PMC-340

Digital Three-Phase Energy Meter

User Manual

Version: V1.1A

May 8, 2018

Standards Compliance

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-340 Series Digital Three-Phase Energy Meter. Throughout the manual the term "meter" generally refers to all models.

This chapter provides an overview of the PMC-340 meter and summarizes many of its key features.

1.1 Overview

The PMC-340 Series Digital Three-Phase Energy Meter is CET's latest offer for the low voltage power/energy metering market featuring DIN rail mount, high accuracy, multifunction measurements and a large, easy to read LCD display. The PMC-340 complies with the IEC 62053-21 Class 1 and IEC 62053-22 Class 0.5S kWh Accuracy Standards for 100A Direct Input and 5A CT Input, respectively. The PMC-340 comes standard with a LED as well as a Solid State Pulse Output for energy pulsing. The PMC-340 optionally provides 2MB memory for Data Recording and 3 Digital Inputs for status monitoring, Tariff switching or pulse counting for collecting WAGES (Water, Air, Gas, Electric and Steam) information. The standard RS-485 port and Modbus protocol support allows the PMC-340 to become a vital component of an intelligent, multifunction monitoring solution for any Power and Energy Management Systems.

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

The PMC-340 is available in two models: PMC-340A and PMC-340B. Following is a list of typical applications for the PMC-340:

- DIN rail mount energy metering
- Industrial and commercial metering
- Substation, building and factory automation
- Sub-metering
- Power quality monitoring

1.2 Features

Ease of use

- Easy to read LCD
- Two LED indicators for energy pulsing and communications activities
- Password-protected setup via front panel or free PMC Setup software
- Easy installation with DIN rail mounting, no tools required
- 3-phase power supply, no external control power required

Basic Measurements

- Multifunction measurements
  - Voltage, Current, kW, kvar, kVA, PF, Phase Angle and Frequency
  - Per phase kWh and kvarh Imp/Exp/Tot/Net and kVAh
  - 4-Quadrant kvarh
  - Device Operating Time (Running Hour)
  - Voltage/Current THD, THOD, THED, Individual harmonics up to 31st and Unbalance
  - Current TDD, TDD Odd, TDD Even, K-factor and Crest Factor
  - kW/kvar/kVA Total Demands. Max. Demands and Max Demands per Tariff

  - Per Phase Current Demands and Max. Demands
  - Max./Min. Log
- Two TOU schedules, each providing
  - 12 Seasons
  - 20 Daily Profiles, each with 12 Periods in 15-minute interval
  - 90 Holidays or Alternate Days
  - 4 Tariffs, each providing the following information
    - kWh/kvarh Imp/Exp, kVAh
    - kW/kvar/kVA Max. Demands of This Month (Since Last Reset) and Last Month (Before Last Reset)
- 12 monthly recording of kWh/kvarh Import/Export/Total/Net, kVAh, kvarh Q1-Q4 as well as kWh/kvarh Import/Export and kVAh per Tariff
- Front Panel & Communication Programming Counters (PMC-340B only)

SOE Log (PMC-340B only)

- 16 events time-stamped to ±1ms resolution
- Setup changes, Digital Input status changes

Data Recorder (PMC-340B only)

- One Data Recorder Log of maximum 16 parameters
- Recording Interval from 1s to 40 days
- Configurable Depth and Recording Offset
- 2MB Log Memory

Digital Inputs (PMC-340B only)

- 3 channels for external status monitoring, pulse counting and Tariff switching
- Self-excited, internally wetted at 24VDC
- 1000Hz sampling

Energy Pulse Outputs

- 1 LED Pulse Output on the front panel for energy pulsing application
- 1 Solid State Digital Relay Output for energy pulsing application

Communications

- Optically isolated RS-485 port, baud rate from 1,200 to 19,200 bps
- Modbus RTU protocol

Real-time Clock

- Battery-backed real-time clock @ 6ppm
- Clock error ≤ 0.5s/day
- Can be set through front panel or communication

System Integration

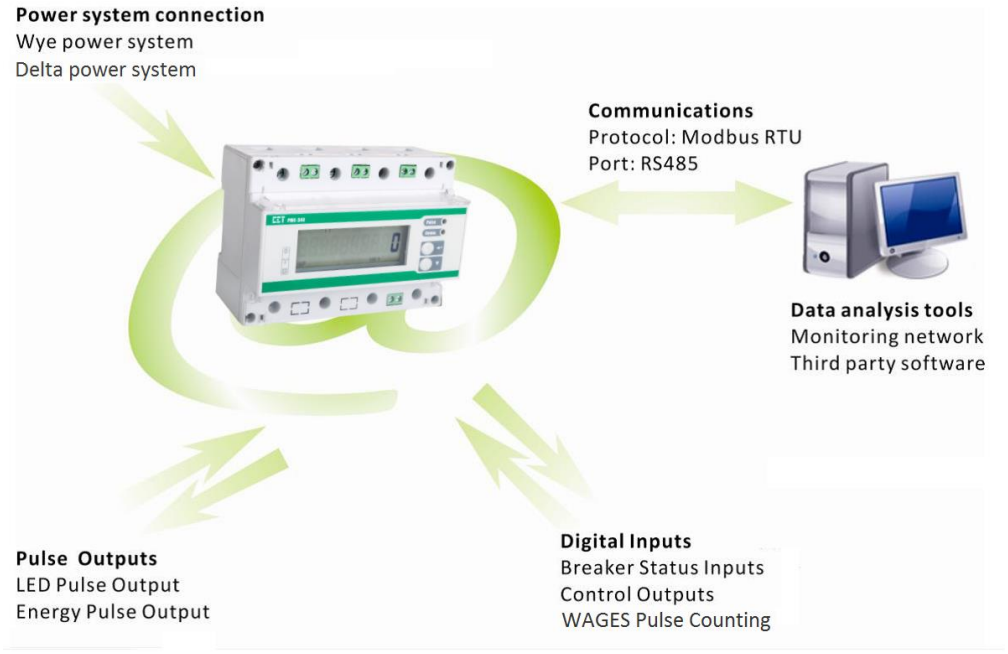
- Supported by our PecStar® iEMS and PMC Setup
- Easy integration into other Automation or SCADA systems via Modbus RTU protocol

Features and Options List

Features and Options	PMC-340 Models	
	A	B
Real-time Measurements		
Uln/Ull per phase and Average	▪	▪
Current per phase and Average, In	▪	▪
kW/kvar/kVA per phase and Total	▪	▪
PF per phase and Total	▪	▪
Frequency	▪	▪
Demands and Peak Demands	▪	▪
Energy Measurements (per phase and 3-phase total)		
kWh Imp, Exp, Net, Total	▪	▪
kvarh Imp, Exp, Net, Total	▪	▪
kVAh Total	▪	▪
4-Quadrant kvarh	▪	▪
TOU Energy (4 Tariffs)	▪	▪
Power Quality		
Voltage and Current Unbalance	▪	▪
THD, THOD, THED, K-Factor, Crest-Factor, TDD	▪	▪
Individual Harmonics (2^{nd} to 31^{st})	▪	▪
Logging		
Max./Min. & Peak Demand Recording	▪	▪
12 Monthly Energy Log	▪	▪
SOE Log	-	▪
Data Recorder Log with 2MB Memory	-	▪
Inputs and Outputs		
DI	-	3
Energy Pulse Output (Solid State Relay)	1	1
LED Energy Pulse Output	1	1
Communications		
RS-485 Port	▪	▪

1.3 PMC-340's application in Power and Energy Management Systems

The PMC-340 series meter can be used to monitor Wye connected power system. Modbus communications allow real-time data and other information to be transmitted across a RS-485 network to an Integrated Energy Management System such as PecStar® iEMS.



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-340 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.

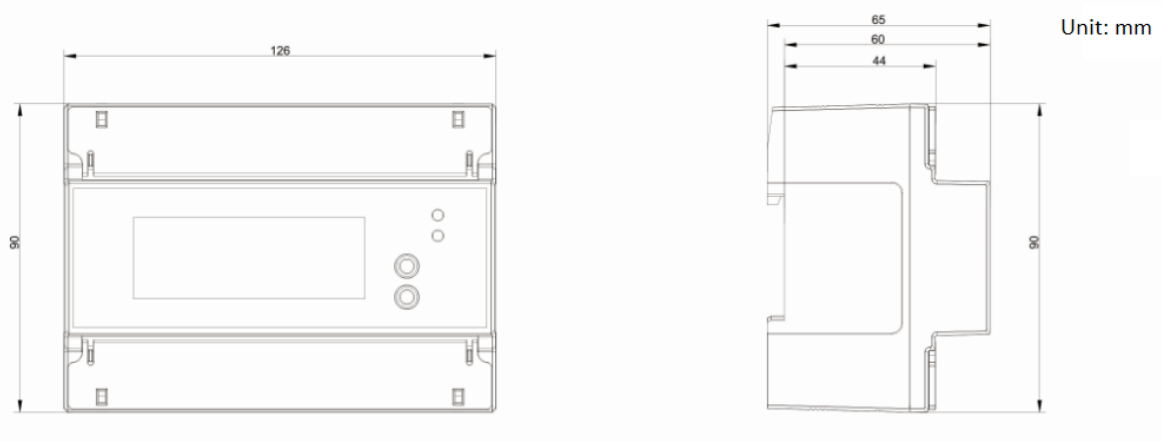
During the operation of the meter, hazardous voltages are present at the input terminals. Failure to observe precautions can result in serious or even fatal injury and equipment damage.

2.1 Appearance

	Terminal	Description
A	L1, L2, L3, N	L1, L2, L3, N from Source
B	1, 2, 3, 4	Voltage Inputs: V1, V2, V3, VN (CT Inputs Option only)
C	5, 6	Pulse Outputs: +, -
D	-	LCD Display
E	-	Energy Pulse and Comm. Indicators
F	-	Buttons
G	7, 8, 9, 10	Digital Inputs: DIC, DI1, DI2, DI3 (PMC-340B only)
H	11, 12	RS-485: D+, D-
I	L1, L2, L3, N	L1', L2', L3', N' to Load

Figure 2-1 Appearance

2.2 Unit Dimensions



Front View **Side View**

Figure 2-2 Dimensions

2.3 Terminal Dimensions

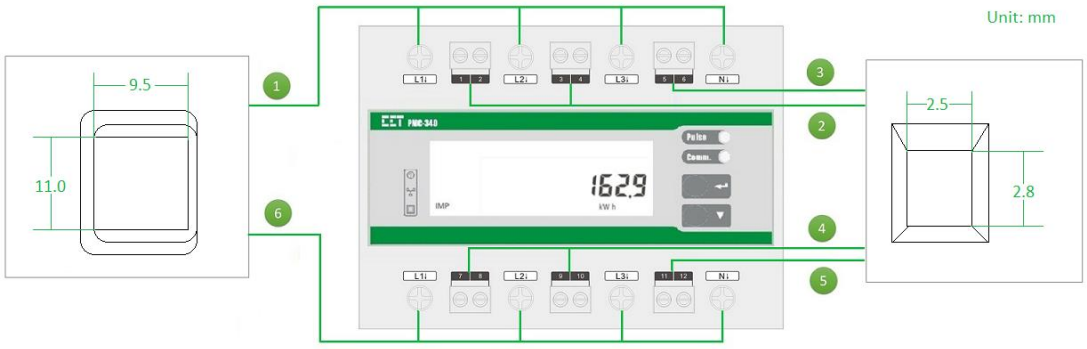


Figure 2-3 Terminal Dimensions

	Terminal	Terminal Dimension (mm)	Wire Size (mm^2)	Max. Torque
1	L1, L2, L3, N	9.5 x 11.0	35.0	25.0 kgf.cm/M6
2	Voltage Inputs	2.5 x 2.8	1.5	4.5 kgf.cm/M2.5 (3.9 lb-in)
3	Pulse Outputs			
4	Digital Inputs			
5	RS-485			
6	L1', L2', L3', N	9.5 x 11.0	35.0	25.0 kgf.cm/M6

Table 2-1 Terminal Dimensions

2.4 Mounting

The PMC-340 should be installed in a dry environment with no dust and kept away from heat, radiation and electrical noise source. Installation steps:

- Before installation, make sure that the DIN rail is already in place
- Move the installation clips at the back of the PMC-340 downward to the "unlock" position
- Align the top of the mounting channel at the back of the PMC-340 at an angle against the top of the DIN rail as shown in Figure 2-4 below
- Rotate the bottom of the PMC-340 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-340 on to the DIN Rail

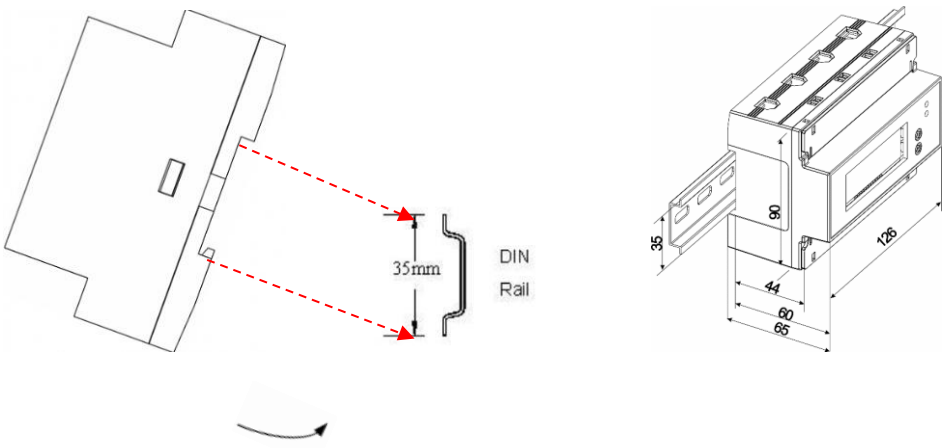
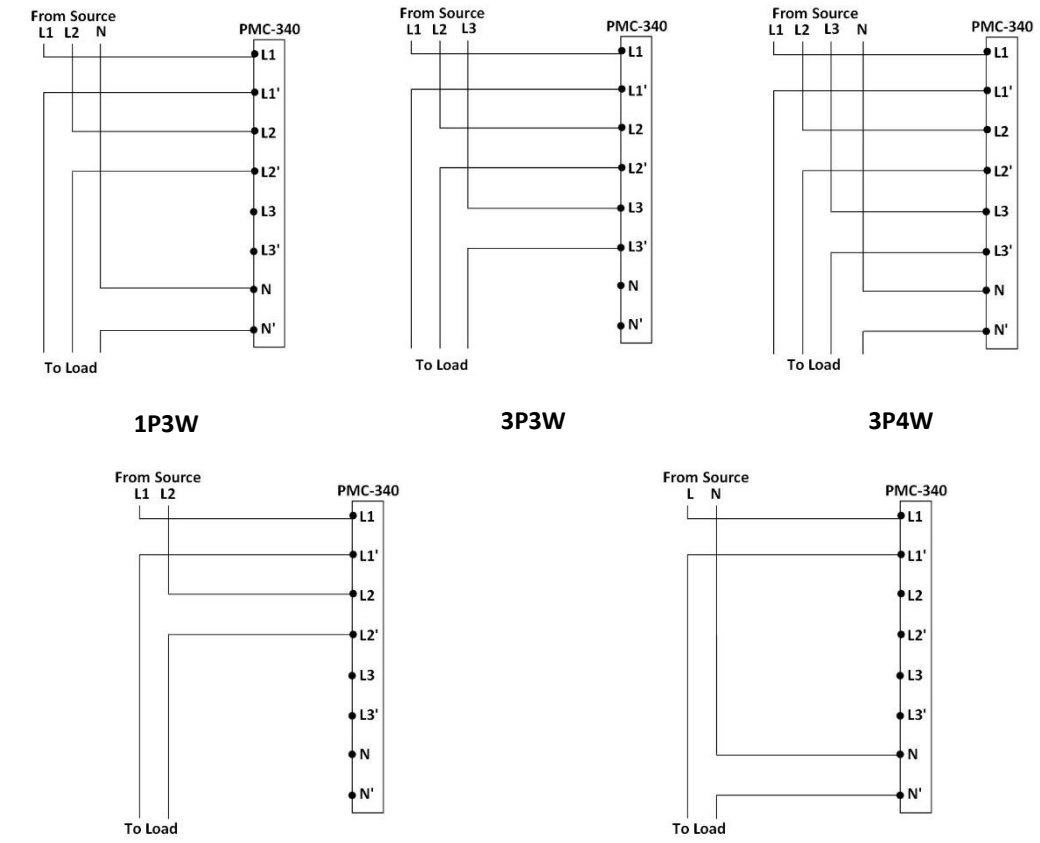


Figure 2-4 Installation

2.5 Wiring Connections

The PMC-340 supports 100A Direct Input or 5A CT Input. Please read this section carefully before installation and choose the correct wiring method for your power system.

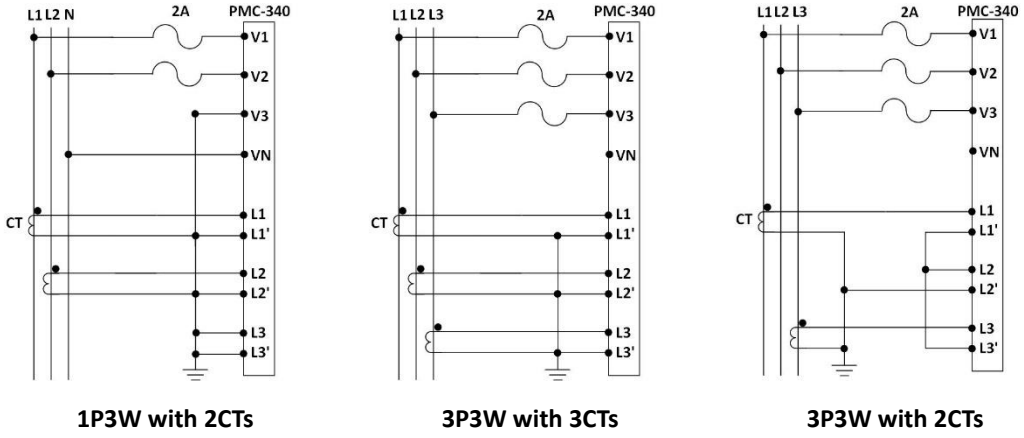
2.5.1 Direct Input Wiring

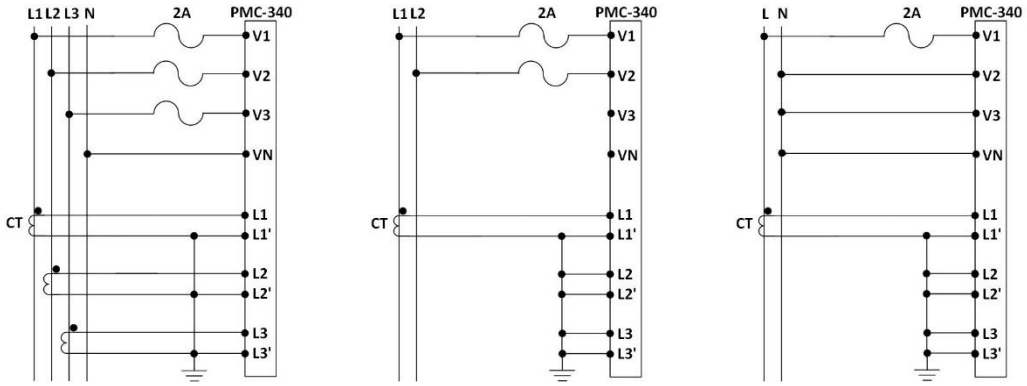


* The wiring modes 1P2W L-N and 1P2W L-L are not supported by PMC-340A.

Figure 2-5 Direct Input connections

2.5.2 CT Input Wiring





3P4W with 3CTs **1P2W L-L with 1CT*** **1P2W L-N with 1CT***

* The wiring modes 1P2W L-N and 1P2W L-L are not supported by PMC-340A.

Figure 2-6 CT Input connections

2.6 RS-485 Wiring

The PMC-340 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, a RS-232/RS-485 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-340.

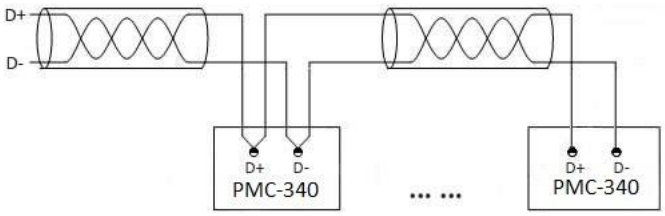


Figure 2-7 RS-485 Connections

2.7 Digital Input Wiring

The following figure illustrates the Digital Input connections on the PMC-340:

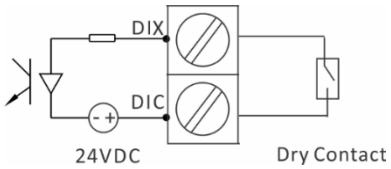


Figure 2-8 DI Connections

2.8 Pulse Output Wiring

The following figure illustrates the Pulse Output connections on the PMC-340:

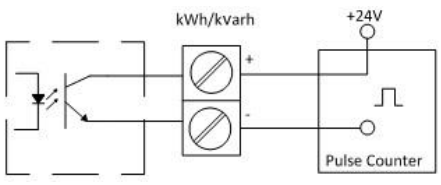


Figure 2-9 Energy Pulse Output Connections

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-340's front panel as described below:

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

Table 3-1 LED Indicators

3.2 Buttons

Buttons	Data Display Mode	Setup Configuration Mode
<▼>	The **Default Display** shows the kWh Import measurement under the **Energy** menu. Pressing this button scrolls through the available measurements in this menu (see Table 3-4 below). While at a particular menu, pressing this button scrolls through the available measurements.	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 selection list.
<↩>	Pressing this button at any time while in **Data Display** mode will jump to the next available menu item (see Table 3-4) depending on where the display is at the time. For example, if the display currently shows **Ib** under the **U/I** menu, pressing <↩> now will immediately jump to the **Power** menu.	Pressing this button for two seconds toggles between **Data Display** mode and **Setup Configuration** mode. Once inside the **Setup Configuration** mode, 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, the cursor is at the right most digit by default. Pressing this button moves the cursor one position to the left. Once the cursor has reached the left most digit, pressing this button again will save the current numeric value into memory.

Table 3-2 Buttons Description

3.3 LCD Display

The PMC-340 comes standard with a large, easy to read LCD display.

Figure 3-2 LED Display

The following table shows the LCD display symbols:

Symbol	Description
L12L23L31	Phase Indicator
T8	Active Tariff Indicator where T*x* indicates Tariff *x*
	Quadrant Indicator
THDDMDUNB	Total Harmonic Distortion/Demand/Unbalance Indicators
COM	Communication Activities Indicator
	Setpoint Alarm Indicator
	DI status
	DO status
	Main Display Area for Measurements/Time/Version information
IMPEXPNETTOTAVG	kxh Import/Export/Net/Total/Average Indicators
MAXMIN	Max./Min. Indicators
MkWAhkvarhHz%	Units

Table 3-3 LCD Display Symbols

Throughout this document, the phase-to-neutral notations of A/B/C and L1/L2/L3 as well as the phase-to-phase notations of AB/BC/CA and L12/L23/L31 may be used interchangeably for specifying a certain parameter to be a phase-to-neutral or phase-to-phase value, respectively.

3.4 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 display screen before entering the **LCD Test** mode.

3.5 Default Display

The PMC-340 has a **Default Display** that shows the **kWh Imp** parameter under the Energy menu as shown below. The user can use the <↩> and <▼> buttons to scroll and display other parameters. If there is no front panel activity for 3 Seconds or longer, the display will return to the **Default Display**. Please refer to Section 3.2 above for a complete description of the front panel and button operations.

Figure 3-3 Default Display

The following table illustrates the menu options and the available measurements under each menu. Depending on the **Wiring Mode** selected, certain measurements may not be available. For example, the per-phase Uln, Uln Average, In, per-phase kW, kvar, kVA and PF measurements are not available when the **Wiring Mode** is set to 3P3W or 1P2W L-L.

Menu	Measurements			
U/I (Voltage/Current)	Uan	Ubn	Ucn	Uln Average
	Uab	Ubc	Uca	Ull Average
	Ia	Ib	Ic	I Average
	In	Frequency	Voltage Unbalance	Current Unbalance
PoWEr (Power)	kWa	kWb	kWc	kW Total
	kvara	kvarb	kvarc	kvar Total
	kVAa	kVAb	kVAc	kVA Total
	PFa	PFb	PFc	PF Total
EnErGy (Energy)	kWh Import	kWh Export	kWh Net	kWh Total
	kvarh Import	kvarh Export	kvarh Net	kvarh Total
	kVAh Total			
ToU EnEr6y (TOU Energy)	T1 kWh Import	T1 kWh Export	T2 kWh Import	T2 kWh Export
	T3 kWh Import	T3 kWh Export	T4 kWh Import	T4 kWh Export
rEAL dMd (Demand)	Ia Demand	Ib Demand	Ic Demand	
	kW Total Demand	kvar Total Demand	kVA Total Demand	
ToU dMd (TOU DMD)	T1 kW Demand	T1 kvar Demand	T1 kVA Demand	
	T2 kW Demand	T2 kvar Demand	T2 kVA Demand	
	T3 kW Demand	T3 kvar Demand	T3 kVA Demand	
	T4 kW Demand	T4 kvar Demand	T4 kVA Demand	
MAx dMd (Max. DMD)	Ia Max. Demand	Ib Max. Demand	Ic Max. Demand	
	kW Total Max. Demand	kvar Total Max. Demand	kVA Total Max. Demand	
	T1 kW Max. Demand	T1 kvar Max. Demand	T1 kVA Max. Demand	
	T2 kW Max. Demand	T2 kvar Max. Demand	T2 kVA Max. Demand	
	T3 kW Max. Demand	T3 kvar Max. Demand	T3 kVA Max. Demand	
	T4 kW Max. Demand	T4 kvar Max. Demand	T4 kVA Max. Demand	
THd (THD)	Uan/Uab[1] THD	Ubn/Ubc[1] THD	Ucn/Uca[1] THD	
	Ia THD	Ib THD	Ic THD	
dI CoUnTer (DI Counter)	DI1	DI2	DI3	

Table 3-4 PMC-340 Data Display Pages

Notes:

1) When the **Wiring Mode** is **3P3W** or **1P2W L-L**, the phase A/B/C Voltage THD/TOHD/TEHD/HD*xx* is phase AB/BC/CA Voltage THD/TOHD/TEHD/HD*xx*.

3.6 Setup Configuration

3.6.1 Functions of buttons

The two front panel buttons take on different meanings in the **Setup Configuration** mode:

<↩>: Pressing this button for two seconds toggles between **Data Display** and **Setup**

Configuration. Once inside **Setup Configuration**, pressing **<↩>** either enters a sub-menu or selects a parameter for modification. If inside a sub-menu, pressing **<↩>** for two seconds will return to the main menu. If a parameter is selected, its value will blink while it's being changed. If the parameter is a numeric value, pressing **<↩>** will move the cursor one digit to the left. When the left most digit has been reached, pressing **<↩>** again will save the current value into memory.

<▼>: Once inside **Setup Configuration**, pressing **<▼>** scrolls to the next setup parameter or sub-menu. If the selected parameter is a numeric value, pressing **<▼>** increments the current digit. If the selected parameter is an enumerated value, pressing **<▼>** scrolls to the next item in the enumerated list. When finished, press **<↩>** to save the current value into memory.

Making setup changes:

- Press **<↩>** for two seconds to enter **Setup Configuration**, and the LCD displays **PROGRAM**.
- Press **<▼>** to advance to the Password page.
- A correct password must be entered before changes are allowed. The factory default password is 0000 (zero). Press the **<↩>** button to select the parameter for modification. Use **<▼>** and **<↩>** to enter the correct password.
- Use **<▼>** to scroll to the desired sub-menu or setup parameter.
- Press **<↩>** to enter a sub-menu or select a setup parameter for modification.
- Once a parameter has been selected, its value will blink.
- Use **<↩>** and **<▼>** to make modification to the selected parameter.
- Press **<↩>** for two seconds to return to the main menu
- Press **<↩>** for two seconds again to exit the **Setup Configuration** mode.
  Also the **Setup Configuration** will be automatically exited if there is a period of inactivity of 3 minute or longer**.**

3.6.2 Setup Menu

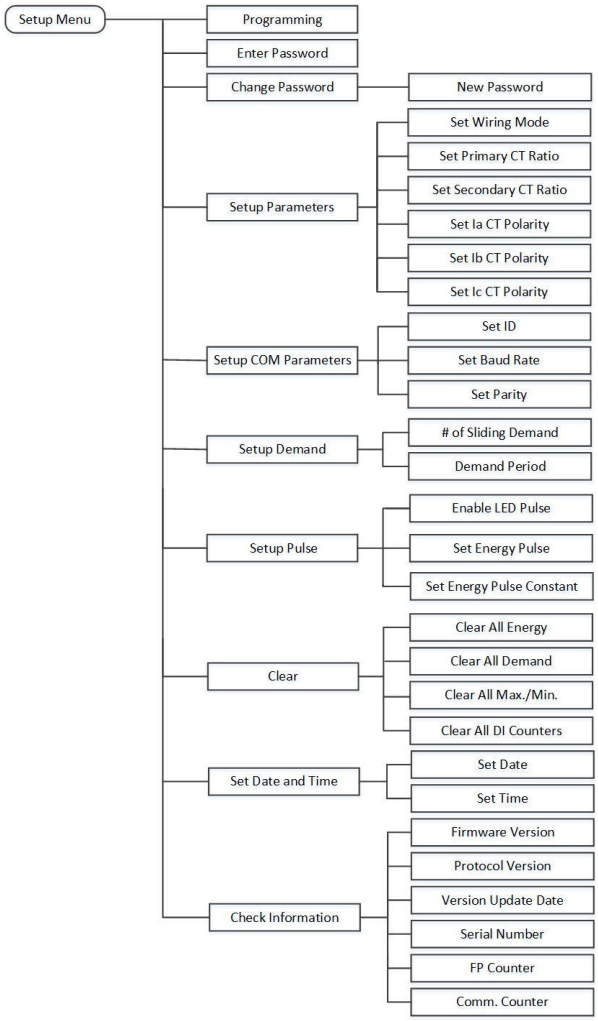


Figure 3-4 Setup Menu

3.6.3 Configuration

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

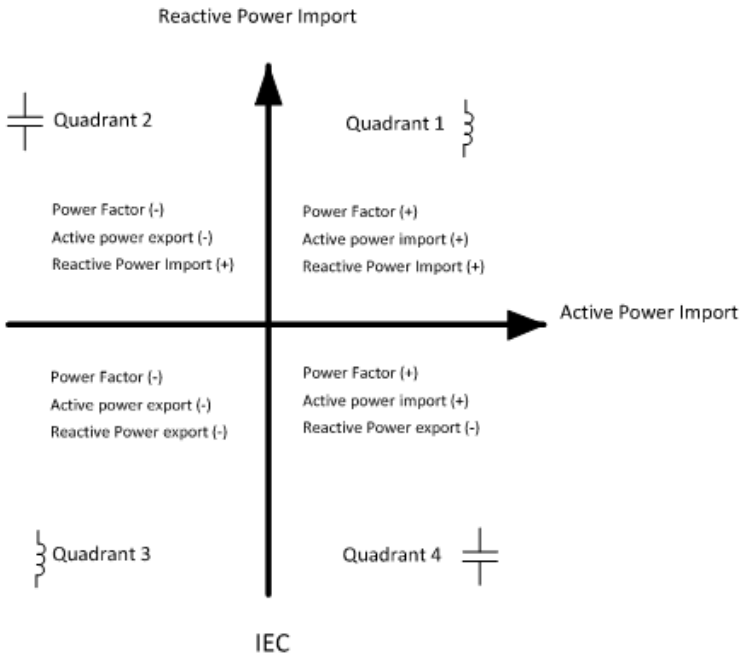
Label Menu Main	Label Menu Sub	Description	Range	Default
ProGrAM		Setup Configuration	/	/
PW		Enter Password	0 to 9999	0
SET PW		Set New Password		
		Enter New Password	0 to 9999	0
SyS SET		Basic Parameters		
	TyPE	Set Meter's wiring connection[1]	DEMO/1P3W/3P3W/ 3P4W/1P2W L-N/ 1P2W L-L	3P4W
	CT1	Set CT Primary Ratio[2]	1 to 30,000	5
	CT2	Set CT Secondary Ratio[2]	1 to 5	5
	I1 rEv	Reverse Phase A CT Polarity	YES/NO	NO
	I2 rEv	Reverse Phase B CT Polarity	YES/NO	NO
	I3 rEv	Reverse Phase C CT Polarity	YES/NO	NO
	PF	Set PF Convention[3]	IEC/IEEE/-IEEE	IEC
	kvA	Set kVA Calculation Method[4]	V=Vector, S=Scalar	V
CoM SET		Comm. Parameters		
	Id	Set Meter Address	1 to 247	100
	bAUd	Set Baud Rate in Bits Per Second (bps)	1200/2400/4800/	9600

		9600/19200/38400	
CFG	Set Comm. Port Data Format	8N2/8O1/8E1/ 8N1/8O2/8E2	8E1
dMd SET	Demand Parameters		
PErIod	Set Demand Period	1 to 60 (min)	15
nUM	Set No. of Sliding Windows	1 to 15	15
PULS SET	Energy Pulse		
LEd	Enable LED Energy Pulsing	OFF / P / Q	P
do	Enable DO Energy Pulsing	OFF / P IMP / P EXP / P TOT / Q IMP / Q EXP / Q TOT / PPS[5] / DMD[6] / TOU[7]	P IMP
CnST	Select Pulse Constant[8]	1/10/100/1000/3200	100
CLr SET	Clear Data		
CLr EnGY	Clear All Energy[9]	YES/NO	NO
CLr dMd	Clear All Demand[10]	YES/NO	NO
CLr Mn	Clear All Max./Min.[11]	YES/NO	NO
CLr dI	Clear All DI Counters	YES/NO	NO
TIME SET	Date and Time		
dAT	Enter the Current Date	YY-MM-DD	/
Clk	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.	/
Pro	Protocol Version	e.g. 10 means V1.0	/
-	Firmware Update Date	e.g. 20140915	/
-	Meter Serial Number	e.g. 1409005094	/
FCnT	Counter for Important Setup Parameter Changes via Front Panel[12]	/	/
CCnT	Counter for Important Setup Parameter Changes via Communications[12]	/	/

Table 3-3 Setup Parameters

Notes:

1) The wiring modes 1P2W L-N and 1P2W L-L are not supported by PMC-340A.
2) This screen only appears if the PMC-340 is equipped with CT Inputs.
3) Power Factor Convention



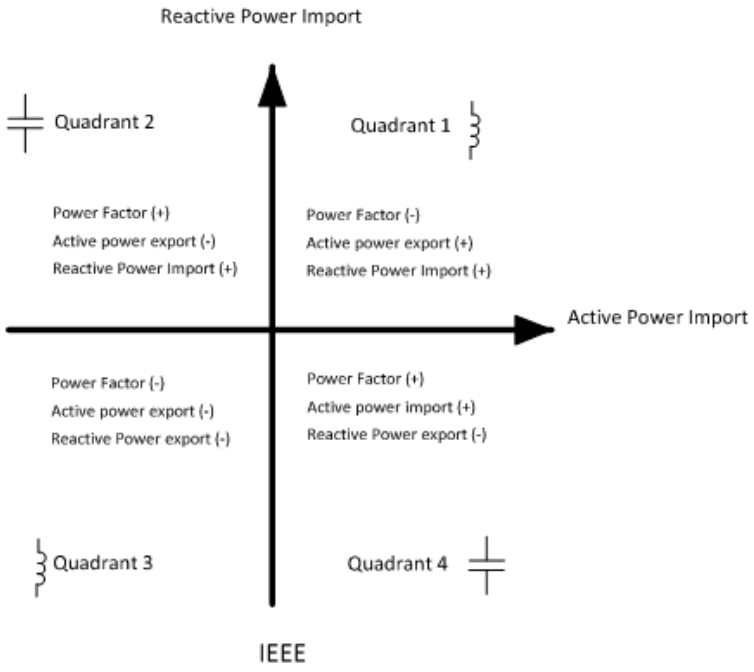


Figure 3-5 PF Convention

4) There are two ways to calculate kVA:

Mode V (Vector method**):** $kVA_{total} = \sqrt{kW_{total}^{2} + kvar_{total}^{2}}$

Mode S (Scalar method**):** $kVA_{total} = kVA_a + kVA_b + kVA_c$

5) PPS: 1 Pulse Per Second.
6) DMD: 1 pulse is generated at the end of every Demand Interval.
7) Tariff Switch: 1 pulse is generated every time a Tariff Switch takes place based on TOU Schedule.
8) The Pulse Constant setup parameter can be configured as 1/10/100 pulses per kXh for 100A Direct Input option and 1000/3200 pulses per kXh for 5A CT Input option, respectively, where kXh may be kWh or kvarh.
9) Select **CLr EnGY** to clear 3-Phase Total Energy registers, Phase A/B/C Energy registers, Monthly Energy Log of the Present Month and the last 1 to 12 months.
10) Select **CLr dMd** to clear Present Demand, Peak Demand log of This Month (Since Last Reset) and Peak Demand log of Last Month (Before Last Reset).
11) Select **CLr Mn** to clear all Max./Min. Log, including Max./Min. Log of This Month (Since Last Reset) and Max./Min. Log of Last Month (Before Last Reset).
12) Please see Section **5.1 Basic Measurement** Note 1) for more information.

Chapter 4 Applications

4.1 Inputs and Outputs

4.1.1 Digital Inputs (PMC-340B Only)

The PMC-340B comes standard with three self-excited Digital Inputs that are internally wetted at 24 VDC. Digital Inputs on the PMC-340B can be used in the following applications:

1) **Digital Input** The digital inputs are typically used for status monitoring which can help prevent equipment damage, improve maintenance, and track security breaches. The real-time statuses of the Digital Inputs are available on the front panel LCD Display as well as 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.

3) **Tariff Switching** Up to 2 Digital Inputs may be used to select to which of the 4 Tariffs the energy consumption should be accumulated. The 2 Digital Inputs (DI1 and DI2) represent 2 binary digits where Tariff 1=00, Tariff 2=01, Tariff 3= 10 and Tariff 4=11 where the least significant digit represents DI1 and the most significant digit represents DI2. The **DI1 Function** setup register must first be programmed as a **Tariff Switch** before configuring DI2 with the same function. In other words, if DI1 is configured as a **Digital Input** or **Energy Pulse Counter** and DI2 is configured as a **Tariff Switch**, the TOU will continue to function based on the TOU Schedule. This feature is available in Firmware V1.00.01. Tariff switching as a result of DI changes will be stored as an event in the SOE Log.

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

Setup Parameter	Definition	Options
DIx Function	Each **DI** can be configured as a Status Input or Pulse Counter. Only DI1 and DI 2 can be set to Tariff Switch.	0=Status Input* 1=Pulse Counter 2=Tariff Switch
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) (Default=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

*Default

Table 4-1 DI Setup Parameters

4.1.2 Energy Pulse Output

The PMC-340 comes standard with one front panel LED Pulse Output and one Solid State Relay Output for energy pulsing. Energy Pulse Output is typically used for accuracy testing. Energy Pulsing can be enabled from the front panel through the **Energy Pulse** setup parameter. The pulse constant can be configured through the **Pulse Constant** setup parameter as 1/10/100 pulses per kXh for the 100A Direct Input option and 1000/3200 pulses per kXh for the 5A CT Input option, respectively, where kXh may be kWh or kvarh.

4.2 Power and Energy

4.2.1 Basic Measurements

The PMC-340 provides the following basic measurements which can be retrieved via the Front panel or communication:

Parameter	Phase A	Phase B	Phase C	Total	Average
Uln	●	●	●	-	●
Ull	●	●	●	-	●
Current	●	●	●	-	●
kW	●	●	●	●	-
kvar	●	●	●	●	-
kVA	●	●	●	●	-
Power Factor	●	●	●	●	-
Frequency	●	-	-	-	-

Table 4-2 Basic Measurements

4.2.2 Energy Measurements

The PMC-340 provides Energy measurements for active energy (kWh), reactive energy (kvarh) and apparent energy (kVAh) with a resolution of 0.01 kxh and maximum value of 10,000,000.00. When the maximum value is reached, the energy registers will automatically roll over to zero. The energy can be reset manually through the front panel or communication.

The PMC-340 provides the following energy measurements:

3-Phase Energy	kWh Import/Export/Net/Total kWh Import/Export of Tariff 1/2/3/4
	kvarh Import/Export/Net/Total kvarh Import/Export of Tariff 1/2/3/4 kvarh of Q1/Q2/Q3/Q4
	kVAh Total
Per-Phase Energy (Phase A/B/C):	kWh Import/Export/Net/Total kWh Import/Export of Tariff 1/2/3/4
	kvarh Import/Export/Net/Total kvarh Import/Export of Tariff 1/2/3/4 kvarh of Q1/Q2/Q3/Q4
	kVAh

Table 4-3 Energy Measurement

4.2.3 Demand Measurements

Demand is defined as the average power consumption over a fixed interval (usually 15 minutes) based on the sliding window method. The PMC-340 provides the following Demand and Peak Demand measurements:

Demands	Ia, Ib, Ic
	kW Total, kvar Total, kVA Total
Peak Demands	Ia, Ib, Ic
	kW Total, kvar Total, kVA Total
	kW Total, kvar Total and kVA Total for each Tariff

Table 4-4 Demand Measurement

The PMC-340 provides the following Demand setup parameters:

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 Peak 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

4.3 Power Quality

4.3.1 Phase Angles

Phase analysis is used to identify the angle relationship between 3-phase Voltages and Currents.

For WYE connected systems, the per phase difference of the Current and Voltage angles should correspond to the per phase PF. For example, if the PF is 0.5 Lag and the Voltage phase angles are 0.0°, 240.0° and 120.0°, the Current phase angles should have the values of -60.0°, 180.0° and 60.0°.

4.3.2 Power Quality Parameters

The PMC-340 provides the following PQ parameters:

4.3.2.1 Harmonics

The PMC-340 provides THD, TOHD, TEHD and individual harmonics up to the 31st order. All harmonic parameters are available through communication while THDs are available on the front panel display. In addition, the PMC-340 also provides TDD, K-factor and Crest-factor measurements for Current, which are only available through communication.

4.3.2.2 TDD

Total Demand Distortion (TDD) is defined as the ratio of the root mean square (RMS) of the harmonic current to the root mean square value of the rated or maximum demand fundamental current, expressed as a percentage.

TDD of the Current I is calculated by the formula below:

$$TDD = \frac{\sqrt{\sum_{h=1}^{h=\infty} (I_h)^2}}{I_L}$$

where

I_L = maximum demand of fundamental current
h = harmonic order
I_h = rms load current at the harmonic order h

4.3.2.3 K-Factor

K-Factor is defined as the weighted sum of the harmonic load currents according to their effects on transformer heating, as derived from ANSI/IEEE C57.110. A **K-Factor** of 1.0 indicates a linear load (no harmonics). The higher the **K-Factor**, the greater the harmonic heating effects.

$$K-Factor = \frac{\sum_{h=1}^{h=h_{max}} (I_h h)^2}{\sum_{h=1}^{h=h_{max}} (I_h)^2}$$

where

I_h = h_{th} Harmonic Current in RMS
h_{max} = Highest harmonic order

4.3.2.4 Crest Factor

Crest Factor is defined as the **Peak to Average Ratio (PAR)**, and its calculation is illustrated below:

$$C = \frac{|X|_{peak}}{X_{rms}}$$

where

$|X|_{peak}$ = Peak amplitude of the waveform
X_{rms} = RMS value

The following table illustrates the available Voltage and Current Harmonic measurements on the PMC-340.

	Phase A/AB	Phase B/BC	Phase C/CA
Harmonic-Voltage	THD	THD	THD
	TEHD	TEHD	TEHD
	TOHD	TOHD	TOHD
	2nd Harmonics	2nd Harmonics	2nd Harmonics
		...	
	31st Harmonic	31st Harmonic	31st Harmonic
Harmonic-Current	THD	THD	THD
	TEHD	TEHD	TEHD
	TOHD	TOHD	TOHD
	TDD	TDD	TDD
	TEDD	TEDD	TEDD
	TODD	TODD	TODD
	K-factor	K-factor	K-factor
	Crest-factor	Crest-factor	Crest-factor
	2nd Harmonics	2nd Harmonics	2nd Harmonics
		...	
	31st Harmonic	31st Harmonic	31st Harmonic

Table 4-6 Harmonic Measurements

4.3.3 Unbalance

The PMC-340 provides Voltage and Current Unbalance measurements. The calculation method of Voltage and Current Unbalance are listed below:

$$\text{Voltage Unbalance} = \frac{V2}{V1} \times 100\%$$

$$\text{Current Unbalance} = \frac{I2}{I1} \times 100\%$$

where

V1, V2 are the Positive and Negative Sequence Components for Voltage, respectively.

and

I1, I2 are the Positive and Negative Sequence Components for Current, respectively.

4.4 Logging

4.4.1 Max./Min. Log

The PMC-340 records the **Max. Log** and **Min. Log** of **This Month (Since Last Reset)** and **Last Month (Before Last Reset)** with timestamp for 44 parameters. Each log includes the relevant parameter value and its timestamp. The recorded data is stored in non-volatile memory and will not suffer any loss in the event of a power failure. The PMC-340's Max./Min. Log records the following parameters:

Max./Min. Parameters					
Ia	Ib	Ic	I avg	Uan	Ubn
Ucn	Uln avg	Uab	Ubc	Uca	Ull avg
kWa	kWb	kWc	kW Total	kvara	kvarb
kvarc	kvar Total	kVAa	kVAb	kVAc	kVAc
PFa	PFb	PFc	PF Total	Frequency	I4
Ia THD	Ib THD	Ic THD	Uan/Uab THD	Ubn/Ubc THD	Ucn/Uca THD
Ia K-Factor	Ib K-Factor	Ic K-Factor	Ia Crest-factor	Ib Crest-factor	Ic Crest-factor
U Unbal.	I Unbal.				

Table 4-7 Max./Min. Measurements

The same **Self-Read Time** for the Peak Demand Log is used to specify the time and day of the month for the Max./Min. Self-Read operation. Please refer to Section 4.5 for a complete description of the **Self-Read Time** and its operation.

The Max./Min. Log of This Month can be reset manually from the front panel or via communications.

4.4.2 Monthly Energy Log

The PMC-340 stores 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.

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 12:00pm on the 15th day of each month.

The Monthly Energy Logs can be reset manually through the front panel or via communications.

The PMC-330 provides the following energy data for the present month and the last 12 months:

Active Energy	kWh Import	kWh Export	kWh Net	kWh Total
	T1 kWh Import	T2 kWh Import	T3 kWh Import	T4 kWh Import
	T1 kWh Export	T2 kWh Export	T3 kWh Export	T4 kWh Export
Reactive Energy	kvarh Import	kvarh Export	kvarh Net	kvarh Total
	T1 kvarh Import	T2 kvarh Import	T3 kvarh Import	T4 kvarh Import
	T1 kvarh Export	T2 kvarh Export	T3 kvarh Export	T4 kvarh Export
	kvarh Q1	kvarh Q2	kvarh Q3	kvarh Q4

Apparent Energy	kVAh

Table 4-8 Energy Measurements for each Monthly Energy Log Record

4.4.3 Peak Demand Log

The PMC-340 records the **Peak Demand** of **This Month (Since Last Reset)** and **Last Month (Before Last Reset)** with timestamp for Ia, Ib, Ic, kW Total, kvar Total and kVA Total as well as kW Total, kvar Total and kVA Total for TOU Tariffs 1 to 4. All Peak Demand information can be accessed through the front panel as well as communications. Please refer to Section 4.5 for a complete description of the **Self-Read Time** and its operation.

Peak Demand Logs of This Month (Since Last Reset) and Last Month (Before Last Reset)
Ia
Ib
Ic
kW Total
kvar Total
kVA Total
kW Total for TOU Tariffs 1 to 4
kvar Total for TOU Tariffs 1 to 4
kVA Total for TOU Tariffs 1 to 4

Table 4-9 Peak Demand

4.4.4 SOE Log (PMC-340B Only)

The PMC-340B's SOE Log can store up to 16 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 for display. If there are more than 16 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.

4.4.5 Data Recorder Log (PMC-340B Only)

The PMC-340B comes equipped with 2MB of memory and provides one Data Recorder 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 28,400 (entry)	28,400
Recording Interval	1 to 3,456,000 seconds	900 s
Offset Time	0 to 43,200 seconds, 0 indicates no offset.	0
Number of Parameters	0 to 16	14
Parameter 1 to 16	See **Appendix A**	See 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 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-340 and accumulate energy consumption into different TOU rates based on the time of consumption. TOU programming is only supported through communications.

The TOU feature on PMC-340 supports two TOU schedules, which can be switched at a pre-defined time. Each TOU schedule supporting:

- Up to 12 seasons
- 90 Holidays or Alternate Days and 3 Weekdays
- 20 Daily Profiles, each with 12 Periods in 15-minute interval
- 4 Tariffs

Instead of using the TOU schedule to switch between Tariffs, the PMC-340 supports Tariff switching based on the status of DI1 to DI2, which is supported in Firmware V1.00.01 or later.

The 2 Digital Inputs (DI1 and DI2) represent 2 binary digits where Tariff 1=00, Tariff 2=01, Tariff 3= 10, and Tariff 4=11 where D1 represents the least significant digit and D2 represents the most significant digit. As soon as DI1 and/or DI2 are configured as **Tariff Switches**, the current **TOU Tariff** will be determined by the status of the DIs, and the TOU Schedule will be ignored. The **DI1 Function** setup register must first be programmed as a **Tariff Switch** before configuring DI2 with the same function. In other words, if DI1 is configured as a **Digital Input** or **Energy Pulse Counter** and DI2 is configured as a **Tariff Switch**, the TOU will continue to function based on the TOU Schedule. The number of Tariffs supported depends on how many DIs are programmed as a Tariff Switch as indicated in the following table.

Tariff	DI Function	
	DI1 = Tariff Switch	DI1 & DI2 = Tariff Switch
T1	DI1 (0=T1)	DI2 + DI1 (00=T1)
T2	DI1 (1=T2)	DI2 + DI1 (01=T2)
T3	Not Available	DI2 + DI1 (10=T3)
T4	Not Available	DI2 + DI1 (11=T4)

Table 4-11 DIs and the Number of Tariff Setup

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 12 periods in 15-min intervals. Up to 20 Daily Profiles can be programmed for each TOU schedule.	1 to 20, the first period starts at 00:00 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, starts from January 1st
Alternate Days #	A day can be defined as an Alternate Day, such as May 1st. Each Alternate Day is assigned with a Daily Profile.	1 to 90.
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	Weekday1, Weekday2, Weekday3 and

	Alternate Day has the highest priority.	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

For each of the 4 Tariff Rates, the PMC-340 provides the following information:

Energy: kWh Import/Export, kvarh Import/Export, kVAh – Per Phase and Total

Peak Demand: kW/kvar/kVA of This Month (Since Last Reset) and Last Month (Before Last Reset). TOU data is available through communications.

Chapter 5 Modbus Register Map

This chapter provides a complete description of the Modbus register map (**Protocol Version 1.0**) for the PMC-340 to facilitate the development of 3rd party communications driver for accessing information on the PMC-340. For a complete Modbus Protocol Specification, please visit http://**www.modbus.org**. The PMC-340 supports the following Modbus functions:

1) Read Holding Registers (Function Code 0x03)
2) 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	Model	
						A	B
0000	RO	Uan	Float	x1	V	▪	▪
0002	RO	Ubn	Float		V	▪	▪
0004	RO	Ucn	Float		V	▪	▪
0006	RO	Uln Average	Float		V	▪	▪
0008	RO	Uab	Float		V	▪	▪
0010	RO	Ubc	Float		V	▪	▪
0012	RO	Uca	Float		V	▪	▪
0014	RO	Ull Average	Float		V	▪	▪
0016	RO	Ia	Float		A	▪	▪
0018	RO	Ib	Float		A	▪	▪
0020	RO	Ic	Float		A	▪	▪
0022	RO	I Average	Float		A	▪	▪
0024	RO	kWa	Float		W	▪	▪
0026	RO	kWb	Float		W	▪	▪
0028	RO	kWc	Float		W	▪	▪
0030	RO	kW Total	Float		W	▪	▪
0032	RO	kvara	Float		var	▪	▪
0034	RO	kvarb	Float		var	▪	▪
0036	RO	kvarc	Float		var	▪	▪
0038	RO	kvar Total	Float		var	▪	▪
0040	RO	kVAa	Float		VA	▪	▪
0042	RO	kVAb	Float		VA	▪	▪
0044	RO	kVAc	Float		VA	▪	▪
0046	RO	kVA Total	Float		VA	▪	▪
0048	RO	PFa	Float			▪	▪
0050	RO	PFb	Float			▪	▪
0052	RO	PFc	Float			▪	▪
0054	RO	PF Total	Float			▪	▪
0056	RO	Frequency	Float		Hz	▪	▪
0058	RO	Uan/Uab (3P3W) Angle	Float		°	▪	▪
0060	RO	Ubn/Ubc (3P3W) Angle	Float		°	▪	▪
0062	RO	Ucn/Uca (3P3W) Angle	Float		°	▪	▪
0064	RO	Ia Angle	Float			▪	▪
0066	RO	Ib Angle	Float			▪	▪
0068	RO	Ic Angle	Float			▪	▪
0070	RO	In (Calculated)	Float		A	▪	▪
0072~0073		Reserved					
0074	RO	Displacement PFa	Float	x1	-	▪	▪
0076	RO	Displacement PFb	Float			▪	▪
0078	RO	Displacement PFc	Float			▪	▪
0080~0093		Reserved					

0092	RO	FP Counter[1]	UINT16	x1	-		▪
0093	RO	Comm. Counter[1]	UINT16				▪
0094	RO	SOE Log Pointer[2]	UINT32				▪
0096	RO	Data Recorder Log Pointer[2]	UINT32				▪
0098		Reserved					
0099	RO	DI Status[3]	Bitmap				▪
0100		Reserved					
0101	RO	Wiring Diagnostic Status[4]	Bitmap			▪	▪
0102		Reserved					
0104	RO	Device Operating Time[5]	UINT32	x0.1	Hour	▪	▪

Table 5-1 Basic Measurements

Notes:

1) 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:
     - Wiring Mode, PT and CT ratios and I Polarities
     - 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 All Demand
     - Clear All Max./Min.
     - Clear All DI 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 Peak Demand Log of This Month (Register 9603)
     - Clear All Demand Registers and Logs (Register 9604)
     - Clear Device Operating Time (Register 9607)
     - Clear All Data (Register 9608)
     - Clear DI1 Counter (Register 9609) (only when DI1 = Energy Pulse Counter)
     - Clear DI2 Counter (Register 9610) (only when DI2 = Energy Pulse Counter)
     - Clear DI3 Counter (Register 9611) (only when DI3 = Energy Pulse Counter)
2) The PMC-340 has one SOE Log and one DR Logs. Each of these logs has a Log Pointer that indicates its current logging position. The range of the **Log Pointer** 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 Log** is performed via communications, its **Log Pointer** will be reset to zero.

   Use the following equation to determine the latest log location:

   Latest Log Location = Modulo [**Log Pointer** / **Log Depth**]

   where **Log Pointer** may be the SOE Log Pointer or DR Log Pointer

   and **Log Depth** is as follows:

   SOE Log Depth = 16 (fixed)

   DR Log Depth = DR Recording Depth (see Section **5.11 Data Recorder Setup**)
3) For the **DI Status** register, the bit values of B0 to B2 represent the states of DI1 to DI3, respectively, with "1" meaning active (closed) and "0" meaning inactive (open).
4) The following table illustrates the **Wiring Diagnostic Status** with 0 meaning Normal and 1 meaning

Abnormal:

Bit	Description
B00	Summary Bit (Set if any other bit is set)
B01	Frequency is out of range between 45 to 65Hz (3P4W and 3P3W)
B02	Any phase voltage < 10% of PT Primary (Register 6000) (3P4W only)
B03	Any phase current < 10% of CT Primary (Register 6004) (3P4W or 3P3W)
B04~B05	Reserved
B06	Voltage Phase Reversal (3P4W or 3P3W)
B07	Current Phase Reversal (3P4W or 3P3W)
B08	Negative kW Total may be abnormal (3P4W or 3P3W)
B09	Negative kWa is may be abnormal (3P4W only)
B10	Negative kWb may be abnormal (3P4W only)
B11	Negative kWc may be abnormal (3P4W only)
B12	CTa polarity may be reversed (3P4W only)
B13	CTb polarity may be reversed (3P4W only)
B14	CTc polarity may be reversed (3P4W only)
B15	Reserved

Table 5-2 Wiring Diagnostic Status Register

5) The **Device Operating Time** means the accumulated Operating Time whenever any per-phase Current exceeds 2% of $I_{nominal}$ (5A), which is 100mA. The Device Operating Time data is stored in non-volatile memory and will not suffer any loss in the event of a power failure.

5.2 Energy Measurements

The Energy registers have a maximum value of 1,000,000,000 and will roll over to zero automatically when it is reached. The actual energy value is 0.01 times of the register value.

5.2.1 3-Phase 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

Table 5-3 3-phase Energy Measurements

5.2.2 Phase A (L1) Energy Measurements

Register	Property	Description	Format	Scale	Unit
0620	RW	kWh Import	INT32	x0.01	kWh
0622	RW	kWh Export	INT32		
0624	RO	kWh Net	INT32		
0626	RO	kWh Total	INT32		
0628	RW	kvarh Import	INT32		kvarh
0630	RW	kvarh Export	INT32		
0632	RO	kvarh Net	INT32		
0634	RO	kvarh Total	INT32		
0636	RW	kVAh	INT32		kVAh
0638	RW	kvarh Q1	INT32		kvarh
0640	RW	kvarh Q2	INT32		
0642	RW	kvarh Q3	INT32		
0644	RW	kvarh Q4	INT32		
0646	RW	kWh Import of T1	INT32		kWh
0648	RW	kWh Export of T1	INT32		
0650	RW	kvarh Import of T1	INT32		kvarh
0652	RW	kvarh Export of T1	INT32		
0654	RW	kVAh of T1	INT32		kVAh
0656	RW	kWh Import of T2	INT32		kWh
0658	RW	kWh Export of T2	INT32		
0660	RW	kvarh Import of T2	INT32		kvarh
0662	RW	kvarh Export of T2	INT32		
0664	RW	kVAh of T2	INT32		kVAh
0666	RW	kWh Import of T3	INT32		kWh
0668	RW	kWh Export of T3	INT32		
0670	RW	kvarh Import of T3	INT32		kvarh
0672	RW	kvarh Export of T3	INT32		
0674	RW	kVAh of T3	INT32		kVAh
0676	RW	kWh Import of T4	INT32		kWh
0678	RW	kWh Export of T4	INT32		
0680	RW	kvarh Import of T4	INT32		kvarh
0682	RW	kvarh Export of T4	INT32		
0684	RW	kVAh of T4	INT32		kVAh

Table 5-4 Phase A Energy Measurements

5.2.3 Phase B (L2) Energy Measurements

Register	Property	Description	Format	Scale	Unit
0740	RW	kWh Import	INT32	x0.01	kWh
0742	RW	kWh Export	INT32		
0744	RO	kWh Net	INT32		
0746	RO	kWh Total	INT32		
0748	RW	kvarh Import	INT32		kvarh
0750	RW	kvarh Export	INT32		
0752	RO	kvarh Net	INT32		
0754	RO	kvarh Total	INT32		
0756	RW	kVAh	INT32		kVAh
0758	RW	kvarh Q1	INT32		kvarh
0760	RW	kvarh Q2	INT32		
0762	RW	kvarh Q3	INT32		
0764	RW	kvarh Q4	INT32		
0766	RW	kWh Import of T1	INT32		kWh
0768	RW	kWh Export of T1	INT32		
0770	RW	kvarh Import of T1	INT32		kvarh
0772	RW	kvarh Export of T1	INT32		
0774	RW	kVAh of T1	INT32		kVAh
0776	RW	kWh Import of T2	INT32		kWh
0778	RW	kWh Export of T2	INT32		
0780	RW	kvarh Import of T2	INT32		kvarh
0782	RW	kvarh Export of T2	INT32		
0784	RW	kVAh of T2	INT32		kVAh
0786	RW	kWh Import of T3	INT32		kWh
0788	RW	kWh Export of T3	INT32		

0790	RW	kvarh Import of T3	INT32		kvarh
0792	RW	kvarh Export of T3	INT32		
0794	RW	kVAh of T3	INT32		kVAh
0796	RW	kWh Import of T4	INT32		kWh
0798	RW	kWh Export of T4	INT32		
0800	RW	kvarh Import of T4	INT32		kvarh
0802	RW	kvarh Export of T4	INT32		
0804	RW	kVAh of T4	INT32		kVAh

Table 5-5 Phase B Energy Measurements

5.2.4 Phase C (L3) Energy Measurements

Register	Property	Description	Format	Scale	Unit
0860	RW	kWh Import	INT32	x0.01	kWh
0862	RW	kWh Export	INT32		
0864	RO	kWh Net	INT32		
0866	RO	kWh Total	INT32		
0868	RW	kvarh Import	INT32		kvarh
0870	RW	kvarh Export	INT32		
0872	RO	kvarh Net	INT32		
0874	RO	kvarh Total	INT32		
0876	RW	kVAh	INT32		kVAh
0878	RW	kvarh Q1	INT32		kvarh
0880	RW	kvarh Q2	INT32		
0882	RW	kvarh Q3	INT32		
0884	RW	kvarh Q4	INT32		
0886	RW	kWh Import of T1	INT32		kWh
0888	RW	kWh Export of T1	INT32		
0890	RW	kvarh Import of T1	INT32		kvarh
0892	RW	kvarh Export of T1	INT32		
0894	RW	kVAh of T1	INT32		kVAh
0896	RW	kWh Import of T2	INT32		kWh
0898	RW	kWh Export of T2	INT32		
0900	RW	kvarh Import of T2	INT32		kvarh
0902	RW	kvarh Export of T2	INT32		
0904	RW	kVAh of T2	INT32		kVAh
0906	RW	kWh Import of T3	INT32		kWh
0908	RW	kWh Export of T3	INT32		
0910	RW	kvarh Import of T3	INT32		kvarh
0912	RW	kvarh Export of T3	INT32		
0914	RW	kVAh of T3	INT32		kVAh
0916	RW	kWh Import of T4	INT32		kWh
0918	RW	kWh Export of T4	INT32		
0920	RW	kvarh Import of T4	INT32		kvarh
0922	RW	kvarh Export of T4	INT32		
0924	RW	kVAh of T4	INT32		kVAh

Table 5-6 Phase C Energy Measurements

5.3 DI Pulse Counter (PMC-340B 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
1202	RW	DI2 Pulse Counter	INT32	
1204	RW	DI3 Pulse Counter	INT32	

Table 5-7 DI Pulse Counter

5.4 Harmonic Measurements

5.4.1 Power Quality Measurements

Register	Property	Description	Format	Scale	Unit
1300	RO	Ia TDD	Float	x1	-
1302	RO	Ib TDD	Float		
1304	RO	Ic TDD	Float		
1306	RO	Ia TDD Odd	Float		

1308	RO	Ib TDD Odd	Float		
1310	RO	Ic TDD Odd	Float		
1312	RO	Ia TDD Even	Float		
1314	RO	Ib TDD Even	Float		
1316	RO	Ic TDD Even	Float		
1318	RO	Ia K-factor	Float		
1320	RO	Ib K-factor	Float		
1322	RO	Ic K-factor	Float		
1324	RO	Ia Crest-factor	Float		
1326	RO	Ib Crest-factor	Float		
1328	RO	Ic Crest-factor	Float		
1330	RO	Voltage Unbalance	Float		
1332	RO	Current Unbalance	Float		

Table 5-8 Power Quality Measurements

5.4.2 Current Harmonic Measurements

Register	Property	Description	Format	Scale	Unit
1400	RO	Ia THD	Float	x1	-
1402	RO	Ib THD	Float		
1404	RO	Ic THD	Float		
1406	RO	Ia TOHD	Float		
1408	RO	Ib TOHD	Float		
1410	RO	Ic TOHD	Float		
1412	RO	Ia TEHD	Float		
1414	RO	Ib TEHD	Float		
1416	RO	Ic TEHD	Float		
1418	RO	Ia HD02	Float		
1420	RO	Ib HD02	Float		
1422	RO	Ic HD02	Float		
1424~1590	RO	…	Float		
1592	RO	Ia HD31	Float		
1594	RO	Ib HD31	Float		
1596	RO	Ic HD31	Float		

Table 5-9 Current Harmonic Measurements

5.4.3 Voltage Harmonic Measurements

Register	Property	Description	Format	Scale	Unit
1600	RO	Uan/Uab THD	Float	x1	-
1602	RO	Ubn/Ubc THD	Float		
1604	RO	Ucn/Uca THD	Float		
1606	RO	Uan/Uab TOHD	Float		
1608	RO	Ubn/Ubc TOHD	Float		
1610	RO	Ucn/Uca TOHD	Float		
1612	RO	Uan/Uab TEHD	Float		
1614	RO	Ubn/Ubc TEHD	Float		
1616	RO	Ucn/Uca TEHD	Float		
1618	RO	Uan/Uab HD02	Float		
1620	RO	Ubn/Ubc HD02	Float		
1622	RO	Ucn/Uca HD02	Float		
1624~1790	RO	…	Float		
1792	RO	Uan/Uab HD31	Float		
1794	RO	Ubn/Ubc HD31	Float		
1796	RO	Ucn/Uca HD31	Float		

Table 5-10 Voltage Harmonic Measurements

Notes:

1) When the **Wiring Mode** is **3P3W** or **1P2W L-L**, the phase A/B/C voltage THD/TOHD/TEHD/HD*xx* is phase AB/BC/CA voltage THD/TOHD/TEHD/HD*xx*.

5.5 Demands

5.5.1 Present Demands

Register	Property	Description	Format	Scale	Unit
3000	RO	Ia	Float	x1	A
3002	RO	Ib	Float		
3004	RO	Ic	Float		
3006	RO	kW Total	Float		W
3008	RO	kvar Total	Float		var
3010	RO	kVA Total	Float		VA

Table 5-11 Present Demand Measurements

5.5.2 Peak Demand Log of This Month (Since Last Reset)

Register	Property	Description	Format	Scale	Unit
3400~3405	RO	Ia	See Table 5-15 Demand Data Structure	x1	A
3406~3411	RO	Ib			
3412~3417	RO	Ic			
3418~3423	RO	kW Total			W
3424~3429	RO	kvar Total			var
3430~3435	RO	kVA Total			VA
3436~3441	RO	kW Total of T1			W
3442~3447	RO	kvar Total of T1			var
3448~3453	RO	kVA Total of T1			VA
3454~3459	RO	kW Total of T2			W
3460~3465	RO	kvar Total of T2			var
3466~3471	RO	kVA Total of T2			VA
3472~3477	RO	kW Total of T3			W
3478~3483	RO	kvar Total of T3			var
3484~3489	RO	kVA Total of T3			VA
3490~3495	RO	kW Total of T4			W
3496~3501	RO	kvar Total of T4			var
3502~3507	RO	kVA Total of T4			VA

Table 5-12 Peak Demand Log of This Month

5.5.3 Peak Demand Log of Last Month (Before Last Reset)

Register	Property	Description	Format	Scale	Unit
3600~3605	RO	Ia	See Table 5-15 Demand Data Structure	x1	A
3606~3611	RO	Ib			
3612~3617	RO	Ic			
3618~3623	RO	kW			W
3624~3629	RO	kvar			var
3630~3635	RO	kVA			VA
3636~3641	RO	kW Total			W
3642~3647	RO	Kvar Total			var
3648~3653	RO	kVA Total			VA
3654~3659	RO	kW Total of T1			W
3660~3665	RO	kvar Total of T1			var
3666~3671	RO	kVA Total of T1			VA
3672~3677	RO	kW Total of T2			W
3678~3683	RO	kvar Total of T2			var
3684~3689	RO	kVA Total of T2			VA
3690~3695	RO	kW Total of T3			W
3696~3701	RO	kvar Total of T3			var
3702~3707	RO	kVA Total of T3			VA

Table 5-13 Peak Demand Log of Last Month

Notes:

1) The following table illustrates Demand Data Structure:

Offset		Description
+0	High	Year - 2000
	Low	Month
+1	High	Day
	Low	Hour
+2	High	Minute
	Low	Second

+3	-	Millisecond
+4~+5	-	Record Value

Table 5-14 Demand Data Structure

5.6 Max./Min. Log

5.6.1 Max. Log of This Month (Since Last Reset)

Register	Property	Description	Format	Scale	Unit
4000~4005	RO	Uan	See 5.6.5 Max./Min. Log Structure	x1	V
4006~4011	RO	Ubn			
4012~4017	RO	Ucn			
4018~4023	RO	Uln Average			
4024~4029	RO	Uab			
4030~4035	RO	Ubc			
4036~4041	RO	Uca			
4042~4047	RO	Ull Average			
4048~4053	RO	Ia			A
4054~4059	RO	Ib			
4060~4065	RO	Ic			
4066~4071	RO	I Average			
4072~4077	RO	kWa			W
4078~4083	RO	kWb			
4084~4089	RO	kWc			
4090~4095	RO	kW Total			
4096~4101	RO	kvara			var
4102~4107	RO	kvarb			
4108~4113	RO	kvarc			
4114~4119	RO	kvar Total			
4120~4125	RO	kVAa			VA
4126~4131	RO	kVAb			
4132~4137	RO	kVAc			
4138~4143	RO	kVA Total			
4144~4149	RO	PFa			-
4150~4155	RO	PFb			
4156~4161	RO	PFc			
4162~4167	RO	PF Total			
4168~4173	RO	Frequency			Hz
4174~4179	RO	I4			A
4180~4185	RO	Uan/Uab THD			-
4186~4191	RO	Ubn/Ubc THD			
4192~4197	RO	Ucn/Uca THD			
4198~4203	RO	Ia THD			
4204~4209	RO	Ib THD			
4210~4215	RO	Ic THD			
4216~4221	RO	Ia K-factor			
4222~4227	RO	Ib K-factor			
4228~4233	RO	Ic K-factor			
4234~4239	RO	Ia Crest-factor			
4240~4245	RO	Ib Crest-factor			
4246~4251	RO	Ic Crest-factor			
4252~4257	RO	Voltage Unbalance			
4258~4263	RO	Current Unbalance			

Table 5-15 Max. Log of This Month (Since Last Reset)

5.6.2 Min. Log of This Month (Since Last Reset)

Register	Property	Description	Format	Scale	Unit
4300~4305	RO	Uan	See 5.6.5 Max./Min. Log Structure	x1	V
4306~4311	RO	Ubn			
4312~4317	RO	Ucn			
4318~4323	RO	Uln Average			
4324~4329	RO	Uab			
4330~4335	RO	Ubc			

4336~4341	RO	Uca			
4342~4347	RO	Ull Average			
4348~4353	RO	Ia			A
4354~4359	RO	Ib			
4360~4365	RO	Ic			
4366~4371	RO	I Average			
4372~4377	RO	kWa			W
4378~4383	RO	kWb			
4384~4389	RO	kWc			
4390~4395	RO	kW Total			
4396~4401	RO	kvara			var
4402~4407	RO	kvarb			
4408~4413	RO	kvarc			
4414~4419	RO	kvar Total			
4420~4425	RO	kVAa			VA
4426~4431	RO	kVAb			
4432~4437	RO	kVAc			
4438~4443	RO	kVA Total			
4444~4449	RO	PFa			-
4450~4455	RO	PFb			
4456~4461	RO	PFc			
4462~4467	RO	PF Total			
4468~4473	RO	Frequency			Hz
4474~4479	RO	I4			A
4480~4485	RO	Uan/Uab THD			-
4486~4491	RO	Ubn/Ubc THD			
4492~4497	RO	Ucn/Uca THD			
4498~4503	RO	Ia THD			
4504~4509	RO	Ib THD			
4510~4515	RO	Ic THD			
4516~4521	RO	Ia K-factor			
4522~4527	RO	Ib K-factor			
4528~4533	RO	Ic K-factor			
4534~4539	RO	Ia Crest-factor			
4540~4545	RO	Ib Crest-factor			
4546~4551	RO	Ic Crest-factor			
4552~4557	RO	Voltage Unbalance			
4558~4563	RO	Current Unbalance			

Table 5-16 Min. Log of This Month (Since Last Reset)

5.6.3 Max. Log of Last Month (Before Last Reset)

Register	Property	Description	Format	Scale	Unit
4600~4605	RO	Uan	See 5.6.5 Max./Min. Log Structure	x1	V
4606~4611	RO	Ubn			
4612~4617	RO	Ucn			
4618~4623	RO	Uln Average			
4624~4629	RO	Uab			
4630~4635	RO	Ubc			
4636~4641	RO	Uca			
4642~4647	RO	Ull Average			
4648~4653	RO	Ia			A
4654~4659	RO	Ib			
4660~4665	RO	Ic			
4666~4671	RO	I Average			
4672~4677	RO	kWa			W
4678~4683	RO	kWb			
4684~4689	RO	kWc			
4690~4695	RO	kW Total			
4696~4701	RO	kvara			var
4702~4707	RO	kvarb			
4708~4713	RO	kvarc			
4714~4719	RO	kvar Total			
4720~4725	RO	kVAa			VA
4726~4731	RO	kVAb			

4732~4737	RO	kVAc			
4738~4743	RO	kVA Total			
4744~4749	RO	PFa			-
4750~4755	RO	PFb			
4756~4761	RO	PFc			
4762~4767	RO	PF Total			
4768~4773	RO	Frequency			Hz
4774~4779	RO	I4			A
4780~4785	RO	Uan/Uab THD			-
4786~4791	RO	Ubn/Ubc THD			
4792~4797	RO	Ucn/Uca THD			
4798~4803	RO	Ia THD			
4804~4809	RO	Ib THD			
4810~4815	RO	Ic THD			
4816~4821	RO	Ia K-factor			
4822~4827	RO	Ib K-factor			
4828~4833	RO	Ic K-factor			
4834~4839	RO	Ia Crest-factor			
4840~4845	RO	Ib Crest-factor			
4846~4851	RO	Ic Crest-factor			
4852~4857	RO	Voltage Unbalance			
4858~4863	RO	Current Unbalance			

Table 5-17 Max. Log of Last Month (Before Last Reset)

5.6.4 Min. Log of Last Month (Before Last Reset)

Register	Property	Description	Format	Scale	Unit
4900~4905	RO	Uan	See 5.6.5 Max./Min. Log Structure	x1	V
4906~4911	RO	Ubn			
4912~4917	RO	Ucn			
4918~4923	RO	Uln Average			
4924~4929	RO	Uab			
4930~4935	RO	Ubc			
4936~4941	RO	Uca			
4942~4947	RO	Ull Average			
4948~4953	RO	Ia			A
4954~4959	RO	Ib			
4960~4965	RO	Ic			
4966~4971	RO	I Average			
4972~4977	RO	kWa			W
4978~4983	RO	kWb			
4984~4989	RO	kWc			
4990~4995	RO	kW Total			
4996~5001	RO	kvara			var
5002~5007	RO	kvarb			
5008~5013	RO	kvarc			
5014~5019	RO	kvar Total			
5020~5025	RO	kVAa			VA
5026~5031	RO	kVAb			
5032~5037	RO	kVAc			
5038~5043	RO	kVA Total			
5044~5049	RO	PFa			-
5050~5055	RO	PFb			
5056~5061	RO	PFc			
5062~5067	RO	PF Total			
5068~5073	RO	Frequency			Hz
5074~5079	RO	I4			A
5080~5085	RO	Uan/Uab THD			-
5086~5091	RO	Ubn/Ubc THD			
5092~5097	RO	Ucn/Uca THD			
5098~5103	RO	Ia THD			
5104~5109	RO	Ib THD			
5110~5115	RO	Ic THD			
5116~5121	RO	Ia K-factor			
5122~5127	RO	Ib K-factor			
5128~5133	RO	Ic K-factor			

5134~5139	RO	Ia Crest-factor			
5140~5145	RO	Ib Crest-factor			
5146~5151	RO	Ic Crest-factor			
5152~5157	RO	Voltage Unbalance			
5158~5163	RO	Current Unbalance			

Table 5-18 Min. Log of Last Month (Before Last Reset)

5.6.5 Max./Min. Log Structure

Offset		Description
+0	High	Year - 2000
	Low	Month
+1	High	Day
	Low	Hour
+2	High	Minute
	Low	Second
+3	-	Millisecond
+4~+5	-	Record Value

Table 5-19 Max./Min. Structure

5.7 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	RW	kWh Import	INT32	x0.01	kWh
0986	RW	kWh Export	INT32		
0988	RO	kWh Net	INT32		
0990	RO	kWh Total	INT32		
0992	RW	kvarh Import	INT32		kvarh
0994	RW	kvarh Export	INT32		
0996	RO	kvarh Net	INT32		
0998	RO	kvarh Total	INT32		
1000	RW	kVAh	INT32		kVAh
1002	RW	kvarh Q1	INT32		kvarh
1004	RW	kvarh Q2	INT32		
1006	RW	kvarh Q3	INT32		
1008	RW	kvarh Q4	INT32		
1010	RW	kWh Import of T1	INT32		kWh
1012	RW	kWh Export of T1	INT32		
1014	RW	kvarh Import of T1	INT32		kvarh
1016	RW	kvarh Export of T1	INT32		
1018	RW	kVAh of T1	INT32		kVAh
1020	RW	kWh Import of T2	INT32		kWh
1022	RW	kWh Export of T2	INT32		
1024	RW	kvarh Import of T2	INT32		kvarh
1026	RW	kvarh Export of T2	INT32		
1028	RW	kVAh of T2	INT32		kVAh
1030	RW	kWh Import of T3	INT32		kWh
1032	RW	kWh Export of T3	INT32		
1034	RW	kvarh Import of T3	INT32		kvarh
1036	RW	kvarh Export of T3	INT32		
1038	RW	kVAh of T3	INT32		kVAh
1040	RW	kWh Import of T4	INT32		kWh
1042	RW	kWh Export of T4	INT32		
1044	RW	kvarh Import of T4	INT32		kvarh
1046	RW	kvarh Export of T4	INT32		
1048	RW	kVAh of T4	INT32		kVAh

Table 5-20 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-340 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.

5.8 SOE Log (PMC-340B Only)

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-1/16)*8

Register	Property	Description	Format
10000~10007	RO	Event 1	See Table 5-22 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	
……		…	
10120~10127	RO	Event 16	

Table 5-21 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 5-22 SOE Log Data Structure

2) SOE Classification

Event Classification	Sub-Classification	Status	Event Value	Description
1=DI Status Changes	1	0=Inactive, 1=Active	1/0	DI1 Inactive / DI1 Active
	2		1/0	DI2 Inactive / DI2 Active
	3		1/0	DI3 Inactive / DI3 Active
5=Operations	1	None	0	Power On
	2	None	0	Power Off
	3	None	0	Setup Parameter Changes via Communication
	4	None	0	Setup Parameter Changes via Front Panel
	5	None	0	Clear Monthly Energy Log of the Last 12 Months via Communication

	6	None	0	Clear 3-Phase Energy registers and Phase A/B/C Energy registers via Communication
	7	None	0	Clear Monthly Energy Log of The Preset Month via Communication
	8	None	0	Clear 3-Phase Total Energy registers and Phase A/B/C Energy Registers, Monthly Energy Log of the Last 12 Months and Monthly Energy Log of the Present Month via Front Panel
	9	None	0	Clear Peak Demand Logs of This Month (Since Last Reset) via Communication
	10	None	0	Clear all Peak Demand Logs and Present Demand via Communication
	11	None	0	Clear All Peak Demand Logs and Present Demand via Front Panel
	12	None	0	Clear Max./Min. Log of This Month (Since Last Reset) via Communication
	13	None	0	Clear All Max./Min. Log via Communication
	14	None	0	Clear all Max./Min. Log via Front Panel
	15	None	0	Clear Device Operating Time via Communication
	16	None	0	Clear All Records via Communication, including 3-Phase Total Energy and Phase A/B/C Energy Registers, Monthly Energy Log of the Last 12 Months, Monthly Energy Log of the Present Month, all Max./Min. Log, all Demand Log, Device Operating Time, DIx Pulse Counters, DR Log and SOE
	17	None	0	Clear DI1 Pulse Counter via Communication
	18	None	0	Clear DI2 Pulse Counter via Communication
	19	None	0	Clear DI3 Pulse Counter via Communication
	20	None	0	Clear DR Logs via Communication
	21	None	0	Clear SOE Logs via Communication
	22	None	0	Clear All DI Counters via Front Panel

Table 5-23 SOE Classification

5.9 Data Recorder Log (PMC-340B Only)

Register	Property	Description	Format	Note
20000	RW	Data Recorder Log Number[1]	UINT32	
20002	RO	High-order Byte: Year	UINT16	1 to 99 (Year-2000)
		Low-order Byte: Month		1 to 120
20003	RO	High-order Byte: Day	UINT16	1 to 28/29/30/31
		Low-order Byte: Hour		0 to 23
20004	RO	High-order Byte: Minute	UINT16	0 to 59
		Low-order Byte: Second		0 to 59
20005	RO	Millisecond	UINT16	
20006~20007	RO	Parameter 1	Float	
20008~20009	RO	Parameter 2	Float	
20010~20011	RO	Parameter 3	Float	
20012~20013	RO	Parameter 4	Float	
20014~20015	RO	Parameter 5	Float	
20016~20017	RO	Parameter 6	Float	
20018~20019	RO	Parameter 7	Float	
20020~20021	RO	Parameter 8	Float	
20022~20023	RO	Parameter 9	Float	
20024~20025	RO	Parameter 10	Float	
20026~20027	RO	Parameter 11	Float	
20028~20029	RO	Parameter 12	Float	
20030~20031	RO	Parameter 13	Float	

20032~20033	RO	Parameter 14	Float	
20034~20035	RO	Parameter 15	Float	
20036~20037	RO	Parameter 16	Float	

Table 5-24 Data Recorder Log

Notes:

1) Writing a value n (where 1 ≤ n ≤ 28,400) to the Data Recorder Log Number register will load the nth Log Record into the buffer from memory.

5.10 Device Setup

5.10.1 Basic Setup Parameters

Register	Property	Description	Format	Range, Default*
6000	RW	PT Primary[1]	UINT32	1 to 1,000,000V, 380*
6002	RW	PT Secondary	UINT32	1 to 690V, 380*
6004	RW	CT Primary	UINT32	1 to 30,000A, 5*
6006	RW	CT Secondary	UINT32	1 to 5A, 5*
6008~6018	RW	Reserved	UINT32	-
6020	RW	Wiring Mode	UINT16	0=DEMO, 1=1P2W L-N 2=1P2W L-L, 3=1P3W 4=3P3W, 5=3P4W*
6021	RW	Power Factor Convention	UINT16	0=IEC*, 1=IEEE, 2=-IEEE
6022	RW	kVA Calculation	UINT16	0=Vector*, 1=Scalar
6023	RW	Ia Polarity	UINT16	0=Normal*, 1=Reverse
6024	RW	Ib Polarity	UINT16	
6025	RW	Ic Polarity	UINT16	
6026~6027	RW	Reserved	UINT16	-
6028	RW	THD Calculation[2]	UINT16	0= THDf*, 1= THDr
6029	RW	Demand Period	UINT16	1 to 60 (minutes), 10*
6030	RW	No. of Sliding Windows	UINT16	1 to 15, 15*
6031~6032	RW	Reserved	UINT16	-
6033	RW	Self-Read Time[3]	UINT16	Default=0xFFFF (Auto Self-Read Disabled)
6034	RW	Monthly Energy Log Self-Read Time[4]	UINT16	0*
6035	RW	Energy Pulse Constant	UINT16	0 to 4 0=1 imp/kxh, 1=10 imp/kxh 2=100 imp/kxh* 3=1000 imp/kxh 4=3200 imp/kxh
6036	RW	LED Energy Pulse	UINT16	0=Disabled* 1=kWh 2=kvarh
6037~6040	RW	Reserved	UINT16	-
6041	RW	Energy Pulse Width	UINT16	60 to 150ms, 80*

Table 5-25 Basic Setup Parameters

Notes:

1) The ratio between PT Primary and PT Secondary cannot exceed 10,000.

2) There are two ways to calculate THD:

THDf (based on Fundamental): $$\mathrm{THD} = \frac{\sqrt{\sum_{n=2}^{\infty} I_n^{\,2}}}{I_1} \times 100\%$$

where I_n represents the RMS value for the n^{th} harmonic and I_1 represents the RMS value of the Fundamental harmonic.

THDr (based on RMS):

$$\mathrm{THD} = \frac{\sqrt{\sum_{n=2}^{\infty} I_n^{\,2}}}{\sqrt{\sum_{n=1}^{\infty} I_n^{\,2}}} \times 100\%$$

where I_n represents the RMS value for the n^{th} harmonic

3) The **Self-Read Time** applies to both the Peak Demand Log as well as the Max./Min. 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 12:00pm on the 15th day of each month.
   - A 0xFFFF value means the automatic self-read operation is disabled and the log will be transferred manually
4) The **Monthly Energy Log Self-Read Time** supports only 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: Self-Read Time = Day * 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.

5.10.2 I/O Setup

Register	Property	Description	Format	Range, Default*	Model	
					A	B
6200	RW	DI1 Function	UINT16	0=Digital Input 1=Energy Pulse Counter* 2=Tariff Switch[1]		▪
6201	RW	DI1 Debounce	UINT16	1 to 1000ms, 20ms*		▪
6202	RW	DI1 Pulse Weight	UINT32	1 to 1,000,000, 1*		▪
6204	RW	Reserved		-		
6205	RW	DI2 Function	UINT16	0=Digital Input 1=Energy Pulse Counter* 2=Tariff Switch[1]		▪
6206	RW	DI2 Debounce	UINT16	1 to 1000ms, 20ms*		▪
6207	RW	DI2 Pulse Weight	UINT32	1 to 1,000,000, 1*		▪
6209	RW	Reserved	UINT16	-		
6210	RW	DI3 Function	UINT16	0=Digital Input 1=Energy Pulse Counter*		▪
6211	RW	DI3 Debounce	UINT16	1 to 1000ms, 20ms*		▪
6212	RW	DI3 Pulse Weight	UINT32	1 to 1,000,000, 1*		▪
6214~6231	RW	Reserved		-		
6232	RW	DO Mode	UINT16	0= Disabled 1= kWh Import 2= kWh Export 3= kWh Total* 4= kvarh Import 5= kvarh Export 6= kvarh Total 7= PPS (PMC-340B Only)[2] 8= DMD[3] 9=TOU Period Switch[4]	▪	▪
6233~6249		Reserved				

Table 5-26 I/O Setup Parameters

Notes:

1) The Tariff Switch option is available in Firmware V1.00.01 or later.
2) PPS: 1 Pulse Per Second
3) DMD: 1 pulse is generated at the end of every Demand Interval
4) Tariff Switch: 1 pulse is generated every time a Tariff Switch takes place based on TOU Schedule.

5.10.3 Communication Setup Parameters

Register	Property	Description	Format	Range, Default*
6400	RW	Reserved		-
6401	RW	Unit ID	UINT16	1 to 247, 100*
6402	RW	Baud Rate	UINT16	0=1200, 1=2400, 2=4800, 3=9600*, 4=19200, Others=Reserved
6403	RW	Comm. Config.	UINT16	0=8N2, 1=8O1, 2=8E1* 3=8N1, 4=8O2, 5=8E2

Table 5-27 Communication Setup

Notes:

1) If the **Baud Rate is** set to an invalid value, it will default to 9600bps automatically.

5.11 Data Recorder Setup (PMC-340B Only)

Register	Property	Description	Format	Range, Default*
6500	RW	Trigger Mode	UINT16	0=Disabled 1=Triggered by Timer*
6501	RW	Recording Mode[1]	UINT16	0=Stop-when-Full 1=First-In-First-Out*
6502	RW	Recording Depth[1]	UINT16	0 to 28,400*
6503	RW	Recording Interval[1]	UINT32	1 to 3456000s, 600s*
6505	RW	Offset Time[2]	UINT16	0* to 43200s
6506	RW	Number of Parameters[1]	UINT16	0 to 16, 14*
6507	RW	Parameter #1[1,3]	UINT16	100 (kWh Import)*
6508	RW	Parameter #2[1,3]	UINT16	101 (kWh Export)*
6509	RW	Parameter #3[1,3]	UINT16	104(kvarh Import)*
6510	RW	Parameter #4[1,3]	UINT16	105 (kvarh Export)*
6511	RW	Parameter #5[1,3]	UINT16	108 (kVAh)*
6512	RW	Parameter #6[1,3]	UINT16	603 (kW Total Demand)*
6513	RW	Parameter #7[1,3]	UINT16	604 (kvar Total Demand)*
6514	RW	Parameter #8[1,3]	UINT16	605 (kVA Total Demand)*
6515	RW	Parameter #9[1,3]	UINT16	600 (Ia Demand)*
6516	RW	Parameter #101[1,3]	UINT16	601 (Ib Demand)*
6517	RW	Parameter #11[1,3]	UINT16	602 (Ic Demand)*
6518	RW	Parameter #12[1,3]	UINT16	109 (DI1 Pulse Counter)*
6519	RW	Parameter #13[1,3]	UINT16	110 (DI2 Pulse Counter)*
6520	RW	Parameter #14[1,3]	UINT16	111 (DI3 Pulse Counter)*
6521	RW	Parameter #15[1,3]	UINT16	0 (Not Used)
6522	RW	Parameter #16[1,3]	UINT16	0 (Not Used)

Table 5-28 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.
3) Please refer to Appendix A for a complete list of Data Recorder Parameters.

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
7001	RO	Current Season	UINT16	0 to 11 (Season #1 to #12)

7002	RO	Current Period	UINT16	0 to 11 (Period #1 to #12)
7003	RO	Current Daily Profile	UINT16	0 to 19 (Daily Profile #1 to #20)
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[2]	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 5-29 TOU Basic Setup

Notes:

1) If DI1 is not programmed as a **Tariff Switch**, the TOU will function based on the TOU Schedule. If at least one DI (DI1) is programmed as a **Tariff Switch**, the TOU Schedule will no longer be used and the Tariff switching will be based on status of the DIs.

2) 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 (0-37)	Month (1-12)	Day (1-31)	Hour (00-23)

Table 5-30 TOU Switch Time Format

5.12.2 Season

The PMC-340 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 19
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 19
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 19
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 19
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 19
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 19
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 19
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 19
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 19
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 19
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 19
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 19
46	RW	Season #12: Weekday#2 Daily Profile	UINT16	
47	RW	Season #12: Weekday#3 Daily Profile	UINT16	

Table 5-31 Season Setup

Notes:

1) **Start Date** for Season #1 is Jan. 1st and cannot be modified.
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-340 has two sets of Daily Profile setup parameters, one for each TOU.

Register Address	Property	Description	Format
7200~7223	RW	Daily Profile #1	See Table 5-34 Daily Profile Data Structure
7224~7247	RW	Daily Profile #2	
7248~7271	RW	Daily Profile #3	
7272~7295	RW	Daily Profile #4	
7296~7319	RW	Daily Profile #5	
7320~7343	RW	Daily Profile #6	
7344~7367	RW	Daily Profile #7	
7368~7391	RW	Daily Profile #8	
7392~7415	RW	Daily Profile #9	
7416~7439	RW	Daily Profile #10	
7440~7463	RW	Daily Profile #11	
7464~7487	RW	Daily Profile #12	
7488~7511	RW	Daily Profile #13	
7512~7535	RW	Daily Profile #14	
7536~7559	RW	Daily Profile #15	
7560~7583	RW	Daily Profile #16	
7584~7607	RW	Daily Profile #17	
7608~7631	RW	Daily Profile #18	
7632~7655	RW	Daily Profile #19	
7656~7679	RW	Daily Profile #20	

Table 5-32 TOU #1's Daily Profile Setup

Register Address	Property	Description	Format
8200~8223	RW	Daily Profile #1	See Table 5-34 Daily Profile Data Structure
8224~8247	RW	Daily Profile #2	
8248~8271	RW	Daily Profile #3	
8272~8295	RW	Daily Profile #4	
8296~8319	RW	Daily Profile #5	

8320~8343	RW	Daily Profile #6	
8344~8367	RW	Daily Profile #7	
8368~8391	RW	Daily Profile #8	
8392~8415	RW	Daily Profile #9	
8416~8439	RW	Daily Profile #10	
8440~8463	RW	Daily Profile #11	
8464~8487	RW	Daily Profile #12	
8488~8511	RW	Daily Profile #13	
8512~8535	RW	Daily Profile #14	
8536~8559	RW	Daily Profile #15	
8560~8583	RW	Daily Profile #16	
8584~8607	RW	Daily Profile #17	
8608~8631	RW	Daily Profile #18	
8632~8655	RW	Daily Profile #19	
8656~8679	RW	Daily Profile #20	

Table 5-33 TOU #2's Daily Profile Setup

Offset	Property	Description		Format	Note
+0	RW	Period #1 Start Time1		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, …, 3=T4
+6	RW	Period #4 Start Time		UINT16	See Period #2 Start Time
+7	RW	Period #4 Tariff		UINT16	0=T1, …, 3=T4
+8	RW	Period #5 Start Time		UINT16	See Period #2 Start Time
+9	RW	Period #5 Tariff		UINT16	0=T1, …, 3=T4
+10	RW	Period #6 Start Time		UINT16	See Period #2 Start Time
+11	RW	Period #6 Tariff		UINT16	0=T1, …, 3=T4
+12	RW	Period #7 Start Time		UINT16	See Period #2 Start Time
+13	RW	Period #7 Tariff		UINT16	0=T1, …, 3=T4
+14	RW	Period #8 Start Time		UINT16	See Period #2 Start Time
+15	RW	Period #8 Tariff		UINT16	0=T1, …, 3=T4
+16	RW	Period #9 Start Time		UINT16	See Period #2 Start Time
+17	RW	Period #9 Tariff		UINT16	0=T1, …, 3=T4
+18	RW	Period #10 Start Time		UINT16	See Period #2 Start Time
+19	RW	Period #10 Tariff		UINT16	0=T1, …, 3=T4
+20	RW	Period #11 Start Time		UINT16	See Period #2 Start Time
+21	RW	Period #11 Tariff		UINT16	0=T1, …, 3=T4
+22	RW	Period #12 Start Time		UINT16	See Period #2 Start Time
+23	RW	Period #12 Tariff		UINT16	0=T1, …, 3=T4

Table 5-34 Daily Profile Data Structure

Notes:

1) **Daily Profile #1's Period #1 Start Time** is always 00:00 and cannot be modified.
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 minimum interval of a period is 15 minutes.
4) 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-340 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 5-36
2	RW	Alternate Day #1 Daily Profile	UINT16	0 to 19
3	RW	Alternate Day #2 Date[1]	UINT32	Table 5-36
5	RW	Alternate Day #2 Daily Profile	UINT16	0 to 19
6	RW	Alternate Day #3 Date[1]	UINT32	Table 5-36
8	RW	Alternate Day #3 Daily Profile	UINT16	0 to 19
9	RW	Alternate Day #4 Date[1]	UINT32	Table 5-36
11	RW	Alternate Day #4 Daily Profile	UINT16	0 to 19
12	RW	Alternate Day #5 Date[1]	UINT32	Table 5-36
14	RW	Alternate Day #5 Daily Profile	UINT16	0 to 19
15	RW	Alternate Day #6 Date[1]	UINT32	Table 5-36
17	RW	Alternate Day #6 Daily Profile	UINT16	0 to 19
18	RW	Alternate Day #7 Date[1]	UINT32	Table 5-36
19	RW	Alternate Day #7 Daily Profile	UINT16	0 to 19
21	RW	Alternate Day #8 Date[1]	UINT32	Table 5-36
22	RW	Alternate Day #8 Daily Profile	UINT16	0 to 19
24	RW	Alternate Day #9 Date[1]	UINT32	Table 5-36
25	RW	Alternate Day #9 Daily Profile	UINT16	0 to 19
27	RW	Alternate Day #10 Date[1]	UINT32	Table 5-36
29	RW	Alternate Day #10 Daily Profile	UINT16	0 to 19
…		…		…
…		…		…
240	RW	Alternate Day #81 Date[1]	UINT32	Table 5-36
162	RW	Alternate Day #81 Daily Profile	UINT16	0 to 19
243	RW	Alternate Day #82 Date[1]	UINT32	Table 5-36
245	RW	Alternate Day #82 Daily Profile	UINT16	0 to 19
246	RW	Alternate Day #83 Date[1]	UINT32	Table 5-36
248	RW	Alternate Day #83 Daily Profile	UINT16	0 to 19
249	RW	Alternate Day #84 Date[1]	UINT32	Table 5-36
251	RW	Alternate Day #84 Daily Profile	UINT16	0 to 19
252	RW	Alternate Day #85 Date[1]	UINT32	Table 5-36
254	RW	Alternate Day #85 Daily Profile	UINT16	0 to 19
255	RW	Alternate Day #86 Date[1]	UINT32	Table 5-36
256	RW	Alternate Day #86 Daily Profile	UINT16	0 to 19
258	RW	Alternate Day #87 Date[1]	UINT32	Table 5-36
260	RW	Alternate Day #87 Daily Profile	UINT16	0 to 19
261	RW	Alternate Day #88 Date[1]	UINT32	Table 5-36
263	RW	Alternate Day #88 Daily Profile	UINT16	0 to 19
264	RW	Alternate Day #89 Date[1]	UINT32	Table 5-36
266	RW	Alternate Day #89 Daily Profile	UINT16	0 to 19
267	RW	Alternate Day #90 Date[1]	UINT32	Table 5-36
269	RW	Alternate Day #90 Daily Profile	UINT16	0 to 19

Table 5-35 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 (0-37)	Month (1-12)	Day (1-31)

Table 5-36 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-340 – Year / Month / Day / Hour / Minute / Second (Register # 60000 to 60002) and UNIX Time (Register # 60004). When sending time to the PMC-340 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	0-37 (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	This time shows the number of seconds since 00:00:00 January 1, 1970

Table 5-37 Time Registers

5.14 Clear/Reset Control

Register	Property	Description	Format	Note	Model	
					A	B
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 Peak Demand Log of This Month (Since Last Reset)[4]			▪	▪
9604	WO	Clear All Demand Registers[5]			▪	▪
9605	WO	Clear Max./Min. Log of This Month (Since Last Reset)[6]			▪	▪
9606	WO	Clear All Max./Min. Log[7]			▪	▪
9607	WO	Clear Device Operating Time			▪	▪
9608	WO	Clear All Data[8]			▪	▪
9609	WO	Clear DI1 Pulse Counter				▪
9610	WO	Clear DI2 Pulse Counter				▪
9611	WO	Clear DI3 Pulse Counter				▪
9612	WO	Clear Data Recorder Logs				▪
9613	WO	Clear SOE				▪
9614	WO	Clear Counters of Important Setup Parameters Changes				▪
9615~9618	WO	Reserved				

Table 5-38 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 the 3-Ø Total and Per-Phase 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 Peak Demand Log of This Month** register to clear Peak Demand Log of This Month (Since Last Reset) when the **Self-Read Time** register is set for automatic Self-Read operation. The Peak 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 Peak Demand of This Month (Since Last Reset) will be transferred to the Peak 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, Peak Demand Log of This Month (Since Last Reset) and Last Month (Before Last Reset).
6) Writing 0xFF00 to the **Clear Max./Min. Log of This Month** register to clear the Max./Min. log of This Month (Since Last Reset) when the **Self-Read Time** register is set for automatic Self-Read operation. The Max./Min. log 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./Min. log of This Month (Since

Last Reset) will be transferred to the Max./Min. log of Last Month (Before Last Reset) and then cleared.

7) Writing 0xFF00 to the **Clear All Max./Min. Log** register to clear both the Max./Min Log of This Month (Since Last Reset) and the Max./Min. Log of Last Month (Before Last Reset).

8) Writing 0xFF00 to the **Clear All Data** register to perform the Clear operation for the action specified in registers # 9600 to 9607 and # 9609 to 9613.

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. 140110 means January 10, 2014
60223	9823	RO	Firmware Update Date: Month	UINT16	
60224	9824	RO	Firmware Update Date: Day	UINT16	
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 3: Reserved
					B4: Current Type • 0=100A Direct Input • 1=5A CT Input
					B5: Reserved

Table 5-39 Meter Information

Notes:

1) The Meter Model appears in registers 60200 to 60219 and contains the ASCII encoding of the string “PMC-340” as shown in the following table.

Register	Value(Hex)	ASCII
60200	0x0050	P
60201	0x004D	M
60202	0x0043	C
60203	0x002D	-
60204	0x0033	3
60205	0x0034	4
60206	0x0030	0
60207-60219	0x2020	Null

Table 5-40 ASCII Encoding of “PMC-340”

Appendix A Data Recorder Parameter List

ID	Parameters	Format	ID	Parameters	Format
Basic and Energy Measurements			176	kvarh Total	INT32
1	Uan	Float	177	kVAh	INT32
2	Ubn	Float	178	kvarh Q1	INT32
3	Ucn	Float	179	kvarh Q2	INT32
4	Uln avg	Float	180	kvarh Q3	INT32
5	Uab	Float	181	kvarh Q4	INT32
6	Ubc	Float	182	kWh Import of T1	INT32
7	Uca	Float	183	kWh Export of T1	INT32
8	Ull avg	Float	184	kvarh Import of T1	INT32
9	Ia	Float	185	kvarh Export of T1	INT32
10	Ib	Float	186	kVAh of T1	INT32
11	Ic	Float	187	kWh Import of T2	INT32
12	I avg	Float	188	kWh Export of T2	INT32
13	I4	Float	189	kvarh Import of T2	INT32
14	kWa	Float	190	kvarh Export of T2	INT32
15	kWb	Float	191	kVAh of T2	INT32
16	kWc	Float	192	kWh Import of T3	INT32
17	kW Total	Float	193	kWh Export of T3	INT32
18	kvara	Float	194	kvarh Import of T3	INT32
19	kvarb	Float	195	kvarh Export of T3	INT32
20	kvarc	Float	196	kVAh of T3	INT32
21	kvar Total	Float	197	kWh Import of T4	INT32
22	kVAa	Float	198	kWh Export of T4	INT32
23	kVAb	Float	199	kvarh Import of T4	INT32
24	kVAc	Float	200	kvarh Export of T4	INT32
25	kVA Total	Float	201	kVAh of T4	INT32
26	PFa	Float	**Phase C (L3) Energy Measurements**		
27	PFb	Float	202	kWh Import	INT32
28	PFc	Float	203	kWh Export	INT32
29	PF Total	Float	204	kWh Net	INT32
30	Frequency	Float	205	kWh Total	INT32
31	Uan/Uab (3P3W) Angle	Float	206	kvarh Import	INT32
32	Ubn/Ubc (3P3W) Angle	Float	207	kvarh Export	INT32
33	Ucn/Uca (3P3W) Angle	Float	208	kvarh Net	INT32
34	Ia Angle	Float	209	kvarh Total	INT32
35	Ib Angle	Float	210	kVAh	INT32
36	Ic Angle	Float	211	kvarh Q1	INT32
37	Fundamental PFa	Float	212	kvarh Q2	INT32
38	Fundamental PFb	Float	213	kvarh Q3	INT32
39	Fundamental PFc	Float	214	kvarh Q4	INT32
Basic Energy Measurements			215	kWh Import of T1	INT32
100	kWh Import	INT32	216	kWh Export of T1	INT32
101	kWh Export	INT32	217	kvarh Import of T1	INT32
102	kWh Net	INT32	218	kvarh Export of T1	INT32
103	kWh Total	INT32	219	kVAh of T1	INT32
104	kvarh Import	INT32	220	kWh Import of T2	INT32
105	kvarh Export	INT32	221	kWh Export of T2	INT32
106	kvarh Net	INT32	222	kvarh Import of T2	INT32
107	kvarh Total	INT32	223	kvarh Export of T2	INT32
108	kVAh	INT32	224	kVAh of T2	INT32
109	DI1 Pulse Counter	INT32	225	kWh Import of T3	INT32
110	DI2 Pulse Counter	INT32	226	kWh Export of T3	INT32
111	DI3 Pulse Counter	INT32	227	kvarh Import of T3	INT32
112	kvarh Q1	INT32	228	kvarh Export of T3	INT32
113	kvarh Q2	INT32	229	kVAh of T3	INT32
114	kvarh Q3	INT32	230	kWh Import of T4	INT32
115	kvarh Q4	INT32	231	kWh Export of T4	INT32
116	kWh Import of T1	INT32	232	kvarh Import of T4	INT32
117	kWh Export of T1	INT32	233	kvarh Export of T4	INT32
118	kvarh Import of T1	INT32	234	kVAh of T4	INT32
119	kvarh Export of T1	INT32	**Power Quality Measurements**		
120	kVAh of T1	INT32	300	Ia TDD	Float

121	kWh Import of T2	INT32	301	Ib TDD	Float
122	kWh Export of T2	INT32	302	Ic TDD	Float
123	kvarh Import of T2	INT32	303	Ia TDD Odd	Float
124	kvarh Export of T2	INT32	304	Ib TDD Odd	Float
125	kVAh of T2	INT32	305	Ic TDD Odd	Float
126	kWh Import of T3	INT32	306	Ia TDD Even	Float
127	kWh Export of T3	INT32	307	Ib TDD Even	Float
128	kvarh Import of T3	INT32	308	Ic TDD Even	Float
129	kvarh Export of T3	INT32	309	Ia K-factor	Float
130	kVAh of T3	INT32	310	Ib K-factor	Float
131	kWh Import of T4	INT32	311	Ic K-factor	Float
132	kWh Export of T4	INT32	312	Ia C-factor	Float
133	kvarh Import of T4	INT32	313	Ib C-factor	Float
134	kvarh Export of T4	INT32	314	Ic C-factor	Float
135	kVAh of T4	INT32	315	Voltage Unbalance	Float
Phase A (L1) Energy Measurements			316	Current Unbalance	316
136	kWh Import	INT32	317	Uan/Uab THD	Float
137	kWh Export	INT32	318	Ubn/Ubc THD	Float
138	kWh Net	INT32	319	Ucn/Uca THD	Float
139	kWh Total	INT32	320	Uan/Uab TOHD	Float
140	kvarh Import	INT32	321	Ubn/Ubc TOHD	Float
141	kvarh Export	INT32	322	Ucn/Uca TOHD	Float
142	kvarh Net	INT32	323	Uan/Uab TEHD	Float
143	kvarh Total	INT32	324	Ubn/Ubc TEHD	Float
144	kVAh	INT32	325	Ucn/Uca TEHD	Float
145	kvarh Q1	INT32	326	Uan/Uab HD02	Float
146	kvarh Q2	INT32	327	Ubn/Ubc HD02	Float
147	kvarh Q3	INT32	328	Ucn/Uca HD02	Float
148	kvarh Q4	INT32		**…**	Float
149	kWh Import of T1	INT32	413	Ia HD31	Float
150	kWh Export of T1	INT32	414	Ib HD31	Float
151	kvarh Import of T1	INT32	415	Ic HD31	Float
152	kvarh Export of T1	INT32	**Demand**		
153	kVAh of T1	INT32	600	Ia Present Demand	Float
154	kWh Import of T2	INT32	601	Ib Present Demand	Float
155	kWh Export of T2	INT32	602	Ic Present Demand	Float
156	kvarh Import of T2	INT32	603	kW Present Demand	Float
157	kvarh Export of T2	INT32	604	kvar Present Demand	Float
158	kVAh of T2	INT32	605	kVA Present Demand	Float
159	kWh Import of T3	INT32	606	Ia Max. Demand	Float
160	kWh Export of T3	INT32	607	Ib Max. Demand	Float
161	kvarh Import of T3	INT32	608	Ic Max. Demand	Float
162	kvarh Export of T3	INT32	609	kW Max. Demand	Float
163	kVAh of T3	INT32	610	kvar Max. Demand	Float
164	kWh Import of T4	INT32	611	kVA Max. Demand	Float
165	kWh Export of T4	INT32	612	T1 kW Max. Demand	Float
166	kvarh Import of T4	INT32	613	T1 kvar Max. Demand	Float
167	kvarh Export of T4	INT32	614	T1 kVA Max. Demand	Float
168	kVAh of T4	INT32	615	T2 kW Max. Demand	Float
Phase B (L2) Energy Measurements			616	T2 kVA Max. Demand	408
169	kWh Import	INT32	617	T2 kVA Max. Demand	Float
170	kWh Export	INT32	618	T3 kW Max. Demand	Float
171	kWh Net	INT32	619	T3 kvar Max. Demand	Float
172	kWh Total	INT32	620	T3 kVA Max. Demand	Float
173	kvarh Import	INT32	621	T4 kW Max. Demand	Float
174	kvarh Export	INT32	622	T4 kvar Max. Demand	Float
175	kvarh Net	INT32	623	T4 kVA Max. Demand	Float

Appendix B Technical Specifications

Inputs (L1, L2, L3, N)	
Voltage (Un)	240VLN
Range	0.7 to 1.1 Un
Burden	<10VA/phase
Direct Input	
Current (Ib/Imax)	20A/100A
Range	0.4% Ib to Imax
Starting Current	0.4% Ib
Burden	<4VA/phase
Wire Size	Maximum 35mm^2 (3 AWG)
Torque for terminals	Maximum 2.5 N.m
CT Input	
Current (In/Imax)	5A/6A
Range	(0.1%-120%) In
Starting Current	0.1% In
Burden	<0.5VA/phase
Frequency	45Hz-65Hz
Solid State Energy Pulse Output (Selectable - kWh/kvarh)	
Pulse Constant	1/10/100/1000/3200 imp/kWh (imp/kvarh)
Isolation	Optical
Max. Load Voltage	80V
Max. Forward Current	50mA
Pulse Width	60-150ms
Communications	
RS-485	Modbus RTU
Baudrate	1200/2400/4800/9600/19200 bps
Maximum Wire Size	1.5 mm^2 (16 AWG)
Maximum Torque	0.45 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
Pollution Degree	2
Mechanical Characteristics	
Mounting	DIN Rail
Unit Dimensions	126x90x65mm
Shipping Weight	165x140x110mm
Shipping Dimensions	TBD
IP Rating	51 (Front), 30 (Body)

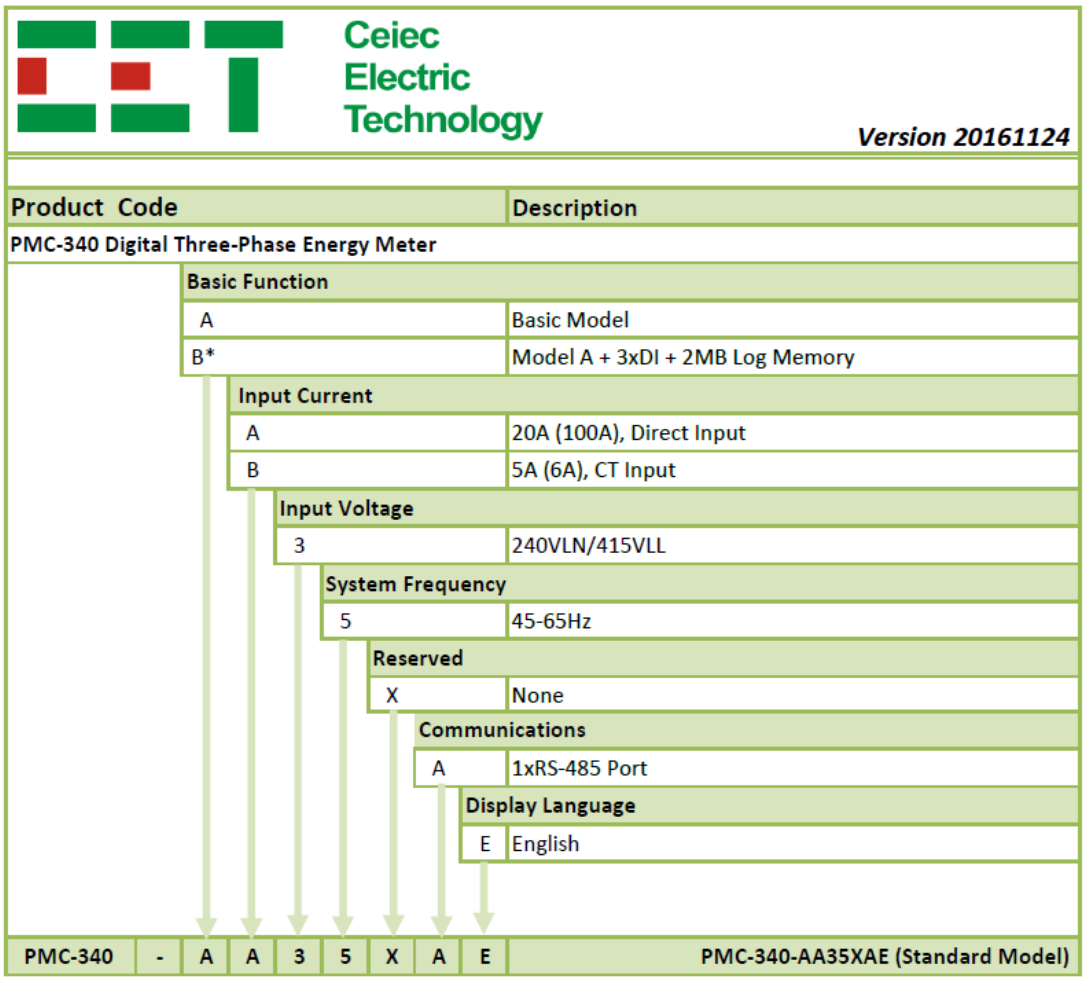
Accuracy

Parameters	Accuracy	Resolution
Voltage	±0.5%	0.01V
Current	±0.5%	0.001A
kW, kvar, kVA	±1%	0.01kW/kvar/kVA
kWh, kVAh	IEC 62053-21 Class 1 for Direct Input IEC 62053-22 Class 0.5S for 5A CT Input	0.01kxh
kvarh	IEC 62053-23 Class 2	0.01kvarh
PF	±1%	0.001
Frequency	±0.02Hz	0.01Hz
Harmonics	IEC 61000-4-7 Class B	0.1%
TDD	IEC 61000-4-7 Class B	0.1%
Crest Factor	0.5%	-
K-Factor	5%	-

Appendix C Standards of Compliance

Safety Requirements	
CE LVD 2014 / 35 / EU	EN 61010-1: 2010, EN 61010-2-030: 2010
Insulation AC Voltage (Dielectric test) Impulse voltage	IEC 62052-11: 2003 NMI M6-1 (PMC-340-B) 4kV @ 1 minute 10kV, 1.2/50µs (NMI M-6)
Electrical safety in low voltage distribution systems up to 1000Vac and 1500 Vdc	IEC 61557-12: 2008 (PMD)
Electromagnetic Compatibility CE EMC Directive 2014 / 30 / EU (EN 61326: 2013)	
Immunity Tests	
Electrostatic Discharge	EN 61000-4-2:2009
Radiated Fields	EN 61000-4-3:2006+A1:2008+A2:2010
Fast Transients	EN 61000-4-4:2012
Surges	EN 61000-4-5:2006
Conducted Disturbances	EN 61000-4-6:2009
Magnetic Fields	EN 61000-4-8:2010
V dips, Interruptions & Variations	EN 61000-4-11:2004
Oscillatory Waves	EN 61000-4-12:2006
Radio Disturbances	CISPR 22:2006, Level B
Emission Tests	
Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment	EN 55011: 2009+A1:2010 (CISPR 11)
Limits and methods of measurement of radio disturbance characteristics of information technology equipment	EN 55022: 2010+AC: 2011 (CISPR 22)
Limits for harmonic current emissions for equipment with rated current ≤16 A	EN 61000-3-2: 2014
Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤16 A	EN 61000-3-3: 2013
Emission standard for residential, commercial and light-industrial environments	EN 61000-6-4: 2007+A1: 2011
Electromagnetic Emission Tests for Measuring Relays and Protection Equipment	EN 61000-4-12: 2006
Mechanical Tests	
Spring Hammer Test	IEC 62052-11: 2003
Vibration Test	IEC 62052-11: 2003
Shock Test	IEC 62052-11: 2003
Revenue Metering Approval	
NMI M-6 of Australia	Approval Mark: NMI 14/2/102 UL Ref. # R4787950540-1-DC & R4787950540-2-CT

Appendix D Ordering Guide



* Additional charges apply

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