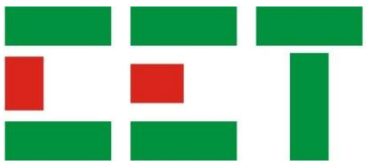
PMC-220-A6

Single-Phase Multifunction Meter

User Manual

Version: V1.0

December 31, 2025



Standards Compliance

Australian Government
Department of Industry, Innovation and Science
National Measurement Institute

CE

DANGER

This symbol indicates the presence of danger that may result in severe injury or death and permanent equipment damage if proper precautions are not taken during the installation, operation or maintenance of the device.

CAUTION

This symbol indicates the potential of personal injury or equipment damage if proper precautions are not taken during the installation, operation or maintenance of the device.

DANGER

Failure to observe the following instructions may result in severe injury or death and/or equipment damage.

- Installation, operation and maintenance of the meter should only be performed by qualified, competent personnel that have the appropriate training and experience with high voltage and current devices. The meter must be installed in accordance with all local and national electrical codes.
- Ensure that all incoming AC power and other power sources are turned OFF before performing any work on the meter.
- Before connecting the meter to the power source, check the label on top of the meter to ensure that it is equipped with the appropriate power supply, and the correct voltage and current input specifications for your application.
- During normal operation of the meter, hazardous voltages are present on its terminal strips and throughout the connected potential transformers (PT) and current transformers (CT). PT and CT secondary circuits are capable of generating lethal voltages and currents with their primary circuits energized. Follow standard safety precautions while performing any installation or service work (i.e. removing PT fuses, shorting CT secondaries, …etc).
- Do not use the meter for primary protection functions where failure of the device can cause fire, injury or death. The meter should only be used for shadow protection if needed.
- Under no circumstances should the meter be connected to a power source if it is damaged.
- To prevent potential fire or shock hazard, do not expose the meter to rain or moisture.
- Setup procedures must be performed only by qualified personnel familiar with the instrument and its associated electrical equipment.
- DO NOT open the instrument under any circumstances.

Limited warranty

- CET offers the customer a minimum of 12-month functional warranty on the meter for faulty parts or workmanship from the date of dispatch from the distributor. This warranty is on a return to factory for repair basis.
- CET does not accept liability for any damage caused by meter malfunctions. CET accepts no responsibility for the suitability of the meter to the application for which it was purchased.
- Failure to install, set up or operate the meter according to the instructions herein will void the warranty.
- Only CET's duly authorized representative may open your meter. The unit should only be opened in a fully anti-static environment. Failure to do so may damage the electronic components and will void the warranty.

Table of Contents

Chapter 1 Introduction

This manual explains how to use the PMC-220-A6 Single-Phase Multifunction Meter. Throughout the manual the term “meter” generally refers to all models.

This chapter provides an overview of the PMC-220-A6 meter and summarizes many of its key features.

1.1 Overview

The PMC-220-A6 Single-Phase Multifunction Meter is CET’s latest offer for the low voltage energy metering market featuring DIN-Rail mount, compact construction, high accuracy, multifunction true RMS measurements and a large, easy to read LCD display. The PMC-220-A6 complies with the IEC 62053-21: 2020 & AS 62053.21: 2023 Class 1. The PMC-220-A6 comes standard with an LED and a Solid State Pulse Output for energy pulsing. The advanced version of PMC-220-A6 provides 16MB on-board non-volatile memory for Data Recording and an optional Digital Input for status monitoring and pulse counting for collecting WAGES (Water, Air, Gas, Electric and Steam) information. With the standard RS-485 port and Modbus RTU protocol, the PMC-220-A6 becomes a vital component of an intelligent, multifunction monitoring solution for any Power and Energy Management Systems.

You can set up the meter via our free setup software. The meter is also supported by our PecStar® Integrated Energy Management System.

- DIN-Rail mount energy metering
- Industrial, Commercial and Utility Substation Metering
- Building, Factory and Process Automation
- Sub-metering and Cost Allocation
- NMI and MID compliant Energy Management

1.2 Features

Ease of use

- Large, Backlit, 7-Segement LCD for both Data viewing and Configuration
- Two LED indicators for Energy Pulsing and Communication activities
- Easy installation with DIN-Rail mounting, no tools required
- Direct Connected Input up to 80A without external CT
- Password protected setup via Front Panel or free software

Basic Measurements

- Multifunction measurements
  - Voltage (U), Current (I), P, Q, S, PF and Frequency
  - kWh and kvarh Imp./Exp./Tot./Net. and kVAh
  - Device Operating Time (Running Hour)
  - Front Panel & Communication Programming Counters
- Demands and Max. Demands for U, I, P/Q/S and Temperature with timestamp for This Month & Last Month (or Since Last Reset & Before Last Reset)
- 12 Monthly recording of kWh/kvarh Imp./Exp., kVAh as well as kWh Imp./Exp. and kVAh per Tariff
- Temperature

Muti-Tariff TOU

- Two TOU schedules, each providing
  - 12 Seasons
  - 12 Daily Profiles, each with 14 Periods
  - 20 Holidays or Alternate Days
  - 5 Tariffs, each providing kWh/kvarh Imp./Exp. and kVAh

Setpoint

- 10 user-programmable Setpoints with extensive list of monitoring parameters including Voltage (U), Current (I), Frequency, P/Q/S/PF Total, P Demand, Temperature and DI Status.
- Configurable thresholds and time delay

Overcurrent Alarm
- Configurable threshold @ 0.1-100 A and time delay @ 1-99 s
- Alarm Events are stored in SOE Log

SOE Log
- 128 events time-stamped to ±1ms resolution
- Setup changes, Setpoint, DI status changes and Overcurrent Alarm, etc.

Data Recorder (Advanced Version Only)
- Two Data Recorder Log of Max. 16 parameters
- Recording Interval from 1 second to 40 days
- Configurable Recording Depth (Max. 65535) and Recording offset
- Capable of recording 16 parameters at 5-min interval for over 7 months
- Available parameters: U, I, P, Q, S, PF, Freq., kWh Imp./Exp., kvarh Imp./Exp., kVAh, Demands and Max. Demands for U, I, P/Q/S Total, DI Pulse Counter, Temperature, and Demand for Temperature

Freeze Logs
- 12 Daily Freeze Logs for Total kWh Imp. and kWh Imp. Per Tariff
- 12 Monthly Freeze Logs for Total kWh Imp. and kWh Imp. Per Tariff

Tamper Detection and Alarm (Advanced Version Only)
- DI connected to external switch as Setpoint Parameter for Tamper Alarm
- Built-in sensor for Strong Magnetic Tamper Detection
- Alarm Events are stored in SOE Log

Communications
- Optically isolated RS-485 port, baud rate from 1,200 to 38,400 bps
- Modbus RTU protocol

Security
- Programmable Password protection for configurations on Front Panel
- 3-level independent security Comm. password protection and different access permissions

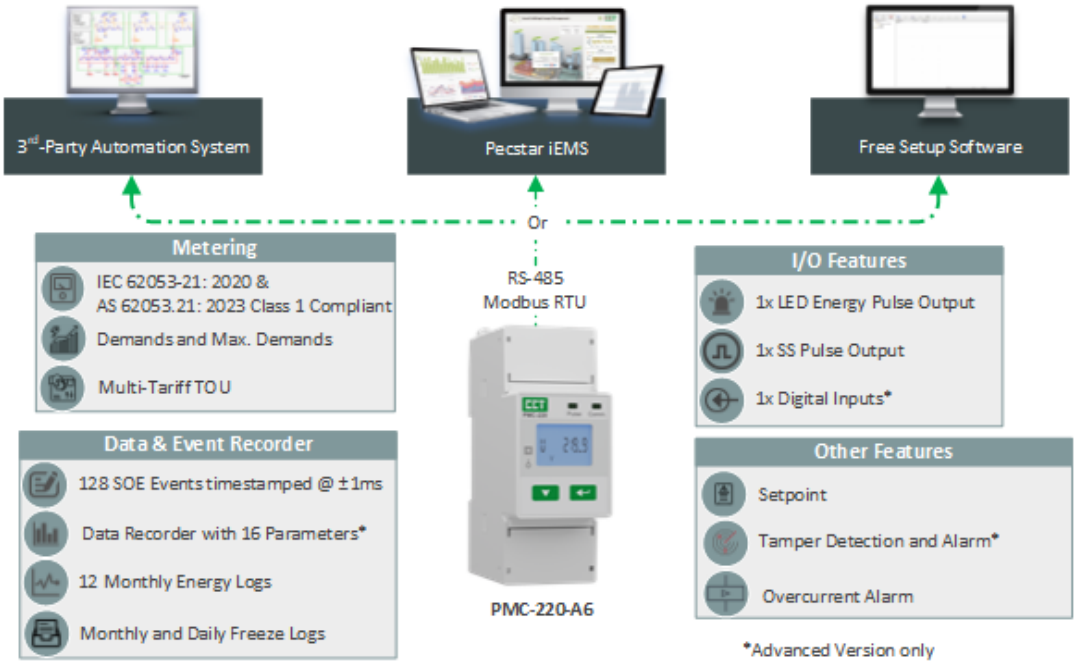
Pulse Outputs
- 1 LED Pulse Output on the Front Panel and 1 Solid State Pulse Output for energy pulsing application

Digital Input (Advanced Version Only)
- Optional 1 channel for external status monitoring or pulse counting
- Self-excited, internally wetted at 5VDC

Real-Time Clock (Advanced Version Only)
- Battery backed RTC @ 6ppm (≤0.5s/day)

System Integration
- Supported by our PecStar® iEMS
- Easy integration into other Automation or SCADA systems via Modbus RTU protocol

1.3 PMC-220-A6's Application in Power and Energy Management Systems



1.4 Getting more information

Additional information is available from CET via the following sources:

- Visit **www.cet-global.com**
- Contact your local representative
- Contact CET directly via email at support@cet-global.com

Chapter 2 Installation

Caution

Installation of the PMC-220-A6 should only be performed by qualified, competent personnel that have the appropriate training and experience with high voltage and current devices. The meter must be installed in accordance with all local and national electrical codes.

During the operation of the meter, hazardous voltages are present at the input terminals. Failure to observe precautions can result in serious or even fatal injury and equipment damage.

2.1 Appearance

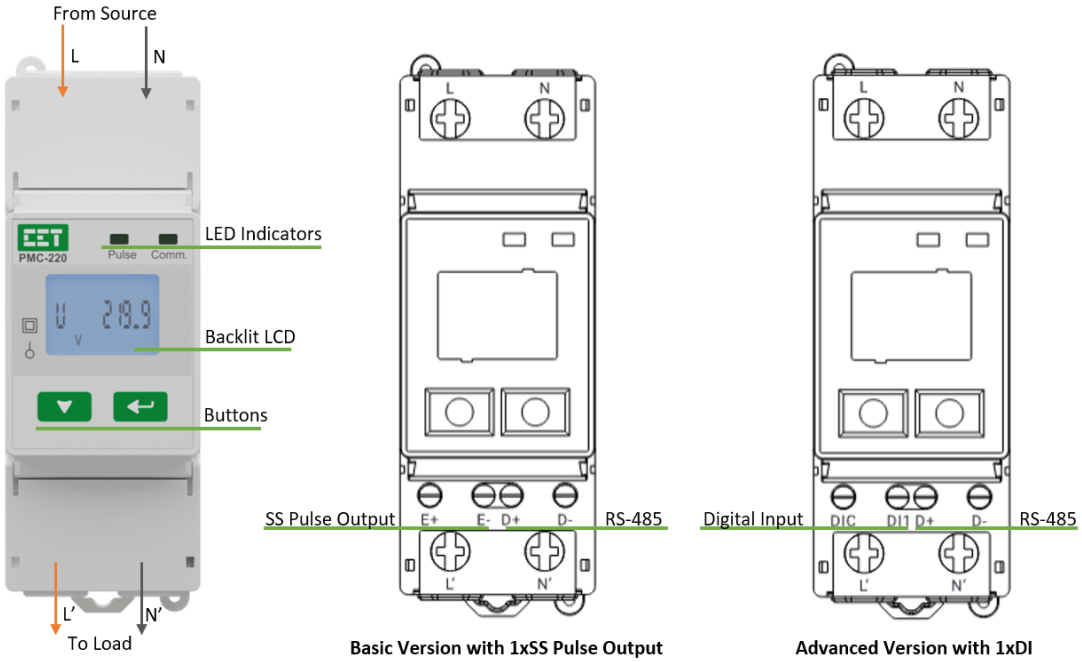


Figure 2-1 Appearance

2.2 Unit Dimensions

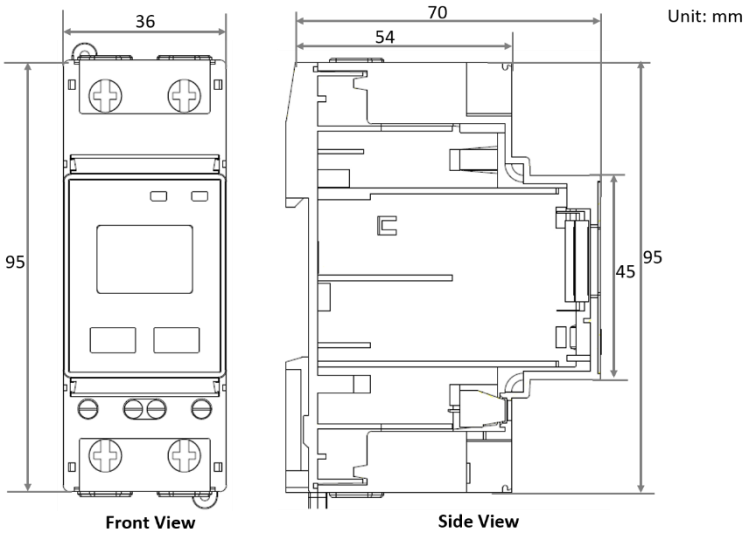


Figure 2-2 Dimensions

2.3 Terminal Dimensions

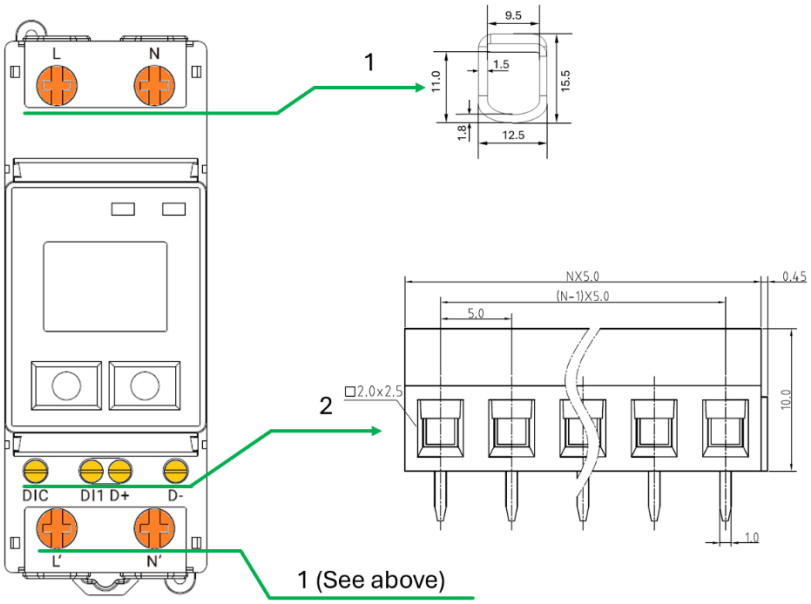


Figure 2-3 Terminal Dimensions

	Terminal	Terminal Dimension (mm)	Wire Size (mm^2)	Torque	
				Tightening	Max.
1	L, N, L', N'	/	Max. 35.0 mm^2 (Max. 2 AWG)	13 kgf.cm/ M6x13.3/ 11.3 lb-in/ 1.3 N.m	18 kgf.cm/ M6x13.3/ 15.6 lb-in/ 1.8 N.m
2	SS Pulse Output	2.0 x 2.5	0.2 - 2.0 mm^2 (26 - 14 AWG)	2.70 kgf.cm/M3/ 2.39 lb-in/ 0.27 N.m	5.1kgf.cm/M3/ 4.42 lb-in/ 0.5 N.m
3	Digital Input				
4	RS-485				

Table 2-1 Terminal Dimensions

2.4 Mounting

The PMC-220-A6 is designed for Indoor applications. It should be installed inside a cabinet in an environment that is dry, dust-free and free from heat, radiation and electrical noise source. The tensile strength should be no less than 120 MPa (for 6-series aluminum alloy enclosures), and the hardness should be no less than HB100 (for 6-series aluminum alloy enclosures). Please make sure that there is enough space inside the cabinet for wiring cables, terminal blocks, fuses and other necessary accessories. Under normal circumstances, the PMC-220-A6 will operate without maintenance, repair or adjustment. Please contact CET Technical Support at **support@cet-global.com** should you require further assistance.

Installation Steps：

- Before installation, make sure that the DIN Rail is already in place
- Move the installation clips at the back of the PMC-220-A6 downward to the “unlock” position
- Align the top of the mounting channel at the back of the PMC-220-A6 at an angle against the top of the DIN Rail as shown in Figure 2-4 right
- Rotate the bottom of the PMC-220-A6 towards the back while applying a slight pressure to make sure that the device is completely and securely fixed on to the DIN Rail
- Push the installation clips upward to the “lock” position to secure the PMC-220-A6 on to the DIN Rail

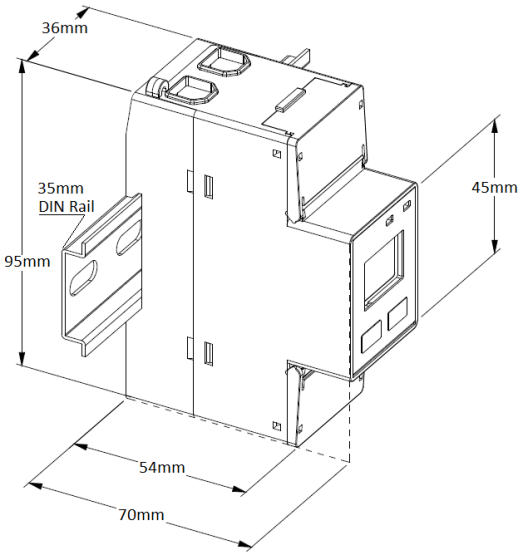


Figure 2-4 Installation

2.5 Input Wiring

Please consult the serial number label to ensure that the voltage and current input is less than or equal to the meter’s input specification.

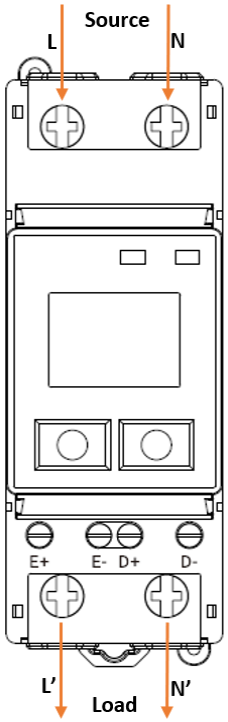


Figure 2-5 Input connections

2.6 RS-485 Wiring

The PMC-220-A6 provides one standard RS-485 port that supports the Modbus RTU protocol. Up to 32 devices can be connected on a RS-485 bus. The overall length of the RS-485 cable connecting all devices should not exceed 1200m.

If the master station does not have a RS-485 communications port, an Ethernet-to-RS-485 gateway or USB/RS-485 converter with optically isolated outputs and surge protection should be used. The following figure illustrates the RS-485 connections on the PMC-220-A6. Please note a piece of insulation should be removed from the end of the wire, and the maximum length of the removed insulation should be 5mm.

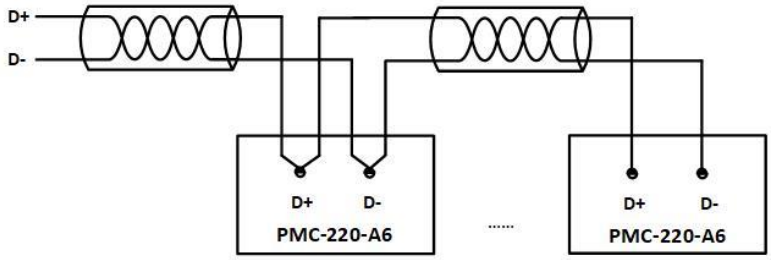


Figure 2-7 RS-485 Connections

2.7 Digital Input Wiring

The following figure illustrates the optional Digital Input connections on the PMC-220-A6. Please note a piece of insulation should be removed from the end of the wire, and the maximum length of the removed insulation should be 5mm.

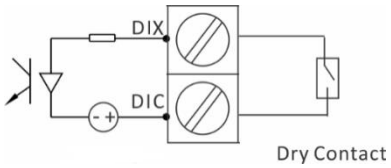


Figure 2-8 DI Connections

2.8 Pulse Output Wiring

The following figure illustrates the Pulse Output connections on the PMC-220-A6. Please note a piece of insulation should be removed from the end of the wire, and the maximum length of the removed insulation should be 5mm.

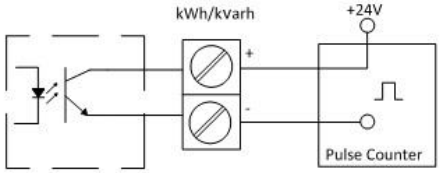


Figure 2-9 Energy Pulse Output Connections

Chapter 3 Front Panel

The meter's LCD display and two buttons are used for both data display and setup configuration purposes.

Figure 3-1 Front Panel Display

3.1 LED Indicator

There are two LED indicators on the PMC-220-A6's front panel as described below:

LED Indicator	Description
Pulse	LED Energy Pulse Output
Comm.	Communications Status

Table 3-1 LED Indicators

3.2 LCD Display

3.2.1 LED Pulse Output

The PMC-220-A6 comes standard with an LED Pulse Output on its Front Panel, which can be used for kWh/kvarh energy pulsing by setting the **PULSE** setup parameter via the Front Panel or **LED Energy Pulse** register via communications.

3.2.2 LCD Display Symbols

The following figure shows the LCD display symbols based on "8".

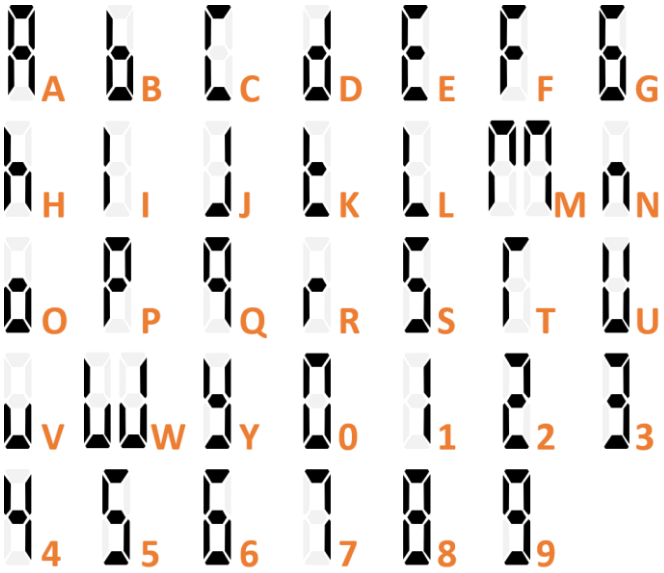


Figure 3-2 LCD Display Symbols

3.3 LCD Testing

Pressing both the <▼> and the <↵> buttons simultaneously for 2 seconds enters the **LCD Test** mode. During testing, all LCD segments are illuminated and will blink on and off three times before returning to the **Data Display** mode.

3.4 Data Display

The PMC-220-A6 has a default display which can be set as one of two modes: Fixed mode which displays kWh Imp. statically and Energy Auto-Scroll mode which displays kWh Imp., kWh Exp., kvarh Imp., kvarh Exp. and kVAh in sequence in 4 seconds interval. The Energy Auto-Scroll setup parameter can only be set via communications.

In **Data Display** mode, pressing the <▼> button scrolls to the next parameter while pressing the <↵> button toggles among **Energy**, **Real-time Data, Operating Time** and **Counter** menus.

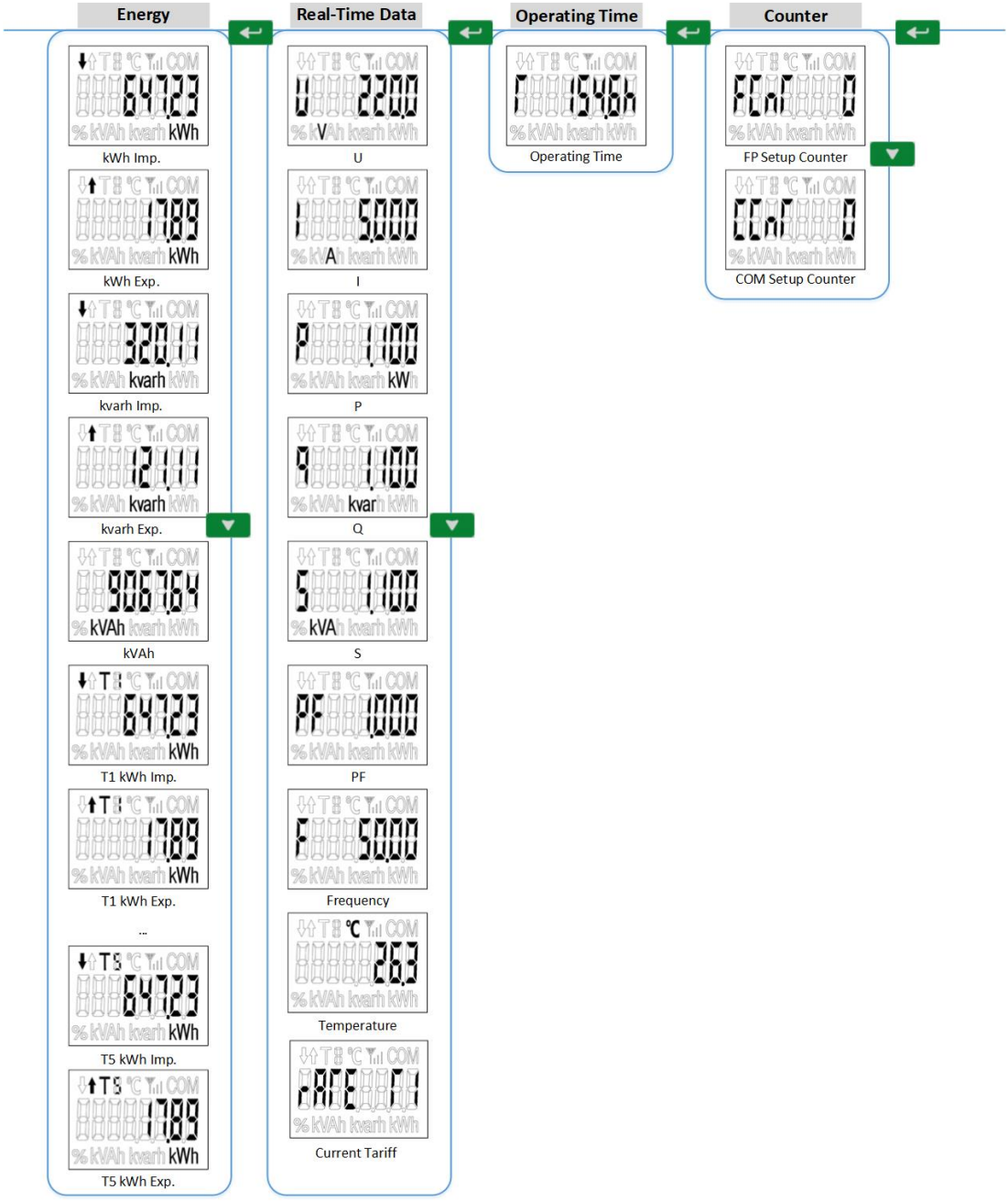


Figure 3-3 Data Display

3.5 Setup Configuration via the Front Panel

Pressing the <↵> button for two seconds enters the **Setup Configuration** mode where the setup parameters can be changed. Upon completion, pressing the <↵> button for two seconds returns to the **Data Display** mode.

3.2.3 Function of buttons

The two Front Panel buttons take on different meanings in the **Setup Configuration** mode and are described below:

<↵>: Pressing this button for two seconds toggles between **Data Display** mode and **Setup Configuration** mode. Once inside the **Setup Configuration** mode and at the main menu, pressing this button selects a parameter for modification. Once selected, the parameter value blinks while it's being changed. If the selected parameter is a numeric value, pressing this button shifts the cursor to the left by one position. When the cursor has reached the left-most digit, pressing this button again will save the new setting into memory. The parameter will also stop blinking once the value has been saved.

<▼>: Before an item is selected, pressing this button scrolls to the next setup parameter. If the selected parameter is a numeric value, pressing this button increments the selected digit. If the selected parameter is an enumerated value, pressing this button scrolls through the enumerated list. Pressing the <↵> button will save the current enumerated value.

Making setup changes:

- Press the <↵> button for two seconds to enter the **Setup Configuration** mode.
- Press the <▼> button to advance to the Password page.
- A correct password must be entered before changes are allowed. The factory default password is zero. Press the <▼> button to select the parameter for modification. Use the <▼> and <↵> buttons to enter the correct password.
- Use the <▼> button to scroll to the desired parameter.
- Press the <↵> button to select the parameter. Once selected, the parameter value will blink.
- Use the <↵>and <▼> buttons to make modification to the selected parameter.
- Pressing the <↵> button for two seconds to exit the **Setup Configuration** mode.

3.6.2 Setup Menu

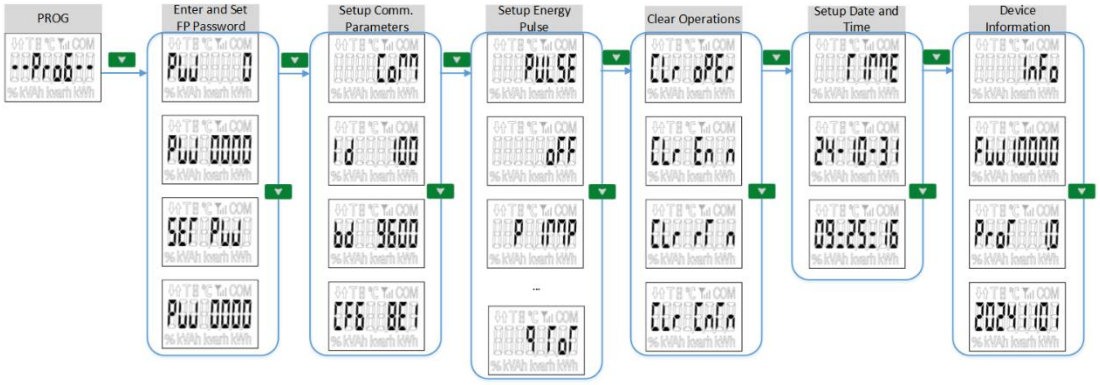


Figure 3-4 Setup Menu

3.6.3 Configuration

The Setup Configuration mode provides access to the following setup parameters:

Label		Description	Range	Default
Menu				
Main	Sub			
PROG		Setup Configuration	/	/
PW		Enter Password	0 to 9999	0
SET PW		Set New Password		
		Enter New Password	0 to 9999	0
CoM SET		Comm. Parameters		
	Id	Set Meter Address	1 to 247	**Note 1**

bd	Set Baud Rate in Bits Per Second	1200/2400/4800/ 9600/19200/38400 (bps)	9600
CFG	Set Comm. Port Data Format	8N2/8O1/8E1/ 8N1/8O2/8E2	8E1
PULSE	Enable LED Energy Pulsing	OFF/P IMP/P EXP/P TOT/ Q IMP/Q EXP/Q TOT	P TOT
CLr oPEr	Clear Data		
CLr En	Clear All Energy	YES/NO	NO
CLr oT	Clear Operating Time for device	YES/NO	NO
CLr CnT	Clear both FP & COM Setup Counters	YES/NO	NO
TIME	Date and Time		
	Enter the Current Date	YY-MM-DD	/
	Enter the Current Time	HH:MM:SS	/
InFo	View Meter Information (Read Only)		
FW	Firmware Version	For example, 1.00.00 means the firmware version is V1.10.00.	/
ProT	Protocol Version	e.g. 10 means V1.0	/
-	Firmware Update Date	e.g. 20240915	/

Table 3-2 Setup Parameters

Notes:

1. The default Unit ID is the last 2 digits of the SN. If the last 2 digits of the SN are 00, the default Unit ID is 100.

Chapter 4 Applications

4.1 Inputs and Outputs

4.1.1 Digital Input (Advanced Version Only)

The advanced version of the PMC-220-A6 provides one optional self-excited Digital Input that is internally wetted at 24 VDC. The Digital Input on the PMC-220-A6 can be used in the following applications:

1) **Digital Input** The digital input is typically used for status monitoring which can help prevent equipment damage, improve maintenance, and track security breaches. The real-time status of the Digital Input is available through communications. Changes in Digital Input status are stored as events in the SOE Log in 1 ms resolution.

2) **Pulse Counting** Pulse counting is supported with programmable pulse weight and facilitates WAGES (Water, Air, Gas, Electricity and Steam) information collection.

The following table describes the DI setup parameters that can be programmed over communications:

Setup Parameter	Definition	Options/Default*
DIx Function	The **DI** can be configured as a Status Input or Pulse Counter.	0=Digital Input* 1=Pulse Counter
DIx Debounce	Specifies the minimum duration the **DI** must remain in the Active or Inactive state before a DI state change is considered to be valid.	1 to 1000 (ms) 20ms*
DIx Pulse Weight	Specifies the incremental value for each received pulse. This is only used when a DI is configured as a Pulse Counter.	1* to 1,000,000

Table 4-1 DI Setup Parameters

4.1.2 Energy Pulse / 1PPS Output

The PMC-220-A6 comes standard with one Front Panel LED Pulse Output and one Solid State Relay Output for kWh or kvarh Energy Pulsing. Energy Pulse Output is typically used for accuracy testing.

The Front Panel LED Energy Pulsing is enabled by default and can be disabled from the Front Panel or through communications and the Solid State Energy Pulsing only can be programmed through the communications. The Pulse Constant can be configured through the **Pulse Constant** (Register 6035) as 10/100/1000/2000/3200 pulses per kXh, where kXh may be kWh or kvarh. If the Solid State Energy Pulsing parameter is configured as 1PPS, the PMC-220-A6 will output a 1PPS signal with a pulse width of 500ms ±0.5ms at the Energy Pulse Output terminals (E+, E-) for the accuracy testing of its internal clock.

4.2 Metering

4.2.1 Basic Measurements

The PMC-220-A6 provides real time measurements for U, I, P, Q, S, PF, Freq., Temperature and Operating Time.

4.2.2 Energy Measurements

The PMC-220-A6 provides Energy measurements for kWh/kvarh Import/Export and kVAh at a resolution of 0.01 kXh and a maximum value of 1,000,000,000.00 kXh. When the maximum value is reached, it will automatically roll over to zero. The energy measurements can be reset manually through the front panel or communication. The PMC-220-A6 provides the following energy measurements:

Active Energy	kWh Import/Export/Net/Total kWh Import/Export of Tariff 1/2/3/4/5
Reactive Energy	kvarh Import/Export/Net/Total kvarh Import/Export of Tariff 1/2/3/4/5 kvarh of Q1/Q2/Q3/Q4
Apparent Energy	kVAh Total

	kVAh Total of Tariff 1/2/3/4/5

Table 4-2 Energy Measurement

4.3 Demand Measurements

Demand is defined as the average consumption over a fixed interval based on the sliding window method. The PMC-220-A6 provides the Present Demand, Max. Demand for This Month (Since Last Reset) and Last Month (Before Last Reset) for I, U, P, Q, S and Temperature. The Present Demand and Max. Demand measurements can be retrieved via communications.

The PMC-220-A6 provides the following Demand setup parameters and can be configured through communications:

Setup Parameter	Definition	Options
Demand Period	1 to 60 minutes. For example, if the **# of Sliding Windows** is set as 1 and the **Demand Period** is 15, the demand cycle will be 1×15=15min.	1 to 60 minutes Default=15
# of Sliding Windows	Number of Sliding Windows.	1 to 15 Default=1
Self-Read Time	The **Self-Read Time** allows the user to specify the time and day of the month for the Max. Demand Self-Read operation. The **Self-Read Time** supports three options: • A zero value means that the Self-Read will take place at 00:00 of the first day of each month. • A non-zero value means that the Self-Read will take place at a specific time and day based on the formula: Self-Read Time = Day x 100 + Hour where 0 ≤ Hour ≤ 23 and 1 ≤ Day ≤ 28. For example, the value 1512 means that the Self-Read will take place at 12:00pm on the 15th day of each month. • A 0xFFFF value will disable the Self-Read operation and replace it with manual operation. A manual reset will cause the Max. Demand of **This Month** to be transferred to the Max. Demand of **Last Month** and then reset. The terms **This Month** and **Last Month** will become **Since Last Reset** and **Before Last Reset**.	Default=0xFFFF

Table 4-5 Demand Setup

4.4 Setpoints

The PMC-220-A6 comes standard with 10 user programmable Setpoints which provide extensive control by allowing a user to initiate an action in response to a specific condition. Typical setpoint applications include alarming, fault detection and power quality monitoring.

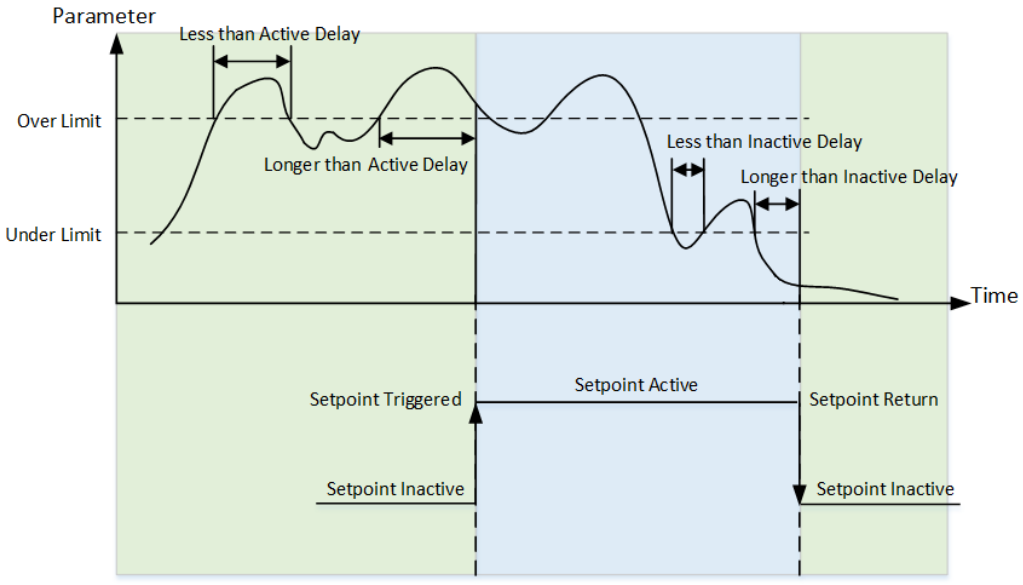


Figure 4-1 Over Setpoint

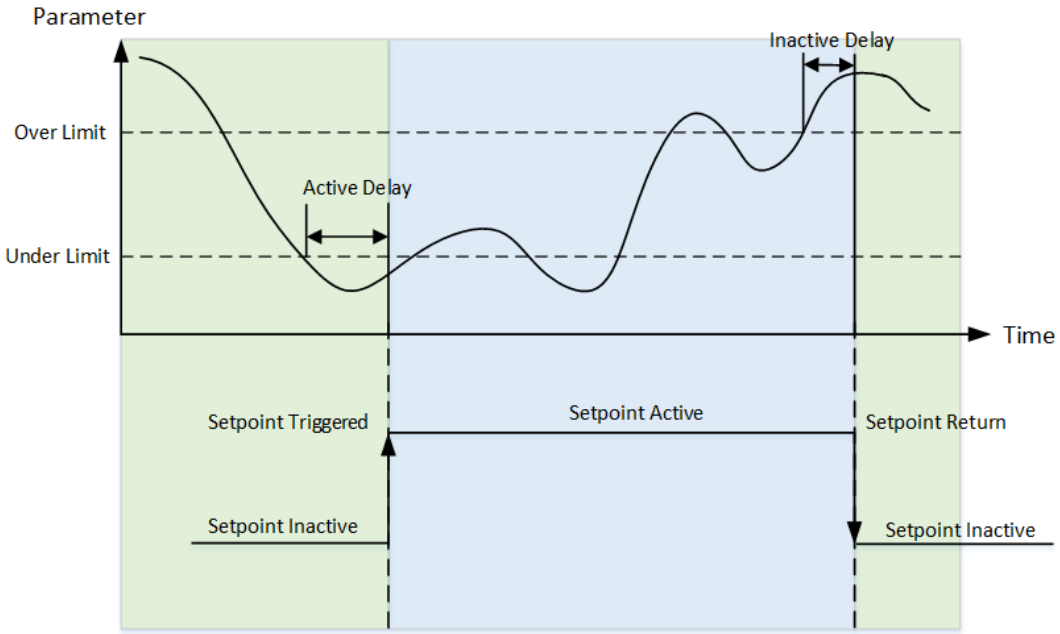


Figure 4-2 Under Setpoint

Setpoints can be programmed through communications and have the following setup parameters:

Setup Parameter	Definition	Options/Default*
Setpoint Type	Disable, Over or Under Setpoint.	0= Disabled 1= Over Setpoint* 2= Under Setpoint
Setpoint Parameter	Specify the parameter to be monitored.	See Table 4-7
Over Limit	Specify the value that the setpoint parameter must exceed for Over Setpoint to become active or for Under Setpoint to become inactive.	0*
Under Limit	Specify the value that the setpoint parameter must go below for Over Setpoint to become inactive or for Under Setpoint to become active.	0*
Active Delay	Specify the minimum duration that the setpoint condition must be met before the setpoint becomes active. An event will be generated and stored in the SOE Log.	0 to 9999s Default=10
Inactive Delay	Specify the minimum duration that the setpoint return condition must be met before the setpoint becomes inactive. An event will be generated and stored in the SOE Log.	0 to 9999 Default=10

Table 4-6 Description for Setpoint Parameters

The table below illustrates the Setpoint Parameters.

Key	Setpoint Parameter	Scale	Unit
0	None	-	-
1	U	x1	V
2	Reserved		
3	I		A
4	Frequency		Hz
5	P (kW Total)		kW
6	PF (PF Total)		-
7	P DMD (Present Demand for kW Total)		kW
8	Q (kvar Total)		kvar
9	S (kVA Total)		kVA
10	Reserved		
11	Temperature		°C
12	DI1		-

Table 4-7 Setpoint Parameters

Notes:
1. If DI1 is configured as Setpoint Parameter, the Over Limit/Under Limit would be invalid.
2. DI1 is pre-configured as Setpoint Parameter to monitor Lid Tamper event. For Over Setpoint, the corresponding Setpoint event descriptions in SOE would be "Lid Tamper Alarm (DI1 Closed)" and "Lid Tamper Return (DI1 Open)" via free setup software. For Under Setpoint, the description would be "Lid Tamper Alarm (DI1 Open)" and Lid Tamper Return (DI1 Closed)" via free setup software.

4.5 Logging

4.5.1 Monthly Energy Log

The PMC-220-A6 can store the monthly energy data for the present month and the last 12 months. The **Monthly Energy Log Self-Read Time** setup parameter allows the user to specify the time and day of the month for the Recorder's self-read operation via communications. The Monthly Energy Logs are stored in the meter's non-volatile memory and will not suffer any loss in the event of power failure, and they are stored on a First-in-First-out basis where the newest log will overwrite the oldest one.

The **Monthly Energy Log Self-Read Time** supports two options:

- A zero value means that the Self-Read will take place at 00:00 of the first day of each month.
- A non-zero value means that the Self-Read will take place at a specific time and day based on the formula: Energy Self-Read Time = Day x 100 + Hour where 0 ≤ Hour ≤ 23 and 1 ≤ Day ≤ 28. For example, the value 1512 means that the Self-Read will take place at 12:00 pm on the 15th day of each month.

The Monthly Energy Logs can be reset manually via communications.

The PMC-220-A6 provides the following Energy data for the Present Month and the last 12 months:

Active Energy	kWh Import/Export, Tariff 1 to Tariff 5 kWh Import/Export
Reactive Energy	kvarh Import/Export
Apparent Energy	kVAh

Table 4-9 Energy Measurement for Monthly Energy Log

4.5.2 SOE Log

The PMC-220-A6's SOE Log can store up to 128 events such as Power-On, Power-Off, Digital Input status changes and setup changes in its non-volatile memory. Each event record includes the event classification, its relevant parameter values and a timestamp in ±1 ms resolution.

All events can be retrieved via communications and if there are more than 128 events, the newest event will replace the oldest event on a first-in-first-out basis. The SOE Log can be reset from via communications.

4.5.3 Max. Demand Log

The PMC-220-A6 records the **Max. Demand** of **This Month (Since Last Reset)** and **Last Month (Before Last Reset)** with timestamp for U, I, P/Q/S and Temperature. All Max. Demand information can be accessed through communications. Please refer to **Section 4.3** for a complete description of the **Self-Read Time** and its operation.

4.5.4 Data Recorder Log (Advanced Version Only)

The advanced version of the PMC-220-A6 is equipped with 16MB of memory and provides two Data Recorders and each capable of recording a maximum of 16 parameters. The Data Recorder Log is stored in the device's non-volatile memory and will not suffer any loss in the event of a power failure.

The programming of the Data Recorder is only supported over communication. The Data Recorder provides the following setup parameters:

Setup Parameters	Value/Option	Default
Trigger Mode	0=Disabled, 1=Triggered by Timer	1
Recording Mode	0=Stop-When-Full, 1=First-In-First-Out	1
Recording Depth	1 to 65535 (entry)	60000
Recording Interval	1 to 3,456,000 seconds	300 s

Offset Time	0 to 43,200 seconds, 0 indicates no offset.	0
Number of Parameters	0 to 16	13
Parameter 1 to 16	See **Section 5.11.**	

Table 4-10 Setup Parameters for Data Recorder

The Data Recorder Log is only operational when the values of **Trigger Mode**, **Recording Mode**, **Recording Depth**, **Recording Interval**, and **Number of Parameters** are all non-zero.

The **Recording Offset** parameter can be used to delay the recording by a fixed time from the **Recording Interval**. For example, if the **Recording Interval** parameter is set to 3600 (hourly) and the **Recording Offset** parameter is set to 300 (5 minutes), the recording will take place at 5 minutes after the hour every hour, i.e. 00:05, 01:05, 02:05…etc. The value of the **Recording Offset** parameter should be less than the **Recording Interval** parameter.

4.5.5 Daily and Monthly Freeze Log

The PMC-220-A6 provides a **Daily Freeze Log** and a **Monthly Freeze Log** for Total kWh Imp. and kWh Imp. per Tariff. It can store up to 12 daily freeze records and 12 monthly freeze records.

The **Daily Self-Read Time** setup parameter allows the user to specify the time of the day for the Daily Freeze Log Self-Read operation, while the **Monthly Self-Read Time** setup parameter allows the user to specify the time and day of the month for the Monthly Freeze Log Self-Read operation.

1) **Daily Freeze Self-Read Time** can be set to a zero value or a non-zero value:
   - A zero value means that the Self-Read will take place at 00:00 everyday.
   - A non-zero value means that the Self-Read will take place at a specific time of the day based on the formula: Self-Read time = (Hour x 100 + Min) where 0 ≤ Hour ≤ 23 and 0 ≤ Min ≤ 59. For example, the value 1512 means that the Self-Read will take place at 15:12 of each day.
2) **Monthly Freeze Self-Read Time** can be set to a zero value or a non-zero value:
   - A zero value means that the Self-Read will take place at 00:00 of the first day of each month.
   - A non-zero value means that the Self-Read will take place at a specific time and day based on the formula: Monthly Self-Read Time = Day x 100 + Hour where 0 ≤ Hour ≤ 23 and 1 ≤ Day ≤ 28. For example, the value 1512 means that the Self-Read will take place at 12:00pm on the 15th day of each month.

The Daily and Monthly Freeze Logs can be reset manually through communications.

4.6 Time of Use (TOU)

Time-Of-Use (TOU) is used for electricity pricing that varies depending on the time of day, day of week, and the season. The TOU system allows the user to configure an electricity price schedule inside the PMC-220-A6 and accumulate energy consumption into different TOU rates based on the time of consumption. TOU programming is only supported through communications.

The PMC-220-A6 supports two TOU schedules, which can be switched at a pre-defined time. Each TOU schedule supporting:

- Up to 12 seasons
- 20 Holidays or Alternate Days and 3 Weekdays
- 12 Daily Profiles, each with 14 Periods
- 5 Tariffs

Each TOU schedule has the following setup parameters and can only be programmed via communications:

Setup Parameters	Definition	Options
Daily Profile #	Specify a daily rate schedule which can be divided into a maximum of 14 periods in 15-min intervals. Up to 12 Daily Profiles can be programmed for each TOU schedule.	1 to 12, the first period starts at at any time of day and the last period end at 24:00.
Season #	A year can be divided into a maximum of 12 seasons. Each season is specified with a Start Date and ends with the next season's Start Date.	1 to 12, starting from any day.
Alternate Days #	A day can be defined as an Alternate Day, such as May	1 to 20.

	1st. Each Alternate Day is assigned with a Daily Profile.	
Day Types	Specify the day type of the week. Each day of a week can be assigned a Day Type such as Weekday1, Weekday2, Weekday3 and Alternate Day. The Alternate Day has the highest priority.	Weekday1, Weekday2, Weekday3 and Alternate Days
Switch Time	Specify when to switch from one TOU schedule to another. Writing 0xFFFFFFFF to this parameter disables switching between TOU schedules.	Format: YYYYMMDDHH

Table 4-12 TOU Setup Parameters

The PMC-220-A6 provides kWh/kvarh Imp./Exp. and kVAh information for each of the 5 Tariff Rates.

Chapter 5 Modbus Map

This chapter provides a complete description of the Modbus register map (**Protocol Version 1.0**) for the PMC-220-A6 to facilitate the development of 3rd party communications driver for accessing information on the PMC-220-A6. The PMC-220-A6 supports the following Modbus functions:

1) Read Holding Registers (Function Code 0x03)
2) Force Single Coil (Function Code 0x05)
3) Preset Multiple Registers (Function Code 0x10)

The following table provides a description of the different data formats used for the Modbus registers:

Format	Description
UINT16/INT16	Unsigned/Signed 16-bit Integer
UINT32/INT32	Unsigned/Signed 32-bit Integer
Float	IEEE 754 32-bit Single Precision Floating Point Number

5.1 Basic Measurements

Register	Property	Description	Format	Scale	Unit
0000	RO	U	Float	x1	V
0002	RO	I	Float		A
0004	RO	P	Float		kW
0006	RO	Q	Float		kvar
0008	RO	S	Float		kVA
0010	RO	PF	Float		--
0012	RO	Frequency	Float		Hz
0014	RO	Device Operating Time (Running Hour)[1]	--	x0.1	Hour
0016	RO	Temperature	Float	x1	°C
0018	RO	DI Status	UINT16		
0019~0030	--	Reserved	--		--
0032	RO	SOE Log Pointer[2]	UINT16		--
0034	RO	Setpoint Status[3]	UINT16		
0035	RO	Overcurrent Detection Status	UINT16		0=Normal 1=Overcurrent
0036~0037	RO	Reserved	UINT16		
0038	RO	FP Counter[4]	UINT16		
0039	RO	Comm. Counter[4]	UINT16		
0040	RW	kWh Imp.	INT32	x0.01	kWh
0042	RW	kWh Exp.	INT32		kWh
0044	RO	kWh Net	INT32		kWh
0046	RO	kWh Total	INT32		kWh
0048	RW	kvarh Imp.	INT32		kvarh
0050	RW	kvarh Exp.	INT32		kvarh
0052	RO	kvarh Net	INT32		kvarh
0054	RO	kvarh Total	INT32		kvarh
0056	RW	kVAh	INT32		kVAh
0058	RO	Device Operating Time (Running Hour)[1]	UINT32	x0.1	Hour
0060	RO	Data Recorder #1 Log Pointer~	UINT32		
0062	RO	Data Recorder #2 Log Pointer~	UINT32		

~Available in the Advanced Version only

Table 5-1 Basic Measurements

Notes:

1) The Operating Time means the accumulated running time whenever Current exceeds 0.1A. The Device Operating Time data is stored in non-volatile memory and will not suffer any loss in the event of a power failure.
   The registers 0014 and 0058 are the same to ensure compatibility with the PMC-220.
2) The range of the **Log Pointer** (SOE and DR) is between 0 and 0xFFFFFFFF, and it is incremented by one for every new log generated and will roll over to 0 if its current value is 0xFFFFFFFF. A value of zero indicates that the SOE or DR does not contain any Log. If a Clear SOE/DR Log is performed via communications, the corresponding Log Pointer will be reset to zero and the SOE Log Pointer will

be immediately incremented by one with a new Clear SOE/DR Log event.

3) For the **Setpoint Status** (0034) register, the bits value of B0 to B9 represents the states of Setpoint #1 to Setpoint #10, respectively, with "1" meaning Active and "0" meaning Return.
4) The FP Counter and Comm. Counter will be incremented every time some important setup parameters, which may affect the accuracy of Energy registers and DI Pulse Counters or the way they are calculated, are changed via Front Panel or Communication, respectively. The FP Counter is incremented every time a relevant setup parameter is changed via the Front Panel, while the Comm. Counter is incremented every time a single packet is sent to change one or more relevant setup parameters through communications. The following actions may trigger these counters to increment:
    - Changing Setup Parameters:
        - DI setup parameters
        - Energy Pulse Constant
        - Preset Energy Value
        - Demand Period and No. of Sliding Windows
        - TOU setup registers
        - Manual Time Set (via Front Panel only)
    - Clear Actions via Front Panel:
        - Clear All Energy
        - Clear both FP & COM Setup Counters
    - Clear Actions via Communication:
        - Clear Monthly Energy Log (Register 9600)
        - Clear Energy (Register 9601)
        - Clear Monthly Energy Log of Present Month (Register 9602)
        - Clear All Data (Register 9603)
        - Clear SOE Logs (Register 9604)
        - Clear Daily Freeze Logs (Register 9605)
        - Clear Monthly Freeze Logs (Register 9606)
        - Clear Device Operating Time (Register 9607)
        - Clear Max. Demand Log of This Month (Register 9608)
        - Clear All Demand Logs (Register 9609)
        - Clear Data Recorder #1 (Register 9610)
        - Clear Data Recorder #2 (Register 9611)
        - Clear All Data Recorders (Register 9612)
        - Clear DI Counter (Register 9613) (only when DI1 = Energy Pulse Counter)
        - Clear both FP & COM Setup Counters (Register 9614)

5.2 Energy Measurements

Register	Property	Description	Format	Scale	Unit
0500	RW	kWh Import	INT32	x0.01	kWh
0502	RW	kWh Export	INT32		
0504	RO	kWh Net	INT32		
0506	RO	kWh Total	INT32		
0508	RW	kvarh Import	INT32		kvarh
0510	RW	kvarh Export	INT32		
0512	RO	kvarh Net	INT32		
0514	RO	kvarh Total	INT32		
0516	RW	kVAh	INT32		kVAh
0518	RW	kvarh Q1	INT32		kvarh
0520	RW	kvarh Q2	INT32		
0522	RW	kvarh Q3	INT32		
0524	RW	kvarh Q4	INT32		
0526	RW	kWh Import of T1	INT32		kWh
0528	RW	kWh Export of T1	INT32		
0530	RW	kvarh Import of T1	INT32		kvarh
0532	RW	kvarh Export of T1	INT32		
0534	RW	kVAh of T1	INT32		kVAh
0536	RW	kWh Import of T2	INT32		kWh
0538	RW	kWh Export of T2	INT32		
0540	RW	kvarh Import of T2	INT32		kvarh

0542	RW	kvarh Export of T2	INT32		
0544	RW	kVAh of T2	INT32		kVAh
0546	RW	kWh Import of T3	INT32		kWh
0548	RW	kWh Export of T3	INT32		
0550	RW	kvarh Import of T3	INT32		kvarh
0552	RW	kvarh Export of T3	INT32		
0554	RW	kVAh of T3	INT32		kVAh
0556	RW	kWh Import of T4	INT32		kWh
0558	RW	kWh Export of T4	INT32		
0560	RW	kvarh Import of T4	INT32		kvarh
0562	RW	kvarh Export of T4	INT32		
0564	RW	kVAh of T4	INT32		kVAh
0566	RW	kWh Import of T5	INT32		kWh
0568	RW	kWh Export of T5	INT32		
0570	RW	kvarh Import of T5	INT32		kvarh
0572	RW	kvarh Export of T5	INT32		
0574	RW	kVAh of T5	INT32		kVAh

Table 5-2 Energy Measurements

5.3 Monthly Energy Log

Register	Property	Description	Format	Scale	Unit
0980	RW	Month	INT16	0* to 12	
0981	RO	High-order Byte: Year (0-99) Low-order Byte: Month (1-12)	INT16	Time Stamp (20YY/MM/DD HH:MM:SS)	
0982	RO	High-order Byte: Day (1-31) Low-order Byte: Hour (0-23)	INT16		
0983	RO	High-order Byte: Minute (0-59) Low-order Byte: Second (0-59)	INT16		
0984	RO	kWh Import	INT32	x0.01	kWh
0986	RO	kWh Export	INT32		kWh
0988	RO	Reserved	INT32		
0990	RO	Reserved	INT32		
0992	RO	kvarh Import	INT32		kvarh
0994	RO	kvarh Export	INT32		kvarh
0996	RO	Reserved	INT32		
0998	RO	Reserved	INT32		
1000	RO	kVAh	INT32		kVAh
1002	RO	Reserved	INT32		
1004	RO	Reserved	INT32		
1006	RO	Reserved	INT32		
1008	RO	Reserved	INT32		
1010	RO	kWh Import of T1	INT32		kWh
1012	RO	kWh Export of T1	INT32		
1014	RO	Reserved	INT32		
1016	RO	Reserved	INT32		
1018	RO	Reserved	INT32		
1020	RO	kWh Import of T2	INT32		kWh
1022	RO	kWh Export of T2	INT32		
1024	RO	Reserved	INT32		
1026	RO	Reserved	INT32		
1028	RO	Reserved	INT32		
1030	RO	kWh Import of T3	INT32		kWh
1032	RO	kWh Export of T3	INT32		
1034	RO	Reserved	INT32		
1036	RO	Reserved	INT32		
1038	RO	Reserved	INT32		
1040	RO	kWh Import of T4	INT32		kWh
1042	RO	kWh Export of T4	INT32		
1044	RO	Reserved	INT32		
1046	RO	Reserved	INT32		
1048	RO	Reserved	INT32		
1050	RO	kWh Import of T5	INT32		kWh
1052	RO	kWh Export of T5	INT32		
1054	RO	Reserved	INT32		
1056	RO	Reserved	INT32		

1058	RO	Reserved	INT32		

Table 5-3 Monthly Energy Log

Notes:

1) This register represents the Month when it is read. To read the Monthly Energy Log, this register must be first written to indicate to the PMC-220-A6 which log to load from memory. The range of this register is from 0 to 12, which represents the Present Month and the Last 12 Months. For example, if the current month is 2016/10, "0" means 2016/10, "1" means 2016/09, "2" means 2016/08, ……"12" means "2015/10".
2) For each Monthly Energy Log, the time stamp shows the exact self-read time (20YY/MM/DD HH:MM:SS) when the log was recorded. For the Monthly Energy Log of the Present Month, the time stamp shows the current time of the meter because the present month is not yet over.
3) The Monthly Energy Log for the Present Month can be modified, but the Monthly Energy Logs for the Last 12 Months are Read Only.

5.4 DI Pulse Counter (Advanced Version Only)

Register	Property	Description	Format	Range/Unit
1200	RW	DI1 Pulse Counter	INT32	0 to 999,99,999 DI Pulse Counter= Pulse Counter x DI Pulse Weight

Table 5-4 DI Pulse Counter

5.5 Demands

5.5.1 Present Demands

Register	Property	Description	Format	Scale	Unit
3000	RO	U	Float	x1	V
3002	RO	I	Float		A
3004	RO	P	Float		kW
3006	RO	Q	Float		kvar
3008	RO	S	Float		kVA
3010	RO	Temperature	Float		°C

Table 5-5 Present Demand Measurements

5.5.2 Max. Demand Log of This Month (Since Last Reset)

Register	Property	Description	Format	Scale	Unit
3400~3405	RO	U	See Table 5-7	x1	V
3406~3411	RO	I			A
3412~3417	RO	P			kW
3418~3423	RO	Q			kvar
3424~3429	RO	S			kVA
3430~3435	RO	Temperature			°C

Table 5-6 Max. Demand Log of This Month

5.5.3 Max. Demand Log of Last Month (Before Last Reset)

Register	Property	Description	Format	Scale	Unit
3600~3605	RO	U	See Table 5-7	x1	V
3606~3611	RO	I			A
3612~3617	RO	P			kW
3618~3623	RO	Q			kvar
3624~3629	RO	S			kVA
3630~3635	RO	Temperature			°C

Table 5-7 Max. Demand Log of Last Month

Notes:

1) The following table illustrates Demand Data Structure:

Offset		Description	Format	Range
+0	High	Year - 2000	UINT16	0 to 99
	Low	Month		1 to 12
+1	High	Day	UINT16	1 to 31
	Low	Hour		0 to 23
+2	High	Minute	UINT16	0 to 59
	Low	Second		0 to 59
+3	-	Millisecond	UINT16	0 to 999

+4~+5	-	Record Value	Float	

Table 5-8 Demand Data Structure

5.6 Daily and Monthly Freeze Logs

5.5.1 Daily Freeze Log

Register	Property	Description	Format	Scale	Unit
12000	RW	Index[1]	INT16	1 to 12	
12001	RO	High-order Byte: Year (0-99) Low-order Byte: Month (1-12)	INT16	-	
12002	RO	High-order Byte: Day (1-31) Low-order Byte: Hour (0-23)	INT16		
12003	RO	High-order Byte: Minute (0-59) Low-order Byte: Second (0-59)	INT16		
12004	RO	kWh Import	INT32	x0.01	kWh
12006	RO	kWh Import of T1	INT32		
12008	RO	kWh Import of T2	INT32		
12010	RO	kWh Import of T3	INT32		
12012	RO	kWh Import of T4	INT32		
12014	RO	kWh Import of T5	INT32		

Table 5-9 Daily Freeze Log

Notes:

1) There is no Log Pointer that indicates the current logging position. Writing a value N between 1 and 12 to the **Index** register to retrieve the Daily Freeze Log of the N_{th} entry. For example, writing 1 to the **Index** register will retrieve yesterday's Daily Freeze Log. If N = 0 or N > 12, an exception response will be returned with the Illegal Data Value error code (0x03) as defined by the Modbus protocol. If all the returned values of the N^{th} Log Record (where $1 \le N \le 12$) are all 0 (including the timestamp), this indicates that the returned Log Record is invalid and that the end of the Log has been reached. If the software is reading the Log for the very first time, it should start with N=1 and stop when either N=12 or when the returned Log Record is invalid. After that, all the software has to do is to read the Log on a daily basis with N=1.

5.5.2 Monthly Freeze Log

Register	Property	Description	Format	Scale	Unit
12500	RW	Index[1]	INT16	1 to 12	
12501	RO	High-order Byte: Year (0-99) Low-order Byte: Month (1-12)	INT16	-	
12502	RO	High-order Byte: Day (1-31) Low-order Byte: Hour (0-23)	INT16		
12503	RO	High-order Byte: Minute (0-59) Low-order Byte: Second (0-59)	INT16		
12504	RO	kWh Import	INT32	x0.1	kWh
12506	RO	kWh Import of T1	INT32		
12508	RO	kWh Import of T2	INT32		
12510	RO	kWh Import of T3	INT32		
12512	RO	kWh Import of T4	INT32		
12514	RO	kWh Import of T5	INT32		

Table 5-10 Monthly Freeze Log

Notes:

1) There is no Log Pointer that indicates the current logging position. Writing a value N between 1 and 12 to the **Index** register to retrieve the Monthly Freeze Log of the N_{th} entry. For example, writing 1 to the **Index** register will retrieve last month's Monthly Freeze Log. If N = 0 or N > 12, an exception response will be returned with the Illegal Data Value error code (0x03) as defined by the Modbus protocol. If all the returned values of the N^{th} Log Record (where $1 \le N \le 12$) are all 0 (including the timestamp), this indicates that the returned Log Record is invalid and that the end of the Log has been reached. If the software is reading the Log for the very first time, it should start with N=1 and stop when either N=12 or when the returned Log Record is invalid. After that, all the software has to do is to read the Log on a monthly basis with N=1.

5.7 SOE Log

The SOE Log Pointer points to the register address within the SOE Log where the next event will be stored. The following formula is used to determine the register address of the most recent SOE event referenced by the SOE Log Pointer value:

Register Address = 10000 + Modulo[(SOE Log Pointer-1) / 128]*8

Register	Property	Description	Format
10000~10007	RO	Event 1	See Table 5-12 SOE Log Data Structure
10008~10015	RO	Event 2	
10016~10023	RO	Event 3	
10024~10031	RO	Event 4	
10032~10039	RO	Event 5	
10040~10047	RO	Event 6	
10048~10055	RO	Event 7	
……		…	
11016~11023	RO	Event 128	

Table 5-11 SOE Log

Notes:

1) SOE Log Data Structure

Offset	Property	Description	Unit
+0	RO	High-order Byte: Event Classification[2]	-
	RO	Low-order Byte: Sub-Classification[2]	
+1	RO	Record Time: Year	0-99 (Year-2000)
	RO	Record Time: Month	1 to 12
+2	RO	Record Time: Day	1 to 31
	RO	Record Time: Hour	0 to 23
+3	RO	Record Time: Minute	0 to 59
	RO	Record Time: Second	0 to 59
+4	RO	Record Time: Millisecond	0 to 999
+5	RO	High-order Byte: Reserved	-
	RO	Low-order Byte: Status[2]	-
+6 to +7	RO	Event Value[2]	-

Table 5-12 SOE Log Data Structure

2) SOE Classification

Event Classification	Sub-Classification	Status	Event Value	Description
1=DI Changes	1	1/2	0	1=DI1 Inactive, 2=DI1 Active
3=Setpoint Status	1	2/1	Trigger Value / Return Value	Over Voltage Setpoint Active/Return
	2			Reserved
	3			Over Current Setpoint Active/Return
	4			Over Frequency Setpoint Active/Return
	5			Over P Setpoint Active/Return
	6			Over PF Setpoint Active/Return
	7			Over P Present DMD Setpoint Active/Return
	8			Over Q Setpoint Active/Return
	9			Over S Setpoint Active/Return
	10			Reserved
	11			Over Temperature Setpoint Active/Return
	12		1=Closed 0=Open	Lid Tamper Alarm (DI1 Closed)/Return (DI1 Open)
	13~40	--	--	Reserved
	41	2/1	Trigger Value / Return Value	Under Voltage Setpoint Active/Return
	42			Reserved
	43			Under Current Setpoint Active/Return
	44			Under Frequency Setpoint Active/Return

	45			Under P Setpoint Active/Return
	46			Under PF Setpoint Active/Return
	47			Under P Present DMD Setpoint Active/Return
	48			Under Q Setpoint Active/Return
	49			Under S Setpoint Active/Return
	50			Reserved
	51			Under Temperature Setpoint Active/Return
	52		1=Closed 0=Open	Lid Tamper Alarm (DI1 Open)/Return (DI1 Closed)
4=Self-diagnostic	1	1	0	Flash Fault~
	2	1	0	FRAM Fault~
	3	1	0	System Parameters Fault
5=Operations	4	1	0	Tamper Detection~
	1	0	0	Power On
	2	0	0	Power Off
	3	-	-	Reserved
	4	0	0	Setup Changes via Front Panel
	5	0	0	Set Clock via Front Panel
	6	0	0	Clear Energy via Front Panel
	7	0	0	Clear Operating Time via Front Panel
	8	0	0	Clear Setup Counters via Front Panel
	9	-	-	Reserved
	10	0	0	Setup Changes via Comm.
	11	0	0	Set Clock via Comm.
	12	0	0	Clear Max. Demand of This Month via Comm.
	13	0	0	Clear All Demand via Comm.
	14	0	0	Preset Energy via Comm.
	15	0	0	Preset TOU Energy via Comm.
	16	0	0	Clear SOE Log via Comm.
	17	0	0	Clear Historical Monthly Energy Log via Comm.
	18	0	0	Clear Real-Time Energy via Comm.
	19	0	0	Clear Present Monthly Energy via Comm.
	20	0	0	Clear Daily Freeze Log via Comm.
	21	0	0	Clear Monthly Freeze Log via Comm.
	22	0	0	Clear Operating Time via Comm.
	23	0	0	Clear all Data via Comm.
	24	0	0	Clear All DI counters via Comm.
	25	0	1 to 4	Switch TOU Schedule[1]
	26	0	0	Clear Data Recorder #1 via Comm.
	27	0	0	Clear Data Recorder #2 via Comm.
	28	0	0	Clear All Data Recorders via Comm.
	29	0	0	Clear Setup Counters via Comm.
6=Overcurrent Event	1~6	-	-	Reserved
	7	2/1	I Value	Overcurrent Event
	8~14	-	-	Reserved

~Available in the advanced version only

Table 5-13 SOE Classification

Notes:

1) The event values of Switch TOU Schedule are illustrated in the table below:

Record Value	Description
1	Switch Schedule 1 to Schedule 2 manually
2	Switch Schedule 2 to Schedule 1 manually
3	Switch Schedule 1 to Schedule 2 automatically
4	Switch Schedule 2 to Schedule 1 automatically

Table 5-14 TOU Switch Records

5.8 Data Recorder Log (Advanced Version Only)

Register	Property	Description	Format
20000~20037	RO	DR Log #1 Buffer	See Table 5-16 Standard DR Log Structure
20038~20075	RO	DR Log #2 Buffer	

Table 5-15 DR Log

Offset	Property	Description	Format
+0	RW	DR Recorder Index	UINT32
+2	RO	High-order Byte: Year (0-99) Low-order Byte: Month (1-12)	UINT16
+3	RO	High-order Byte: Day (1-31) Low-order Byte: Hour (0-23)	UINT16
+4	RO	High-order Byte: Minute (0-59) Low-order Byte: Second (0-59)	UINT16
+5	RO	Millisecond	UINT16
+6~+7	RO	Parameter #1	Float
+8~+9	RO	Parameter #2	
+10~+11		Parameter #3	
…		…	
+36~+37	RO	Parameter #16	

Table 5-16 DR Data Buffer Structure

Notes:

2) Writing a value *n* to the Data Recorder Index will load the nth Log into the buffer from memory, and the valid range of the DR Index is:
   - Between ***1*** and ***DR Log Pointer*** when DR Log Pointer ≤ DR Log Depth (see **Section 5.11** for DR Log Depth)
   - Between ***DR Log Pointer - (DR Log Depth - 1)*** and ***DR Log Pointer*** when the DR Log Pointer > DR Log Depth

3) Writing a pointer value that points to a Log Record that is either already expired or has not been generated yet to the Data Recorder Index register will generate an exception response with the Illegal Data Value error code (0x03) as defined by the Modbus protocol.

5.9 Device Setup

5.9.1 Basic Setup Parameters

Register	Property	Description	Format	Range, Default*
6000	RW	PT Primary[1]	UINT32	220V*
6002	RW	PT Secondary[1]	UINT32	
6004	RW	CT Primary[2]	UINT32	5A*
6006	RW	CT Secondary[2]	UINT32	
6008~6018	RW	Reserved	UINT32	-
6019	RW	Time Zone[3]	UINT16	0 to 32, 26*
6020	RW	Language	UINT16	1=English*
6021	RW	Power Factor Convention	UINT16	0=IEC*, 1=IEEE, 2=-IEEE
6022	RW	I Polarity	UINT16	0=Normal*, 1=Reverse
6023	RW	Demand Period	UINT16	1 to 60 (minutes), 1*
6024	RW	No. of Sliding Windows	UINT16	1 to 15*
6025	RW	Max. Demand Self-Read Time[4]	UINT16	Default=0xFFFF (Auto Self-Read Disabled)
6026~6033	RW	Reserved	UINT16	-
6034	RW	Monthly Energy Log Self-Read Time[5]	UINT16	0*
6035	RW	Energy Pulse Constant	UINT16	0=10 imp/kxh, 1=100 imp/kxh 2=1000 imp/kxh 3=2000 imp/kxh* 4=3200 imp/kxh
6036	RW	LED Energy Pulse	UINT16	0=OFF 1=P Imp. (kWh Imp.) * 2=P Exp. (kWh Exp.) 3=P Tot. (kWh Total) 4=Q Imp. (kvarh Imp.) 5=Q Exp. (kvarh Exp.)

				6=Q Tot. (kvarh Total)
6037	RW	Default Display	UINT16	0=Fixed (kWh Imp.)* 1=Auto Scroll
6038~6040	RW	Reserved	UINT16	-
6041	RW	Energy Pulse Width	UINT16	30 to 500ms, 50ms*
6042	RW	Monthly Freeze Log Self-Read Time[6]	UINT16	0*
6043	RW	Daily Freeze Log Self-Read Time[7]	UINT16	0*
6044	RW	Overcurrent Threshold	UINT16	1 to 1000 (x0.1A), 800*
6045	RW	Overcurrent Time Delay	UINT16	0 to 99 s, 60*
6046	RW	Tamper Detection Enable~	UINT16	0=Disabled, 1=Enabled*
6047	RW	Tamper Detection Delay	UINT16	1* (0 means Tamper Detection is disabled.)

~Available in the advanced version only

Table 5-17 Basic Setup Parameters

Notes:

1. The PT Primary and PT Secondary should be set simultaneously, and only identical settings are supported.
2. The CT Primary and CT Secondary should be set simultaneously, and only identical settings are supported.
3. The following table lists the Time Zones supported:

Code	Time Zone	Code	Time Zone
0	GMT-12:00	**17**	GMT+03:30
1	GMT-11:00	**18**	GMT+04:00
2	GMT-10:00	**19**	GMT+04:30
3	GMT-09:00	**20**	GMT+05:00
4	GMT-08:00	**21**	GMT+05:30
5	GMT-07:00	**22**	GMT+05:45
6	GMT-06:00	**23**	GMT+06:00
7	GMT-05:00	**24**	GMT+06:30
8	GMT-04:00	**25**	GMT+07:00
9	GMT-03:30	**26**	GMT+08:00
10	GMT-03:00	**27**	GMT+09:00
11	GMT-02:00	**28**	GMT+09:30
12	GMT-01:00	**29**	GMT+10:00
13	GMT+00:00	**30**	GMT+11:00
14	GMT+01:00	**31**	GMT+12:00
15	GMT+02:00	**32**	GMT+13:00
16	GMT+03:00		

Table 5-18 Time Zones

4. The Self-Read Time applies to the Max. Demand Log and supports the following three options:
   - A zero value means that the Self-Read will take place at 00:00 of the first day of each month.
   - A non-zero value means that the Self-Read will take place at a specific time and day based on the formula: Self-Read Time = (Day x 100 + Hour) where 0 ≤ Hour ≤ 23 and 1 ≤ Day ≤ 28. For example, the value 1512 means that the Self-Read will take place at 12:00 pm on the 15th day of each month.
   - A 0xFFFF value means the automatic self-read operation is disabled and replaced with manual operation.
5. The Monthly Energy Log Self-Read Time supports the following options:
   - A Zero value means that the Self-Read will take place at 00:00 of the first day of each month,
   - A non-zero value means that the Self-Read will take place at a specific time and day based on the formula: Self-Read Time = (Day x 100 + Hour) where 0 ≤ Hour ≤ 23 and 1 ≤ Day ≤ 28. For example, the value 1512 means that the Self-Read will take place at 12:00 pm on the 15th day of each month.
6. The **Daily Freeze Self-Read Time** can be set to a zero value or a non-zero value:
   - A zero value means that the Self-Read will take place at 00:00 everyday.
   - A non-zero value means that the Self-Read will take place at a specific time of the day based on the formula: Self-Read time = (Hour x 100 + Min) where 0 ≤ Hour ≤ 23 and 0 ≤ Min ≤ 59. For example, the value 1512 means that the Self-Read will take place at 15:12 of each day.
7. The **Monthly Freeze Self-Read Time** can be set to a zero value or a non-zero value:
   - A zero value means that the Self-Read will take place at 00:00 of the first day of each month.
   - A non-zero value means that the Self-Read will take place at a specific time and day based on the formula: Monthly Self-Read Time = Day x 100 + Hour where 0 ≤ Hour ≤ 23 and 1 ≤ Day ≤ 28. For example, the value 1512 means that the Self-Read will take place at 12:00pm on the 15th day of each month.

5.9.2 I/O Setup

Register	Property	Description	Format	Range, Default*
6200	RW	DI1 Function~	UINT16	0=Status Input 1=Pulse Counter*
6201	RW	Reserved	UINT16	
6202	RW	Reserved	UINT16	
6203	RW	DI1 Debounce~	UINT16	1 to 9999ms, 20ms*
6204	RW	Reserved	UINT16	
6205	RW	Reserved	UINT16	
6206	RW	DI1 Pulse Weight~	UINT32	1 to 1,000,000, 1*
6208	RW	Reserved	UINT32	
6210	RW	Reserved	UINT32	
6212	RW	SS Energy Pulse	UINT16	0=Disabled, 1 = kWh Total* 2 = kvarh Total, 3 = kWh Import 4 = kWh Export, 5 = kvarh Import 6 = kvarh Export, 7=1PPS

~Available in the advanced version only

Table 5-19 I/O Setup Parameters

5.9.3 3-Level Permission Setup

Register	Property	Description	Format	Range, Default*
6300	WO	Enter Comm. Permission Password	UINT16	0 to 9999, 0*
6301	RW	Valid Time for entered password	UINT16	60 to 3600 (s), 180*
6302	RW	Modify Level 1 (Read-only) Password	UINT16	0 to 9999, 1111*
6303	RW	Modify Level 2 (Read/Set Time) Password	UINT16	0 to 9999, 2222*
6304	RW	Modify Level 3 (Read/Write) Password	UINT16	0 to 9999, 3333*
6305	RW	3-Level Comm. Permission Password	UINT16	0=Disabled*, 1=Enabled
6306	RW	Enable Clear Operations on Front Panel	UINT16	0=Yes*, 1=No

Table 5-20 Permission Setup

Notes:

1. If an incorrect Comm. Permission Password has been written to register 6300 for 3 consecutive times, Modbus access will be locked out for approximately 5 minutes.
2. When the register value of **Enable Clear Operations on Front Panel** (register 6306) is set to 1, the following operations on the Front Panel will not be displayed and could not be operated via Front Panel, including Clear Energy, Clear Operating Time and Clear Setup Counters. Furthermore, the Date/Time on the Front Panel is read-only and cannot be set via Front Panel at the same time.

5.9.4 Communication Setup Parameters

Register	Property	Description	Format	Range, Default*
6400	RW	Reserved		-
6401	RW	Unit ID	UINT16	1 to 247, Last 2 digits of SN*[1]
6402	RW	Baud Rate	UINT16	0=1200, 1=2400, 2=4800, 3=9600*, 4=19200, 5=38400
6403	RW	Comm. Config.	UINT16	0=8N2, 1=8O1, 2=8E1* 3=8N1, 4=8O2, 5=8E2

Table 5-21 Communication Setup

Notes:

1) If the last 2 digits of SN is 00, the default ID should be 100.

5.10 Setpoint Setup

Register	Property	Description	Format	Range, Default*
6500	RW	Setpoint #1 Type	UINT16	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6501	RW	Setpoint #1 Parameter	UINT16	0 to 12 (See Note 1), 0*
6502	RW	Setpoint #1 Over Limit	Float	See Note 2, 0*
6504	RW	Setpoint #1 Under Limit	Float	
6506	RW	Setpoint #1 Active Delay	UINT16	0 to 9999 (s), 10*
6507	RW	Setpoint #1 Inactive Delay	UINT16	0 to 9999 (s), 10*
6508~6509	--	Reserved	--	--

6510	RW	Setpoint #2 Type	UINT16	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6511	RW	Setpoint #2 Parameter	UINT16	0 to 12 (See Note 1), 0*
6512	RW	Setpoint #2 Over Limit	Float	See Note 2, 0*
6514	RW	Setpoint #2 Under Limit	Float	
6516	RW	Setpoint #2 Active Delay	UINT16	0 to 9999 (s), 10*
6517	RW	Setpoint #2 Inactive Delay	UINT16	0 to 9999 (s), 10*
6518~6519	--	Reserved	--	--
…	…	…	…	…
6590	RW	Setpoint #10 Type	UINT16	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6591	RW	Setpoint #10 Parameter	UINT16	0 to 12 (See Note 1), 0*
6592	RW	Setpoint #10 Over Limit	Float	See Note 2, 0*
6594	RW	Setpoint #10 Under Limit	Float	
6596	RW	Setpoint #10 Active Delay	UINT16	0 to 9999 (s), 10*
6597	RW	Setpoint #10 Inactive Delay	UINT16	0 to 9999 (s), 10*
6598~6599	--	Reserved	--	--

Table 5-22 Setpoint Setup

Notes:

1. The table below illustrates the Setpoint Parameters.

Key	Parameter	Scale	Unit	Key	Parameter	Scale	Unit
0	Null	--	--	7	P Demand	x1	kW
1	U	x1	V	8	Q	x1	kvar
2	Reserved	--	--	9	S	x1	kVA
3	I	x1	A	10	Reserved	--	--
4	Frequency	x1	Hz	11	Temperature	x1	°C
5	P	x1	kW	12	DI	x1	--
6	PF	x1	--				

Table 5-23 Setpoint Parameters

2. The Over Limit specifies the value that the Setpoint parameter must exceed for Over Setpoint to become active or for Under Setpoint to become inactive. The Under Limit Specifies the value that the Setpoint parameter must go below for Over Setpoint to become inactive or for Under Setpoint to become active.
3. If a specific DI is configured as Setpoint Parameter, the Over Limit/Under Limit would be invalid.
4. DI1 is pre-configured as Setpoint Parameter to monitor Lid Tamper event. For **Over Setpoint**, the corresponding Setpoint event descriptions in SOE would be "Lid Tamper Alarm (DI1 Closed)" and "Lid Tamper Return (DI1 Open)" via PMC-EasyConfig. For **Under Setpoint**, the description would be "Lid Tamper Alarm (DI1 Open)" and Lid Tamper Return (DI1 Closed)" via PMC-EasyConfig.

5.11 Data Recorder Setup (Advanced Version Only)

Register	Property	Description		Format	Range, Default*
6600	RW	Data Recorder #1	Trigger Mode	UINT16	0=Disabled 1=Triggered by Timer*
6601	RW		Recording Mode[1]	UINT16	0=Stop-when-Full 1=First-In-First-Out*
6602	RW		Recording Depth[1]	UINT16	0 to 65535, 6000*
6603	RW		Recording Interval[1]	UINT32	1 to 3456000s, 300s*
6605	RW		Offset Time[2]	UINT16	0* to 43200s
6606	RW		Number of Parameters[1]	UINT16	0 to 16, 13*
6607	RW		Parameter #1[1,3]	UINT16	8 (kWh Import)*
6608	RW		Parameter #2[1,3]	UINT16	9 (kWh Export)*
6609	RW		Parameter #3[1,3]	UINT16	10 (kvarh Import)*
6610	RW		Parameter #4[1,3]	UINT16	11 (kvarh Export)*
6611	RW		Parameter #5[1,3]	UINT16	24 (DI Counter)*
6612	RW		Parameter #6[1,3]	UINT16	25 (Temperature)*
6613	RW		Parameter #7[1,3]	UINT16	26 (Temp. Demand)*
6614	RW		Parameter #8[1,3]	UINT16	1 (U)*
6615	RW		Parameter #9[1,3]	UINT16	2 (I)*
6616	RW		Parameter #10[1,3]	UINT16	4 (P)*
6617	RW		Parameter #11[1,3]	UINT16	3 (Frequency)*

6618	RW		Parameter #12[1,3]	UINT16	13 (U Demand)*
6619	RW		Parameter #13[1,3]	UINT16	14 (I Demand)*
6620	RW		Parameter #14[1,3]	UINT16	0 (Not Used)
6621	RW		Parameter #15[1,3]	UINT16	0 (Not Used)
6622	RW		Parameter #16[1,3]	UINT16	0 (Not Used)
6623~6645	RW	Data Recorder #2	Please refer to Data Recorder #1		

Table 5-24 Data Recorder Setup

Notes:

1) Changing any of these Data Recorder setup registers will reset the Data Recorder.
2) **Recording Offset** can be used to delay the recording by a fixed amount of time from the **Recording Interval**. For example, if the **Recording Interval** is set to 3600 (hourly) and the **Recording Offset** is set to 300 (5 minutes), the recording will take place at 5 minutes after the hour every hour, i.e. 00:05, 01:05, 02:05…etc. The value of the **Recording Offset** parameter should be less than the **Recording Interval** parameter.

5.12 TOU Setup

5.12.1 Basic

Register	Property	Description	Format	Range, Default*
7000	RO	Current Tariff[1]	UINT16	0=T1, 1=T2, 2=T3, 3=T4, 4=T5
7001	RO	Current Season	UINT16	0 to 11 (Season #1 to #12)
7002	RO	Current Period	UINT16	0 to 13 (Period #1 to #14)
7003	RO	Current Daily Profile	UINT16	0 to 11 (Daily Profile #1 to #12)
7004	RO	Current Day Type	UINT16	0=Weekday1 1=Weekday2 2=Weekday3 3=Alternate Day
7005	RO	Current TOU Schedule No	UINT16	0=TOU #1 1=TOU #2
7006	RW	TOU Switch Time	UINT32	See Note 1)
7008	WO	Switch TOU Manually	UINT16	Write 0xFF00 to manually switch the TOU schedule
7009	RW	Sunday Setup	UINT16	0*=Weekday1 1=Weekday2 2=Weekday3
7010	RW	Monday Setup	UINT16	
7011	RW	Tuesday Setup	UINT16	
7012	RW	Wednesday Setup	UINT16	
7013	RW	Thursday Setup	UINT16	
7014	RW	Friday Setup	UINT16	
7015	RW	Saturday Setup	UINT16	

Table 5-24 TOU Basic Setup

Notes:

1) The following table illustrates the data structure for the TOU Switch Time. For example, 0x1003140C indicates a switch time of 12:00pm on March 20th, 2016. Writing 0xFFFFFFFF to this register disables the switching between TOU schedules.

Byte 3	Byte 2	Byte 1	Byte 0
Year-2000 (0-99)	Month (1-12)	Day (1-31)	Hour (00-23)

Table 5-25 TOU Switch Time Format

5.12.2 Season

The PMC-220-A6 has two sets of Season setup parameters, one for each TOU. The Base Addresses for the two sets are 7100 and 8100, respectively, where the Register Address = Base Address + Offset. For example, the register address for TOU #1's Season #2's Start Date is 7100+4 = 7104.

Offset	Property	Description	Format	Range/Note
0	RW	Season #1: Start Date[1]	UINT16	0x0101
1	RW	Season #1: Weekday#1 Daily Profile	UINT16	0 to 11
2	RW	Season #1: Weekday#2 Daily Profile	UINT16	
3	RW	Season #1: Weekday#3 Daily Profile	UINT16	
4	RW	Season #2: Start Date	UINT16	High-order Byte: Month
				Low-order Byte: Day

5	RW	Season #2: Weekday#1 Daily Profile	UINT16	0 to 11
6	RW	Season #2: Weekday#2 Daily Profile	UINT16	
7	RW	Season #2: Weekday#3 Daily Profile	UINT16	
8	RW	Season #3: Start Date	UINT16	See Season #2: Start Date
9	RW	Season #3: Weekday#1 Daily Profile	UINT16	0 to 11
10	RW	Season #3: Weekday#2 Daily Profile	UINT16	
11	RW	Season #3: Weekday#3 Daily Profile	UINT16	
12	RW	Season #4: Start Date	UINT16	See Season #2: Start Date
13	RW	Season #4: Weekday#1 Daily Profile	UINT16	0 to 11
14	RW	Season #4: Weekday#2 Daily Profile	UINT16	
15	RW	Season #4: Weekday#3 Daily Profile	UINT16	
16	RW	Season #5: Start Date	UINT16	See Season #2: Start Date
17	RW	Season #5: Weekday#1 Daily Profile	UINT16	0 to 11
18	RW	Season #5: Weekday#2 Daily Profile	UINT16	
19	RW	Season #5: Weekday#3 Daily Profile	UINT16	
20	RW	Season #6: Start Date	UINT16	See Season #2: Start Date
21	RW	Season #6: Weekday#1 Daily Profile	UINT16	0 to 11
22	RW	Season #6: Weekday#2 Daily Profile	UINT16	
23	RW	Season #6: Weekday#3 Daily Profile	UINT16	
24	RW	Season #7: Start Date	UINT16	See Season #2: Start Date
25	RW	Season #7: Weekday#1 Daily Profile	UINT16	0 to 11
26	RW	Season #7: Weekday#2 Daily Profile	UINT16	
27	RW	Season #7: Weekday#3 Daily Profile	UINT16	
28	RW	Season #8: Start Date	UINT16	See Season #2: Start Date
29	RW	Season #8: Weekday#1 Daily Profile	UINT16	0 to 11
30	RW	Season #8: Weekday#2 Daily Profile	UINT16	
31	RW	Season #8: Weekday#3 Daily Profile	UINT16	
32	RW	Season #9: Start Date	UINT16	See Season #2: Start Date
33	RW	Season #9: Weekday#1 Daily Profile	UINT16	0 to 11
34	RW	Season #9: Weekday#2 Daily Profile	UINT16	
35	RW	Season #9: Weekday#3 Daily Profile	UINT16	
36	RW	Season #10: Start Date	UINT16	See Season #2: Start Date
37	RW	Season #10: Weekday#1 Daily Profile	UINT16	0 to 11
38	RW	Season #10: Weekday#2 Daily Profile	UINT16	
39	RW	Season #10: Weekday#3 Daily Profile	UINT16	
40	RW	Season #11: Start Date	UINT16	See Season #2: Start Date
41	RW	Season #11: Weekday#1 Daily Profile	UINT16	0 to 11
42	RW	Season #11: Weekday#2 Daily Profile	UINT16	
43	RW	Season #11: Weekday#3 Daily Profile	UINT16	
44	RW	Season #12: Start Date	UINT16	See Season #2: Start Date
45	RW	Season #12: Weekday#1 Daily Profile	UINT16	0 to 11
46	RW	Season #12: Weekday#2 Daily Profile	UINT16	
47	RW	Season #12: Weekday#3 Daily Profile	UINT16	

Table 5-26 Season Setup

Notes:

1) **Start Date** for Season #1 can be set as any day within the calendar year.
2) Setting a Season's **Start Date** as 0xFFFF terminates the TOU's Season settings. All subsequent Seasons' setup parameters will be ignored since the previous Season's duration is from its **Start Date** to the end of the year.
3) The **Start Date** of a particular Season must be later than the previous Season's.

5.12.3 Daily Profile

The PMC-220-A6 has two sets of Daily Profile setup parameters, one for each TOU.

Register	Property	Description	Format
7200~7227	RW	Daily Profile #1	See Table 5-29 Daily Profile Data Structure
7228~7255	RW	Daily Profile #2	
7256~7283	RW	Daily Profile #3	
7284~7311	RW	Daily Profile #4	
7312~7339	RW	Daily Profile #5	
7340~7367	RW	Daily Profile #6	
7368~7395	RW	Daily Profile #7	
7396~7423	RW	Daily Profile #8	
7424~7451	RW	Daily Profile #9	
7452~7479	RW	Daily Profile #10	

7480~7507	RW	Daily Profile #11	
7508~7535	RW	Daily Profile #12	

Table 5-27 TOU #1's Daily Profile Setup

Register	Property	Description	Format
8200~8227	RW	Daily Profile #1	See Table 5-29 Daily Profile Data Structure
8228~8255	RW	Daily Profile #2	
8256~8283	RW	Daily Profile #3	
8284~8311	RW	Daily Profile #4	
8312~8339	RW	Daily Profile #5	
8340~8367	RW	Daily Profile #6	
8368~8395	RW	Daily Profile #7	
8396~8423	RW	Daily Profile #8	
8424~8451	RW	Daily Profile #9	
8452~8479	RW	Daily Profile #10	
8480~8507	RW	Daily Profile #11	
8508~8535	RW	Daily Profile #12	

Table 5-28 TOU #2's Daily Profile Setup

Offset	Property	Description		Format	Note
+0	RW	Period #1 Start Time[1]		UINT16	0x0000
+1	RW	Period #1 Tariff		UINT16	0=T1, …, 3=T4
+2	RW	Period #2 Start Time	High-order Byte: Hour	UINT16	0 ≤ Hour < 24
			Low-order Byte: Min		Min = 0, 15, 30, 45
+3	RW	Period #2 Tariff		UINT16	0=T1, …, 4=T4
+4	RW	Period #3 Start Time		UINT16	See Period #2 Start Time
+5	RW	Period #3 Tariff		UINT16	0=T1, …, 4=T5
+6	RW	Period #4 Start Time		UINT16	See Period #2 Start Time
+7	RW	Period #4 Tariff		UINT16	0=T1, …, 4=T5
+8	RW	Period #5 Start Time		UINT16	See Period #2 Start Time
+9	RW	Period #5 Tariff		UINT16	0=T1, …, 4=T5
+10	RW	Period #6 Start Time		UINT16	See Period #2 Start Time
+11	RW	Period #6 Tariff		UINT16	0=T1, …, 4=T5
+12	RW	Period #7 Start Time		UINT16	See Period #2 Start Time
+13	RW	Period #7 Tariff		UINT16	0=T1, …, 4=T5
+14	RW	Period #8 Start Time		UINT16	See Period #2 Start Time
+15	RW	Period #8 Tariff		UINT16	0=T1, …, 4=T5
+16	RW	Period #9 Start Time		UINT16	See Period #2 Start Time
+17	RW	Period #9 Tariff		UINT16	0=T1, …, 4=T5
+18	RW	Period #10 Start Time		UINT16	See Period #2 Start Time
+19	RW	Period #10 Tariff		UINT16	0=T1, …, 4=T5
+20	RW	Period #11 Start Time		UINT16	See Period #2 Start Time
+21	RW	Period #11 Tariff		UINT16	0=T1, …, 4=T5
+22	RW	Period #12 Start Time		UINT16	See Period #2 Start Time
+23	RW	Period #12 Tariff		UINT16	0=T1, …, 4=T5
+24	RW	Period #13 Start Time		UINT16	See Period #2 Start Time
+25	RW	Period #13 Tariff		UINT16	0=T1, …, 4=T5
+26	RW	Period #14 Start Time		UINT16	See Period #2 Start Time
+27	RW	Period #14 Tariff		UINT16	0=T1, …, 4=T5

Table 5-29 Daily Profile Data Structure

Notes:

1) **Daily Profile #1's Period #1 Start Time** can be set to any time of day.
2) Setting a Period's **Start Time** as 0xFFFF terminates the Daily Profile's settings. All later Daily Profile' setup parameters will be ignored, and the previous Period's duration is from its **Start Time** to the end of the day.
3) The **Start Time** of a particular Period must be later than the previous Period's.

5.12.4 Alternate Days

Each Alternate Day is assigned a Daily Profile and has a higher priority than Season. If a particular date is set as an Alternate Day, its assigned Daily Profile will override the "normal" Daily Profile for this day according the TOU settings.

The PMC-220-A6 has two sets of Alternate Days setup parameters, one for each TOU. The Base Addresses for the two sets are 7700 and 8700, respectively, where the Register Address = Base Address + Offset. For example, the register address for TOU #2's Alternative Day #2's Date is 8700+3 = 8703.

Offset	Property	Description	Format	Note
0	RW	Alternate Day #1 Date[1]	UINT32	Table 5-31
2	RW	Alternate Day #1 Daily Profile	UINT16	0 to 11
3	RW	Alternate Day #2 Date[1]	UINT32	Table 5-31
5	RW	Alternate Day #2 Daily Profile	UINT16	0 to 11
6	RW	Alternate Day #3 Date[1]	UINT32	Table 5-31
8	RW	Alternate Day #3 Daily Profile	UINT16	0 to 11
9	RW	Alternate Day #4 Date[1]	UINT32	Table 5-31
11	RW	Alternate Day #4 Daily Profile	UINT16	0 to 11
12	RW	Alternate Day #5 Date[1]	UINT32	Table 5-31
14	RW	Alternate Day #5 Daily Profile	UINT16	0 to 11
15	RW	Alternate Day #6 Date[1]	UINT32	Table 5-31
17	RW	Alternate Day #6 Daily Profile	UINT16	0 to 11
18	RW	Alternate Day #7 Date[1]	UINT32	Table 5-31
19	RW	Alternate Day #7 Daily Profile	UINT16	0 to 11
21	RW	Alternate Day #8 Date[1]	UINT32	Table 5-31
22	RW	Alternate Day #8 Daily Profile	UINT16	0 to 11
24	RW	Alternate Day #9 Date[1]	UINT32	Table 5-31
25	RW	Alternate Day #9 Daily Profile	UINT16	0 to 11
27	RW	Alternate Day #10 Date[1]	UINT32	Table 5-31
29	RW	Alternate Day #10 Daily Profile	UINT16	0 to 11
…		…		…
…		…		…
57	RW	Alternate Day #20 Date[1]	UINT32	Table 5-31
59	RW	Alternate Day #20 Daily Profile	UINT16	0 to 11

Table 5-30 Alternate Days Setup

Notes:

1) The following table illustrates the data structure for the Date register:

Byte 3	Byte 2	Byte 1	Byte 0
Reserved	Year-2000 (0-99)	Month (1-12)	Day (1-31)

Table 5-31 Date Format

When the Year and/or Month are set as **0xFF**, it means the Alternate Day is repetitive by year and/or month, i.e. the same day of every year or every month is an Alternate Day.

5.13 Time

There are two sets of Time registers supported by the PMC-220-A6 – Year / Month / Day / Hour / Minute / Second (Register # 60000 to 60002) and UNIX Time (Register # 60004). When sending time to the PMC-220-A6 over Modbus communications, care should be taken to only write one of the two Time register sets. All registers within a Time register set must be written in a single transaction. If registers 60000 to 60004 are being written to at the same time, both Time register sets will be updated to reflect the new time specified in the UNIX Time register set (60004) and the time specified in registers 60000-60002 will be ignored. Writing to the Millisecond register (60003) is optional during a Time Set operation. When broadcasting time, the function code must be set to 0x10 (Pre-set Multiple Registers). Incorrect date or time values will be rejected by the meter. In addition, attempting to write a Time value less than Jan 1, 2000 00:00:00 will be rejected.

Register		Property	Description	Format	Note
60000	9000	RW	High-order Byte: Year	UINT16	10-90 (Year-2000)
			Low-order Byte: Month		1 to 12
60001	9001	RW	High-order Byte: Day	UINT16	1 to 31
			Low-order Byte: Hour		0 to 23

60002	9002	RW	High-order Byte: Minute	UINT16	0 to 59
			Low-order Byte: Second		0 to 59
60003	9003	RW	Millisecond	UINT16	0 to 999
60004 ~ 60005	9004 ~ 9005	RW	UNIX Time	UINT32	0x4B3D3B00 to 0xE398E47F the corresponding time is 2010.01.01 00:00:00 to 2090.12.31 23:59:59 (GMT 0:00 Time Zone)

Table 5-32 Time Registers

5.14 Clear/Reset Control

Register	Property	Description	Format	Note
9600	WO	Clear Monthly Energy Log[1]	UINT16	Writing "0xFF00" to the register execute the described action.
9601	WO	Clear Energy[2]		
9602	WO	Clear Monthly Energy Log of Present Month[3]		
9603	WO	Clear All Data[6]		
9604	WO	Clear SOE		
9605	WO	Clear Daily Freeze Log		
9606		Clear Monthly Freeze Log		
9607	WO	Clear Device Operating Time		
9608	WO	Clear Max. Demand Log of This Month (Since Last Reset)[4]		
9609	WO	Clear All Demands[5]		
9610	WO	Clear Data Recorder #1 Logs~		
9611	WO	Clear Data Recorder #2 Logs~		
9612	WO	Clear All Data Recorder Logs~		
9613	WO	Clear All DI Counters~		
9614	WO	Clear Counters of Setup Parameters Changes		

~Available in the advanced version only

Table 5-33 Clear Control

Notes:

1) Writing 0xFF00 to the **Clear Monthly Energy Log** register to clear the Monthly Energy Log of the last 1 to 12 months, excluding the Monthly Energy Log for the Present Month.
2) Writing 0xFF00 to the **Clear Energy** register to clear total energy registers.
3) Writing 0xFF00 to the **Clear Monthly Energy Log of Present Month** register to clear the Monthly Energy Log of the Present Month.
4) Writing 0xFF00 to the **Clear Max. Demand Log of This Month** register to clear Max. Demand Log of This Month (Since Last Reset) when the **Self-Read Time** register is set for automatic Self-Read operation. The Max. Demand of Last Month will not be cleared. If the **Self-Read Time** register is set for manual operation with a register value of 0xFFFF, the Max. Demand of This Month (Since Last Reset) will be transferred to the Max. Demand of Last Month (Before Last Reset) and then cleared.
5) Writing 0xFF00 to the **Clear All Demand Registers** register to clear all Demand registers and logs, including Real-time Present Demand, Max. Demand Log of This Month (Since Last Reset) and Last Month (Before Last Reset).
6) Writing 0xFF00 to the **Clear All Data** register to perform the Clear operation for the action specified in registers # 9600 to 9602 and # 9604 to 9614.

5.15 Meter Information

Register		Property	Description	Format	Note
60200~60219	9800~9819	RO	Meter Model[1]	UINT16	See Note 1
60220	9820	RO	Firmware Version	UINT16	e.g. 10000 shows the version is V1.00.00
60221	9821	RO	Protocol Version	UINT16	e.g. 10 shows the version is V1.0
60222	9822	RO	Firmware Update Date: Year-2000	UINT16	e.g. 251110 means November 10, 2025
60223	9823	RO	Firmware Update Date: Month	UINT16	
60224	9824	RO	Firmware Update	UINT16	

			Date: Day		
60225	9825	RO	Serial Number	UINT32	
60227	9827	RO	Reserved	UINT16	
60228	9828	RO	Reserved	UINT16	
60229	9829	RO	Feature Code	UINT16	Bit 0 to Bit 1: · 0=Basic Version · 1=Advanced Version
					Bit 2 to Bit 3: I/O · 0=SS Pulse Output · 1=DI
					Bit 4 to Bit 5: Protocol · 0=Modbus · 1=Reserved
					Bit 6: Language · 0=English

Table 5-34 Meter Information

Notes:

1) The Meter Model appears in registers 60200 to 60219 and contains the ASCII encoding of the string “PMC-220-A6” as shown in the following table.

Register	Value(Hex)	ASCII
60200	0x50	P
60201	0x4D	M
60202	0x43	C
60203	0x2D	-
60204	0x32	2
60205	0x32	2
60206	0x30	0
60207	0x2D	-
60208	0x41	A
60209	0x36	6
60207-60219	0x20	Null

Table 5-35 ASCII Encoding of “PMC-220-A6”

Appendix A Technical Specifications

Measurement Inputs (L, N, L', N')				
Voltage (Un)	100VAC	220VAC	230VAC	240VAC
Overrange (% Un)	276%	120%	125%	115%
Range (V)				
Basic Version	120-240V AC, ±15%			
Advanced Version	100-240V AC, ±15%			
Current (In/Imax)	5A/80A, Direct Connected Input			
Starting Current (Ist)	0.4% In (0.02A)			
Minimum Current (Imin)	5% In (0.25A)			
Burden	<0.1VA			
Frequency	45Hz-65Hz			
Digital Input (DI1, DIC)				
Type	Dry contact, 5VDC internally wetted			
Sampling	1000Hz			
Hysteresis	1ms minimum			
Solid State Energy Pulse Output (Selectable - kWh/kvarh)				
Type	Optically Isolated Solid State Relay			
Max. Load Voltage	80 VDC			
Max. Forward Current	50 mA			
Pulse Constant	10/100/1000/2000/3200 imp/kXh			
Pulse Width	30-500 ms			
Communications				
RS-485	Modbus RTU			
Baud Rate	1.2/2.4/4.8/9.6/19.2/38.4 kbps			
Wire Size	0.2 - 2.0 mm^2 (26 - 14 AWG)			
Maximum Torque	5.1kgf.cm/M3/4.42 lb-in/0.5 N.m			
Environmental Conditions				
Operating Temp.	-25°C to +70°C			
Storage Temp.	-40°C to +85°C			
Humidity	5% to 95% non-condensing			
Atmospheric Pressure	70kPa to 106kPa			
Altitude	<3000m			
Pollution Degree	2			
Mechanical Characteristics				
Unit Dimensions	36x95x70mm			
Mounting	DIN-Rail Mounting			
IP Rating	IP51 (Front), IP30 (Body)			

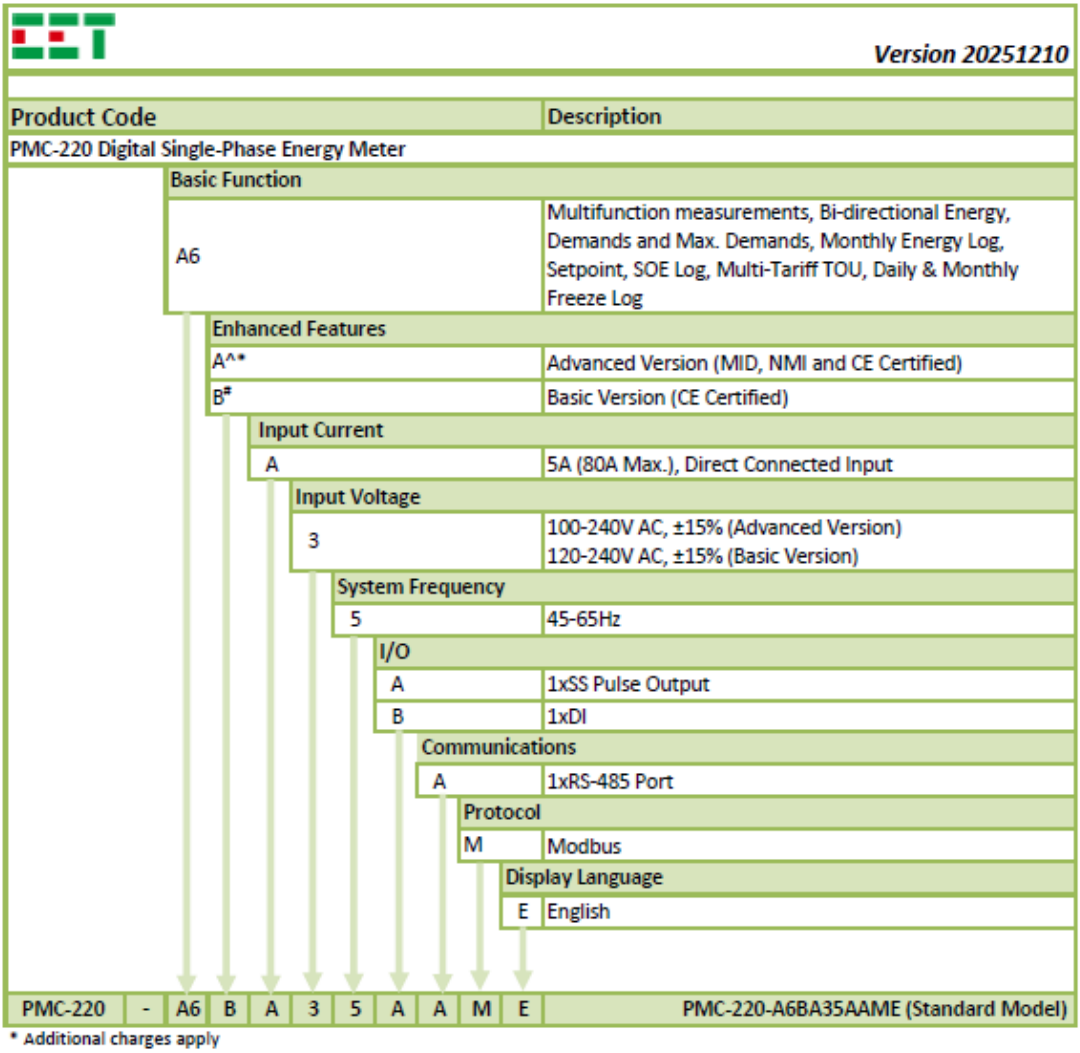
Accuracy

Parameters	Accuracy	Resolution
Voltage	±0.5%	0.1V
Current	±0.5%	0.001A
P, Q, S	±1.0%	0.01kX
kWh	IEC 62053-21: 2020 & AS 62053.21: 2023 Class 1 EN 50470-1 & EN 50470-3 Class B	0.01kWh
kvarh	IEC 62053-24: 2020 Class 1	0.01kvarh
PF	±1.0%	0.001
Frequency	±0.02Hz	0.001Hz

Appendix B Standards of Compliance

Safety Requirements	
CE LVD 2014/35/EU	EN 61010-1: 2010 + A1: 2019 EN 61010-2-030: 2010
Electrical Safety in Low Voltage Distribution Systems up to 1000Vac and 1500 Vdc	IEC 61557-12: 2021 (PMD)
Products Safety Requirements and Tests NMI AC Voltage Impulse Voltage	IEC 62052-31: 2015 AS 62052.31: 2017 + A1: 2021 M13-1 4kV @ 1 minute 6kV, 1.2/50μs
Electromagnetic Compatibility EMC 2014/30/EU (EN IEC 61326: 2021)	
Immunity Tests	
Electrostatic Discharge	EN 61000-4-2: 2009
Radiated Fields	EN IEC 61000-4-3: 2020
Fast Transients	EN 61000-4-4: 2012
Surges	EN 61000-4-5: 2014 + A1: 2017
Conducted Disturbances	EN 61000-4-6: 2014
Magnetic Fields	EN 61000-4-8: 2010
Voltage Dips & Interruptions	EN IEC 61000-4-11: 2020
Ring Wave	EN 61000-4-12: 2017
Emission Tests	
Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (Ism) Radio-Frequency Equipment	EN 55011: 2016+A1: 2017+A11: 2020+A2:2021
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	EN 55032: 2015+A11: 2020+A1:2020
Limits for Harmonic Current Emissions for Equipment with Rated Current ≤16 A	EN IEC 61000-3-2: 2019+A1: 2021
Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤16 A	EN 61000-3-3: 2013+A1: 2019+A2: 2021
Emission Standard for Residential, Commercial and Light-Industrial Environments	EN IEC 61000-6-4: 2019
Mechanical Tests	
Spring Hammer Test	IEC 62052-31: 2015 & AS 62052.31: 2017 + A1: 2021
Vibration Test	IEC 62052-11: 2020 & AS 62052.11: 2023
Shock Test	IEC 62052-11: 2020 & AS 62052.11: 2023
Revenue Metering Approval	
NMI M13-1 of Australia	Approval Mark: NMI XX/X/XXX

Appendix C Ordering Guide



Version 20251210

Product Code	Description
PMC-220 Digital Single-Phase Energy Meter	
Basic Function	
A6	Multifunction measurements, Bi-directional Energy, Demands and Max. Demands, Monthly Energy Log, Setpoint, SOE Log, Multi-Tariff TOU, Daily & Monthly Freeze Log
Enhanced Features	
A^*	Advanced Version (MID, NMI and CE Certified)
B#	Basic Version (CE Certified)
Input Current	
A	5A (80A Max.), Direct Connected Input
Input Voltage	
3	100-240V AC, ±15% (Advanced Version) 120-240V AC, ±15% (Basic Version)
System Frequency	
5	45-65Hz
I/O	
A	1xSS Pulse Output
B	1xDI
Communications	
A	1xRS-485 Port
Protocol	
M	Modbus
Display Language	
E	English

PMC-220	-	A6	B	A	3	5	A	A	M	E	PMC-220-A6BA35AAME (Standard Model)

* Additional charges apply

^ Device with Enhanced Features Option "A" supports additional functions including 16 MB on-board memory, Battery-Backed Real-Time Clock, Data Recorder Log, and Strong Magnetic Tamper Detection, which are not supported on Option "B".

Device with Enhanced Features Option "B" can only work with I/O option "A".

Contact us

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