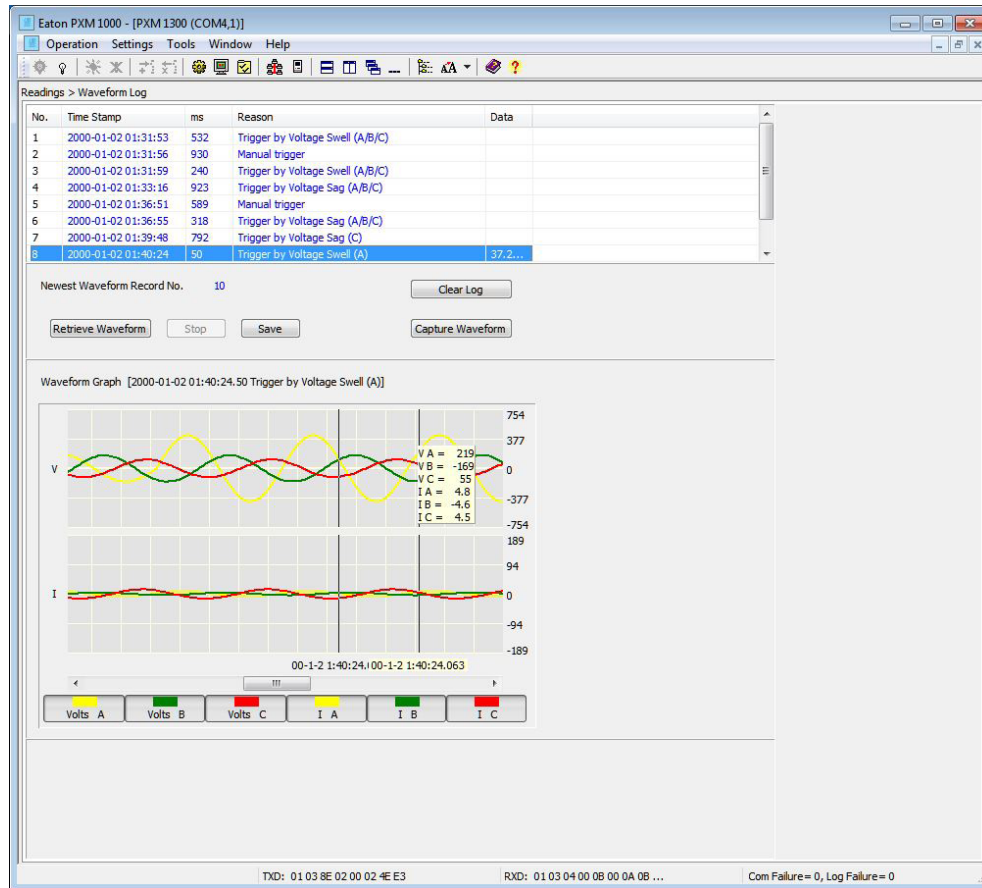
B. 333 mV: Real Value (Unit: A) = Waveform Value/K (firmware above 3.21, K = 14427.15; other: K = 15869.87);

C. 100 mV Rogowski coil: Real Value (Unit: A) = Waveform Value/K (firmware above 3.21, K = 20291.1; firmware 3.20, K = 22068.8, other: K = 15869.87);

D. mA CT: Real Value (Unit: A) = Waveform Value/K (80 mA CT: K = 7414.289; 100 mA: K = 9267.440; 200 mA: K = 18514.68); The voltage and current value obtained from the waveform are the PT or CT secondary side value.

The waveform capture retrieve page is shown in Figure 56.

Figure 56. Waveform Capture Retrieve Page.



Note: When selecting 400 Hz type, there is no support event logging and wave capture.

4.8 Seal Function

Panels with the Seal function, which has a sealed key control, are different from the panels without a seal. When the seal is in Opened status, the functions are the same as normal meters. But when the Seal function is in Sealed status, some functions of the meters, which includes parameters blocked by seal and optional parameters, will be blocked. These parameters can still be accessible by the local display and via communications the same way they could be accessed before. But, in Seal, these parameters cannot be modified by the local display and via communications in the way they were before.

Addresses for the Seal function are 101EH and 101FH.

Address 101EH is for the parameters blocked by Seal, which can be configured by the user. These setting will be valid only when the Seal function is in sealed status.

Address 101FH is for the status of Seal Function. When the panel is a normal one, or the seal panel is in Invalid Sealed status, this address will show that the Seal is open. When the Seal is valid, this address will show the sealed status and corresponding parameters will be blocked.

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Table 9. Seal Function Address Status.

101EH	Sealed Nonstandard Parameters Selection	Bit0: 1st communication parameters Bit1: 2nd communication parameters Bit2: run time clear Bit3: DI pulse count Bit4:TOU 1: valid of corresponding selection 0: invalid
101FH	Seal Status	0x0A: Seal sealed; Other: Seal opened.

Parameters blocked by the Seal function:

As long as Seal is in the Sealed status, the parameters below must be blocked, no matter what the value of address 101EH.

Table 10. Seal Parameters Status.

System Parameters Setting:

Address	Parameter	Keys	Communication
1003H	Voltage input wiring type	√	√
1004H	Current input wiring type	√	√
1005H	PT1 (High 16 bit)	√	√
1006H	PT1 (Low 16 bit)	√	√
1007H	PT2	√	√
1008H	CT1	√	√
1009H	CT2	√	√
100AH	kWh pulse constant	√	√
100BH	Kvarh pulse constant	√	√
100DH	Demand slid window time	√	√
100EH	Demand calculating mode	√	√
100FH	Clear demand memory	√	√
1012H	Current I1 direction	√	√
1013H	Current I2 direction	√	√
1014H	Current I3 direction	√	√
1015H	VAR/PF convention	√	√
1016H	Energy clear	√	√
1017H	Energy calculating mode	√	√
1018H	Reactive power measuring mode	√	√
1019H	Energy display mode	√	√
101DH	Basic parameter mode	√	√
101EH	Sealed nonstandard parameters selection	-	√

Note: "√" means these addresses will be blocked for keys and communication, and "-" means this function is unavailable.

Table 10. Seal Parameters Status (continued).**Energy:**

Address	Parameter	Keys	Communication
4048H--4049H	Energy IMP	-	√
404AH--404BH	Energy EXP	-	√
404CH--404DH	Reactive Energy IMP	-	√
404EH--404FH	Reactive Energy EXP	-	√
4050H--4051H	Energy TOTAL	-	√
4052H--4053H	Energy NET	-	√
4054H--4055H	Reactive Energy TOTAL	-	√
4056H--4057H	Reactive Energy NET	-	√
4058H--4059H	Apparent Energy	-	√
4620H--4621H	Phase A Energy IMP	-	√
4622H--4623H	Phase A Energy EXP	-	√
4624H--4625H	Phase B Energy IMP	-	√
4626H--4627H	Phase B Energy EXP	-	√
4628H--4629H	Phase C Energy IMP	-	√
462AH--462BH	Phase C Energy EXP	-	√
462CH--462DH	Phase A Reactive Energy IMP	-	√
462EH--462FH	Phase A Reactive Energy EXP	-	√
4630H--4631H	Phase B Reactive Energy IMP	-	√
4632H--4633H	Phase B Reactive Energy EXP	-	√
4634H--4635H	Phase C Reactive Energy IMP	-	√
4636H--4637H	Phase C Reactive Energy EXP	-	√
4638H--4639H	Phase A Apparent Energy	-	√
463AH--463BH	Phase B Apparent Energy	-	√
463CH--463DH	Phase C Apparent Energy	-	√

DO:

Address	Parameter	Keys	Communication
10A5H	Working mode of DO 1 and 2	√	√
10A6H	DO pulse width	√	√
10A7H	DO1 output	√	√
10A8H	DO2 output	√	√
10B7H	Working mode of DO 3 and 4	√	√
10B8H	DO pulse width	√	√
10B9H	DO3 output	√	√
10BAH	DO4 output	√	√

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Sealed Nonstandard Parameters:

Table 11. Sealed Nonstandard Parameters

- When bit 0 of address 101EH is valid, parameters about 1st communication should be blocked.

Address	Parameter	Keys	Communication
0FFEh	Communication Protocol 1	√	√
0FFFH	Parity Setting 1	√	√
1000H	Password	√	√
1001H	Communication address 1	√	√
1002H	Baud rate 1	√	√

- When bit 1 of address 101EH is valid, parameters about 2nd communication should be blocked.

Address	Parameter	Keys	Communication
102FH	Baud rate 2	√	√
1030H	Parity Setting 2	√	√
1031H	Communication address 2	√	√
Ethernet Module			
	DHCP setting	√	√
	IP address 1st byte (high)	√	√
	IP address 2nd byte (low)	√	√
	IP address 3rd byte (high)	√	√
	IP address 4th byte (low)	√	√
	Submask 1st byte (high)	√	√
	Submask 2nd byte (low)	√	√
	Submask 3rd byte (high)	√	√
	Submask 4th byte (low)	√	√
	Gateway 1st byte (high)	√	√
	Gateway 2nd byte (low)	√	√
	Gateway 3rd byte (high)	√	√
	Gateway 4th byte (low)	√	√
	DNS1 1st byte (high)	√	√
	DNS1 2nd byte (low)	√	√
	DNS1 3rd byte (high)	√	√
	DNS1 4th byte (low)	√	√
	DNS2 1st byte (high)	√	√
	DNS2 2nd byte (low)	√	√
	DNS2 3rd byte (high)	√	√
	DNS2 4th byte (low)	√	√
	Modbus Tcp/IP port	√	√
	Http port	√	√
BACnet Module			
	BACnet module enable	√	√
	DHCP setting	√	√
	IP address 1st byte (high)	√	√
	IP address 2nd byte (low)	√	√

Table 11. Sealed Nonstandard Parameters (continued).

Address	Parameter	Keys	Communication
	IP address 3rd byte (high)	√	√
	IP address 4th byte (low)	√	√
	Submask 1st byte (high)	√	√
	Submask 2nd byte (low)	√	√
	Submask 3rd byte (high)	√	√
	Submask 4th byte (low)	√	√
	Gateway 1st byte (high)	√	√
	Gateway 2nd byte (low)	√	√
	Gateway 3rd byte (high)	√	√
	Gateway 4th byte (low)	√	√
	DNS1 1st byte (high)	√	√
	DNS1 2nd byte (low)	√	√
	DNS1 3rd byte (high)	√	√
	DNS1 4th byte (low)	√	√
	DNS2 1st byte (high)	√	√
	DNS2 2nd byte (low)	√	√
	DNS2 3rd byte (high)	√	√
	DNS2 4th byte (low)	√	√
	MAC address	√	√
	BACnet baud rate	√	√
	Max info frames	√	√
	BACnet Port	√	√

3. When bit 2 of address 101EH is valid, parameters below should be blocked.

Address	Parameter	Keys	Communication
1011H	Run time clear	√	√

4. When bit 3 of address 101EH is valid, parameters below should be blocked.

Address	Parameter	Keys	Communication
101CH	Pulse counter clear	√	√
109eH	DI1-6 type	√	√
109fH	DI pulse constant	√	√
10a3H	DI7-10 type	√	√
10a4H	DI pulse constant	√	√
10aaH	DI11-14 type	√	√
10abH	DI pulse constant	√	√
10b0H	DI15-20 type	√	√
10b1H	DI pulse constant	√	√
10b5H	DI21-24 type	√	√
10b6H	DI pulse constant	√	√
10bcH	DI25-28 type	√	√
10bdH	DI pulse constant	√	√

4. Detailed Functions and Software

Table 11. Sealed Nonstandard Parameters (continued).

5. When bit 4 of address 101EH is valid, parameters below should be blocked.

Address	Parameter	Keys	Communication
103fH	Week	-	√
1040H	Year	-	√
1041H	Month	-	√
1042H	Day	-	√
1043H	Hour	-	√
1044H	Minute	-	√
1045H	Second	-	√

Note: Standard time is valid within ± 5 minutes, it will be invalid if not in this range.

Address	Parameter	Keys	Communication
TOU			
1039H	Ten-year download setting enable	-	√
103aH	Sharp demand clear	-	√
103bH	Peak demand clear	-	√
103cH	Valley demand clear	-	√
103dH	Normal demand clear	-	√
103eH	Total demand clear	-	√
Current and last month TOU energy			
7200H-7263H	Current and last month TOU energy	-	√
DST setting			
7700H-7717H	DST setting	-	√
Season setting			
7800H-780EH	Basis parameter of TOU	-	√
7820H-7AECH	Season setting	-	√
Ten-year holiday setting			
7B00H-7E97H	Ten-Year Holiday setting	-	√

5. Extended Modules

5.1 IO Modules

5.1.1 The Purpose of IO Modules

The standard PXM 1000 meter base does not have any built-in IO functions. However, with the addition of the extended modules, multiple IO options can be added. These functions include digital input, pulse counter, relay output, analog output, analog input, etc.

There are three types of IO modules, PXM1K-1, PXM1K-2, and PXM1K-3. Please note that a maximum of three modules may be attached to the meter. If a communication module is used, it must be installed on the back of the meter first before any IO modules are attached. No more than two of the same type IO modules can be attached. According to the difference in communication with PXM 1000 meter, each type of IO module also has two modes, logic NO. 1 and logic NO. 2. This means, two of each type of IO module can be linked to the PXM 1000 meter simultaneously (one being logic NO. 1 and the other being logic NO. 2).

The PXM1K-1 module is composed of:

Six Digital Inputs (DI) - Each DI can be used to detect remote signals, or be used as an input pulse counter. When it is used to detect remote signals, it also can enable sequence of events (SOE), recording the event and time of the event.

Two Relay Outputs (RO) - Can be used for controlling or alarms. Each of the ROs work in the same mode. When it operates in controlling mode, there are two output options; latching and pulse. When it operates in alarm mode, it has only one latching output mode.

24 V Isolated Power Supply - Used as an auxiliary power supply for digital inputs.

The PXM1K-2 module is composed of:

Four Digital Inputs (DI) - Each DI can be used to detect remote signals, or be used as an input pulse counter. When it is used to detect remote signals, it can also enable a sequence of events (SOE), recording the events and time of the events.

Two Analog Outputs (AO) - Can output analog voltage or analog current. When it outputs analog voltage, the range of voltage is from 0 to 5 V or from 1 to 5 V. When it outputs analog current, the range of current is from 0 to 20 mA or from 4 to 20 mA.

Two Digital Outputs (DO) - Can be used in alarm mode or energy pulse output mode. Both of the DOs work in the same mode. When the DOs operate in the energy pulse output mode, they can output various types of energy.

The PXM1K-3 module is composed of:

Four Digital Inputs (DI) - Each DI can be used to detect remote signals, or be used as an input pulse counter. When a DI is used to detect remote signals, it can also enable a sequence of events (SOE), recording the events and time of the events.

Two Relay Outputs (RO) - Can be used for controlling or alarms. Each of the ROs work in the same mode. When a RO operates in the controlling mode, there are two output options: latching mode and pulse. When it operates in alarm mode, it has only one latching output mode.

Two Analog Inputs (AI) - Can detect input analog voltage or analog current. When an AI detects input analog voltage, the range of voltage is from 0 to 5 V or from 1 to 5 V. When it detects input analog current, the range of current is from 0 to 20 mA or from 4 to 20 mA.

5. Extended Modules

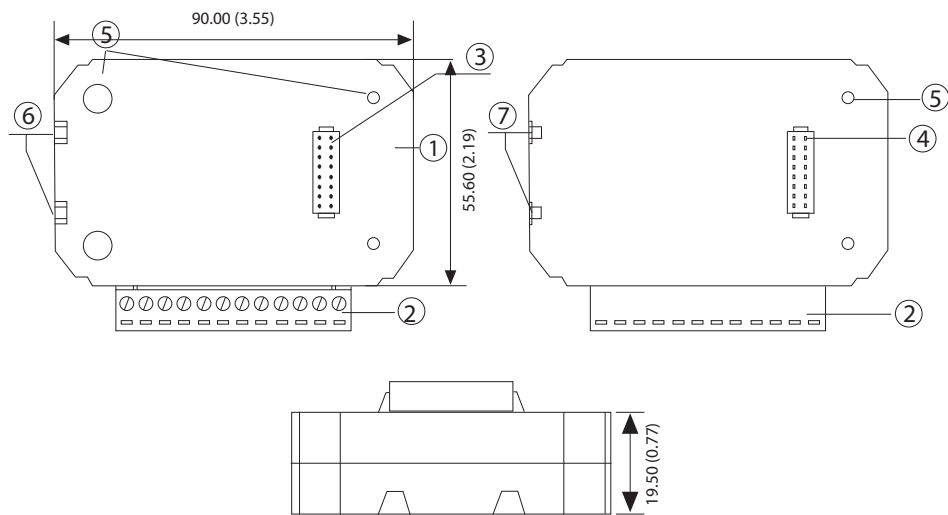
5.1.2 List of Functions of IO Modules

Table 12. Functions of IO Modules.

Functions	PXM1K-1	PXM1K-2	PXM1K-3
Detection of remote signals	•	•	•
Recording of SOE	•	•	•
Counting of input pulses	•	•	•
Output remote controlling by relay	•		•
Output alarm by relay	•		•
Output alarm by digital output		•	
Output power pulses by digital output		•	
Analog output		•	
Analog input			•
24 V isolated voltage output	•		

5.1.3 Appearance and Dimensions

Figure 57. Dimensions



1	Enclosure	5	Installation Screw
2	Wiring Terminals	6	Counterpart of Clip
3	Linking Pins	7	Installation Clip
4	Linking Socket		

5.1.4 Installation Method

Environment

Please verify the installation environment meets the requirements listed as follows:

Temperature:

Operation: -25°C to 70°C (-13°F to 158°F)

Storage: -40°C to 85°C (-40°F to 185°F)

Humidity:

5% to 95% non-condensing.

Location:

The PXM 1000 meter and IO modules should be installed in a dry and dust free environment avoiding heat, radiation, and high electrical noise sources.

Installation Method:

The IO modules are linked to the meter and to each other with link pins. The maximum number of extended modules linked to a PXM 1000 meter, including IO module, Ethernet module, RS-485 module, and BACnet module is **three**. The communication modules must be installed first. No other module can be installed before them.

1. Insert the installation clips into the module to be linked to the PXM 1000 meter. Press the IO module lightly into the meter until a solid link is established.
2. Tighten the installation screws. Torque is $0.2 \text{ nm} \pm 0.02$ ($1.77 \text{ lb-in} \pm 0.177$)
3. Install other IO modules in the same way.

Note: Install the IO Modules carefully to avoid damage;

⚠ WARNING

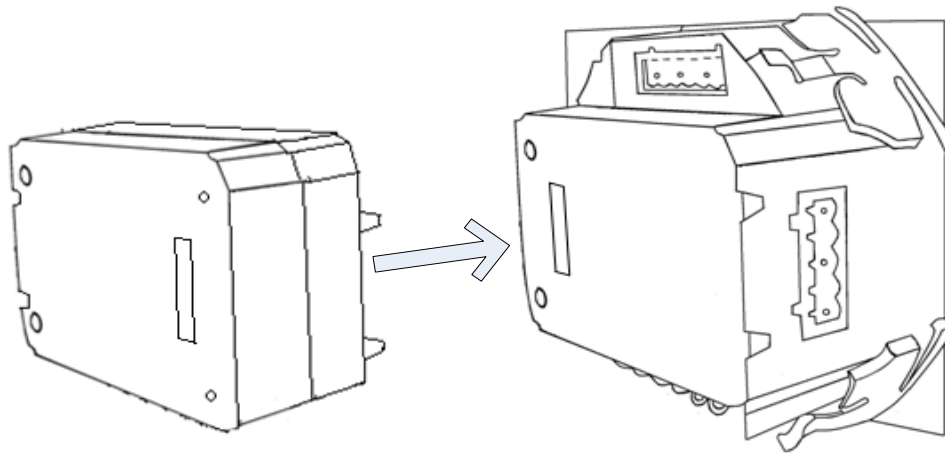
Do not attempt to install or perform maintenance on equipment while it is energized. Death, severe personal injury, or substantial property damage can result from contact with energized equipment. Always verify that no voltage is present. Before proceeding with the task, and always follow generally accepted safety procedures.

⚠ WARNING

Switch main power off and wait five (5) minutes before making any connection or disconnection on the device. Danger of explosion!

Eaton is not liable for the misapplication or misinstallation of its products.

Figure 58. Installation of the IO Modules.

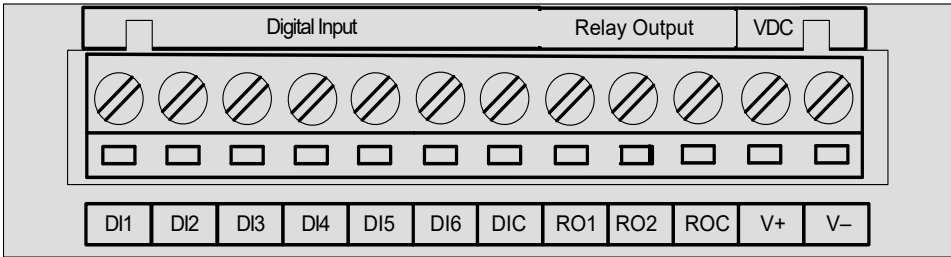


5. Extended Modules

5.1.5 Wiring the IO Modules:

Terminal strips of PXM1K-1 module:

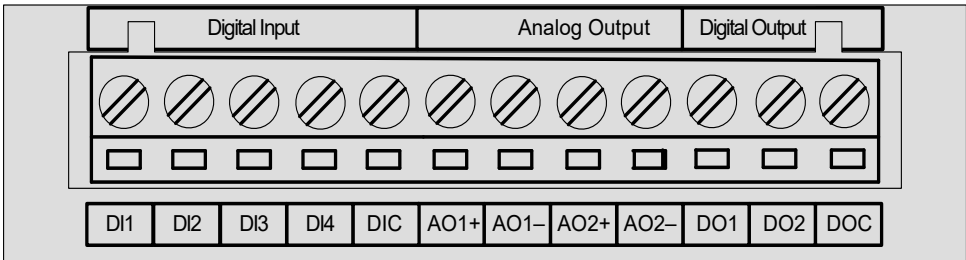
Figure 59. Terminal Strips of PXM1K-1 Module.



DI1 to DIC: digital input terminals, where DIC is the common terminal for DI1 to DI6 circuits.
RO1 to ROC: relay output terminals, where ROC is the common terminal for RO1 and RO2 circuits.
V24+ and V24-: auxiliary voltage supply terminals.

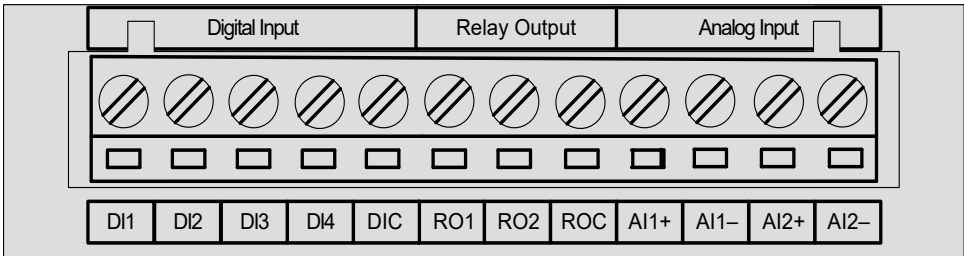
Terminal Strips of PXM1K-2 Module:

Figure 60. Terminal Strips of PXM1K-2 Module.



DI1 to DIC: digital input terminals, where DIC is the common terminal for DI1 to DI4 circuits.
AO1+, AO1-, AO2+, AO2-: analog output terminals.
DO1 to DOC: digital output terminals, where DOC is the common terminals for the DO1 to DO2 circuits.

Figure 61. Terminals Strips of PXM1K-3 module:



DI1 to DIC: digital input terminals, where DIC is the common terminal for the DI1 to DI4 circuits.
RO1 to ROC: relay output terminals, where ROC is the common terminal for the RO1 and RO2 circuits.
AI1+, AI1-, AI2+, AI2-: analog input terminals.

Sequence of DI, RO, DO, AO, AI in IO Modules (according to the logical order in the communication address table of the main body):

DI Sequence: PXM1K-11 (PXM1K-1 module in logic NO.1): DI1-6

PXM1K-21 (PXM1K-2 module in logic NO.1): DI7-10

PXM1K-31 (PXM1K-3 module in logic NO.1): DI11-14

PXM1K-12 (PXM1K-1 module in logic NO.2): DI15-20

PXM1K-22 (PXM1K-2 module in logic NO.2): DI21-24

PXM1K-32 (PXM1K-3 module in logic NO.2): DI25-28

RO Sequence: PXM1K-11 (PXM1K-1 module in logic NO.1): RO1-2

PXM1K-31 (PXM1K-3 module in logic NO.1): RO3-4

PXM1K-12 (PXM1K-1 module in logic NO.2): RO5-6

PXM1K-32 (PXM1K-3 module in logic NO.2): RO7-8

DO Sequence: PXM1K-21 (PXM1K-2 module in logic NO.1): DO1-2

PXM1K-22 (PXM1K-2 module in logic NO.2): DO3-4

AO Sequence: PXM1K-21 (PXM1K-2 module in logic NO.1): AO1-2

PXM1K-22 (PXM1K-2 module in logic NO.2): AO3-4

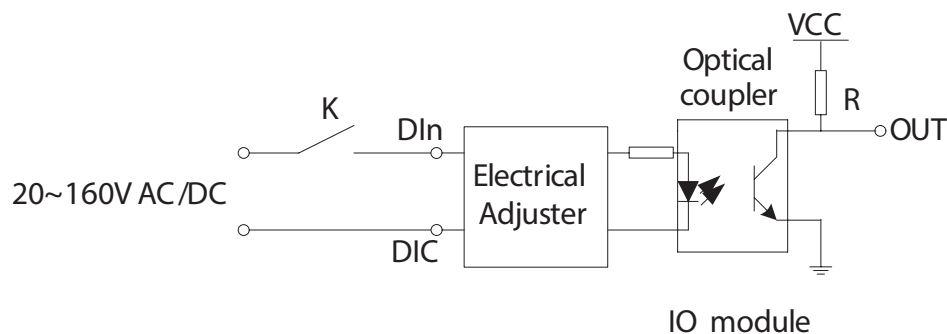
AI Sequence: PXM1K-31 (PXM1K-3 module logic NO.1): AI1-2

PXM1K-32 (PXM1K-3 module in logic NO.2): AI3-4

Wiring of Digital Input Circuit:

There are six digital input circuits, four digital input circuits and four digital input circuits in PXM1K-1, PXM1K-2, and PXM1K-3 modules respectively. The digital input circuit can be used to detect remote signals, or be used as an input pulse counter.

Figure 62. Schematic Diagram of Digital Input Circuit.



The circuit drawing of the digital input is simplified as shown in Figure 62. When K is switched off, OUT is in high state. When K is switched on, OUT is in low state.

The external power supply for the digital input is 20-160 Vac/Vdc. The maximum current in the loop line is 2 mA.

The wire selected for digital input should be between AWG 22~16 or 0.5~ 1.3 mm².

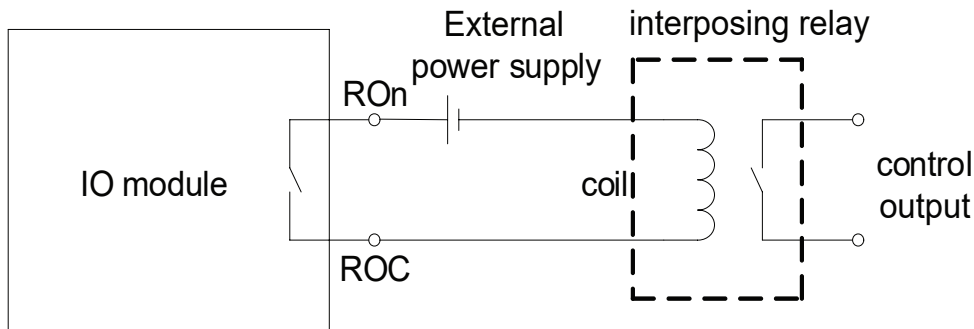
5. Extended Modules

Wiring of Relay Output Circuit:

There are two relay output circuits in PXM1K-1 and PXM1K-3 modules respectively. The relay output circuit can work in a controlling state or an alarm state. When it operates in a controlling state, it has two optional output modes: latching and pulse. When it operates in an alarm state, it has only one latching output mode.

The relay type is a mechanical Form A contact with 3 A/250 Vac or 3 A/30 Vdc. An interposing relay is recommended in the output circuit as in Figure 63.

Figure 63. Schematic Diagram of Relay Output Circuit.



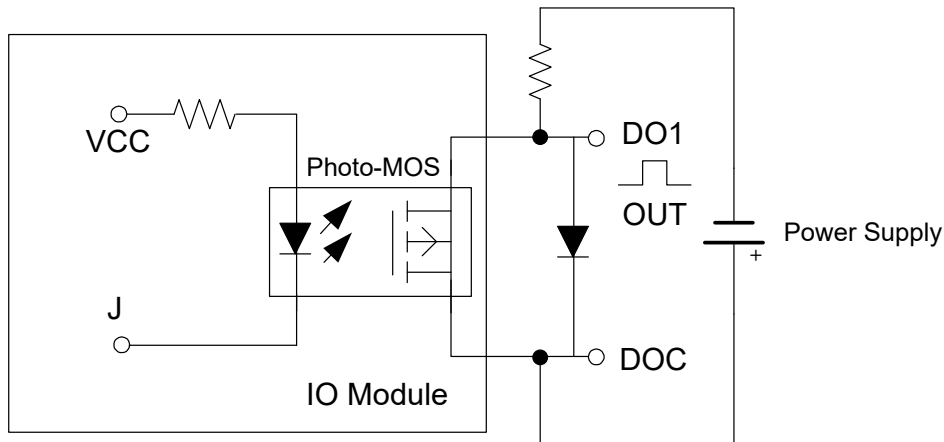
The wire selected for the relay output should be between AWG 22~16 or 0.5~1.3 mm².

Wiring of Digital Output Circuit:

There are two digital output circuits in the PXM1K-2 module. The digital output circuit can work in an alarm state or work in an energy pulse output state.

Digital output circuit form is Photo-MOS. The simplified circuit is shown in Figure 64.

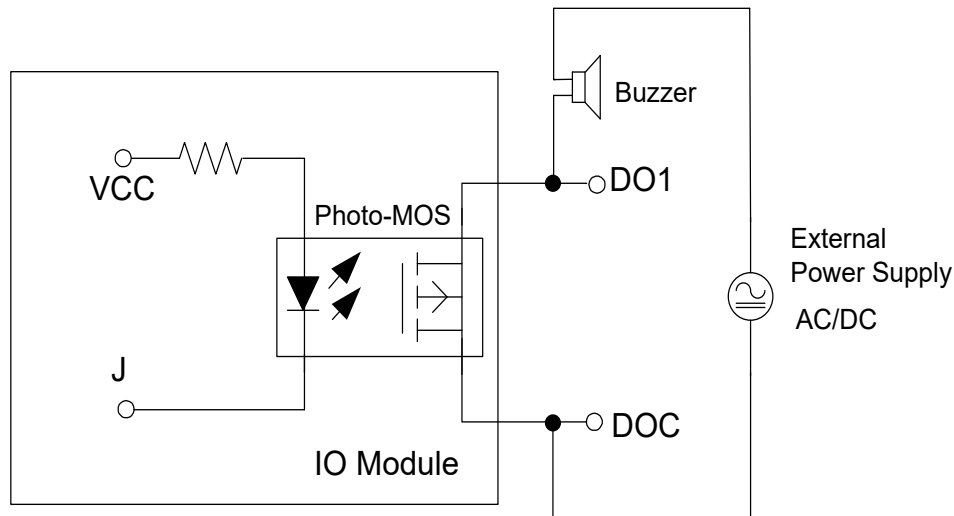
Figure 64. Schematic Diagram of Digital Output Circuit 1.



When J is in the low state as shown in Figure 64, OUT is in low state. When J is in the high state, OUT is in high state. OUT can therefore output pulse signals under the control of J.

The max output voltage and current of the digital output circuit are 250 V and 100 mA respectively.

Another drawing of the alarming output with buzzer is shown in Figure 65.

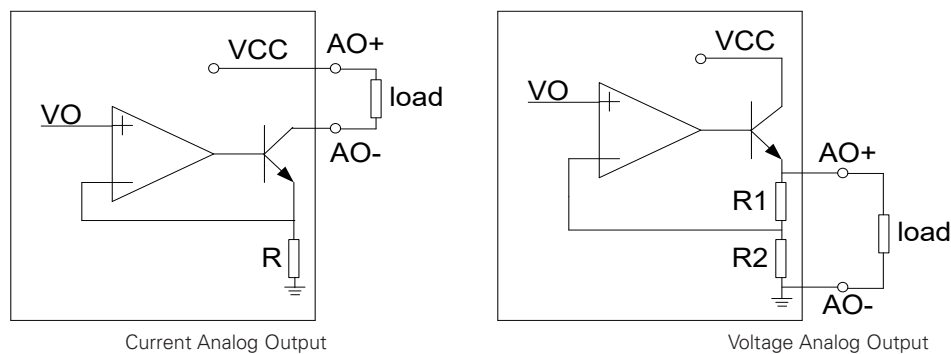
Figure 65. Schematic Diagram of Digital Output Circuit 2.

The wire selected for the digital output circuit should be between AWG22~16 or 0.5~1.3 mm².

Wiring of Analog Output Circuit:

There are two analog output circuits in PXM1K-2 modules. The terminals of the analog output circuits are AO1+, AO1-, and AO2+, AO2-. The analog output circuit can convert any one of 30 electrical quantities, which is selected by user, to analog voltage or current. The analog output circuit supplies four output modes, including 0 to 20 mA mode, 4 to 20 mA mode, 0 to 5 V mode, and 1 to 5 V mode.

The simplified circuit is as shown in Figure 66.

Figure 66. Schematic Diagram of the Analog Output Circuit.

The Load Capability of the Analog Output Circuit:

0 to 20 mA mode: the max load resistance is 500 Ω.

4 to 20 mA mode: the max load resistance is 500 Ω.

0 to 5 V mode: the max load current is 20 mA.

1 to 5 V mode: the max load current is 20 mA.

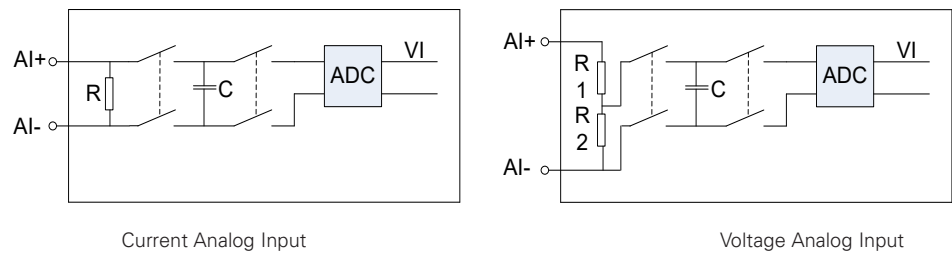
5. Extended Modules

Wiring of the Analog Input Circuit:

There are two analog input circuits in PXM1K-3 modules. The terminals of analog input circuit are AI1+, AI1- and AI2+, AI2-. The analog input circuit supplies four input modes, including 0 to 20 mA mode, 4 to 20 mA mode, 0 to 5 V mode, and 1 to 5 V mode.

The simplified circuit is as shown in Figure 67.

Figure 67. Schematic Diagram of the Analog Input Circuit.

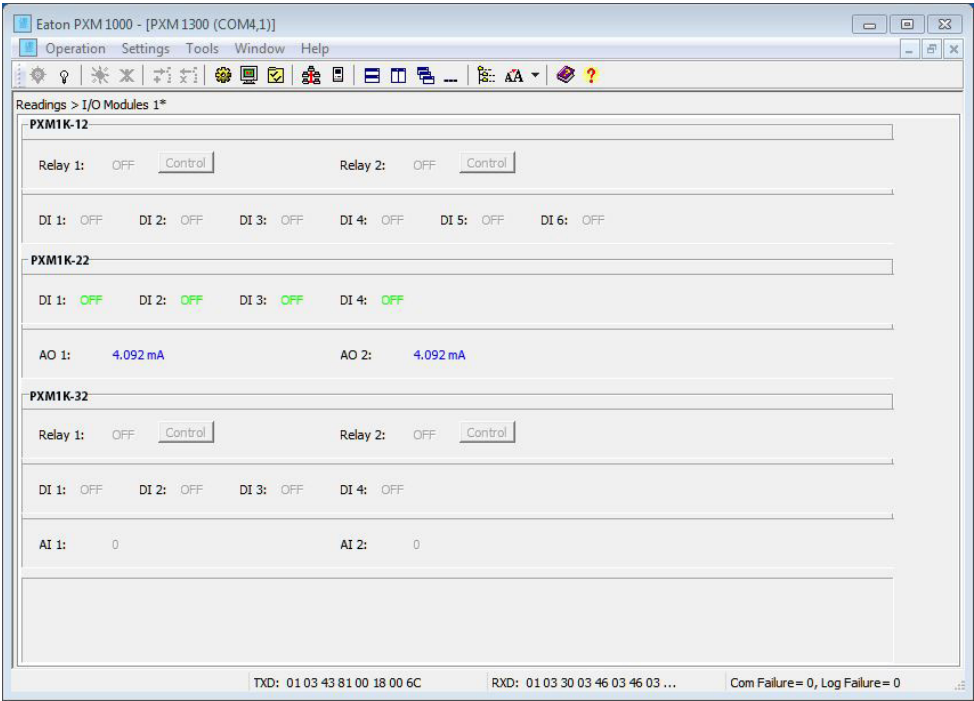


24 V Isolated Power Supply:

To simplify and make it more convenient for the end user, there is a DI auxiliary power supply provided in PXM1K-1 module. The voltage of the DI auxiliary power supply is 24 Vdc (1W). This power supply can NOT be used for other purposes.

Figure 68 shows the function of IO modules, which is displayed in the utility software as follows, where PXM1K-12 (PXM1K-1 module in logic NO.2), PXM1K-22 (PXM1K-2 module in logic NO.2), and PXM1K-32 (PXM1K-3 module in logic NO.2) are linked to PXM 1000 meter.

Figure 68. Functions of the IO Modules.



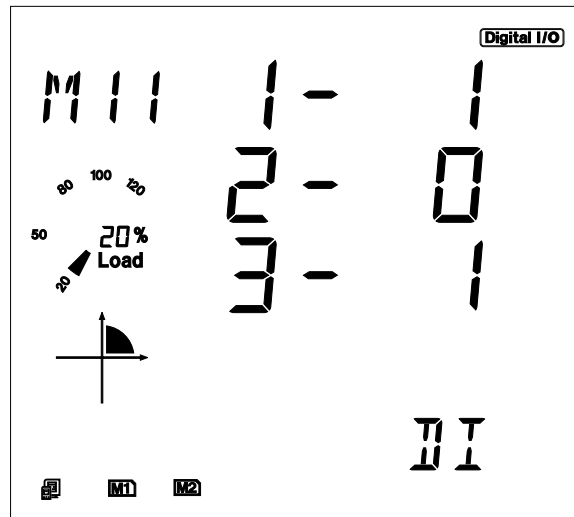
5.1.6 Detection of Remote Signals

The digital input circuit can be set to detect remote signals.

A. Detection of Remote Signals

When the digital input circuit detects a qualified voltage input, it will show "1" on screen and "ON" in the software. Otherwise, it will show "0" on screen and "OFF" in the software.

Figure 69. Showing the DI State on the Screen.



B. Record of SOE

When the digital input circuit is set to detect remote signals, the recording function of SOE can be enabled. Therefore, when the remote signals change, the IO module can record this information accordingly.

SOE Record: Including "4399H to 4439H" address registers. "4399H to 4438H" address registers record 20 groups of SOE records. "4439H" records the IO module which generates the SOE records. For example, if register "4439H" is 1, the 20 groups of SOE records are all generated by PXM1K-11 (PXM1K-1 module in logic NO.1).

The 20 groups of SOE records are arranged based on time. When more than 20 groups of SOE records are generated, the records will begin at the first group.

When the PXM 1000 meter is powered on, the SOE begins to record. The data in the SOE records will not be lost if the meter is powered off. When the enabled SOE function is changed, the records will be lost.

All groups of SOE records are in the same format. Take the first group of SOE records for example. The "4399H to 439fH" registers record the time information, including year, month, day, hour, minute, second, and millisecond. "43a0H" register records the state information, which is an unsigned integer, where bit 0 records DI1 state, bit 1 records DI2 state, and so on. For example, if "43a0H" is "1", it means that DI1 is "1", and others are all "0".

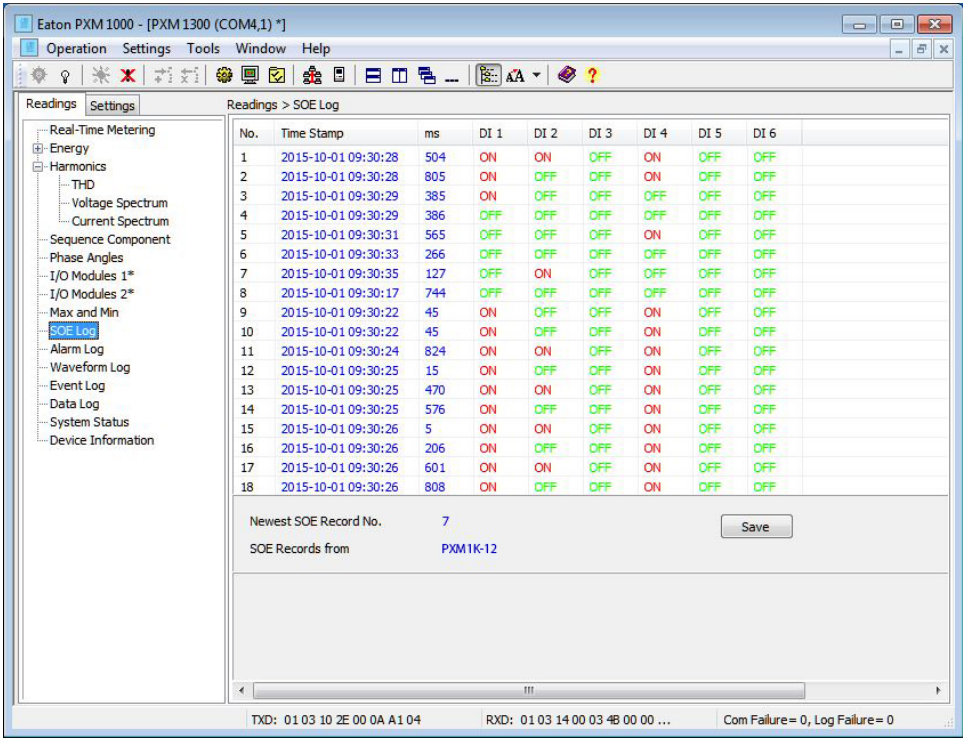
Note: If one of digital input circuits is set to be a pulse counter when the IO module is SOE enabled, then the counterpart bit of "43a0H" register will always be "0".

Data of SOE records can only be read by the utility software. It cannot be read on screen.

Figure 70 shows the data information of SOE records of PXM1K-12 (PXM1K-1 module in logic NO.2) read by the utility software.

5. Extended Modules

Figure 70. Data Information of SOE Records Read by the Utility Software.



C. Parameter Setting of Detection of Remote Signals

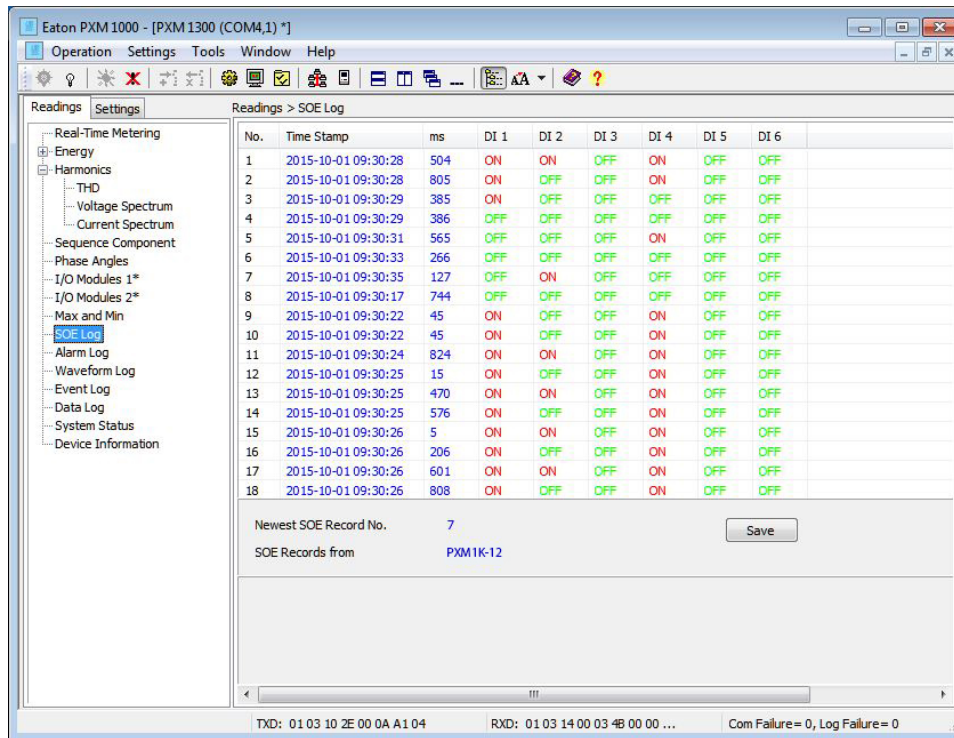
Take the parameter setting of PXM1K-11 (PXM1K-1 module in logic NO.1) for example.

“109eH” register: This register is an unsigned integer, where bit0 determines DI1’s working mode, bit1 determines DI2’s working mode, and so on. If the bit is “1”, then the DI circuit is set to be a pulse counter. Otherwise, the DI circuit is set to detect remote signals. Figure 71 shows the parameter setting of the digital input circuits.

“101bH” register: This register is an unsigned integer. It determines which IO module will be SOE enabled. If the register is “0”, then any IO module is SOE disabled. If the register is “1”, then PXM1K-11 (PXM1K-1 module in logic NO.1) is SOE enabled. If the register is “2”, then PXM1K-21 (PXM1K-2 module in logic NO.1) is SOE enabled. If the register is “3”, then PXM1K-31 (PXM1K-3 module in logic NO.1) is SOE enabled. If the register is “4”, then PXM1K-12 (PXM1K-1 module in logic NO.2) is SOE enabled. If the register is “5”, then PXM1K-22 (PXM1K-2 module in logic NO.2) is SOE enabled. If the register is “6”, then PXM1K-32 (PXM1K-3 module in logic NO.2) is SOE enabled.

Only one IO module can be SOE enabled at a time. If the IO module is not linked to the PXM 1000 meter, then there is no need to enable the SOE function in the utility software.

Figure 71 shows the parameters setting of IO module’s SOE function.

Figure 71. Parameter Settings of the IO Module's SOE Function.

5.1.7 Pulse Counter

The digital input circuit can also be set to count pulses.

Recorded number of pulses: including "4349H to 4380H" address. The "4349H to 4380H" registers record 28 groups of the individual number of pulses. This includes six groups of records for PXM1K-11 (PXM1K-1 module in logic NO.1), four groups of records for PXM1K-21 (PXM1K-2 module in logic NO.1), four groups of records for PXM1K-31 (PXM1K-3 module in logic NO.1), six groups of records for PXM1K-12 (PXM1K-1 module in logic NO.2), 4 groups of records for PXM1K-22 (PXM1K-2 module in logic NO.2), and four groups of records for PXM1K-32 (PXM1K-3 module in logic NO.2) in sequence. One group of records is an unsigned long integer, for example, "4349H to 434aH" registers record the number of pulses for the DI1 circuit of PXM1K-11 (PXM1K-1 module in logic NO.1).

5. Extended Modules

Figure 72 shows the recorded number of pulses read on the screen.

Figure 72. Recorded Number of Pulses Read on the Screen.

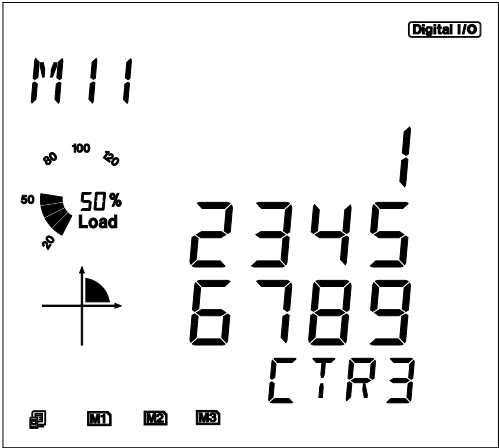
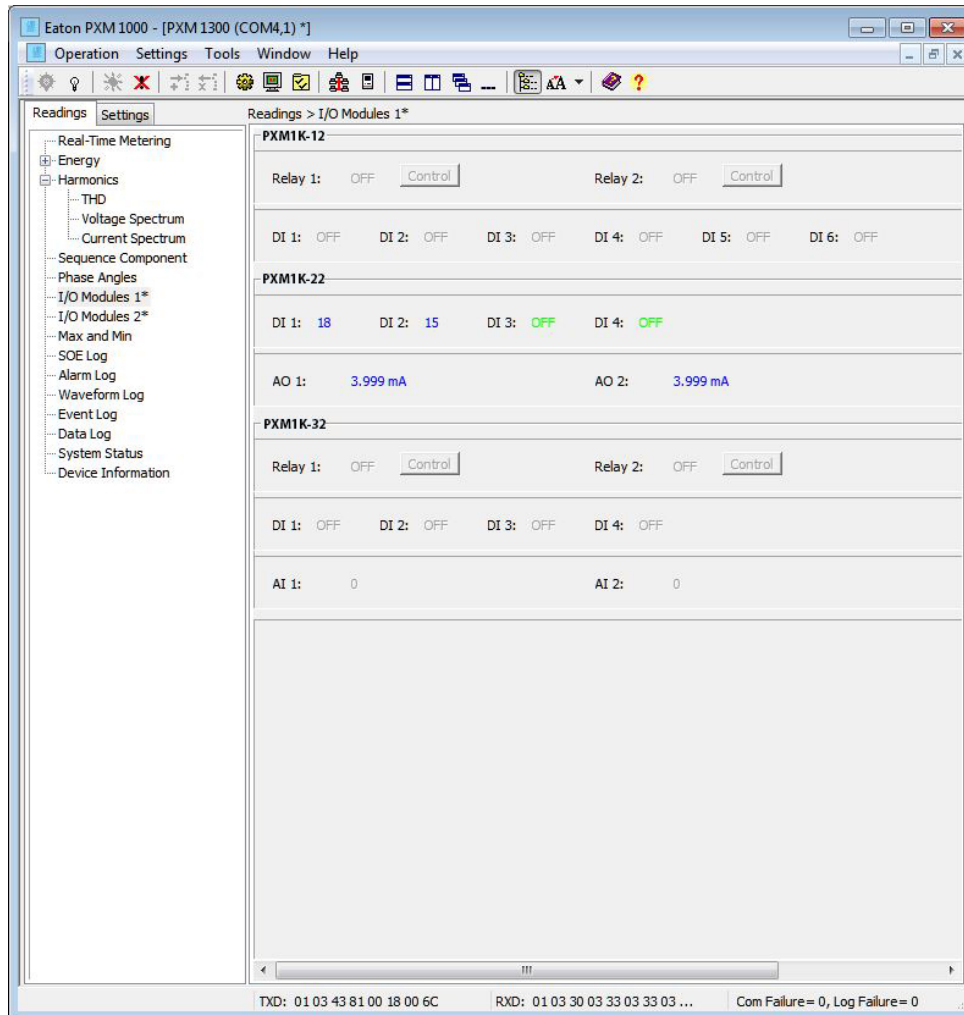


Figure 73 shows the recorded number of pulses read by the utility software.

Figure 73. Recorded Number of Pulses Read by the Utility Software.



Parameter Settings for Counting Input Pulses:

Take PXM1K-11 (PXM1K-1 module in logic NO.1) for example.

1. "109eH" register: if the bit is set as "1," the counterpart digital input circuit is set to be a counter of input pulses.
2. "109fH" register: this register is an unsigned integer. If this register is A, and the digital input circuit is set to be a pulse counter, then the real number of pulses counted by this DI circuit will be as follows:

$$\text{Real number of pulses} = A \times \text{Recorded number of pulses.}$$

For example, if A = 20, the recorded number of pulses counted by DI1 circuit of PXM1K-11 is 100 (4349H to 434aH registers), then the real number of pulses is $20 \times 100 = 2,000$.

The parameter setting is shown in Figure 71.

5. Extended Modules

5.1.8 Relay Output

Relays in IO modules can work in two different modes, one is the controlling mode, and the other is the alarm mode. For the controlling mode, relays can be switched on and off directly. For the alarm mode, the action of the relays is controlled by whether the alarm has occurred or not.

There are two mode selections for relay output: one is latching and the other is pulse. For the latching mode, the relay can be used to output two states (On or Off). For the pulse mode, the output of the relay changes from Off to On for a period of time and then goes Off. The period can be set from 50 to 3,000 ms.

Note: When the relay is working in alarm mode, the default output mode is latching mode.

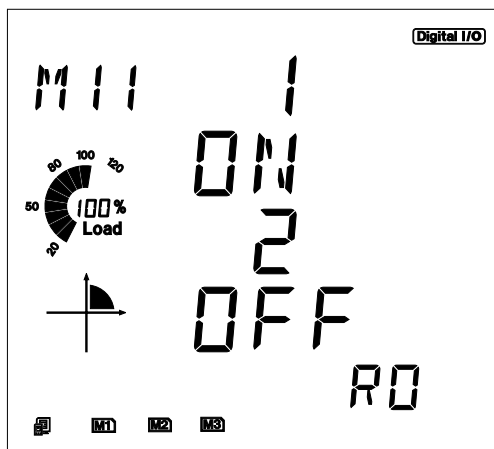
A. Display of Relay State

If the relay state is "ON", it means that relay is switched On. If relay state is "OFF", it means that relay is switched Off.

Figure 72 shows the status of relays read on the screen.

Figure 68 shows the status of relays read by the utility software.

Figure 74. Status of the Relays Read on Screen.



B. Parameter Setting

Take PXM1K-11 (PXM1K-1 module in logic NO.1) for example.

"RO working mode (10a0H)" register: This register determines the working mode of the relays. If the register is "0", then RO1 and RO2 will work in the controlling mode. If the register is "1", then RO1 and RO2 will work in the alarm mode.

"RO output mode (10a1H)" register: This register determines the output mode of the relays. If the register is "0", then RO1 and RO2 will work in the latching output mode. If the register is "1", then RO1 and RO2 will work in the pulse output mode.

"RO pulse width (10a2H)" register: When the relays are working in the pulse mode, this register determines the period of time which can be set from 50 to 3,000 ms. For example, if this register is "100", the relay (RO1 or RO2) will be switched on for 100 ms after receiving the "ON" instruction and then be switched off.

The parameter setting is shown in Figure 69.

5.1.9 Digital Output

There are two mode selections for the digital output circuit: one is the alarm mode and the other is the energy output mode. For the alarm mode, the action of the digital output circuit is controlled by whether the alarm is triggered or not. For the energy output mode, the digital output circuits can output various types of energy, such as import active energy, export active energy, import reactive energy, and export reactive energy. When outputting energy pulses, the pulse width can be set from 20 to 1000 ms. The minimum interval between two pulses is 20 ms.

Parameter Setting:

Take PXM1K-21 (PXM1K-2 module in logic NO.1) for example.

“DO working mode (10a5H)” register: This register determines the working mode of the DO circuits. If the register is “0”, then DO1 and DO2 will work in the energy output mode. If the register is “1”, then DO1 and DO2 will work in the alarm mode.

“DO pulse width (10a6H)” register: When the DO circuits work in the energy output mode, this register determines the width of energy pulses.

“DO1 output type (10a7H)” register: When the DO circuits work in the energy output mode, this register determines the energy output type for DO1. If this register is “0”, DO1 outputs nothing. If this register is “1”, DO1 outputs import active energy. If this register is “2”, DO1 outputs export active energy. If this register is “3”, DO1 outputs import reactive energy. If this register is “4”, DO1 outputs export reactive energy.

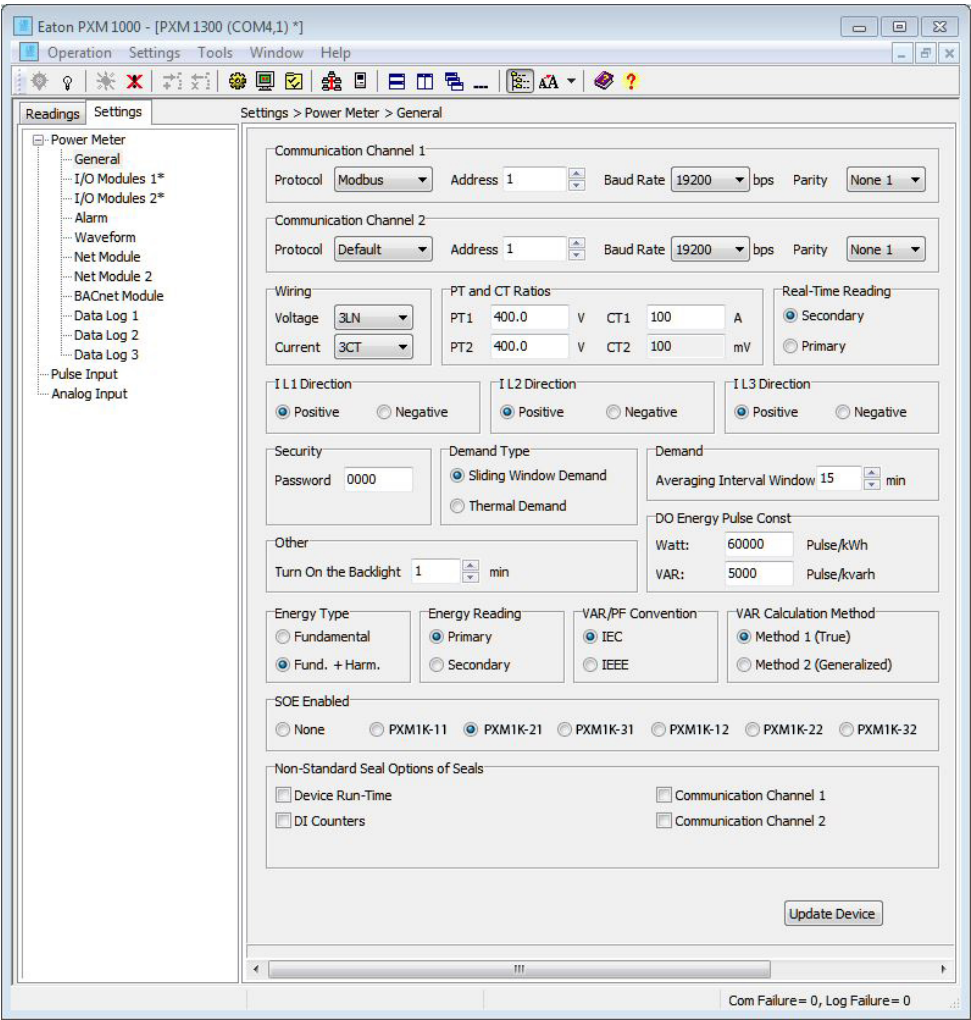
“DO2 output type (10a8H)” register: When DO circuits work in the energy output mode, this register determines the energy output type for DO2. The value of this register is defined as the same as “DO1 output type” register.

The “DO1 output type” register and “DO2 output type” register can be set to the same value or different values.

The parameter setting is shown in Figure 73.

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Figure 75. Parameter Setting of the DO Energy Pulse Constant.



Note: In Figure 73 the DO Energy Pulse Constants are based on the secondary reading; refer to calculator for more information.

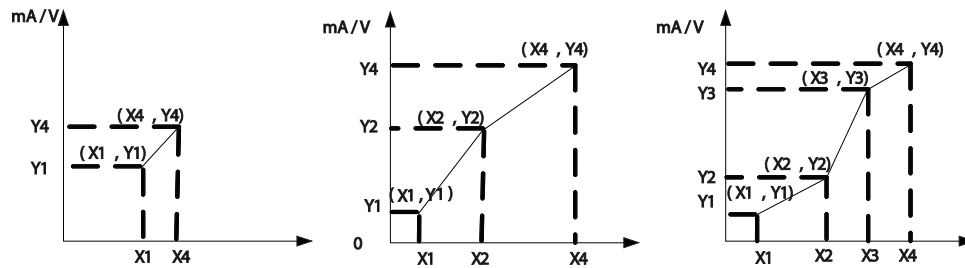
5.1.10 Analog Output

1. Analog Output Relationship with Electrical Quantities

The analog output (AO) circuit can convert anyone of 30 electrical quantities selected by the user (reference Chapter 6) to analog voltage or current.

The analog output circuit supplies four output modes including: 0 to 20 mA mode, 4 to 20 mA mode, 0 to 5 V mode, and 1 to 5 V mode.

Figure 74 shows the relationship between analog output and various electrical quantities.

Figure 76. Relationship Between Analog Output and Various Electrical Quantities.

Note: The following section introduces how the AO function works.

Addresses about the AO function are from 10D0H to 10F3H, which include three groups of parameters such as gradient number, AO following value range, and AO output range.

A. AO Gradient Number Selection of input/output transfer curve.

When the number is 1, which includes (X1, Y1) and (X4, Y4), only the following parameters should be set:

- AO following value range setting start point;
- AO following value range setting end point
- AO1 output range setting start point; and
- AO1 output range setting end point.

When the number is 2, which includes (X1, Y1), (X2, Y2), and (X4, Y4), only the following parameters should be set:

- AO following value range setting start point;
- AO1 following value range setting point 2;
- AO following value range setting end point;
- AO1 output range setting start point;
- AO1 output range setting point 2; and
- AO1 output range setting end point.

When the number is 3, which includes (X1, Y1), (X2, Y2), (X3, Y3), and (X4, Y4), only the following parameters should be set:

- AO following value range setting start point;
- AO1 following value range setting point 2;
- AO1 following value range setting point 3; and
- AO following value range setting end point.

At the same time, the AO1 output range setting start point, AO1 output range setting point 2, AO1 output range setting point 3, and AO1 output range setting end point should be set.

B. Following the value range setting:

The AO following value range setting start point (X1), AO1 following value range setting point 2 (X2), AO1 following value range setting point 3 (X3), and AO following value range setting end point (X4) are increasing value, while they should be within range of AO following value. Otherwise, the function of the AO will be affected.

5. Extended Modules

- Frequency: When selecting 50 Hz or 60 Hz type, frequency range is 45 Hz ~ 65 Hz, real setting value is 4,500 ~ 6,500. When selecting 400 Hz type, the frequency range is 300 Hz ~ 500 Hz, real setting value is 30,000~50,000.
- Phase voltage V1, V2, V3, and average phase voltage: 0~480 V, real setting value is 0~4,800.
- Line voltage V12, V23, V31, and average line voltage: 0~831 V, real setting value is 0~8,310.
- Current I1, I2, I3, and average current: 0~10 A, real setting value is 0~10,000.
- Power Pa, Pb, and Pc: -4,800~4,800 W, real setting value is -4,800~4,800.
- System power: -14,400~14,400 W, real setting value is -14,400~14,400.
- Reactive power Qa, Qb, and Qc: -4,800~4,800 Var, real setting value is -4,800~4,800.
- System reactive power: -14,400~14,400 Var, real setting value is -14,400 ~ 14,400
- Apparent power Sa, Sb, and Sc: 0~4,800 VA, real setting value is 0~4,800.
- System apparent power: 0~14,400 VA, real setting value is 0~14,400.
- Power factor PFa, PFb, PFc, and System power factor: -1~1, real setting value is -1,000~1,000.

C. AO output range setting:

The AO output value range setting start point (Y1), AO1 output value range setting point 2 (Y2), AO1 output value range setting point 3 (Y3), and AO output value range setting end point (Y4) are increasing value, while they should be within range of the AO output value.

When the AO type is 0 ~ 20 mA, the corresponding range is 0 ~ 24 mA, the setting value range is 0 ~ 4,915, and the relationship is:

$$\text{mA} = \text{setting value} \times 20/4,096.$$

When the AO type is 4 ~ 20 mA, the corresponding range is 4 ~ 24 mA, the setting value range is 819 ~ 4,915, and the relationship is:

$$\text{mA} = \text{setting value} \times 20/4,096.$$

When the AO type is 0 ~ 5 V, the corresponding range is 0 ~ 6 V, the setting value range is 0 ~ 4,915, and the relationship is:

$$\text{V} = \text{setting value} \times 5/4,096.$$

When the AO type is 1 ~ 5 V, the corresponding range is 1 ~ 6 V, the setting value range is 819 ~ 4,915, and the relationship is

$$\text{V} = \text{setting value} \times 5/4,096.$$

Note: If the voltage input wiring of the meter is 2LL or 3LL, then the analog outputs relative to phase voltage, neutral current, phase active/reactive/apparent power, and phase power factor will always be 0.

Note: The maximum of analog output is 1.2 times the range.

2. Display of Analog Output

Value of the analog output is displayed in hex on the screen. The relationship between the displayed value and real value of analog output is:

$$\text{Real value} = \frac{\text{Displayed Value} \times 20 \text{ mA (current output mode)}}{4096}$$

or

$$\text{Real value} = \frac{\text{Displayed Value} \times 5 \text{ V (voltage output mode)}}{4096}$$

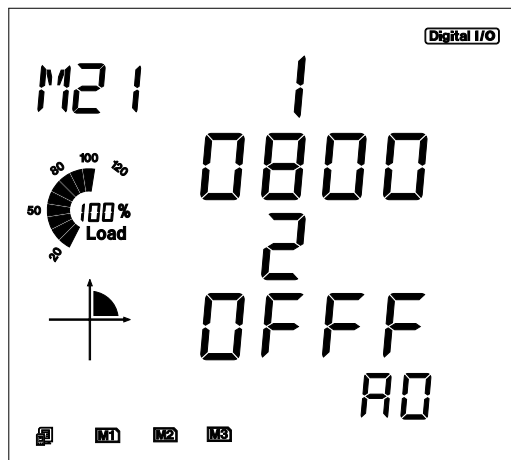
As shown in Figure 75, the displayed value of AO1 is 0 x 0800, so the real value of AO1 is:

$$(0 \times 0800 / 4096) \times 5 \text{ V}$$

or

$$(0 \times 800 / 4096) \times 20 \text{ mA.}$$

Figure 77. AO Value Read on the Screen.



3. Parameter Setting

Take the PXM1K-21 (PXM1K-2 module in logic NO.1) for example.

“Electrical quantities mapped to AO1 (10c2H)” register: This register determines to which electrical quantity AO1 should be mapped (see Chapter 6 for explanation). For example, if this register is “0”, then AO1 is mapped to “Frequency”.

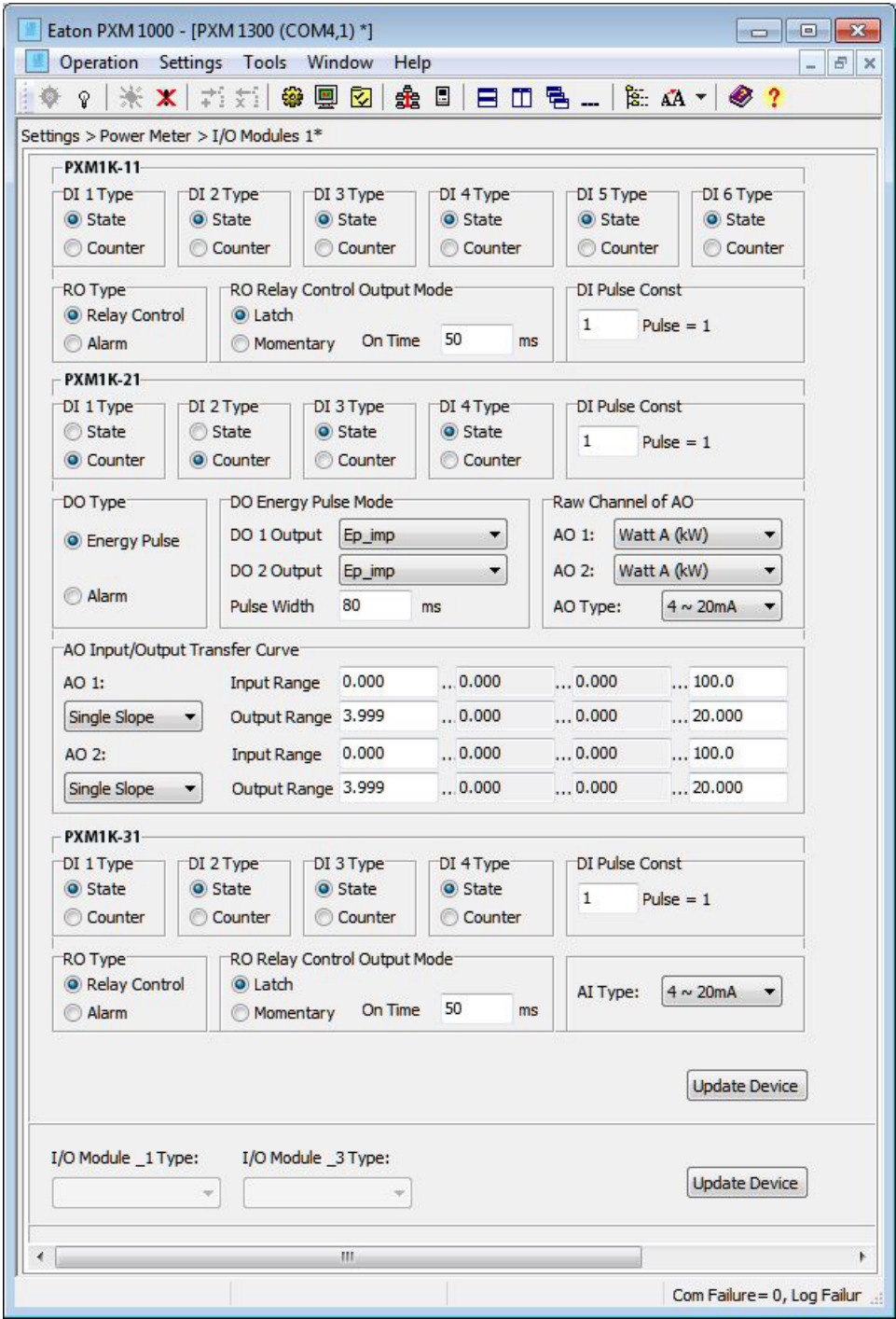
“Electrical quantities mapped to AO2 (10c3H)” register: This register determines to which electrical quantity the AO2 should be mapped. The value of this register is defined as the same as “Electrical quantities mapped to AO1 (10c2H)” register.

“Electrical quantities mapped to the AO1 (10c2H)” register and “Electrical quantities mapped to AO2 (10c3H)” register can be set to the same value .

The parameter setting is shown in Figure 76:

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Figure 78. Parameter Setting of the IO Modules.



5.1.11 Analog Input

Analog input circuits supply four types of input modes including: 0 to 20 mA mode, 4 to 20 mA mode, 0 to 5 V mode, and 1 to 5 V mode.

Figure 77 shows the relationship between the AI value and the input analog value.

AI value ranges from 0 to 4,095 without any unit. The AI value is displayed in hex on screen.

Figure 78 shows the AI value read on screen.

Figure 79. Relationship Between the AI Value and the Input Analog Value.

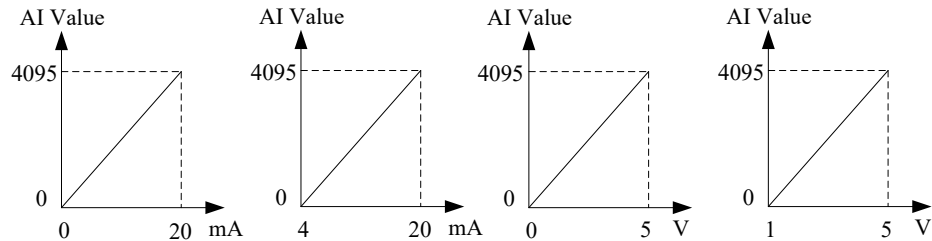
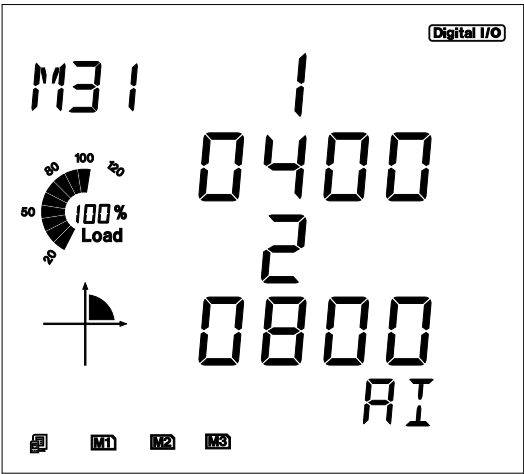


Figure 78 shows the AI value read on screen.

Figure 80. The AI Value Read on the Screen.



5. Extended Modules

5.2 Ethernet Module

5.2.1 Functional Description of the Ethernet Module

Please read the Technical Data and specifications of the Ethernet module in the Appendix prior to using it.

The PXM 1000 Ethernet Module module supports the Modbus-TCP protocol. When connected to the PXM 1000 series meter, it is a slave device that can only respond to queries. The default value for the Modbus Port is 502. The user defined range is 2000~5999.

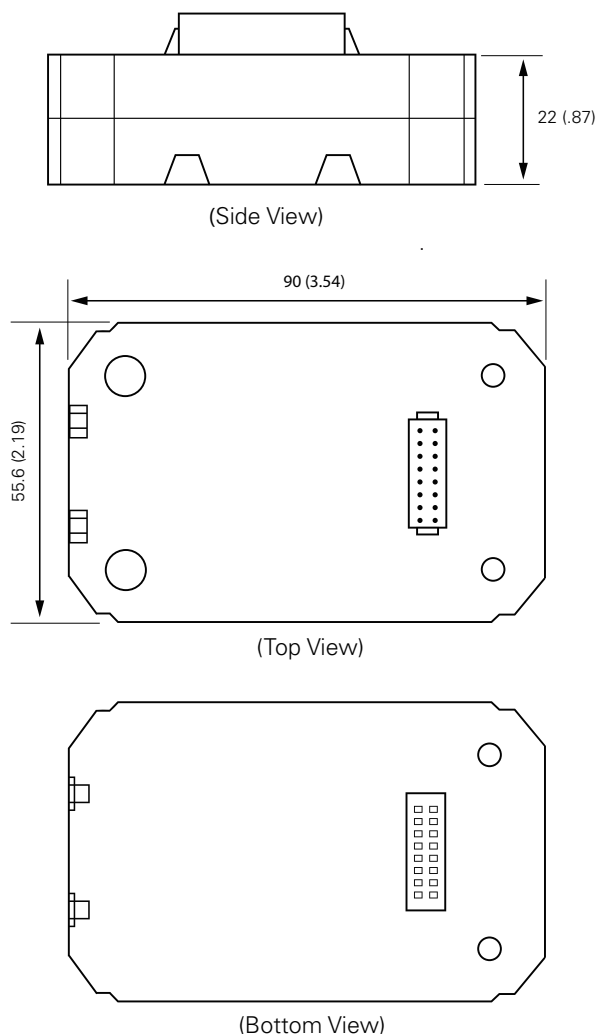
The PXM 1000 Ethernet Module supports the SMTP protocol. It has the ability to send emails based on a time interval or when there is a triggered event. It can send mail from encrypted servers and servers that use different SMTP ports.

The PXM 1000 Ethernet Module protocol supports HTTPS protocol. It is used as an HTTPS server and the default value of the protocol port is 443.

Using the HTTPS protocol, the PXM 1000 Ethernet Module can send post requests to both HTTP and HTTPS servers.

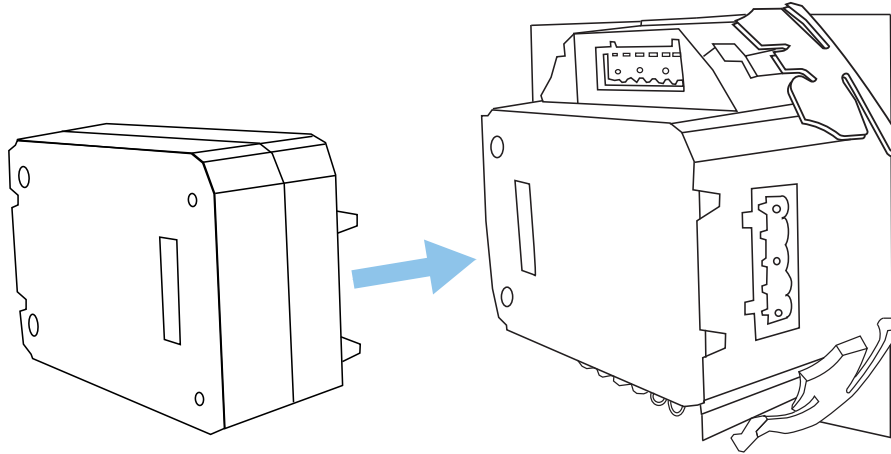
5.2.2. Appearance and Dimensions

Figure 81. Ethernet Module Dimensions



5.2.3. Installation Method

Figure 82. Plugging the Ethernet Module into the PXM 1000.



The PXM 1000 Ethernet Module module is linked to the PXM 1000 series meter by a communication plug. Other extended modules such as the IO modules can be linked to the PXM 1000 series meter through the PXM 1000 Ethernet Module.

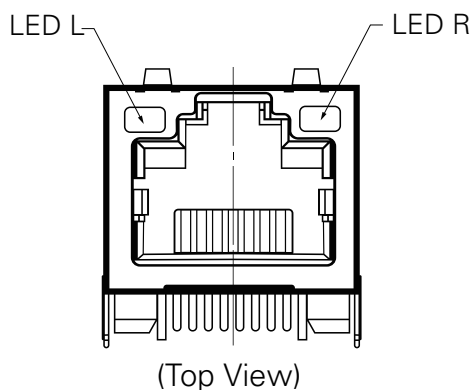
1. Remove the cover from the back of the PXM 1000 series meter exposing the communication socket
2. Insert the installation clips to the grooves in the PXM 1000 series meter and then press the PXM 1000 Ethernet Module module lightly to establish a linking between meter and module
3. Tighten the installation screws

Note: Installation with power supplied to the PXM 1000 meter is forbidden.

5.2.4. Definition of RJ45

The PXM 1000 Ethernet Module uses a standard RJ45 connector to access the Ethernet network.

Figure 83. Ethernet Module LED Indicator Locations.



5. Extended Modules

Table 13. Ethernet Module RJ45 Pinout Configuration

Pin	Signal	Description
1	TX+	Tranceive Data+
2	TX-	Tranceive Data-
3	RX+	Receive Data+
4	n/c	Not connected
5	n/c	Not connected
6	RX-	Receive Data-
7	n/c	Not connected
8	n/c	Not connected

LED_L (Yellow): Displays the speed status. When the LED is on, it indicates 100 Mbps, while an off LED represents a speed of 10 Mbps.

LED_R (Green): Displays the link and activity status. When the LED is on, it indicates that the link status. When the LED is flashing, it indicates that there is activity.

5.2.5. Initializing the Ethernet module

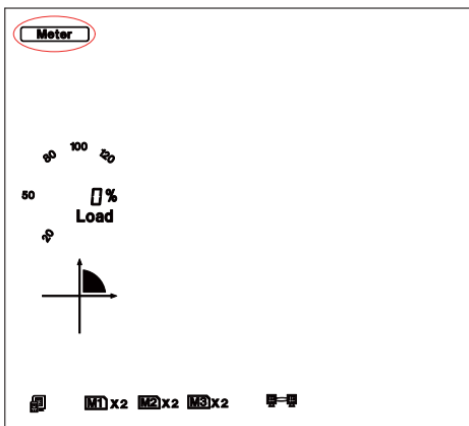
The default settings in the PXM 1000 series meter are as follows.

- IP address (192.168.1.254);
- Subnet mask (255.255.255.0);
- Gateway (192.168.1.1);
- Primary DNS server (202.106.0.20);
- Modbus Port 502.

This information can be found by using the buttons from the meter display. The following is how to configure the Ethernet module settings from the display:

1. Press the “H” and “V/A” buttons simultaneously on the PXM 1000 series meter. Release the buttons and the meter will enter the meter selecting mode, as indicated by the flashing “Meter” cursor.

Figure 84. Selecting Mode Menu.



- Press the "P" or "E" button to move the cursor to "Setting". Press "V/A" button to enter the parameter setting mode. The device address page is the first page of the "Setting" mode. It will show the Modbus address of the meter for a second before changing to the Password Setting Page and prompting for the password on the device. Press the "P" or "E" button to modify the password. Press the "V/A" button to confirm the password (default password is 0000) and enter the parameter setting page. Press the "P" or "E" button to move the cursor to "NET" and press the "V/A" button to enter the Ethernet module settings.

Figure 85. Password Setting Page.

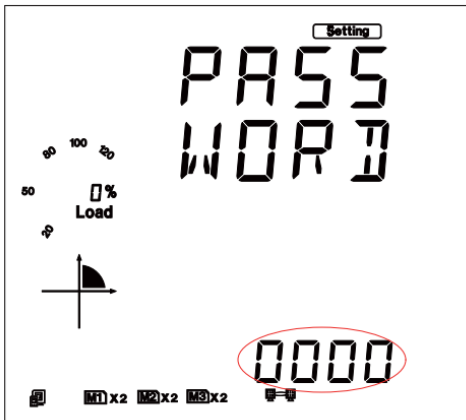


Figure 86. Parameter Setting Page.

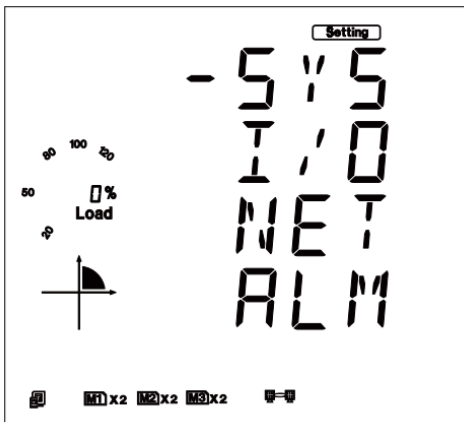
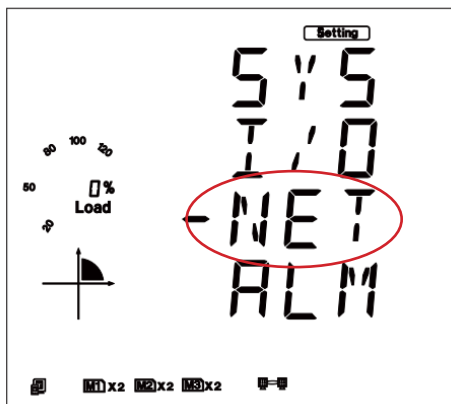


Figure 87. Ethernet Module Settings Page.



5. Extended Modules

- The first page of the NET Settings will be the N01 DHCP setting. By default, this is configured to Manual. Setting this configuration to Auto will allow the router to assign the meter with an IP address, while Manual will allow the user to configure the IP address. Press the "V/A" button to enter edit mode. Press "P" or "E" to change the setting and press "V/A" to confirm.

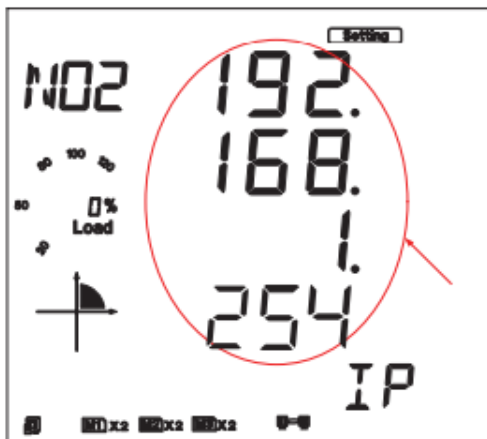
Note: If the DHCP is selected as Auto, the Ethernet module needs to be rebooted before it can be assigned with the new IP address. The reboot option is available in Step 11.

Figure 88. N01 DHCP Settings Page.



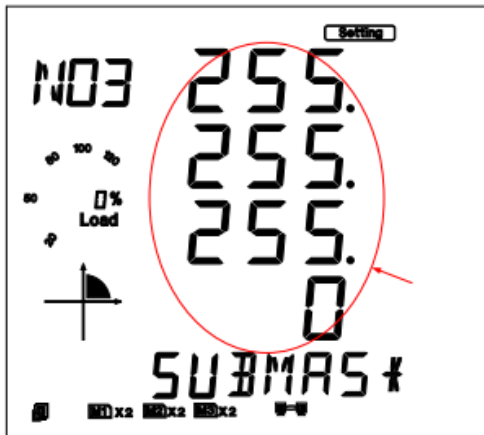
- Press "P" to get to "N02 IP address" page. This is the IP address of the meter and will be the IP address to access the web interface of the module. Users can configure the IP address if the DHCP is configured to Manual. Press "V/A" to configure the IP address. The cursor of the first digit will begin to flash. Press the "H" button to scroll through the digits, press the "P" or "E" to change the value of the flashing cursor and press "V/A" to confirm.

Figure 89. N02 IP Address Page.



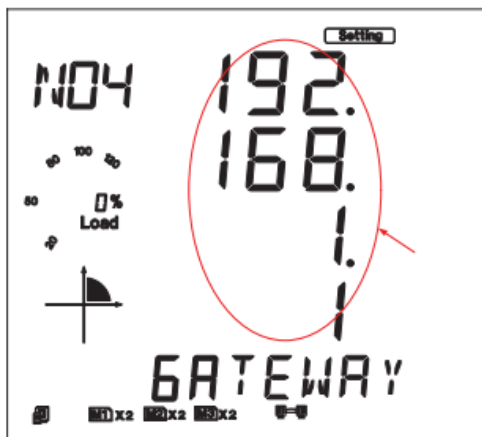
5. Press "P" to get to "N03 Subnet Mask" page. Press "V/A" to configure the subnet address. The cursor of the first digit will begin to flash. Press the "H" button to scroll through the digits, press the "P" or "E" to change the value of the flashing cursor and press "V/A" to confirm

Figure 90. N03 Subnet Mask Page.



6. Press "P" to get to "N04 Gateway" page. Press "V/A" to configure the gateway address. The cursor of the first digit will begin to flash. Press the "H" button to scroll through the digits, press the "P" or "E" to change the value of the flashing cursor and press "V/A" to confirm.

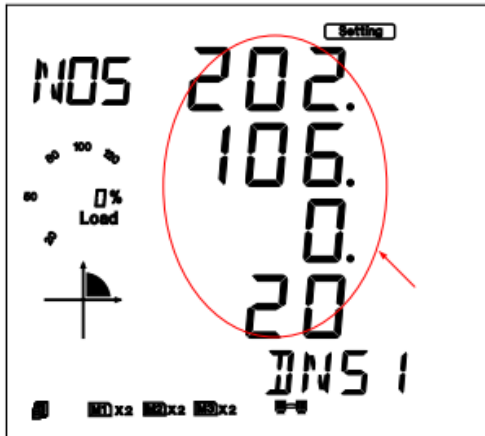
Figure 91. N04 Gateway Address Page.



5. Extended Modules

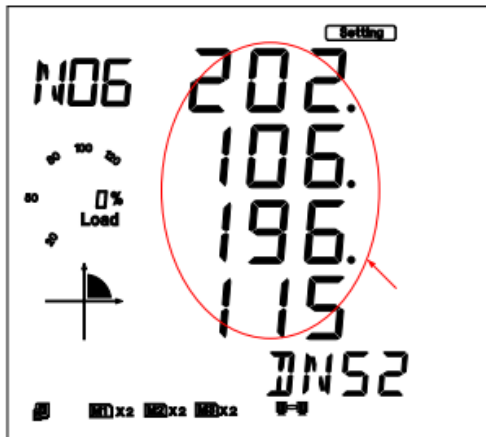
- Press "P" to get to "N05 DNS Primary Server" page. Press "V/A" to configure the DNS address. The cursor of the first digit will begin to flash. Press the "H" button to scroll through the digits, press the "P" or "E" to change the value of the flashing cursor and press "V/A" to confirm. The DNS parameters must be set correctly to use the SMTP, FTP/HTTP Post, and PX-EVA functions.

Figure 92. N05 DNS Primary Server Page.



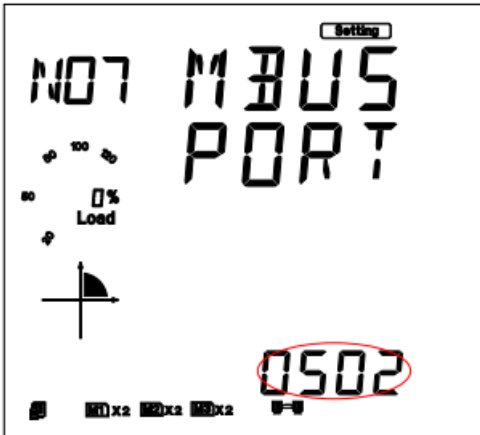
- Press "P" to get to "N06 DNS Secondary Server" page. Press "V/A" to configure the DNS secondary address. The cursor of the first digit will begin to flash. Press the "H" button to scroll through the digits, press the "P" or "E" to change the value of the flashing cursor and press "V/A" to confirm.

Figure 93. N06 DNS Secondary Server Page.



9. Press "P" to get to "N07 Modbus Port" page. Press "V/A" to configure the Modbus port. The cursor of the first digit will begin to flash. Press the "H" button to scroll through the digits, press the "P" or "E" to change the value of the flashing cursor and press "V/A" to confirm.

Figure 94. N07 Modbus Port Page.



10. Press "P" to get to "N08 HTTP Port" page. Press "V/A" to configure the HTTP port. The cursor of the first digit will begin to flash. Press the "H" button to scroll through the digits, press the "P" or "E" to change the value of the flashing cursor and press "V/A" to confirm.

Figure 95. N08 HTTP Port Page.



5. Extended Modules

11. Press "P" to get to "N09 Net Rest" page . After making any changes to the Network settings, users must reboot the Ethernet module from this page for the settings to take effect. Press "V/A" to reboot the module and the cursor will begin to flash. Press the "P" or "E" button to change the setting to "Reset" and press "V/A" to confirm. The cursor will return to "No" once successful.

Figure 96. N09 Network Reset page.



After configuring the PXM 1000 Ethernet Module module, press the "H" and "V/A" buttons simultaneously to return to the menu selection.

5.2.6. Cable

An RJ45 cable is needed to connect the meter to the network. A shielded twisted pair cable (standard 568A or standard 568B) is recommended as reference to the EIA/TIA standard.

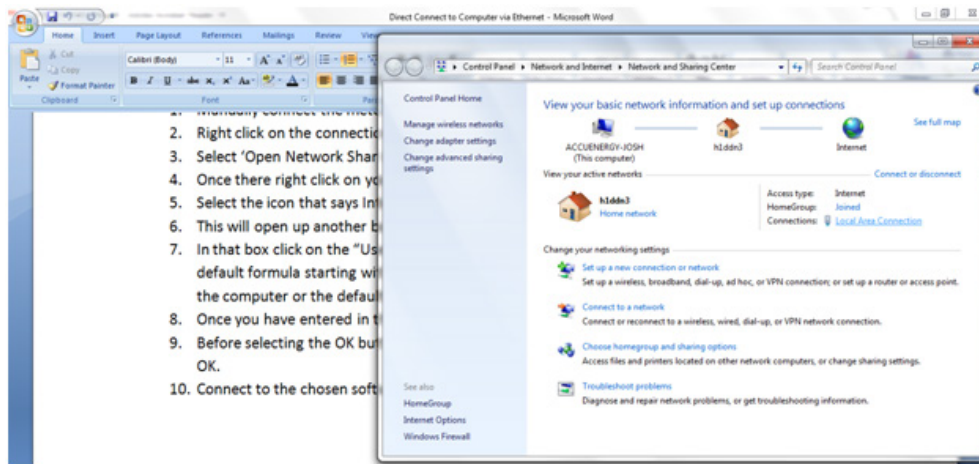
5.2.7. Connection Method

5.2.7.1. Direct Connect to a Computer

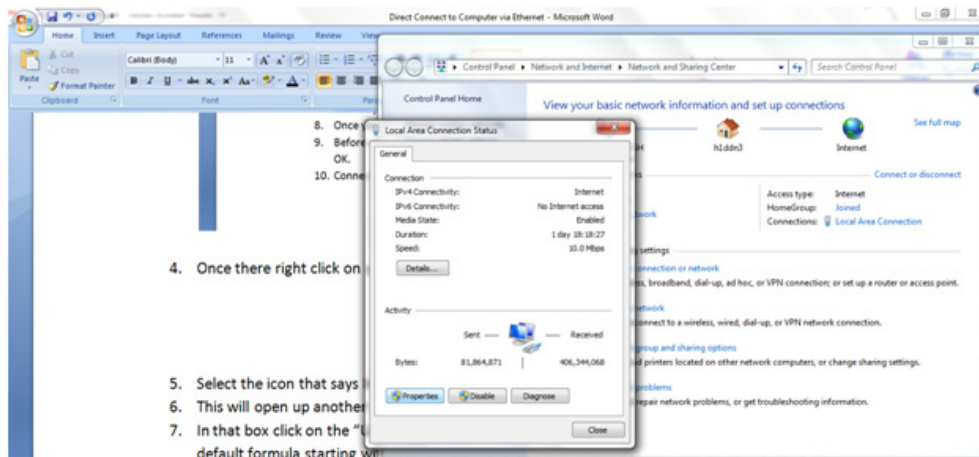
The PXM 1000 Ethernet Module can be connected to a computer using a crossover cable (standard 568A). The PXM 1000 Ethernet Module module supports Modbus-TCP and HTTPS functions for this method of connection.

To connect meter directly to the computer, the following can be done using a computer running the Windows OS.

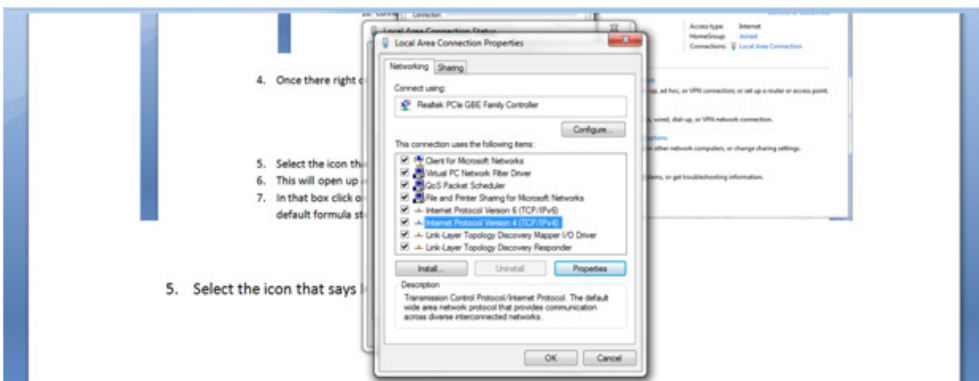
1. Manually connect the meter via Ethernet cable to the computer.
2. Right click on the connection icon.
3. Select "Open Network Sharing Center."

Figure 97. Network and Sharing Center Page.

4. Once there, right click on the "Local Area Connection" icon and click properties.

Figure 98. Local Area Connection Status Page.

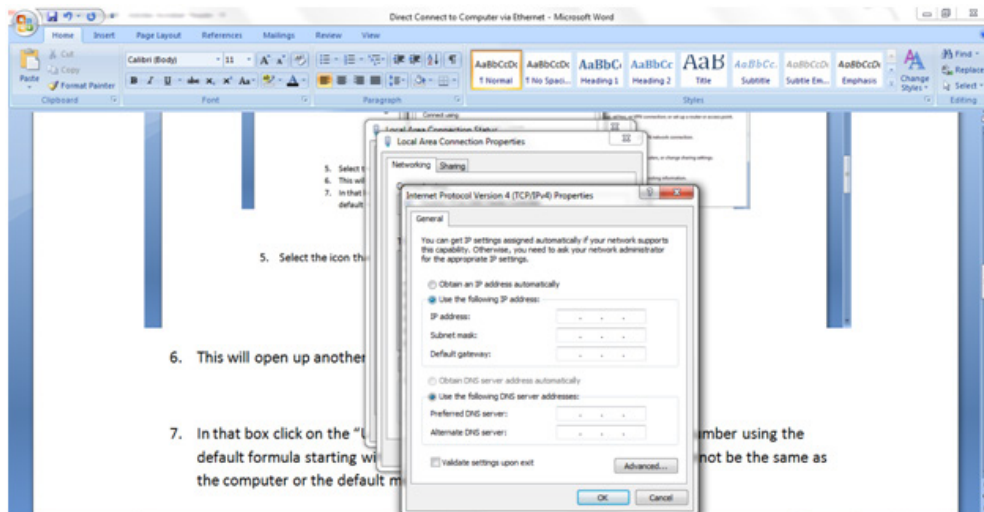
5. Select the icon that says "Internet Protocol Version 4 TCP/IP".

Figure 99. Selecting the "Internet Protocol Version 4 TCP/IP" Icon.

5. Extended Modules

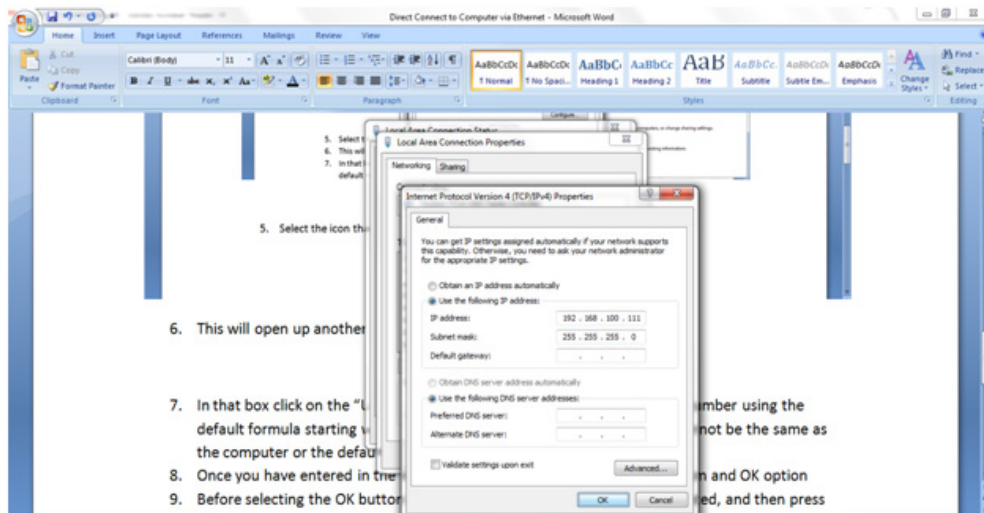
- The "Internet Protocol Version 4(TCP/IP) Properties" box will pop up.

Figure 100. The Internet Protocol Version 4 (TCP/IP) Properties box.



- Click on "Use the following IP address" and enter in an IP number so that meter and computer are in the same local network range. For example, if the meter has IP address of 192.168.1.254, then the computer must be assigned with a IP 192.168.1.xxx, where xxx can be any number but cannot be the same as the value assigned to the meter.

Figure 101. Entering the IP Addresses.



- Once you have entered in the IP address, press the Tab key on your keyboard until you reach the bottom and click OK.
- Before selecting the OK button, make note of the IP address you have assigned to the meter and then press OK.

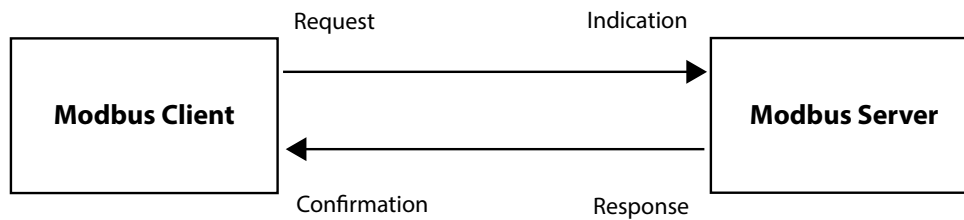
5.2.7.2 Direct Connect to Router/Switch

The PXM 1000 Ethernet Module can be connected to a router or switch using a patch cable. The DHCP can be configured to "Auto" to have the router assign the meter with an IP address or can be configured to "Manual" to set an IP address using the information in Chapter 5.

5.2.8 Description of Modbus-TCP Protocol

The Modbus-TCP protocol is the communication protocol in the PXM 1000 Ethernet Module. The protocol establishes a master and slave connection in Ethernet. The master device (client) first sets up a TCP-IP link with slave device (server). The master device then sends a request to the slave device and the slave device in return sends a response to the master device. The figure below shows how the Modbus-TCP protocol works.

Figure 102. Modbus-TCP Protocol.



5.2.8.1 Protocol

5.2.8.1.1 Data Frame Format

MBAP Header	Function	Data
7x8-Bits	8-Bits	Nx8-Bits

5.2.8.1.2 Modbus Application Header (MBAP Header) Field

Table 14. Modbus Codes Meaning and Actions.

Code	Meaning	Action
Transaction Identifier	2 bytes	Identification of a Modbus request/response transaction
Protocol Identifier	2 bytes	Modbus protocol = 0
Length	2 bytes	Number of following bytes
Unit Identifier	1 byte	Slave address, in the range of 0~247 decimal

5.2.8.1.3 Function Field

The function code field of a message frame contains eight bits. Valid codes are in the range of 1-255. When a message is sent from a client to as server device the function code field tells the server what kinds of action to perform.

Table 15. Function Codes Meaning and Actions.

Code	Meaning	Action
01	Read relay output status	Obtain current status of relay output
02	Read digital input (DI) status	Obtain current status of DI
03	Read data	Obtain current binary value in one or more registers
05	Control single relay output	Force relay to a state of On or Off
16	Write multiple registers	Place specific value into a series of consecutive multiple-registers

5. Extended Modules

5.2.8.1.4 Data Field

The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF. The data field of messages sent from a master to slave contains additional information which the slave must use to take the action defined by the function code. This can include information such as the register addresses, the quantity of registers to query, and the count of the actual number of data bytes. For example, if the master requests a slave to read a group of holding registers (function code 03) and the data field specifies the starting register and how many registers are to be read.

If the master needs to perform a write to a group of registers in the slave (function code 10 hexadecimal), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

5.2.8.2 Format of Communication

Table 16. Explanation of Frame.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Data # of Regs. High	Data # of Regs. Low
03H	40H	00H	00H	48H

The meaning of each abbreviated field in Table 16 is:

- Transaction Identifier High: High byte of transaction identifier;
- Transaction Identifier Low: Low byte of transaction identifier;
- Protocol Identifier High: High byte of protocol identifier;
- Protocol Identifier Low: Low byte of protocol identifier;
- Length High: High byte of length;
- Length Low: Low byte of length;
- Unit Identifier: Slave address;
- Fun.: Function code;
- Data Start Reg. High: High byte of starting register address;
- Data Start Reg. Low: Low byte of starting register address;
- Data # of Regs. High: High byte of number of registers;
- Data # of Regs. Low: Low byte of number of registers .

5.2.8.2.1 Read Status of Relay (Function Code 01)

This function code is used to read the relay output status in the PXM 1000 series meter.

1 = On 0 = Off

There are eight relay outputs in the PXM 1000 series meter and they start at address 0000H.

The following query is to read two relay output status of the PXM 1000 series address 1.

Query:**Table 17. Read Two Relay Output Status Query.**

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Data # of Regs. High	Data # of Regs. Low
01H	00H	00H	00H	02H

Response:

The PXM 1000 series meter responds back with the MBAP header, function code, quantity of data bytes, and the data.

An example of response to read the status of the first two relay outputs starting at 0000H is shown below. The status of relay output 1 and 2 corresponds to the last two bits of data.

Relay 1: Bit 0 **Relay 2: Bit 1**

Table 18. Example of Read Two Relay Output Status Response.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	04H	01H

Fun.	Byte Count	Data
02H	01H	02H

The content of the data is:

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	0

MSB**LSB**

(Relay 1 = OFF, Relay 2 = ON)

5.2.8.2.2 Read Status of DI (Function Code 02)

1 = On 0 = Off

There are 28 DIs in the PXM 1000 series meter starting at address 0000H.

The following query is to read four DI statuses of PXM1K-11X module with logic address of 1 in the PXM 1000 series meter.

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Query:

Table 19. Read Four DI Statuses Query.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Data # of Regs. High	Data # of Regs. Low
02H	00H	00H	00H	04H

Response:

The response includes the MBAP header, function code, quantity of data characters, and the data.

An example response from the meter to read the status of four DIs (DI1 = On, DI2 = On, DI3 = On, DI4 = On) is shown below. The status of each corresponds to the last four bits of the data.

DI1: bit0 **DI2: bit1** **DI3: bit2** **DI4: bit3**

Table 20. Example of Read Four DI Statuses Response.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	04H	01H

Fun.	Byte Count	Data
02H	01H	0FH

The content of the data is:

7	6	5	4	3	2	1	0
0	0	0	0	1	1	1	1

MSB

LSB

5.2.8.2.3 Read Data (Function Code 03)

Query:

This function allows the user to obtain the measurement results of the PXM 1000 series meter.

Below is an example to read six registers corresponding to the device clock of the meter, starting at 1040H.

Table 21. Read Six Register Time Query.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Data # of Regs. High	Data # of Regs. Low
03H	10H	40H	00H	06H

Response:

An example response is provided to read the time (2017-12-18 14:15:20).

Table 22. Example of Read Six Register Time Response.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Count	Data 1 High	Data 1 Low	Data 2 High	Data 2 Low	Data 3 High	Data 3 Low	Data 4 High	Data 4 Low	Data 5 High	Data 5 Low	Data 6 High	Data 6 Low
03H	0CH	07H	D6H	00H	0CH	00H	12H	00H	0EH	00H	0FH	00H	14H

5.2.8.2.4 Control Relay(Function Code05)**Query:**

This function code enables the control of a single relay output in the PXM 1000 series meter. Any relay output in the PXM 1000 series meter can be controlled On or Off starting at 0000H.

Sending the data "FF00H" will set the relay output On and sending "0000H" will turn it Off. All other values are illegal and will not affect they relay output status.

Table 23. Example of Request to a PXM 1000 Series Meter to Turn On Relay Output 1.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Data # of Regs. High	Data # of Regs. Low
05H	00H	00H	FFH	00H

Response:

The normal response to the command request is to retransmit the message as received after the relay output status has been altered.

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Table 24. Example of Turn On Relay Output 1 Response.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Value High	Value Low
05H	00H	00H	FFH	00H

5.2.8.2.5 Preset/Reset Multi-register (Function Code 16)

Query

This function code allows the user to modify the contents of a register. The example below is a request to a PXM 1000 series meter with device address 1 to preset the CT1(500) and CT2(5) registers. The CT1 data address is 1008H and CT2 is at 1009H.

Table 25. Example of Request to Preset the CT1(500) and CT2(5) Registers.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
00H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Data # of Regs. High	Data # of Regs. Low	Byte Count	Value 1 High	Value 1 Low	Value 2 High	Value 2 Low
10H	10H	08H	00H	02H	04H	01H	F4H	00H	05H

Response

The normal response to a preset multi-register request including the MBAP header, function code, data start register, and the number of registers is shown below.

Table 26. Example of Preset the CT1(500) and CT2(5) Registers Response.

Transaction Identifier High	Transaction Identifier Low	Protocol Identifier High	Protocol Identifier Low	Length High	Length Low	Unit Identifier
0010H	00H	00H	00H	00H	06H	01H

Fun.	Data Start Reg. High	Data Start Reg. Low	Data # of Regs. High	Data # of Regs. Low
10H	10H	08H	00H	02H

5.2.9 Web Interface Readings and Parameter Settings

The PXM 1000 Ethernet Module module supports the HTTPS protocol to allow for the use of a web interface. The user will need to access the PXM 1000 Ethernet Module web interface to configure the module and use its functions. The web interface allows for remote initial setup of the PXM 1000 meter.

The PXM 1000 Ethernet Module web interface allows for different user access levels.

In the following cases, the IP address of the module will be "192.168.1.161".

5.2.9.1 User Access Login

Enter the correct IP address of the module in the search bar of the internet browser to access the web interface of the PXM 1000 Ethernet Module.

The user will be redirected to a web page prompting to select the Access Level and enter appropriate password for that level.

The User level is ideal for users who need only to take readings and view status from the meter.

The default password for the User level is "view".

The Admin level is ideal for users who need access to configurations on the meter or the web interface and to view readings.

The default password for the Admin level is "admin".

The PXM 1000 Ethernet Module web interface will only allow one administrator and one user to be logged in at the same time. If another user logs in with the same access level, the previous user with that access level will be logged out.

Figure 103. Access Level Selection and Password Page.

The two different access levels are summarized below:

Table 27. Access Levels Summary.

Access Level	Default Password	Read Parameter/Status	Configure Settings
User	view	Yes	No
Admin	admin	Yes	Yes

5. Extended Modules

5.2.9.2 Dashboard

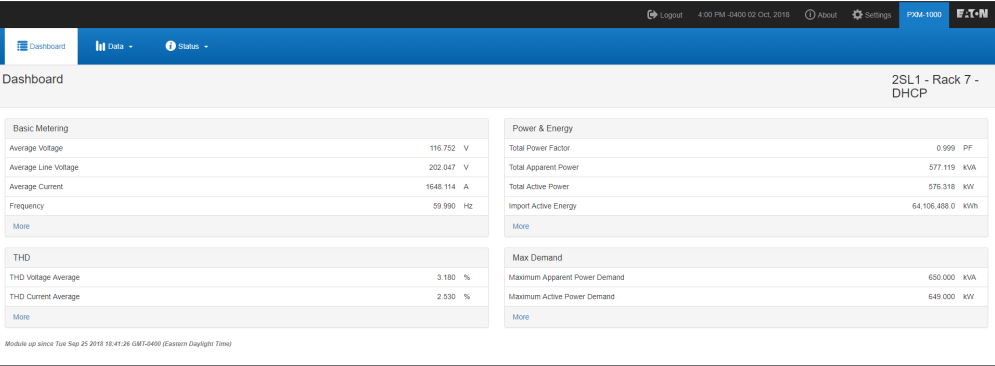
In the dashboard, the user will find the tabs to access different pages in the web interface such as "Data", "Status", and "Settings". The dashboard is the first page the user will see once they have entered the correct password for the appropriate access level. The dashboard is the same for both access levels.

The dashboard displays selected parameters from the different groups of metering parameters such as "Basic Metering", "Power & Energy", "THD" and "Max Demand". Clicking on "More" under any one of these four metering parameter groups will take the user to the web page which contains all the parameters supported by that metering parameter group.

In the bottom left corner of the page, the dashboard also displays how long the PXM 1000 Ethernet Module module has been connected to the network since the last reboot of the module.

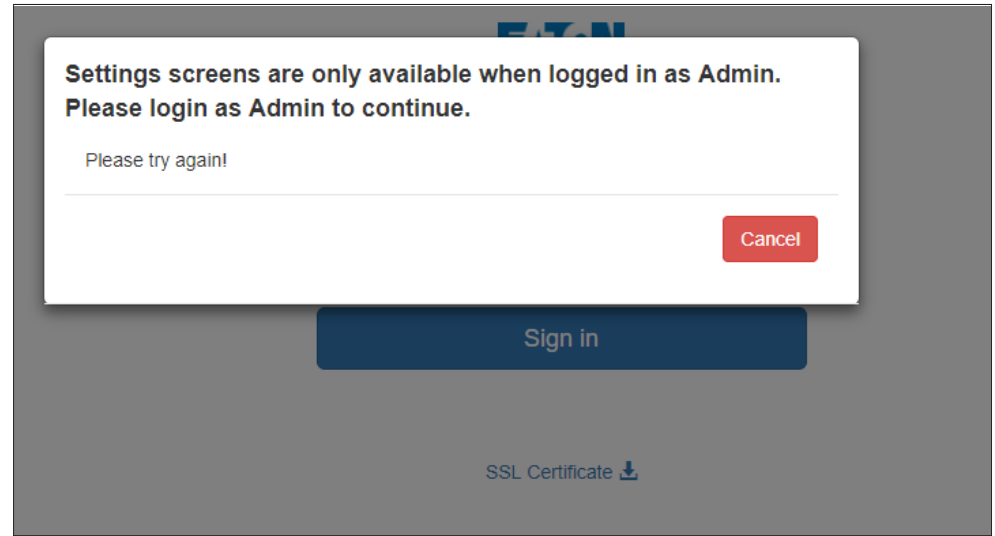
The parameters on this page are updated every five seconds.

Figure 104. Dashboard Page.



Note: If user is logged in with "User" access, clicking on "Settings" will automatically log the user out from the web interface.

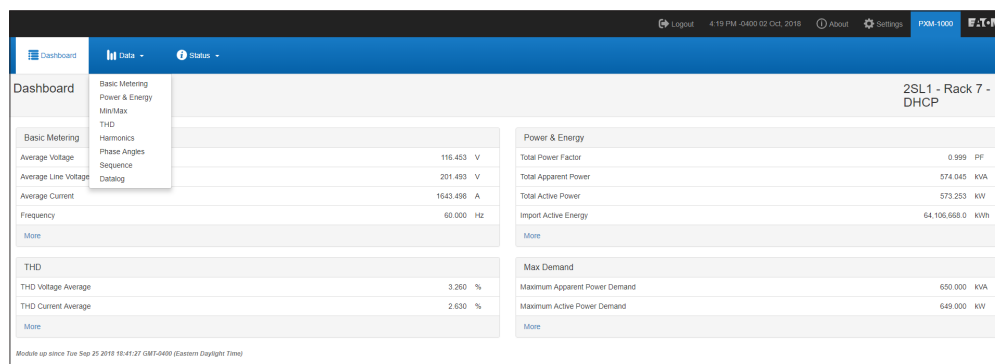
Figure 105. Access Level Verification and Password Page.



5.2.9.3 Data Web Page

Click on the “Data” tab to visit the metering data web pages. There are seven kinds of data parameter web pages. They are “Basic Metering”, “Power & Energy”, “THD”, “Harmonics”, “Harmonic”, “Phase Angles”, and “Sequence and Datalog”. Each web page shows data from the PXM 1000 series meter.

Figure 106. Available Data Parameter Pages.

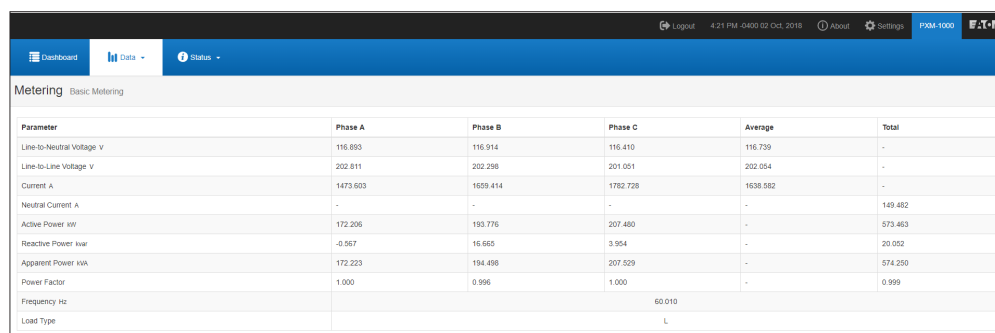


Basic Metering:

The Basic Metering web page includes the data of real-time parameters for the PXM 1000 series meter. This includes the Line Voltages, Phase Voltages, Current, Neutral Current, Active, Reactive and Apparent Power, Power Factor, Frequency, and Load type.

The parameters on this page are updated every five seconds.

Figure 107. Basic Metering Page.



Power & Energy:

The Power & Energy web page shows the energy data for the PXM 1000 series meter such as the Active and Reactive energy that is consumed and delivered as well as the Apparent energy per phase and total.

This web page also shows the Demand parameters for the Active, Reactive, and Apparent Power as well as the three phase Current demands.

The parameters in this web page are updated every five seconds.

5. Extended Modules

Figure 108. Power & Energy Page.

Logout

4 22 PM -0400 02 Oct, 2018

About

Settings

PXM-1000

E.T-M

Dashboard

Data

Status

Metering

Power & Energy

Energy by Consumption/Generation

Parameter	Import	Export	Total	Net
Active Energy kWh	64,106,700.000	327.200	64,107,028.000	64,106,376.000
Reactive Energy kvarh	4,302,211.000	24,893,698.000	29,195,908.000	-20,591,486.000
Apparent Energy kVAh	-	-	-	5,790,167.000

Energy by Phase

Parameter	Phase A	Phase B	Phase C
Import Active Energy	13,622,926.0	14,421,480.0	36,062,360.0
Export Active Energy kWh	158.2	142.2	102.5
Import Reactive Energy kvarh	1,115,755.8	1,729,305.6	1,457,884.5
Export Reactive Energy kvarh	29,403,434.0	45,418,040.0	50,072,952.0
Apparent Energy kVAh	22,412,920.0	31,126,532.0	52,250,708.0

Demand

Parameter	Phase A	Phase B	Phase C	Total
Active Power Demand kW	-	-	-	575.411
Reactive Power Demand kvar	-	-	-	20.339
Apparent Power Demand kVA	-	-	-	576.210
Current Demand A	1,473.722	1,685.547	1,781.092	-

Min/Max:

The Min/Max page shows the maximum and minimum statistics that the meter has recorded since the lifetime of the meter, or from the last reset of the min/max statistics as well as the time stamps at which they were recorded.

The parameters in this web page are updated every ten seconds.

Figure 109. Min/Max Page.

Dashboard

Data

Status

Logging

4:23 PM -0400 02 Oct, 2018

About

Settings

PXM-1000

E.T-M

Metering

MinMax

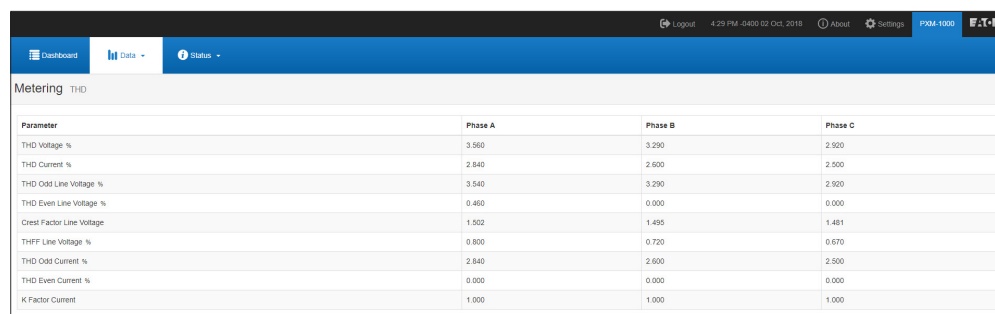
Parameter	Min	Min Timestamp	Max	Max Timestamp
Phase A Voltage V	0.000	2016-04-14 10:26:38	143.100	2016-01-23 10:56:19
Phase B Voltage V	0.000	2016-04-14 10:26:38	143.100	2016-01-23 10:56:21
Phase C Voltage V	0.000	2016-04-12 15:33:53	143.300	2016-01-23 10:56:22
Line Voltage AB V	0.000	2016-04-14 10:26:38	225.800	2016-01-23 10:56:18
Line Voltage BC V	0.000	2016-04-14 10:26:38	227.300	2016-01-23 10:56:20
Line Voltage CA V	0.000	2016-04-14 10:26:38	243.200	2016-06-14 13:47:15
Phase A Current A	0.000	2016-04-15 11:41:24	10490.000	2016-08-01 16:34:23
Phase B Current A	0.000	2016-04-15 11:41:24	12643.000	2016-08-01 16:34:23
Phase C Current A	0.000	2016-04-12 15:33:57	12017.000	2016-08-01 16:34:23
Active Power kW	-321.000	2016-07-23 11:59:40	3,932.000	2016-08-01 16:34:23
Reactive Power kvar	-210.000	2016-12-01 16:28:29	138.000	2016-06-05 09:16:52
Apparent Power kVA	0.000	2016-04-14 10:26:38	4,122.000	2016-08-01 16:34:23
Power Factor	-1.000	2016-07-23 11:59:41	1.000	2016-04-06 16:58:02
Frequency Hz	0.000	2016-04-11 12:45:14	60.730	2016-09-07 13:04:21
Active Power Demand kW	0.000	2016-04-11 12:45:14	649.000	2016-05-19 01:23:10
Reactive Power Demand kvar	-191.000	2017-10-01 02:37:06	24.000	2016-05-18 22:10:08
Apparent Power Demand kVA	0.000	2016-04-11 12:45:14	650.000	2016-05-19 01:26:11
Voltage Unbalance %	0.000	2016-04-06 16:11:30	100.000	2016-05-18 11:47:03
Current Unbalance %	0.000	2016-04-11 12:45:14	100.000	2016-05-18 11:47:03
Phase A Voltage THD %	0.000	2016-04-11 12:45:14	62.450	2016-03-24 05:37:06
Phase B Voltage THD %	0.000	2016-04-11 12:45:14	58.480	2016-03-24 05:37:06
Phase C Voltage THD %	0.000	2016-04-11 12:45:14	62.810	2016-03-24 05:37:06
Phase A Current THD %	0.000	2016-04-11 12:45:14	66.100	2016-06-05 09:15:17
Phase B Current THD %	0.000	2016-04-06 20:05:20	61.170	2016-06-05 09:16:53
Phase C Current THD %	0.000	2016-04-11 12:45:14	64.430	2016-06-05 09:15:25

THD:

The THD web page shows the power quality data such as the THD, THFF, Crest, and K Factor for both the voltage and current.

The parameters in this web page are updated every 15 seconds.

Figure 110. THD Page.



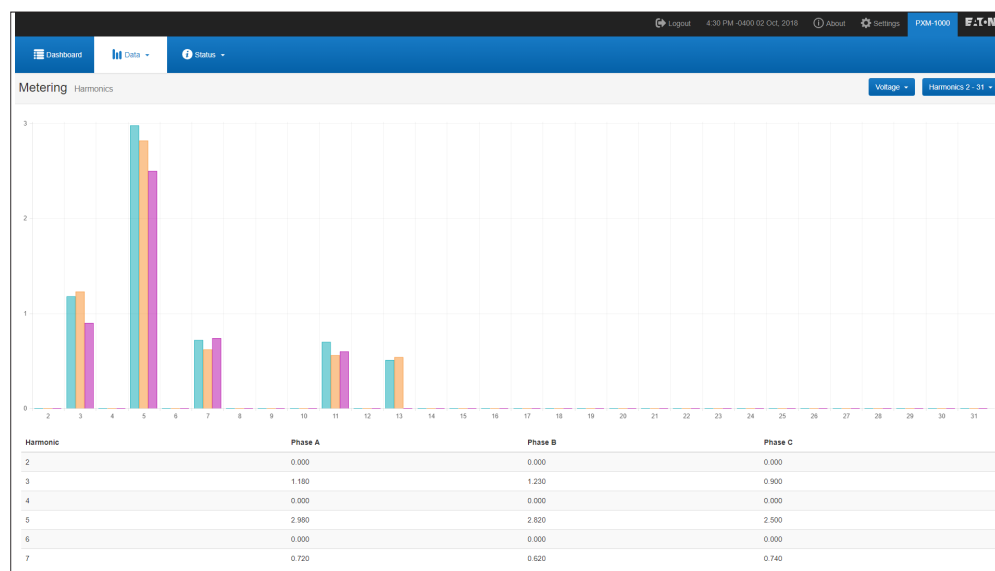
Parameter	Phase A	Phase B	Phase C
THD Voltage %	3.560	3.290	2.920
THD Current %	2.840	2.600	2.500
THD Odd Line Voltage %	3.540	3.290	2.920
THD Even Line Voltage %	0.460	0.000	0.000
Crest Factor Line Voltage	1.502	1.495	1.481
THFF Line Voltage %	0.800	0.720	0.670
THD Odd Current %	2.840	2.600	2.500
THD Even Current %	0.000	0.000	0.000
K Factor Current	1.000	1.000	1.000

Harmonics:

The Harmonics web page will show the harmonics of the voltage and the current waveform being measured. It will display the harmonics of each phase in graphical and tabular format. Select between voltage and current to view their respective harmonics as well as between the 2nd-31st harmonics or 32nd-63rd from the drop down list.

The parameters in this web page are updated every 15 seconds.

Figure 111. Harmonics Page.



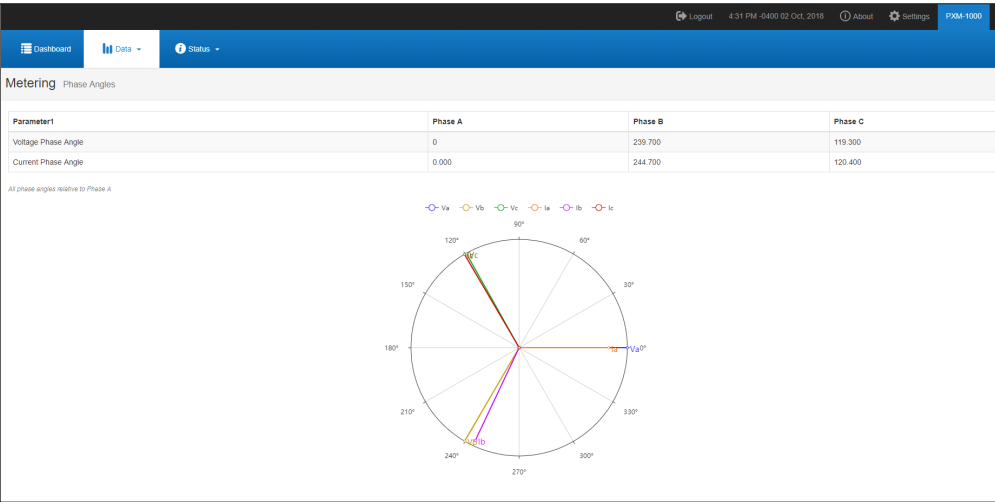
5. Extended Modules

Phase Angles:

The Phase Angles web page will show the phase angles of the voltage and current waveform being measured which can be used for remote troubleshooting. This page provides a visual diagram of the phase angles with respect to the voltage connected to the Phase A voltage input.

The parameters in this web page are updated every five seconds.

Figure 112. Phase Angles Page.

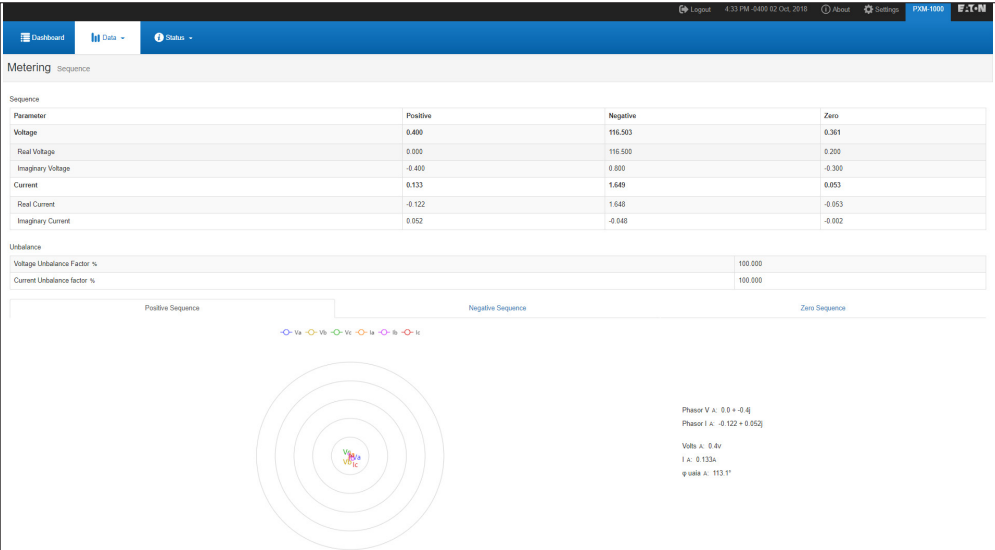


Sequence:

The Sequence web page will show the positive, negative, and zero components of the volt- age and current waveform being measured.

The parameters in this web page are updated every 15 seconds.

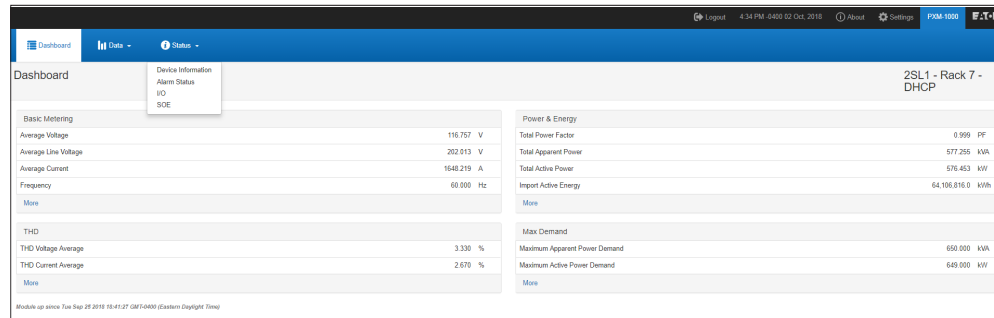
Figure 113. Sequence Page.



5.2.9.4 Status Web Page

Click on the “Status” tab to visit the status parameter web pages. There are four kinds of status web pages. They are "Device Information", "Alarm Status", "I/O", and “SOE” statuses. Each web page shows different statuses or information about the PXM 1000 series meter.

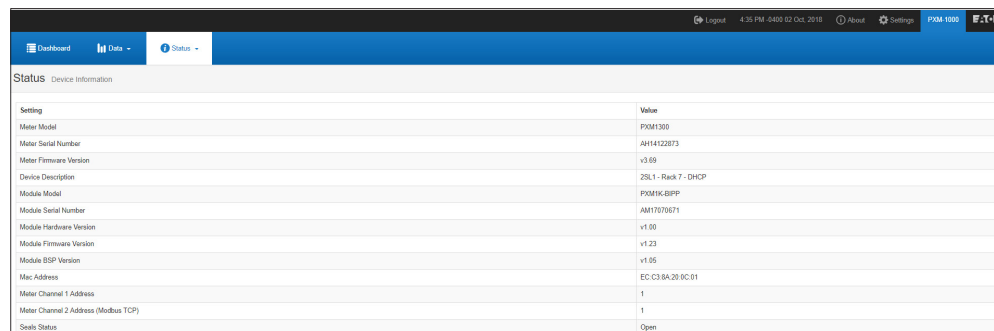
Figure 114. Available Status Pages.



Device Information:

The Device Information web page shows information about the PXM 1000 series meter and PXM 1000 Ethernet Module module. It contains the model of the PXM 1000 series meter, serial number, firmware version, and meter addresses. It also contains the serial number, hardware and firmware version, as well as the MAC address of the PXM 1000 Ethernet Module module.

Figure 115. Device Information Page.



Alarm Status:

The alarm status web page shows the alarm log of the meter. It will show the status of up to 16 alarm events indicating the alarm ID, status, parameter, value, and time stamp of the alarm event.

Once all 16 alarm events are full, the newest alarm event will then wrap around to alarm 1.

The parameters in this web page are updated every ten seconds.

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Figure 116. Alarm Status Page.

Status Alarm Status					
	Alarm ID	Status	Parameter	Value	Timestamp
Alarm 1	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 2	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 3	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 4	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 5	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 6	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 7	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 8	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 9	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 10	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 11	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 12	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 13	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 14	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 15	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000
Alarm 16	0	Cleared	Frequency	0.000Hz	0000-00-00 00:00:00.000

I/O:

The I/O web page will display the status of the I/O modules that are connected and their values, depending on the model of the module that is connected to the meter - i.e. - the PXM1K-110 module will display the Relay Output status (on/off), DI status/counter. The parameters in this web page are updated every five seconds.

Figure 117. I/O Page.

Status I/O					
PXM-IO11 Module Disabled					
PXM-IO21 Module Disabled					
PXM-IO31 Module Disabled					
PXM-IO12 Module Enabled					
Relay Output					
RO1	On	RO2			Off
Digital Input					
DI1 Status	On	DI2 Status			Off
DI3 Counter	4	DI4 Status			On
DI5 Status	Off	DI6 Status			On
PXM-IO22 Module Disabled					
PXM-IO32 Module Enabled					
Relay Output					
RO1	On	RO2			Off
Analog Input					
AI1	0.001mA	AI2			0.001mA
Digital Input					
DI1 Status	Off	DI2 Status			Off
DI3 Status	Off	DI4 Status			Off

SOE (Sequence of Event):

The SOE web page will display the Sequence of Event log for the enabled I/O module that is attached to the PXM 1000 series meter with time stamps. It will display the DI status for up to 20 events. The parameters in this web page are updated every ten seconds.

Figure 118. SOE Page.

Group	DI1 Status	DI2 Status	DI3 Status	DI4 Status	DI5 Status	DI6 Status	Timestamp
Group 1	ON	OFF	OFF	ON	ON	ON	2018-10-02 16:45:08.771
Group 2	ON	OFF	OFF	ON	ON	OFF	2018-10-02 16:45:08.774
Group 3	ON	OFF	OFF	OFF	ON	OFF	2018-10-02 16:45:08.776
Group 4	OFF	OFF	OFF	OFF	ON	OFF	2018-10-02 16:45:08.908
Group 5	OFF	OFF	OFF	ON	ON	ON	2018-10-02 16:45:10.495
Group 6	OFF	OFF	OFF	ON	ON	ON	2018-10-02 16:45:10.495
Group 7	OFF	OFF	OFF	ON	ON	ON	2018-10-02 16:45:10.500
Group 8	ON	OFF	OFF	ON	OFF	ON	2018-10-02 16:45:10.682
Group 9	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 10	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 11	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 12	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 13	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 14	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 15	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 16	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 17	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 18	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 19	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000
Group 20	OFF	OFF	OFF	OFF	OFF	OFF	2000-00-00 00:00:00.000

5.2.9.5 Settings Web Page

Click on the “Settings” tab to visit the parameter setting web pages that can be configured from the PXM 1000 Ethernet Module module. There are four parameter settings that can be configured. They are “Meter”, “Communications”, “Management”, and “Firmware” settings. Each settings web page will require the PXM 1000 Ethernet Module module to be rebooted from the Management web page after any configuration is saved, so the saved changes can take effect.

Note: The Settings web page will only be accessible at Admin level.

Figure 119. Settings Page.



Meter Setting:

The meter setting web page will allow user to configure basic meter settings in order for the meter to measure the voltage and current and display it correctly.

Voltage Wiring: Select how the meter’s voltage input terminal is wired by selecting a configuration from the drop down list - i.e. - for a three-phase three-wire configuration without a neutral, select 3LL.

Current Wiring: Select the number of CT’s that are connected to the meter’s current input terminal by selecting a number from the drop down list.

PT1: Enter the rated input of the potential transformer that is connected to the meter. Possible range is from 50 to 1,000,000V.

CT1: Enter the rated input of the current transformer that is used with the meter. Possible ranges for the CT1 is from 1 to 50,000 A.

PT2: Enter the rated output of the potential transformer. Possible range is from 50 to 400 V.

CT2: Select the rated output of the current transformer from the drop down list. By default this setting is already configured.

5. Extended Modules

Real time Reading: Select the mode of the readings for the meter when it is polled through Modbus. By default the meter is in secondary mode which will require some parameters to be scaled by a relationship. Configuring the meter in primary mode does not require any scaling.

I A Direction: Represents the flow of direction for the Phase A current being measured. Configure this setting to troubleshoot issues related to incorrect polarity of readings such as real power, Power Factor, etc.

I B Direction: Represents the flow of direction for the Phase B current being measured. Configure this setting to troubleshoot issues related to incorrect polarity of readings such as real power, Power Factor, etc.

I C Direction: Represents the flow of direction for the Phase C current being measured. Configure this setting to troubleshoot issues related to incorrect polarity of readings such as real power, Power Factor, etc.

Click “Save” after changing any settings.

Figure 120. Meter Settings Page.

Settings Meter Save

Device Description
PXM1300TA13 @ 28.1 DHCP

Voltage Wiring
3LN - Three Phase Four Wire Y

Current Wiring
3CT

PT1
400.0
Default 400, Range 50-1,000,000

CT1
500
Default 5, Range 1-50,000

PT2
400.0
Default 400, Range 50-400

CT2
333mV

Realtime Reading
☐ Secondary
☒ Primary

I A Direction
☒ Positive
☐ Negative

I B Direction
☒ Positive
☐ Negative

I C Direction
☒ Positive
☐ Negative

Save

Communication:

The communication setting web page will allow the user to configure settings related to the Ethernet network. The functions that the PXM 1000 Ethernet Module support can be configured from this web page by selecting the corresponding tab such as Emails, Time/Date, Datalog, HTTP/FTP Post, PX-EVA Post for communicating with the PX-EVA software, and SNMP.

Figure 121. Communications Settings Page.

The screenshot shows the 'Communications' tab in the 'Settings' section of the PXM 1000 web interface. The top navigation bar includes 'Meter', 'Communications', 'Management', and 'Firmware'. The 'Settings' section has a 'Save' button. The 'Communications' sub-section includes tabs for 'Network', 'Email', 'Time/Date', 'Catalog', 'HTTP/FTP Port', 'BACnet-IP', 'PX-EVA Port', and 'SNMP'. The 'Network' tab is active, showing the following settings:

- DHCP:** Radio buttons for 'Manual' and 'Auto'. 'Auto' is selected.
- DHCP DNS Server 1:** Text input field with '192.168.2.146' and a default value of '8.8.8.8'.
- DHCP DNS Server 2:** Text input field with '192.168.2.146' and a default value of '8.8.4.4'.
- Allow HTTP:** Radio buttons for 'No' and 'Yes'. 'Yes' is selected.
- HTTPS Port:** Text input field with '443' and a default value of '443, Range: 6000-9999'.
- Modbus TCP Port:** Text input field with '502' and a default value of '502, Range: 2000-5999'.
- Meter Channel 2 Address (Modbus TCP):** Text input field with '1' and a range of '1-247'.
- Proxy Server Enable:** Radio buttons for 'No' and 'Yes'. 'Yes' is selected.
- Proxy Server URL:** Text input field with 'proxy.etn.com'.
- Proxy Server Port:** Text input field with '8080'.

A 'Save' button is located at the bottom left of the settings area.

Network:

DHCP: Select “Manual” to manually configure the IP address to access the meter. If set to “Manual”, you will also need to set the Subnet Mask and Gateway.

Select “Auto” to have the meter assigned a IP address automatically. With this selection the Subnet Mask, Gateway and DNS servers will also be automatically assigned.

Note: After changing DHCP to Auto, check the display of the meter to obtain the new IP address that has been assigned after the PXM 1000 Ethernet Module has completed its reboot and the router has assigned the meter with an IP address.

IP Address: If the DHCP is configured to Manual, the IP address can be configured from this page.

Subnet Mask: If the DHCP is configured to Manual, the Subnet Mask can be configured from this page.

Gateway: If the DHCP is configured to Manual, the Gateway can be configured from this web page.

DHCP DNS Server 1: Enter the address of the DNS 1 server in this page.

DHCP DNS Server 2: Enter the address of the DNS 2 server in this page.

Allow HTTP: Enable this setting so that the PXM 1000 Ethernet Module can be accessed through HTTP at port 80.

HTTPS Port: Enter the HTTPS port number of the meter. By default, this setting is configured to 443. The range can be from 6000 to 9,999.

Note: This setting should never be configured to 80.

Modbus TCP Port: Enter the Modbus port number of the meter. By default, this setting is configured to 502. The range can be from 2,000 to 5,999.

Proxy Server Enabled: Enable this setting so that the PXM 1000 Ethernet Module can act as an intermediary to communicate with another server.

Click “Save” after changing any settings. Users will be prompted to reboot the PXM 1000 Ethernet Module immediately or later. If later is chosen the PXM 1000 Ethernet Module will need to be rebooted from the “Management” page.

5. Extended Modules

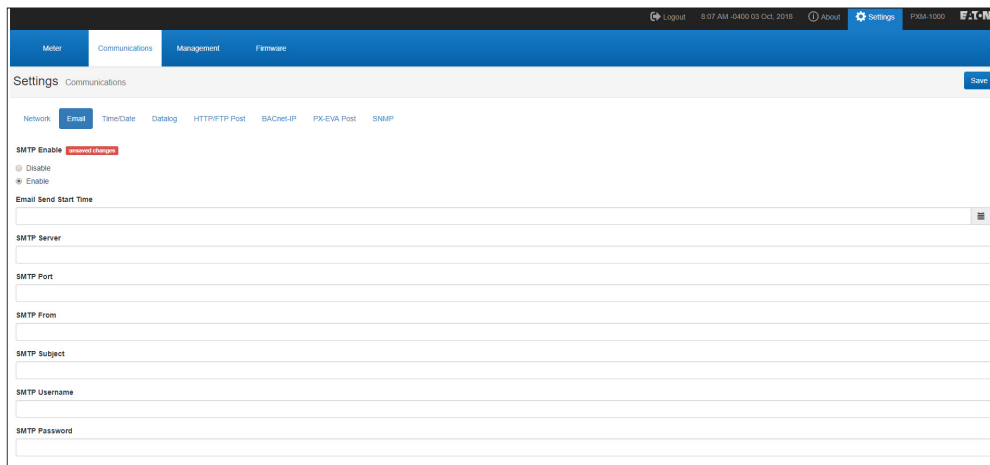
Emails:

The PXM 1000 Ethernet Module supports the SMTP protocol so users can setup the email function on the PXM 1000 Ethernet Module to enable the meter to send emails based on a time interval or when there is an alarm or SOE event or a combination of both. Users must know their SMTP server provider and details regarding their SMTP server, which can be provided by users' IT personal.

There are three modes available for sending emails that the user can enable. The first mode is "Triggered Sending" where emails are sent immediately when there is a new alarm or SOE event. The second mode is "Timed Sending". Users can receive emails at a certain period of time based on the time interval configured and the email will include the data that is selected to be sent. The third mode is when both of the above are enabled.

Users can configure the mail function for their needs by clicking on the "Settings" tab and selecting "Communications". Once redirected to the Communications web page, select "Email".

Figure 122. Email Settings Page.



The screenshot shows the 'Email Settings' page within the PXM 1000 web interface. The top navigation bar includes 'Meter', 'Communications', 'Management', and 'Firmware'. The 'Settings' tab is active, and the 'Email' sub-tab is selected. The page contains the following fields and options:

- SMTP Enable:** A dropdown menu with 'Enable' selected (indicated by a red 'Selected/Default' label).
- Email Send Start Time:** A date and time picker.
- SMTP Server:** A text input field.
- SMTP Port:** A text input field.
- SMTP From:** A text input field.
- SMTP Subject:** A text input field.
- SMTP Username:** A text input field.
- SMTP Password:** A text input field.

To use this function the following settings need to be configured.

SMTP Enable: Select "Enable" to further configure the settings related to the SMTP function.

Email Send Start Time: Use the calendar date picker to select the date and time to begin sending email notifications.

SMTP Server: Enter the URL of a valid SMTP server - i.e. - mail.eaton.com or smtp.gmail.com.

SMTP Port: Enter the port number associated with the SMTP server.

SMTP From: Enter a name or phrase which will appear to let you know who the mail is from - i.e. - "Technical Support".

SMTP Username: Enter the SMTP user name for the SMTP server set above.

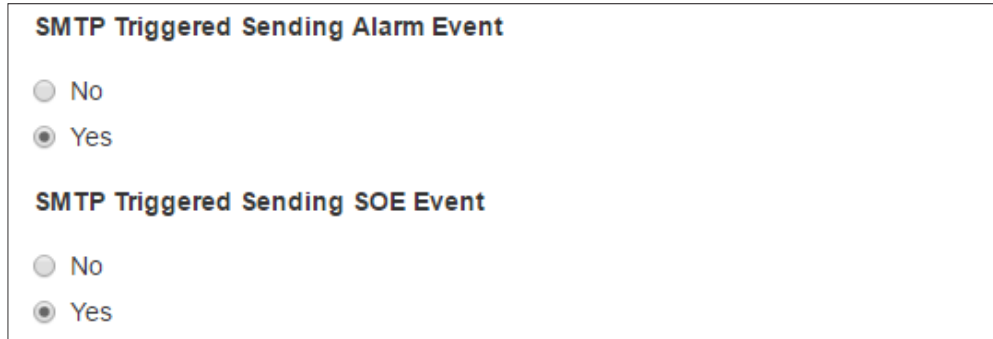
SMTP Password: Enter the SMTP user password for the user set above.

SMTP To Address 1; 2; 3: Enter up to three recipients that you wish to have the email sent to in "SMTP To Address 1", "SMTP To Address 2", and "SMTP To Address 3".

After configuring the above settings, the next step is to select the content for the emails.

To enable emails to be sent based on a new Alarm or SOE Event, select “Yes” under “SMTP Triggered Sending Alarm Event” or “SMTP Triggered Sending SOE Event”.

Figure 123. SMTP Triggered Page.



The screenshot shows a configuration page with two sections. The first section is titled "SMTP Triggered Sending Alarm Event" and has two radio button options: "No" and "Yes", with "Yes" being selected. The second section is titled "SMTP Triggered Sending SOE Event" and also has two radio button options: "No" and "Yes", with "Yes" being selected.

To receive email reports at timed intervals, configure the following settings:

SMTP Timed Sending Interval: Configure this setting with a value between 5-1440 minutes. This represents how often the emails will be sent.

To receive emails on specific groups of parameters select “Yes” under “SMTP Timed Sending xxx”.

Where xxx can be for receiving emails on:

- **Metering:** Report on real time voltage, current, power, etc.;
- **Energy:** Report on energy parameters;
- **Harmonics:** Report on the voltage and current harmonics from 2nd to 63rd;
- **Sequence:** Report on the positive, negative, and zero components of the voltage and current waveform;
- **Min/Max:** Report on the maximum and minimum statistics that the meter has recorded since the lifetime of the meter or from the last reset of the min/max statistics;
- **Alarm:** Report of the alarm log;
- **SOE Record:** Report of the SOE log.

Click “Save” after changing any settings. Users will be prompted to reboot the PXM 1000 Ethernet Module immediately or later. If later is chosen the PXM 1000 Ethernet Module will need to be rebooted from the “Management” page.

5. Extended Modules

Figure 124. Receive Email Page.

SMTP Timed Sending Interval

5

SMTP Timed Sending Metering

No

Yes

SMTP Timed Sending Energy

No

Yes

SMTP Timed Sending Harmonics

No

Yes

SMTP Timed Sending Sequence

No

Yes

SMTP Timed Sending Min/Max

No

Yes

SMTP Timed Sending Alarms

No

Yes

SMTP Timed Sending SOE Record

No

Yes

Save

Time/Date:

The device clock of the PXM 1000 series meter can be set through the web interface of the PXM 1000 Ethernet Module module. The PXM 1000 Ethernet Module module also supports the Simple Network Time Protocol (SNTP) protocol so that the module can update the meter’s device clock by synchronizing with a time server.

The PXM 1000 Ethernet Module can sync with up to three time servers. If a time server is down, the module will synchronize with the second or third time server if they are configured.

The settings for the time and date can be found by clicking on the “Settings” tab and selecting “Communications.” Click “Time/Date” to access the web page.

Figure 125. Time/Date Settings Page.

Logout

8:18 AM - 04/09/2018

About

Settings

PXM-1000

Eaton

Model

Communications

Management

Firmware

Settings

Communications

Save

Network

Email

Time/Date

Datalog

HTTP/FTP Post

BACnet-IP

PX-EVA Post

SNMP

SNTP Enable

Unsaved changes

Disable

Enable

Device Clock

October 3, 2018 8:16 AM

Time Zone

USA (Eastern)

Save

SNTP Enable: Select “Yes” to enable the function and to further configure the settings related to the SNTP function.

Device Clock: The device clock of the PXM 1000 series can be configured from this setting.

Time Zone: Select the time zone the meter is in or the time zone in which you would like the meter’s time to be synchronized to from the drop down list.

SNTP Interval: Enter a number from 1 min to 6,000 minutes to configure how often the meter will synchronize it’s time with the time server.

SNTP Server 1; 2; 3: Enter up to three SNTP servers in the "SNTP Server 1", "SNTP Server 2", and "SNTP Server 3" fields.

Examples of North American SNTP servers are:

0.us.pool.ntp.org

1.us.pool.ntp.org

2.us.pool.ntp.org

3.us.pool.ntp.org

For more NTP servers based on region, visit the following site:

<http://www.pool.ntp.org/en/>

Click “Save” after changing any settings. Users will be prompted to reboot the PXM 1000 Ethernet Module immediately or later. If later is chosen the PXM 1000 Ethernet Module will need to be rebooted from the “Management” page.

Figure 126. Time/Date Servers Page.

The screenshot shows the 'Time/Date' configuration page within the PXM 1000 web interface. The page has a blue header with navigation tabs: Motor, Communications, Management, and Firmware. Below the header, there's a 'Settings' section with sub-tabs: Network, Email, Time/Date (selected), Datalog, HTTP/FTP Post, BACnet/IP, PK-EVA Post, and SNMP. The 'Time/Date' sub-tab is active, showing the following settings:

- SNTP Enable:** Radio buttons for 'Disable' and 'Enable'. 'Enable' is selected.
- SNTP Interval (minutes):** A text input field containing '60'. Below it, a range 'range: 1-6000 minutes' is displayed.
- SNTP Server 1:** A text input field containing '10.130.15.225'.
- SNTP Server 2:** A text input field containing '10.130.12.49'.
- SNTP Server 3:** A text input field containing '151.110.126.15'.
- Device Clock:** A date and time field showing 'October 3, 2018 8:16 AM'.
- Time Zone:** A dropdown menu showing 'USA (Eastern)'.

A 'Save' button is located at the bottom right of the settings area.

Datalog:

The PXM 1000 Ethernet Module supports logging data onto its memory. Once enabled, the module can log up to a day or month of data. The data can be downloaded as a .csv file using a FTP client.

The PXM 1000 Ethernet Module can log data at intervals of time ranging from 15 seconds to 1 month.

5. Extended Modules

Figure 127. Datalog Settings Page.

The screenshot shows the 'Datalog' settings page within the 'Settings' section of the PXM 1000 web interface. The page has a blue header with navigation tabs: Meter, Communications, Management, and Firmware. The 'Settings' tab is active, and the 'Datalog' sub-tab is selected. The page contains several configuration sections: 'Data Upload' with radio buttons for 'Disable' and 'Enable' (selected); 'Log Start Time' with a date/time picker set to 'August 7, 2018 11:43 AM'; 'Log Interval' with a dropdown menu set to '5 minutes'; 'Backup File Length' with a dropdown menu set to '1 day'; 'Backup File Prefix' with a text field containing 'PXM1K_14_208_logger1'; 'SFTP Enable' with radio buttons for 'Disable' and 'Enable' (selected); and 'SFTP Password' with a text field containing 'eaton'. There are buttons for 'Reset SFTP Password' and 'Save' at the bottom.

Data Upload: To use the datalog function to log the data onto the module, select the Enable option to view and configure the settings that are applicable.

Once enabled, the following settings related to when the logging of the data will begin. How often the data should be logged, the format and prefix of the file name, and how the time stamp will be represented need to be configured:

Log Start Time: Select a valid time for the meter to start logging the data.

Note: The device clock of the meter should be correctly configured and up to date.

Log Interval: Select how frequently the module will log data to the file from the drop down list. The logging interval can be from 15 seconds to 1 month.

Backup File Length: Select the length of the log file, as either 1 day or 1 month of data, from the drop down list.

Backup File Prefix: Provide a name for the log file which will be appended to the beginning of the log file. By default "logger1" will be appended to the beginning of the log file.

SFTP Enable: To download the logged data from the module using a FTP client, select Enable. The log file will then be available to be downloaded using a FTP client using the following credentials:

Host: sftp://IPAddressofthemeter

Username: sftpuser

SFTP Password: eaton

Port: 22

By default, the password for retrieving the backup log files is "eaton". The user can configure any password or can reset to the default of eaton by clicking on the "Reset SFTP Password".

Note: After enabling the SFTP function, the user must reboot the communication module in order to access the data logs with the default password of "eaton".

Click "Save" after changing any settings. Users will be prompted to reboot the PXM 1000 Ethernet Module immediately or later. If later is chosen the PXM 1000 Ethernet Module will need to be rebooted from the "Management" page.

HTTP/FTP Post:

The PXM 1000 Ethernet Module supports the HTTP and FTP Post functions to send data from the meter to a HTTP/FTP server. The PXM 1000 Ethernet Module can post .csv files to two different web servers using HTTP Post and can also send the same .csv file to a server using FTP Post.

In the case when there is no connection to the server, the PXM 1000 Ethernet Module will store the posts and send it out after the connection is restored.

The PXM 1000 Ethernet Module can post data to a server at intervals of time ranging from 15 seconds to 1 month.

The settings for the data log function can be found by clicking on the "Settings" tab and selecting "Communications". Click "Datalog" to access the data log web page.

The settings for the HTTP/FTP Post function can be found by clicking on the "Settings" tab and selecting "Communications". Click "HTTP/FTP Post" to access the HTTP/FTP Post web page.

Data Upload: To use the HTTP/FTP post function to send data to the appropriate server, select the Enable option to view and configure the settings that are applicable.

Figure 128. HTTP/FTP Post Settings Page.

Once enabled, the following settings related to when the uploading of the data should begin, how often the data should be logged and uploaded, the format of the file name, and how the time stamp will be represented.

Log Start Time: Select a valid time for the meter to start logging the data to be posted.

Note: The device clock of the meter should be correctly configured and up to date.

Log Interval: Select how frequently the meter will log data to the file that will be uploaded to the server from the drop down list. The logging interval can be from 15 seconds to 1 month.

Time Stamp Format: Select the format of the time stamp for the data that is logged. The format for the time stamp can be based on the Local Time, UTC seconds, or based on ISO8601 format.

Push File Prefix: Provide a name for the log file which will be appended to the beginning of the logfile if "Time Interval Format" is selected as the Post File Name Format. By default "logger1" will be appended to the beginning of the log file.

Post File Length: Select how frequently the log file will be uploaded to the server from the drop down list. The log file length can be from 15 seconds to 1 month.

5. Extended Modules

With the above settings configured the following settings need to be configured depending on which protocol will be used.

HTTP Push Channel 1 Enable: Select “Yes” to enable and to further configure the HTTP Push 1 settings.

HTTP Push 1 Meter Upload Url: Enter the Url of the HTTP server that will receive the data from the meter.

HTTP Push 1 Port: Enter the port number for the server that will receive the data.

HTTP Push 1 Password: Enter the password to send data to the receiving server if applicable. Otherwise, leave blank.

HTTP Push 1 Interval: Select how frequently the data should be uploaded to the HTTP server. The data can be posted in intervals from 15 seconds to 1 month.

Figure 129. Uploading HTTP Data Settings Page.

HTTP Push Channel 1 Enable

unsaved changes

No

Yes

HTTP Push 1 Meter Id

HTTP Push 1 Meter Upload Url

HTTP Push 1 Port

80

HTTP Push 1 Password

HTTP Push 1 Interval

5 minutes

Test HTTP Push 1

Clear HTTP Push 1 Logs

Note: The "TEST HTTP Push1" button should only be utilized after clicking the “Save” button otherwise a fail response will be observed. If a fail response occurs after clicking “Save”, the settings should be double checked or troubleshooting on the server side may be required.

In the case the network is down and the module cannot send the data to the server, it will accumulate all the failed posts and send them out when the network is up. These failed posts can be cleared by clicking the "Clear HTTP Push Logs".

HTTP Push Channel 2 Enable: Select “Yes” to enable and to further configure the HTTP Push 2 settings.

HTTP Push 2 Meter Upload Url: Enter the Url of the HTTP server that will receive the data from the meter.

HTTP Push 2 Port: Enter the port number for the server that will receive the data.

HTTP Push 2 Password: Enter the password to send data to the receiving server if applicable. Otherwise, leave blank.

HTTP Push 2 Interval: Select how frequently the data should be uploaded to the HTTP server. The data can be posted in intervals from 15 seconds to 1 month.

FTP Push Enable: Select “Yes” to enable and further configure the FTP Push settings.

FTP Push Meter Upload Url: Enter the Url of the FTP server that will receive the data from the meter.

FTP Push Port: Enter the port number for the server that will receive the data.

FTP Push Username: Enter a valid username to send the data to the FTP server. An incorrect username could result in no data being received by the server.

FTP Push Password: Enter a valid password for the username above to send data to the receiving FTP server.

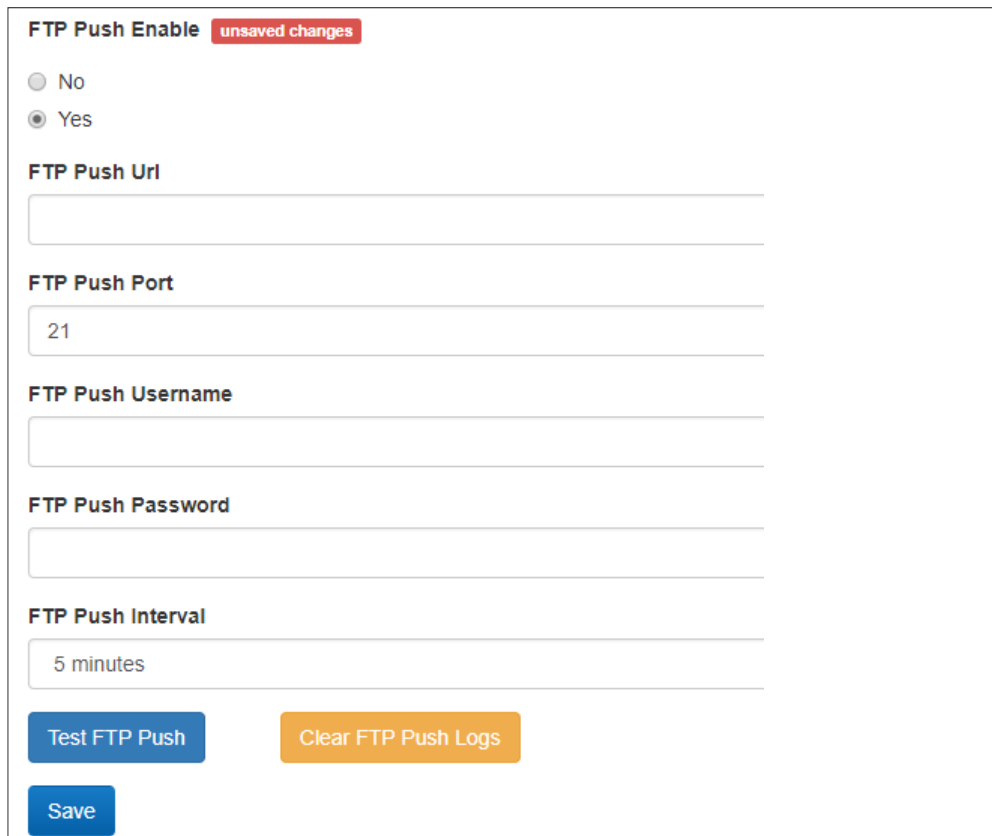
FTP Push Interval: Select how frequently the data should be uploaded to the FTP server. The data can be posted in intervals from 15 seconds to 1 month.

Note: The “TEST FTP Push” button should only be utilized after clicking the “Save” button, otherwise a fail response will be observed. If a fail response occurs after clicking “Save,” the settings should be double checked or troubleshooting on the server side may be required.

In the case the network or FTP server is down and the module cannot send the data to the server, it will accumulate all the failed posts and send them out when the network is up. These failed posts can be cleared by clicking the “Clear FTP Push Logs”.

Click “Save” after changing any settings. Users will be prompted to reboot the PXM 1000 Ethernet Module immediately or later. If later is chosen, the PXM 1000 Ethernet Module will need to be rebooted from the “Management” page.

Figure 130. Uploading FTP Data Settings Page.



FTP Push Enable unsaved changes

☐ No
☒ Yes

FTP Push Url

FTP Push Port

FTP Push Username

FTP Push Password

FTP Push Interval

Test FTP Push Clear FTP Push Logs

Save

5. Extended Modules

PX-EVA Post:

The PXM 1000 Ethernet Module module can directly interface with the Eaton Cloud software PX-EVA. The PXM 1000 Ethernet Module will post data to the cloud software every five minutes.

PX-EVA will require the serial number of the PXM 1000 Ethernet Module module which will then provide a token that will be used to configure the PXM 1000 Ethernet Module so it can send its data to PX-EVA.

The settings for the PX-EVA Post function can be found by clicking on the “Settings” tab and selecting “Communications.” Select “PX-EVA Post” to access the settings to configure the PXM 1000 Ethernet Module to send data to PX-EVA.

PX-EVA Reporting: Select “Enable” to enable the function and to further configure the settings related to PX-EVA.

PX-EVA URL: The following post URL will be configured by default so that the data can sent to the correct server: `http://px-eva.eaton.com/api/v1/devices/new-data/`

PX-EVA Token: Copy and paste the token provided by the PX-EVA software into this field.

Note: The “TEST PX-EVA” button should only be utilized after clicking the “Save” button, otherwise a fail response will be observed. If a fail response occurs after clicking “Save”, the serial number entered in PX-EVA should be double checked.

Click “Save” after changing any settings. Users will be prompted to reboot the PXM 1000 Ethernet Module immediately or later. If later is chosen, the PXM 1000 Ethernet Module will need to be rebooted from the “Management” page.

In the case the network is down and the module cannot send the data to the server, it will accumulate all the failed posts and send them out when the network is up. These failed posts can be cleared by clicking the “Clear PX-EVA Post Logs”.

Figure 131. PX-EVA Settings Page.

The screenshot shows the 'Settings' page for the PXM 1000 Ethernet Module, specifically the 'Communications' tab. The 'PX-EVA Post' sub-tab is selected. The page displays the following settings:

- Power Xpert - Energy Visualization Application:** A toggle switch set to 'Enable'.
- Link to PX-EVA:** A text field containing the URL `https://px-eva.eaton.com/api/v1/devices/newdata/` with a 'Copy' button.
- Ethernet Module Serial Number:** A text field containing the value `AM18040137` with a 'Copy' button.
- PX-EVA Authentication Token:** A text field containing the value `ad3a199-00e8-43a0-86de-f8c231ea03d`.

At the bottom of the settings area, there are three buttons: 'Test PX-EVA Connection' (blue), 'Clear PX-EVA Post Logs' (orange), and 'Save' (blue). The top navigation bar includes 'Meter', 'Communications', 'Management', and 'Firmware' tabs, with 'Settings' being the active section. The top right corner shows 'Logout', '3:06 PM - 0800 24 Oct 2018', 'About', 'Settings', 'PXM 1000', and the Eaton logo.

SNMP:

The PXM 1000 Ethernet Module module supports the Simple Network Management Protocol (SNMP) for reporting the metering data to the management station. The PXM 1000 Ethernet Module uses a public community string for read-only access. By default, the module will communicate using SNMP port 161. The PXM 1000 Ethernet Module also supports traps to send unsolicited messages to up to four management stations.

The settings for the SNMP protocol can be found by clicking on the “Settings” tab and selecting “Communications.” Select “SNMP” to access the settings to configure the PXM 1000 Ethernet Module to communicate with a SNMP management station.

SNMP Enable: Select “Enable” to enable the function and to further configure the settings related to the SNMP protocol.

Read Only Community: By default, the community string is public, this configuration is similar to a password which allows only authorized users to access the meters data.

SNMP Port: By default, the SNMP Port is configured to 161. The SNMP Port can be any value from 16,100 to 16,199.

Trap Enable: Select "Enable" so that the meter will send a message to the management station when an event is triggered. The event could be a change in digital input status (DIS). The notification can then be sent to up to four stations.

Figure 132. SNMP Settings Page.

The screenshot shows the 'SNMP' settings page within the 'Communications' section of the PXM 1000 web interface. The page has a top navigation bar with 'Meter', 'Communications', 'Management', and 'Firmware' tabs. Below this, there's a sub-navigation bar with 'Settings', 'Communications', 'Network', 'Email', 'Time/Date', 'Datalog', 'HTTP/FTP Post', 'BACnet-IP', 'PX-EVA Post', and 'SNMP'. The 'SNMP' tab is active. The main content area includes:

- SNMP Enable:** Radio buttons for 'Disable' and 'Enable' (selected).
- Read Only Community:** A text field containing 'public'.
- SNMP Port:** A text field containing '161'. Below it, a note says 'Default: 161, Range 16100-16199'.
- Trap Enable:** Radio buttons for 'Disable' and 'Enable' (selected).

Trap Target 1: Enter the IP address and port number of station number 1 that should be notified when there is an event.

Trap Target 2: Enter the IP address and port number of station number 2 that should be notified when there is an event.

Trap Target 3: Enter the IP address and port number of station number 3 that should be notified when there is an event.

Trap Target 4: Enter the IP address and port number of station number 4 that should be notified when there is an event.

Report Buffer Size: Enter the size of the buffer for the amount of notifications will be stored before being sent to the management station. A maximum of 30 notifications can be stored.

Report Hold Time: Enter the time in seconds for how long the notification will be in queue before it gets sent to the management station. By default, this setting is configured to 0 so the notification will be sent immediately after an event occurs. This setting could be configured from 0-300 seconds.

5. Extended Modules

Figure 133. Trap Settings Page.

Trap Enable

☐ Disable

☒ Enable

Trap Target 1

Trap Target 2

Trap Target 3

Trap Target 4

Report Buffer Size

30

Range 0-30

Report Hold Time

0

Range 0-300

Save

Management:

The Management web page can be used to reset parameters such as the demand, energy, max/min, and the alarm records, reboot the web module, as well as setting or changing the password for the access levels. The user can also download the network log file for the module from this page which can be used for diagnostics of the module.

Note: Please send the log file to Eaton’s Customer Integrity Team (mrsupport@eaton.com) for analysis.

This page is where the PXM 1000 Ethernet Module can be rebooted so that all changes and configurations can take effect. This can be done by clicking on "Reboot Communication Module".

Firmware:

The Firmware web page is used for updating the firmware version on the PXM 1000 Ethernet Module module. The user can update the module if needed or they can contact Technical Support with the current firmware version of the PXM 1000 Ethernet Module module which can be found from the Device Information page.

Figure 134. Firmware Settings Page.

Logout

8:51 AM - 0400 23 Oct 2018

About

Settings

PXM1-1000

F.T.N

Meter

Communications

Management

Firmware

Settings Firmware

Firmware Update

Current version: v1.23

Select firmware file

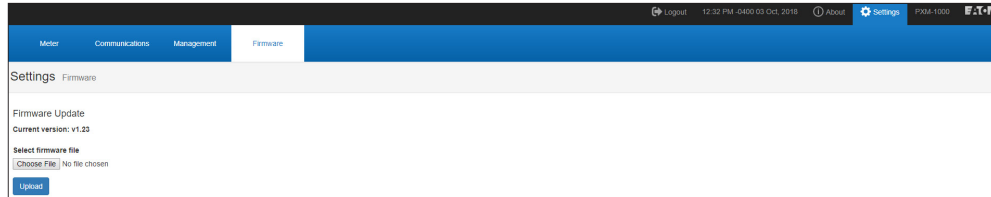
Choose File No file chosen

Upload

To update the module using the Select Firmware File option:

1. Click on "Choose File" and select the firmware file to update from your computer. Then click on "Upload".

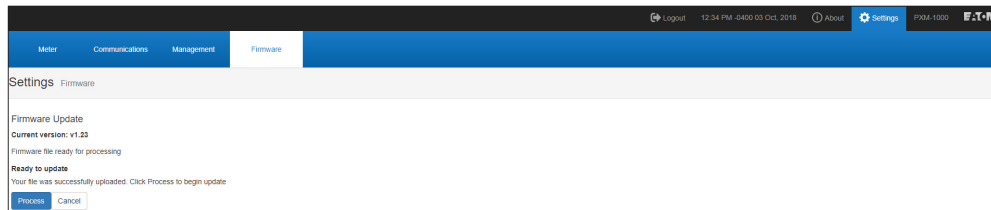
Figure 135. Select the Firmware and Upload Page.



Once the upload was successfully uploaded you will see the following page confirming that the file was uploaded.

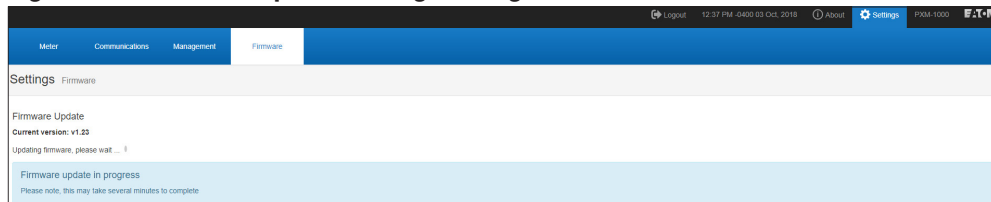
2. Click "Process" to begin the update.

Figure 136. Upload Successful and Process Page.



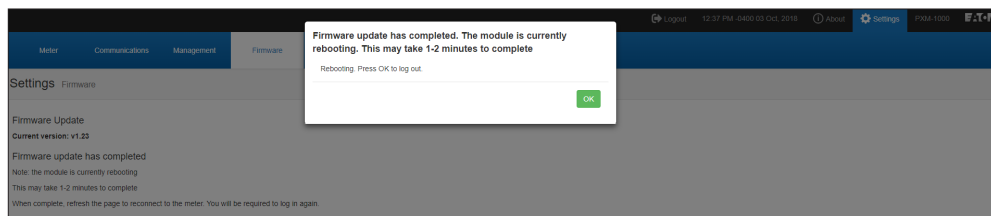
The update will begin and you will see the following message: "Firmware update in progress."

Figure 137. Firmware Update in Progress Page.



Once the update is complete, you will see the following page.

Figure 138. Firmware Update Successful Page.



Note: The module is currently rebooting. This may take 1-2 minutes to complete. When complete, refresh the page to reconnect to the meter. You will be required to log in again.

5. Extended Modules

5.3 BACnet Communications

5.3.1 BACnet Overview

The Building Automation and Control Network (BACnet), described in the ANSI/ASHRAE Standard 135-1995, is one of the most widely used building management systems protocols. BACnet was designed to allow communication of building automation and control systems for applications such as heating, ventilating, and air-conditioning control, lighting control, access control, and fire detection systems and their associated equipment. The BACnet protocol provides mechanisms for computerized building automation devices to exchange information, regardless of the particular building service they perform.

5.3.2 Introduction

The PXM 1000 BACnet module supports BACnet communication using BACnet IP communication. It communicates in native BACnet IP over Ethernet to seamlessly integrate with most building automation/control systems. The PXM 1000 meter's BACnet IP protocol supports 106 objects which lets you track up 78 measurements and 28 IO parameters.

The PXM 1000 meter supports native BACnet/IP that lets it act as a BACnet server in any BACnet application. The PXM 1000 meter's BACnet IP also comes with a web interface that allows users to configure the BACnet related parameters and read measurements by using a standard browser.

5.3.3 About BACnet Protocol

The BACnet protocol operates in a client-server environment. A client machine sends a service request (message) to a server machine. Once the service is performed, the results are reported back to the client machine. BACnet defines 5 groups (or classes) of 35 message types. For example, one class contains messages for retrieving and manipulating the object properties described above. An example of a common service request in this class is "ReadProperty." When the server machine receives this message from a client machine, it locates the requested property of the requested object and sends the value to the client.

The BACnet protocol consists of objects that contain different kinds of information. Each object has properties that contain data related to it.

Below is an example from the PXM1K-BIPP (BACnet/IP protocol) of an object for Total Active Power:

- Object instance: 18
- Object name: Total Active Power
- Object type: Analog Input
- Object unit: kW

For more detailed information, visit the BACnet website at www.bacnet.org.

5.3.4 Using the PXM 1000 Meter's BACnet Protocol

There are different Ethernet based-versions of BACnet. The dominant Ethernet version is BACnet/IP.

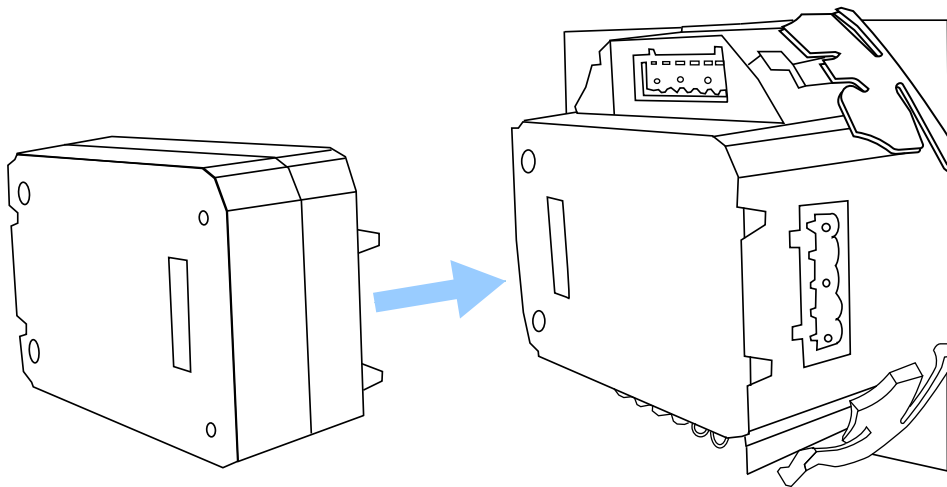
BACnet/IP has been developed to allow the BACnet protocol to use TCP/IP networks. You could say that BACnet/IP is a way of hooking BACnet up to the Internet and communicating with different Local Area Networks (LANs). This enables system owners, facility managers, or even external suppliers to access BACnet networks and manage their devices and systems remotely.

Table 28. BACnet/IP Characteristics.

Network type	Ethernet based network using UDP for data transfer.
Topology	Line or star topology (standard ethernet topology)
Installation	Ethernet twisted pair cables with RJ45 connectors
Speed	10/100 Mbit/s full duplex
Max. station	No network limitation of number of nodes.
Data	Up to 1,476 bytes per frame

5.3.5 Using the BACnet Module (PXM1K-BIPP)

5.3.5.1 Installation Method

Figure 139. BACnet Module Installation.

The BACnet module is linked to the PXM 1000 meter by a communication plug. It can also be linked to other extended modules like IO modules.

1. Insert the installation clips to the counterpart of the meter, and then press the BACnet module lightly until linking is established.
2. Tighten the installation screws.

Notes:

- Install the BACnet module carefully to avoid damage;
- Under no circumstances should any installation be done with the meter powered on. Failure to do so may result in injury or death.

5. Extended Modules

5.3.5.2 Definition of RJ45 Interface and 485 Interface

The BACnet/IP module uses a standard RJ45 connector to access the network.

Figure 140. BACnet Module Electrical Characteristics.

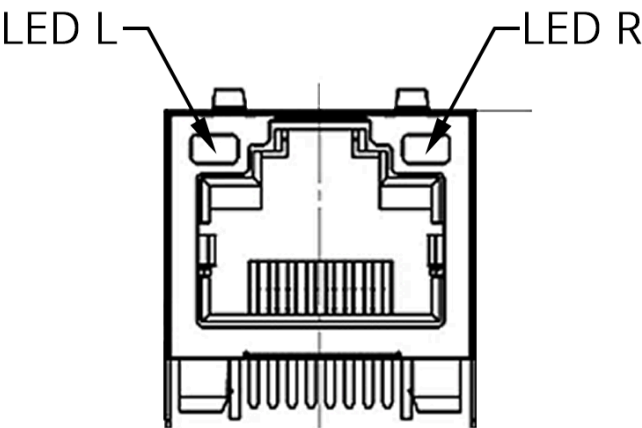


Figure 141. BACnet Module Electrical Characteristics of the Connectors.

Pin	Signal	Description
1	TX+	Tranceived Data+
2	TX-	Tranceived Data-
3	RX+	Received Data+
4	n/c	Not Connected
5	n/c	Not Connected
6	RX-	Received Data-
7	n/c	Not Connected
8	n/c	Not Connected

5.3.6 Initializing the BACnet Modules

5.3.6.1 BACnet/IP Module (PXM1K-BIPP)

PXM1K-BIPP module's default settings are as follows:

IP address (192.168.1.254); subnet mask (255.255.255.0); gateway (192.168.1.1); DNS1 (8.8.8.8); DNS2 (8.8.4.4).

The PXM 1000 will need to be configured in order to communicate with the PXM1K-BIPP.

The following process shows how to configure BACnet module settings by using the keys on the display.

- Pressing "H" key and "V/A" key simultaneously on the meter will go to the menu selecting mode. The "Meter" cursor flashes in this mode.
- Press the "P" or "E" key to move the cursor to "Setting". Press the "V/A" key to go into the meter parameter setting mode. Device address page is the first page of

"Setting" mode. It shows the Modbus address of the device for several seconds, before changing to the Password Setting Page and prompting for the password on the device. Press the "V/A" button to confirm the password and enter the Parameter Settings menu. Press the "V/A" key to enter the "SYS" System Setting page.

Figure 142. The Password Page.

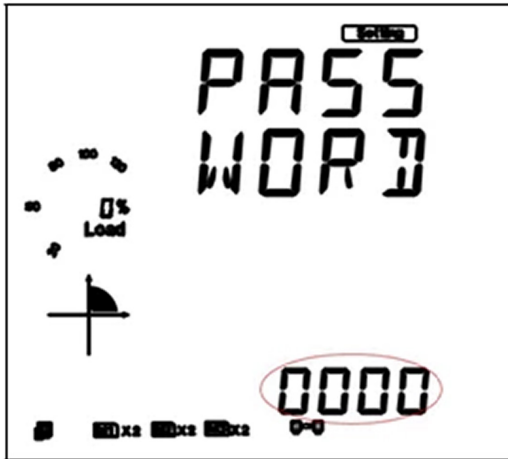
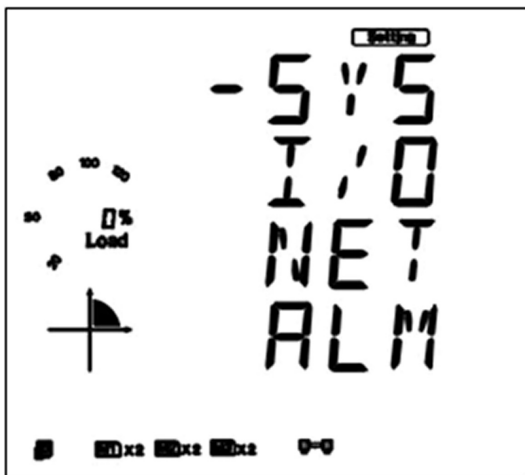


Figure 143. The System Settings Page.



- Once in the System Settings menu, the initial page is S01 ADDR, the meters RS485 address page. Press the "P" key to go to the S02 BPS2 page. The baud rate should be at 38,400.
- Press the "V/A" key to enter the edit mode to configure the desired baud rate using the "P" or "E" key. Select 38,400. Press the "V/A" key to confirm.
- Scroll through the settings using the "P" or "E" key until you reach the S31 Parity2 page. Press the "V/A" key to enter edit mode.
- Press the "P" or "E" key to change the setting to "1NO" and press the "V/A" key to confirm the setting.

5. Extended Modules

- Press the "P" or "E" key to move to the page S34 PROTOCOL 2 page. Press the "V/A" key to enter edit mode.
- Press the "P" or "E" key to change the setting to "Other" and press the "V/A" key to confirm the setting.
- Press the "H" key to back out of the system settings and press the "E" key to move the cursor to "NET".
- Press "V/A" key to enter the BACnet module settings page to configure the IP address of the PXM1K-BIPP.
- Press the "P" key to move to N02 IP page. If you would like to change it, press the "V/A" key to enter edit mode.
- Press "V/A" to modify; the first digit will begin to flash.
- Press the "P" or "E" key to change the number of the flashing digit.
- Press "H" to switch the flashing digit.
- Press "V/A" to confirm the setting.
- Press the "P" key to move to the N03 SUBMASK page. If you would like to change it, press the "V/A" key to enter edit mode and follow the procedure for changing the IP address above.
- Press the "P" key to move to the N04 GATEWAY page. If you would like to change it, press the "V/A" key to enter edit mode and follow the procedure for changing the IP address above.
- Press the "P" key to move to the N05 DNS1 page. If you would like to change it, press the "V/A" key to enter edit mode and follow the procedure for changing the IP address above.
- Press the "P" key to move to the N06 DNS2 page. If you would like to change it, press the "V/A" key to enter edit mode and follow the procedure for changing the IP address above.

After making any changes to the settings above, the PXM1K-BIPP will require a reset in order for the setting to take effect.

- Press the "P" key to move to N09 NET REST page.
- Press "V/A" key to modify; "NO" should begin to flash.
- Press "P" key to change "NO" to "RESET".
- Press "V/A" key to reset the module. "NO" will be displayed on the screen and the PXM1K-BIPP module settings should now take effect.

5.3.7 BACnet Objects

5.3.7.1 PXM1K-BIPP Reading Objects

The PXM1K-BIPP module for the PXM 1000 meter supports 78 predefined objects based on the meters real-time measurement parameters. There is no programming or mapping necessary to use the BACnet objects. The object's name easily identifies the measurement they contain.

The following objects have the object type as Analog Inputs. The following table lists each of the objects with their instance number and the units of measurement.

Table 29. Analog Inputs.

Instance	Object Type	Name	Object Data Type	Units
1	Analog Input	Frequency	Float	Hz
2	Analog Input	Phase A Voltage	Float	V
3	Analog Input	Phase B Voltage	Float	V
4	Analog Input	Phase C Voltage	Float	V
5	Analog Input	Average Line Voltage	Float	V
6	Analog Input	Line Voltage AB	Float	V
7	Analog Input	Line Voltage BC	Float	V
8	Analog Input	Line Voltage CA	Float	V
9	Analog Input	Average Line Voltage	Float	V
10	Analog Input	Phase A Current	Float	A
11	Analog Input	Phase B Current	Float	A
12	Analog Input	Phase C Current	Float	A
13	Analog Input	Average Current	Float	A
14	Analog Input	Neutral Current	Float	A
15	Analog Input	Phase A Active Power	Float	kW
16	Analog Input	Phase B Active Power	Float	kW
17	Analog Input	Phase C Active Power	Float	kW
18	Analog Input	Total Active Power	Float	kW
19	Analog Input	Phase A Reactive Power	Float	kvar
20	Analog Input	Phase B Reactive Power	Float	kvar
21	Analog Input	Phase C Reactive Power	Float	kvar
22	Analog Input	Total Reactive Power	Float	kvar
23	Analog Input	Phase A Apparent Power	Float	kVA
24	Analog Input	Phase B Apparent Power	Float	kVA
25	Analog Input	Phase C Apparent Power	Float	kVA
26	Analog Input	Total Apparent Power	Float	kVA
27	Analog Input	Phase A Power Factor	Float	
28	Analog Input	Phase B Power Factor	Float	
29	Analog Input	Phase C Power Factor	Float	
30	Analog Input	Total Power Factor	Float	
31	Analog Input	Voltage Unbalance Factor	Float	%
32	Analog Input	Current Unbalance Factor	Float	%
33	Analog Input	Load Type	Float	
34	Analog Input	Active Power Demand	Float	kW
35	Analog Input	Reactive Power Demand	Float	kvar
36	Analog Input	Apparent Power Demand	Float	kVA
37	Analog Input	Phase A Current Demand	Float	A
38	Analog Input	Phase B Current Demand	Float	A
39	Analog Input	Phase C Current Demand	Float	A
40	Analog Input	Import Active Energy	Float	kWh
41	Analog Input	Export Active Energy	Float	kWh
42	Analog Input	Import Reactive Energy	Float	kWh
43	Analog Input	Export Reactive Energy	Float	kWh
44	Analog Input	Energy Total	Float	kWh

5. Extended Modules

Table 29. Analog Inputs (Continued).

Instance	Object Type	Name	Object Data Type	Units
45	Analog Input	Energy Net	Float	kWh
46	Analog Input	Reactive Energy Total	Float	kvarh
47	Analog Input	Reactive Energy Net	Float	kvarh
48	Analog Input	Apparent Energy	Float	kVAh
49	Analog Input	Phase A Import Active Energy	Float	kWh
50	Analog Input	Phase A Export Active Energy	Float	kWh
51	Analog Input	Phase B Export Active Energy	Float	kWh
52	Analog Input	Phase B Export Active Energy	Float	kWh
53	Analog Input	Phase C Import Active Energy	Float	kWh
54	Analog Input	Phase C Export Active Energy	Float	kWh
55	Analog Input	Phase A Import Reactive Energy	Float	kvarh
56	Analog Input	Phase A Export Reactive Energy	Float	kvarh
57	Analog Input	Phase B Import Reactive Energy	Float	kvarh
58	Analog Input	Phase B Export Reactive Energy	Float	kvarh
59	Analog Input	Phase C Import Reactive Energy	Float	kvarh
60	Analog Input	Phase C Export Reactive Energy	Float	kvarh
61	Analog Input	Phase A Apparent Energy	Float	kVAh
62	Analog Input	Phase B Apparent Energy	Float	kVAh
63	Analog Input	Phase C Apparent Energy	Float	kVAh
64	Analog Input	Phase A Voltage THD	Float	%
65	Analog Input	Phase B Voltage THD	Float	%
66	Analog Input	Phase C Voltage THD	Float	%
67	Analog Input	Average Voltage THD	Float	%
68	Analog Input	Phase A Current THD	Float	%
69	Analog Input	Phase B Current THD	Float	%
70	Analog Input	Phase C Current THD	Float	%
71	Analog Input	Average Current THD	Float	%

Table 30. Binary Inputs .

Instance	Object Type	Name	Object Data Type
1	Binary Input	IO11-DI1	Bit
2	Binary Input	IO11-DI2	Bit
3	Binary Input	IO11-DI3	Bit
4	Binary Input	IO11-DI4	Bit
5	Binary Input	IO11-DI5	Bit
6	Binary Input	IO11-DI6	Bit
7	Binary Input	IO21-DI1	Bit
8	Binary Input	IO21-DI2	Bit
9	Binary Input	IO21-DI3	Bit
10	Binary Input	IO21-DI4	Bit
11	Binary Input	IO31-DI1	Bit
12	Binary Input	IO31-DI2	Bit
13	Binary Input	IO31-DI3	Bit
14	Binary Input	IO31-DI4	Bit

Table 30. Binary Inputs (Continued).

Instance	Object Type	Name	Object Data Type
15	Binary Input	IO12-DI1	Bit
16	Binary Input	IO12-D2	Bit
17	Binary Input	IO12-DI3	Bit
18	Binary Input	IO12-DI4	Bit
19	Binary Input	IO12-DI5	Bit
20	Binary Input	IO12-DI6	Bit
21	Binary Input	IO22-DI1	Bit
22	Binary Input	IO22-DI2	Bit
23	Binary Input	IO22-DI3	Bit
24	Binary Input	IO22-DI4	Bit
25	Binary Input	IO32-DI1	Bit
26	Binary Input	IO32-DI2	Bit
27	Binary Input	IO32-DI3	Bit
28	Binary Input	IO32-DI4	Bit

Table 31. Analog Inputs: IO Module.

Instance	Object Type	Name	Object Data Type	Units
1001	Analog Input	IO21-AI1	Float	mA/Volts
1002	Analog Input	IO21-AI2	Float	mA/Volts
1003	Analog Input	IO22-AI3	Float	mA/Volts
1004	Analog Input	IO22-AI4	Float	mA/Volts
1005	Analog Input	IO31-AI1	Float	mA/Volts
1006	Analog Input	IO31-AI2	Float	mA/Volts
1007	Analog Input	IO32-AI3	Float	mA/Volts
1008	Analog Input	IO32-AI4	Float	mA/Volts

Table 32. Analog Inputs: DI Counter.

Instance	Object Type	Name
2001	Analog Input	IO11-DI1-Counter
2002	Analog Input	IO11-DI2-Counter
2003	Analog Input	IO11-DI3-Counter
2004	Analog Input	IO11-DI4-Counter
2005	Analog Input	IO11-DI5-Counter
2006	Analog Input	IO11-DI6-Counter
2007	Analog Input	IO21-DI1-Counter
2008	Analog Input	IO21-DI2-Counter
2009	Analog Input	IO21-DI3-Counter
2010	Analog Input	IO21-DI4-Counter
2011	Analog Input	IO31-DI1-Counter
2012	Analog Input	IO31-DI2-Counter
2013	Analog Input	IO31-DI3-Counter
2014	Analog Input	IO31-DI4-Counter
2015	Analog Input	IO12-DI1-Counter
2016	Analog Input	IO12-DI2-Counter

5. Extended Modules

Table 32. Analog Inputs: DI Counter (Continued).

Instance	Object Type	Name
2017	Analog Input	IO12-DI3-Counter
2018	Analog Input	IO12-DI4-Counter
2019	Analog Input	IO12-DI5-Counter
2020	Analog Input	IO12-DI6-Counter
2021	Analog Input	IO22-DI1-Counter
2022	Analog Input	IO22-DI2-Counter
2023	Analog Input	IO22-DI3-Counter
2024	Analog Input	IO22-DI4-Counter
2025	Analog Input	IO32-DI1-Counter
2026	Analog Input	IO32-DI2-Counter
2027	Analog Input	IO32-DI3-Counter
2028	Analog Input	IO32-DI4-Counter

5.3.8 PXM1K-BIPP through the Web Server

5.3.8.1 Configuring the BACnet-IP Settings

To configure the BACnet related setting on the PXM1K-BIPP, users must use the built in web server. Ensure the network settings related to the PXM1K-BIPP are configured correctly so it can be accessed by a computer within the LAN.

- Open an Internet browser and enter the IP address of the meter.
- Login in with “Admin” access.

Note: The default password for the Admin user access is “admin”.

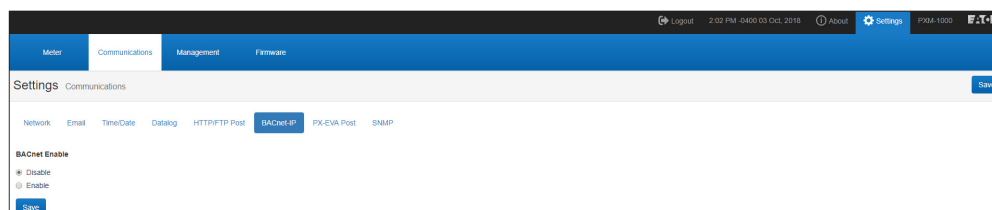
- Click on “Settings” and select the “Communications” tab.

Figure 144. Opening the Communications Tab.



Select the “BACnet-IP” tab to configure the settings related to BACnet-IP protocol.

Figure 145. The BACnet Tab.



Under "BACnet Enabled", select "Enable" to enable the BACnet protocol.

Figure 146. Enabling the BACnet Protocol.

The screenshot shows the PXM 1000 web interface. The top navigation bar includes 'Meter', 'Communications', 'Management', and 'Firmware'. The 'Settings' page is active, with a sub-tab 'Communications'. Under 'Communications', the 'BACnet-IP' tab is selected. The 'BACnet Enable' section has a red 'Unsaved changes' warning and two radio buttons: 'Disable' and 'Enable', with 'Enable' selected. Below this are input fields for 'BACnet Port', 'Device Instance', 'Device Name', 'Location', and 'Description'. The 'Enable Foreign Device Function' section has two radio buttons: 'No' and 'Yes', with 'No' selected. A 'Save' button is at the bottom left.

- Enter the "BACnet Port" or the UDP port number. The default port is 47808.
- Enter a "Device Instance" for the device which is the instance number for the device object in the BACnet system. It must be unique within the system.
- Enter the "Network ID" number for the BACnet IP network in which the device resides. The Network ID would need to be the same for the BACnet devices to communicate with each other.
- Enter a "Device Name" for the device to distinguish it from other devices within the network.
- Under the "Enable Foreign Device Function", select "Enable" to communicate with a BACnet device from another subnet.
- Enter the IP of the BACnet Broadcast Management Device (BBMD) under the "BBMD IP" field for the device which will receive broadcast messages on one subnet and forward them to another subnet.
- Enter BACnet Port of the BBMD in "BBMD Port"
- Enter a value between 5-1440 min. in the "Time To Live" for how often the foreign device will register in the BBMD's foreign device table.

5. Extended Modules

Figure 147. Entering the "Time To Live" Value.

Enable Foreign Device Function unsaved changes

☐ No

☒ Yes

BBMD IP

BBMD Port

Time To Live

Enter time in minutes

EPICS file download

Save

- Click “Save” to save all settings to the module.
- The module will require a reboot in order for the settings to take effect.
- Click on “Settings” and select “Management”.
 - Click on the “Reboot” button on the "Reboot Communications Module" option.

Figure 148. Resetting the Communications Module.

Meter

Communications

Management

Firmware

Logout

2:08 PM -0400 03 Oct, 2018

About

Settings

PXM-1000

E-T-M

Settings Management

Setting	Action
Reset Demand	Reset
Reset Energy	Reset
Reset Max and Min	Reset
Reset Alarm Record	Reset
Reboot Communications Module	Reboot
Device Clock	2:08 PM -0400 03 Oct, 2018
Reset Device Run Time	Reset
Live API Token	
Reset API Token	Reset
Reset Admin Password	Enter new password Show password Save
Reset View Password	Enter new password Show password Save

Download diagnostics file

5.3.8.2 BACnet Protocol Implementation Conformity Statement

The EPICS document for the PXM1K-BIPP can be found on the Eaton website at www.eaton.com. The PICS document for the PXM1K-BIPP can be downloaded from the following URL:

<http://www.eaton.com/us/en-us/catalog/low-voltage-power-distribution-controls-systems/power-xpert-meter-1000.html>

6. Communication

This chapter will mainly discuss how to handle the meter via the communication port using the utility software. It is highly recommended that previous chapters be read before moving onto this chapter, a familiarity with Modbus™ would also be helpful.

6.1 Modbus Protocol Introduction

Modbus RTU protocol is used for communication in PXM 1000 series meters. Data format and error check methods are defined in the Modbus protocol. The half duplex query and respond mode is adopted in the Modbus protocol. There is only one master device in the communication network. The others are slave devices, waiting for the query of the master.

Transmission Mode

Transmission Mode, which is compatible with Modbus RTU mode, defines the data structure within a frame and the rules are used to transmit the data. This can be found in Table 33.

Framing

Table 33. Data Frame Format.

Address	Function	Data	Check
8-Bits	8-Bits	N×8-Bits	16-Bits
	Coding System	8-bit binary	
	Start bit	1	
	Data bits	8	
	Parity	no parity, odd parity, even parity	
	Stop bit	1 or 2	
	Error checking	CRC check	

Address Field

The address field of a message frame contains eight bits. Valid slave device addresses are in the range of 0 ~ 247 decimal. A master addresses a slave by placing the slave address in the address field of the message. When the slave sends its response, it places its own address in this address field of the response to let the master know which slave is responding.

Function Code Field

The function code field of a message frame contains eight bits. Valid codes are in the range of 1 ~ 255 decimal. When a message is sent from a master to a slave device, the function code field tells the slave what kind of action to perform.

6. Communication

Table 34. Function Codes.

Code	Meaning	Action
01	Read Relay Output Status	Obtain current status of the Relay Output.
02	Read Digital Input (DI) Status	Obtain current status of the Digital Input.
03	Read Data	Obtain current binary value from one or more registers.
05	Control Relay Output	Force the relay state to "ON" or "OFF".
16	Preset Multiple-Register	Place specific binary values into a series of consecutive Multiple-Registers.

Data Field

The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF hexadecimal. The data field of messages sent from a master to slave devices contain additional information which the slave must use to take the action defined by the function code. This can include items such as register addresses, the quantity of items to be handled, and the count of actual data bytes in the field. For example, if the master requests a slave to read a group of holding registers (function code 03), the data field specifies the starting register and how many registers are to be read. If the master writes to a group of registers in the slave (function code 10 hexadecimal), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

If no error occurs, the data field of a response from a slave to a master contains the data requested. If an error occurs, the field contains an exception code that the master application can use to determine the next action to be taken. The data field can be nonexistent (of zero length) in certain kinds of messages.

Error Check Field

Every message includes an error checking field which is based on the Cyclical Redundancy Check (CRC) method. The CRC field checks the contents of the entire message. It is applied regardless of any parity check method used for the individual characters of the message. The CRC field is two bytes long, containing a 16-bit binary value. The CRC value is calculated by the transmitting device and is appended to the message.

The receiving device recalculates the CRC value during reception of the message and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal, an error will be reported. The CRC calculation is first started by preloading the whole 16-bit register to 1's. The process begins by applying successive 8-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC. When generating the CRC, each 8-bit character is exclusive ORed (connected in logical OR fashion) with the register contents. The result is shifted towards the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB is equal to 1, the register is exclusive ORed with a preset, fixed value. If the LSB equals to 0, no action will be taken. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next 8-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. After all the bytes of the message have been applied, the final contents of the register, which should exchange the high-byte and the low-byte, is the CRC value. When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

6.2 Communication Format

Explanation of Frame

Table 35. Explanation of Frame.

Addr	Fun	Data Start Reg HI	Data Start Reg LO	Data #of Regs HI	Data #of Regs LO	CRC 16 HI	CRC 16 LO
06H	03H	00H	00H	00H	21H	84H	65H

Addr: Address of slave device

Fun: Function code

Data Start Reg HI: Start register address high byte

Data Start Reg LO: Start register address low byte

Data # of Reg HI: Number of register high byte

Data # of Reg LO: Number of register low byte

CRC16 HI: CRC high byte

CRC16 LO: CRC low byte

1. Reading Relay Status

Function Code 01

This function code is used to read the status of the relay in the meter.

1 = On 0 = Off

Relay 1's address is 0000H, Relay 2's address is 0001H, and so on.

The following query is to read the relay status for the meter with communication address 17.

Query

Table 36. Read the Status of Relay 1 and Relay 2 Query Message.

Addr	Fun	Data Start Reg HI	Data Start Reg LO	Relay #of Regs HI	Relay #of Regs LO	CRC 16 HI	CRC 16 LO
11H	01H	00H	00H	00H	02H	BFH	5BH

Response

The PXM 1000 meter's response includes the meter address, function code, quantity of data byte, the data, and error checking. An example response to read the status of Relay 1 and Relay 2 is shown as Table 37. The status of Relay 1 and Relay 2 are responding to the last 2 bits of the data.

Relay 1: bit0 Relay 2: bit1

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Table 37. Relay Status Response.

Address	Function Code	Byte Count	Data	CRC High	CRC Low		
11H	01H	01H	02H	D4H	89H		
The content of the data is:							
7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	0
MSB						LSB	

Relay 1 = OFF (LSB), Relay 2=ON (Left to LSB)

2. Read Status of DI

Function Code 02

1 = On 0 = Off

DI1's address is 0000H, DI2's address is 0001H, and so on.

The following query is to read the Status of four DIs of the PXM 1000 meter with communication address 17.

Query

Table 38. Read Four DIs Query Message.

Addr	Fun	DI Start Addr HI	DI Start Addr LO	DI Num HI	DI Num LO	CRC 16 HI	CRC 16 LO
11H	02H	00H	00H	00H	04H	7BH	59H

Response

The PXM 1000 meter's response includes the meter address, function code, quantity of data characters, the actual data characters, and error checking. An example response to read the status of four DIs are shown in Table 39. The DI status corresponds to the last four bits of the data.

DI1: bit0; DI2: bit1; DI3: bit2; DI4: bit3.

Table 39. Read Status of DI.

Address	Function Code	Byte Count	Data	CRC High	CRC Low		
11H	02H	01H	03H	E5H	49H		
The content of the data is:							
7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	1
MSB						LSB	

DI1 = On, DI2 = On, DI3 = Off, DI4 = Off.

3. Read Data (Function Code 03)

Query

This function allows the master to obtain the measurement results from the PXM 1000 meter. Table 40 is an example of reading the measured data (F, V1, and V2) from slave device number 17. The data address of F is 4000H, 4001H; V1's address is 4002H, 4003; and V2's address is 4004H, 4005H.

Table 40. Read F, V1, V2 Query Message.

Addr	Fun	Data Start Addr HI	Data Start Addr LO	Data # of Regs HI	Data # of Regs LO	CRC 16 Regs HI	CRC 16 Regs LO
11H	03H	40H	00H	00H	06H	D2H	98H

Response

The PXM 1000 meter's response includes the meter address, function code, quantity of data bytes, data, and error checking. An example response to read F, V1, and V2 (F = 42480000H [50.00 Hz], V1 = 42C7CCCDH [99.9 V], V2 = 42C83333H [100.1 V]) is shown:

Table 41. Read F, V1, and V2 Message.

Addr	Fun	Byte Count	Data1 HI	Data1 LO	Data 2 HI	Data2 LO	Data3 HI	Data3 LO	Data4 HI	Data4 LO
11H	3H	0CH	42H	48H	00H	00H	42H	C7H	CCH	CDH
Data5 HI	Data5 LO	Data 6 HI	Data6 LO	CRC16 HI	CRC16 LO					
42H	C8H	33H	33H	CAH	7FH					

4. Control Relay (Function Code 05)

Query

This message forces a relay to either turn "ON" or "OFF". Any relay that exists within the PXM 1000 meter can be forced to either "ON" or "OFF" status. The data value FF00H will set the relay "ON" and the value 0000H will turn it "OFF". All other values are invalid and will not affect that relay.

The example below is a request to the PXM 1000 meter with the address of 17 to turn on Relay 1.

Table 42. Control Relay Query Message.

Addr	Fun	DO Addr HI	DO Addr LO	Value HI	Value LO	CRC 16 HI	CRC 16 LO
11H	05H	00H	00H	FFH	00H	8EH	AAH

Response

The normal response to the command request is to retransmit the message as received after the relay status has been altered.

Table 43. Control Relay Response Message.

Addr	Fun	Relay Addr HI	Relay Addr LO	Value HI	Value LO	CRC HI	CRC LO
11H	05H	00H	00H	FFH	00H	8EH	AAH

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5. Preset / Reset Multi-Register (Function Code 16)

Query

Function 16 allows the user to modify the contents of a multi-register. Some registers of the PXM 1000 meter can have their contents changed by this message. The example below is a request to a PXM 1000 meter with the address of 17 to preset Ep_imp as “17807783.3KWh”, while its HEX value is 0A9D4089H. The Ep_imp data address is 4048H and 4049H.

Table 44. Preset Multi-register Query Message.

Addr	Fun	Data Start Reg HI	Data Start Reg LO	Data # of Reg HI	Data # of Reg LO	Byte Count
11H	10H	40H	48H	00H	02H	04H
Value HI	Value LO	Value HI	Value LO	CRC HI	CRC LO	
0AH	9DH	40H	89H	F1H	6AH	

Response

The normal response to a preset multi-register request includes the PXM 1000 meter’s address, function code, data start register, the number of registers, and error checking.

Table 45. Preset Multi-register Response Message.

Addr	Fun	Data Start Reg hi	Data Start Reg lo	Data # of Reg hi	Data # of Reg lo	CRC16 Hi	CRC16 Lo
11H	10H	40H	48H	00H	02H	D6H	8EH

6.3 Data Address Table and Application Details

There are several rules to follow in using the PXM 1000 Series meter:

1. Data type:

- “bit” refers to binary.
- “word” refers to a 16-bit unsigned integer using one data address and two bytes of memory; it varies from 0 to 65535.
- “int” refers to a 16-bit integer using one data address and two bytes of memory; it varies from -32768 to 32767.
- “Dword” refers to a 32-bit unsigned integer using two data addresses and four bytes of memory with the high word at the front and low word at the end; it varies from 0 to 4294967295. Rx = high word x 65536 + low word.
- “float” refers to a 32-bit single value using two data addresses and four bytes of memory; it varies from -1.175494E-38 to 3.402823E+38.

2. Relationship Between Communication Value and Numerical Value

It is important to note that the value returned in some Modbus registers have to be scaled to reflect the actual circuit reading. Table 46 shows how they respond to each other.

Note: In the current channel, CTs are optional, which include voltage type CT or current type CT.

A. When a current type CT is selected and the value of CT2 is 1 or 5, and using relationship listed below to count primary value, the value of CT2 should be the original 1 or 5.

B. When a voltage type CT is selected and the value of CT2 is 333, and using relationship listed below to count primary value, the value of CT2 should not be 333, but 1.

C. When you select 100 mv/50 Hz, or 120 mv/60 Hz Rogowski coil, the value of CT2 is 100, and using relationship listed below to count primary value, the value of CT2 should not be 100, but 1.

D. When you select 80/100/200 mA CT, the value of CT2 is 80, 100, or 200, and using relationship listed below to count primary value, the value of CT2 should not be 80, 100, or 200, but 1.

Table 46. Relationship Between Communications and Numerical Values.

Parameters	Relationship	Unit	Format Code
System parameters	Numerical value equal to communication value	No unit	F1
Run time	$T = Rx/100$	Hour	F2
Clock	Numerical value equal to communication value	Unit of time	F3
Energy (primary)	$E_p = Rx/10$	kWh	F4
Reactive energy (primary)	$E_q = Rx/10$	kvarh	F5
Apparent energy (primary)	$E_s = Rx/10$	kVA	F6
Energy (secondary)	$E_p = Rx/1000$	kWh	F7
Reactive energy (secondary)	$E_q = Rx/1000$	kvarh	F8
Apparent energy (secondary)	$E_s = Rx/1000$	kVA	F9
Frequency	$F = Rx/100$	Hz	F10
Voltage (secondary)	$U = Rx \times (PT1/PT2)/10$	V	F11
Current, current demand (secondary)	$I = Rx \times (CT1/CT2)/1000$	A	F12
Power, demand (secondary)	$P = Rx \times (PT1/PT2) \times (CT1/CT2)$	W	F13
Reactive power, demand (secondary)	$Q = Rx \times (PT1/PT2) \times (CT1/CT2)$	var	F14
Apparent power, demand (secondary)	$S = Rx \times (PT1/PT2) \times (CT1/CT2)$	VA	F15
Power factor	$PF = Rx/1000$	No unit	F16
Unbalance factor	$Unbl = (Rx/1000) \times 100\%$	No unit	F17
THD	$THD = (Rx/10000) \times 100\%$	No unit	F18
Harmonics	$HD_n = (Rx/10000) \times 100\%$	No unit	F19
Total odd HD	$HD_o = (Rx/10000) \times 100\%$	No unit	F20
Total even HD	$HD_e = (Rx/10000) \times 100\%$	No unit	F21
Crest factor	$CF = Rx/1000$	No unit	F22
K factor	$KF = Rx/10$	No unit	F23
THFF	$THFF = (Rx/10000) \times 100\%$	No unit	F24
Phase angle	Phase angle = Rx/10	Degree	F25

Note: Regions from the “System parameters settings” to the “Data logging 3 settings” are the regions that can be set and modified. Please use the following guidelines when communicating with the meter.

6. Communication

1. When function code 10H is used, one communication command can only modify the contents in one region, such as "System parameters settings", "System status parameter", "Date and Time table", "Out-of-limit alarms - Global settings", "Out-of-limit alarm - Single settings", "I/O Modules settings", Data logging 1 settings, Data logging 2 settings, and Data logging 3 settings. It can not be accomplished in one communication order to modify contents in both of two or more regions above.
2. When function code 03H is used, the rules and limitations described in 1. above will not be applied.

6.3.1 System Parameter Setting

System parameters determine how the meter works. Please refer to Chapters 3 and 4 for more details.

Function code: 03H for reading, 10H for writing. Data type: word. Format code: F1.

Table 47. System Parameter Settings.

Address	Parameter	Default	Range	Data Type	Property
0ffdh	Frequency	0	0 : 50Hz 1 : 60 Hz 2: 400 Hz	Word	R/W
0ffdh	First Communication Protocol	0	0:MODBUS Protocol; 1:DNP3.0 Protocol	Word	R/W
0fffH	Parity Setting1	3	0: EVEN 1: odd 2:NON2 3:NON1	Word	R/W
1000H	Password	0	0 ~ 9999	Word	R/W
1001H	Communication Address	1	1 ~ 247 (MODBUS); 0 ~ 65534 (DNP3.0)	Word	R/W
1002H	Baud Rate	19200	1200 ~ 38400	Word	R/W
1003H	Voltage Input Wiring Type	0	0:3LN, 1:1LN, 2:2LL, 3:3LL, 4:1LL	Word	R/W
1004H	Current Input Wiring Type	0	0:3CT ,1:1CT, 2:2CT	Word	R/W
1005H	PT1	220.0	50.0 ~ 500000.0	Unit 32	R/W
1007H	PT2	220.0	50.0 ~ 400.0	Word	R/W
1008H	CT1	5	1 ~ 50000	Word	R/W
1009H	CT2	5	1, 5	Word	R/W
100aH	kWh Pulse Constant	1	1 ~ 60000 (Setting Method, See Remarks)	Word	R/W
100bH	kvarh Pulse Constant	1	1 ~ 60000 (Setting Method, See Remarks)	Word	R/W
100cH	LCD Backlight Time	1	0 ~ 120	Word	R/W
100dH	Demand Slid Window Time	15	1 ~ 30	Word	R/W
100eH	Demand Calculating Mode	1	1: Sliding Window 2: Thermal	Word	R/W
100fH	Clear Demand Memory	0	Only 1 Works	Word	R/W
1010H	Max/Min Clear	55H	Only 0AH Works	Word	R/W
1011H	Run Time Clear	0	Only 1 Works	Word	R/W
1012H	Current I1 Direction	0	0: Positive; 1: Negative	Word	R/W
1013H	Current I2 Direction	0	0: Positive; 1: Negative	Word	R/W
1014H	Current I3 Direction	0	0: Positive; 1: Negative	Word	R/W
1015H	VAR/PF Convention	0	0: IEC, 1: IEEE	Word	R/W
1016H	Energy Clear	0	Only 1 Works	Word	R/W
1017H	Energy Calculating Mode	1	0: Fundamental; 1: Full-wave (also referred to as True RMS)	Word	R/W
1018H	Reactive Power Measuring Mode	0	0: Real, 1: General	Word	R/W
1019H	Energy Display Mode	0	0: Primary, 1: Secondary	Word	R/W
101aH	Ethernet Module Reset	0	0: None, 1: Reset, 2: Load Default and Reset	Word	R/W
101bH	SOE Enable	0	0: None; 1: PXM1K-11; 2: PXM1K-21; 3: PXM1K-31; 4: PXM1K-12; 5: PXM1K-22; 6: PXM1K-32;	Word	R/W
101cH	Pulse Counter Clear	0	0: None; 1: PXM1K-11; 2: PXM1K-21; 3: PXM1K-31; 4: PXM1K-12; 5: PXM1K-22; 6: PXM1K-32;	Word	R/W
101dH	Basic Parameter Mode	0	0: Secondary; 1:Primary	Word	R/W

Notes: When OFFEH is 0, first communication protocol is set to MODBUS, while OFFEH is 1, first communication protocol is DNP3.0. At this time, special DNP3.0 software is needed, and normal software will be invalid.

100AH, 100BH setting method: $1000 * 3600 / (U * I * n * \text{pulse constant}) = \text{pulse period (S)}$, pulse period calculated by the pulse constant must be greater than the pulse width (20ms ~ 1000 ms) of IO module DO setting. Wherein n is applied by the User, and if the three-phase signals are added, then n is 3. U and I are generally equal to the User settings PT2, CT2, ie, rated voltage and rated current.

0x1017H: When selecting 400 Hz type, only support true RMS.

6.3.2 System Status Parameters

“System status” indicates what events happened in the meter, what kinds of flags are read by the user, and the index of the storage of events. Flags should be cleared after being read by the controller, otherwise new data will not be stored properly.

Function code: 03H for reading, 10H for writing. Data type: word.

Table 48. System Status Parameters.

Address	Parameter	Format Code	Range	Data Type	Property
101EH	Sealed Nonstandard Parameters		Bit0: 1st Communication Parameters; Bit1: 2nd Communication Parameters; Bit2: Run Time Clear; Bit3: DI Pulse Count; Bit4: TOU; 1: Valid of Corresponding Selection; 0: invalid	Word	R/W
101FH	Seal Status		0x0A: Seal Sealed; Other: Seal Opened.	Word	R/W
1020H	Reserved				
1021H	Alarm Record Clear		0x0A: Clear; Other: Not Clear	Word	R/W
1022H~102DH	Reserved				
102eH	System Status		Bit0: New Alarming or Not; Bit1: New SOE or Not	Word	R
102fH	Baud Rate 2	38400		Word	R/W
1030H	Parity Setting 2		0: EVEN 1: Odd 2:NON2 3:NON1	Word	R/W
1031H	Communication Address2		1 ~ 247	Word	R
1032H	Alarming Group Number	F1	0: No Alarming Record; 1 ~ 16: Last Alarming Record Group Number	Word	R
1033H	SOE Group Number	F1	0: No SOE Record; 1 ~ 20: Last SOE Group Number	Word	R
1034H	Run Time (High)	F2	0 ~ 99999999	Word	R
1035H	Run Time (Low)			Word	R
1036H	Expanded IO Modules Connecting Status		Bit0: PXM1K-11; Bit1: PXM1K-12; Bit2: PXM1K-21; Bit3: PXM1K-22; Bit4: PXM1K-31; Bit5: PXM1K-32; 0: Disconnected 1: Connected	Word	R
1037H	Reserved				
1038H	2 nd Communication Selection		1: BACnet Protocol 0: Other Protocol	Word	R/W
1039H	Ten Year Download Setting Enable		1: Enable is Valid	Word	R/W
103aH	Sharp Demand Clear		0x0A: Clear; Other: Not Clear	Word	R/W
103bH	Peak Demand Clear		0x0A: Clear; Other: Not Clear	Word	R/W
103cH	Valley Demand Clear		0x0A: Clear; Other: Not Clear	Word	R/W
103dH	Normal Demand Clear		0x0A: Clear; Other: Not Clear	Word	R/W
103eH	Total Demand Clear		0x0A: Clear; Other: Not Clear	Word	R/W

Note: Please refer to Chapter 3 and Chapter 4 for more details about parameter settings.

6. Communication

Note: When 1038H is 1, the second communication protocol is set to BACnet protocol, while second communication should select BACnet module. When 1038H is 0, the second communication protocol is set to other protocols, while the second communication should select the second RS-485 module, or Ethernet module. If selected protocol does not match attached module, communication can not process. If you use Ethernet or PROFIBUS module, you should set 38400 bps and NON1 for the second communication. When Ethernet or Profibus module will connect normally, the User can not change the protocol, baud and parity.

6.3.3 Date and Time Table

Function code: 03H for reading, 10H for presetting.

Table 49. Date and Time Table.

Address	Parameter	Format Code	Range	Data Type	Property
103fH	Week	F3	0~6	Word	R/W
1040H	Year	F3	2000-2099	Word	R/W
1041H	Month	F3	1~12	Word	R/W
1042H	Day	F3	1~31	Word	R/W
1043H	Hour	F3	0~23	Word	R/W
1044H	Minute	F3	0~59	Word	R/W
1045H	Second	F3	0~59	Word	R/W

6.3.4 Over/Under Limit Alarming Setting

This setting consists of global alarm settings and single channel alarm settings. Global alarm settings contain settings of all global variables. There are 16 groups of records with the same format. Function code: 03H for reading, 10H for writing. Please refer to Chapter 4 for more details.

Table 50. Global Alarm Settings.

Address	Parameter	Range	Data Type	Property
1046H	Global Alarming Enable	0:disable; 1:enable	Word	R/W
1047H	Alarming Flash Enable	0:disable; 1:enable	Word	R/W
1048H	Alarming Channel Enable Setting	0~65535; Bit0: channel 1; 1:enable; 0:disable; Bit1: channel 2;; Bit15: channel 16	Word	R/W
1049H	Logic "And" Between Alarming Setting	0~255; Bit0: first logic switch; 1:enable; 0:disable; Bit1: second logic switch;; Bit7: eighth logic switch	Word	R/W
104aH	Alarming Output to D01 Setting	0~65535; Bit0: channel 1 output; 1:enable; 0:disable; Bit1: channel 2 output;; Bit15: channel 16 output	Word	R/W
104bH	Alarming Output to D02 Setting	0~65535; The same as previous	Word	R/W
104cH	Alarming Output to D03 Setting	0~65535; The same as previous	Word	R/W
104dH	Alarming Output to D04 Setting	0~65535; The same as previous	Word	R/W

Table 51. Single Alarm Settings.

Address	Parameter	Format Code	Range	Data Type	Property
104eH	First Group: Parameter Code	F1	0~79	Word	R/W
104fH	First Group: Comparison Mode	F1	1: greater than; 2: equal to; 3: less than	Word	R/W
1050H	First Group: Setpoint Value	F10~F18	Related with parameters	Word	R/W
1051H	First group: delay	F1	0~3000(*10 ms)	Word	R/W
1052H	First Group: Output to Relay	F1	0: none, 1~8: related relay	Word	R/W
1053H~109dH	2 nd to 16 th Group		Same as the first group	Word	R/W

Table 52. Alarming Parameter Code.

Setting Value	Alarming Object	Setting Value	Alarming Object	Setting Value	Alarming Object
0	Frequency	1	Va	2	Vb
3	Vc	4	Average Phase Voltage	5	Uab
6	Ubc	7	Uca	8	Average Line Voltage
9	Current of Phase A	10	Current of Phase B	11	Current of Phase C
12	Average Current	13	Neutral Current	14	Power of Phase A
15	Power of Phase B	16	Power of Phase C	17	Power of All
18	Reactive Power of Phase A	19	Reactive Power of Phase B	20	Reactive Power of Phase C
21	Reactive Power of All	22	Apparent Power of Phase A	23	Apparent Power of Phase B
24	Apparent Power of Phase C	25	Apparent Power of All	26	PF of A
27	PF of B	28	PF of C	29	PF
30	Voltage Unbalance Factor U_unbl	31	Current Unbalance Factor I_unbl	32	Load Characteristic (R/L/C)
33	THD_V1(V1 or V12)	34	THD_V2(V2 or V31)	35	THD_V3(V3 or V23)
36	Average THD_V	37	THD_I1	38	THD_I2
39	THD_I3	40	Average THD_I	41	AI1 Sampling Value
42	AI2 Sampling Value	43	AI3 Sampling Value	44	AI4 Sampling Value
45	Active Power Demand of All	46	Reactive Power Demand of All	47	Apparent Power Demand of All
48	Current Demand of Phase A	49	Current Demand of Phase B	50	Current Demand of Phase C
51	Reversed Phase Sequence	52~79	DI1~DI28		

Note: When reversed phase sequence (51) is selected, whether the value of the comparison mode or setpoint value is set or not, does not affect alarm result and angle of Ub to Ua will be recorded.

Note: When DI (52~79) is selected, whether the value of the comparison mode is set or not, does not affect the alarm result as long as the setpoint value is set to 1, 2 or 3.
 1 stands for DI alarm is from OFF to ON, and recovery is from ON to OFF.
 2 stands for DI alarm is from ON to OFF, and recovery is from OFF to ON.
 3 stands for DI alarm from ON to OFF, and recovery is from OFF to ON and present DI status is recorded.

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6.3.5 I/O Modules Settings

I/O module setting changes will be made only if the corresponding I/O modules are installed. No changes will be made otherwise. Please check the I/O module connection status before doing any settings. Function code: 03H for reading, 10H for writing. Please refer to Chapter 5 Extended Modules for more details.

Table 53. I/O Module Settings - PXM1K-11.

Address	Parameter	Default	Range	Data Type	Property
109eH	DI1~6 Type	0	Bit0: DI1, Bit1: DI2, Bit2: DI3, Bit3: DI4, Bit4: DI5, Bit5: DI6, 0: DI,1: pulse counter	Word	R/W
109fH	DI Pulse Constant	0	1~65535	Word	R/W
10a0H	Working Mode of Relays 1 and 2	0	0: control output, 1: alarming output	Word	R/W
10a1H	Output Mode of Relays 1 and 2	0	0: latch, 1: pulse	Word	R/W
10a2H	Pulse Width	50	50~3000 ms	Word	R/W

Table 54. I/O Module Settings - PXM1K-21.

Address	Parameter	Default	Range	Data Type	Property
10a3H	DI7~10 Type	0	Bit0: DI7, Bit1: DI8, Bit2: DI9, Bit3: DI10, 0: DI,1: pulse counter	Word	R/W
10a4H	DI Pulse Constant	0	1~65535	Word	R/W
10a5H	Working Mode of DO	0	0: pulse output; 1: alarming output	Word	R/W
10a6H	DO Pulse Width	20	20~1000 ms	Word	R/W
10a7H	DO1 Output	0	0: none; 1: consumption power (real forward energy); 2: generating power (real reverse energy); 3: absorption reactive power (reactive delivered energy); 4: generating reactive power(reactive received energy)	Word	R/W
10a8H	DO2 Output	0	Same as above	Word	R/W
10a9H	A01,2 Type	1 or 2	0: 0~20mA, 1: 4~20mA, 2: 0~5V, 3: 1~5V	Word	R/W

Table 55. I/O Module Settings - PXM1K-31.

Address	Parameter	Default	Range	Data Type	Property
10aaH	DI11~14 Type	0	Bit0: DI11, Bit1: DI12, Bit2: DI13, Bit3: DI14, 0: DI, 1: pulse counter	Word	R/W
10abH	DI Pulse Constant	0	1~65535	Word	R/W
10acH	Working Mode of Relays 3 and 4	0	0: control output, 1: alarming output	Word	R/W
10adH	Output Mode of Relays 3 and 4	0	0: latch, 1: pulse	Word	R/W
10aeH	Pulse Width	50	50~3000 ms	Word	R/W
10afH	AI1, 2 Type	1 or 2	0: 0~20 mA, 1: 4~20 mA,, 2: 0~5 V, 3: 1~5 V	Word	R/W

Table 56. I/O Module Settings - PXM1K-12.

Address	Parameter	Default	Range	Data Type	Property
10b0H	DI15~20 tType	0	Bit0: DI15, Bit1: DI16, Bit2: DI17, Bit3: DI18, Bit4: DI19, Bit5: DI20 0-DI, 1-pulse counter	Word	R/W
10b1H	DI Pulse Constant (High)	0	1~65535	Word	R/W
10b2H	Working Mode of Relays 5 and 6	0	0: control output, 1: alarming output	Word	R/W
10b3H	Output Mode of Relays 5 and 6	0	0: latch, 1: pulse	Word	R/W
10b4H	Pulse Width	50	50-3000 ms	Word	R/W

Table 57. I/O Module Settings - PXM1K-22.

Address	Parameter	Default	Range	Data Type	Property
10b5H	DI21~24 Type	0	Bit0: DI21, Bit1: DI22, Bit2: DI23, Bit3: DI24 0: DI, 1: pulse counter	Word	R/W
10b6H	DI Pulse Constant	0	1~65535	Word	R/W
10b7H	Working Mode of DO3, 4	0	0: pulse output, 1: alarming output	Word	R/W
10b8H	DO Pulse Width	20	20~1000 ms	Word	R/W
10b9H	DO3 Output	0	0: none; 1: consumption power 2: generating power; 3: consumption reactive power; 4: generating reactive power	Word	R/W
10baH	DO4 Output	0	Same as above	Word	R/W
10bbH	AO3,4 Type	1 or 2	0: 0~20 mA, 1: 4~20 mA, 2: 0~5 V, 3: 1~5 V	Word	R/W

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Table 58. I/O Module Settings - PXM1K-32.

Address	Parameter	Default	Range	Data Type	Property
10bcH	DI25~28 Type	0	Bit0: DI25, Bit1: DI26, Bit2: DI27, Bit3: DI28, 0: DI, 1: pulse counter	Word	R/W
10bdH	DI Pulse Constant	0	1~65535	Word	R/W
10beH	Working Mode of Relays 7 and 8	0	0: control output, 1: alarming output	Word	R/W
10bfH	Output Mode of Relays 7 and 8	0	0: latch, 1: pulse	Word	R/W
10c0H	Pulse Width	50	50~3000	Word	R/W
10c1H	AI3, 4 Type	1 or 2	0: 0~20 mA, 1: 4~20 mA, 2: 0~5 V, 3: 1~5 V	Word	R/W

Table 59. Analog Output (AO) Parameter Assignment.

Address	Parameter	Default	Range	Data Type	Property
10c2H	AO1 Transforming Parameter	0	Refer to Table 60	Word	R/W
10c3H	AO2 Transforming Parameter	0	Refer to Table 60	Word	R/W
10c4H	AO3 Transforming Parameter	0	Refer to Table 60	Word	R/W
10c5H	AO4 Transforming Parameter	0	Refer to Table 60	Word	R/W

Table 60. AO Parameter Settings.

Setting Value	Transforming Object	Setting Value	Transforming Object
0	Frequency	20	Phase C reactive power
1	Vc	21	All reactive power
2	Vb	22	Phase A apparent power
3	Vc	23	Phase B apparent power
4	Average phase voltage	24	Phase C apparent power
5	Uab	25	All apparent power
6	Ubc	26	A PF
7	Uca	27	B PF
8	Average line voltage	28	C PF
9	Phase A current	29	PF
10	Phase B current		
11	Phase C current		
12	Average Current		
13	Neutral current		
14	Phase A Power		
15	Phase B power		
16	Phase C power		
17	All power		
18	Phase A reactive power		
19	Phase B reactive power		

Table 61. AO Transfer Curve Settings.

Address	Parameter	Default	Range	Data Type	Property
10d0H	AO1 Gradient Number Selection of Input/Output Transfer Curve	1	1: 1 Gradient, 2: 2 Gradient; 3: 3 Gradient	INT	R/W
10d1H	AO1 Following Value Range Setting Start Point		Please see Note	INT	R/W
10d2H	AO1 Following Value Range Setting Point 2			INT	R/W
10d3H	AO1 Following Value Range Setting Point 3			INT	R/W
10d4H	AO1 Following Value Range Setting End Point			INT	R/W
10d5H	AO1 Output Range Setting Start Point		AO type of 0~24 mA or 0~6: 0~4915; AO type of 4~24 mA or 1~6: 819~4915	INT	R/W
10d6H	AO1 Output Range Setting Point 2			INT	R/W
10d7H	AO1 Output Range Setting Point 3			INT	R/W
10d8H	AO1 Output Range Setting End Point			INT	R/W
10d9-10E1H	AO2 Gradient Setting (Same as AO1)		Same as AO1	INT	R/W
10E2H-10EAH	AO3 Gradient Setting (Same as AO1)		Same as AO1	INT	R/W
10EBH-10F3H	AO4 Gradient Setting (Same as AO1)		Same as AO1	INT	R/W

Note: AO Gradient Number Selection of input/output transfer curve. When the number is 1, only AO following value range setting start point, AO following value range setting end point, AO1 output range setting start point, and AO1 output range setting end point should be set.

When the number is 2, only AO following value range setting start point, AO1 following value range setting point 2, AO following value range setting end point, AO1 output range setting start point, AO1 output range setting point 2, and AO1 output range setting end point should be set.

When the number is 3, only AO following value range setting start point, AO1 following value range setting point 2, AO1 following value range setting point 3, and AO following value range setting end point should be set. At the same time, AO1 output range setting start point, AO1 output range setting point 2, AO1 output range setting point 3, and AO1 output range setting end point should be set.

Note: Following value range setting:

AO following value range setting start point, AO1 following value range setting point 2, AO1 following value range setting point 3, and AO following value range setting end point are increasing value, while they should be within range of AO following value. Otherwise, the function of AO will be affected.

Frequency: When selecting 50 or 60 Hz type, frequency range is 45 ~ 65 Hz, real setting value is 4,500 ~ 6,500.

When selecting 400 Hz type, frequency range is 300 ~ 500 Hz, real setting value is 30,000 ~ 50,000.

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Phase voltage V1, V2, V3, and average phase voltage: 0 ~ 480 V, real setting value is 0 ~ 4,800.

Line to line voltage V12, V23, V31, and average line to line voltage: 0 ~ 831 V, real setting value is 0 ~ 8,310.

Current I1, I2, I3, and average current: 0 ~ 10 A, real setting value is 0 ~ 1,0000.

Power Pa, Pb, and Pc: -4,800 ~ 4,800 W, real setting value is -4,800 ~ 4,800.

System power: -14,400~14,400 W, real setting value is -14,400~14,400.

Reactive power Qa, Qb, and Qc: -4,800 ~ 4,800 Var, real setting value is 4,800 ~ 4,800.

System reactive power: -14,400 ~ 14,400 Var, real setting value is -14,400 ~ 14,400.

Apparent power Sa, Sb, and Sc: 0 ~ 4,800 VA, real setting value is 0 ~ 4,800.

System apparent power: 0 ~ 14,400 VA, real setting value is 0 ~ 14,400.

Power factor PFa, PFb, PFC, and system power factor: -1 ~ 1, real setting value is -1,000 ~ 1,000.

Note: AO output range setting:

AO output value range setting start point, AO1 output value range setting point 2, AO1 output value range setting point 3, and AO output value range setting end point are increasing value, while they should be within range of AO output value.

When AO type is 0 ~ 20 mA, the setting value range is 0 ~ 4,915, and the relationship is $\text{mA} = \text{setting value} \times 20/4,096$.

When AO type is 4 ~ 20 mA, the setting value range is 819 ~ 4,915, and the relationship is $\text{mA} = \text{setting value} \times 20/4,096$.

When AO type is 0 ~ 5 V, the setting value range is 0~ 4,915, and the relationship is $\text{V} = \text{setting value} \times 5/4,096$.

When AO type is 1 ~ 5 V, the setting value range is 819~ 4,915, and the relationship is $\text{V} = \text{setting value} \times 5/4,096$.

6.3.6 100 ms Refresh Metering Parameter

Table 62. 100 ms Refresh Metering Parameters.

Note: Parameters are all secondary values in this table.

Address	Parameter	Code	Relationship	Data Type	Property
3000H~3001H	Frequency	F1	$F = R_x$	Float	R
3002H~3003H	Phase Voltage V1	F1	$U = R_x \times (PT1/PT2)$	Float	R
3004H~3005H	Phase Voltage V2	F1	$U = R_x \times (PT1/PT2)$	Float	R
3006H~3007H	Phase Voltage V3	F1	$U = R_x \times (PT1/PT2)$	Float	R
3008H~3009H	Average Voltage Vavg	F1	$U = R_x \times (PT1/PT2)$	Float	R
300aH~300bH	Line Voltage V12	F1	$U = R_x \times (PT1/PT2)$	Float	R
300cH~300dH	Line Voltage V23	F1	$U = R_x \times (PT1/PT2)$	Float	R
300eH~300fH	Line Voltage V31	F1	$U = R_x \times (PT1/PT2)$	Float	R
3010H~3011H	Average Line Voltage Vlavg	F1	$U = R_x \times (PT1/PT2)$	Float	R
3012H~3013H	Current I1	F1	$I = R_x \times (CT1/CT2)$	Float	R
3014H~3015H	Current I2	F1	$I = R_x \times (CT1/CT2)$	Float	R
3016H~3017H	Current I3	F1	$I = R_x \times (CT1/CT2)$	Float	R
3018H~3019H	Average Current Iavg	F1	$I = R_x \times (CT1/CT2)$	Float	R
301aH~301bH	Neutral Current In	F1	$I = R_x \times (CT1/CT2)$	Float	R
301cH~301dH	Phase A Power Pa	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
301eH~301fH	Phase B Power Pb	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3020H~3021H	Phase C Power Pc	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3022H~3023H	System Power Psum	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3024H~3025H	Phase A Reactive Power Qa	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3026H~3027H	Phase B Reactive Power Qb	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3028H~3029H	Phase C Reactive Power Qc	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
302aH~302bH	System Reactive Power Qsum	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
302cH~302dH	Phase A Apparent Power Sa	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
302eH~302fH	Phase B Apparent Power Sb	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3030H~3031H	Phase C Apparent Power Sc	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3032H~3033H	System S Apparent Power Ssum	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
3034H~3035H	Phase A Power Factor PFa	F1	$PF = R_x$	Float	R
3036H~3037H	Phase B Power Factor PFb	F1	$PF = R_x$	Float	R
3038H~3039H	Phase C Power Factor PFc	F1	$PF = R_x$	Float	R
303aH~303bH	System Power Factor PFsum	F1	$PF = R_x$	Float	R

6.3.7 Metering Parameter Address

Basic Analog Measurements

There are two different modes to read basic analog measurements: one is secondary mode, and the other is primary mode. In primary mode, the numerical value in the register of the meter is equal to the real physical value. In secondary mode, the relationship between the numerical value in the register and the real physical value is shown in the Table 63. (Rx is the numerical value in the register of PXM 1000 meter.)

Function code: 03H for reading.

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Table 63. Relationship Between the Numerical Value and the Real Physical Value.

Address	Parameter	Code	Relationship	Data Type	Property
4000H~4001H	Frequency	F1	$F = R_x$	Float	R
4002H~4003H	Phase Voltage V1	F1	$U = R_x \times (PT1/PT2)$	Float	R
4004H~4005H	Phase Voltage V2	F1	$U = R_x \times (PT1/PT2)$	Float	R
4006H~4007H	Phase Voltage V3	F1	$U = R_x \times (PT1/PT2)$	Float	R
4008H~4009H	Average Voltage Vavg	F1	$U = R_x \times (PT1/PT2)$	Float	R
400aH~400bH	Line Voltage V12	F1	$U = R_x \times (PT1/PT2)$	Float	R
400cH~400dH	Line Voltage V23	F1	$U = R_x \times (PT1/PT2)$	Float	R
400eH~400fH	Line Voltage V31	F1	$U = R_x \times (PT1/PT2)$	Float	R
4010H~4011H	Average Line Voltage Vlavg	F1	$U = R_x \times (PT1/PT2)$	Float	R
4012H~4013H	Current I1	F1	$I = R_x \times (CT1/CT2)$	Float	R
4014H~4015H	Current I2	F1	$I = R_x \times (CT1/CT2)$	Float	R
4016H~4017H	Current I3	F1	$I = R_x \times (CT1/CT2)$	Float	R
4018H~4019H	Average Current Iavg	F1	$I = R_x \times (CT1/CT2)$	Float	R
401aH~401bH	Neutral Current In	F1	$I = R_x \times (CT1/CT2)$	Float	R
401cH~401dH	Phase A Power Pa	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
401eH~401fH	Phase B Power Pb	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4020H~4021H	Phase C Power Pc	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4022H~4023H	System Power Psum	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4024H~4025H	Phase A Reactive Power Qa	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4026H~4027H	Phase B Reactive Power Qb	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4028H~4029H	Phase C Reactive Power Qc	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
402aH~402bH	System Reactive Power Qsum	F1	$Q = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
402cH~402dH	Phase A Apparent Power Sa	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
402eH~402fH	Phase B Apparent Power Sb	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4030H~4031H	Phase C Apparent Power Sc	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4032H~4033H	System Apparent Power Ssum	F1	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4034H~4035H	Phase A Power Factor PFa	F1	$PF = R_x$	Float	R
4036H~4037H	Phase B Power Factor PFb	F1	$PF = R_x$	Float	R
4038H~4039H	Phase C Power Factor PFc	F1	$PF = R_x$	Float	R
403aH~403bH	System Power Factor PFsum	F1	$PF = R_x$	Float	R
403cH~403dH	Voltage Unbalance Factor U_unbl	F1	$Unbalance = R_x \times 100\%$	Float	R
403eH~403fH	Current Unbalance Factor I_unbl	F1	$Unbalance = R_x \times 100\%$	Float	R
4040H~4041H	Load Characteristic (L/C/R)	F1	76.0/67.0/82.0(ASCII)	Float	R
4042H~4043H	Power Demand	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4044H~4045H	Reactive Power Demand	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
4046H~4047H	Apparent Power Demand	F1	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R

Note: When CT2 = 5, calculating use CT2 = 5 in the formula, others use CT2 = 1 in the formula.

Table 64. Standard Registers.

Address	Parameter	Relationship	Data Type	Property
1FFEh-1FFFh	Product ID	200E	UInt32	R
2001H-2001H	Primary/Secondary Status	See Note Following Table	UInt16	R
2002H-2002H	Cause-Of-Status	0-79	UInt16	R
2003H-2004H	Current - IA	$I = R_x \times (CT1/CT2)$	Float	R
2005H-2006H	Current - IB	$I = R_x \times (CT1/CT2)$	Float	R
2007H-2008H	Current - IC	$I = R_x \times (CT1/CT2)$	Float	R
2009H-200AH	Current - IN	$I = R_x \times (CT1/CT2)$	Float	R
200BH-200CH	Current - Average	$I = R_x \times (CT1/CT2)$	Float	R
200DH-200EH	Voltage - VAB	$U = R_x \times (PT1/PT2)$	Float	R
200FH-2010H	Voltage - VBC	$U = R_x \times (PT1/PT2)$	Float	R
2011H-2012H	Voltage - VCA	$U = R_x \times (PT1/PT2)$	Float	R
2013H-2014H	Voltage - VLL Average	$U = R_x \times (PT1/PT2)$	Float	R
2015H-2016H	Voltage - VAN	$U = R_x \times (PT1/PT2)$	Float	R
2017H-2018H	Voltage - VBN	$U = R_x \times (PT1/PT2)$	Float	R
2019H-201AH	Voltage - VCN	$U = R_x \times (PT1/PT2)$	Float	R
201BH-201CH	Voltage - VLN Average	$U = R_x \times (PT1/PT2)$	Float	R
201DH-201EH	Real Power - Watts	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
2021H-2022H	Power Factor	$PF = R_x$	Float	R
2023H-2024H	Frequency	$F = R_x$	Float	R
2025H-2026H	Real Power - Phase A Watts	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
2027H-2028H	Real Power - Phase B Watts	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
2029H-202AH	Real Power - Phase C Watts	$P = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
202BH-202CH	Apparent Power - Phase A VA	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
202DH-202EH	Apparent Power - Phase B VA	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
202FH-2030H	Apparent Power - Phase C VA	$S = R_x \times (PT1/PT2) \times (CT1/CT2)$	Float	R
2031H-2032H	Power Factor - Phase A	$PF = R_x$	Float	R
2033H-2034H	Power Factor - Phase B	$PF = R_x$	Float	R
2035H-2036H	Power Factor - Phase C	$PF = R_x$	Float	R
2037H-2037H	Forward Energy Scaling = 2 for F4; 0 for F7	0, 2	UInt16	R
2038H-2039H	Forward Energy	F4, F7	UInt32	R
203AH-203AH	Reverse Energy Scaling, = 2 for F4; 0 for F7	0, 2	UInt16	R
203BH-203CH	Reverse Energy	F4, F7	UInt32	R
203DH-203DH	Sum Total Energy Scaling = 2 for F4; 0 for F7	0, 2	UInt16	R
203EH-203FH	Sum Total Energy	F4, F7	UInt32	R

Note: Register 2001H

Primary Status Code	Primary Status Definition	Secondary Status Code	Secondary Status Definition
4	Alarmed	1	Not applicable
9	Operational	7	Powered up

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Real Time Energy Measurement

Data stored in this block can be preset or cleared.

Function code: 03H for reading, 10H for writing. Data type: Dword.

It can be configured as primary energy or secondary energy according to the user setting. Please refer to Table 46 for more details about the relationship between numerical value in the register and the real physical value.

Table 65. Real Time Energy Measurement.

Address	Parameter	Code	Range	Data Type	Property
4048H~4049H	Energy IMP	F4/F7	0~999999999	Dword	R/W
404aH~404bH	Energy EXP	F4/F7	0~999999999	Dword	R/W
404cH~404dH	Reactive Energy IMP	F5/F8	0~999999999	Dword	R/W
404eH~404fH	Reactive Energy EXP	F5/F8	0~999999999	Dword	R/W
4050H~4051H	Energy TOTAL	F4/F7	0~999999999	Dword	R/W
4052H~4053H	Energy NET	F4/F7	0~999999999	Dword	R/W
4054H~4055H	Reactive Energy TOTAL	F5/F8	0~999999999	Dword	R/W
4056H~4057H	Reactive Energy NET	F5/F8	0~999999999	Dword	R/W
4058H~4059H	Apparent Energy	F6/F9	0~999999999	Dword	R/W
4620H~4621H	Phase A Energy IMP	F4/F7	0~999999999	Dword	R/W
4622H~4623H	Phase A Energy EXP	F4/F7	0~999999999	Dword	R/W
4624H~4625H	Phase B Energy IMP	F4/F7	0~999999999	Dword	R/W
4626H~4627H	Phase B Energy EXP	F4/F7	0~999999999	Dword	R/W
4628H~4629H	Phase C Energy IMP	F4/F7	0~999999999	Dword	R/W
462AH~462BH	Phase C Energy EXP	F4/F7	0~999999999	Dword	R/W
462CH~462DH	Phase A Reactive Energy IMP	F5/F8	0~999999999	Dword	R/W
462EH~462FH	Phase A Reactive Energy EXP	F5/F8	0~999999999	Dword	R/W
4630H~4631H	Phase B Reactive Energy IMP	F5/F8	0~999999999	Dword	R/W
4632H~4633H	Phase B Reactive Energy EXP	F5/F8	0~999999999	Dword	R/W
4634H~4635H	Phase C Reactive Energy IMP	F5/F8	0~999999999	Dword	R/W
4636H~4637H	Phase C Reactive Energy EXP	F5/F8	0~999999999	Dword	R/W
4638H~4639H	Phase A Apparent Energy	F6/F9	0~999999999	Dword	R/W
463AH~463BH	Phase B Apparent Energy	F6/F9	0~999999999	Dword	R/W
463CH~463DH	Phase C Apparent Energy	F6/F9	0~999999999	Dword	R/W

Harmonics

THD, harmonics, odd HD, even HD, crest factor, THFF, K factor, etc., are all stored here. The data type is "Word". Voltage parameters refer to line voltage when it is set to "2 LL/3 LL" and phase voltage for others. Function code: 03H for reading.

Table 66. Harmonics.

Address	Parameter	Code	Range	Data Type	Property
The following are the THD of voltage and current.					
405aH	THD_V1 of V1(V12)	F18	> = 0	Word	R
405bH	THD_V1 of V2(V31)	F18	> = 0	Word	R
405cH	THD_V1 of V3(V23)	F18	> = 0	Word	R
405dH	Average THD_V	F18	> = 0	Word	R
405eH	THD_I1	F18	> = 0	Word	R
405fH	THD_I2	F18	> = 0	Word	R
4060H	THD_I3	F18	> = 0	Word	R
4061H	Average THD_I	F18	> = 0	Word	R
Voltage harmonics, even HD, odd HD, and crest factor are shown as below.					
4062H~407fH	Harmonics of V1(V12) (the 2 nd to 31 st)	F19	> = 0	Word	R
4500H~451fH	Harmonics of V1(V12) (the 32 nd to 63 rd)	F19	> = 0	Word	R
4080H	Odd HD of V1(V12)	F20	> = 0	Word	R
4081H	Even HD of V1(V12)	F21	> = 0	Word	R
4082H	Crest Factor of V1 (V12)	F22	0~65535	Word	R
4083H	THFF of V1 (V12)	F24	> = 0	Word	R
4520H~453fH	Harmonics of V2 (V31) (the 32 nd to 63 rd)	Same as V1		Word	R
40A2H	Odd HD of V2(V31)	Same as V1		Word	R
40A3H	Even HD of V2(V31)	Same as V1		Word	R
40A4H	Crest Factor of V2(V31)	Same as V1		Word	R
40A5H	THFF of V2(V31)	Same as V1		Word	R
40A6H~40C3H	Harmonics of V3(V23) (the 2 nd to 31 st)	Same as V1		Word	R
4540H~455fH	Harmonics of V3 (V23) (the 32 nd to 63 rd)	Same as V1		Word	R
40C4H	Odd HD of V3(V23)	Same as V1		Word	R
40C5H	Even HD of V3(V23)	Same as V1		Word	R
40C6H	Crest Factor of V3(V23)	Same as V1		Word	R
40C7H	THFF of V3(V23)	Same as V1		Word	R
Current harmonics, even HD, odd HD, and K factor are shown as below.					
40c8H~40e5H	Harmonics of I1 (the 2 nd to 31 st)	F19	> = 0	Word	R
4560H~457fH	Harmonics of I1 (the 32 nd to 63 rd)	F19	> = 0	Word	R
40e6H	Odd HD of I1	F20	> = 0	Word	R
40e7H	Even HD of I1	F21	> = 0	Word	R
40e8H	K Factor of I1	F23	0~65535	Word	R
40E9H~4106H	Harmonics of I2 (the 2 nd to 31 st)	Same as I1		Word	R
4580H~459fH	Harmonics of I2 (the 32 nd to 63 rd)	Same as I1		Word	R
4107H	Odd HD of I2	Same as I1		Word	R
4108H	Even HD of I2	Same as I1		Word	R
4109H	K Factor of I2	Same as I1		Word	R
410AH~4127H	Harmonics of I3 (the 2 nd to 31 st)	Same as I1		Word	R
45a0H~45bfH	Harmonics of I3 (the 32 nd to 63 rd)	Same as I1		Word	R

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Table 66. Harmonics (continued).

Address	Parameter	Code	Range	Data Type	Property
4128H	Odd HD of I3	Same as I1		Word	R
4129H	Even HD of I3	Same as I1		Word	R
412AH	K Factor of I3	Same as I1		Word	R

Note: When selecting 400 Hz type, harmonics support 2nd ~ 15th.

MAX/MIN Records

MAX/MIN value and time stamp. Function code: 03H for reading.

Table 67. MIN/MAX Values and Time Stamp.

Address	Parameter	Code	Range	Data Type	Property
4136H	MAX of V1	F11	-32768~32767	int	R
4137H~413cH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
413dH	MAX of V2	F11	-32768~32767	int	R
413eH~4143H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4144H	MAX of V3	F11	-32768~32767	int	R
4145H~414aH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
414bH	MAX of V12	F11	-32768~32767	int	R
414cH~4151H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4152H	MAX of V23	F11	-32768~32767	int	R
4153H~4158H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4159H	MAX of V31	F11	-32768~32767	int	R
415aH~415fH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4160H	MAX of I1	F12	-32768~32767	int	R
4161H~4166H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4167H	MAX of I2	F12	-32768~32767	int	R
4168H~416dH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
416eH	MAX of I3	F12	-32768~32767	int	R
416fH~4174H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4175H	MAX of system power	F13	-32768~32767	int	R
4176H~417bH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
417cH	MAX of system reactive power	F14	-32768~32767	int	R
417dH~4182H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4183H	MAX of system apparent power	F15	-32768~32767	int	R
4184H~4189H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
418aH	MAX of power factor	F16	-32768~32767	int	R
418bH~4190H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4191H	MAX of frequency	F10	-32768~32767	int	R
4192H~4197H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4198H	MAX of power demand	F13	-32768~32767	int	R
4199H~419eH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
419fH	MAX of reactive power demand	F14	-32768~32767	int	R
41a0H~41a5H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41a6H	MAX of apparent power demand	F15	-32768~32767	int	R

Table 67. MIN/MAX Values and Time Stamp (continued).

Address	Parameter	Code	Range	Data Type	Property
41a7H~41acH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41adH	MAX of voltage unbalance factor	F17	-32768~32767	int	R
41aeH~41b3H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41b4H	MAX of current unbalance factor	F17	-32768~32767	int	R
41b5H~41baH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41bbH	MAX of V1(V12) THD	F18	-32768~32767	int	R
41bcH~41c1H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41c2H	MAX of V2(V31) THD	F18	-32768~32767	int	R
41c3H~41c8H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41c9H	MAX of V3(V23) THD	F18	-32768~32767	int	R
41caH~41cfH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41d0H	MAX of I1 THD	F18	-32768~32767	int	R
41d1H~41d6H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41d7H	MAX of I2 THD	F18	-32768~32767	int	R
41d8H~41ddH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
41deH	MAX of I3 THD	F18	-32768~32767	int	R
41dfH~41e4H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R

The addresses for the MIN value of the above parameters are located in 41e5H to 4293H. They have the same format as the MAX value.

Note: The MAX and MIN Frequency value should use word data type (0~65535).

Sequence Component

U1 (U12) and I1 consist of a real part and a complex part. They have a positive sequence, negative sequence, and zero sequence. Data type is "int." Function Code: 03H for reading.

Table 68. Sequence Component.

Address	Parameter	Code	Range	Data Type	Property
4294H	Positive sequence real part of UA	F11	-32768~32767	int	R
4295H	Positive sequence complex part of UA	F11	-32768~32767	int	R
4296H	Negative sequence real part of UA	F11	-32768~32767	int	R
4297H	Negative sequence complex part of UA	F11	-32768~32767	int	R
4298H	Zero sequence real part of UA	F11	-32768~32767	int	R
4299H	Zero sequence complex part of UA	F11	-32768~32767	int	R
429aH	Positive sequence real part of IA	F12	-32768~32767	int	R
429bH	Positive sequence complex part of IA	F12	-32768~32767	int	R
429cH	Negative sequence real part of IA	F12	-32768~32767	int	R
429dH	Negative sequence complex part of IA	F12	-32768~32767	int	R
429eH	Zero sequence real part of IA	F12	-32768~32767	int	R
429fH	Zero sequence complex part of IA	F12	-32768~32767	int	R

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Phase Angle

All voltage and current's phase angles corresponding to V1 (V12) are stored here. The user can find out the phase sequence according to them. Data type is "Word". Function Code: 03H for reading.

Table 69. Phase Angle.

Address	Parameter	Code	Range	Data Type	Property
42a0H	Phase angle of V2 to V1 Phase angle of V23 to V12	F25	0~3600	Word	R
42a1H	phase angle of V3 to V1; phase angle of V31 to V12	F25	0~3600	Word	R
42a2H	phase angle of I1 to V1; phase angle of I1 to V12	F25	0~3600	Word	R
42a3H	Phase angle of I2 to V1; Phase angle of I2 to V12	F25	0~3600	Word	R
42a4H	Phase angle of I3 to V1; Phase angle of I3 to V12	F25	0~3600	Word	R
42a5H	Reserved			Word	R
42a6H	Reserved			Word	R
42a7H	Reserved			Word	R
42a8H	Reserved			Word	R

Alarming Records

There are 16 groups of records with the same format. Function Code: 03H for reading, 10H for writing. Please refer to Chapter 4 for more details.

Table 70. Alarm Records.

Address	Parameter	Code	Range	Data Type	Property
42a9H	First group: alarming status	F1	0~65535	Word	R
42aaH	First group: alarming parameter code	F1	0~79	Word	R
42abH	First group: over/under limit or reset value	F10~F18	Related with parameters	Word	R
42acH~42b2H	First group: time stamp: yyyy:mm:dd:hh:mm:ss.ms	F3		Word	R
42b3H~42bcH	Second group	Same as the first group			
42bdH~42c6H	Third group	Same as the first group			
42c7H~42d0H	Fourth group	Same as the first group			
42d1H~42daH	Fifth group	Same as the first group			
42dbH~42e4H	Sixth group	Same as the first group			
42e5H~42eeH	Seventh group	Same as the first group			
42efH~42f8H	Eighth group	Same as the first group			
42f9H~4302H	Ninth group	Same as the first group			
4303H~430cH	Tenth group	Same as the first group			
430dH~4316H	Eleventh group	Same as the first group			
4317H~4320H	Twelfth group	Same as the first group			
4321H~432aH	Thirteenth group	Same as the first group			
432bH~4334H	Fourteenth group	Same as the first group			
4335H~433eH	Fifteenth group	Same as the first group			
433fH~4348H	Sixteenth group	Same as the first group			

Counting Number of I/O Modules

DI are arranged according to expanded I/O module addresses. The user can check the counting number of the DI along with those modules. The DI counting records are stored in non-volatile memory and will not be erased during power off. They can be reset via communication and the front panel. Data type is "Dword". Function Code: 03H for reading.

Note: Max and min values are always in secondary, so relationship must be applied.

Table 71. DI Counting Number.

Address	Parameter	Code	Range	Data Type	Property
PXM1K-11					
4349H~434aH	DI1 pulse counter number	F1	0~4294967295	Dword	R
434bH~434cH	DI2 pulse counter number	F1	0~4294967295	Dword	R
434dH~434eH	DI3 pulse counter number	F1	0~4294967295	Dword	R
434fH~4350H	DI4 pulse counter number	F1	0~4294967295	Dword	R
4351H~4352H	DI5 pulse counter number	F1	0~4294967295	Dword	R
4353H~4354H	DI6 pulse counter number	F1	0~4294967295	Dword	R
PXM1K-21					
4355H~4356H	DI7 pulse counter number	F1	0~4294967295	Dword	R
4357H~4358H	DI8 pulse counter number	F1	0~4294967295	Dword	R
4359H~435aH	DI9 pulse counter number	F1	0~4294967295	Dword	R
435bH~435cH	DI10 pulse counter number	F1	0~4294967295	Dword	R
PXM1K-31					
435dH~435eH	DI11 pulse counter number	F1	0~4294967295	Dword	R
435fH~4360H	DI12 pulse counter number	F1	0~4294967295	Dword	R
4361H~4362H	DI13 pulse counter number	F1	0~4294967295	Dword	R
4363H~4364H	DI14 pulse counter number	F1	0~4294967295	Dword	R
PXM1K-12					
4365H~4366H	DI15 pulse counter number	F1	0~4294967295	Dword	R
4367H~4368H	DI16 pulse counter number	F1	0~4294967295	Dword	R
4369H~436aH	DI17 pulse counter number	F1	0~4294967295	Dword	R
436bH~436cH	DI18 pulse counter number	F1	0~4294967295	Dword	R
436dH~436eH	DI19 pulse counter number	F1	0~4294967295	Dword	R
436fH~4370H	DI20 pulse counter number	F1	0~4294967295	Dword	R
PXM1K-22					
4371H~4372H	DI21 pulse counter number	F1	0~4294967295	Dword	R
4373H~4374H	DI22 pulse counter number	F1	0~4294967295	Dword	R
4375H~4376H	DI23 pulse counter number	F1	0~4294967295	Dword	R
4377H~4378H	DI24 pulse counter number	F1	0~4294967295	Dword	R
PXM1K-32					
4379H~437aH	DI25 pulse counter number	F1	0~4294967295	Dword	R
437bH~437cH	DI26 pulse counter number	F1	0~4294967295	Dword	R
437dH~437eH	DI27 pulse counter number	F1	0~4294967295	Dword	R
437fH~4380H	DI28 pulse counter number	F1	0~4294967295	Dword	R

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Analog Input (AI)

The Modbus register reading of AI is mapped to the range of 0 ~ 4,095 according to its sampling value using an algorithm. Data type is "Word". Function Code: 03H for reading. Please refer to Chapter 5 - "Extended Modules" for more details.

Table 72. AI Input Value.

Address	Parameter	Code	Range	Data Type	Property
4385H	AI1 sampling value	F1	0~4095	Word	R
4386H	AI2 sampling value	F1	0~4095	Word	R
4387H	AI3 sampling value	F1	0~4095	Word	R
4388H	AI4 sampling value	F1	0~4095	Word	R

Analog Output (AO)

The Modbus register reading of AO is the actual value of the output. There are two output options for AO: V or mA. Out-of-limit or Data type is "Float". Function Code: 03H for reading. Please refer to Chapter 5 - "Extended Modules" for more details.

Table 73. AO Output.

Address	Parameter	Code	Range	Data Type	Property
4389H - 438aH	Value of AO1	F1		Float	R
438bH - 438cH	Value of AO2	F1		Float	R
438dH - 438eH	Value of AO3	F1		Float	R
438fH - 4390H	Value of AO4	F1		Float	R

Sequence of Event (SOE) Records

There are 20 groups of records with the same format. Function Code: 03H for reading. Before gathering SOE records, the selected I/O module must be SOE enabled. If the SOE is enabled but I/O module is not connected, SOE record logs will not be collected. Please refer to Chapter 5 - "Extended Modules" for more details.

Table 74. SOE Records.

Address	Parameter	Code	Range	Data Type	Property
4399H~439fH	First group: time stamp: yyyy:mm:dd:hh:mm:ss:ms	F3		Word	R
43a0H	First group: DI status	F1		Word	R
43a1H~4438H	2 nd to 20 th group			Word	R
4439H	I/O module of SOE	F1	0: none; 1: PXM1K-11; 2: PXM1K-21; 3: PXM1K-31; 4: PXM1K-12; 5: PXM1K-22; 6: PXM1K-32	Word	R

Current Demand

Includes real-time current demand, the maximum current demand, and time of occurrence.
Function Code: 03H for reading.

Table 75. Current Demand.

Address	Parameter	Code	Range	Data Type	Property
4600H - 4601H	Phase A current demand	F1	$I = R_x \times (CT1/CT2)$	Float	R
4602H - 4603H	Phase B current demand	F1	$I = R_x \times (CT1/CT2)$	Float	R
4604H - 4605H	Phase C current demand	F1	$I = R_x \times (CT1/CT2)$	Float	R
4606H	Max of Phase A current demand	F12	0-65535	int	R
4607 - 460cH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
460dH	Max of Phase B current demand	F12	0-65535	int	R
460e - 4613H	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R
4614H	Max of Phase C current demand	F12	0-65535	int	R
4615 - 461AH	Time stamp: yyyy:mm:dd:hh:mm:ss	F3	Time	int	R

Digital Input (DI) Status

Current DI status, if the related I/O module is not connected, will be set to 0. Function Code: 02H for reading.

Table 76. DI Status.

Address	Parameter	Range	Data Type
PXM1K-11			
0000H	DI1	1 = ON, 0 = OFF	Bit
0001H	DI2	1 = ON, 0 = OFF	Bit
0002H	DI3	1 = ON, 0 = OFF	Bit
0003H	DI4	1 = ON, 0 = OFF	Bit
0004H	DI5	1 = ON, 0 = OFF	Bit
0005H	DI6	1 = ON, 0 = OFF	Bit
PXM1K-21			
0006H	DI7	1 = ON, 0 = OFF	Bit
0007H	DI8	1 = ON, 0 = OFF	Bit
0008H	DI9	1 = ON, 0 = OFF	Bit
0009H	DI10	1 = ON, 0 = OFF	Bit
PXM1K-31			
000aH	DI11	1 = ON, 0 = OFF	Bit
000bH	DI12	1 = ON, 0 = OFF	Bit
000cH	DI13	1 = ON, 0 = OFF	Bit
000dH	DI14	1 = ON, 0 = OFF	Bit
PXM1K-12			
000eH	DI15	1 = ON, 0 = OFF	Bit
000fH	DI16	1 = ON, 0 = OFF	Bit
0010H	DI17	1 = ON, 0 = OFF	Bit
0011H	DI18	1 = ON, 0 = OFF	Bit
0012H	DI19	1 = ON, 0 = OFF	Bit
0013H	DI20	1 = ON, 0 = OFF	Bit

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Table 76. DI Status (continued).

Address	Parameter	Range	Data Type
PXM1K-22			
0014H	DI21	1 = ON, 0 = OFF	Bit
0015H	DI22	1 = ON, 0 = OFF	Bit
0016H	DI23	1 = ON, 0 = OFF	Bit
0017H	DI24	1 = ON, 0 = OFF	Bit
PXM1K-32			
0018H	DI25	1 = ON, 0 = OFF	Bit
0019H	DI26	1 = ON, 0 = OFF	Bit
001aH	DI27	1 = ON, 0 = OFF	Bit
001bH	DI28	1 = ON, 0 = OFF	Bit

Relay Status

Function Code: 01H for reading, 05H for controlling output.

Table 77. Relay Status.

Address	Parameter	Range	Data type
PXM1K-11			
0000H	Relay1	1 = ON, 0 = OFF	Bit
0001H	Relay2	1 = ON, 0 = OFF	Bit
PXM1K-31			
0002H	Relay3	1 = ON, 0 = OFF	Bit
0003H	Relay4	1 = ON, 0 = OFF	Bit
PXM1K-12			
0004H	Relay5	1 = ON, 0 = OFF	Bit
0005H	Relay6	1 = ON, 0 = OFF	Bit
PXM1K-32			
0006H	Relay7	1 = ON, 0 = OFF	Bit
0007H	Relay8	1 = ON, 0 = OFF	Bit

6.3.8 Data Logging

Data Logging Setting

In order to generate historical logs for the selected parameters, users should program the meter so that the selected parameters from the corresponding Modbus registers can be copied to the historical log record. Since certain parameters occupy two registers, to supplement this, the programmable settings for the historical logs contain a list of descriptors. Each descriptor lists the number of Modbus registers for the specified parameter. By combining these two lists, the historical log record can be interpreted.

For example:

Registers 4002H and 4003H are programmed to be recorded by the historical log. Since two registers are used, the corresponding descriptor is set as 2. These registers program the log to record "Volts AN."

The historical log programmable settings are comprised of three blocks, one for each log. Each log works identically to each other. Therefore, only historical log 1 is described here. All register addresses in this section are shown within the address range of historical log 1.

1100H - 11DFH (Historical Log 1)

11C0H - 127FH (Historical Log 2)

1280H - 133FH (Historical Log 3)

Block Size: 192 registers per log (384 bytes)

Data Log Settings' Address Map.

Table 78. Data Log Settings' Address Map.

1100H - 1101H	1102H - 1176H	1177H - 11b1H	11B2H - 11B5H
Header	Register List	Item Descriptor List	Logging Timer setting

The following are the details.

1. Header:

Registers - 1100H-1101H

Size - 2 Registers

Table 79. Header Description

Address	1100H		1101H	
Byte	0 (low byte)	1 (high byte)	2 (low byte)	3 (high byte)
Value	Sectors	Registers	Interval	

Registers: The number of registers to log in the record range from 0 - 117. The size of the record in memory is $[12 + (\text{Registers} \times 2)]$.

Sectors: The number of memory sectors allocated to this log. Each sector is 64 kbyte in size. 63 sectors are available for allocation among the three historical logs. Valid allocation range is from 0 - 63 (when the sector is set 0, this log is disabled).

Interval: The data capture interval for the historical log records. Valid time interval can be set from 0 - 1,440 minutes. When the interval is set to 0, this log is disabled.

Note: When Sectors or Register or Interval is zero, this log is disabled.

2. Register List:

Registers: 1102H - 1176H

Size: One or two register(s) per parameter; 117 available registers per historical log.

The register list controls which Modbus registers are recorded in each historical log record. Since many parameters, such as voltage, energy, etc., take up more than one register, multiple registers are allocated for those parameters.

For example:

In order to record "Volts AN" into the historical log, Volts AN's Modbus address (4002H and 4003H) are assigned and programmed to the log record list so that information can be stored into the historical log registers.

- Each unused register item should be set to 0000H or FFFFH to indicate no parameters are associated with them.
- The actual size of the record, and the number of items in the register list which are used, is determined by the registers in the header.
- Valid register address ranges that can be recorded in the historical log registers are 4000H-412BH, 4294H-42A8H, 4349H-4398H, and 4500H-461BH.

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3. Item Descriptor List:

Registers: 1177H–11B1H

Size: One byte per item, 117 bytes (59 registers)

While the register list describes what to log, the item descriptor list describes how to interpret that information. Each descriptor describes how many Modbus addresses are used to describe a parameter. Either one or two addresses will be used for each parameter.

For example:

If the first descriptor is two, and the second descriptor is one, then the first two register items belong to the 1st descriptor, and the 3rd register item belongs to the 2nd descriptor.

Note: As can be seen from the example above, it is not a one-to-one relation between the register list and the descriptor list. A single descriptor may refer to two register items.

4. Logging Timer Setting

If data logging only records one period of data, or only starts from one specific time, the corresponding time and logging mode should be set so the data logging function is successful.

Modbus address 11B2H is used as the logging mode select. When value is 0, the logging mode is set to mode 1, without time setting. When value is 1, the logging mode is set to mode 2, so 11B3H-11B5H (start year, month, day, hour, minute, and second) and 11B6H-11B8H (end year, month, day, hour, minute, and second) should be set. When the value is 2, the logging mode is set to mode 3, so only 11B4H (hour) and 11B5H (minute) should be set. Refer to Chapter 4 for more information on how data logging works.

Registers 11B3H-11B5H (start time)

11B6H-11B8H (end time)

Size 6 Registers

Table 80. Logging Timer Description

Byte	0	1	2	3	4	5
value	month	year	hour	day	second	minute

Log Status Block

The log status block describes the current status of the log in question.

Table 81. Log Status Block.

Address	Parameter	Range	Data Type	Property
6100H ~ 6101H	Max Records	0– 294903	Dword	R
6102H ~ 6103H	Used Records	1– 294903	Dword	R
6104H	Record Size	14 – 246	Word	R
6105H	Reserved		Word	R
6106H ~ 6108H	First Record Time Stamp		Word	R
6109H ~ 610bH	Last Record Time Stamp		Word	R
6200H ~ 620bH	Data Logging 2 status	Same as the first group		
6300H ~ 630bH	Data Logging 3 status	Same as the first group		

Max Records: The maximum number of records the log can hold given the record size and sector allocation.

Used Records: The number of records stored in the log. This number will equal the Max Records when the log has filled. This value will be set to 1 when the log is reset.

Record Size: The number of bytes in this record, including the time stamp. The record's format in the meter is:

Record number (4 bytes) + time stamp (6 bytes) + [data1 ~ dataN] (2 Nbytes) + CRC(2 bytes).

First Record Time stamp: Time stamp of the oldest record.

Last Record Time stamp: Time stamp of the newest record.

Log Retrieval Block

The log retrieval block consists of two parts: the header and the window. The header is used to verify the data shown within the requested log window. The window is a sliding block of data that can be used to access any record in the specified log.

Registers 6000H-6003H

Size 4 Registers

Table 82. Log Retrieval.

Address	Parameter	Property	Format	Description
6000H	Log type	R/W	Nnnnnnnn	log type
			ssssssss	reserve
6001H	Record number, status	R/W	Nnnnnnnn	record number
			wwwwwwww	status
6002H ~ 6003H	offset	R/W		
6004H ~ 607eH	window	R		

Log type: The log to be retrieved. Write this value to set which log is being retrieved.

0 - Historical Log 1

1 - Historical Log 2

2 - Historical Log 3

Records number: The number of records that fit within a window. This value is configurable. Any number less than a full window may be used. This number tells the retrieving program how many records to expect to be retrieved in the window:

$$(\text{Record number} \times \text{record size}) = \text{bytes used in the window.}$$

This value should be $((123 \times 2) / \text{Record Size})$, rounded down. The greater this number is, the faster the retrieving speed is.

For example, with a record size of 50:

$$\text{Records number} = ((123 \times 2) / 50) = 4.92 \approx 4.$$

Status: The status of the current window. Since the time to prepare a window may exceed an acceptable Modbus delay (one second), this acts as a ready status flag to notify when the window is ready for retrieval. When this value indicates that the window is not ready, the data in the window should be ignored. Window Status is read-only; any writes are ignored.

This value also indicates the memory erasing status when setting the date logging settings.

bH Window is Ready

FFH Window is Not Ready

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aaH Memory is Erasing

bbH Memory Erasing is Finished

CXH Register List is Set as Error.

X: bit0 1, Register List is Set as Error in data logging 1;

bit1 1, Register List is Set as Error in data logging 2;

bit2 1, Register List is Set as Error in data logging 3.

For example, 0 x C6H, Register Lists are an Error in data logging 2 and 3.

Offset: The offset of the record number of the first record in the data window and the record number of the “first record time stamp”. Setting this value controls which records will be available in the data window. When the log is retrieved, the first (oldest) record is “latched”. This means that offset 0 will always point to the oldest record at the time of latching.

Window: The actual data of the records, arranged according to the above settings.

Note: If the logging timer is disabled, the first recording sector will be erased when the log is full. Therefore, the user should not read the whole log when the used record number is near to the max record number. Under this condition, the user should read the “Used Records” field and compare it to the previous “Used Records” field from the last reading before retrieving the information and reading the window.

If the current “Used Records” field is greater than the “Used Records” field from the last reading, and if the “Offset” field is less than the difference between the current and previous “Used Records” field, the first sector has been erased and the difference between the “Used Records” field should be subtracted from the recording number.

If the “Offset” field is greater than the difference between the current and previous “Used Records” field, the “Offset” number should be subtracted from the recording number.

To avoid this situation, the user should read the log before it is almost full.

For example: Data logging 1 has 3 sectors and each has 448 records, and the total records are 1,344. If the user presses the “Read All” button when the “Used Records” number is at 1,340, and if the first sector is erased before the information is transferred to the computer, the data stored in this sector is erased permanently and cannot be retrieved. If the records from the first sector can be retrieved before it gets erased, the new value of “Offset” will be equal to the original “Offset” field minus the value of the difference between the current and previous “Used Records” fields.

Data Logging Operation Examples

The following example illustrates a data logging operation. The example makes the following assumptions:

- The log is Historical Log 1.
- The Log contains VAN, VBN, VCN (12 bytes), the interval is 1min, the sectors are 10, the registers are 6, and the logging timer function is disabled.
- Retrieval is starting at record offset 0 (oldest record).
- No new records are recorded to the log during the log retrieval process.

A. Data Logging Settings

Now set the data log 1 according to the assumptions:

1. Set the data log with VAN, VBN, VCN. Here we should set their modbus address 0 x 4002, 0 x 4003, 0 x 4004, 0 x 4005, 0 x 4006 and 0 x 4007 to 0 x 1102, 0 x 1103, 0 x 1104, 0 x 1105, 0 x 1106, and 0 x 1107. The descriptor is 2, so set the 0 x 0202 and 0 x 0200 to 0 x 1177 and 0 x 1178.
2. The register is 6 and sector is 10, so we set 0 x 060A to 0 x 1100.

3. The interval is 1min , so set the 0 x 0001 to 0 x 1101.
4. The logging timer function is disabled, so set the 0 to 0 x 11b9.

B. Log Retrieval Procedure

The following procedure documents how to retrieve a single log from the oldest record to the newest record.

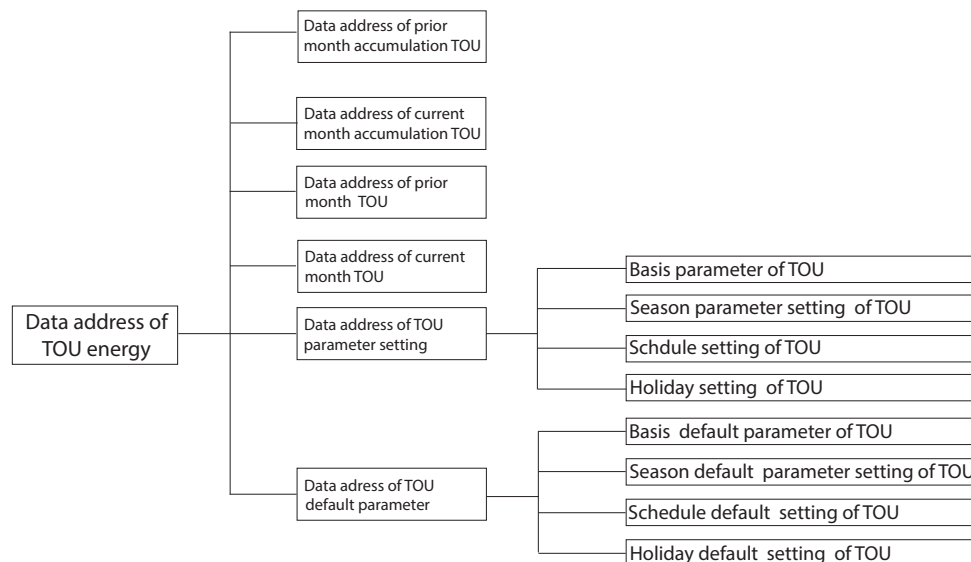
1. Compute the number of records per window, as follows:
 $\text{Records Per Window} = (246 \setminus \text{RecordSize}) = 246 \setminus 24 = 10.$
2. Write the Records per window and Record offset. In this example, set the 0 x 0A0B and 0 x 0000 to 0 x 6001d and 0 x 6002.
 This step tells the meter what data to return in the window.
3. Read the record window status from 0 x 6001.
 - If the Window Status is 0 x FF, go to Step 2.
 - If the Window Status is 0 x 0B, read the data window.
4. Read the data window and compute the next Expected Record offset.
 - Compute the next expected record offset by adding the Records Per Window and go to Step 2.
 - If there are no remaining records after the current record window, stop reading.

6.3.9 Time of Use (TOU)

Data Address of TOU Energy

The data address saves the parameter of energy, which includes the data address of the last month TOU energy, data address of current month TOU energy, data address of TOU parameter setting, and data address of TOU default parameter. Except for the data address of the TOU default parameter, the data address is read with 03 code, preset with 16 code.

Figure 149. Division Plan of TOU Energy.



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Table 83. Data Address of TOU.

Address	Parameter	Range	Data Type	Type of Access
Current month accumulation TOU energy				
7200H~7201H	Ep_imp(sharp)	0~99999999.9	Dword	R/W
7202H~7203H	Ep_exp(sharp)	0~99999999.9	Dword	R/W
7204H~7205H	Eq_imp(sharp)	0~99999999.9	Dword	R/W
7206H~7207H	Eq_exp(sharp)	0~99999999.9	Dword	R/W
7208H~7209H	Es(sharp)	0~99999999.9	Dword	R/W
720AH~720BH	Ep_imp(peak)	0~99999999.9	Dword	R/W
720CH~720DH	Ep_exp(peak)	0~99999999.9	Dword	R/W
720EH~720FH	Eq_imp(peak)	0~99999999.9	Dword	R/W
7210H~7211H	Eq_exp(peak)	0~99999999.9	Dword	R/W
7212H~7213H	Es(peak)	0~99999999.9	Dword	R/W
7214H~7215H	Ep_imp(valley)	0~99999999.9	Dword	R/W
7216H~7217H	Ep_exp(valley)	0~99999999.9	Dword	R/W
7218H~7219H	Eq_imp(valley)	0~99999999.9	Dword	R/W
721AH~721BH	Eq_exp(valley)	0~99999999.9	Dword	R/W
721CH~721DH	Es(valley)	0~99999999.9	Dword	R/W
721EH~721FH	Ep_imp(normal)	0~99999999.9	Dword	R/W
7220H~7221H	Ep_exp(normal)	0~99999999.9	Dword	R/W
7222H~7223H	Eq_imp(normal)	0~99999999.9	Dword	R/W
7224H~7225H	Eq_exp(normal)	0~99999999.9	Dword	R/W
7226H~7227H	Es(normal)	0~99999999.9	Dword	R/W
7228H~7229H	Ep_imp(sum)	0~99999999.9	Dword	R/W
722AH~722BH	Ep_exp(sum)	0~99999999.9	Dword	R/W
722CH~722DH	Eq_imp(sum)	0~99999999.9	Dword	R/W
722EH~722FH	Eq_exp(sum)	0~99999999.9	Dword	R/W
7230H~7231H	Es(sum)	0~99999999.9	Dword	R/W
Prior month accumulation TOU energy				
7232H~7233H	Ep_imp(sharp)	0~99999999.9	Dword	R/W
7234H~7235H	Ep_exp(sharp)	0~99999999.9	Dword	R/W
7236H~7237H	Eq_imp(sharp)	0~99999999.9	Dword	R/W
7238H~7239H	Eq_exp(sharp)	0~99999999.9	Dword	R/W
723AH~723BH	Es(sharp)	0~99999999.9	Dword	R/W
723CH~723DH	Ep_imp(peak)	0~99999999.9	Dword	R/W
723EH~723FH	Ep_exp(peak)	0~99999999.9	Dword	R/W
7240H~7241H	Eq_imp(peak)	0~99999999.9	Dword	R/W
7242H~7243H	Eq_exp(peak)	0~99999999.9	Dword	R/W
7244H~7245H	Es(peak)	0~99999999.9	Dword	R/W
7246H~7247H	Ep_imp(valley)	0~99999999.9	Dword	R/W
7248H~7249H	Ep_exp(valley)	0~99999999.9	Dword	R/W
724AH~724BH	Eq_imp(valley)	0~99999999.9	Dword	R/W
724CH~724DH	Eq_exp(valley)	0~99999999.9	Dword	R/W
724EH~724FH	Es(valley)	0~99999999.9	Dword	R/W

Table 83. Data Address of TOU (continued).

Address	Parameter	Range	Data Type	Type of Access
7250H~7251H	Ep_imp(normal)	0~99999999.9	Dword	R/W
7252H~7253H	Ep_exp(normal)	0~99999999.9	Dword	R/W
7254H~7255H	Eq_imp(normal)	0~99999999.9	Dword	R/W
7256H~7257H	Eq_exp(normal)	0~99999999.9	Dword	R/W
7258H~7259H	Es(normal)	0~99999999.9	Dword	R/W
725AH~725BH	Ep_imp(sum)	0~99999999.9	Dword	R/W
725CH~725DH	Ep_exp(sum)	0~99999999.9	Dword	R/W
725EH~725FH	Eq_imp(sum)	0~99999999.9	Dword	R/W
7260H~7261H	Eq_exp(sum)	0~99999999.9	Dword	R/W
7262H~7263H	Es(sum)	0~99999999.9	Dword	R/W

The address area includes the max of Ep_imp, Ep_exp, Eq_im, Eq_exp, Es, Current demand, and time stamp, when tariff setting parameter is sharp, peak, valley, and normal. Function: 03H Read.

Table 84. Data Address of Peak Demand

Note: The following Format Codes apply: F12 for current, F13 for Active power, F14 for Reactive power and F15 for Apparent power.

Address	Parameter	Range	Data Type	Type of Access
7500H~7503H	Max of Ep_imp (sharp) demand and time stamp; (format: power; year/mon; day/hour; min/sec)	-32768~32767	Int	R
7504H~7507H	Max of Ep_exp(sharp) demand and time stamp	-32768~32767	Int	R
7508H~750bH	Max of Eq_im(sharp) demand and time stamp	-32768~32767	Int	R
750cH~750fH	Max of Eq_exp(sharp) demand and time stamp	-32768~32767	Int	R
7510H~7513H	Max of Es(sharp) demand and time stamp	-32768~32767	Int	R
7514H~7517H	Max of Ia(sharp) demand and time stamp	-32768~32767	Int	R
7518H~751bH	Max of Ib(sharp) demand and time stamp	-32768~32767	Int	R
751cH~751fH	Max of Ic(sharp) demand and time stamp	-32768~32767	Int	R
7520H~7523H	Max of Ep_imp(peak) demand and time stamp	-32768~32767	Int	R
7524H~7527H	Max of Ep_exp(peak) demand and time stamp	-32768~32767	Int	R
7528H~752bH	Max of Eq_im(peak) demand and time stamp	-32768~32767	Int	R
752cH~752fH	Max of Eq_exp(peak) demand and time stamp	-32768~32767	Int	R
7530H~7533H	Max of Es(peak) demand and time stamp	-32768~32767	Int	R
7534H~7537H	Max of Ia (peak) demand and time stamp	-32768~32767	Int	R
7538H~753bH	Max of Ib (peak) demand and time stamp	-32768~32767	Int	R
753cH~753fH	Max of Ic (peak) demand and time stamp	-32768~32767	Int	R
7540H~7543H	Max of Ep_imp(valley) demand and time stamp	-32768~32767	Int	R
7544H~7547H	Max of Ep_exp(valley) demand and time stamp	-32768~32767	Int	R
7548H~754bH	Max of Eq_im(valley) demand and time stamp	-32768~32767	Int	R
754cH~754fH	Max of Eq_exp(valley) demand and time stamp	-32768~32767	Int	R
7550H~7553H	Max of Es(valley) demand and time stamp	-32768~32767	Int	R
7554H~7557H	Max of Ia (valley) demand and time stamp	-32768~32767	Int	R
7558H~755bH	Max of Ib (valley) demand and time stamp	-32768~32767	Int	R
755cH~755fH	Max of Ic (valley) demand and time stamp	-32768~32767	Int	R
7560H~7563H	Max of Ep_imp(normal) demand and time stamp	-32768~32767	Int	R
7564H~7567H	Max of Ep_exp(normal) demand and time stamp	-32768~32767	Int	R
7568H~756bH	Max of Eq_im(normal) demand and time stamp	-32768~32767	Int	R

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Table 84. (continued).

Address	Parameter	Range	Data Type	Type of Access
756cH~756fH	Max of Eq_exp(normal) demand and time stamp	-32768~32767	Int	R
7570H~7573H	Max of Es(normal) demand and time stamp	-32768~32767	Int	R
7574H~7577H	Max of Ia (normal)demand and time stamp	-32768~32767	Int	R
7578H~757bH	Max of Ib (normal)demand and time stamp	-32768~32767	Int	R
757cH~757fH	Max of Ic (normal) demand and time stamp	-32768~32767	Int	R
7580H~7583H	Max of Ep_imp(all) demand and time stamp	-32768~32767	Int	R
7584H~7587H	Max of Ep_exp(all) demand and time stamp	-32768~32767	Int	R
7588H~758bH	Max of Eq_im(all) demand and time stamp	-32768~32767	Int	R
758cH~758fH	Max of Eq_exp(all) demand and time stamp	-32768~32767	Int	R
7590H~7593H	Max of Es(all) demand and time stamp	-32768~32767	Int	R
7594H~7597H	Max of Ia(all)demand and time stamp	-32768~32767	Int	R
7598H~759bH	Max of Ib(all)demand and time stamp	-32768~32767	Int	R
759cH~759fH	Max of Ic(all) demand and time stamp	-32768~32767	Int	R

The address area includes the daylight saving time (DST) setting. Function: 03H Read, 10H Preset.

Table 85. DST Settings.

Address	Parameter	Range	Data Type	Type of Access
7700H	DST enable	0: disable; 1: enable	Word	R/W
7701H	DST format	0: format 1; 1: format 2	Word	R/W
Format 1				
7702H	DST Start Mon	1~12	Word	R/W
7703H	DST Start Day	1~31	Word	R/W
7704H	DST Start Hour	0~23	Word	R/W
7705H	DST Start Min	0~59	Word	R/W
7706H	DST Start Adjust time (Unit: Min)	1~120 Default: 60	Word	R/W
7707H	DST Ending Mon	1~12	Word	R/W
7708H	DST Ending Day	1~31	Word	R/W
7709H	DST Ending Hour	0~23	Word	R/W
770AH	DST Ending Min	0~59	Word	R/W
770BH	DST Ending Adjust time (Unit: Min)	1~120 Default: 60	Word	R/W
Format 2				
770CH	DST Start Mon	1~12	Word	R/W
770DH	DST Start week	0~6 0: Sunday; 1~6 Monday to Saturday	Word	R/W
770EH	DST Start First few weeks	1~5	Word	R/W
770FH	DST Start Hour	0~23	Word	R/W
7710H	DST Start Min	0~59	Word	R/W
7711H	DST Start Adjust time (Unit: Min)	1~120 Default: 60	Word	R/W
7712H	DST Ending Mon	1~12	Word	R/W
7713H	DST Ending Week	0~6 0: Sunday; 1~6 Monday to Saturday	Word	R/W
7714H	DST Ending First few weeks	1~5	Word	R/W
7715H	DST Ending Hour	0~23	Word	R/W
7716H	DST Ending Min	0~59	Word	R/W
7717H	DST Ending Adjust time (Unit: Min)	1~120 Default: 60	Word	R/W

Data address of the TOU parameter setting includes the basis parameter of TOU, time zone setting parameter of TOU, time table setting parameter of TOU, and holiday setting parameter of TOU. Function: 03 code, 10 reset.

Table 86. Data Address of TOU.

Address	Parameter	Range	Data Type	Type of Access
Basis parameter of TOU				
7800H	Season Number	0~12	Word	R/W
7801H	Schedule Number	0~14	Word	R/W
7802H	Segment Number	0~14	Word	R/W
7803H	Tariff Number	0~3	Word	R/W
7804H	Weekend Setting (bit0-Sunday; bit1~bit6 : Monday~Saturday bit = 1 means using energy, bit = 0 means not using energy)	0~127	Word	R/W
7805H	Weekend Schedule	0-14	Word	R/W
7806H	Holiday Number	0-30	Word	R/W
7807H	Time of Use factory setting	1:enable	Word	R/W
7808H	Choice of calculation auto reset; (0: End of Month)	1:enable	Word	R/W
7809H	TOU auto reset fixed date:day; (default is 1)		Word	R/W
780AH	TOU auto reset fixed date:hour (default is 0)	1~31	Word	R/W
780BH	TOU auto reset fixed date:minute (default is 0)	0~23	Word	R/W
780CH	TOU auto reset fixed date:second (default is 0)	0~59	Word	R/W
780DH	TOU auto reset fixed date: second (default is 0)	0~59	Word	R/W
780EH	Error code (default)	0: The setting of parameter is correct; 1: Tariff setting error; 2: Schedule setting error; 4: Segment setting error; 8: Season setting error; 16: Parameter of season setting error 32: Holiday setting error; 64: Parameter of holiday setting error; 256: Tariff of schedule setting error; 512: Time of schedule setting error; 1024: Period of schedule setting error; 048: Period of weekend setting error; 4096: Weekend setting error;		
Season Setting				
7820H~7822H	Data and Season Table of the 1 st Season		Word	R/W
7823H~7825H	Data and Season Table of the 2 nd Season		Word	R/W
7826H~7828H	Data and Season Table of the 3 rd Season		Word	R/W
7829H~782BH	Data and Season Table of the 4 th Season		Word	R/W
782CH~782EH	Data and Season Table of the 5 th Season		Word	R/W
782FH~7831H	Data and Season Table of the 6 th Season		Word	R/W
7832H~7834H	Data and Season Table of the 7 th Season		Word	R/W
7835H~7837H	Data and Season Table of the 8 th Season		Word	R/W
7838H~783AH	Data and Season Table of the 9 th Season		Word	R/W
783BH~783DH	Data and Season Table of the 10 th Season		Word	R/W
783EH~7840H	Data and Season Table of the 11 th Season		Word	R/W
7841H~7843H	Data and Season Table of the 12 th Season		Word	R/W
Schedule Setting				
7844H~7846H	1 st Segment and Tariff Number of the 1 st schedule		Word	R/W
7847H~7849H	2 nd Segment and Tariff Number of the 1 st schedule		Word	R/W
784AH~784CH	3 rd Segment and Tariff Number of the 1 st schedule		Word	R/W
784DH~784FH	4 th Segment and Tariff Number of the 1 st schedule		Word	R/W

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Table 86 Data Address of TOU (continued).

Address	Parameter	Range	Data Type	Type of Access
7850H~7852H	5 th Segment and Tariff Number of the 1 st schedule		Word	R/W
7853H~7855H	6 th Segment and Tariff Number of the 1 st schedule		Word	R/W
7856H~7858H	7 th Segment and Tariff Number of the 1 st schedule		Word	R/W
7859H~785BH	8 th Segment and Tariff Number of the 1 st schedule		Word	R/W
785CH~785EH	9 th Segment and Tariff Number of the 1 st schedule		Word	R/W
785FH~7861H	10 th Segment and Tariff Number of the 1 st schedule		Word	R/W
7862H~7864H	11 th Segment and Tariff Number of the 1 st schedule		Word	R/W
7865H~7867H	12 th Segment and Tariff Number of the 1 st schedule		Word	R/W
7868H~786AH	13 th Segment and Tariff Number of the 1 st schedule		Word	R/W
786BH~786DH	14 th Segment and Tariff Number of the 1 st schedule		Word	R/W
786EH~7897H	From 1 st to 14 th Segment and Tariff Number of the 2 nd schedule	The same as 1 st schedule	Word	R/W
7898H~78C1H	From 1 st to 14 th Segment and Tariff Number of the 3 rd schedule	The same as 1 st schedule	Word	R/W
78C2H~78EBH	From 1 st to 14 th Segment and Tariff Number of the 4 th schedule	The same as 1 st schedule	Word	R/W
78ECH~7915H	From 1 st to 14 th Segment and Tariff Number of the 5 th schedule	The same as 1 st schedule	Word	R/W
7916H~793FH	From 1 st to 14 th Segment and Tariff Number of the 6 th schedule	The same as 1 st schedule	Word	R/W
7940H~7969H	From 1 st to 14 th Segment and Tariff Number of the 7 th schedule	The same as 1 st schedule	Word	R/W
796AH~7993H	From 1 st to 14 th Segment and Tariff Number of the 8 th schedule	The same as 1 st schedule	Word	R/W
7994H~79BDH	From 1 st to 14 th Segment and Tariff Number of the 9 th schedule	The same as 1 st schedule	Word	R/W
79BEH~79E7H	From 1 st to 14 th Segment and Tariff Number of the 10 th schedule	The same as 1 st schedule	Word	R/W
79E8H~7A11H	From 1 st to 14 th Segment and Tariff Number of the 11 th schedule	The same as 1 st schedule	Word	R/W
7A12H~7A3BH	From 1 st to 14 th Segment and Tariff Number of the 12 th schedule	The same as 1 st schedule	Word	R/W
7A3CH~7A65H	From 1 st to 14 th Segment and Tariff Number of the 13 th schedule	The same as 1 st schedule	Word	R/W
7A66H~7A8FH	From 1 st to 14 th Segment and Tariff Number of the 14 th schedule	The same as 1 st schedule	Word	R/W
Holiday Setting				
7A90H~7A92H	Data and the Schedule of the 1 st holiday		Word	R/W
7A93H~7A95H	Data and the schedule of the 2 nd holiday		Word	R/W
7A96H~7A98H	Data and the schedule of the 3 rd holiday		Word	R/W
7A99H~7A9BH	Data and the schedule of the 4 th holiday		Word	R/W
7A9CH~7A9EH	Data and the schedule of the 5 th holiday		Word	R/W
7A9FH~7AA1H	Data and the schedule of the 6 th holiday		Word	R/W
7AA2H~7AA4H	Data and the schedule of the 7 th holiday		Word	R/W
7AA5H~7AA7H	Data and the schedule of the 8 th holiday		Word	R/W
7AA8H~7AAAH	Data and the schedule of the 9 th holiday		Word	R/W
7AABH~7AADH	Data and the schedule of the 10 th holiday		Word	R/W
7AAEH~7AB0H	Data and the schedule of the 11 th holiday		Word	R/W
7AB1H~7AB3H	Data and the schedule of the 12 th holiday		Word	R/W
7AB4H~7AB6H	Data and the schedule of the 13 th holiday		Word	R/W
7AB7H~7AB9H	Data and the schedule of the 14 th holiday		Word	R/W
7ABAH~7ABCH	Data and the schedule of the 15 th holiday		Word	R/W
7ABDH~7ABFH	Data and the schedule of the 16 th holiday		Word	R/W
7AC0H~7AC2H	Data and the schedule of the 17 th holiday		Word	R/W
7AC3H~7AC5H	Data and the schedule of the 18 th holiday		Word	R/W
7AC6H~7AC8H	Data and the schedule of the 19 th holiday		Word	R/W
7AC9H~7ACBH	Data and the schedule of the 20 th holiday		Word	R/W
7ACCH~7ACEH	Data and the schedule of the 21 st holiday		Word	R/W
7ACFH~7AD1H	Data and the schedule of the 22 nd holiday		Word	R/W

Table 86. Data Address of TOU (continued).

Address	Parameter	Range	Data Type	Type of Access
7AD2H~7AD4H	Data and the schedule of the 23 rd holiday		Word	R/W
7AD5H~7AD7H	Data and the schedule of the 24 th holiday		Word	R/W
7AD8H~7ADAH	Data and the schedule of the 25 th holiday		Word	R/W
7ADBH~7ADDH	Data and the schedule of the 26 th holiday		Word	R/W
7ADEH~7AE0H	Data and the schedule of the 27 th holiday		Word	R/W
7AE1H~7AE3H	Data and the schedule of the 28 th holiday		Word	R/W
7AE4H~7AE6H	Data and the schedule of the 29 th holiday		Word	R/W
7AE7H~7AE9H	Data and the schedule of the 30 th holiday		Word	R/W
7AEA H	Holiday setting enable		Word	R/W
7AEBH	Start year holiday setting		Word	R/W
7AEC H	End year holiday setting		Word	R/W

The address area includes Ten-Year Holiday setting. Function: 03H Read 10H Preset.

Table 87. Data Address of Ten-Year Holiday.

The 1st Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7B00H~7B02H	The 1 st holiday and schedule (format: month / day / schedule)	Word	R/W
7B03H~7B05H	The 2 nd holiday and schedule	Word	R/W
7B06H~7B08H	The 3 rd holiday and schedule	Word	R/W
7B09H~7B0BH	The 4 th holiday and schedule	Word	R/W
7B0CH~7B0EH	The 5 th holiday and schedule	Word	R/W
7B0FH~7B11H	The 6 th holiday and schedule	Word	R/W
7B12H~7B14H	The 7 th holiday and schedule	Word	R/W
7B15H~7B17H	The 8 th holiday and schedule	Word	R/W
7B18H~7B1AH	The 9 th holiday and schedule	Word	R/W
7B1BH~7B1DH	The 10 th holiday and schedule	Word	R/W
7B1EH~7B20H	The 11 th holiday and schedule	Word	R/W
7B21H~7B23H	The 12 th holiday and schedule	Word	R/W
7B24H~7B26H	The 13 th holiday and schedule	Word	R/W
7B27H~7B29H	The 14 th holiday and schedule	Word	R/W
7B2AH~7B2CH	The 15 th holiday and schedule	Word	R/W
7B2DH~7B2FH	The 16 th holiday and schedule	Word	R/W
7B30H~7B32H	The 17 th holiday and schedule	Word	R/W
7B33H~7B35H	The 18 th holiday and schedule	Word	R/W
7B36H~7B38H	The 19 th holiday and schedule	Word	R/W
7B39H~7B3BH	The 20 th holiday and schedule	Word	R/W
7B3CH~7B3EH	The 21 st holiday and schedule	Word	R/W
7B3FH~7B41H	The 22 nd holiday and schedule	Word	R/W
7B42H~7B44H	The 23 rd holiday and schedule	Word	R/W
7B45H~7B47H	The 24 th holiday and schedule	Word	R/W
7B48H~7B4AH	The 25 th holiday and schedule	Word	R/W
7B4BH~7B4DH	The 26 th holiday and schedule	Word	R/W
7B4EH~7B50H	The 27 th holiday and schedule	Word	R/W
7B51H~7B53H	The 28 th holiday and schedule	Word	R/W

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Table 87. Data Address of Ten-Year Holiday (continued).

The 1st Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7B54H~7B56H	The 29 th holiday and schedule	Word	R/W
7B57H~7B59H	The 30 th holiday and schedule	Word	R/W
7B5AH	The 1 st setting year	Word	R/W
7B5BH	Holiday number of the 1 st year	Word	R/W

The 2nd Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7B5CH~7B5EH	The 1 st holiday and schedule (format: month / day /schedule)	Word	R/W
7B5FH~7B61H	The 2 nd holiday and schedule	Word	R/W
7B62H~7B64H	The 3 rd holiday and schedule	Word	R/W
7B65H~7B67H	The 4 th holiday and schedule	Word	R/W
7B68H~7B6AH	The 5 th holiday and schedule	Word	R/W
7B6BH~7B6DH	The 6 th holiday and schedule	Word	R/W
7B6EH~7B70H	The 7 th holiday and schedule	Word	R/W
7B71H~7B73H	The 8 th holiday and schedule	Word	R/W
7B74H~7B76H	The 9 th holiday and schedule	Word	R/W
7B77H~7B79H	The 10 th holiday and schedule	Word	R/W
7B7AH~7B7CH	The 11 th holiday and schedule	Word	R/W
7B7DH~7B7FH	The 12 th holiday and schedule	Word	R/W
7B80H~7B82H	The 13 th holiday and schedule	Word	R/W
7B83H~7B85H	The 14 th holiday and schedule	Word	R/W
7B86H~7B88H	The 15 th holiday and schedule	Word	R/W
7B89H~7B8BH	The 16 th holiday and schedule	Word	R/W
7B8CH~7B8EH	The 17 th holiday and schedule	Word	R/W
7B8FH~7B91H	The 18 th holiday and schedule	Word	R/W
7B92H~7B94H	The 19 th holiday and schedule	Word	R/W
7B95H~7B97H	The 20 th holiday and schedule	Word	R/W
7B98H~7B9AH	The 21 st holiday and schedule	Word	R/W
7B9BH~7B9DH	The 22 nd holiday and schedule	Word	R/W
7B9EH~7BA0H	The 23 rd holiday and schedule	Word	R/W
7BA1H~7BA3H	The 24 th holiday and schedule	Word	R/W
7BA4H~7BA6H	The 25 th holiday and schedule	Word	R/W
7BA7H~7BA9H	The 26 th holiday and schedule	Word	R/W
7BAAH~7BACH	The 27 th holiday and schedule	Word	R/W
7BADH~7BAFH	The 28 th holiday and schedule	Word	R/W
7BB0H~7BB2H	The 29 th holiday and schedule	Word	R/W
7BB3H~7BB5H	The 30 th holiday and schedule	Word	R/W
7BB6H	The 2 th setting year	Word	R/W
7BB7H	Holiday number of the 2 th year	Word	R/W

Table 87. Data Address of Ten-Year Holiday (continued).**The 3rd Year Holiday Address Function: 03H Read 10H Preset**

Address	Parameter	Data Type	Type of Access
7BB8H~7BBAH	The 1 st holiday and schedule (format: month / day / schedule)	Word	R/W
7BBBH~7BBDH	The 2 nd holiday and schedule	Word	R/W
7BBEH~7BC0H	The 3 rd holiday and schedule	Word	R/W
7BC1H~7BC3H	The 4 th holiday and schedule	Word	R/W
7BC4H~7BC6H	The 5 th holiday and schedule	Word	R/W
7BC7H~7BC9H	The 6 th holiday and schedule	Word	R/W
7BCAH~7BCCH	The 7 th holiday and schedule	Word	R/W
7BCDH~7BCFH	The 8 th holiday and schedule	Word	R/W
7BD0H~7BD2H	The 9 th holiday and schedule	Word	R/W
7BD3H~7BD5H	The 10 th holiday and schedule	Word	R/W
7BD6H~7BD8H	The 11 th holiday and schedule	Word	R/W
7BD9H~7BDBH	The 12 th holiday and schedule	Word	R/W
7BDCH~7BDEH	The 13 th holiday and schedule	Word	R/W
7BDFH~7BE1H	The 14 th holiday and schedule	Word	R/W
7BE2H~7BE4H	The 15 th holiday and schedule	Word	R/W
7BE5H~7BE7H	The 16 th holiday and schedule	Word	R/W
7BE8H~7BEAH	The 17 th holiday and schedule	Word	R/W
7BEBH~7BEDH	The 18 th holiday and schedule	Word	R/W
7BEEH~7BF0H	The 19 th holiday and schedule	Word	R/W
7BF1H~7BF3H	The 20 th holiday and schedule	Word	R/W
7BF4H~7BF6H	The 21 st holiday and schedule	Word	R/W
7BF7H~7BF9H	The 22 nd holiday and schedule	Word	R/W
7BFAH~7BFBH	The 23 rd holiday and schedule	Word	R/W
7BFDH~7BFFH	The 24 th holiday and schedule	Word	R/W
7C00H~7C02H	The 25 th holiday and schedule	Word	R/W
7C03H~7C05H	The 26 th holiday and schedule	Word	R/W
7C06H~7C08H	The 27 th holiday and schedule	Word	R/W
7C09H~7C0BH	The 28 th holiday and schedule	Word	R/W
7C0CH~7C0EH	The 29 th holiday and schedule	Word	R/W
7C0FH~7C11H	The 30 th holiday and schedule	Word	R/W
7C12H	The 3 rd setting year	Word	R/W
7C13H	Holiday number of the 3 rd year	Word	R/W

The 4th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7C14H~7C16H	The 1 st holiday and schedule (format: month / day / schedule)	Word	R/W
7C17H~7C19H	The 2 nd holiday and schedule	Word	R/W
7C1AH~7C1CH	The 3 rd holiday and schedule	Word	R/W
7C1DH~7C1FH	The 4 th holiday and schedule	Word	R/W
7C20H~7C22H	The 5 th holiday and schedule	Word	R/W
7C23H~7C25H	The 6 th holiday and schedule	Word	R/W
7C26H~7C28H	The 7 th holiday and schedule	Word	R/W
7C29H~7C2BH	The 8 th holiday and schedule	Word	R/W
7C2CH~7C2EH	The 9 th holiday and schedule	Word	R/W

6. Communication

Table 87. Data Address of Ten-Year Holiday (continued).

The 4th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7C2FH~7C31H	The 10 th holiday and schedule	Word	R/W
7C32H~7C34H	The 11 th holiday and schedule	Word	R/W
7C35H~7C37H	The 12 th holiday and schedule	Word	R/W
7C38H~7C3AH	The 13 th holiday and schedule	Word	R/W
7C3BH~7C3DH	The 14 th holiday and schedule	Word	R/W
7C3EH~7C40H	The 15 th holiday and schedule	Word	R/W
7C41H~7C43H	The 16 th holiday and schedule	Word	R/W
7C44H~7C46H	The 17 th holiday and schedule	Word	R/W
7C47H~7C49H	The 18 th holiday and schedule	Word	R/W
7C4AH~7C4CH	The 19 th holiday and schedule	Word	R/W
7C4DH~7C4FH	The 20 th holiday and schedule	Word	R/W
7C50H~7C52H	The 21 st holiday and schedule	Word	R/W
7C53H~7C55H	The 22 nd holiday and schedule	Word	R/W
7C56H~7C58H	The 23 rd holiday and schedule	Word	R/W
7C59H~7C5BH	The 24 th holiday and schedule	Word	R/W
7C5CH~7C5EH	The 25 th holiday and schedule	Word	R/W
7C5FH~7C61H	The 26 th holiday and schedule	Word	R/W
7C62H~7C64H	The 27 th holiday and schedule	Word	R/W
7C65H~7C67H	The 28 th holiday and schedule	Word	R/W
7C68H~7C6AH	The 29 th holiday and schedule	Word	R/W
7C6BH~7C6DH	The 30 th holiday and schedule	Word	R/W
7C6EH	The 4 th setting year	Word	R/W
7C6FH	Holiday number of the 4th year	Word	R/W

The 5th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7C70H~7C72H	The 1 st holiday and schedule (format: month /day /schedule)	Word	R/W
7C73H~7C75H	The 2 nd holiday and schedule	Word	R/W
7C76H~7C78H	The 3 rd holiday and schedule	Word	R/W
7C79H~7C7BH	The 4 th holiday and schedule	Word	R/W
7C7CH~7C7EH	The 5 th holiday and schedule	Word	R/W
7C7FH~7C81H	The 6 th holiday and schedule	Word	R/W
7C82H~7C84H	The 7 th holiday and schedule	Word	R/W
7C85H~7C87H	The 8 th holiday and schedule	Word	R/W
7C88H~7C8AH	The 9 th holiday and schedule	Word	R/W
7C8BH~7C8DH	The 10 th holiday and schedule	Word	R/W
7C8EH~7C90H	The 11 th holiday and schedule	Word	R/W
7C91H~7C93H	The 12 th holiday and schedule	Word	R/W
7C94H~7C96H	The 13 th holiday and schedule	Word	R/W
7C97H~7C99H	The 14 th holiday and schedule	Word	R/W
7C9AH~7C9CH	The 15 th holiday and schedule	Word	R/W
7C9DH~7C9FH	The 16 th holiday and schedule	Word	R/W
7CA0H~7CA2H	The 17 th holiday and schedule	Word	R/W
7CA3H~7CA5H	The 18 th holiday and schedule	Word	R/W

Table 87. Data Address of Ten-Year Holiday (continued).**The 5th Year Holiday Address Function: 03H Read 10H Preset**

Address	Parameter	Data Type	Type of Access
7CA6H~7CA8H	The 19 th holiday and schedule	Word	R/W
7CA9H~7CABH	The 20 th holiday and schedule	Word	R/W
7CACH~7CAEH	The 21 st holiday and schedule	Word	R/W
7CAFH~7CB1H	The 22 nd holiday and schedule	Word	R/W
7CB2H~7CB4H	The 23 rd holiday and schedule	Word	R/W
7CB5H~7CB7H	The 24 th holiday and schedule	Word	R/W
7CB8H~7CBAH	The 25 th holiday and schedule	Word	R/W
7CBBH~7CBDH	The 26 th holiday and schedule	Word	R/W
7CBEH~7CC0H	The 27 th holiday and schedule	Word	R/W
7CC1H~7CC3H	The 28 th holiday and schedule	Word	R/W
7CC4H~7CC6H	The 29 th holiday and schedule	Word	R/W
7CC7H~7CC9H	The 30 th holiday and schedule	Word	R/W
7CCA	The 5 th setting year	Word	R/W
7CCBH	Holiday number of the 5 th year	Word	R/W

The 6th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7CCCH~7CCEH	The 1 st holiday and schedule (format: month / day / schedule)	Word	R/W
7CCFH~7CD1H	The 2 nd holiday and schedule	Word	R/W
7CD2H~7CD4H	The 3 rd holiday and schedule	Word	R/W
7CD5H~7CD7H	The 4 th holiday and schedule	Word	R/W
7CD8H~7CDAH	The 5 th holiday and schedule	Word	R/W
7CDBH~7CDDH	The 6 th holiday and schedule	Word	R/W
7CDEH~7CE0H	The 7 th holiday and schedule	Word	R/W
7CE1H~7CE3H	The 8 th holiday and schedule	Word	R/W
7CD4H~7CE6H	The 9 th holiday and schedule	Word	R/W
7CE7H~7CE9H	The 10 th holiday and schedule	Word	R/W
7CEAH~7CECH	The 11 th holiday and schedule	Word	R/W
7CEDH~7CEFH	The 12 th holiday and schedule	Word	R/W
7CF0H~7CF2H	The 13 th holiday and schedule	Word	R/W
7CF3H~7CF5H	The 14 th holiday and schedule	Word	R/W
7CF6H~7CF8H	The 15 th holiday and schedule	Word	R/W
7CF9H~7CFBH	The 16 th holiday and schedule	Word	R/W
7CFCH~7CFEH	The 17 th holiday and schedule	Word	R/W
7CFFH~7D01H	The 18 th holiday and schedule	Word	R/W
7D02H~7D04H	The 19 th holiday and schedule	Word	R/W
7D05H~7D07H	The 20 th holiday and schedule	Word	R/W
7D08H~7D0AH	The 21 st holiday and schedule	Word	R/W
7D0BH~7D0DH	The 22 nd holiday and schedule	Word	R/W
7D0EH~7D10H	The 23 rd holiday and schedule	Word	R/W
7D11H~7D13H	The 24 th holiday and schedule	Word	R/W
7D14H~7D16H	The 25 th holiday and schedule	Word	R/W
7D17H~7D19H	The 26 th holiday and schedule	Word	R/W
7D1AH~7D1CH	The 27 th holiday and schedule	Word	R/W

6. Communication

Table 87. Data Address of Ten-Year Holiday (continued).

The 6th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7D1DH~7D1FH	The 28 th holiday and schedule	Word	R/W
7D20H~7D22H	The 29 th holiday and schedule	Word	R/W
7D23H~7D25H	The 30 th holiday and schedule	Word	R/W
7D26H	The 6 th setting year	Word	R/W
7D27H	Holiday number of the 6 th year	Word	R/W

The 7th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7D28H~7D2AH	The 1 st holiday and schedule (format: month / day / schedule)	Word	R/W
7D2BH~7D2DH	The 2 nd holiday and schedule	Word	R/W
7D2EH~7D30H	The 3 rd holiday and schedule	Word	R/W
7D31H~7D33H	The 4 th holiday and schedule	Word	R/W
7D34H~7D36H	The 5 th holiday and schedule	Word	R/W
7D37H~7D39H	The 6 th holiday and schedule	Word	R/W
7D3AH~7D3CH	The 7 th holiday and schedule	Word	R/W
7D3DH~7D3FH	The 8 th holiday and schedule	Word	R/W
7D40H~7D42H	The 9 th holiday and schedule	Word	R/W
7D43H~7D45H	The 10 th holiday and schedule	Word	R/W
7D46H~7D48H	The 11 th holiday and schedule	Word	R/W
7D49H~7D4BH	The 12 th holiday and schedule	Word	R/W
7D4CH~7D4EH	The 13 th holiday and schedule	Word	R/W
7D4FH~7D51H	The 14 th holiday and schedule	Word	R/W
7D52H~7D54H	The 15 th holiday and schedule	Word	R/W
7D55H~7D57H	The 16 th holiday and schedule	Word	R/W
7D58H~7D5AH	The 17 th holiday and schedule	Word	R/W
7D5BH~7D5DH	The 18 th holiday and schedule	Word	R/W
7D5EH~7D60H	The 19 th holiday and schedule	Word	R/W
7D61H~7D63H	The 20 th holiday and schedule	Word	R/W
7D64H~7D66H	The 21 st holiday and schedule	Word	R/W
7D67H~7D69H	The 22 nd holiday and schedule	Word	R/W
7D6AH~7D6CH	The 23 rd holiday and schedule	Word	R/W
7D6DH~7D6FH	The 24 th holiday and schedule	Word	R/W
7D70H~7D72H	The 25 th holiday and schedule	Word	R/W
7D73H~7D75H	The 26 th holiday and schedule	Word	R/W
7D76H~7D78H	The 27 th holiday and schedule	Word	R/W
7D79H~7D7BH	The 28 th holiday and schedule	Word	R/W
7D7CH~7D7EH	The 29 th holiday and schedule	Word	R/W
7D7FH~7D81H	The 30 th holiday and schedule	Word	R/W
7D82H	The 7 th setting year	Word	R/W
7D83H	Holiday number of the 7 th year	Word	R/W

Table 87. Data Address of Ten-Year Holiday (continued).**The 8th Year Holiday Address Function: 03H Read 10H Preset**

Address	Parameter	Data Type	Type of Access
7D84H~7D86H	The 1 st holiday and schedule (format: month / day / time table)	Word	R/W
7D87H~7D89H	The 2 nd holiday and schedule	Word	R/W
7D8AH~7D8CH	The 3 rd holiday and schedule	Word	R/W
7D8DH~7D8FH	The 4 th holiday and schedule	Word	R/W
7D90H~7D92H	The 5 th holiday and schedule	Word	R/W
7D93H~7D95H	The 6 th holiday and schedule	Word	R/W
7D96H~7D98H	The 7 th holiday and schedule	Word	R/W
7D99H~7D9BH	The 8 th holiday and schedule	Word	R/W
7D9CH~7D9EH	The 9 th holiday and schedule	Word	R/W
7D9FH~7DA1H	The 10 th holiday and schedule	Word	R/W
7DA2H~7DA4H	The 11 th holiday and schedule	Word	R/W
7DA5H~7DA7H	The 12 th holiday and schedule	Word	R/W
7DA8H~7DAAH	The 13 th holiday and schedule	Word	R/W
7DABH~7DADH	The 14 th holiday and schedule	Word	R/W
7DAEH~7DB0H	The 15 th holiday and schedule	Word	R/W
7DB1H~7DB3H	The 16 th holiday and schedule	Word	R/W
7DB4H~7DB6H	The 17 th holiday and schedule	Word	R/W
7DB7H~7DB9H	The 18 th holiday and schedule	Word	R/W
7DBAH~7DBCH	The 19 th holiday and schedule	Word	R/W
7DBDH~7DBFH	The 20 th holiday and schedule	Word	R/W
7DC0H~7DC2H	The 21 st holiday and schedule	Word	R/W
7DC3H~7DC5H	The 22 nd holiday and schedule	Word	R/W
7DC6H~7DC8H	The 23 rd holiday and schedule	Word	R/W
7DC9H~7DCBH	The 24 th holiday and schedule	Word	R/W
7DCCH~7DCEH	The 25 th holiday and schedule	Word	R/W
7DCFH~7DD1H	The 26 th holiday and schedule	Word	R/W
7DD2H~7DD4H	The 27 th holiday and schedule	Word	R/W
7DD5H~7DD7H	The 28 th holiday and schedule	Word	R/W
7DD8H~7DDAH	The 29 th holiday and schedule	Word	R/W
7DDBH~7DDDH	The 30 th holiday and schedule	Word	R/W
7DDEH	The 8 th setting year	Word	R/W
7DDFH	Holiday number of the 8 th year	Word	R/W

The 9th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7DE0H~7DE2H	The 1 st holiday and schedule (format: month /day /schedule)	Word	R/W
7DE3H~7DE5H	The 2 nd holiday and schedule	Word	R/W
7DE6H~7DE8H	The 3 rd holiday and schedule	Word	R/W
7DE9H~7DEBH	The 4 th holiday and schedule	Word	R/W
7DECH~7DEEH	The 5 th holiday and schedule	Word	R/W
7DEFH~7DF1H	The 6 th holiday and schedule	Word	R/W
7DF2H~7DF4H	The 7 th holiday and schedule	Word	R/W
7DF5H~7DF7H	The 8 th holiday and schedule	Word	R/W
7DF8H~7DFAH	The 9 th holiday and schedule	Word	R/W

6. Communication

Table 87. Data Address of Ten-Year Holiday (continued).

The 9th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7DFBH~7DFDH	The 10 th holiday and schedule	Word	R/W
7DFEH~7E00H	The 11 th holiday and schedule	Word	R/W
7E01H~7E03H	The 12 th holiday and schedule	Word	R/W
7E04H~7E06H	The 13 th holiday and schedule	Word	R/W
7E07H~7E09H	The 14 th holiday and schedule	Word	R/W
7E0AH~7E0CH	The 15 th holiday and schedule	Word	R/W
7E0DH~7E0FH	The 16 th holiday and schedule	Word	R/W
7E10H~7E12H	The 17 th holiday and schedule	Word	R/W
7E13H~7E15H	The 18 th holiday and schedule	Word	R/W
7E16H~7E18H	The 19 th holiday and schedule	Word	R/W
7E19H~7E1BH	The 20 th holiday and schedule	Word	R/W
7E1CH~7E1EH	The 21 st holiday and schedule	Word	R/W
7E1FH~7E21H	The 22 nd holiday and schedule	Word	R/W
7E22H~7E24H	The 23 rd holiday and schedule	Word	R/W
7E25H~7E27H	The 24 th holiday and schedule	Word	R/W
7E28H~7E2AH	The 25 th holiday and schedule	Word	R/W
7E2BH~7E2DH	The 26 th holiday and schedule	Word	R/W
7E2EH~7E30H	The 27 th holiday and schedule	Word	R/W
7E31H~7E33H	The 28 th holiday and schedule	Word	R/W
7E34H~7E36H	The 29 th holiday and schedule	Word	R/W
7E37H~7E39H	The 30 th holiday and schedule	Word	R/W
7E3AH	The 9 th setting year	Word	R/W
7E3BH	Holiday number of the 9 th year	Word	R/W

The 10th Year Holiday Address Function: 03H Read 10H Preset

Address	Parameter	Data Type	Type of Access
7E3CH~7E3EH	The 1 st holiday and schedule (format: month /day /schedule)	Word	R/W
7E3FH~7E41H	The 2 nd holiday and schedule	Word	R/W
7E42H~7E44H	The 3 rd holiday and schedule	Word	R/W
7E45H~7E47H	The 4 th holiday and schedule	Word	R/W
7E48H~7E4AH	The 5 th holiday and schedule	Word	R/W
7E4BH~7E4DH	The 6 th holiday and schedule	Word	R/W
7E4EH~7E50H	The 7 th holiday and schedule	Word	R/W
7E51H~7E53H	The 8 th holiday and schedule	Word	R/W
7E54H~7E56H	The 9 th holiday and schedule	Word	R/W
7E57H~7E59H	The 10 th holiday and schedule	Word	R/W
7E5AH~7E5CH	The 11 th holiday and schedule	Word	R/W
7E5DH~7E5FH	The 12 th holiday and schedule	Word	R/W
7E60H~7E62H	The 13 th holiday and schedule	Word	R/W
7E63H~7E65H	The 14 th holiday and schedule	Word	R/W
7E66H~7E68H	The 15 th holiday and schedule	Word	R/W
7E69H~7E6BH	The 16 th holiday and schedule	Word	R/W
7E6CH~7E6EH	The 17 th holiday and schedule	Word	R/W
7E6FH~7E71H	The 18 th holiday and schedule	Word	R/W

Table 87. Data Address of Ten-Year Holiday (continued).**The 10th Year Holiday Address Function: 03H Read 10H Preset**

Address	Parameter	Data Type	Type of Access
7E72H~7E74H	The 19 th holiday and schedule	Word	R/W
7E75H~7E77H	The 20 th holiday and schedule	Word	R/W
7E78H~7E7AH	The 21 st holiday and schedule	Word	R/W
7E7BH~7E7DH	The 22 nd holiday and schedule	Word	R/W
7E7EH~7E80H	The 23 rd holiday and schedule	Word	R/W
7E81H~7E83H	The 24 th holiday and schedule	Word	R/W
7E84H~7E86H	The 25 th holiday and schedule	Word	R/W
7E87H~7E89H	The 26 th holiday and schedule	Word	R/W
7E8AH~7E8CH	The 27 th holiday and schedule	Word	R/W
7E8DH~7E8FH	The 28 th holiday and schedule	Word	R/W
7E90H~7E92H	The 29 th holiday and schedule	Word	R/W
7E93H~7E95H	The 30 th holiday and schedule	Word	R/W
7E96H	The 10 th setting year	Word	R/W
7E97H	Holiday number of the 10 th year	Word	R/W

Table 88. Event Trigger Settings

Address	Parameter	Data Type	Property	Range	Default	Factory Setting
8000H	Manual Triggering Waveform	Word	R/W	0XAA: Enable; 0: Disable	0	0
8001H	DI Triggering - PXM1K-11	Word	R/W	bit1bit0: DI1; bit3bit2: DI2; bit5bit4: DI3; bit7bit6: DI4; bit9bit8: DI5; bit11bit10: DI6; 00: Disable; 01: From OFF to ON; 10: From ON to OFF; 11: Any DI state change;	0	0
8002H	DI Triggering - PXM1K-21	Word	R/W	Bit1bit0: DI7; bit3bit2 : DI8; bit5bit4: DI9; bit7bit6: DI10; The same as above	0	0
8003H	DI Triggering - PXM1K-31	Word	R/W	Bit1bit0: DI11; bit3bit2 : DI12; bit5bit4: DI13; bit7bit6: DI14; The same as above	0	0
8004H	Voltage Rated Value	Word	R/W	50 – 400 V or 50 – 690 V (only in 3LL)	400	400
8005H	Voltage Sag Triggering Waveform	Word	R/W	1: Enable; 0: Disable	0	0
8006H	Voltage Sag Threshold	Word	R/W	20 - 100(%)	50	50
8007H	Voltage Sag Half Cycle Count	Word	R/W	4 - 200 half cycles	10	10
8008H	Voltage Swell Triggering Waveform	Word	R/W	1: Enable; 0: Disable	0	0
8009H	Voltage Swell Threshold	Word	R/W	50 - 140(%)	100	100
800AH	Reserved	Word	R/W			
800BH	Current Rated Value	Word	R/W	500 - 5,000 (mA)	5,000	5,000
800CH	Over-current Triggering Waveform	Word	R/W	1: Enable; 0: Disable	0	0
800DH	Over-current Threshold	Word	R/W	50 - 150(%)	100	100
800EH	Clear Waveform	Word	R/W	0X55 Enable	0	0
800FH	Clear Power Quality Event	Word	R/W	0X55 Enable	0	0

Note: In 3LL and 2LL, the voltage rated value is line voltage; in 3LN, the voltage rated value is phase voltage.

6. Communication

Waveform Capture Data Retrieve Address

Waveform Capture includes the timestamp, triggering condition, and waveform data. Every group uses the same data format. Only one group of waveforms are saved in the registers. When retrieving the waveform, first write the 1 - 8 group number into 0X801FH, then read the registers after the 8 group to acquire the waveform corresponding to the written group number.

The relationship between voltage waveform value and real value:

- 5 A, 1 A: Real Value (Unit: A) = Waveform Value/1683.153;
- 333 mV: Real Value (Unit: A) = Waveform Value/K (firmware above 3.21, K=14427.15; other: K = 15869.87);
- 100 mV (Rogowski coil): Real Value (Unit: A) = Waveform Value/K (firmware above 3.21, K = 20291.1; firmware 3.20, K = 22068.8, other: K = 15869.87);
- mA CT: Real Value (Unit:A) = Waveform Value/K (80 mA CT:K = 7414.289; 100 mA: K = 9267.440; 200 mA: K = 18514.68).

The relationship between the current waveform value and the real value:

$$\text{Real Value (unit: V)} = \text{Waveform Value} \times 0.01463866.$$

The voltage and current value obtained from the waveform are the PT or CT secondary side value.

Read: FC03, Preset: FC16. For more information, please refer to Chapter 4.7.

Table 89. Event List

Address	Parameter	Data Type	Property	Range	Default Factory Settings	
8CFDH	Newest Event Group Number	Word	R	1 - 50,000; 0: No Data	0	0
8CFEH	Event for Retrieving Starting Group Number	Word	R/W	1 - 50,000 Note: Only valid smaller or equal to the Newest Event Group Number.	1	1
8CFFH						
No.1 Event						
8D00H	Timestamp High Byte – Year Low Byte - Month	Word	R	Time		
8D01H	Timestamp High Byte – Day Low Byte - Hour	Word	R	Time		
8D02H	Timestamp High Byte – Minute Low Byte - Second	Word	R	Time		
8D03H	Timestamp: Millisecond	Word	R	Time		
8D04H	Voltage Sag or Voltage Swell Condition	Word	R	0: Disabled; 1: Voltage Sag; 2: Voltage Swell		
8D05H	Rated Value	Word	R	50 – 400 V or 50 – 690 V (Only in 3LL)		
8D06H	Threshold	Word	R	Voltage Sag: 20 - 100 (%) Voltage Swell: 50 - 140 (%)		
8D07H	Half-cycle Count	Word	R	Voltage Sag Event: 4 - 200; Voltage Swell Event: 0		
8D08H-8D0FH	No. 2 Event	Word	R			
8D10H-8D17H	No. 3 Event	Word	R			
8D18H-8D1FH	No. 4 Event	Word	R			
8D20H-8D27H	No. 5 Event	Word	R			
8D28H-8D2FH	No. 6 Event	Word	R			

Power Quality Event Retrieve Address

A power quality event includes timestamp, triggering condition, and related settings. Every group uses the same data format. Only ten groups of data are saved in the registers. When retrieving the event data, its parameters must be correctly set in order to get correct information.

Read: FC03, Preset: FC16. For more information, please refer to Chapter 4.7.

Appendix A – Technical Data and Specification

Input Ratings

Energy Accuracy (PXM 1100)

Active Power	
(According to IEC 62053-22)	Class 0.2S
(According to ANSI C12.20)	Class 0.2
Reactive	
(According to IEC 62053-23)	Class 2

Harmonic Resolution

Metered Value	2 nd ~ 63 rd (50 or 60 Hz type)
	2 nd ~ 15 th (400 Hz type)

Voltage Input

Nominal Full Scale	400 Vac L-N, 690 Vac L-L
Withstand	1,500 Vac continuous; 3,250 Vac, 50/60 Hz for 1 minute
Metering Frequency	45 ~ 65 Hz
Pickup Voltage	10 Vac
Burden	0.05 VA (typical) @ 5 Arms
Accuracy	0.2% full scale

Current inputs (each channel)

Nominal secondary sensor settings:

Current Sensor Input Options	5A	1A	333mV	100mV Rope CT	80mA/100mA/200mA
Nominal Configuration Selection	5A	1A	1A	1A	1A
Metering range (%of nominal)	200%	200%	120%	120%	120%
Pickup current (%of nominal)	0.1%	0.1%	0.5%	0.5%	0.5%
Withstand	20 A rms continuous, 100 A rms for 1 second, non-recurring				
Burden	0.05 VA (typical) @ 5 A rms				
Accuracy	0.2% full scale				

Accuracy

Parameters		Accuracy	Resolution	Range
Voltage		0.2%	0.1 V	10 V ~ 1000 kV
Current		0.2%	0.001 A	5 mA ~ 50000 A
Power		0.2%	1 W	-9999 MW ~ 9999 MW
Reactive Power		0.2%	1 Var	-9999 MVar ~ 9999 MVar
Apparent Power		0.2%	1 VA	0 ~ 9999 MVA
Power Demand		0.2%	1 W	-9999 MW ~ 9999 MW
Reactive Power Demand		0.2%	1 Var	-9999 MVar ~ 9999 MVar
Apparent Power Demand		0.2%	1 VA	0 ~ 9999 MVA
Power Factor		0.2%	0.001	-1.000 ~ 1.000
Frequency		0.2%	0.01Hz	45.00 ~ 65.00 Hz (50Hz or 60Hz type) 300.00 ~ 500.00 (400 type)
Energy	Primary	0.2%	0.1 kWh	0 ~ 99999999.9 kWh
	Secondary	0.2%	0.001 kWh	0 ~ 999999.999 kWh
Reactive Energy	Primary	0.2%	0.1 kvarh	0 ~ 99999999.9 kvarh
	Secondary	0.2%	0.001 kvarh	0 ~ 999999.999 kvarh
Apparent Energy	Primary	0.2%	0.1 kVAh	0 ~ 99999999.9 kVAh
	Secondary	0.2%	0.001 kVAh	0 ~ 999999.999 kVAh
Harmonics		1.0%	0.1%	> = 0.0%
Phase Angle		2.0%	0.1°	0.0° ~ 359.9°
Imbalance Factor		2.0%	0.1%	0.0% ~ 100%
Running Time		<1 second/day	0.01 h	0 ~ 9999999.99 h
Temperature Drift		<100 ppm/°C		
		0.5%/year		

Control Power

AC/DC Control Power

Operating Range	100 - 415 Vac, 50/60 Hz; 100 - 300 Vdc
Burden	5 W
Withstand	3250 Vac, 50/60 Hz 1 min
	Installation Category III (Distribution)

Low Voltage DC Control Power (Optional)

Operating Range	20 - 60 Vdc
Burden	5 W

Appendix A – Technical Data and Specification

I/O Options

Digital Input

Input Voltage Range	20 - 160 Vac/dc
Input Current (Max)	2 mA
Start Voltage	15 V
Stop Voltage	5 V
Pulse Frequency (Max)	100 Hz, 50% Duty Ratio
SOE Resolution	2 ms

Digital Output (DO) (Photo-MOS)

Voltage Range	0 - 250 Vac/dc
Load Current	100 mA (Max)
Output Frequency	25 Hz, 50% Duty Ratio
Isolation Voltage	2500 Vac

Relay Output (RO)

Switching Voltage (Max)	250 Vac, 30 Vdc
Load Current	5 A (resistive), 2 A (inductive)
Set Time	10 ms (Max)
Contact Resistance	30 mΩ (Max)
Isolation Voltage	2500 Vac
Mechanical Life	1.5 × 10 ⁷

Analog Output (AO)

Output Range	0 - 5 V/1 - 5 V, 0 - 20 mA/4-20 mA (Optional)
Accuracy	0.5%
Temperature Drift	50 ppm/°C typical
Isolation Voltage	500 Vdc
Open Circuit Voltage	15 V

Analog Input (AI)

Input Range	0 - 5 V/1-5 V, 0 - 20 mA/4 - 20 mA (Optional)
Accuracy	0.2%
Temperature Drift	50 ppm/°C typical
Isolation Voltage	500 Vdc

Power Supply for DI (24Vdc)

Output Voltage	24 Vdc
Output Current	42 mA
Load (Max)	21 DIs

General Specifications

Product Specifications

Dimensions (mm)	96 x 96 x 51 (Cut-out 92 x 92 or 4-inch Round)
Protection Level	IP54 (Front), IP30 (Cover)
Weight (g) [oz]	350 g [11.25 oz]
Temperature	-25°C ~ 70°C (-13°F ~ 158°F), Metering -40°C~85°C (-40°F ~ 185°F), Storage
Humidity	5% ~ 95% Non-condensing
Power Supply	100 - 415 Vac, 50/60 Hz; 100 - 300 Vdc; Category III, Pollution Degree 2
Power Consumption	5 W

General Specifications (Continued)**Standard Compliance**

Measurement Standard	IEC 62053-22; ANSI C12.20
Environmental Standard	IEC 60068-2
Safety Standard	IEC 61010-1, UL 61010-1
EMC Standard	IEC 61000-4/-2-3-4-5-6-8-11, CISPR 22
Outlines Standard	DIN 43700, ANSI C39.1

Communication

RS-485 (Standard)	2-wire connection
	MODBUS RTU Protocol
	Up to 38400 baud rate
Ethernet (Optional)	10 M/100 M BaseT
	MODBUS TCP/IP Protocol
	Data browsing through HTTP
	Sends e-mail automatically
BACnet IP(Optional)	RJ45; BACnet Protocol

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Publication No. MN150009EN/TBG001247
October 2018

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