PMC-352-C

3-Phase LoRa DIN Energy Meter

User Manual

Version: V1.1A

November 30, 2023

Standards Compliance

$\mathsf{C} \mathsf{E}$

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-352-C 3-Phase LoRa DIN Energy Meter. Throughout the manual the term "meter" generally refers to all models.

This chapter provides an overview of the PMC-352-C meter and summarizes many of its key features.

1.1 Overview

The PMC-352-C 3-Phase LoRa DIN Energy Meter is CET's latest offer for the wireless IoT energy monitoring market using the LoRa technology for its wireless communication capability. Designed in a compact DIN form factor measuring 36x65x90mm, it is perfect for energy and condition monitoring applications in space-limited power distribution board. The PMC-352-C comes standard with 4xNTC Inputs for temperature monitoring and 3xDI for status monitoring. With a standard RS-485 and optionally LoRa supporting the Modbus RTU protocol and IEC 62053-21 Class 1 compliance, the PMC-352-C becomes a vital component of an intelligent, distributed and wireless IoT based EMS or Condition Monitoring System.

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

Following is a list of typical applications for the PMC-352-C:

- Industrial, Commercial and Utility Substation Monitoring
- Sub-metering and Cost Allocation
- Wireless Energy & Condition Monitoring of Busbar or Machines
- Building, Factory and Process Automation
- Energy Management and Power Quality Monitoring
- Production Line Energy Management Refinement

1.2 Features

Ease of use
- Easy installation with DIN Rail mounting, no tools required
- Simple commissioning and low-deployment cost with Split-Core CT and wireless IoT communication

Basic Measurements
- ULN, ULL and I per Phase and Average
- P, Q, S and PF per Phase and Total
- kWh, kvarh Import/Export/Net/Total and kVAh Total
- Frequency and Device Operating Time (Running Hours)

Enhanced Measurements
- U and I THD, TOHD, TEHD and Individual Harmonics up to 31st
- U and I Unbalance and Phase Angles
- Fundamental kW and PF
- kvarh Q1-Q4
- Present Demands for kW/kvar/kVA total and per Phase Current

Setpoints
- 10 user programmable Setpoints with extensive list of monitoring parameters including Voltage, Current, Power and THD, etc.
- Configurable thresholds, time delays and parameters

SOE Log
- 16 events time-stamped to ±1ms resolution
- Setup changes, Setpoint, DI status changes, Clear Actions, etc.

Standard I/O
- 3xDI for Status Monitoring or Utility Pulse Counting
- 4xNTC Inputs for Temperature Monitoring (sensor not included)

Diagnostics
- Frequency Out-of-Range, Loss of Voltage / Current
- kW Direction per Phase and Total, Possible incorrect CT Polarity
- Incorrect U & I Phase Sequence

Communications
- Optically isolated RS-485 port at 1200 to 38,400 bps
- Built-in LoRa with configurable ISM Bands for EU863-870, RU864-870, IN865-867, US902-928, AU915-928, AS920-923 and AS923-925
- Modbus RTU protocol

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

1.3 PMC-352-C's application in a wireless IoT based EMS using LoRa network

The PMC-352-C can be used to monitor 3-phase or single-phase power system and become a vital component of an intelligent, distributed and wireless IoT based EMS or Condition Monitoring System.
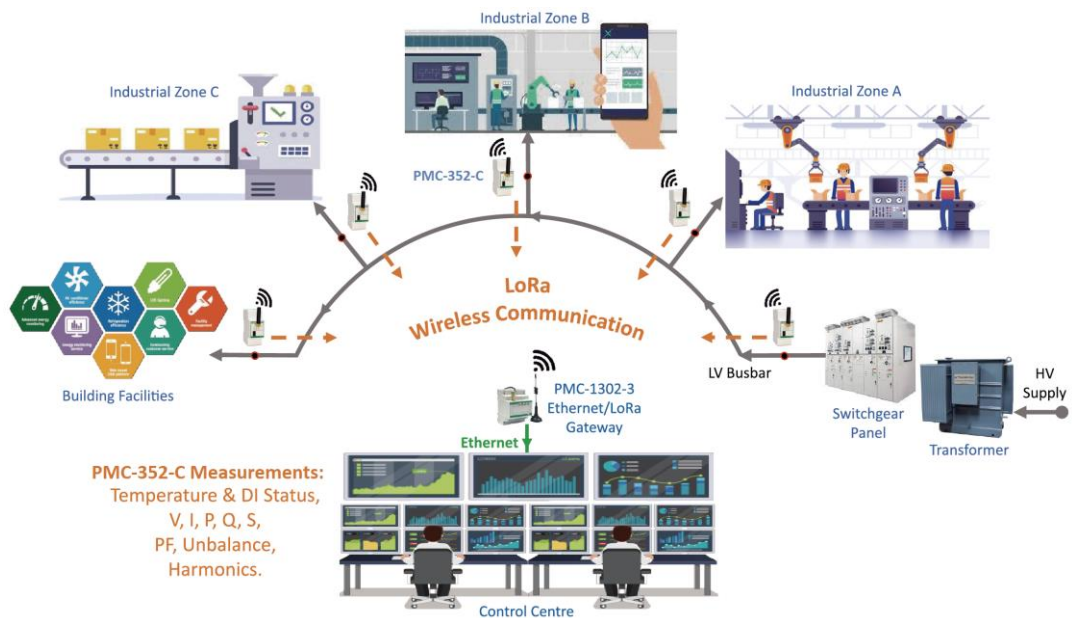
Figure 1- 1 PMC-352-C's application in a wireless IoT based EMS using LoRa network

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 support@cet-global.com

Chapter 2 Installation

⚠ Caution

Installation of the PMC-352-C should only be performed by qualified, competent personnel who 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

2.1.1 Main Unit

A Voltage Phase Active Indicator
B Device Running Status
C Infrared communication port
D LoRa Antenna (Optional)
E Communication Indicator
F Alarm Indicator
G 4xNTC Input
H 3xDigital Input
I 1xRS-485
J 3xCurrent Input
K 3xVoltage Input
L Power Supply (Optional)
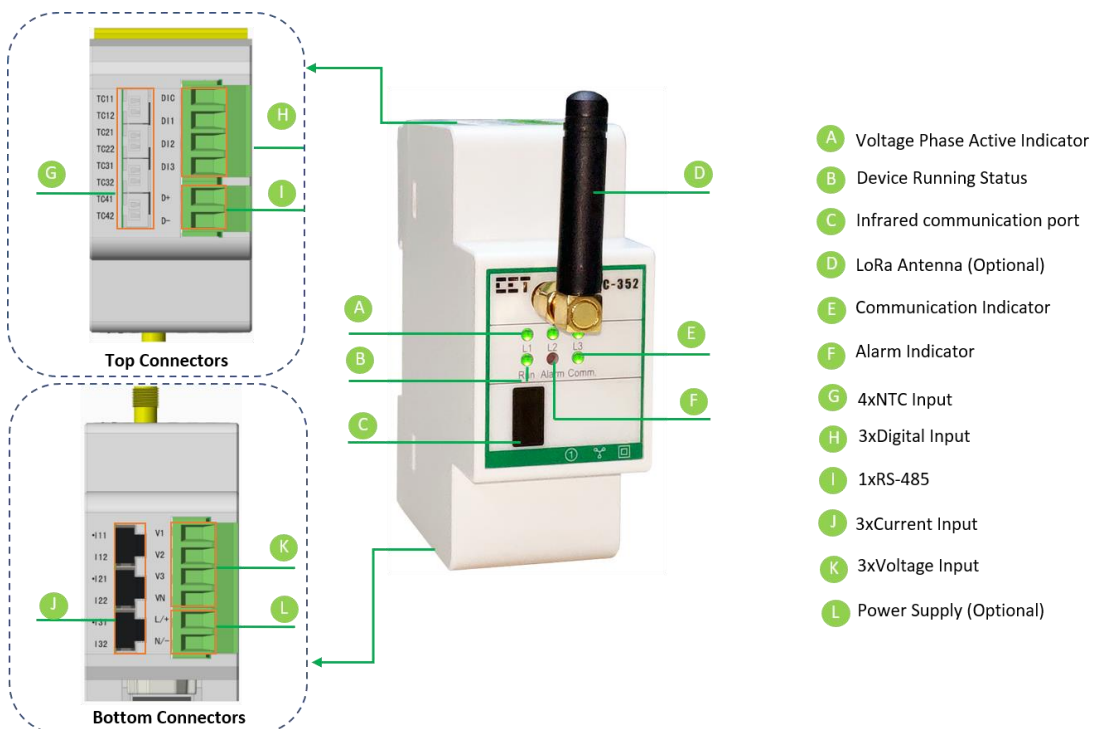
Figure 2-1 Appearance

2.1.2 LED Indicator

There are six LED indicators on the PMC-352-C's Front Panel as described below:

Indicator	Color	Status	Description
L1/L2/L3	Green	On	Register 6040 is enabled and the corresponding Voltage Phase is active
		Off	Register 6040 is enabled and the corresponding Voltage Phase is inactive
		All off	Register 6040 is disabled
Run	Green	Blink for one second	Device is running normally
		Off	Power Off or Device is running abnormally
Alarm	Red	On	Setpoint Alarm
Comm.	Green	Flashing	Receiving or transmitting data via RS-485 or LoRa
		Off	No Communication

Table 2-1 LED Indicators

2.1.3 Split-Core CT Appearances & Specifications

Split-Core CT Appearances & Specifications

PMC-SCCT-5A-2mA-16-A
Input: 5A
Output: 2mA

PMC-SCCT-100A-40mA-16-A/
PMC-SCCT-200A-40mA-24-A/
PMC-SCCT-400A-40mA-35-A
Input: 100A/200A/400A
Output: 40mA

PMC-SCCT-800A-40mA-A/
PMC-SCCT-1600A-40mA-A
Input: 800A/1600A
Output: 40mA
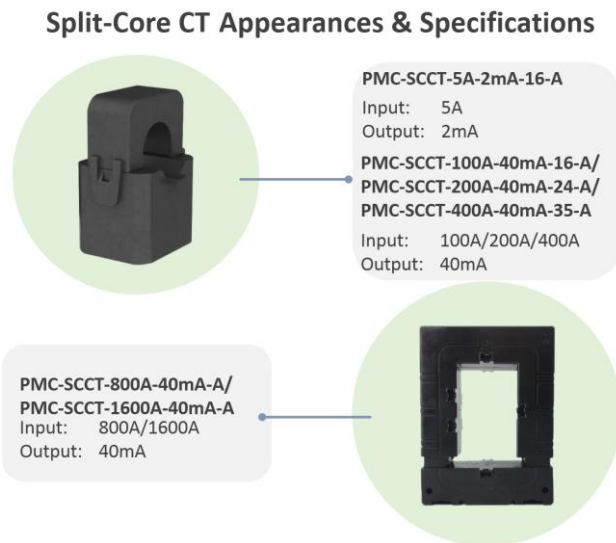
Figure 2-2 Split-Core CT Appearances & Specifications

2.1.4 Antenna Appearances & Specifications

2.5dBi Antenna

Frequency Range: 860-935MHz
Band Width: 75MHz
Impedance: 50Ω
Power Capability: 50W
Height: 42±3mm
VSWR: ≤2
(Voltage Standing Wave Ratio)
Gain: 2.5dBi

2dBi Antenna

Frequency Range: 860-935MHz
Band Width: 75MHz
Impedance: 50Ω
Power Capability: 50W
Height: 91±5mm
VSWR: ≤2
(Voltage Standing Wave Ratio)
Gain: 2dBi

Figure 2-3 Antenna Appearances & Specifications

2.1.5 Connecting Cable (For 800A/40mA and 1600A/40mA SCCT only)

PMC-BCC-350-2
Length: 2m
Figure 2-4 Connecting Cable

2.2 Dimensions

2.2.1 Unit Dimensions

Unit: mm

Front View   **Side View**   **Bottom View**
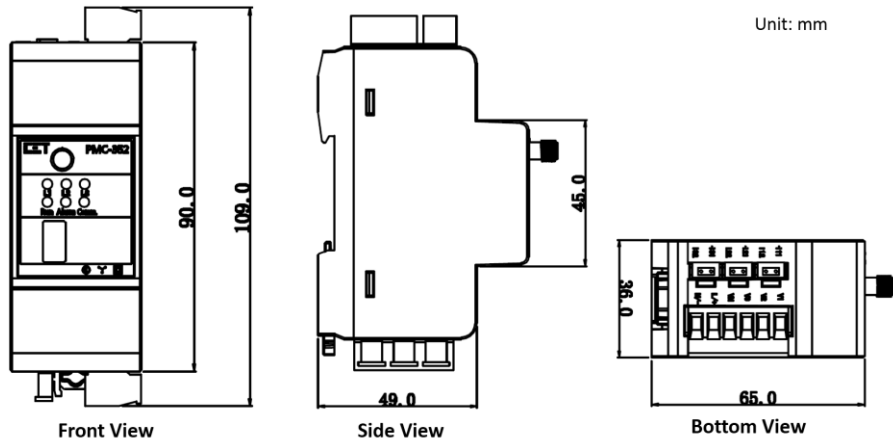
Figure 2-5 Unit Dimensions

2.2.2 Terminal Dimensions

Terminal	Terminal Dimensions	Wire Size	Max. Torque
Voltage Input (V1, V2, V3, VN)			
Power Supply (L/+, N/-)	2.6mm x 3.2mm	1.5mm²	5.0 kgf.cm/M3.0 (4.3 lb-in)
DI (DIC, DI1 to DI3)			
RS-485 (D+, D-)			
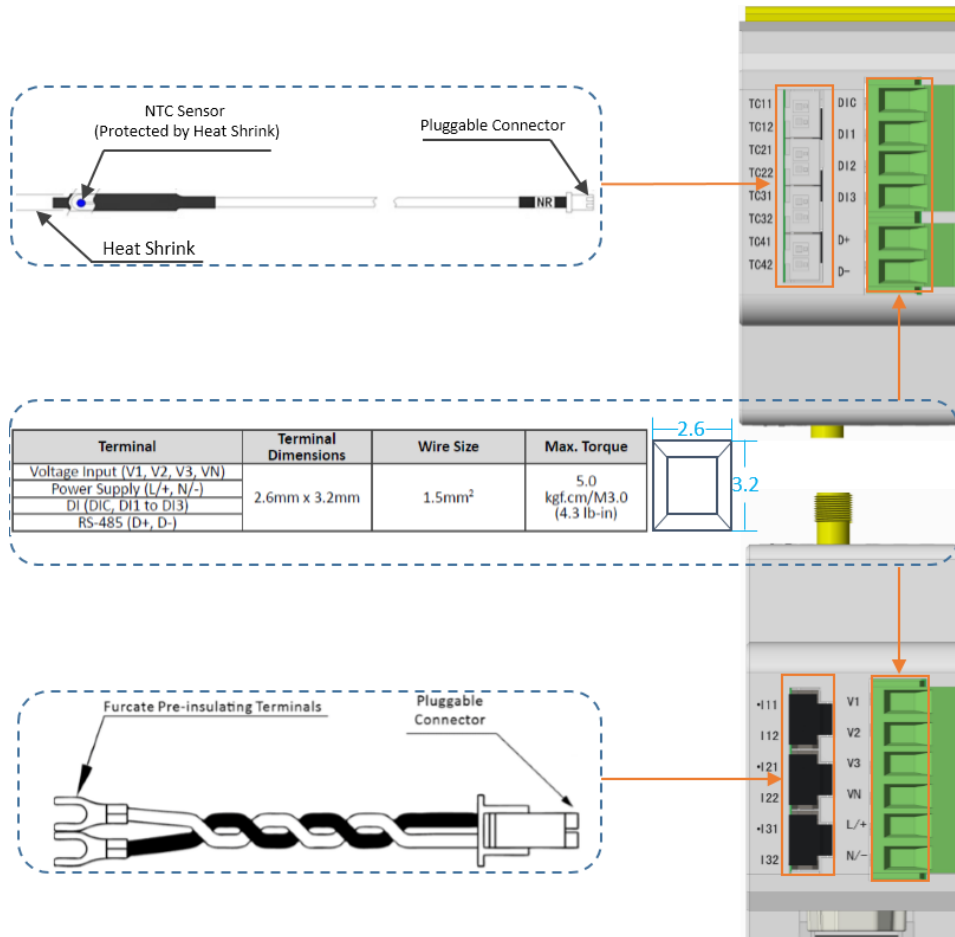
Figure 2-6 Terminal Dimensions

2.2.3 CT Dimensions

2.2.3.1 5A/2mA, 100A/40mA, 200A/40mA or 400A/40mA SCCT
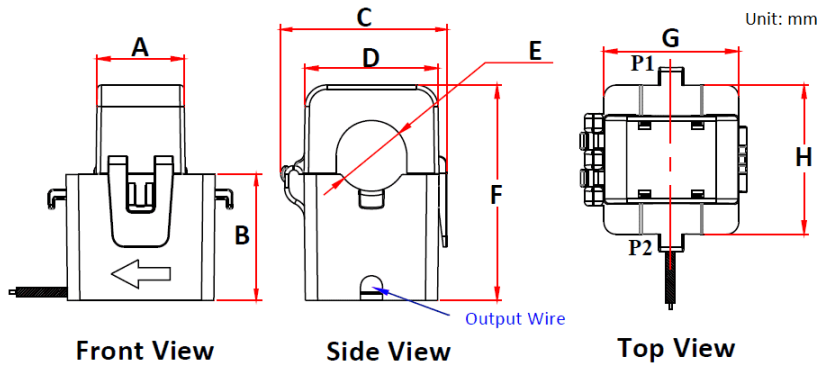
Model	A	B	C	D	E	F	G	H
PMC-SCCT-5A-2mA-16-A	20	26.5	36.3	30	Ø16	47	30	32.5
PMC-SCCT-100A-40mA-16-A	19.9	28.6	38	30.26	Ø16.1	48.9	30.7	33.9
PMC-SCCT-200A-40mA-24-A	22	40	54	43	Ø24	71	43	37
PMC-SCCT-400A-40mA-35-A	25	47	65	56	Ø35	86	56	43

Table 2-2 5A/2mA, 100A/40mA, 200A/40mA or 400A/40mA SCCTs Dimension

2.2.3.2 800A Split-Core CT (PMC-SCCT-800A-40mA-A)
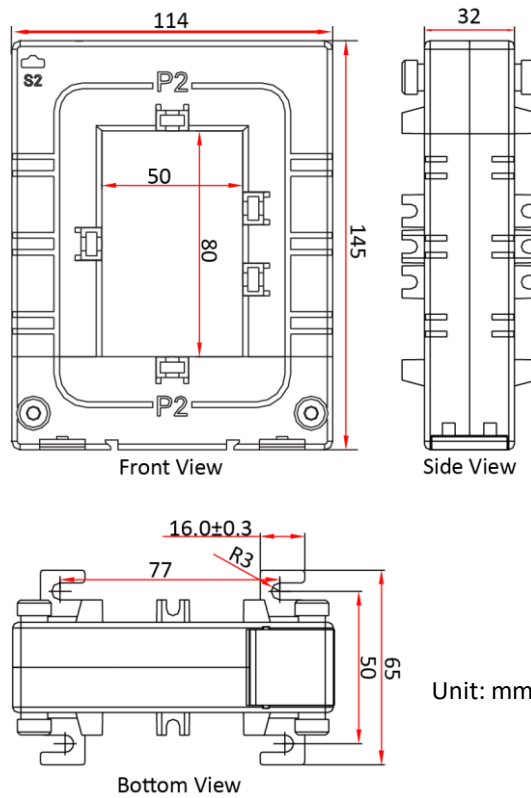
Figure 2-7 800A SCCT Dimension

2.2.3.3 1600A Split-Core CT (PMC-SCCT-1600A-40mA-A)

Unit: mm
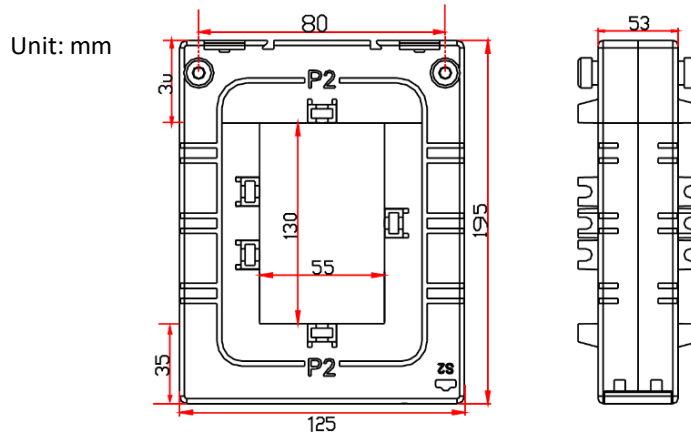
Figure 2-8 1600A SCCT Dimension

2.2.4 NTC Dimensions

2.2.4.1 NTC-104/NTC-1043/NTC-1044

Dual Wire White Cable (2*7*0.15), L=2000±30mm

Heat Shrink (Yellow, Green, Red)

Φ4*30mm Nickel-plated Copper (Protected by Heat Shrink)

NR

NTC Thermistor (Protected by Heat Shrink)

White Pluggable Connector
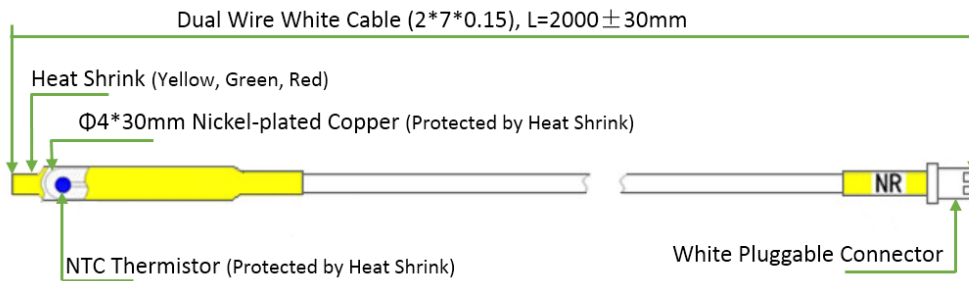
Figure 2-9 NTC-104/NTC-1043/NTC-1044 Dimensions

2.2.4.2 NTC-104M4/NTC-104M10

Ring Connector (φ4mm or φ10mm)

Stainless Steel
(Protected by Heat Shrink)

Dual wire Black SR Cable (2*7*0.15)
L=2000±30mm

NR

Black   Yellow

White Pluggable Connector

Heat Shrink

NTC Thermistor (Protected by Heat Shrink)
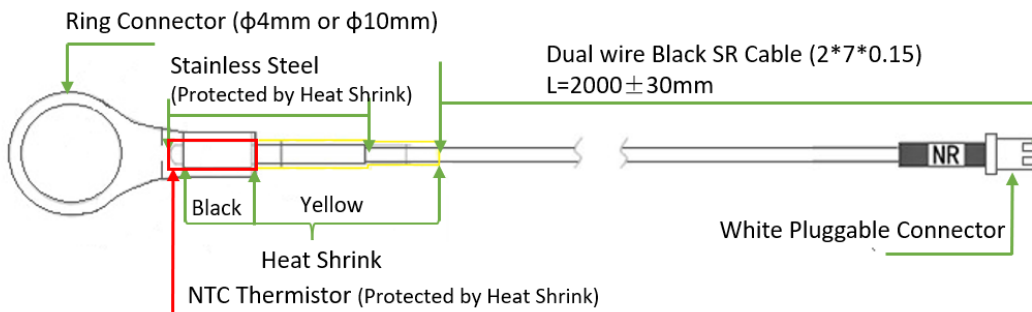
Figure 2-10 NTC-104M4/NTC-104M10 Dimensions

2.3 Mounting

The PMC-352-C should be installed in a dry environment with no dust and kept away from heat, radiation and electrical noise source.

1. Before installation, make sure that the DIN Rail is already in place.
2. Move the installation clips at the back of the PMC-352-C downward to the "unlock" position.
3. Align the top of the mounting channel at the back of the PMC-352-C at an angle against the top of the DIN Rail as shown in Figure 2-11 right.
4. Rotate the bottom of the PMC-352-C towards the back while applying a slight pressure to make sure that the device is completely and securely fixed on to the DIN Rail.
5. Push the installation clips upward to the "lock" position to secure the PMC-352-C on to the DIN Rail.
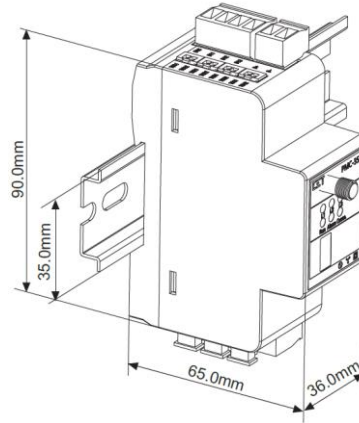
Figure 2-11 Installation

2.4 Wiring Mode

Please read this section carefully before installation and choose the correct wiring method for your power system.
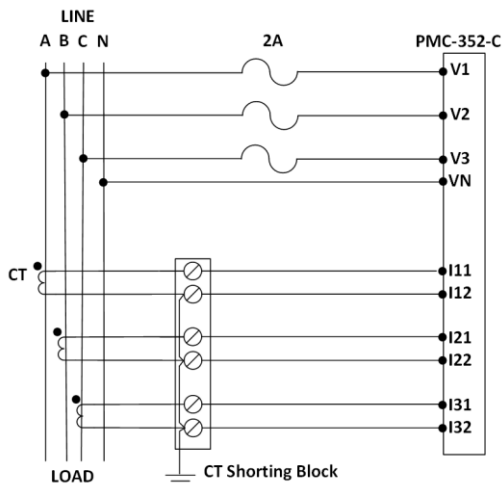
3P4W with 3CTs
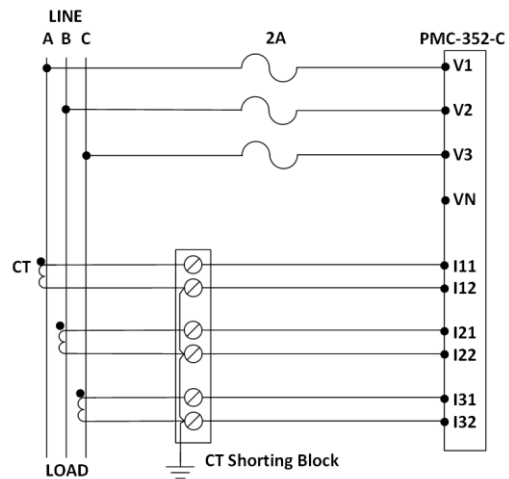
3P3W with 3CTs
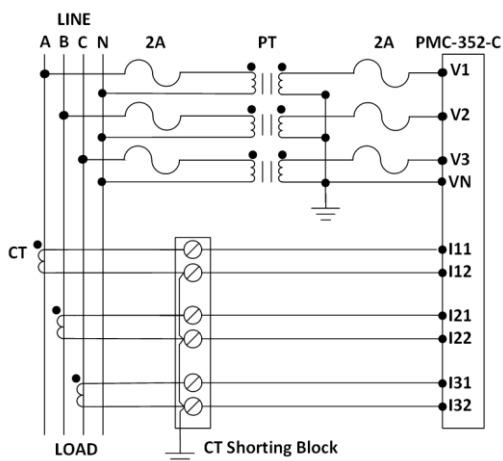
3P4W with 3PTs, 3CTs
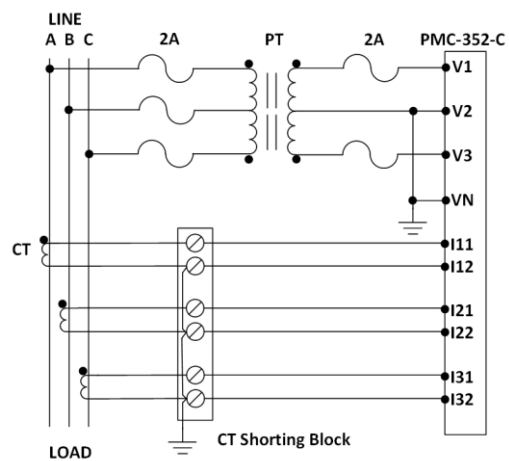
3P3W with 2PTs, 3CTs
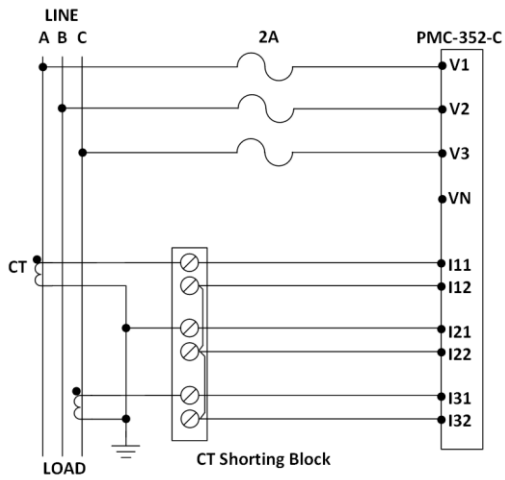
3P3W Direct Connection with 2CTs
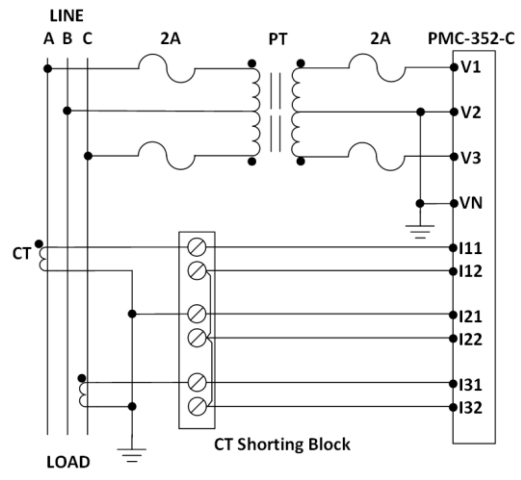
3P3W Direct Connection with 2PTs, 2CTs
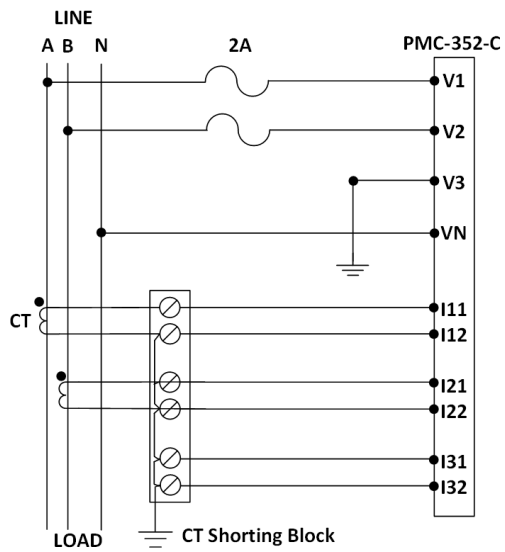
1P3W with 2CTs*

1P2W Uln with 1CT*
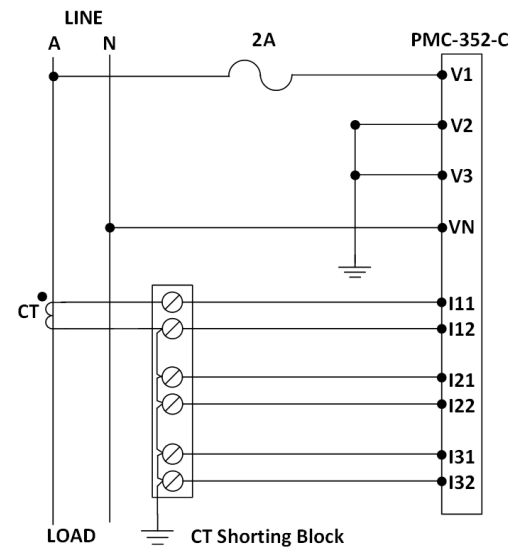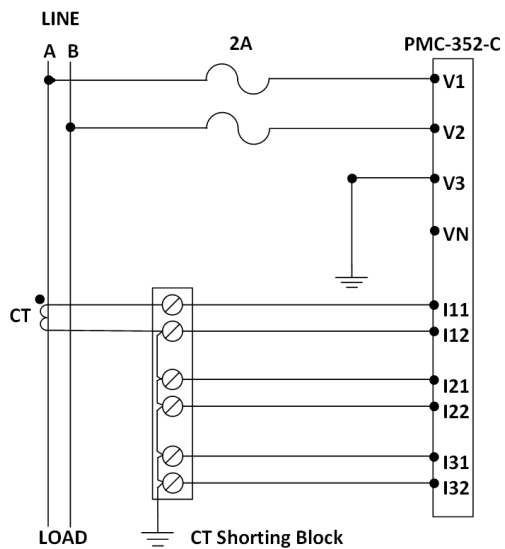
1P2W Ull with 1CT*
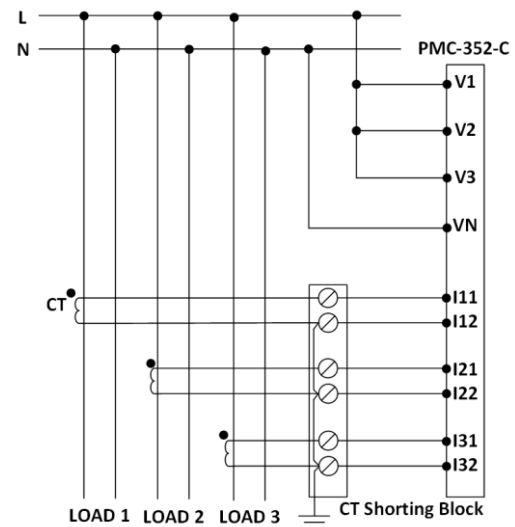
3x1P with 3CTs*

*Only applicable to the PMC-352-C with independent power supply option

Figure 2-12 Wiring Modes

2.5 SCCT Installation

 Caution

Please make sure that the circuit is de-energized before installing the SCCT for maximum safety. Do not open circuit the SCCT's secondary output under any circumstances while the circuit is energized. Failure to observe proper precaution while working with this product may result in serious injury or death.

2.5.1 Wiring for 5A/2mA, 100A/40mA, 200A/40mA or 400A/40mA SCCT

Steps:
  a. These SCCTs come with a pluggable connector at the end of the output wires. Insert the 2-pin pluggable connector securely into the Current Input terminal on the PMC-352-C.

  b. Open the SCCT by slightly pulling on the clip. Please ensure that SCCT's contact surface is clean and without contaminants for best accuracy performance.

  c. Put the cable through the opening of the SCCT and make sure that Current flow direction is aligned with the arrow marking on the SCCT. Close the SCCT and make sure that the clip is securely latched.

  d. Secure the cable to the SCCT with a wire strap.

Figure 2-13 5A/2mA, 100A/40mA, 200A/40mA or 400A/40mA SCCT Installation

2.5.2 Wiring for 800A/40mA or 1600A/40mA SCCT
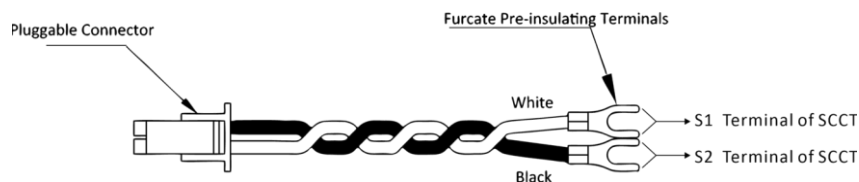
Steps:
  1. Connect the white and black leads with the spade connector of the PMC-BCC-350-2 to the SCCT's S1 and S2 terminals, respectively, and insert the 2-pin pluggable connector to the meter's Current Input terminal of the PMC-352-C.

  2. Open the SCCT by removing the thumb-screws that hold the SCCT together and make sure that SCCT's contact surface is clean and without contaminants for best accuracy performance.

  3. Install the SCCT around the busbar and then carefully secure it using the provided mounting fixtures such as mounting bolts and insulation caps as shown below.

  4. Reassemble the SCCT and tighten the thumb screws.
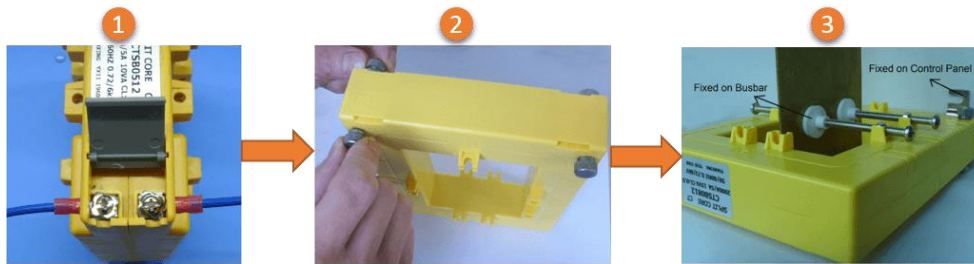
Figure 2-14 800A/40mA, 1600A/40mA SCCT installation

Notes:
1. Please separate the adjacent CTs by about 2 cm to reduce potential magnetic interference.
2. Please ensure the Load Current does not exceed the CT's Primary Current specification.

2.6 LoRa Antenna Installation

Connect either the 2dBi or 2.5dBi antenna to the PMC-352-C by applying the correct torque to tighten the connection as shown in the figure below. For best communication performance, the antenna should be mounted outside of a metal enclosure and preferably positioned vertically. The base of the 2dBi antenna is equipped with a magnetic coupler for easy mounting on metal surface.

2dBi Antenna Installation   **2.5dBi Antenna Installation**

Figure 2-15 LoRa Antennas Connection

2.7 RS-485 Wiring

The PMC-352-C provides one standard RS-485 port that supports the Modbus RTU protocol. Up to 32 devices can be connected on a RS-485 bus. The overall length of the RS-485 cable connecting all devices should not exceed 1200m.

If the master station does not have a RS-485 communications port, an Ethernet-to-RS-485 gateway or USB/RS-485 converter with optically isolated outputs and surge protection should be used. The following figure illustrates the RS-485 connections on the PMC-352-C.
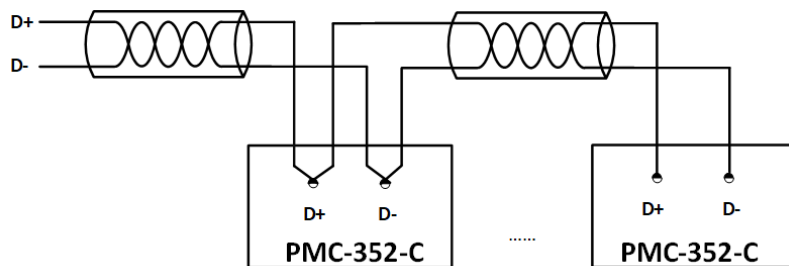
Figure 2-16 RS-485 Connections

2.8 Digital Input Wiring

The following figure illustrates the Digital Input connections:
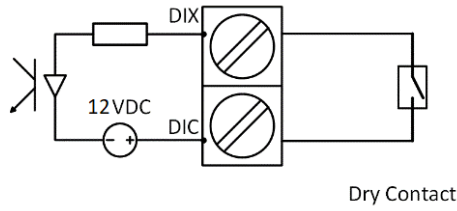
Figure 2-17 DI Connections

2.9 NTC Input Wiring

The following figure illustrates the NTC Input connections on the PMC-352-C.
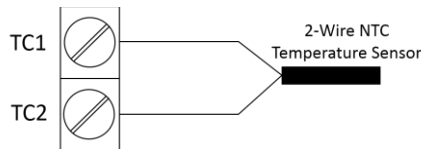
Figure 2-18 NTC Input Connections

2.10 Power Supply Wiring

For the PMC-352-C equipped with the independent power supply option, connect the live wire to the L/+ terminal and the neutral wire to the N/- terminal for an AC supply and the positive wire to the L/+ terminal and the negative wire to the N/- terminal for a DC supply.
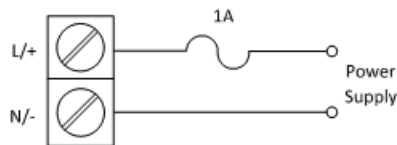
Figure 2-19 Independent Power Supply Connections

For the PMC-352-C equipped with the self-powered option, the L/+ and N/- terminals are absent so the supply power is derived from the V1 and V3 terminals. As a result, the self-powered option should only be used in a 3-phase power system. If the PMC-352-C is used in a single-phase power system, the independent power supply option should be used instead.

Chapter 3 Applications

3.1 Inputs

3.1.1 Digital Inputs

The PMC-352-C comes standard with three self-excited Digital Inputs that are internally wetted at 12VDC. Digital Inputs on the PMC-352-C 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 through communications. Changes in Digital Input status are stored as events in the SOE Log in 1 ms resolution.

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

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

Setup Parameter	Definition	Options/Default*
DIx Function	Each **DI** can be configured as a Status Input or Pulse Counter.	0=Status Input* 1=Pulse Counter
DIx Debounce	Specifies the minimum duration the **DI** must remain in the Active or Inactive state before a DI state change is considered to be valid.	1 to 9999 (ms) 20*
DIx Pulse Weight	Specifies the incremental value for each received pulse. This is only used when a DI is configured as a Pulse Counter.	1* to 1,000,000

Table 3-1 DI Setup Parameters

3.1.2 NTC Temperature Input

The PMC-352-C provides four NTC Inputs for temperature measurements. The thermistor sensors are not included and should be purchased separately if required. The 2-wire outputs of the thermistor sensor are connected to the NTC Input of the PMC-352-C. The PMC-352-C can provide accurate temperature monitoring with the standard NTC inputs for measuring the temperature of the Neutral Conductor, Transformer or other equipment.

3.2 Power and Energy

3.2.1 Basic Measurements

The PMC-352-C provides the following basic measurements which can be retrieved through communication:

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

Table 3-2 Basic Measurements

3.2.2 Energy Measurements

The PMC-352-C 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 communication. The PMC-352-C provides the following energy measurements:

Per-Phase & 3-Phase	kWh Import/Export/Net/Total	kvarh of Q1/Q2/Q3/Q4
	kvarh Import/Export/Net/Total	kVAh Total

Table 3-3 Energy Measurement

3.2.3 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-352-C provides Present Demand for Ia, Ib, Ic, kW Total, kvar Total and kVA Total, updated once a second. Only Import Demand is provided for kW Total, kvar total and kVA Total.

The PMC-352-C provides the following 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 min Default=15
# of Sliding Windows	Number of Sliding Windows.	1 to 15 Default=1

Table 3-4 Demand Setup

3.3 Power Quality

3.3.1 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°.

3.3.2 Unbalance

The PMC-352-C provides Voltage and Current Unbalance measurements. The calculation method of Voltage and Current Unbalances is based on the ratio of Positive and Negative Sequence Components.

$$\text{Voltage Unbalance} = \frac{V2}{V1} \times 100\% \qquad\qquad \text{Current Unbalance} = \frac{I2}{I1} \times 100\%$$

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.

3.3.3 Harmonics

The PMC-352-C provides Voltage and Current with THD, TOHD, TEHD and up to the 31st individual harmonics analysis. All harmonic parameters are available through communications.

The following table illustrates the available Voltage and Current Harmonics measurements on the PMC-352-C.

	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 Harmonics	31st Harmonics	31st Harmonics
Harmonic-Current	THD	THD	THD
	TEHD	TEHD	TEHD
	TOHD	TOHD	TOHD
	2nd Harmonics	2nd Harmonics	2nd Harmonics
	...		
	31st Harmonics	31st Harmonics	31st Harmonics

Table 3-5 Harmonic Measurements

There are two methods for calculating the **THD**, which are based on Fundamental (THDf) and RMS (THDr). **Fundamental** is defined as the lowest frequency of a periodic waveform.

THDf:

$$THDf = \frac{\sqrt{\sum_{n=2}^{\infty} I_n^2}}{I_1} \times 100\%$$

THDr:

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

where I_1 represents the RMS value of the fundamental component, and I_n represents the RMS value for the nth harmonic.

3.4 Setpoints

The PMC-352-C comes standard with 10 user-programmable Setpoints which provide extensive control by allowing a user to initiate an action in response to a specific condition. Typical setpoint applications include alarming, fault detection and power quality monitoring.
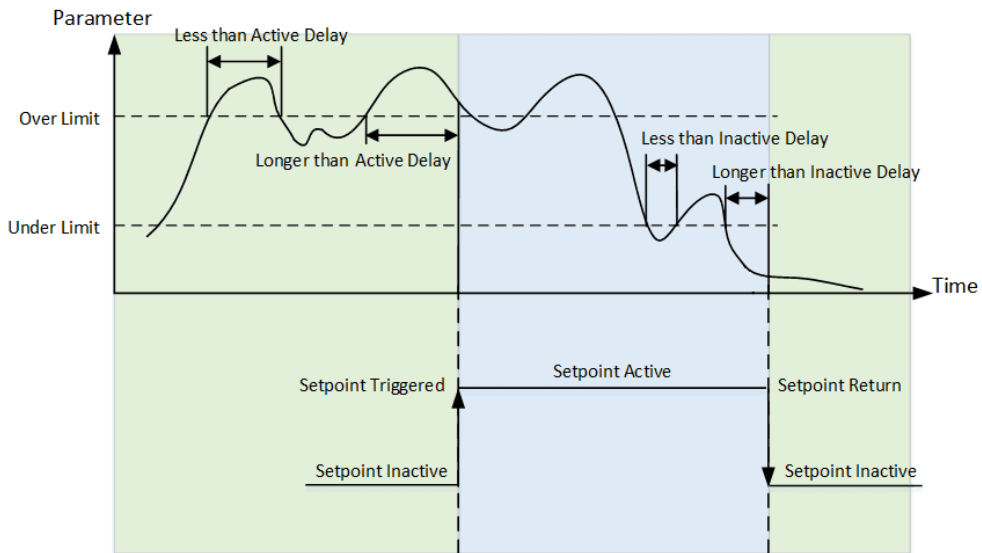
Figure 3-1 Over Setpoint
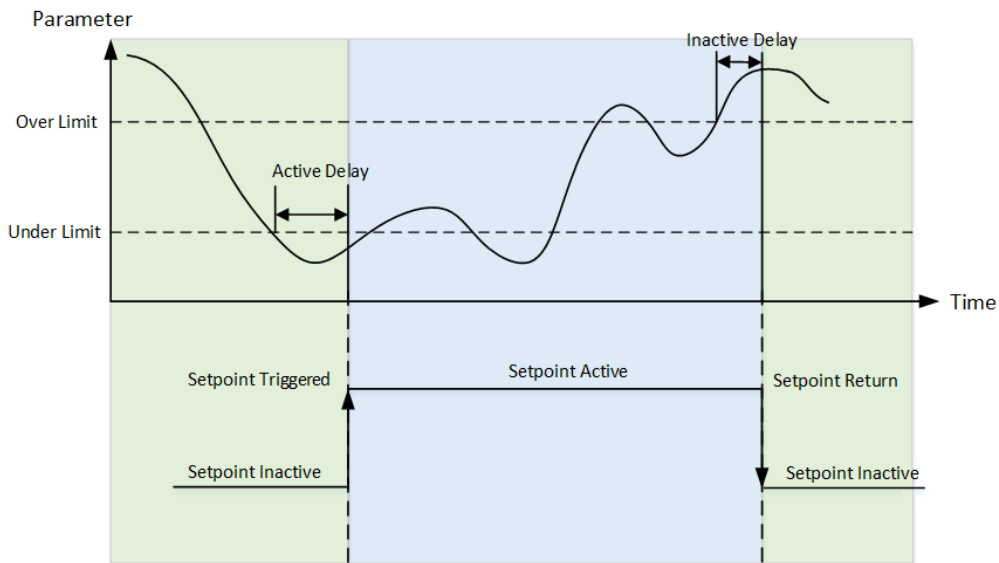
Figure 3-2 Under Setpoint

Setpoints can be programmed via communication and have the following setup parameters:

Parameter	Definition	Options/Default*
Setpoint Type	Over or Under Setpoint.	0=Disabled* 1=Over Setpoint 2=Under Setpoint
Setpoint Parameter	Specify the parameter to be monitored.	See **Table 3-7**
Over Limit	Specify the value that the setpoint parameter must exceed for Over Setpoint to become active or for Under Setpoint to become inactive.	0*
Under Limit	Specify the value that the setpoint parameter must go below for Over Setpoint to become inactive or for Under Setpoint to become active.	0*
Active Delay	Specify the minimum duration that the setpoint condition must be met before the setpoint becomes active. An event will be generated and stored in the SOE Log. The range of the **Active Delay** is between 0 and 9999 seconds.	0* to 9999s
Inactive Delay	Specify the minimum duration that the setpoint return condition must be met before the setpoint becomes inactive. An event will be generated and stored in the SOE Log. The range of the **Inactive Delay** is between 0 and 9999 seconds.	0* to 9999s
Trigger (Reserved)	Specify what action a setpoint would take when it becomes active.	0 = None*

Table 3-6 Description for Setpoint Parameters

The table below illustrates the Setpoint Parameters.

Key	Setpoint Parameter	Scale	Unit
0	None	-	-
1	Uln (Any Phase Voltage)		V
2	Ull (Any Line Voltage)		
3	I (Any Phase Current)		A
4	Reserved		
5	Frequency		Hz
6	P (kW Total)		W
7	Q (kvar Total)		var
8	S (kVA Total)		VA
9	PF (PF Total)	x1	-
10~15	Reserved		
16	U THD		100%
17	U TOHD		100%
18	U TEHD		100%
19	I THD		100%
20	I TOHD		100%
21	I TEHD		100%
22	Voltage Unbalance		100%
23	Current Unbalance		100%
24	Phase Reversal[2]	-	-
25-27	Reserved	-	-
28	TC1		°C
29	TC2		
30	TC3		
31	TC4		
32	I1	x1	A
33	I2		
34	I3		
35	Uan		V
36	Ubn		
37	Ucn		

Table 3-7 Setpoint Parameters

Notes:
1. For the PMC-352-C, the **Trigger** registers are reserved and the **Alarm** indicator on the Front Panel would be lit when any Setpoint becomes active. The Setpoint status is stored in the register 0100.
2. When **Phase Reversal** is set as the **Setpoint Parameter**, the **Setpoint Type** should be set to 1 (i.e., Over Setpoint). The **Setpoint Type**=2 (i.e., Under Setpoint) is invalid. In addition, the **Over Limit** and **Under Limit** should be set as 0 and 1, respectively.

3.5 SOE Log

The PMC-352-C's SOE Log can store up to 16 events such as Power-on, Power-off, Digital Input status changes, Setup changes and Setpoint events in its non-volatile memory. Each event record includes the event classification, its relevant parameter values and a timestamp in ±1 ms resolution. The SOE Log can be retrieved or reset via communications. If there are more than 16 events, the newest event will replace the oldest event on a First-In-First-Out basis.

3.6 Diagnostics

The PMC-352-C provides wiring error detection for 3P4W and 3P3W wiring modes, which allow users to check for possible problems especially during the initial commissioning stage. The following wiring errors may be detected:

- Frequency Out-of-Range
- Voltage / Current Phase Loss
- Incorrect Voltage and Current Phase Sequence
- kW Direction per phase and Total
- Possible Incorrect CT Polarity

Please note the detections above are based on the assumptions below:

- The Voltage and Current Phase Sequence are consistent
- kW is kW Import, which means the kW is over 0
- The wiring is correct
- 3P4W wiring mode supports all detections
- 3P3W wiring mode does not support the detection of Voltage Phase Loss, kW Direction per phase and CT Polarity

The Diagnostic register (0101) indicates the status of the wiring error detection with a bit value of 1 meaning active and 0 meaning inactive which are illustrated in table below:

Bit	Event
B00	Summary Bit (Set if any other bit is set)
B01	Frequency is out of range between 45 to 65Hz
B02	Voltage Phase Loss (3P4W only)
B03	Current Phase Loss
B04~B05	Reserved
B06	Voltage Phase Reversal (3P4W only)
B07	Current Phase Reversal
B08	Negative kW Total may be abnormal
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 3-8 Wiring Diagnostic Register

3.6.1 Voltage Phase Loss

The **Voltage Phase Loss** status under the **Wiring Diagnostic** register (0101) is based on the following logic diagram. During **Voltage Phase Loss**, the **Voltage Phase Reversal** detection is invalid.
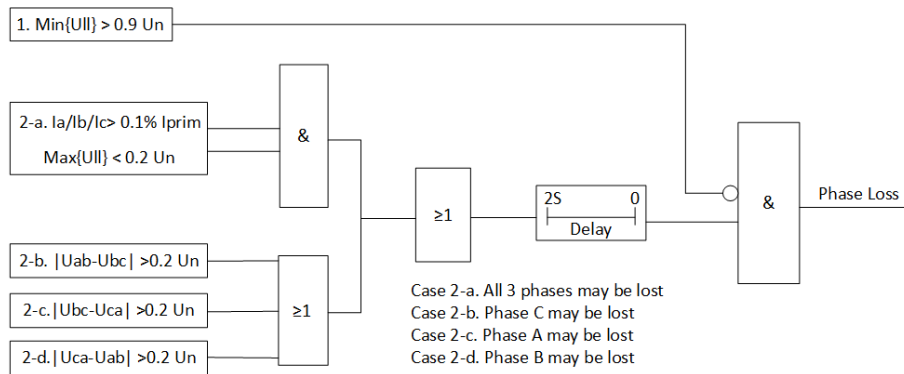
where Un and Iprim represent the Voltage and Current nominal in Primary values. For the Voltage and Current Phase Loss detection to work correctly, the PT Primary and CT Primary should be configured to represent the respective nominal values.

Figure 3-3 Voltage Phase Loss Logic

3.6.2 Current Phase Loss

The following requirements should be met simultaneously for the **Current Phase Loss** status to be valid. During **Current Phase Loss**, the **Current Phase Reversal** detection is invalid.

1.   Any one or two phases Current = 0.
2.   At least one phase Current ≥ 0.1%Iprim.

Chapter 4 Modbus Register Map

This chapter provides a complete description of the Modbus register map (**Protocol Version 1.0**) for the PMC-352-C to facilitate the development of 3rd party communications driver for accessing information on the PMC-352-C. For a complete Modbus Protocol Specification, please visit http://**www.modbus.org**. The PMC-352-C supports the following Modbus functions:

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

The following table provides a description of the different data formats used for the Modbus registers. The PMC-352-C uses the Big Endian byte ordering system.

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

4.1 Basic Measurements

Register	Property	Description	Format	Scale	Unit
0000	RO	Uan	Float		
0002	RO	Ubn	Float		
0004	RO	Ucn	Float		
0006	RO	Uln Average	Float		V
0008	RO	Uab	Float		
0010	RO	Ubc	Float		
0012	RO	Uca	Float		
0014	RO	Ull Average	Float		
0016	RO	Ia	Float		
0018	RO	Ib	Float		A
0020	RO	Ic	Float		
0022	RO	I Average	Float		
0024	RO	kWa	Float		
0026	RO	kWb	Float		W
0028	RO	kWc	Float		
0030	RO	kW Total	Float		
0032	RO	kvara	Float		
0034	RO	kvarb	Float		var
0036	RO	kvarc	Float		
0038	RO	kvar Total	Float	x1	
0040	RO	kVAa	Float		
0042	RO	kVAb	Float		VA
0044	RO	kVAc	Float		
0046	RO	kVA Total	Float		
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		°
0070~0072	RO	Reserved	Float		
0074	RO	Displacement PFa	Float		
0076	RO	Displacement PFb	Float		-
0078	RO	Displacement PFc	Float		
0080	RO	Displacement PF Total	Float		
0082~0084	RO	Reserved	Float	-	-
0086	RO	TC1	Float	x1	℃

0088	RO	TC2	Float		
0090	RO	TC3	Float		
0092	RO	TC4	Float		
0094~0095	RO	Reserved	UINT16		
0096	RO	DI Status[1]	UINT16		
0097	RO	Voltage Phase Active Status[2]	UINT16		
0098	RO	Temp. Self-diagnostic Status	UINT16	-	-
0099	RO	Reserved	UINT16		
0100	RO	Setpoint Alarm Status[3]	UINT16		
0101	RO	Wiring Diagnostic Status[4]	UINT16		
0102	RO	SOE Pointer[5]	UINT32		
0104	RO	Device Operating Time[6]	UINT32	x0.1	Hour
0106	RO	Wireless Signal Strength	UINT16	-	-
0107~0111	RO	Reserved	UINT16		
0112	RO	kWa H01	Float		
0114	RO	kWb H01	Float		
0116	RO	kWc H01	Float	×1	W
0118	RO	kW Total H01	Float		
0120	RO	kW Total TH	Float		

Table 4-1 Basic Measurements

Notes:
1. 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).
2. For the **Voltage Phase Active Status** register, the bit values of B0 to B2 represent the states of Uan, Ubn and Ucn, respectively, with "0" meaning Active and "1" meaning Inactive.
3. For the **Setpoint Status** register, the bit values indicate the various Setpoint states with "1" meaning Active and "0" meaning Inactive. The following table illustrates the details of the **Setpoint Alarm Status** register.

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Setpoint10	Setpoint9
Bit7	**Bit6**	**Bit5**	**Bit4**	**Bit3**	**Bit2**	**Bit1**	**Bit0**
Setpoint8	Setpoint7	Setpoint6	Setpoint5	Setpoint4	Setpoint3	Setpoint2	Setpoint1

Table 4-2 Setpoint Alarm Status Register

4. The following table illustrates the Wiring Diagnostic Status with "0" meaning Normal and "1" meaning Abnormal:

Bit	Event
B00	Summary Bit (Set if any other bit is set)
B01	Frequency is out of range between 45 to 65Hz
B02	Voltage Phase Loss (3P4W only)
B03	Current Phase Loss
B04~B05	Reserved
B06	Voltage Phase Reversal (3P4W only)
B07	Current Phase Reversal
B08	Negative kW Total may be abnormal
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 4-3 Wiring Diagnostic Status Register

5. The range of the SOE Log Pointers is between 0 and 0xFFFFFFFFH. The Log Pointer is incremented by one for every new log generated and will roll over to 0 if its current value is 0xFFFFFFFFH. If a Clear SOE Log is performed via communications, the corresponding Log Pointer will be reset to zero. Therefore, any 3rd party software should assume that a Clear Log action has been performed if it sees the SOE Log Pointer rolling over to zero or to a value that is smaller than its own pointer.
6. The Device Operating Time means the accumulated Operating Time whenever any per-phase Current goes above 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.
7. For the Temp. Self-diagnostic Status register, the bit values of B0 to B3 represents the states of external Temperature Probe for TC1 to TC4, respectively, with "1" meaning Faulty and "0" meaning Normal.

4.2 Energy Measurements

The Energy registers have a maximum value of 10,000,000.00 and will roll over to zero automatically when it is reached. The actual energy value is 0.01 times of the register value.

4.2.1 3-Phase Energy Measurements

Register	Property	Description	Format	Scale	Unit
0500	RW	kWh Import	INT32		
0502	RW	kWh Export	INT32		kWh
0504	RO	kWh Net	INT32		
0506	RO	kWh Total	INT32		
0508	RW	kvarh Import	INT32		
0510	RW	kvarh Export	INT32		kvarh
0512	RO	kvarh Net	INT32	x0.01	
0514	RO	kvarh Total	INT32		
0516	RW	kVAh Total	INT32		kVAh
0518	RW	kvarh Q1	INT32		
0520	RW	kvarh Q2	INT32		kvarh
0522	RW	kvarh Q3	INT32		
0524	RW	kvarh Q4	INT32		

Table 4-4 3-phase Energy Measurements

4.2.2 Phase A (L1) Energy Measurements

Register	Property	Description	Format	Scale	Unit
0620	RW	kWh Import	INT32		
0622	RW	kWh Export	INT32		kWh
0624	RO	kWh Net	INT32		
0626	RO	kWh Total	INT32		
0628	RW	kvarh Import	INT32		
0630	RW	kvarh Export	INT32		kvarh
0632	RO	kvarh Net	INT32	x0.01	
0634	RO	kvarh Total	INT32		
0636	RW	kVAh	INT32		kVAh
0638	RW	kvarh Q1	INT32		
0640	RW	kvarh Q2	INT32		kvarh
0642	RW	kvarh Q3	INT32		
0644	RW	kvarh Q4	INT32		

Table 4-5 Phase A Energy Measurements

4.2.3 Phase B (L2) Energy Measurements

Register	Property	Description	Format	Scale	Unit
0740	RW	kWh Import	INT32		
0742	RW	kWh Export	INT32		kWh
0744	RO	kWh Net	INT32		
0746	RO	kWh Total	INT32		
0748	RW	kvarh Import	INT32		
0750	RW	kvarh Export	INT32		kvarh
0752	RO	kvarh Net	INT32	x0.01	
0754	RO	kvarh Total	INT32		
0756	RW	kVAh	INT32		kVAh
0758	RW	kvarh Q1	INT32		
0760	RW	kvarh Q2	INT32		kvarh
0762	RW	kvarh Q3	INT32		
0764	RW	kvarh Q4	INT32		

Table 4-6 Phase B Energy Measurements

4.2.4 Phase C (L3) Energy Measurements

Register	Property	Description	Format	Scale	Unit
0860	RW	kWh Import	INT32		
0862	RW	kWh Export	INT32		kWh
0864	RO	kWh Net	INT32		
0866	RO	kWh Total	INT32		
0868	RW	kvarh Import	INT32		
0870	RW	kvarh Export	INT32	x0.01	kvarh
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		

Table 4-7 Phase C Energy Measurements

4.3 DI Pulse Counter

Register	Property	Description	Format	Range/Unit
1200	RW	DI1 Pulse Counter	UINT32	0 to 999,999,999
1202	RW	DI2 Pulse Counter	UINT32	DI Pulse Counter = Pulse Counter
1204	RW	DI3 Pulse Counter	UINT32	x DI Pulse Weight

Table 4-8 DI Pulse Counter

4.4 User-defined Data Map

Register	Property	Description	Format	Default
40100	RO	Serial Number	UINT32	
40102	RO	DI Status	UINT16	
40103~40105	RO	Reserved	UINT16	
40106	RO	Setpoint Status	UINT16	
40107~40108	RO	Reserved	UINT16	
40109	RO	Ia	Float	
40111	RO	Ib	Float	
40113	RO	Ic	Float	
40115	RO	kWa	Float	
40117	RO	kWb	Float	
40119	RO	kWc	Float	
40121	RO	CRC	UINT16	
40122	RO	Parameter #1	Float	Uan
40124	RO	Parameter #2	Float	Ubn
40126	RO	Parameter #3	Float	Ucn
40128	RO	Parameter #4	Float	Uab
40130	RO	Parameter #5	Float	Ubc
40132	RO	Parameter #6	Float	Uca
40134	RO	Parameter #7	Float	PFa
40136	RO	Parameter #8	Float	PFb
40138	RO	Parameter #9	Float	PFc
40140	RO	Parameter #10	Float	0 (None)
40142	RO	Parameter #11	Float	TC1
40144	RO	Parameter #12	Float	TC2
40146	RO	Parameter #13	Float	TC3
40148	RO	Parameter #14	Float	TC4
40150	RO	Parameter #15	Float	Uan THD
40152	RO	Parameter #16	Float	Ubn THD
40154	RO	Parameter #17	Float	Ucn THD
40156	RO	Parameter #18	Float	Ia THD
40158	RO	Parameter #19	Float	Ib THD
40160	RO	Parameter #20	Float	Ic THD
40162	RO	Parameter #21	Float	kWh Import
40164	RO	Parameter #22	Float	kWh Export
40166	RO	Parameter #23	Float	kvarh Import
40168	RO	Parameter #24	Float	kvarh Export
40170	RO	Parameter #25	Float	kVAh
40172	RO	Parameter #26	Float	0 (None)
40174	RO	Parameter #27	Float	0 (None)
40176	RO	Parameter #28	Float	0 (None)
40178	RO	Parameter #29	Float	0 (None)
40180	RO	Parameter #30	Float	0 (None)

Table 4-9 User-defined Parameter Measurements

4.5 Harmonic Measurements

4.5.1 Power Quality Measurements

Register	Property	Description	Format	Scale	Unit
1300~1328	RO	Reserved	Float	-	-
1330	RO	Voltage Unbalance	Float	x1	-

1332	RO	Current Unbalance	Float	x1	-

Table 4-10 Power Quality Measurements

4.5.2 Current Harmonic Measurements

Register	Property	Description	Format	Scale	Unit
1400	RO	Ia THD	Float		
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	x1	(0.1 means 10%)
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 4-11 Current Harmonic Measurements

4.5.3 Voltage Harmonic Measurements

Register	Property	Description	Format	Scale	Unit
1600	RO	Uan/Uab THD	Float		
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	x1	(0.1 means 10%)
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 4-12 Voltage Harmonic Measurements

Notes:
1. When the **Wiring Mode** is **3P3W**, the phase A/B/C voltage THD/TOHD/TEHD/HD*xx* is phase AB/BC/CA voltage THD/TOHD/TEHD/HD*xx*.

4.6 Present Demands

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

Table 4-13 Present Demand Measurements

4.7 SOE Log

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

Register Address = 10000 + Modulo (SOE Log Pointer-1/16)*8

Register	Property	Description	Format
10000~10007	RO	Event 1	
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	
10056~10063	RO	Event 8	See **Note 1)**
10064~10071	RO	Event 9	
10072~10079	RO	Event 10	
10080~10087	RO	Event 11	
10088~10095	RO	Event 12	
10096~10103	RO	Event 13	
10104~10111	RO	Event 14	
10112~10119	RO	Event 15	
10120~10127	RO	Event 16	

Table 4-14 SOE Log

Notes:
1. SOE Log Data Structure

Offset	Property	Description	Unit
+0	RO	Hi: Event Classification	See Note 2)
	RO	Lo: Sub-Classification	
+1	RO	Hi: Year	0-37 (Year-2000)
	RO	Lo: Month	1 to 12
+2	RO	Hi: Day	1 to 31
	RO	Lo: Hour	0 to 23
+3	RO	Hi: Minute	0 to 59
	RO	Lo: Second	0 to 59
+4	RO	Millisecond	0 to 999
+5	RO	Hi: Reserved	-
	RO	Lo: Status[2]	-
+6 to +7	RO	Event Value[3]	-

Table 4-15 SOE Log Data Structure

2. The return value "01" means DI Inactive /Active (including Setpoint & Diagnosis)/Connection Fault; and the return value "00" means DI Active /Setpoint Return/Connection Restore.
3. The returned Event Value (for SOE Event Classification=Setpoint only) is in Float format, and please refer to **Table 4-22 Setpoint Parameters** to check the Unit for each parameter.
4. SOE Classification

Event Classification	Sub-Classification	Status	Event Value	Description
1=DI Changes	1	1/0		DI1 Active / DI1 Inactive
	2	1/0		DI2 Active / DI2 Inactive
	3	1/0		DI3 Active / DI3 Inactive
2				Reserved
3=Setpoint	1	1/0	Trigger Value/ Return Value	Over Uln Setpoint Active/Return
	2	1/0		Over Ull Setpoint Active/Return
	3	1/0		Over Current Setpoint Active/Return
	4	1/0		Reserved
	5	1/0		Over Frequency Setpoint Active/Return
	6	1/0		Over kW Total Setpoint Active/Return
	7	1/0		Over kvar Total Setpoint Active/Return
	8	1/0		Over kVA Total Setpoint Active/Return
	9	1/0		Over PF Total Setpoint Active/Return
	10~15	1/0		Reserved
	16	1/0		Over Voltage THD Setpoint Active/Return
	17	1/0		Over Voltage TOHD Setpoint Active/Return
	18	1/0		Over Voltage TEHD Setpoint Active/Return
	19	1/0		Over Current THD Setpoint Active/Return
	20	1/0		Over Current TOHD Setpoint Active/Return
	21	1/0		Over Current TEHD Setpoint Active/Return
	22	1/0		Over Voltage Unbalance Setpoint Active/Return
	23	1/0		Over Current Unbalance Setpoint Active/Return
	24	1/0		Reversal Phase Setpoint Active/Return
	25~27	1/0		Reserved
	28	1/0		Over TC1 Setpoint Active/Return

	29	1/0		Over TC2 Setpoint Active/Return
	30	1/0		Over TC3 Setpoint Active/Return
	31	1/0		Over TC4 Setpoint Active/Return
	32	1/0		Over Ia Setpoint Active/Return
	33	1/0		Over Ib Setpoint Active/Return
	34	1/0		Over Ic Setpoint Active/Return
	35	1/0		Over Uan Setpoint Active/Return
	36	1/0		Over Ubn Setpoint Active/Return
	37	1/0		Over Ucn Setpoint Active/Return
	38~40	1/0		Reserved
	41	1/0		Under Uln Setpoint Active/Return
	42	1/0		Under Ull Setpoint Active/Return
	43	1/0		Under Current Setpoint Active/Return
	44	1/0		Reserved
	45	1/0		Under Frequency Setpoint Active/Return
	46	1/0		Under kW Total Setpoint Active/Return
	47	1/0		Under kvar Total Setpoint Active/Return
	48	1/0		Under kVA Total Setpoint Active/Return
	49	1/0		Under PF Total Setpoint Active/Return
	50~55	1/0		Reserved
	56	1/0		Under Voltage THD Setpoint Active/Return
	57	1/0		Under Voltage TOHD Setpoint Active/Return
	58	1/0		Under Voltage TEHD Setpoint Active/Return
	59	1/0		Under Current THD Setpoint Active/Return
	60	1/0		Under Current TOHD Setpoint Active/Return
	61	1/0		Under Current TEHD Setpoint Active/Return
	62	1/0		Under Voltage Unbalance Setpoint Active/Return
	63	1/0		Under Current Unbalance Setpoint Active/Return
	64~66			Reserved
	67	1/0		Under TC1 Setpoint Active/Return
	68	1/0		Under TC2 Setpoint Active/Return
	69	1/0		Under TC3 Setpoint Active/Return
	70	1/0		Under TC4 Setpoint Active/Return
	71	1/0		Under Ia Setpoint Active/Return
	72	1/0		Under Ib Setpoint Active/Return
	73	1/0		Under Ic Setpoint Active/Return
	74	1/0		Under Uan Setpoint Active/Return
	75	1/0		Under Ubn Setpoint Active/Return
	76	1/0		Under Ucn Setpoint Active/Return
4=Self-diagnosis	1	1	0	System Parameter Fault
	2	1	0	Internal Parameter Fault
	3	1	0	Reserved
	4	1	0	Memory Fault
5=Operations	1	0	0	Reserved
	2	0	0	Power Off
	3~29	0		Reserved
	30	0	0	Clear All Energy Registers via Comm.[5]
	31~36	0	0	Reserved
	37	0	0	Clear All Data via Comm.[6]
	38	0	0	Clear SOE Log via Comm.
	39	0	x=1~3	Clear DIx Pulse Counter via Comm.
	40	0	0	Clear All DI Pulse Counters via Comm.
	41	0	0	Clear Device Operating Time via Comm.
	42	0	0	Reserved
	43	0	0	Setup Changes via Comm.
	44	0	0	Preset Energy Value via Comm.

Table 4-16 SOE Classification

5. **Clear All Energy Registers via Comm.** means to clear the 3-Ø Total and Per-Phase energy registers.
6. **Clear All Data via Comm.** means to clear All Energy Registers, SOE Logs, Device Operating Time and DI Pulse Counters.

4.8 Device Setup

4.8.1 Basic Setup

Register	Property	Description	Format	Range, Default*
6000	RW	PT Primary[1]	UINT32	1 to 1,000,000V, 381*
6002	RW	PT Secondary	UINT32	1 to 690V, 381*
6004	RW	CT Primary[2]	UINT32	1 to 30,000A, 5*
6006	RW	CT Secondary[2]	UINT32	1 to 5A/100A, 5*
6008	RW	SCCT Type[3]	UINT32	1=100A*, 2=200A, 3=400A, 4=800A, 5~6= Reserved, 7=1600A
6010~6018	RW	Reserved	UINT32	-
6020	RW	Wiring Mode[4]	UINT16	0=DEMO, 1=1P2W_LN, 2=1P2W_LL, 3=1P3W, 4=3P3W, 5=3P4W*, 6=3P3W_2CT, 7=3x1P
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	
6024	RW	Ib Polarity	UINT16	0=Normal*, 1=Reverse
6025	RW	Ic Polarity	UINT16	
6026~6027	RW	Reserved	UINT16	-
6028	RW	THD Calculation[5]	UINT16	0= THDf*, 1= THDr
6029	RW	Demand Period[6]	UINT16	1 to 60 (minutes), 15*
6030	RW	No. of Sliding Windows	UINT16	1 to 15, 1*
6031~6039	RW	Reserved	UINT16	
6040	RW	Voltage Phase Active Indicator (3P4W Only)[7]	UINT16	0=Disabled, 1=Enabled*
6041	RW	kvarh Calculation		0=RMS, 1=Fund.

Table 4-17 Basic Setup Parameters

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

2. **CT Primary** and **CT Secondary** registers are only valid when the meter is ordered with the SCCTA option for use with the 5A/2mA SCCT, where the **CT Primary/Secondary** refers to the ratings of the CT with 5A output. The **SCCT Type** setup register is disregarded in this case.

3. The **SCCT Type** register determines the CT Primary/Secondary ratio for the meter automatically for the 100A, 200A, 400A, 800A or 1600A SCCT. The **CT Primary** and **CT Secondary** setup registers are disregarded in this case.

4. The wiring modes of **1P2W_LN**, **1P2W_LL**, **1P3W** and **3x1P** are only supported when the PMC-352-C is ordered with independent power supply option (please refer to Appendix C Ordering Guide for more information). The self-powered supply option derives the power from the V1 and V3 inputs of a 3-phase power system. This means that the self-powered supply option will not work for single-phase applications where V1 and V3 have the same phase relationship.

5. There are two ways to calculate **THD**:

   THDf:

   $$THDf = \frac{\sqrt{\sum_{n=2}^{\infty} I_n^2}}{I_1} \times 100\%$$

   where I_1 represents the RMS value of the fundamental component, and I_n represents the RMS value for the nth harmonic with n for harmonic order.

   THDr:

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

   where I_n represents the RMS value for the nth harmonic with n for harmonic order.

6. The Present Demand will be reset once the **Demand Period**/**No. of Sliding Windows** is changed.

7. The **Voltage Phase Active Indicator** setup register, if enabled, will lit the corresponding L1/L2/L3 LED to illustrate if the Voltage input is active for a particular phase. The **Voltage Phase Active Status** is stored in the register 0097.

4.8.2 I/O Setup

Register	Property	Description	Format	Range, Default*
6200	RW	DI1 Function	UINT16	
6201	RW	DI2 Function	UINT16	0=Digital Input*, 1=Pulse Counting
6202	RW	DI3 Function	UINT16	
6203~6207	RW	Reserved	UINT16	-
6208	RW	DI1 Debounce	UINT16	1 to 9999 ms, 20*

6209	RW	DI2 Debounce	UINT16	
6210	RW	DI3 Debounce	UINT16	
6211~6215	RW	Reserved	UINT16	-
6216	RW	DI1 Pulse Weight[1]	UINT32	
6218	RW	DI2 Pulse Weight[1]	UINT32	1* to 1000000
6220	RW	DI3 Pulse Weight[1]	UINT32	

Table 4-18 I/O Setup Parameters

Notes:
1. DIx Counter= DIx Pulse Counter × DIx Pulse Weight.

4.8.3 Comm. Setup

Register	Property	Description	Format	Range, Default*
6400	RW	Serial Port Protocol	UINT16	0=Modbus RTU*
6401	RW	Unit ID	UINT16	1 to 247, 100*
6402	RW	Baud Rate[1]	UINT16	0=1200, 1=2400, 2=4800, 3=9600*, 4=19200, 5=38400
6403	RW	Comm. Config.	UINT16	0=8N2, 1=8O1, 2=8E1* 3=8N1, 4=8O2, 5=8E2
6404~6409	RW	Reserved	UINT16	
6410	RW	LoRa Gateway[2]	UINT16	0=Disabled*, 1=Enabled
6411	RW	LoRa Band[3,4]	UINT16	0-7, 6 (AS923-925)*
6412	RW	LoRa Channel[3,4]	UINT32	0-15, 0 (923.00)*
6413	RW	Custom Channel 0 Freq.[3]	UINT32	
6415	RW	Custom Channel 1 Freq.[3]	UINT32	860.00~935.00
...	RW	...	UINT32	
6443	RW	Custom Channel 15 Freq.[3]	UINT32	

Table 4-19 Communication Setup

Notes:
1. If **Baud Rate** is set to an invalid value, it will default to 9600bps automatically.
2. If **LoRa Gateway** is enabled, the PMC-352-C would act as a LoRa Master and transfer any RS-485 packets that are received from the Modbus Master on its RS-485 port but not destined for itself, via LoRa to downstream PMC-352-Cs that operate on the same LoRa Channel and vice versa.
3. **LoRa Band** is only valid when the PMC-352-C is equipped with LoRa option.
4. The table below lists the supported LoRa Bands and the corresponding channel assignments.

   For the Custom Channel x Freq., the valid range of Frequency is 860.00-935.00MHz and the channel frequency assignment must be unique.

	Region	0	1	2	3	4	5	6	7
		EU 863-870	RU 864-870	IN 865-867	US 902-928	AU 915-928	AS 920-923	AS 923-925	Custom
Channel									
0	Channel 0	863.00	864.00	865.00	902.00	915.00	920.00	923.00	915.00
1	Channel 1	863.47	864.41	865.33	903.73	915.87	920.33	923.29	915.33
2	Channel 2	863.93	864.81	865.66	905.47	916.73	920.66	923.57	915.66
3	Channel 3	864.40	865.21	865.99	907.20	917.60	920.99	923.86	915.99
4	Channel 4	864.87	865.61	866.32	908.93	918.47	921.32	924.14	916.32
5	Channel 5	865.34	866.01	866.65	910.67	919.34	921.65	924.43	916.65
6	Channel 6	865.80	866.40	866.98	912.40	920.20	921.98	924.71	916.98
7	Channel 7	866.27	866.80	867.31	914.13	921.07	922.31	924.99	917.31
8	Channel 8	866.74	867.20	867.64	915.86	921.94	922.64	920.10	917.64
9	Channel 9	867.20	867.60	867.97	917.60	922.80	922.97	920.46	917.97
10	Channel 10	867.67	867.99	868.30	919.33	923.67	923.30	920.82	918.30
11	Channel 11	868.14	868.39	868.63	921.06	924.54	923.63	921.18	918.63
12	Channel 12	868.60	868.79	868.96	922.80	925.40	923.96	921.54	918.96
13	Channel 13	869.07	869.19	869.29	924.53	926.27	924.29	921.91	919.29
14	Channel 14	869.54	869.59	869.62	926.26	927.14	924.62	922.27	919.62
15	Channel 15	869.99	869.99	869.95	927.99	927.99	924.95	922.63	919.95

Table 4-20 Channel Assignments

4.8.4 Setpoint Setup

Register	Property	Description		Format	Range, Default*
6500	RW	Setpoint #1	Setpoint Type	UINT16	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6501	RW		Parameters[1]	UINT16	0* to 37
6502	RW		Over Limit	Float	0*
6504	RW		Under Limit	Float	0*

6506	RW		Active Delay	UINT16	0* to 9999 s
6507	RW		Inactive Delay	UINT16	0* to 9999 s
6508	RW		Trigger 1 (Reserved)[2]	UINT16	0=None
6509	RW		Trigger 2 (Reserved)[2]	UINT16	
...			...		...
6590	RW		Setpoint Type	UINT32	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6591	RW	Setpoint #10	Parameter[1]	UINT16	0* to 37
6592	RW		Over Limit	Float	0*
6594	RW		Under Limit	Float	0*
6596	RW		Active Delay	UINT16	0* to 9999 s
6597	RW		Inactive Delay	UINT16	0* to 9999 s
6598	RW		Trigger 1 (Reserved)[2]	UINT16	0=None
6599	RW		Trigger 2 (Reserved)[2]	UINT16	

Table 4-21 Setpoint Setup

Notes:
1. The table below illustrates the Setpoint Parameters.

Key	Setpoint Parameter	Scale	Unit	Key	Setpoint Parameter	Scale	Unit
0	None	-	-	22	Voltage Unbalance	x1	100%
1	Uln (Any Phase Voltage)		V	23	Current Unbalance		100%
2	Ull (Any Line Voltage)			24	Phase Reversal[3]	-	-
3	I (Any Phase Current)		A	25~27	Reserved		
4	Reserved			28	TC1		℃
5	Frequency		Hz	29	TC2		
6	P (kW Total)		W	30	TC3		
7	Q (kvar Total)		var	31	TC4		
8	S (kVA Total)	x1	VA	32	I1	x1	A
9	PF (PF Total)		-	33	I2		
10~15	Reserved			34	I3		
16	U THD		100%	35	Uan		V
17	U TOHD		100%	36	Ubn		
18	U TEHD		100%	37	Ucn		
19	I THD		100%				
20	I TOHD		100%				
21	I TEHD		100%				

Table 4-22 Setpoint Parameters

2. For the PMC-352-C, the **Trigger** registers are reserved and the **Alarm** indicator on the Front Panel would be lit when any Setpoint becomes active. The Setpoint status is stored in the register 0100.

3. When **Phase Reversal** is set as the **Setpoint Parameter**, the **Setpoint Type** should be set to 1 (i.e., Over Setpoint). The **Setpoint Type**=2 (i.e., Under Setpoint) is invalid. In addition, the **Over Limit** should be set as 0 and **Under Limit should be** as 1.

4.8.5 User-defined Data Map

Up to 30 parameters can be mapped here to allow for efficient communication of the most commonly used parameters.

Register	Property	Description	Format	Range, Default*
6900	RW	Parameter #1	UINT16	Uan
6901	RW	Parameter #2	UINT16	Ubn
6902	RW	Parameter #3	UINT16	Ucn
6903	RW	Parameter #4	UINT16	Uab
6904	RW	Parameter #5	UINT16	Ubc
6905	RW	Parameter #6	UINT16	Uca
6906	RW	Parameter #7	UINT16	PFa
6907	RW	Parameter #8	UINT16	PFb
6908	RW	Parameter #9	UINT16	PFc
6909	RW	Parameter #10	UINT16	0 (None)
6910	RW	Parameter #11	UINT16	TC1
6911	RW	Parameter #12	UINT16	TC2
6912	RW	Parameter #13	UINT16	TC3
6913	RW	Parameter #14	UINT16	TC4
6914	RW	Parameter #15	UINT16	Uan THD
6915	RW	Parameter #16	UINT16	Ubn THD
6916	RW	Parameter #17	UINT16	Ucn THD
6917	RW	Parameter #18	UINT16	Ia THD
6918	RW	Parameter #19	UINT16	Ib THD

6919	RW	Parameter #20	UINT16	Ic THD
6920	RW	Parameter #21	UINT16	kWh Import
6921	RW	Parameter #22	UINT16	kWh Export
6922	RW	Parameter #23	UINT16	kvarh Import
6923	RW	Parameter #24	UINT16	kvarh Export
6924	RW	Parameter #25	UINT16	kVAh
6925	RW	Parameter #26	UINT16	None
6926	RW	Parameter #27	UINT16	None
6927	RW	Parameter #28	UINT16	None
6928	RW	Parameter #29	UINT16	None
6929	RW	Parameter #30	UINT16	None

Table 4-23 User-defined Parameters Setup

Notes:

1. The table below lists the available parameters for the User-Defined Data Map:

ID	Description	ID	Description	ID	Description
Real-time Measurements (Format: Float)					
0	None	14	kWb	28	PF Total
1	Uan	15	kWc	29	Frequency
2	Ubn	16	kW Total	30	Uan/Uab Angle
3	Ucn	17	kvara	31	Ubn/Ubc Angle
4	Uln Average	18	kvarb	32	Ucn/Uca Angle
5	Uab	19	kvarc	33	Ia Angle
6	Ubc	20	kvar Total	34	Ib Angle
7	Uca	21	kVAa	35	Ic Angle
8	Ull Average	22	kVAb	36	Reserved
9	Ia	23	kVAc	37	Reserved
10	Ib	24	kVA Total	38	TC1
11	Ic	25	PFa	39	TC2
12	I Average	26	PFb	40	TC3
13	kWa	27	PFc	41	TC4
Power Quality (Format: Float)					
60	Phase A Fundamental kW	88	Uan/Uab TEHD	185	Ib TOHD
61	Phase B Fundamental kW	89	Ubn/Ubc TEHD	186	Ic TOHD
62	Phase C Fundamental kW	90	Ucn/Uca TEHD	187	Ia TEHD
63	Fundamental kW Total	91	Uan/Uab HD02	188	Ib TEHD
64	Harmonic kW Total	92	Ubn/Ubc HD02	189	Ic TEHD
65~79	Reserved	93	Ucn/Uca HD02	190	Ia HD02
80	Voltage Unbalance	…	…	191	Ib HD02
81	Current Unbalance	178	Uan/Uab HD31	192	Ic HD02
82	Uan/Uab THD	179	Ubn/Ubc HD31	…	…
83	Ubn/Ubc THD	180	Ucn/Uca HD31	277	Ia HD31
84	Ucn/Uca THD	181	Ia THD	278	Ib HD31
85	Uan/Uab TOHD	182	Ib THD	279	Ic HD31
86	Ubn/Ubc TOHD	183	Ic THD		
87	Ucn/Uca TOHD	184	Ia TOHD		
Energy Measurements (Format: INT32)					
300	DI1 Pulse Counter	310	kvarh Import	318	kvarh Q4
301	DI2 Pulse Counter	311	kvarh Export	319~358	Reserved
302	DI3 Pulse Counter	312	kvarh Net	359	kWha Import
303~305	Reserved	313	kvarh Total	360	kWhb Import
306	kWh Import	314	kVAh	361	kWhc Import
307	kWh Export	315	kvarh Q1	362	kvarha Import
308	kWh Net	316	kvarh Q2	363	kvarhb Import
309	kWh Total	317	kvarh Q3	364	kvarhc Import

Table 4-24 User-defined Parameters List

4.9 Time

There are two sets of Time registers supported by the PMC-352-C – Year/Month/Day/Hour/Minute/ Second (Register # 60000 to 60002) and UNIX Time (Register # 60004). When sending time to the PMC-352-C 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 4-25 Time Registers

4.10 Clear/Reset Control

Register	Property	Description	Format	Note
9600	WO	Reserved		
9601	WO	Clear All Energy[1]		
9602~9606	WO	Reserved		
9607	WO	Clear Device Operating Time		
9608	WO	Clear All Data[2]	UINT16	Writing "0xFF00" to the register to execute the described action.
9609	WO	Clear SOE Log		
9610	WO	Clear DI1 Pulse Counter		
9611	WO	Clear DI2 Pulse Counter		
9612	WO	Clear DI3 Pulse Counter		
9613~9617	WO	Reserved		
9618	WO	Clear All Pulse Counters		

Table 4-26 Clear Control

Notes:

1. Writing 0xFF00 to the **Clear All Energy** register to clear the 3-Ø Total and Per-Phase energy registers.

2. Writing 0xFF00 to the **Clear All Data** register to perform the clear operation for all Energy Registers, SOE Logs, Device Operating Time and DI Pulse Counters.

4.11 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 Date: Day	UINT16	
60225	9825	RO	Serial Number	UINT32	e.g. 1901030100 means the 100th PMC-352-C that was manufactured on January 3rd, 2019
60227	9827	RO	Reserved	UINT16	
60228	9828	RO	Reserved	UINT16	
60229	9829	RO	Feature Code	UINT16	See Note 2

Table 4-27 Meter Information

Notes:

1. The Meter Model appears in registers 60200 to 60219 and contains the ASCII encoding of the string "PMC-352-C" 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	0x0035	5
60206	0x0032	2

60207	0x002D	-
60208	0x0043	C
60209-60219	0x0020	Null

Table 4-28 ASCII Encoding of "PMC-352-C"

2. The following table illustrates the details for the Feature Code register.

B6 to B15	B3 to B5 (Expansion Communication)	B0 to B2 (Input Current)
Reserved	0= N (None), 2=7 (LoRa)	0=B (2mA Input), 1=A (40mA Input)
	Please refer to **Appendix C Ordering Guide**	

Table 4-29 Feature Code for PMC-352-C

Appendix A Technical Specifications

Voltage Inputs (V1, V2, V3, VN)	
Voltage (Un) Range	277VLN/480VLL 40V to 1.2Un (88V to 550V for Self-Powered option)
Burden	<0.02VA/phase
Frequency	45-65Hz

Current Inputs (I11, I12, I21, I22, I31, I32)		
	SCCT Option	**SCCTA Option**
Current (In) Range Starting Current External SCCTs	40mA 0.15%-100% In 0.15% In 100A/40mA 200A/40mA 400A/40mA 800A/40mA 1600A/40mA	2mA 0.1%-120% In 0.2% In 5A/2mA

Power Supply (L/+, N/-)	
Standard Optional Burden	60-264VAC/DC, ±10%, 47-440Hz 88V-550VAC, Self-Powered via Uca (U31) <2W

Digital Inputs (DI1, DI2, DI3, DIC)	
Type Sampling Hysteresis	Dry contact, 12VDC internally wetted 1000Hz 1ms minimum

NTC Temperature Inputs (TC1, TC2, TC3, TC4)	
NTC Type Measurement Range	2-Wire Thermistors (sensor not included) -20°C to +140°C

Communications	
RS-485 (Standard) Protocol Baud Rate	Modbus RTU 1200/2400/4800/9600/19200/38400 bps
LoRa RF Range ISM Bands	860-935 MHz (Configurable) EU863-870, RU864-870, IN865-867, US902-928, AU915-928, AS920-923, AS923-925
RF Output Power Receiver Sensitivity Output Watts FCC Part 15C	19 dBm (Maximum) -137 dBm (Maximum) 0.03 (Typical) Certified by TCB

Environmental Conditions	
Operating Temp. Storage Temp. Humidity Atmospheric Pressure Pollution Degree	-25°C to +70°C -40°C to +85°C 5% to 95% non-condensing 70 kPa to 106 kPa 2

Mechanical Characteristics	
Mounting Unit Dimensions IP Rating	DIN Rail 36x65x90mm IP30

Accuracy

Parameters	Accuracy	Resolution
Voltage	±0.5%	0.0001V
Current	±0.5%	0.0001A
kW, kvar, kVA	±1.0%	0.0001kW/kvar/kVA
kWh	IEC 62053-21 Class 1	0.01kWh
kvarh	IEC 62053-23 Class 2	0.01kvarh
PF	±1.0%	0.0001
Frequency	±0.02Hz	0.0001Hz
THD	IEC 61000-4-7 Class B	0.0001%
Temperature	±1°C	0.001°C

Appendix B Standards of Compliance

Safety Requirements	
CE LVD 2014 / 35 / EU	EN 61010-1: 2010 EN 61010-2-030: 2010
Electrical Safety in Low Voltage Distribution Systems up to 1000VAC and 1500VDC	IEC 61557-12: 2018 (PMD)
Insulation AC Voltage: 2kV @ 1 minute Insulation Resistance: >100MΩ Impulse Voltage: 6kV, 1.2/50µs	IEC 62052-11: 2003 IEC 62053-21: 2003
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: 2014+A1: 2017
Conducted Disturbances	EN 61000-4-6: 2014
Magnetic Fields	EN 61000-4-8: 2010
Voltage Dips and Interruptions	EN 61000-4-11: 2004+A1: 2017
Emission Tests	
Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	EN 55011: 2016
Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	EN 55032:2015
Limits for Harmonic Current Emissions for Equipment with Rated Current ≤16A	EN 61000-3-2: 2014
Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤16A	EN 61000-3-3: 2013
Emission Standard for Residential, Commercial and light-industrial environments	EN 61000-6-4: 2007+A1: 2011
Mechanical Tests	
Spring Hammer Test	IEC 62052-11: 2003
Vibration Test	IEC 62052-11: 2003
Shock Test	IEC 62052-11: 2003

Appendix C Ordering Guide

<table>
<tr><td colspan="9">CET Electric Technology</td><td colspan="2">Version 20220315</td></tr>
<tr><td colspan="9">Product Code</td><td colspan="2">Description</td></tr>
<tr><td colspan="9" colspan="2">PMC-352 3-Phase LoRa DIN Energy Meter</td><td></td></tr>
</table>

Product Code	Description
PMC-352 3-Phase LoRa DIN Energy Meter	
Basic Function	
C	Multifunction Measurements, 1xRS-485
Input Current	
A	40mA Input for use with 100A/40mA, 200A/40mA, 400A/40mA, 800A/40mA or 1600A/40mA SCCTs (SCCTs not included)
B	2mA Input for use with 5A/2mA SCCT (SCCTs not included)
Input Voltage	
3	277VLN/480VLL ±15%
Power Supply	
2	60-264VAC/DC, 47-440Hz
N*	88-550VAC, Self-Powered from Uca (or U31)^
Frequency	
5	45-65Hz
I/O	
A	3xDI
Expansion Communication*	
N	None
7*	LoRa (860-935 MHz) configurable for EU863-870, RU864-870, IN865-867, US902-928, AU915-928, AS920-923, AS923-925
Language	
E	English

PMC-352	-	C	A	3	2	5	A	N	E	PMC-352-CA325ANE (Standard Model)

* Additional charges apply

^ The Self-Powered option is only supported for 3-phase power system. If the PMC-352 is used in a single-phase application, Power Supply option 2 should be selected.

Accessories Ordering Guide

Split-Core CTs

CET Electric Technology

Version 20220315

PMC-352 Accessories				
Split-Core CTs for PMC-352				
Model #	**Specification**	**Accuracy**	**Aperture (mm)**	**Cable Length**
PMC-SCCT-100A-40mA-16-A	100A, 1-phase Split-Core CT with Pluggable Connector	0.5	φ16	2m
PMC-SCCT-200A-40mA-24-A	200A, 1-phase Split-Core CT with Pluggable Connector	0.5	φ24	2m
PMC-SCCT-400A-40mA-35-A	400A, 1-phase Split-Core CT with Pluggable Connector	0.5	φ35	2m
PMC-SCCT-800A-40mA-A	800A, 1-phase Split-Core CT	0.5	80x50	Note 2
PMC-SCCT-1600A-40mA-A	1600A, 1-phase Split-Core CT	0.5	130x55	Note 2
PMC-SCCT-5A-2mA-16-A	5A/2mA, 1-phase Split-core CT with Pluggable Connector	2.0	φ16	2m

1) Please refer to Cable Length for details and contact the factory in advance for special requirements.
2) The PMC-SCCT-800A-40mA-A and PMC-SCCT-1600A-40mA-A come with PMC-BCC-350-2, which is a 2m cable with 2-Pin Black Pluggable Connector.
3) Each PMC-352 may be equipped with 3 pcs of SCCT.

NTC Thermistors

PMC-352 Accessories	
NTC Thermistors	
Model #	**Specification**
NTC-104	1xThermistor Sensor with a 0.3m Cable and 2-pin Connector
NTC-1043	3xThermistor Sensor (Yellow, Green & Red) with 2m Cables and 2-pin Connectors
NTC-1044	4xThermistor Sensor (Yellow, Green, Red & Black) with 2m Cables and 2-pin Connectors
NTC-104M4	1xThermistor Sensor (φ4mm Ring Connector) with a 2m Cable and 2-pin Connector
NTC-104M10	1xThermistor Sensor (φ10mm Ring Connector) with a 2m Cable and 2-pin Connector

Contact us

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