PMC-D961MD

DC Multifunction Meter
User Manual
Version: V2.0

April 7, 2026

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

Chapter1 Introduction

This manual explains how to use the PMC-D961MD DC Multifunction Meter. Throughout the manual the term "meter" generally refers to all models. Differences between the models are indicated with the appropriate model number.

This chapter provides an overview of the PMC-D961MD meter and summarizes many of its key features.

1.1 Overview

The PMC-D961MD DC Multifunction Meter is CET's latest offer for the low-cost DC metering market. Housed in an industry standard DIN form factor measuring 96x96x92mm, it is perfectly suited for industrial, commercial and utility DC metering applications. The PMC-D961MD complies with Class 0.5 kWh Accuracy Standard and features quality construction, multifunction measurements and a bright, easy to read LCD display. The PMC-D961MD comes standard with two Front Panel LED indicators for Energy Pulsing and Communication. It provides 4xDI for status monitoring, 2xDO for Control and Alarming, and 1xSS Pulse Output for kWh Energy Pulsing applications. The standard SOE Log records meter events such as power-off, Setpoints, setup changes and DI operations in 1ms resolution. With a standard RS-485 port and an optional 10Base-T/100Base-TX Ethernet Port support, the PMC-D961MD becomes a vital component of an intelligent, multifunction monitoring solution for any DC Power and Energy Management systems.

You can set up the meter through its Front Panel or via our free software. The meter is also supported by our PecStar® iEMS Integrated Energy Management System.

Following is a list of typical applications for the PMC-D961MD:

- DC Inverter, DC Panel Metering and DC Charging Station
- Industrial and commercial DC metering
- DC Distribution Monitoring

Contact CET Technical Support should you require further assistance with your application.

1.2 Features

Ease of use

- Large, 7-Segment LCD display
- Intuitive user interface
- LED indicators for Energy Pulsing and Communication activities
- Password protected setup via Front Panel or free setup software
- Easy installation with mounting clips, no tools required

Measurements

- Voltage, Current and P Import/Export
- Bi-directional kWh measurements, kWh Net & Total

Demands

- Present Demands for Current and P
- Max. Demands with Timestamp for This Month & Last Month

Setpoints

- 6 user programmable Setpoints with extensive list of monitoring parameters including Voltage, Current, Power and P, I Demand, etc.
- Configurable thresholds, time delays and DO triggers

SOE Log

- 32 events time-stamped to ±1ms resolution
- Setup changes, Power On/Off, Setpoints and DI status changes as well as DO operations

Max./Min. Log

- Max./Min. Log with Timestamp for Current and P
- Configurable for This Month & Last Month

Monthly Freeze Log
- Monthly Log with Timestamps for kWh Import/Export
- Available through Modbus communication for 24 Monthly Freeze records

Inputs and Outputs
- 2xFront Panel LED indicator for Energy Pulsing and Communication
- 4xDigital Input for Status Monitoring
- 2xDigital Output for Control and Alarming
- 1xSS Pulse Output

Communications
- Standard with one RS-485 port with baud rate from 1.2kbps to 38.4kbps
- One optional 10Base-T/100Base-TX Ethernet Port with RJ45 connector
- Modbus RTU and Modbus TCP support

Real-Time Clock
- Battery-backed Real-time Clock with 6ppm accuracy (≤±0.5s per day)

System Integration
- Supported by CET's PecStar® iEMS
- Easy integration into other Automation, SCADA or BMS systems via Modbus RTU

1.3 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

Chapter2 Installation

Caution

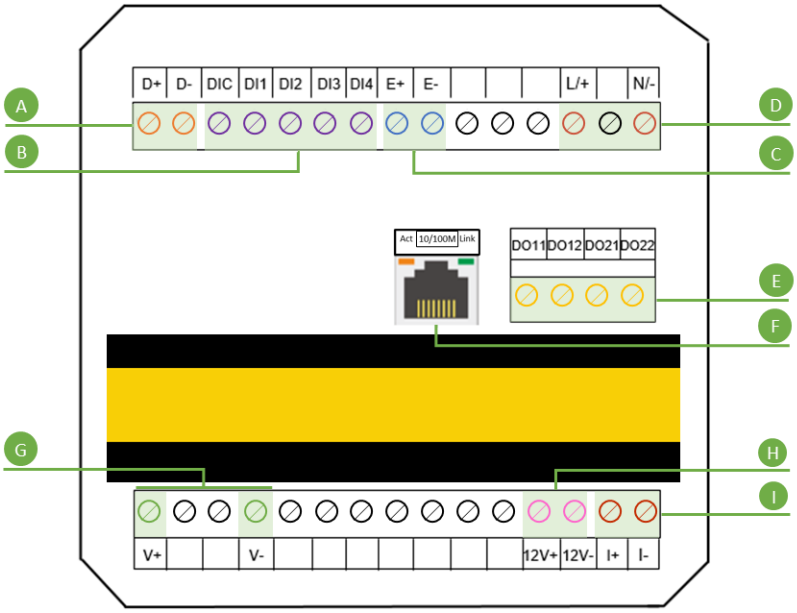
Installation of the PMC-D961MD should only be performed by qualified, competent personnel that have the appropriate training and experience with high voltage and current devices. The meter must be installed in accordance with all local and national electrical codes.

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

1 LED Pulse Output
2 Enclosure
3 Front Panel
4 Comm. Indicator
5 Measurements
6 Units
7 Buttons

Figure 2-1 Appearance

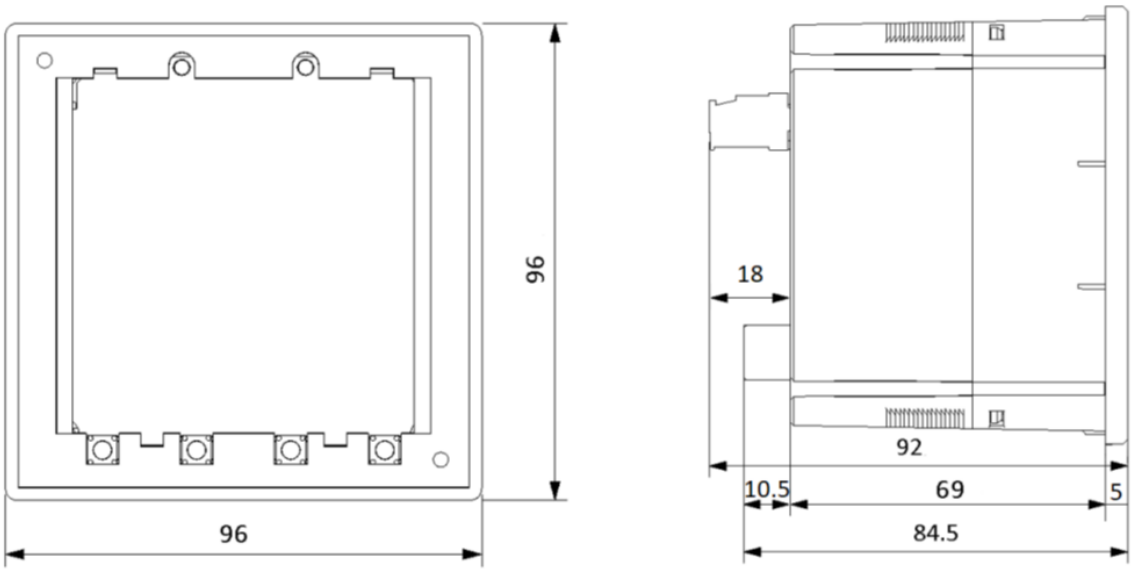


A 1x RS-485
B 4x Digital Input
C 1x Solid State Pulse Output
D Power Supply
E 2x Digital Output
F Ethernet Port (Optional)
G Voltage Input
H Hall Senor Power Supply
I Hall Senor Current Input

Figure 2-2 Rear Panel

2.2 Unit Dimensions

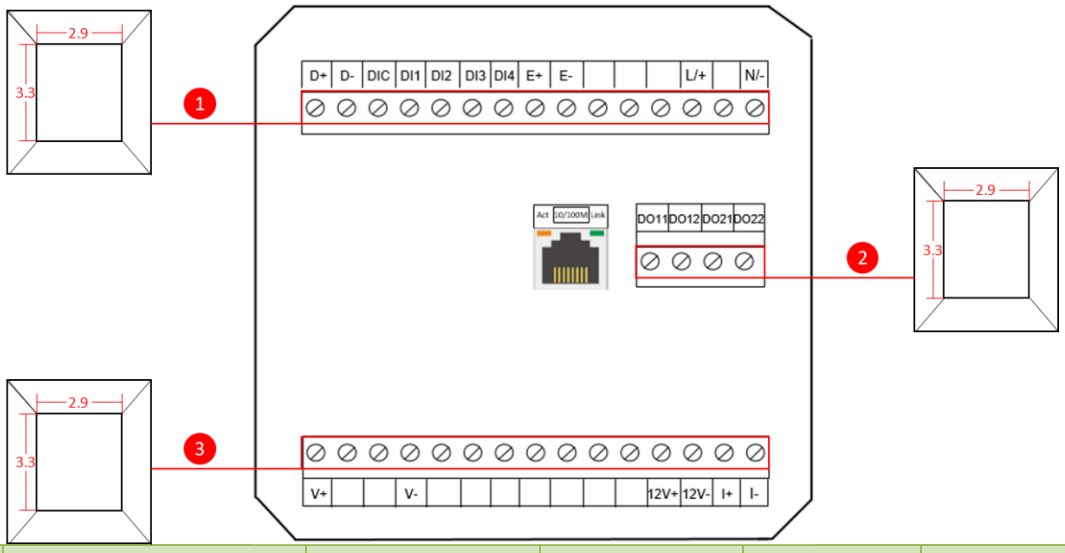
Unit: mm



Front View **Side View**

Figure 2-3 Unit Dimensions

2.3 Terminal Dimensions

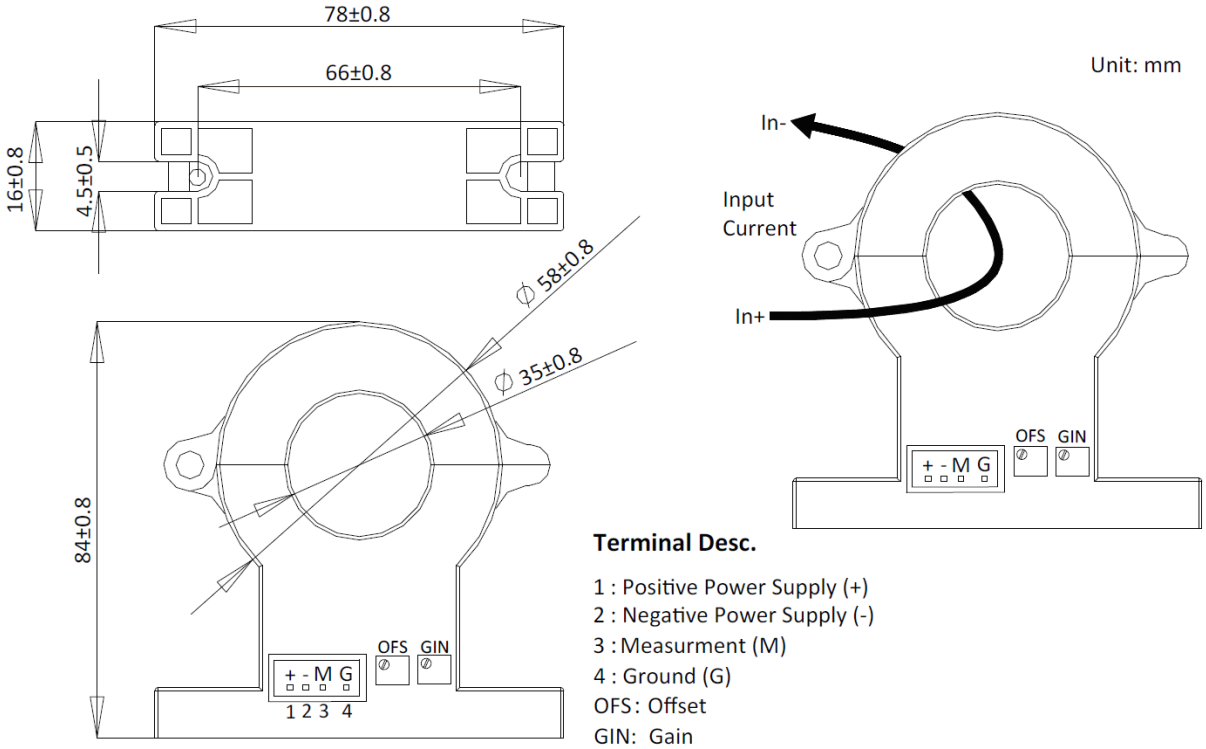


No.	Terminal	Terminal Dimensions	Wire Size	Tightening Torque	Max. Torque
1	RS-485	2.9*3.3mm (28-12AWG)	0.2-3.5mm²	4 kgf.cm/ M3/ 3.54 Ib-in/ 0.4 N.m	5.1 kgf.cm/ M3/ 4.42 Ib-in/ 0.5 N.m
	DI				
	EN Pulse Output				
	Power Supply				
2	DO				
3	Voltage Input				
	Hall Senor Voltage				
	Hall Senor Current Input				

Figure 2-4 Rear Panel

2.4 Hall-Effect Sensor Dimensions

2.4.1 PMC-DCT-200A(300A)-4V-A

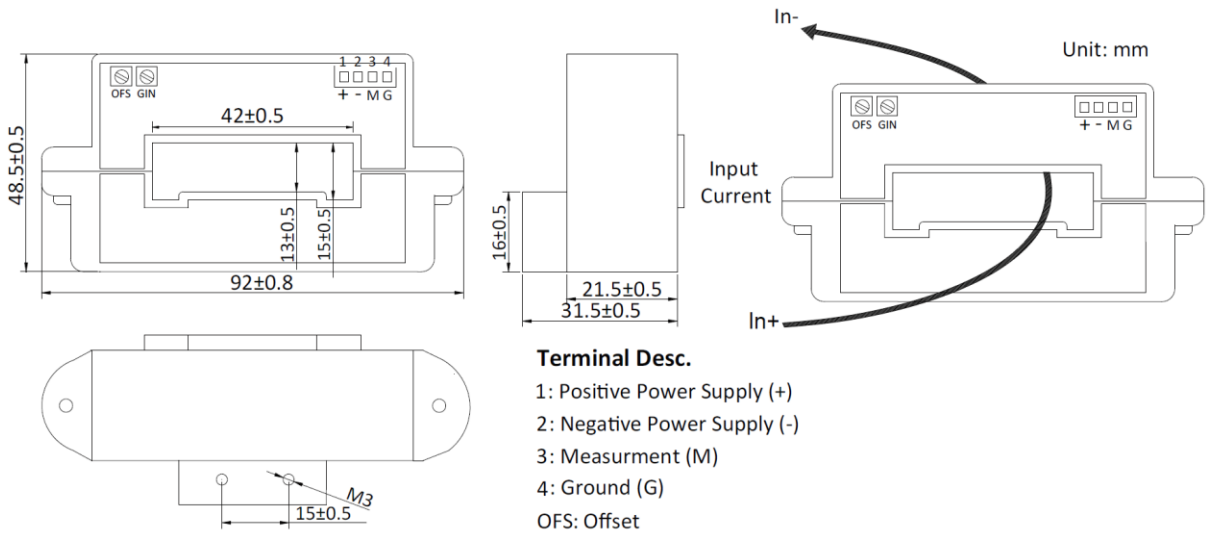


Terminal Desc.

1 : Positive Power Supply (+)
2 : Negative Power Supply (-)
3 : Measurment (M)
4 : Ground (G)
OFS: Offset
GIN: Gain

Figure 2-5 PMC-DCT-200A(300A)-4V-A Dimension

2.4.2 PMC-DCT-400A(600A)-4V-A

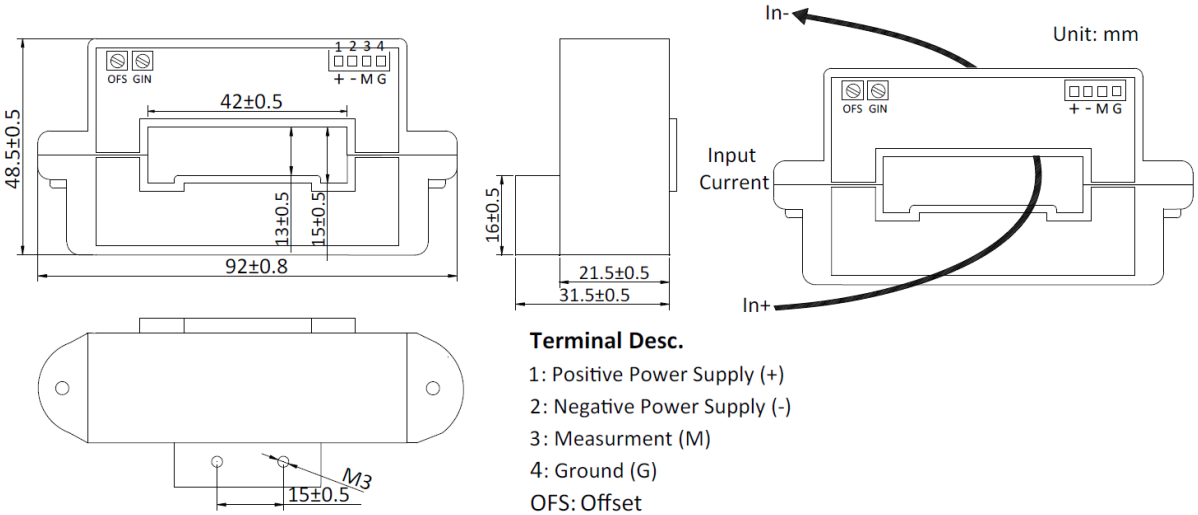


Terminal Desc.

1: Positive Power Supply (+)
2: Negative Power Supply (-)
3: Measurment (M)
4: Ground (G)
OFS: Offset
GIN: Gain

Figure 2-6 PMC-DCT-400A(600A)-4V-A Dimension

2.4.3 PMC-DCT-600A(900A)-4V-A

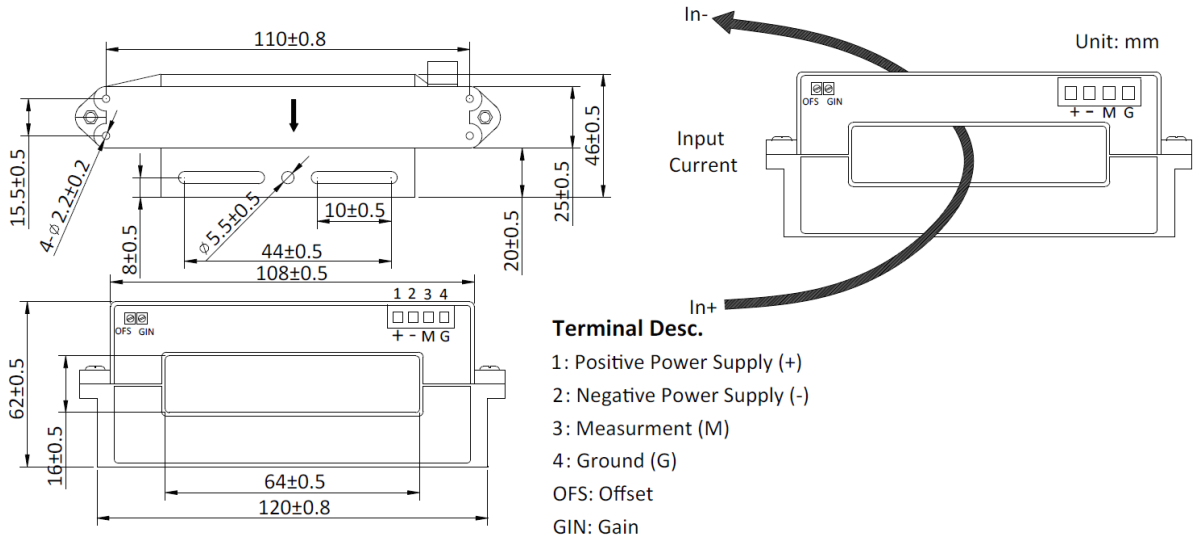


Terminal Desc.

1: Positive Power Supply (+)
2: Negative Power Supply (-)
3: Measurment (M)
4: Ground (G)
OFS: Offset
GIN: Gain

Figure 2-7 PMC-DCT-600A(900A)-4V-A Dimension

2.4.4 PMC-DCT-800A(1200A)-4V-A



Terminal Desc.

1: Positive Power Supply (+)
2: Negative Power Supply (-)
3: Measurment (M)
4: Ground (G)
OFS: Offset
GIN: Gain

Figure 2-8 PMC-DCT-800A(1200A)-4V-A Dimension

2.4.5 PMC-DCT-1000A(1500A)-4V-A

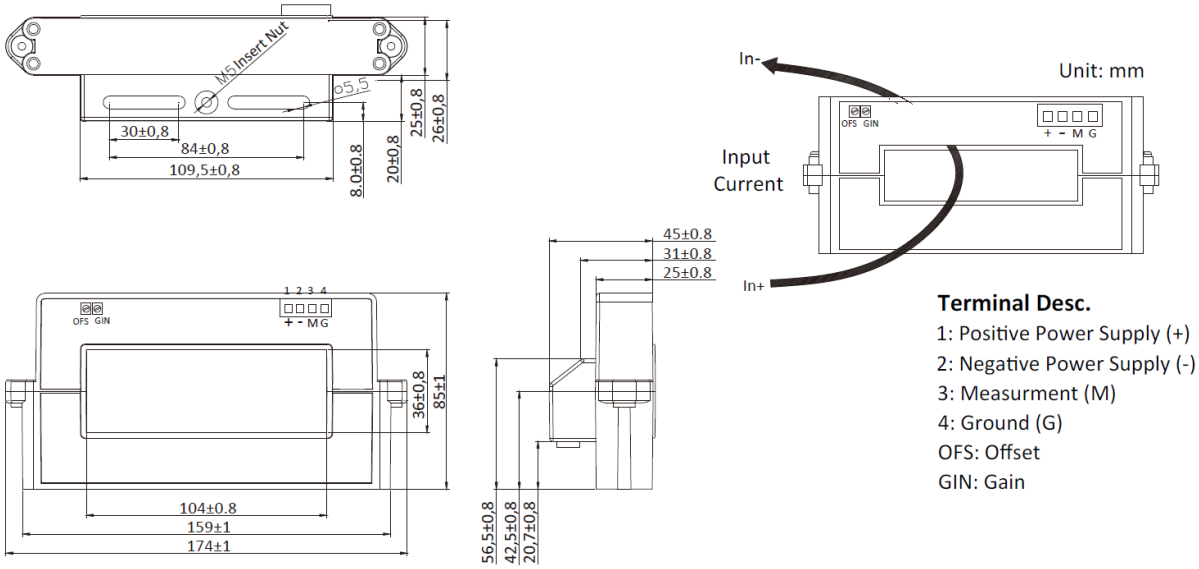


Figure 2-9 PMC-DCT-1000A(1500A)-4V-A Dimension

2.4.6 PMC-DCT-2000A(3000A)-4V-A

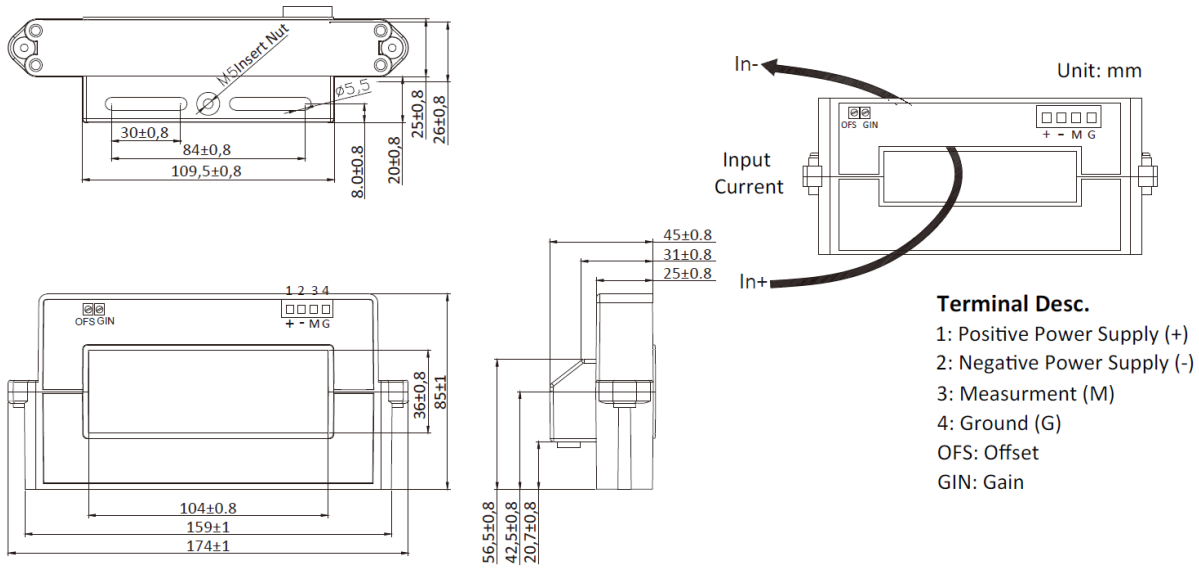


Figure 2-10 PMC-DCT-2000A(3000A)-4V-A Dimension

2.5 Mounting

The PMC-D961MD meter should be installed in a dry environment with no dust and kept away from heat, radiation and electrical noise source.

Installation steps:

- Remove the installation clips from the meter
- Fit the meter through a 92mmx92mm cutout as shown in **Figure 2-11**
- Re-install the installation clips and push the clips tightly against the panel to secure the meter

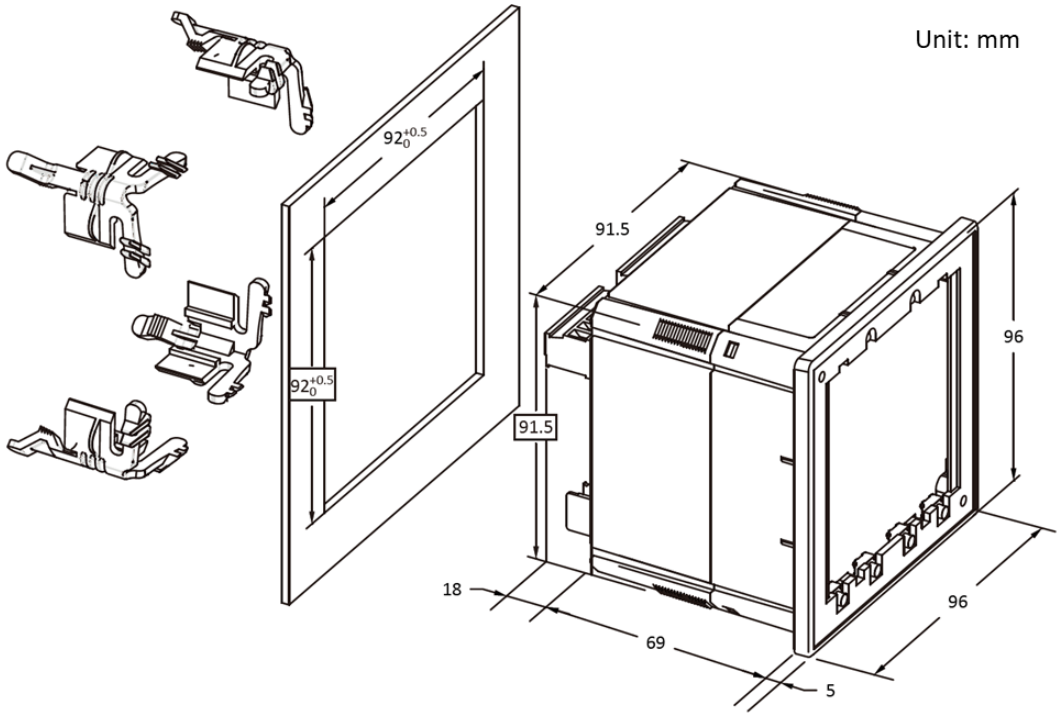


Figure 2-11 Panel Cutout

2.6 Input Wiring

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

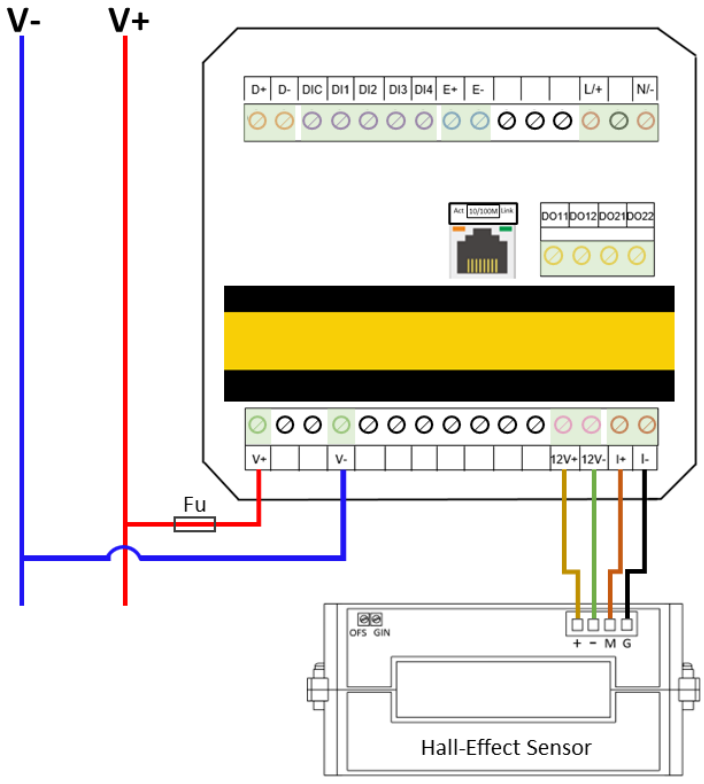


Figure 2-12 Input Wiring

For the Current Inputs, connect the **12V+, 12V-, I+** and **I-** terminals of the PMC-D961MD to the **+, -, M** and **G** terminals of the Hall-Effect Sensor, respectively. Please note that the ±12V DC Power supply required for Hall-Effect Sensors will be supplied by PMC-D961MD device. No additional power supply is required.

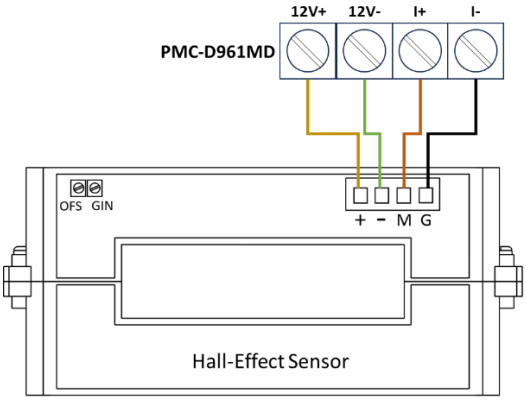


Figure 2-13 Current Input Wiring

2.7 Communications Wiring

- **Ethernet Port (10Base-T/100Base-TX)**

The following table illustrates the pin definition for the RJ45 Ethernet connector.

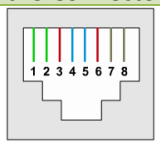
RJ45 Connector	Pin	Meaning
	1	Transmit Data+
	2	Transmit Data-
	3	Receive Data+
	4,5,7,8	NC
	6	Receive Data-

Table 2-1 RJ45 Connector Pin Description for 10Base-T/100Base-TX

- **RS-485 Port**

The PMC-D961MD provides one RS-485 port and 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 RS232/RS-485 or USB/RS-485 converter with optically isolated output and surge protection should be used.

The following figure illustrates the RS-485 communications connections on the PMC-D961MD:

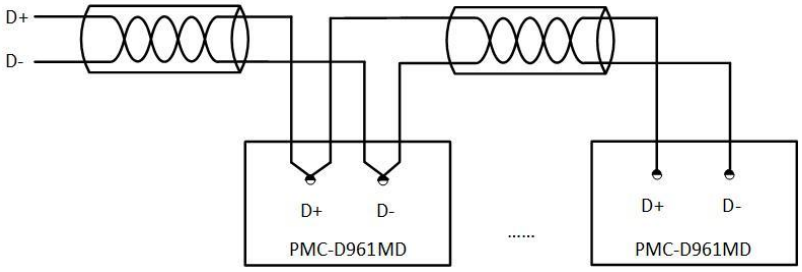


Figure 2-14 Communications Connections

2.8 Digital Input Wiring

The following figure illustrates the Digital Input connections on the PMC-D961MD:

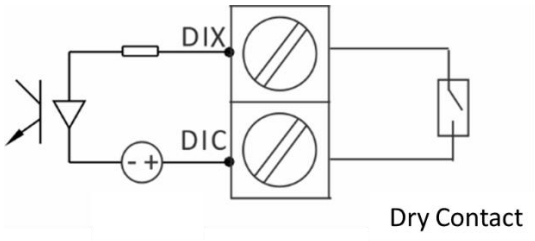


Figure 2-15 DI Connections

2.9 Digital Output Wiring

The following figure illustrates the Digital Output connections on the PMC-D961MD:

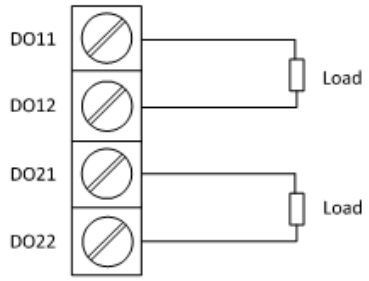


Figure 2-16 DO Connections

The following figure illustrates the Digital Output connections when the DO is used for controlling circuit breaker.

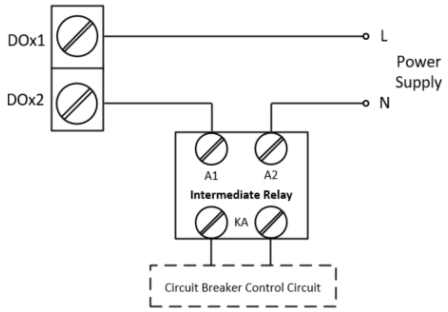


Figure 2-17 DO Connections for Controlling Circuit Breaker

2.10 Solid-State Pulse Output Wiring

The following figure illustrates the Solid-State Pulse Output connections on the PMC-D961MD:

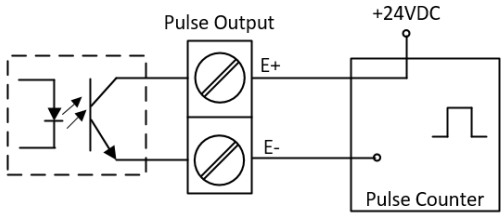


Figure 2-18 Solid-State Pulse Output Connections

2.11 Power Supply Wiring

For AC supply, connect the live wire to the L/+ terminal and the neutral wire to the N/- terminal.

For DC supply, connect the positive wire to the L/+ terminal and the negative wire to the N/- terminal.

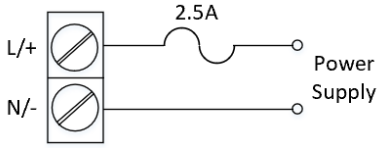


Figure 2-19 Power Supply Connections

Chapter3 Front Panel

The PMC-D961MD meter has a large, bright, 7-Segment LCD display and four buttons for data display and meter configuration. This chapter introduces the front panel operations.

1 LED Pulse Output
2 Front Panel
3 Comm. Indicator
4 Measurements
5 Units
6 Buttons

Figure 3-1 Front Panel

3.1 Display

This section provides a description of the LCD display and following table shows the special LCD display symbols:

Label	Description					
Measurement Values	A	B	C	D	E	F
	G	H	I	J	K	L
	M	N	O	P	Q	R
	S	T	U	V	W	Y
	0	1	2	3	4	
Symbols	AB BC CA Phase AB/BC/CA/A/B/C		TM LM This Month Last Month		AVG Average	
	— Negative Symbol		DMD Demand		UNB Unbalance: Reserved	
	Hz MkW Mkvar MkVA Measurement Units for Frequency and Power (P, Q, S) (Frequency and Power (Q, S) are reserved)					
	PF Power Factor: Reserved		NET TOT Net, Total			
	kWh kvarh kVAh Measurement Units for kWh, kvarh and kVAh (kvarh and kVAh are reserved)					
	DI1 DI2 DI3 DI4 4x Digital Input					
	DO1 DO2 2x Digital Output					
	Alarm Symbol					

Table 3-1 Special LCD display symbols

3.2 Using the Front Panel Buttons

The PMC-D961MD's front panel has been designed with a 4-button user-friendly interface that allows users to quickly scroll through most of the available measurements.

Mode		Data Display Mode	Setup Configuration Mode			
Button/Parameter		Real-time Measurements & Energy	Enter Password	Browse/Setup Menu (Until a parameter is selected)	Enumerated Parameter	Numeric Parameter
Energy/ ◄	Short Press	Toggles between Real-time Measurements and Energy Measurements.	← (Shift Left)	Esc (Exit)	Cancel (Exit)	Cancel (Exit)
▼	Short Press	Advances to the next measurement page.	↓ (Decrement)	↓ (Cursor Down)	↓ (Next)	↓ (Decrement)
▲	Short Press	Returns to the previous measurement page.	↑ (Increment)	↑ (Cursor Up)	↑ (Previous)	↑ (Increment)
Setup/ ↵	Short Press	-	OK (Confirm)	Enter (Select Parameter)	OK (Confirm)	OK (Confirm)
	Long Press 2s	Enters/Exits Setup Configuration Mode	-	-	-	-

Table 3-2 Buttons Description

3.3 Data Display

The following sections illustrate the available measurements for each display option.

3.3.1 Real-Time Measurement

Menu	Display Screens	1st Row	2nd Row	3rd Row	4th Row
Real-time Measurements	Display 1	Voltage			
	Display 2	Current			
	Display 3	P			
	Display 4	I Demand			
	Display 5	P Demand			
	Display 6	I Max. Demand of This Month (Since Last Reset)			
	Display 7	I Max. Demand of Last Month (Before Last Reset)			
	Display 8	P Max. Demand of This Month (Since Last Reset)			
	Display 9	P Max. Demand of Last Month (Before Last Reset)			

Table 3-3 Real-time Measurements Display

3.3.2 Energy

Menu	Display Screens	1st Row	2nd Row	3rd Row	4th Row
Energy	Display 1	kWh Import			
	Display 2	kWh Export			
	Display 3	kWh Net			
	Display 4	kWh Total			

Table 3-4 Energy Display

3.4 Setup Configuration via the Front Panel

3.4.1 Making Setup Changes

1) Entering the Password:

- Press **<Setup/↵>** for two seconds to enter **Setup Configuration** mode, and the LCD displays **PROG**.
- Press <▼> advance to the Password page.
- A correct password must be entered before changes are allowed. Press **<Setup/↵>** to enter the password. The factory default password is "0".
- Press <**Energy/**◄> to shift the cursor to the left by one position and press <▲> or <▼> to increment or decrement the numeric value for the password.

- When the password has been entered, press **< Setup/↵>** to save the password. If the entered password is correct, its value will be shown on the display. If the entered password is incorrect, the setup parameters only can be checked. Press <▲ > or <▼> to scroll through the list of sub-menus. Once the desired sub-menu is reached, press **<Setup/↵>** to select it and press **<Setup/↵>** again to modify it. When finished, press **<Setup/↵>** to return to the main menu.

2) Selecting a parameter to change:

- Press <▲> or <▼> to scroll to the desired parameter within a sub-menu.
- Press **< Setup/↵>** to select a parameter. Once a parameter has been selected, its value will blink.

3) Changing and saving a setup parameter:

- For a Numeric parameter, press <**Energy**/◄> to shift the cursor to the left by one position or <▲ > or <▼> to increment or decrement the numeric value.
- For an Enumerated parameter, press <▲> or <▼> to scroll through the enumerated list.
- After modification, press **<Setup/↵>** to save the change into memory.
- Repeat step 3) until all setup parameters have been changed.

4) Exiting the Setup Mode

- Press **<Setup/↵>** for two seconds to return to the main menu and press **<Setup/↵>** again to return to the **Data Display** Mode.
- Also, the **Setup Mode** will be automatically exited if there is a period of inactivity of 5 minutes or longer.

3.4.2 Setup Menu

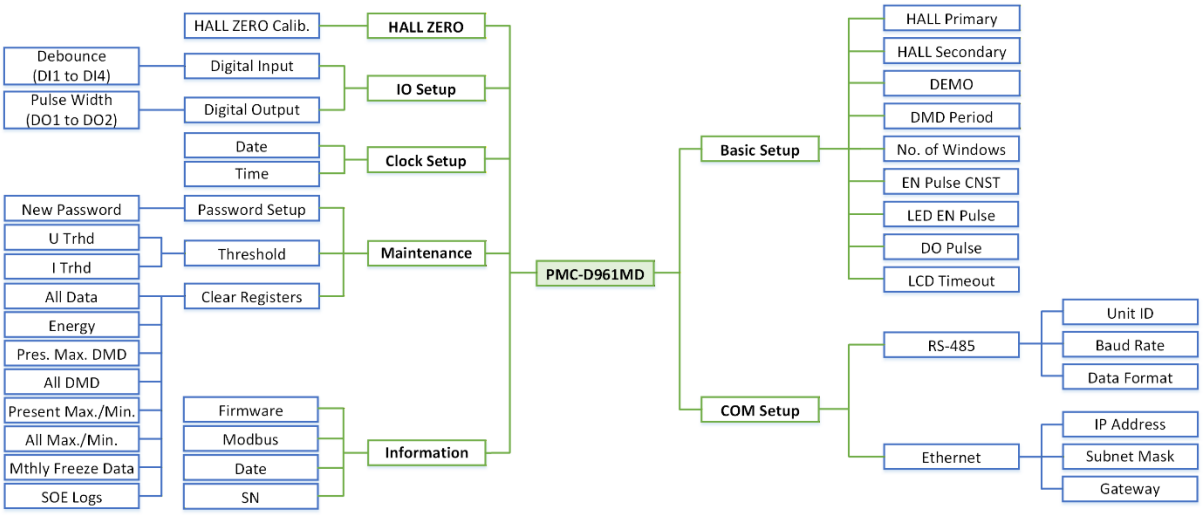


Figure 3-2 Setup Menu

3.4.3 Configuration

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

Label Menu Main Sub	Parameters	Description	Range	Default
PROG	Programming	Setup Configuration	/	/
Input PASS	Password	Enter Password	0000 to 9999	0
Basic				
HALL 1 SET	HALL Primary	HALL Primary Current	1 to 10000A	1000
HALL 2 SET	HALL Secondary	HALL Secondary Voltage	1 to 6V	4.0
DEMO SET	DEMO mode	DEMO mode	NO/YES	NO
PRD TIME SET	Demand Period	Demand Period	1 to 60 min	15
SUB NUM SET	Set No. of Sliding Windows	Set No. of Sliding Windows	1 to 15	1
PULSE CONST	Pulse Constant	Pulse Constant	1/10/100/400 Imp./kWh	10

LED PULSE SET	LED Pulse	Enable LED kWh Pulsing	Disabled/kWh ToT./kWh Imp./kWh Exp.	kWh ToT.
DO Pulse	SS Pulse Output	Enable Solid-State Pulsing Output		
BL Time SET	Backlight Timeout	Backlight Timeout	0 to 60 mins	5
COM SET				
ID SET	Meter Address	Unit ID	1 to 247	Last 2 digits of SN [1]
BD SET	Baud Rate	Data rate in bits per second	1200/2400/4800/ 9600/19200/38400bps	9600
CFG SET	Comm. Port Configuration	Data Format	8N2/8O1/8E1/ 8N1/8O2/8E2	8E1
ETH SET				
ETH ADDR TYPE	Ethernet Address Type	Set the type of Ethernet Address	0: STATIC, 1: DHCP	0: STATIC
IP	IP Address	Ethernet IP Address	/	192.168.0.100
SM	Subnet Mask	Ethernet Subnet Mask	/	255.255.255.0
GW	Gateway	Ethernet Gateway	/	192.168.0.1
HALL ZERO SET				
HALL ZERO CALIB	Hall Zero Calibration	Hall Zero Calibration	NO/YES	NO
IO SET				
DI1 Delay SET	DI1 Debounce	Debounce for DI1 to DI4	1 to 9999 ms	20 ms
DI2 Delay SET	DI2 Debounce			
DI3 Delay SET	DI3 Debounce			
DI4 Delay SET	DI4 Debounce			
DO1 Delay SET	DO1 Pulse Width	Pulse Width for DO1 to DO2	0 to 6000 (x0.1s) (0=Latch Mode)	10 (x0.1s)
DO2 Delay SET	DO2 Pulse Width			
TIME SET				
DATE SET	Date	Enter the Current Date	YYYY-MM-DD	/
TIME SET	Clock	Enter the Current Time	HH:MM:SS	/
NEW PASS SET				
NEW PASS SET	New Password	Set new password	0000 to 9999	0
TRHD SET				
U TRHD SET	Voltage Threshold	Set Voltage Threshold	x0.1V	100
I TRHD SET	Current Threshold	Set Current Threshold	x0.01%	15
CLR SET				
CLR ALL DATA	Clear All Data	Clear All Data	YES/NO	NO
CLR THIS ENGY	Clear Pres. Energy	Clear Pres. Energy	YES/NO	NO
CLR MAX DMD	Clear Pres. Max. DMD	Clear Pres. Max. DMD	YES/NO	NO
CLR ALL DMD	Clear All Demand	Clear All Demand	YES/NO	NO
CLR THIS MAX	Clear Present Max./Min. Log	Clear Present Max./Min. Log	YES/NO	NO
CLR ALL MAX	Clear All Max./Min. Logs	Clear All Max./Min. Logs	YES/NO	NO
CLR FREEZE MON	Clear Monthly Freeze Data	Clear Monthly Freeze Data	YES/NO	NO
CLR SOE	Clear All SOE Logs	Clear All SOE Logs	YES/NO	NO
INFO		Check meter information		
FW	Main Board Firmware	Main Board Firmware Version	e.g. 2.00.00 means V2.00.00	/
PROT DATE	Protocol Version FM Update Date	Protocol Version and Firmware Update Date	e.g. V2.0 e.g. 2025.09.22	/
SN	Serial Number	Serial Number	e.g. 1505250196	/

Table 3-5 Setup Parameters

Notes:

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

Chapter4 Applications

4.1 Inputs and Outputs

4.1.1 Digital Inputs

The PMC-D961MD comes standard with four self-excited Digital Inputs that are internally wetted with a sampling frequency of 1000Hz and programmable debounce. The Digital Inputs on the PMC-D961MD 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 as well as through communications. Changes in Digital Input status are stored as events in the SOE Log in 1ms resolution.

The DI parameter **DIx Debounce** specifies the minimum duration the **DI** must remain in the Active or Inactive state before a state change is considered to be valid. The **DIx Debounce** can be programmed via the Front Panel or through communications.

4.1.2 Digital Outputs

The PMC-D961MD comes standard with two Form A Electrometrical Relays. Digital Outputs are normally used for setpoint alarming, load control, or remote control applications.

Digital Outputs on the PMC-D961MD can be used in the following applications:

1) **Front Panel Control** Manually operated from the Front Panel. Please refer to the **DO Control** setup parameter in **Section 3.4.3** for a detailed description.
2) **Remote Control** Remotely operated over communications via our free PMC EasyConfig software or PecStar® iEMS Integrated Energy Management System.
3) **Control Setpoint** Control Setpoints can be programmed to trigger DO action upon becoming active. Please refer to **Section 4.4** for a detailed description.

The DO parameter **DOx Pulse Width** specifies the duration for which the relay output will be active when a Remote Operate or Setpoint Trigger command is received to operate it. The **DOx Pulse Width** can be programmed via the Front Panel or through communications.

Since there are multiple ways to trigger the Digital Outputs on the PMC-D961MD, a prioritized scheme has been developed to avoid conflicts between different applications. In general, Front Panel Control has the highest priority and can override other control schemes. Remote Control and Control Setpoint share the same priority, meaning that they can all be programmed to control the same Digital Output. This scheme is equivalent to having an implicit Logical OR operation for the control of a Digital Output and may be useful in providing a generic alarm output signal. However, the sharing of a Digital Output is not recommended if the user intends to generate a control signal in response to a specific setpoint condition.

4.1.3 Energy Pulse Output

The PMC-D961MD comes standard with one Front Panel LED Pulse Output and one Solid-State Relay Output for energy pulsing. Energy Pulse Outputs are typically used for accuracy testing. The LED Pulse Output on the PMC-D961MD can be enabled via the Front Panel or through communications, and the Solid-State Pulse Output is enabled by default.

4.2 Basic Measurement

The PMC-D961MD provides following basic measurements which are available through the Front Panel or communication:

- Voltage, Current and P Import/Export
- kWh Import and kWh Export
- kWh Net and kWh Total

4.3 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-D961MD provides Present Demand for Current and P Total which can be retrieved through the Front Panel or communications.

The PMC-D961MD provides the following setup parameters:

Setup Parameter	Definition	Options/Default*
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 15*
No. of Sliding Windows	Number of Sliding Windows.	1* to 15
Self-Read Time	The **Self-Read Time** allows the user to specify the time and day of the month for the Max. Demand Self-Read operation. • 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.	100*

Table 4-1 Demand Setup

4.4 Setpoints

The PMC-D961MD comes standard with 6 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 and fault detection monitoring.

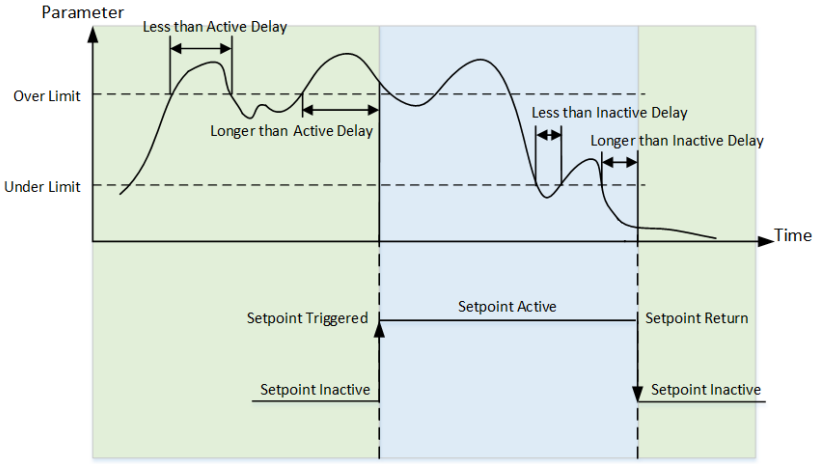


Figure 4-1 Over Setpoint

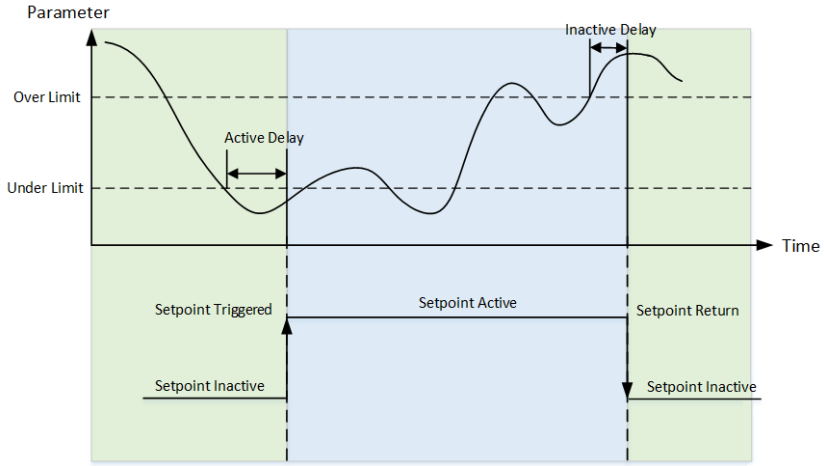


Figure 4-2 Under Setpoint

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

Setup Parameter	Definition	Options/Default*
Setpoint Type	Disable, Over or Under Setpoint.	0=Disabled* 1=Over Setpoint 2=Under Setpoint
Setpoint Parameter	Specify the parameter to be monitored.	See **Table 4-3 Setpoint Parameters** 0* to 5
Over Limit	Specify the value that the setpoint parameter must exceed for Over Setpoint to become active or for Under Setpoint to become inactive.	
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.	
Active Delay	Specify the minimum duration that the setpoint condition must be met before the setpoint becomes active. An event will be generated and stored in the SOE Log.	0 to 9999s
Inactive Delay	Specify the minimum duration that the setpoint return condition must be met before the setpoint becomes inactive. An event will be generated and stored in the SOE Log.	0 to 9999s
Setpoint Trigger	Specify what action a setpoint would take when it becomes active. Please refer to **Table 4-4 Setpoint Triggers** below for a list of Setpoint Triggers.	See **Table 4-4 Setpoint Triggers**

Table 4-2 Description for Setpoint Parameters

Key	Parameter	Scale	Unit
0	None	-	
1	U	x1	V
2	I		A
3	P		W
4	I DMD (I Present Demand)		A
5	P DMD (P Total Present Demand)		W

Table 4-3 Setpoint Parameters

Key	Action
0	None
1	DO1
2	DO2
3	DO1 & DO2

Table 4-4 Setpoint Triggers

4.5 Logging

4.5.1 Max./Min. Log

The PMC-D961MD records the **Max. Log** and **Min. Log** of **This Month** and **Last Month** with timestamp for Current and P. 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 same **Self-Read Time** for the Max. Demand Log is used to specify the time and day of the month for the Max./Min. Self-Read operation. Please refer to **Section 4.3** for a complete description of the **Self-Read Time** and its operation. The Max./Min. Log of This Month can be reset manually via front panel or through communications.

4.5.2 Max. Demand Log

The PMC-D961MD records the **Max. Demand** of **This Month** and **Last Month** with timestamp for Current and P Total. All Max. Demand information can be accessed through the front panel as well as communications. Please refer to **Section 4.3** for a complete description of the **Self-Read Time** and its operation.

4.5.3 SOE Log

The PMC-D961MD's SOE Log can store up to 32 events such as Power-on, Power-off, Digital Input status changes, Digital Output 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. All events

can be retrieved via Front Panel or through communications. If there are more than 32 events, the newest event will replace the oldest event on a First-In-First-Out basis. The SOE Log can be reset via front panel or through communications.

4.5.4 Monthly Freeze Log

The PMC-D961MD provides a **Monthly Freeze Log** for kWh Import/Export and can store up to 24 monthly freeze records (2 years). All Freeze Logs and their respective setup registers can only be accessed through communications. Please refer to **Section 4.3** for a complete description of the **Self-Read Time** and its operation. The PMC-D961MD's Freeze Logs can freeze and record the following parameters:

Freeze Type	Parameters	Depth
Monthly Freeze	Import and Export kWh with Timestamp	24

Table 4-5 Freeze Log

The **Monthly Self-Read Time** setup parameter allows the user to specify the time and day of the month for the Monthly Freeze Log Self-Read operation.
Monthly Freeze Self-Read Time can be set to a zero value or a non-zero value:

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

Chapter5 Modbus Register Map

This chapter provides a complete description of the Modbus register map (**Protocol Versions 2.0** and above) for the PMC-D961MD DC Multifunction Meter to facilitate the development of 3rd party communications driver for accessing information on the PMC-D961MD.

The PMC-D961MD 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-D961MD 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

For a complete Modbus Protocol Specification, please visit www.modbus.org.

5.1 Basic Measurements

Register	Property	Description	Format	Scale	Unit
0000	RO	SOE Pointer [1]	UINT32	x1	
0002	RO	DI Status [2]	UINT16	x1	
0003	RO	DO Status [3]	UINT16	x1	
0004	RO	Global Setpoint Status [4]	UINT16	-	
0005~0009	RO	Reserved	UINT16		
0010	RO	U	Float	x1	V
0012	RO	I	Float	x1	A
0014	RO	P	Float	x1	W
0016	RO	kWh Import [5]	INT32	x0.01	kWh
0018	RO	kWh Export [5]	INT32	x0.01	kWh
0020	RO	I Demand	Float	x1	A
0022	RO	P Demand	Float	x1	W
0024	RO	kWh Net	INT32	x0.1	kWh
0026	RO	kWh Total	INT32	x0.1	kWh
0028~0039	RO	Reserved	Float	-	

Table 5-1 Basic Measurements

Notes:

1. The PMC-D961MD has one SOE Log. The log 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. If a Clear Log is performed via Front Panel or through communications, its Log Pointer will be reset to zero, and the SOE Log Pointer will be immediately incremented by one with a new "Clear SOE" event. When the number of events is larger than the respective Log Depth, the latest 32 SOE logs is stored on a FIFO basis.
2. For the **DI Status** register, the bit values of B0 to B3 represent the states of DI1 to DI4, respectively, with "1" meaning Active (Closed) and "0" meaning Inactive (Open).
3. For the DO Status register, the bit values of B0 to B1 represent the states of DO1 to DO2, respectively, with "1" meaning Active (Closed) and "0" meaning Inactive (Open).
4. For the Setpoint Status register, the bit values of B0 to B5 represent the states of Setpoint 1 to Setpoint 6, respectively, with "1" meaning Active and "0" meaning Inactive.
5. The kWh Import/Export 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 0.1 times of the register value.

5.2 Energy Measurements

Register	Property	Description	Format	Scale	Unit
0500	RW	kWh Import [1]	INT32	x0.1	kWh
0502	RW	kWh Export [1]	INT32		
0504	RO	kWh Net [1]	INT32		
0506	RO	kWh Total [1]	INT32		
0508	RO	kWh Import Rollover Times	UINT32	-	
0510	RO	kWh Export Rollover Times	UINT32	-	

Table 5-2 Energy Measurements

Notes:

1. The kWh Import/Export and kWh Net/Total 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 0.1 times of the register value.

5.3 Demands

5.3.1 Present Demands

Register	Property	Description	Format	Scale	Unit
3000	RO	I	Float	x1	A
3002	RO	P	Float		W

Table 5-3 Present Demand Measurements

5.3.2 Max. Demand Log of This Month

Register	Property	Description	Format	Scale	Unit
3400~3405	RO	I	See Section **5.3.4** Demand Data Structure	x1	A
3406~3411	RO	P			W

Table 5-4 Max. Demand Log of This Month

5.3.3 Max. Demand Log of Last Month

Register	Property	Description	Format	Scale	Unit
3600~3605	RO	I	See Section **5.3.4** Demand Data Structure	x1	A
3606~3611	RO	P			W

Table 5-5 Demand Log of Last Month

5.3.4 Demand Data Structure

Offset		Property	Description	Format	Range
+0	High	RO	Year - 2000	UNIT16	0 to 99
	Low	RO	Month		1 to 12
+1	High	RO	Day	UNIT16	1 to 31
	Low	RO	Hour		0 to 23
+2	High	RO	Minute	UNIT16	0 to 59
	Low	RO	Second		0 to 59
+3	-	RO	Millisecond	UNIT16	0 to 999
+4~+5	-	RO	Max. Demand Value	Float	

Table 5-6 Demand Data Structure

5.4 Max./Min. Log

5.4.1 Max. Log of This Month

Register	Property	Description	Format	Scale	Unit
4000~4005	RO	I	See Section **5.4.5** Demand Data Structure	x1	A
4006~4011	RO	P			W

Table 5-7 Max. Log of This Month

5.4.2 Min. Log of This Month

Register	Property	Description	Format	Scale	Unit
4300~4305	RO	I	See Section **5.4.5** Demand Data Structure	x1	A
4306~4311	RO	P			W

Table 5-8 Min. Log of This Month

5.4.3 Max. Log of Last Month

Register	Property	Description	Format	Scale	Unit
4600~4605	RO	I	See Section **5.4.5** Demand Data Structure	x1	A
4606~4611	RO	P			W

Table 5-9 Max. Log of Last Month

5.4.4 Min. Log of Last Month

Register	Property	Description	Format	Scale	Unit
4900~4905	RO	I	See Section **5.4.5** Demand Data Structure	x1	A
4906~4911	RO	P			W

Table 5-10 Min. Log of Last Month

5.4.5 Max./Min. Log Structure

Offset		Property	Description	Format	Range
+0	High	RO	Year - 2000	UNIT16	0 to 99
	Low	RO	Month		1 to 12
+1	High	RO	Day	UNIT16	1 to 31
	Low	RO	Hour		0 to 23
+2	High	RO	Minute	UNIT16	0 to 59
	Low	RO	Second		0 to 59
+3	-	RO	Millisecond	UNIT16	0 to 999
+4~+5	-	RO	Max./Min. Value (Float)	Float	

Table 5-11 Max./Min. Data Structure

5.5 Monthly Freeze Log

Register	Property	Description	Format	Scale	Unit
12500	RW	Index [1]	INT16	1 to 24	
12501	RO	High-order Byte: Year (0~99) Low-order Byte: Month (1~12)	INT16	-	
12502	RO	High-order Byte: Day (1~31) Low-order Byte: Hour (0~23)	INT16		
12503	RO	High-order Byte: Minute (0~59) Low-order Byte: Second (0~59)	INT16		
12504	RO	kWh Import	INT32	0.1	kWh
12506	RO	kWh Export	INT32	0.1	kWh

Table 5-12 Monthly Freeze Log

Notes:

1. There is no Log Pointer that indicates the current logging position. Writing a value N between 1 and 24 to the Index register to retrieve the Monthly Freeze Log of the Nth entry. For example, writing 1 to the Index register will retrieve last month's Monthly Freeze Log. If N = 0 or N > 24, an exception response will be returned with the Illegal Data Value error code (0x03) as defined by the Modbus protocol. If all the returned values of the Nth Log Record (where 1 ≤ N ≤ 24) are all 0 (including the timestamp), this indicates that the returned Log Record is invalid and that the end of the Log has been reached. If the software is reading the Log for the very first time, it should start with N=1 and stop when either N=24 or when the returned Log Record is invalid. After that, all the software has to do is to read the Log on a monthly basis with N=1.

5.6 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-1/32)*8

Register	Property	Description	Format
10000~10007	RO	Event 1 [1]	See **Table 5-14 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	
10056~10063	RO	Event 8	
10064~10071	RO	Event 9	
10072~10079	RO	Event 10	
10080~10087	RO	Event 11	
10088~10095	RO	Event 12	
...		...	
10248~10255	RO	Event 32	

Table 5-13 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 5-14 SOE LOG Data Structure

2. SOE Event Classification

Event Classification	Sub-Classification	Status	Event Value	Description
1=DI Changes	1	2 / 1	0	DI1 Active/DI1 Inactive
	2	2 / 1		DI2 Active/DI2 Inactive
	3	2 / 1		DI3 Active/DI3 Inactive
	4	2 / 1		DI4 Active/DI4 Inactive
2=DO Changes	1	2 / 1		DO1 Operated/Released by Remote Control
	2	2 / 1		DO2 Operated/Released by Remote Control
3=Setpoint	1	2 / 1	Trigger Value / Return Value	Over U Setpoint Active/Return
	2	2 / 1		Over I Setpoint Active/Return
	3	2 / 1		Over P Setpoint Active/Return
	4	2 / 1		Over I DMD Setpoint Active/Return
	5	2 / 1		Over P DMD Setpoint Active/Return
	6~40	-	-	Reserved
	41	2 / 1	Trigger Value / Return Value	Under U Setpoint Active/Return
	42	2 / 1		Under I Setpoint Active/Return
	43	2 / 1		Under P Setpoint Active/Return
	44	2 / 1		Under I DMD Setpoint Active/Return
	45	2 / 1		Under P DMD Setpoint Active/Return
4=Self-diagnosis	1	2	0	System Parameter Fault
	2	2		Internal Parameter Fault
	3	-	-	Reserved
	4	2	0	Memory Fault
5=Operations	1	1	0	Power On
	2	1		Power Off
	3	1		Clear Pres. Energy via Front Panel
	4	1		Clear Pres. Max. DMD via Panel
	5	1		Clear All DMD via Panel
	6	1		Clear Present Max./Min. via Panel
	7	1		Clear All Max./Min. via Panel
	8	1		Clear All Data via Panel
	9	1		Clear SOE Logs via Panel
	10	1		Set Clock via Panel
	11	1		Setup Changed via Panel
	12	1		Clear Monthly Freeze Logs via Panel
	13~19	-	-	Reserved
	20	1	0	Clear Pres. Energy via Comm.
	21	1		Clear Pres. Max. DMD via Comm.

	22	1		Clear All DMD via Panel
	23	1		Clear Present Max./Min. via Comm.
	24	1		Clear All Max./Min. via Comm.
	25	1		Clear All Data via Comm.
	26	1		Clear SOE Logs via Comm.
	27	1		Setup Changed via Comm.
	28	1		Preset Energy Values via Comm.
	29	1		Clear Monthly Freeze Logs via Comm.
	30~36	-	-	Reserved
	37	1	0	I Zero Adjustment

Table 5-15 SOE Event Classification

5.7 Device Setup

5.7.1 Basic Setup Parameters

Register	Property	Description	Format	Range/Default*
6000	RW	Hall I Primary	UINT16	1 to 10,000A, 1000A*
6001	RW	Hall U Secondary	UINT16	10 to 60V (x0.1V), 40.0V*
6002	RW	DEMO Enable	UINT16	0=Disabled*, 1=Enabled
6003	RW	Demand Period	UINT16	1 to 60 (mins), 15*
6004	RW	Number of Sliding Windows	UINT16	1* to 15
6005	RW	Max. Demand Log Self-Read Time [1]	UINT16	100*
6006	RW	Max./Min. Log Self-Read Time	UINT16	0*
6007	RW	Monthly Freeze Log Self-Read Time [1]	UINT16	100*
6008	RW	Energy Pulse Constant	UINT16	0=1 imp/kWh 1=10 imp/kWh* 2=100 imp/kWh 3=400 imp/kWh
6009	RW	LED Energy Pulse	UINT16	0=Disabled, 1=kWh Total* 2=kWh Import*, 3=kWh Export
6010	RW	LCD Timeout	UINT16	0 to 60 (mins), 5*
6011	RW	Setpoint LCD Flash Alarm	UINT16	0=Disabled*, 1=Enabled
6012	RW	Time Zone [2]	UINT16	0 to 32, 26*
6013	RW	Solid-State Pulse Output	UINT16	0=Disabled, 1= kWh Total* 2=kWh Import, 3=kWh Export
6014	RW	I Polarity	UINT16	0=Normal, 1=Reverse
6015	RW	DHCP Enable	UINT16	0=Disabled*, 1=Enabled
6016	RW	SNTP Server IP Address [3]	UINT32	0.0.0.0*
6018	RW	SNTP Time Sync. Interval [4]	UINT16	0 to 9999 (mins), 60*
6019	RW	EN Pulse Width	UINT16	30 to 500 (ms), 50*

Table 5-16 Setup Parameters

Notes:

1. For the Max. Demand/ Max./Min. Self-Read Time and Monthly Freeze Log Self-Read Time:
   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.
2. The following table lists the Codes for different Time Zones.

Code	Time Zone	Offset (min)	Code	Time Zone	Offset (min)
0	GMT-12:00	-720	17	GMT+3:30	210
1	GMT-11:00	-660	18	GMT+4:00	240
2	GMT-10:00	-600	19	GMT+4:30	270
3	GMT-9:00	-540	20	GMT+5:00	300
4	GMT-8:00	-480	21	GMT+5:30	330
5	GMT-7:00	-420	22	GMT+5:45	345
6	GMT-6:00	-360	23	GMT+6:00	360
7	GMT-5:00	-300	24	GMT+6:30	390
8	GMT-4:00	-240	25	GMT+7:00	420
9	GMT-3:30	-210	26	GMT+8:00	480
10	GMT-3:00	-180	27	GMT+9:00	540
11	GMT-2:00	-120	28	GMT+9:30	570
12	GMT-1:00	-60	29	GMT+10:00	600
13	GMT-0:00	0	30	GMT+11:00	660

14	GMT+1:00	60	31	GMT+12:00	720
15	GMT+2:00	120	32	GMT+13:00	780
16	GMT+3:00	180			

Table 5-17 Time Zones

3. The SNTP time synchronization server address refers to the IP address of the computer hosting the SNTP time server. Please configure this address based on the actual IP address of the computer where the time server is installed. For example, if the IP address is 192.168.1.2, it should be set as 0xC0A80102.
4. Setting it to 0 disables SNTP time synchronization.

5.7.2 I/O Setup Parameters

Register	Property	Description	Format	Range/Default*
6200	RW	DI1 Debounce	UINT16	1 to 9999ms, 20*
6201	RW	DI2 Debounce	UINT16	1 to 9999ms, 20*
6202	RW	DI3 Debounce	UINT16	1 to 9999ms, 20*
6203	RW	DI4 Debounce	UINT16	1 to 9999ms, 20*
6204	RW	DO1 Pulse Width	UINT16	0 to 6000 (x0.1s), 10* (0 = Latch Mode)
6205	RW	DO2 Pulse Width	UINT16	

Table 5-18 I/O Setup

5.7.3 Communication Setup Parameters

Register	Property	Description	Format	Range/Default*
6400	RW	RS-485 Port Function	UINT16	0* (Modbus)
6401	RW	Unit ID	UINT16	1 to 247, 100*
6402	RW	Baud Rate	UINT16	0=1200, 1=2400, 2=4800 3=9600*, 4=19200, 5=38400
6403	RW	Comm. Config.	UINT16	0=8N2, 1=8O1, 2=8E1* 3=8N1, 4=8O2, 5=8E2
6404	RW	Ethernet IP Address	UINT32	192.168.0.100*
6406	RW	Ethernet Subnet Mask	UINT32	255.255.255.0*
6408	RW	Ethernet Gateway	UINT32	192.168.0.1*

Table 5-19 Communication Setup

5.7.4 Setpoints Setup Parameters

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 5
6502	RW		Over Limit [2]	Float	
6504	RW		Under Limit [2]	Float	
6506	RW		Active Delay	UINT16	0 to 9999 s
6507	RW		Inactive Delay	UINT16	0 to 9999 s
6508	RW		Trigger Action 1 [3]	UINT16	0 to 3
6509	RW		Reserved	UINT16	
6510	RW	Setpoint #2	Setpoint Type	UINT32	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6511	RW		Parameter [1]	UINT16	0* to 5
6512	RW		Over Limit [2]	Float	
6514	RW		Under Limit [2]	Float	
6516	RW		Active Delay	UINT16	0 to 9999 s
6517	RW		Inactive Delay	UINT16	0 to 9999 s
6518	RW		Trigger Action 1 [3]	UINT16	0 to 3
6519	RW		Reserved	UINT16	
6520	RW	Setpoint #3	Setpoint Type	UINT32	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6521	RW		Parameter [1]	UINT16	0* to 5
6522	RW		Over Limit [2]	Float	
6524	RW		Under Limit [2]	Float	
6526	RW		Active Delay	UINT16	0 to 9999 s
6527	RW		Inactive Delay	UINT16	0 to 9999 s
6528	RW		Trigger Action 1 [3]	UINT16	0 to 3

6529	RW		Reserved	UINT16	
…			…		
6650	RW	Setpoint #6	Setpoint Type	UINT32	0=Disabled* 1=Over Setpoint 2=Under Setpoint
6551	RW		Parameter [1]	UINT16	0* to 5
6552	RW		Over Limit [2]	Float	
6554	RW		Under Limit [2]	Float	
6556	RW		Active Delay	UINT16	0 to 9999 s
6557	RW		Inactive Delay	UINT16	0 to 9999 s
6558	RW		Trigger Action 1 [3]	UINT16	0 to 3
6559	RW		Reserved	UINT16	

Table 5-20 Setpoint Setup Parameters

Notes:

1. The PMC-D961MD provides the following setpoint parameters:

Key	Parameter	Scale	Unit
0	None	-	-
1	U	x1	V
2	I		A
3	P		W
4	I DMD(I Present Demand)		A
5	P DMD (P Total Present Demand)		W

Table 5-21 Setpoint Parameters

2. For Over Setpoint, the setpoint parameter must exceed the Over Limit to become active and go below the Under Limit to become inactive.
   For Under Setpoint, the setpoint parameter must go below the Under Limit to become active and exceed the Over Limit to become inactive.
3. The PMC-D961MD provides the following Setpoint Triggers:

Key	Action
0	None
1	DO1
2	DO2
3	DO1 & DO2

Table 5-22 Setpoint Triggers

5.8 Remote Control

The DO Control registers are implemented as both “Write-Only” Modbus Coil Registers (0XXXXX) and Modbus Holding Registers (4XXXXX), which can be controlled with the Force Single Coil command (Function Code 0x05) or the Preset Multiple Hold Registers (Function Code 0x10). The PMC-D961MD does not support the Read Coils command (Function Code 0x01) because DO Control registers are “Write-Only”. The DO Status register 0003 should be read instead to determine the current DO status. The Remote Control registers are valid only if the device is equipped with the appropriate option.

Register	Property	Description	Format	Note
9100	WO	Execute DO1 Close	UINT16	Writing “0xFF00” to the register to perform the described action.
9101	WO	Execute DO1 Open	UINT16	
9102	WO	Execute DO2 Close	UINT16	
9103	WO	Execute DO2 Open	UINT16	

Table 5-23 DO Control

5.9 Clear/Reset Control

Register	Property	Description	Format	Note
9600	WO	Clear All Data [1]	UINT16	Writing "0xFF00" to the register to execute the described action.
9601	WO	Clear Present Energy	UINT16	
9602	WO	Clear Present Max. Demand	UINT16	
9603	WO	Clear All Demand [2]	UINT16	
9604	WO	Clear Present Max./Min. Logs	UINT16	
9605	WO	Clear All Max./Min. Log [3]	UINT16	
9606	WO	Clear Monthly Freeze Logs	UINT16	
9607	WO	Clear SOE Logs	UINT16	
9608~9609	WO	Reserved	UINT16	

Table 5-24 Clear Control

Notes:

1. Writing 0xFF00 to the **Clear All Data** register to perform the Clear operation for the actions specified in registers # 9601 to # 9607.
2. Writing 0xFF00 to the **Clear All Demand** register to clear all Demand registers and logs, including Present Demand, Max. Demand Log of This Month and Last Month.
3. Writing 0xFF00 to the **Clear All Max./Min. Log** register to clear both the Max./Min Log of This Month and the Max./Min. Log of Last Month.

5.10 Time

There are two sets of Time registers supported by the PMC-D961MD - Year / Month / Day / Hour / Minute / Second (Registers # 60000 to 60002) and UNIX Time (Register # 60004). When sending time to the PMC-D961MD 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 one of Time register sets is being written, another Time register set will be updated to reflect the new time. The Millisecond register (60003) must be written during the Time Set operation. When broadcasting time, the function code must be set to 0x10 (Pre-set Multiple Registers). Incorrect date or time values will be rejected by the meter. In addition, attempting to write a Time value less than Jan 1, 2000 00:00:00 will be rejected.

Register		Property	Description	Format	Note
60000	9000	RW	High-order Byte: Year	UINT16	10-90 (Year-2000)
			Low-order Byte: Month		1 to 12
60001	9001	RW	High-order Byte: Day	UINT16	1 to 31
			Low-order Byte: Hour		0 to 23
60002	9002	RW	High-order Byte: Minute	UINT16	0 to 59
			Low-order Byte: Second		0 to 59
60003	9003	RW	Millisecond	UINT16	0 to 999
60004	9004	RW	UNIX Time	UINT32	0x4B3D3B00 to 0xE398E47F the corresponding time is 2010.01.01 00:00:00 to 2090.12.31 23:59:59 (GMT 0:00 Time Zone)

Table 5-25 Time Registers

5.11 Meter Information

Register		Property	Description	Format	Note
9800 ~ 9819	60200 ~ 60219	RO	Meter Model [1]	UINT16	
9820	60220	RO	Firmware Version	UINT16	e.g. 10000 shows the version is V1.00.00
9821	60221	RO	Protocol Version	UINT16	e.g. 10 means V1.0
9822	60222	RO	Firmware Update Date: Year-2000	UINT16	e.g. 240110 means January 10, 2024
9823	60223	RO	Firmware Update Date: Month	UINT16	
9824	60224	RO	Firmware Update Date: Day	UINT16	
9825	60225	RO	Serial Number	UINT32	
9827 ~ 9828	60027 ~ 60228	RO	Reserved	UINT16	
9829	60229	RO	Feature Code [2]	Bitmap	
9830	-	RO	Effective IP Address [3]	UINT32	e.g. 192.168.8.97 corresponds to 0xC0A80861
9832	-	RO	Effective Subnet Mask [3]	UINT32	
9834	-	RO	Effective Gateway [3]	UINT32	

Table 5-26 Meter Information

Notes:

1. The Meter Model appears from registers 9800-9819 and contains the ASCII encoding of the string “PMC-D961MD” as shown in the following table.

Register	Value (Hex)	ASCII
9800	0x50	P
9801	0x4D	M
9802	0x43	C
9803	0x2D	-
9804	0x44	D
9805	0x39	9
9806	0x36	6
9807	0x31	1
9808	0x4D	M
9809	0x44	D
9810~9819	0x20	Null

Table 5-27 ASCII Encoding of “PMC-D961MD”

2. The Feature Code details are illustrated in the following table.

Bit7~Bit15	Bit6	Bit5	Bit2~Bit4	Bit0~Bit1
Reserved	Ethernet Port 0=None 1=10Base-T/100Base-TX Ethernet Port	Language 0=Chinese 1=English	Reserved	Reserved

Table 5-28 Feature Bitmap

3. The available IP, subnet mask, and gateway address refer to the effective and communicable parameters of the network interface. If DHCP is not enabled, the static IP is displayed. If DHCP is enabled but no address has been assigned yet, 0 is displayed. If DHCP is enabled and a dynamic IP has been obtained, the dynamic IP is displayed.

Appendix A Technical Specifications

DC Inputs	
Voltage Input	
Standard (Un)	1000V DC
Measurement Range	10-1500V DC
Overload	1.5xUn continuous
Burden	<0.01VA
Current Input	
Nominal Input (In)	±4V (via Hall-Effect Sensor)/optional ±5V
Measurement Range	0.8% to 120% In
Burden	<0.001VA
Overload	1.2xIn continuous
Power Supply (L/+, N/-)	
Standard	24-250 VAC/DC, ±10%, 47-440Hz
Burden	<2VA
Digital Inputs (DIC, DI1, DI2, DI3, DI4)	
Type	Dry contact, internally wetted
Hysteresis	20ms minimum
Digital Outputs (DO11, DO12, DO21, DO22)	
Type	Form A Mechanical Relay
Loading	5A @ 250VAC or 30VDC
Pulse Output (E+, E-)	
Type	Solid-State Pulse Output
Pulse Constant	1/10/100/400 Imp/kWh
Pulse Width	80ms±20ms
Communications	
RS-485 Port	
Baud Rate	1200/2400/4800/9600/19200/38400bps
Protocol	Modbus RTU
Ethernet Port (Optional)	
Speed	10/100 Mbps
Protocol	Modbus TCP
Environmental Conditions	
Operating Temp.	-25°C to 70°C
Storage Temp.	-40°C to 85°C
Humidity	5% to 95% non-condensing
Atmospheric Pressure	70 kPa to 106 kPa
Mechanical Characteristics	
Panel Cutout	92x92 mm
Unit Dimensions	96x96x92 mm
IP Rating	IP65

Appendix B Accuracy Specifications

Parameters	Accuracy	Resolution
Voltage	±0.2%	0.001V
Current	±0.5%	0.001A
P	±0.5%	0.001W
kWh	Class 0.5	0.1kWh

Appendix C Standards Compliance

Safety Requirements	
CE LVD 2014 / 35 / EU	EN 61010-1: 2010 + A1: 2019 EN IEC 61010-2-030: 2021 + A11: 2021
Electrical Safety in Low Voltage Distribution Systems up to 1000Vac and 1500 Vdc	IEC 61557-12: 20121 (PMD)
Insulation Dielectric test Insulation resistance Impulse voltage	IEC 62052-31: 2015 EN 61010-1: 2010 + A1: 2019 1.5kV @ 1 minute >100MΩ 6kV, 1.2/50μs
Electromagnetic Compatibility CE EMC Directive 2014 / 30 / EU (EN IEC 61326: 2021)	
Immunity Tests	
Electrostatic Discharge	EN 61000-4-2: 2009
Radiated Fields	EN 61000-4-3: 2020
Fast Transients	EN 61000-4-4: 2019
Surges	EN 61000-4-5: 2014 + A1: 2017
Conducted Disturbances	EN 61000-4-6: 2014 + AC: 2015
Magnetic Fields	EN 61000-4-8: 2010
Voltage Dips and Interruptions	EN IEC 61000-4-11: 2020
Ring Wave	EN 61000-4-12: 2017
Immunity Standard for Industrial Environments	EN IEC 61000-6-2: 2019
Emission Tests	
Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	EN 55011: 2016 + A1: 2017 + A11: 2020 + A2: 2021
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	EN 55032: 2015 + AC: 2016 + A11: 2020 + A1: 2020
Limits for Harmonic Current Emissions for Equipment with Rated Current ≤ 16A	EN IEC 61000-3-2: 2019 + A1: 2021
Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤ 16A	EN 61000-3-3: 2013 + A1: 2019 + A2: 2021
Emission Standard for Industrial Environments	EN IEC 61000-6-4: 2019
Mechanical Tests	
Spring Hammer Test	IEC 62052-31: 2015
Shock Test	IEC 62052-11: 2020
Vibration Test	IEC 62052-11: 2020

Appendix D Ordering Guide

Version 20251015

Product Code	Description
PMC-D961MD DC Multifunction Meter	
Basic Function	
L	DIN96 Panel Mounting, 7-Segment LCD display, 1xDC Voltage Input, 1xDC Current Input and Bi-directional kWh measurements, Demands, Max./Min. Logs, Monthly Freeze Logs, Setpoints and SOE Logs
Input Current	
2	1 x ±4V/5V DC Input via Hall-Effect Sensor
Input Voltage	
5	10-1500V DC
Power Supply	
2	24-250 VAC/DC ± 10%, 47-440Hz
I/O	
A	4xDI + 2xDO + 1xPulse Output
Communications	
A	1xRS-485 Port
E*	1xRS-485 Port + 1x10Base-T/100Base-TX Ethernet Port
Display Language	
E	English

PMC-D961MD	-	L	2	5	2	A	A	E	PMC-D961MD-L252AAE (Standard Model)

*Additional charges apply.

1) Please refer to Accessories sheet for Hall-Effect sensors' order information.

2) ±12V DC Power supply required for Hall-Effect Sensors will be supplied by PMC-D961MD device. No additional power supply is required.

Version 20251015

PMC-D961MD Accessories

Split-Core Hall-Effect Sensor

Product Code	Model #	Specification	Accuracy	Dimension (mm)	Burden (W)	Cable Length
180005732	PMC-DCT-200A-4V-A	200(300)A	Class 1	Round hole, ϕ35	0.3	Not included
180005733	PMC-DCT-400A-4V-A	400(600)A	Class 1	Square hole, 42x15	0.3	Not included
180005734	PMC-DCT-600A-4V-A	600(900)A	Class 1	Square hole, 42x15	0.3	Not included
180005735	PMC-DCT-800A-4V-A	800(1200)A	Class 1	Square hole, 64x16	0.3	Not included
180008434	PMC-DCT-1000A-4V-A	1000(1500)A	Class 1	Square hole, 104x36	0.3	Not included
180008435	PMC-DCT-2000A-4V-A	2000(3000)A	Class 1	Square hole, 104x36	0.3	Not included

The cables for connecting PMC-D961MD to Hall-Effect Sensors are not included. The recommended wire size is 0.5 - 1.0 mm^2.

Contact us

CET Electric Technology Inc.
Email: sales@cet-global.com
Web: www.cet-global.com