Multi-functional Power Meter DPM-C520 User Manual

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Preface

Thank you for choosing this product. This manual offers information related to installation of the DPM-C530A power meter. Before using the meter, please read this manual carefully to ensure proper use of this meter. Also, please place the manual at an easy-to-find location for reference at any time. Before you finish reading this manual, please observe the following notes:

- No water vapor, corrosive and flammable gas shall be present in the installation environment.
- Follow the instructions on the diagram for wiring the device.
- Grounding must be performed correctly and properly according to provisions from related regulations on electric work currently effective in the country.
- Do not disassemble the meter or alter its wiring with power connected.
- With power on, do not touch the power-connecting area to avoid electric shock.

If you still experience issues in the use, please contact your distributor or our customer service center. As the product gets updated and improved, modifications on the specifications will be addressed in the newest version of manual obtainable by contacting your distributor or downloading from the Delta Electronics website (http://www.delta.com.tw/ia/).

Notes

2.1 Safety Notes

Always be aware of the following safety notes when installing, wiring, operating, maintaining, and checking the device.

◆ Notes on Installation

» Install the power meter according to instructions on the manual. Otherwise, damage on the device might result.

» It is forbidden to expose and use this product in a place present with matters, such as water vapor, corrosive and flammable gas. Otherwise, electric shock, fire, or explosion might result.

» Do not install the meter in an environment with a temperature that exceeds range on the specification. Otherwise, inability of the meter to operate normally or damage on the meter might result.

» Do not use the meter on an alarm console that might cause personnel injury or death, damage on the device, or system shutdown.

◆ Note on Wiring

» Keep a good grounding on the grounded terminals, as improper grounding might cause abnormal communication, electric shock, or fire.

◆ Notes on Operation

» Do not alter wiring with power turned on. Otherwise, electric shock or personnel injury might result.

» Do not touch the panel with a sharp item. Otherwise, indentation on the panel might result, which causes the meter to not function normally.

◆ Maintenance and Check

» Do not get to inside of the meter. Otherwise, electric shock might result.

» Do not take the meter panel apart when the power is on. Otherwise, electric shock might result.

» Do not touch the wiring terminals within 10 minutes after turning off power, as the remaining voltage might cause electric shock.

» Do not block ventilation ducts when operating the meter. Otherwise, the meter will breakdown because of inadequate heat dissipation.

◆ Methods of Wiring

» Do not use voltage that exceeds range specified for the meter. Otherwise, electric shock or fire might result.
» When wiring, take apart the quick connector from the main meter body.
» Connect only one cord on one plug on the quick connector.
» For wrongfully forced unplug, recheck the connecting cord and restart.

◆ Wiring for Communication Circuits

» Follow the standard specification on use of wires for communication wiring.
» Length of communication wires should be within the specified standard.
» Use correct grounding loop to avoid communication issues.
» To avoid stronger noise interference that causes the meter to not operate normally, use an independent wiring slot to separate the communication cable for the meter from all power cords and motor power cords.

2.2 Installation Environment

Before installation, this product must be placed in its packaging box. If not used for a while, be sure to watch for the following when storing the meter, so that the product could be kept under the company's warranty coverage for future maintenance.

- Place the device in a dry location free of dust.
- Ambient temperature for the storage location must be within the range of -20° C to +70° C (-4° F to 158° F).
- Relative humidity for the storage location must be within the range of 5% to 95%, with no condensation.
- Avoid storing at an environment present with corrosive gas and liquid.
- Package properly and store on a rack or counter.
- Suitable installation environment for this product includes: place with no device that generates high amount of heat; place with no water drop, vapor, dust, and oily dust; place with no corrosive and flammable gas; place with no floating dust and metal particles; place with no shaking and interference from electromagnetic noise.

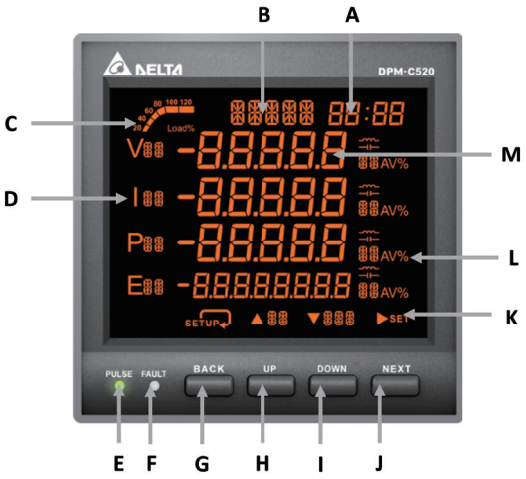
Descriptions of Parts

3.1 Operating Interface

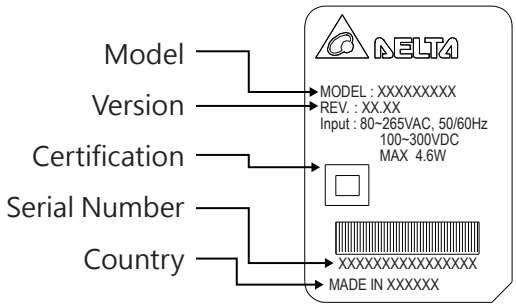
DPM-C520 uses a LCD display that exhibits four pieces of measurement information on each page. Diagram below is an illustration of the interface.

Descriptions:

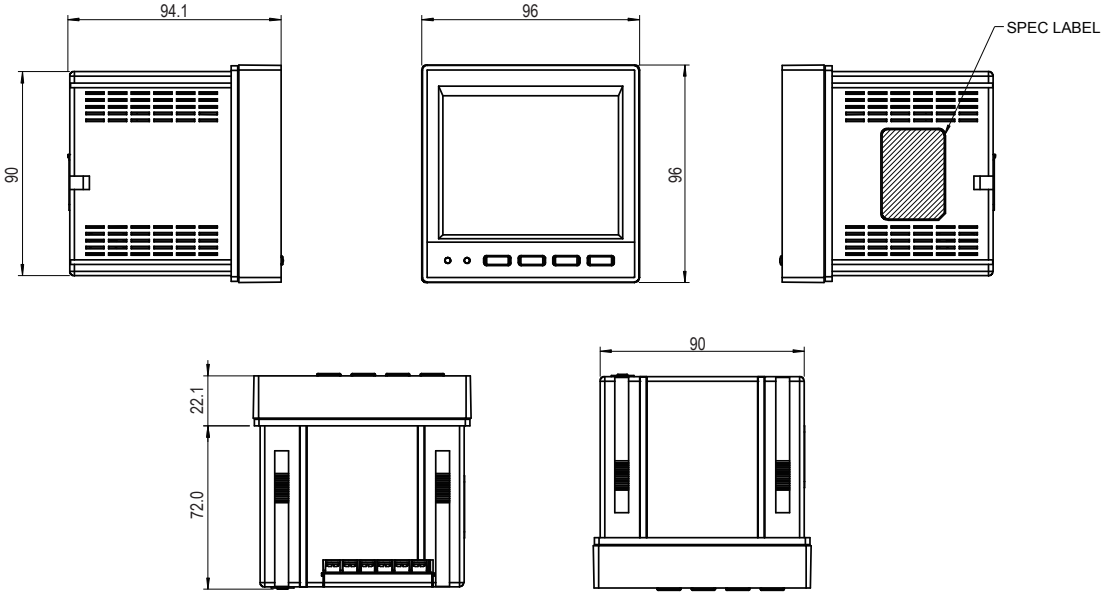
A. Time
B. Title
C. Load percentage
D. Item
E. PULSE light
F. FAULT light
G. BACK key
H. Up key
I. DOWN key
J. NEXT key
K. Submenu
L. Unit
M. Values



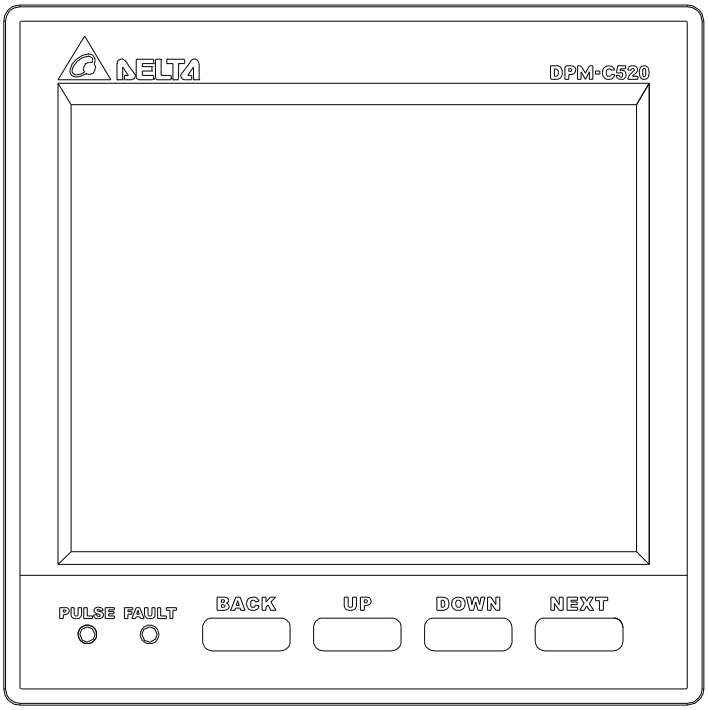
3.2 Product Name Tag



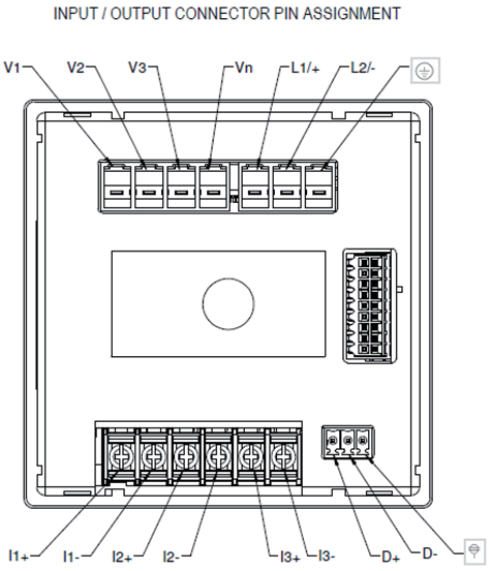
3.3 Exterior and Dimensions



◆ Front



◆ Back



FUNCTION	PIN	VOLTAGE	CURRENT
MEASURED VOTAGE	V1	20V L-N ~ 400V L-N 35V L-L ~ 690V L-L	-
	V2		
	V3		
	Vn		
CONTROL POWER	L1/+	80 ~ 265 V_{AC} 100 ~ 300 V_{DC}	400mA MAX.
	L2/-		
	⏚		
MEASURED CURRENT	I1+	-	1A ~ 5A
	I1-		
	I2+		
	I2-		
	I3+		
	I3-		
RS-485	D+	-7 ~ +12 V_{DC}	-
	D-		
	⏚		

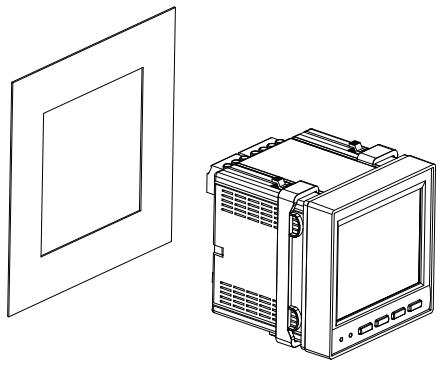
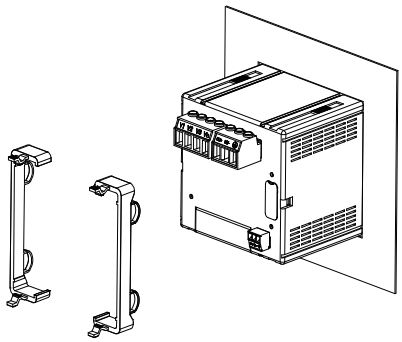
Installation

4.1 Installation Method

Note:

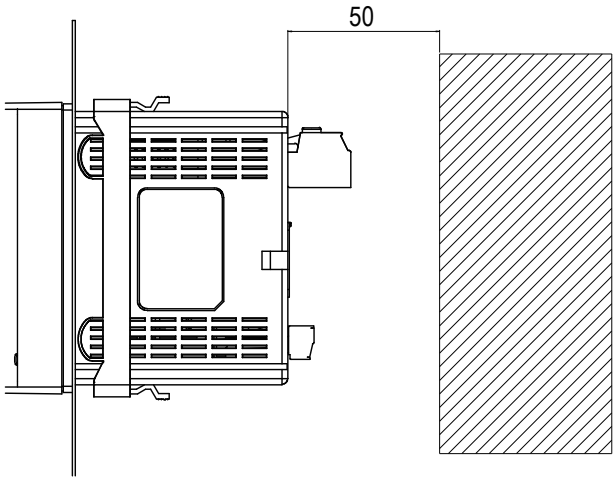
- The installation method should be based on instructions. Otherwise, breakdown would result.
- For better effectiveness of cooling cycles, sufficient space must be kept between adjacent objects and walls during the installation. Otherwise, imperfect cooling would result.
- Maximal thickness for the panel installed should not exceed 5 mm.

Illustration of Installation:

Step 1: Open the square hole on the metal plate and then install the power meter.	Step 2: Install the fixing mount into the sliding slot and then push the meter in to touch the metal plate.
	

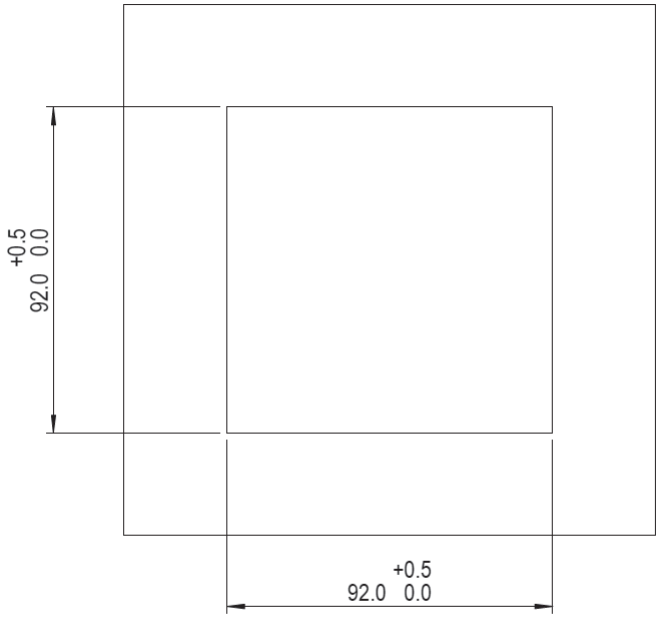
Step 3:

During the installation, reserve a 50 mm-wide space behind the power meter for dissipating heat



Unit: mm

Dimensions of Panel Hole :



Panel Hole
Thickness : 0.8~4.0mm

Unit: mm (inches)

4.2 Basic Checks

Items Checked	Contents of Checks
General Check	■ Regularly check for losing of the fixing mount at the location where the power meter and device are connected. ■ Guard against entrance of foreign objects, such as oil, water, or metal powder at the heat dissipating holes. Guard against entrance of drill cut powders into the power meter. ■ Should the power meter be installed at a place present with harmful gas or dust, guard against entrance of those matters into the meter.
Pre-operation Check (not supplied with control power)	■ Insulate the connecting spot of the wiring terminals. ■ Communications wiring should be done properly, or abnormal operations might result. ■ Check for presence of conducive and flammable objects, such as screws or metal pieces, in the power meter. ■ Should electronic devices used near the power meter experience electromagnetic interference, tune with instruments to reduce electromagnetic interference. ■ Check for correct voltage level for the power supplied to the power meter.
Pre-running Check (supplied with control power)	■ Check whether power indicator light is lit. ■ Check whether communication between every device is normal. ■ If there is any abnormal response from the power meter, contact your distributor or our customer service center.

Wiring Diagrams

5.1 Wiring on the Back

This chapter illustrates how the wiring on the back is done.

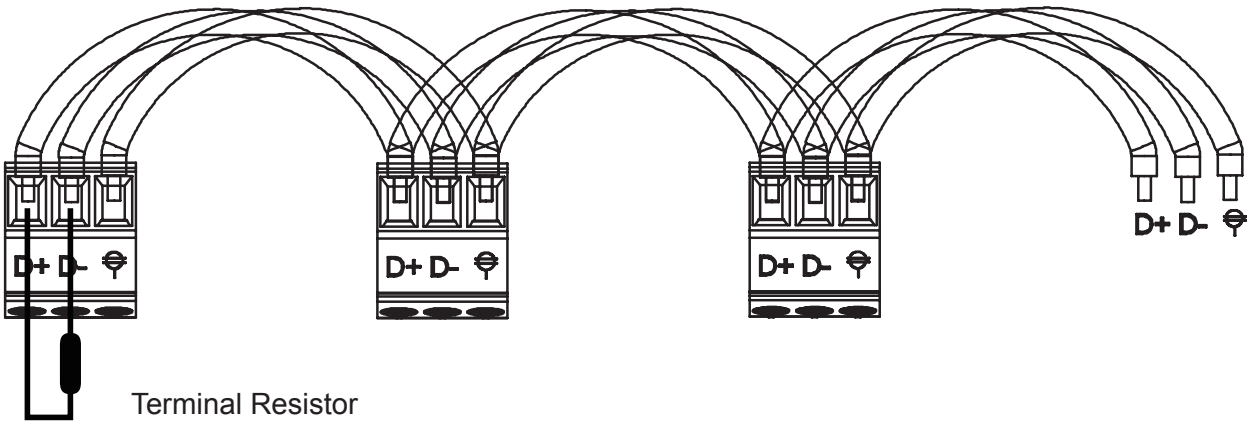
Note:

- To avoid electric shock, do not alter wiring when the power is on.
- As there is no power switch on the power meter, be sure to install a breaker switch on the power cord for the meter.

Recommended wiring materials are shown below:

Connecting Terminals	Wire Diameters	Screw Turning Torque
Functional Power	AWG 10～24	7.14 kgf-cm (0.7 N*m)
Measured Voltage	AWG 10～26	7.14 kgf-cm (0.7 N*m)
Measured Current	AWG 14～22	8.0 kgf-cm (0.79 N*m)
RS-485	AWG 14～28	2.04 kgf-cm (0.2 N*m)

RTwisted pair cables must be used in cabling for RS485 communication. When connecting multiple devices in series, the wiring method is displayed in the diagram below.



The D+ communication terminal for all devices should be connected on the same twisted pair cable. The D-terminals should be connected on the other twisted pair cable. The insulation net is grounded. The device on the end terminal needs to have terminal resistor (100~120Ω，0.25W) installed on it.

5.2 Descriptions of Wiring

This chapter illustrates how wiring is done for this panel.

■ Measured Voltage:

When measured voltage is higher than the rated specification (refer to Electrical Specification 9.1) for the device, use of an external potential transformer should be considered.

■ Measured Current:

When measured current is higher than the rated specification (refer to Electrical Specification 9.1) for the device, use of an external current transformer should be considered.

■ Supported Methods of Wiring:

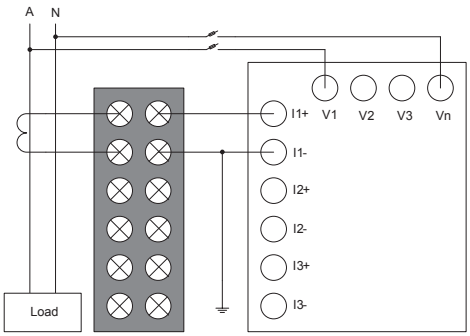


Diagram 5-1: One-phase two-wire, 1 CT

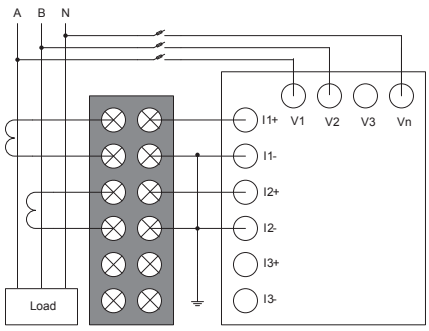


Diagram 5-2: One-phase three-wire, 2 CT

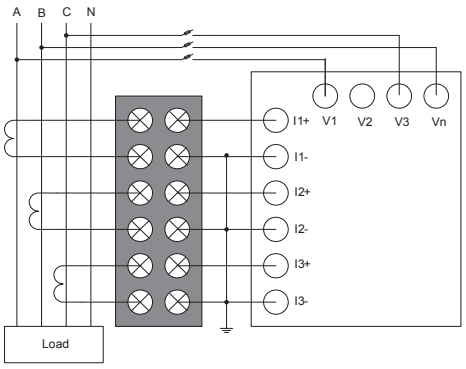


Diagram 5-3: Three-phase three-wire,
Δ Delta-connection, 3 CT, No PT

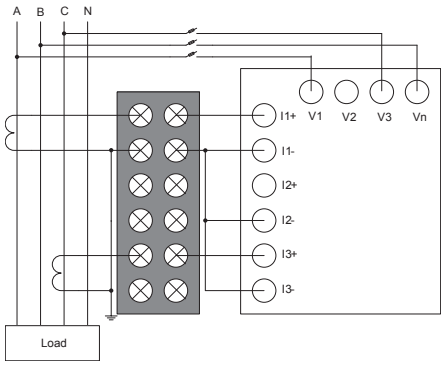


Diagram 5-4: Three-phase three-wire,
Δ Delta-connection, 2 CT, No PT

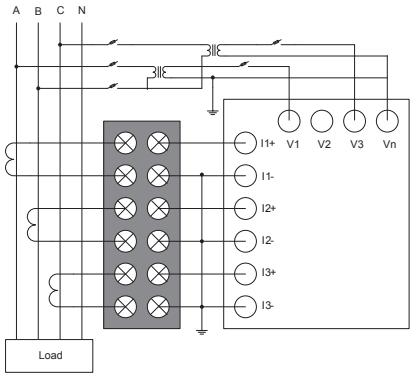


Diagram 5-5: Three-phase three-wire,
Δ Delta-connection, 3 CT, 2 PT

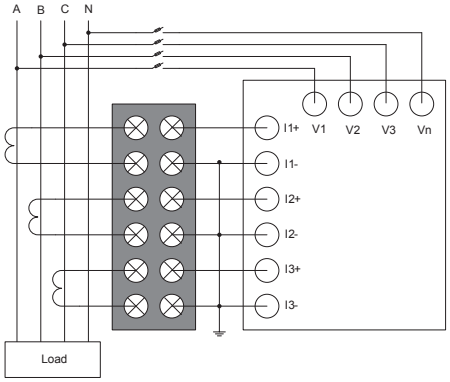


Diagram 5-6: Three-phase four-wire,
Y-connection, 3 CT, No PT

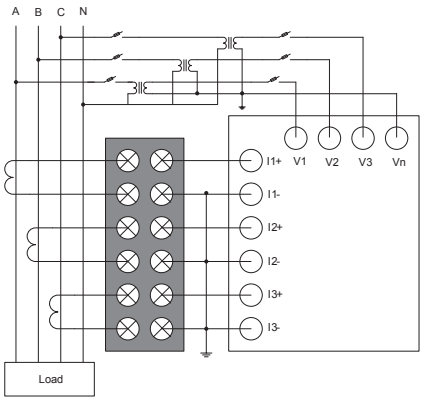


Diagram 5-7: Three-phase four-wire,
Y-connection, 3 CT, 3 PT

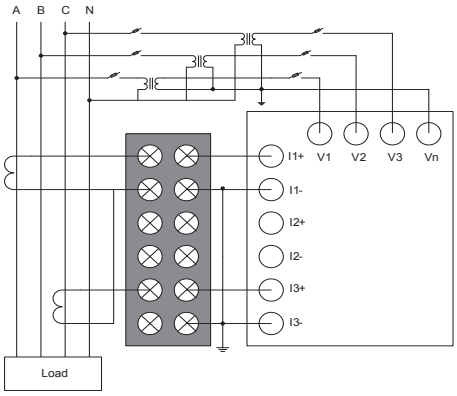
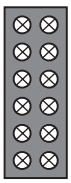


Diagram 5-8: Three-phase four-wire,
Y-connection, 2 CT, 3 PT

■ The following symbols are used in the diagram:

Symbol					
Description	Grounding	Current transformer	Terminal resistor	Potential or voltage transformer	Fuse

Panel Display and Settings

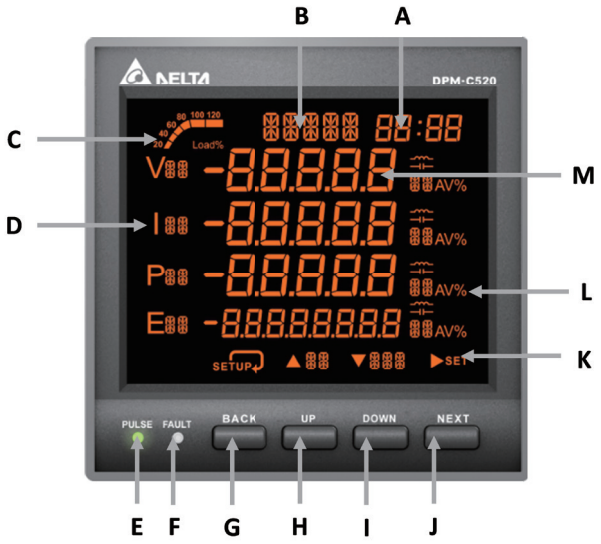
6.1 Panel Display

6.1.1 Area of Display

DPM-C520 uses LCD display that exhibits four pieces of measurement information on each page. Diagram below is an illustration of the display panel:

Descriptions:

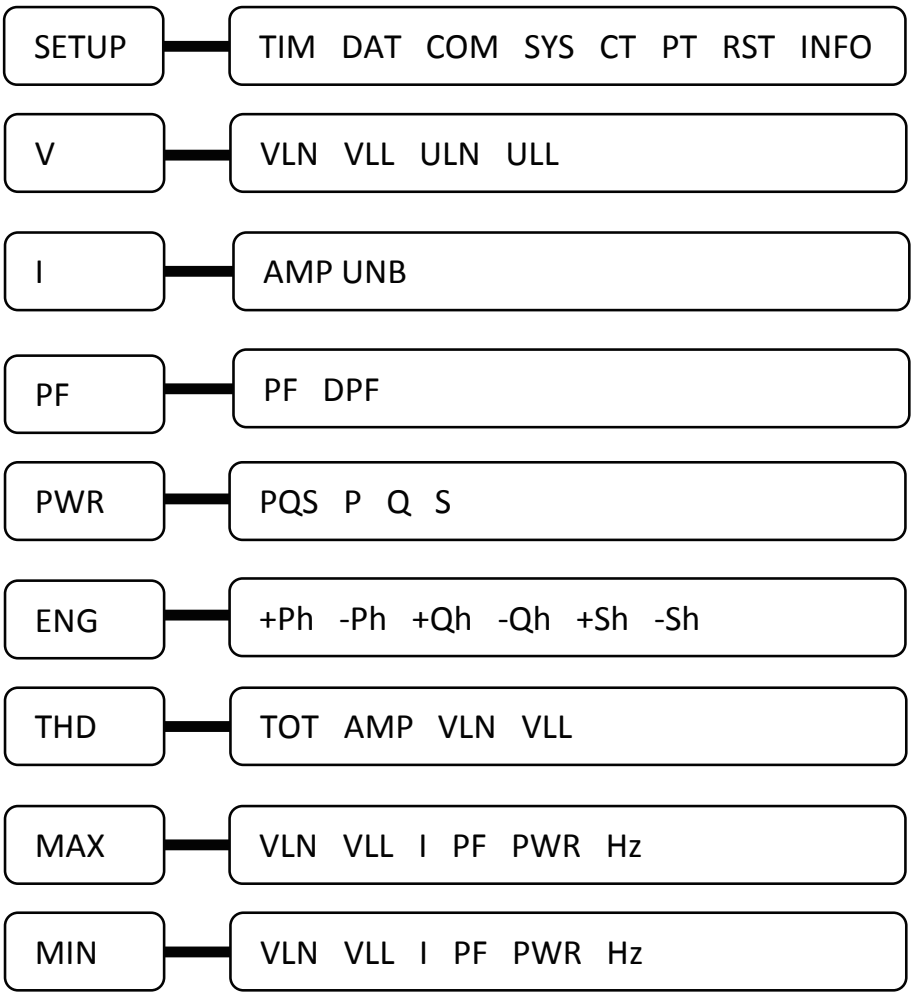
A	Time
B	Title
C	Load percentage
D	Item
E	PULSE light
F	FAULT light
G	BACK key
H	UP key
I	DOWN key
J	NEXT key
K	Submenu
L	Unit
M	Values



6.1.2 Descriptions of the Keys

Name of Key	General Mode	Configuration Mode
BACK key	Enter into Menu or return to previous page	Return without saving current settings
UP key	Move up to select an item or page	Increase numbers
DOWN key	Move down to select an item or page	Decrease numbers
NEXT key	Enter into the selected item	Enter into the setting and move to the next location of setting

6.1.3 Menu Tree



6.2 General Operations

6.2.1 Reading Measured Data

- Voltage Measurement:
  Parameter of voltage measured by the power meter, including voltage L-N, voltage L-N, voltage L-N unbalance, voltage L-L unbalance, etc.
- Current Measurement:
  Parameter of current measured by the meter, including current, current unbalance, and others.
- Power Factor, Frequency (PF, Hz):
  Power factor and parameter of frequency measured by the meter, including power factor, displacement power factor, frequency, and others.
- Power Measurement:
  Parameter of power measured by the meter, including active, reactive, and apparent power per phase and total.
- Energy Measurement:
  Parameter of electrical energy measured by the meter, including active, reactive, and apparent electrical energy as delivered and received.
- Harmonic:
  Parameter of harmonic measured by the meter, including total harmonic distortion for voltage and current.
- Maximum:
  Maximum parameter measured by the meter, including maximum value of voltage, current, power factor, frequency, power.
- Minimum:
  Minimum parameter measured by the meter, including minimum value of voltage, current, power factor, frequency, power.
- Alarm:
  Parameter of alarms for the meter.

(1) Press the BACK key until HOME appears.

(2) Select an item that you want to take a look at.

(3) Press the BACK key to return to the HOME page.

Example:

Press the BACK key to show the HOME page. Using UP, DOWN and NEXT keys to switch to pages for voltage L-N, voltage L-L, voltage L-N unbalance and voltage L-L unbalance.

6.3 Setup Operations

6.3.1 Time Settings

■ Time:
Current time on the meter, including hour, minute.

■ Steps to set up are as follows:

(1) Press BACK key until HOME appears.

(2) Press Setup (BACK Key) to enter the setup page.

(3) Press ► (NEXT key) until TIM appears and press UP key to enter the TIME setting page

(4) When the option HH is highlighted, start set up by using the Up and Down keys to select the numbers needed

(5) Press SET (NEXT key) to finish setting and move on to next one.

(6) When the option MM is highlighted, start set up by using the Up and Down keys to select the numbers needed.

(7) Press SET (NEXT Key) to finish setting.

(8) Press BACK key to cancel the changes without saving.

6.3.2 Date Settings

■ Date:
Current date on the meter, including year, month and day.

■ Steps to set up are as follows:

(1) Press BACK key until HOME appears.

(2) Press Setup (BACK Key) to enter the setup page.

(3) Press ► (NEXT key) until DAT appears and press DOWN key to enter the DAT setting page.

(4) When the option YY is highlighted, start set up by using the Up and Down keys to select the numbers needed.

(5) Press SET (NEXT key) to finish setting and move on to the next one (MM).

(6) When the option MM is highlighted, start set up by using the Up and Down keys to select the numbers needed.

(7) Press SET (NEXT Key) to finish setting and move on to the next one (DD).

(8) When the option DD is highlighted, start set up by using the Up and Down keys to select the numbers needed.

(9) Press SET (NEXT Key) to finish setting.

(10) Press BACK key to cancel the changes without saving.

6.3.3 Potential and Current Transformers Setting

- Address:
  Range of address for the device is 1~254, with the broadcast address of 255 and factory default of 1.
- Baud Rate:
  Speed of communication transmission, with the factory default of 9600 kbps.
- Parity:
  8O1, 8N1 (default) and 8E1 can be selected.
- Steps to set up are as follows:
  (1) Press BACK key until HOME appears.
  (2) Press ► (NEXT key) until COM appears and press UP key to enter the COM setting page
  (3) When the option is highlighted, start set up by using the Up and Down keys to select the numbers needed.
  (4) Press SET (NEXT key) to finish set up for a number and move on to set up for the next number.
  (5) Repeat steps (3)~(5) until finishing setup for the last number and press the SET (NEXT key). When the highlight disappears, setup is complete. Press BACK key to cancel the changes without saving.
  (6) Baud rate and parity can be setup as above.

6.3.4 System Parameters Setting

- Power System:
  Selection of wiring method for the system, with a selection of one-phase two-wire, one-phase three-wire, three-phase three-wire, three-phase four-wire (factory default).
- Number of CTs:
  Numbers of current transformers on the system. 0, 1, 2, 3 current transformers are selectable. The default setting of current transformers is 3.
- Number of PTs:
  Numbers of potential transformers on the system. 0, 2, 3 potential transformers are selectable. The default setting of potential transformers is 3.
- Steps to set up are as follows:
  (1) Press BACK key until HOME appears.
  (2) Press ► (NEXT key) until SYS appears and press DOWN key to enter into the SYS setting page.
  (3) When the option is highlighted, start set up by using the Up and Down keys to select the mode needed.
  (4) Press SET (NEXT) key to finish set up and move on to the next one (CT).
  (5) When the option is highlighted, start set up by using the Up and Down keys to select the number needed.

(6) Press SET (NEXT) key to finish set up and move on to the next one (PT).

(7) When the option is highlighted, start set up by using the Up and Down keys to select the number needed.

(8) Press the BACK key to cancel the changes without saving.

6.3.5 Current Transformers Setting

- Primary-side current transformer (CT1):
  Ampere for the primary-side current transformer, with a selectable range of 1~9999 A (factory default: 1 A).
- Secondary-side current transformer (CT2):
  Ampere for the secondary-side current transformer, with a selection of 1 and 5 A (factory default: 1 A).
- Steps to set up are as follows:
  (1) Press BACK key until HOME appears.
  (2) Press ► (NEXT key) until CT appears and press UP key to enter into the CT setting page
  (3) When the option is highlighted, start set up by using the Up and Down keys to select the numbers needed.
  (4) Press SET (NEXT key) to finish set up for a number and move on to set up for the next number.
  (5) Repeat steps (3)~(5) until finishing setup for the last number and press the SET (NEXT key). When the highlight disappears, setup is complete.
  (6) Press the BACK key to cancel the changes without saving.

6.3.6 Potential Transformers Setting

- Primary-side potential transformer (PT1):
  Voltage for the primary-side potential transformer, with a selectable range of 1~9999 V (factory default: 1V).
- Secondary-side potential transformer (PT2):
  Voltage for the secondary-side potential transformer, with a selectable range of 1~9999 V (factory default: 1V).
- Steps to set up are as follows:
  (1) Press BACK key until HOME appears.
  (2) Press ► (NEXT key) until PT appears and press the DOWN key to enter the PT setting page.
  (3) When the option is highlighted, start set up by using the Up and Down keys to select the numbers needed.

(4) Press SET (NEXT key) to finish set up for a number and move on to set up for the next number.

(5) Repeat steps (3)~(5) until finishing setup for the last number and press the SET (NEXT key). When the highlight disappears, setup is complete.

(6) Press the BACK key to cancel the changes without saving.

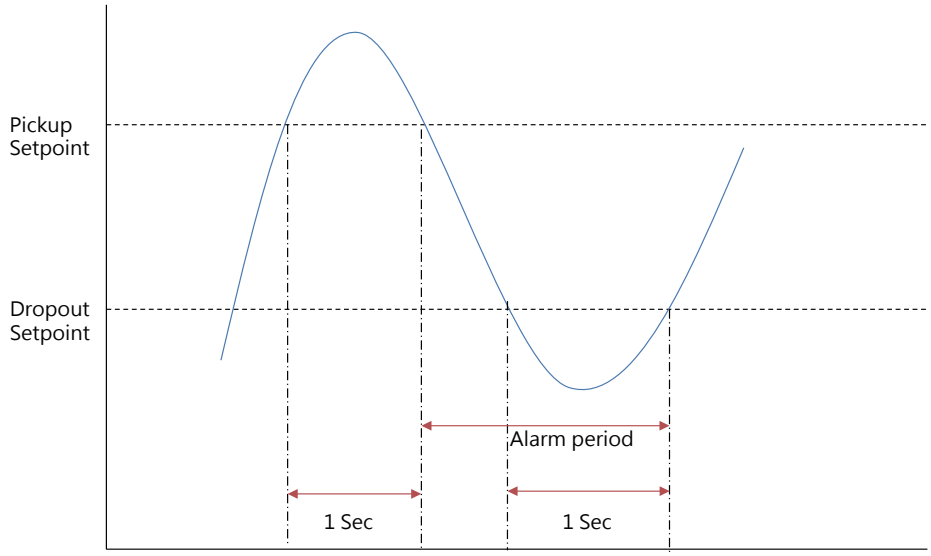
6.3.7 Restore Settings

- Default:
  Restores settings on the meter to factory default.
- Energy:
  Resets to zero for the value of electrical energy accumulated on the meter.
- MaxMin:
  Clears all records of maximum and minimum values logged on the meter.
- Alarm:
  Clears all alarm logs detected on the meter.
- Steps to set up are as follows:
  (1) Press BACK key until HOME appears.
  (2) Press ► (NEXT key) until RST appears and press UP key to enter the RST setting page.
  (3) Press ► (NEXT key) until DEF appears and press UP key to enter the DEF setting page.
  (4) Press SET (NEXT key) to restore the power meter to default setting.
  (5) Press ► (NEXT key) until ENG appears on RST setting page.
  (6) Press DOWN key to enter the ENG setting page.
  (7) Press SET (NEXT key) to clear the value of energy accumulated on the meter.
  (8) Press ► (NEXT key) until MM appears on RST setting page.
  (9) Press UP key to enter into the MAXMIN setting page.
  (10) Press SET (NEXT key) to clear the records of maximum and minimum values logged on the meter.
  (11) Press ► (NEXT key) until ALA appears on RST setting page.
  (12) Press DOWN key to enter into the ALA setting page.
  (13) Press SET (NEXT key) to clear all alarm logs detected on the meter.

6.3.8 Alarm Settings

- Alarm:
  Whether this alarm is enabled or disabled (factory default).
- Pickup setpoint:
  When the threshold set on the meter is exceeded, an alarm is triggered. The factory default is 0.
- Dropout setpoint:
  When the threshold set on the meter falls short, the alarm is cleared. The factory default is 0.
- Steps to set up are as follows:

  Configure the alarm setting, alarm enable, pickup setpoint and dropout setting which MODBUS address are 0x1F～0xB8 for each alarms.



6.3.9 Parameter grouping

- Parameter grouping:
  block of MODBUS address mirrored from standard selected MODBUS address that allows meter value, MODBUS address 0x100～0x18B, can be gathered with single MODBUS block read. Default value is 0xFFFF.

- Steps to set up are as follows:
  (1) Configure MODBUS address 0x50c～0x515 with selected MODBUS address of meter value by MODBUS function code 0x06 or 0x10.

  (2) Read MODBUS address 0x600～0x609 for selected meter values with MODBUS function code 0x3 after Step 1 is complete.

  Example:

  1. To mirror the voltage L-N and current value from standard MODBUS address 0x100～0x101 and 0x126～0x127 to a continuous block MODBUS address which can be gathered with single MODBUS block read command: Write 0x100 and 0x101 (the MODBUS address of voltage L-N) into MODBUS address 0x50C and 0x50D with function code 0x06 (single write) or 0x10 (multi write). Write 0x126 and 0x127(the MODBUS address of current) into MODBUS address 0x50E and 0x50F with function code 0x06 (single write) or 0x10 (multi write). Other MODBUS address is shown in 7.1 Address Table.

  2. After step1 is finished, voltage L-N and current value can be gathered with a single MODBUS block read of address 0x50C～0x50F through MODBUS function code 0x03. Voltage L-N and current value are in IEEE754 format. Other MODBUS address data types are shown in the 7.1 Address Table.

Parameters and Functions

7.1 Overview of Parameters

MODBUS Address		Item Communicated	Range	Data Type	Unit	Data Size (Byte)	Read (R)/Write (W)
Hex	Modicom Format						
0. System Parameter: 0001 ~ 00FF							
1	40002	Present date	year: 00~99 month: 1~12	byte	year, month	2	R/W
2	40003		day:1~31 week: Sun.~Sat.	byte	day, week	2	R/W
3	40004	Present time	hour: 00~23 minute: 00~59	byte	hour and minute	2	R/W
4	40005		second: 00~59	word	second	2	R/W
5	40006	Meter constant	3200	uint	P/kWh	2	R
6	40007	Meter model	0: None 2: DPMC520	word		2	R
7	40008	Total time on power	day: 0~65535	uint	day	2	R
8	40009		hour: 00~23 minute: 00~59	byte	hour, minute	2	R
9	40010	Firmware version	0.0000 ~ 9.9999	uint		2	R
A	40011	Data/Time of Last firmware download	year: 00~99 month: 1~12	byte	year, month	2	R
B	40012		day: 1~31	word	day	2	R
C	40013	Reserved					
D	40014	Power system configuration	0: 3φ4W 1: 3φ3W 2: 1φ2W 3: 1φ3W	word		2	R/W
E	40015	CT primary(A)	1 ~ 9999	uint	A	2	R/W
F	40016	CT secondary(A)	0: 1A 1: 5A	word	A	2	R/W
10	40017	PT primary	1 ~ 9999	uint	V	2	R/W
11	40018	PT secondary	1 ~ 9999	uint	V	2	R/W
12	40019	Quantity of transformer	0: 3CT3PT 1: 3CT2PT 2: 3CT0PT 3: 2CT3PT 4: 2CT2PT 5: 2CT0PT 6: 1CT3PT 7: 1CT2PT 8: 1CT0PT	word		2	R/W
13	40020	Reserved					
14	40021	Reserved					
15	40022	Reserved					
16	40023	Baud rate	0: 9600 1: 19200 2: 38400	word	bps	2	R/W
17	40024	Communication mode	1: RTU	word		2	R/W
18	40025	Data bit	0: 8	word	bit	2	R/W

19	40026	Parity	0: None 1: Even 2: Odd	word		2	R/W
1A	40027	Stop bit	0: 1	word	bit	2	R/W
1B	40028	MODBUS address	0 ~ 255	word		2	R/W
1C	40029	Meter reset	0: None	word			
			1: Reset factory default				
			2: Reset value of energy				
			3: Clear alarm logs and times			2	W
			4: Reset maximum and minimum values				
1D	40030	Reserved					
1E	40031	Reserved					
Alarm - Over Current							
1F	40032	Alarm Enable	0: Disable 1: Enable	word		2	R/W
20	40033	Pickup setpoint (current exceeding this value, alarm triggered)	0.000 ~ 99999.999	Float	A	4	R/W
21	40034						
22	40035	Reserved					
23	40036	Dropout setpoint (current lower than this value, alarm cleared)	0.000 ~ 99999.999	Float	A	4	R/W
24	40037						
Over Voltage L - L							
34	40053	Alarm Enable	0: Disable 1: Enable	word		2	R/W
35	40054	Pickup setpoint (voltage exceeding this value, alarm triggered)	0.000 ~ 99999.999	Float	V	4	R/W
36	40055						
37	40056	Reserved					
38	40057	Dropout setpoint (voltage lower than this value, alarm cleared)	0.000 ~ 99999.999	Float	V	4	R/W
39	40058						
3A	40059	Reserved					
Under Voltage L - L							
3B	40060	Alarm Enable	0: Disable 1: Enable	word		2	R/W
3C	40061	Pickup setpoint (voltage lower than this value, alarm triggered)	0.000 ~ 99999.999	Float	V	4	R/W
3D	40062						
3E	40063	Reserved					
3F	40064	Dropout setpoint (voltage exceeding this value, alarm cleared)	0.000 ~ 99999.999	Float	V	4	R/W
40	40065						
41	40066	Reserved					
Over Voltage L - N							
42	40067	Alarm Enable	0: Disable 1: Enable	word		2	R/W

43	40068	Pickup setpoint (voltage exceeding this value, alarm triggered)	0.000 ~ 99999.999	Float	V	4	R/W
44	40069						
45	40070	Reserved					
46	40071	Dropout setpoint (voltage lower than this value, alarm cleared)	0.000 ~ 99999.999	Float	V	4	R/W
47	40072						
48	40073	Reserved					
Under Voltage L-N							
49	40074	Alarm Enable	0: Disable 1: Enable	word		2	R/W
4A	40075	Pickup setpoint (voltage lower than this value, alarm triggered)	0.000 ~ 99999.999	Float	V	4	R/W
4B	40076						
4C	40077	Reserved					
4D	40078	Dropout setpoint (voltage exceeding this value, alarm cleared)	0.000 ~ 99999.999	Float	V	4	R/W
4E	40079						
Over Active Power							
5E	40095	Alarm Enable	0: Disable 1: Enable	word		2	R/W
5F	40096	Pickup setpoint (active power exceeding this value, alarm triggered)	0.000 ~ 99999.999	Float	kW	4	R/W
60	40097						
61	40098	Reserved					
62	40099	Dropout setpoint (active power lower than this value, alarm cleared)	0.000 ~ 99999.999	Float	kW	4	R/W
63	40100						
64	40101	Reserved					
Over Reactive Power							
65	40102	Alarm Enable	0: Disable 1: Enable	word		2	R/W
66	40103	Pickup setpoint (reactive power exceeding this value, alarm triggered)	0.000 ~ 99999.999	Float	kVAR	4	R/W
67	40104						
68	40105	Reserved					
69	40106	Dropout setpoint (reactive power lower than this value, alarm cleared)	0.000 ~ 99999.999	Float	kVAR	4	R/W
6A	40107						
6B	40108	Reserved					
Over Apparent Power							
6C	40109	Alarm Enable	0: Disable : Enable	word		2	R/W
6D	40110	Pickup setpoint (apparent power exceeding this value, alarm triggered)	0.000 ~ 99999.999	Float	kVA	4	R/W
6E	40111						
6F	40112	Reserved					
70	40113	Dropout setpoint (apparent power lower than this value, alarm cleared)	0.000 ~ 99999.999	Float	kVA	4	R/W
71	40114						

72	40115	Reserved					
Over Frequency							
AB	40172	Alarm Enable	0: Disable 1: Enable	word		2	R/W
AC	40173	Pickup setpoint (frequency exceeding this value, alarm triggered)	0.0000 ~ 99.9999	Float	Hz	4	R/W
AD	40174						
AE	40175	Reserved					
AF	40176	Dropout setpoint (frequency lower than this value, alarm cleared)	0.0000 ~ 99.9999	Float	Hz	4	R/W
B0	40177						
B1	40178	Reserved					
Under Frequency							
B2	40179	Alarm Enable	0: Disable 1: Enable	word		2	R/W
B3	40180	Pickup setpoint (frequency lower than this value, alarm triggered)	0.0000 ~ 99.9999	Float	Hz	4	R/W
B4	40181						
B5	40182	Reserved					
B6	40183	Dropout setpoint (frequency exceeding this value, alarm cleared)	0.0000 ~ 99.9999	Float	Hz	4	R/W
B7	40184						
B8	40185	Reserved					
1.Meter Parameters: 0100 ~ 01FF							
100	40257	Voltage A-N	0.000 ~ 99999.999	Float	V	4	R
101	40258						
102	40259	Voltage B-N	0.000 ~ 99999.999	Float	V	4	R
103	40260						
104	40261	Voltage C-N	0.000 ~ 99999.999	Float	V	4	R
105	40262						
106	40263	Voltage L-N Avg	0.000 ~ 99999.999	Float	V	4	R
107	40264						
108	40265	Voltage A-B	0.000 ~ 99999.999	Float	V	4	R
109	40266						
10A	40267	Voltage B-C	0.000 ~ 99999.999	Float	V	4	R
10B	40268						
10C	40269	Voltage C-A	0.000 ~ 99999.999	Float	V	4	R
10D	40270						
10E	40271	Voltage L-L Avg	0.000 ~ 99999.999	Float	V	4	R
10F	40272						
110	40273	Voltage unbalance A-N	0.00 ~ 99.99	Float	%	4	R
111	40274						

112	40275	Voltage unbalance B-N	0.00 ~ 99.99	Float	%	4	R
113	40276						
114	40277	Voltage unbalance C-N	0.00 ~ 99.99	Float	%	4	R
115	40278						
116	40279	Voltage unbalance L-N Avg	0.00 ~ 99.99	Float	%	4	R
117	40280						
118	40281	Voltage unbalance A-B	0.00 ~ 99.99	Float	%	4	R
119	40282						
11A	40283	Voltage unbalance B-C	0.00 ~ 99.99	Float	%	4	R
11B	40284						
11C	40285	Voltage unbalance C-A	0.00 ~ 99.99	Float	%	4	R
11D	40286						
11E	40287	Voltage unbalance L-L Avg	0.00 ~ 99.99	Float	%	4	R
11F	40288						
120	40289	Current A	0.000 ~ 99999.999	Float	A	4	R
121	40290						
122	40291	Current B	0.000 ~ 99999.999	Float	A	4	R
123	40292						
124	40293	Current C	0.000 ~ 99999.999	Float	A	4	R
125	40294						
126	40295	Current Avg	0.000 ~ 99999.999	Float	A	4	R
127	40296						
128	40297	Current N	0.000 ~ 99999.999	Float	A	4	R
129	40298						
12A	40299	Current unbalance A	0.00 ~ 99.99	Float	%	4	R
12B	40300						
12C	40301	Current unbalance B	0.00 ~ 99.99	Float	%	4	R
12D	40302						
12E	40303	Current unbalance C	0.00 ~ 99.99	Float	%	4	R
12F	40304						
130	40305	Current unbalance Avg	0.00 ~ 99.99	Float	%	4	R
131	40306						
132	40307	Power factor total	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
133	40308						
134	40309	Power factor A	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
135	40310						
136	40311	Power factor B	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
137	40312						

138	40313	Power factor C	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
139	40314						
13A	40315	Displacement power factor total	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
13B	40316						
13C	40317	Displacement power factor A	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
13D	40318						
13E	40319	Displacement power factor B	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
13F	40320						
140	40321	Displacement power factor C	0.00000 ~ 1.00000 (positive: lag negative: lead)	Float		4	R
141	40322						
142	40323	Frequency	0.0000 ~ 99.9999	Float	Hz	4	R
143	40324						
144	40325	Active power total	0.000 ~ 99999.999	Float	kW	4	R
145	40326						
146	40327	Active power A	0.000 ~ 99999.999	Float	kW	4	R
147	40328						
148	40329	Active power B	0.000 ~ 99999.999	Float	kW	4	R
149	40330						
14A	40331	Active power C	0.000 ~ 99999.999	Float	kW	4	R
14B	40332						
14C	40333	Reactive power total	0.000 ~ 99999.999	Float	kVAR	4	R
14D	40334						
14E	40335	Reactive power A	0.000 ~ 99999.999	Float	kVAR	4	R
14F	40336						
150	40337	Reactive power B	0.000 ~ 99999.999	Float	kVAR	4	R
151	40338						
152	40339	Reactive power C	0.000 ~ 99999.999	Float	kVAR	4	R
153	40340						
154	40341	Apparent power total	0.000 ~ 99999.999	Float	kVA	4	R
155	40342						
156	40343	Apparent power A	0.000 ~ 99999.999	Float	kVA	4	R
157	40344						
158	40345	Apparent power B	0.000 ~ 99999.999	Float	kVA	4	R
159	40346						
15A	40347	Apparent power C	0.000 ~ 99999.999	Float	kVA	4	R
15B	40348						

15C	40349	Active energy delivered	0x00000000 ~ 0xFFFFFFFF	uint	Wh	4	R
15D	40350						
15E	40351	Active energy received	0x00000000 ~ 0xFFFFFFFF	uint	Wh	4	R
15F	40352						
160	40353	Reactive energy delivered	0x00000000 ~ 0xFFFFFFFF	uint	VARh	4	R
161	40354						
162	40355	Reactive energy received	0x00000000 ~ 0xFFFFFFFF	uint	VARh	4	R
163	40356						
164	40357	Apparent energy delivered	0x00000000 ~ 0xFFFFFFFF	uint	VAh	4	R
165	40358						
166	40359	Apparent energy received	0x00000000 ~ 0xFFFFFFFF	uint	VAh	4	R
167	40360						
174	40373	THD current A	0.000 ~ 999.999	Float	%	4	R
175	40374						
176	40375	THD current B	0.000 ~ 999.999	Float	%	4	R
177	40376						
178	40377	THD current C	0.000 ~ 999.999	Float	%	4	R
179	40378						
17C	40381	THD voltage A-N	0.000 ~ 999.999	Float	%	4	R
17D	40382						
17E	40383	THD voltage B-N	0.000 ~ 999.999	Float	%	4	R
17F	40384						
180	40385	THD voltage C-N	0.000 ~ 999.999	Float	%	4	R
181	40386						
182	40387	THD voltage A-B	0.000 ~ 999.999	Float	%	4	R
183	40388						
184	40389	THD voltage B-C	0.000 ~ 999.999	Float	%	4	R
185	40390						
186	40391	THD voltage C-A	0.000 ~ 999.999	Float	%	4	R
187	40392						
188	40393	THD current-Avg	0.000 ~ 999.999	Float	%	4	R
189	40394						
18A	40395	THD voltage-Avg	0.000 ~ 999.999	Float	%	4	R
18B	40396						
2. Maximum Values: 0200 ~ 02FF							
200	40513	Max voltage A-B	0.000 ~ 99999.999	Float	V	4	R
201	40514						

202	40515	Max voltage A-B date	year: 00~99 month: 1~12	byte	year, month	2	R
203	40516		day: 1~31	word	day	2	R
204	40517	Max voltage A-B time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
205	40518		second: 00~59	word	second	2	R
206	40519	Max voltage B-C	0.000 ~ 99999.999	Float	V	4	R
207	40520						
208	40521	Max voltage B-C date	year: 00~99 month: 1~12	byte	year, month	2	R
209	40522		day: 1~31	word	day	2	R
20A	40523	Max voltage B-C time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
20B	40524		second: 00~59	word	second	2	R
20C	40525	Max voltage C-A	0.000 ~ 99999.999	Float	V	4	R
20D	40526						
20E	40527	Max voltage C-A date	year: 00~99 month: 1~12	byte	year, month	2	R
20F	40528		day: 1~31	word	day	2	R
210	40529	Max voltage C-A time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
211	40530		second: 00~59	word	second	2	R
212	40531	Max voltage A-N	0.000 ~ 99999.999	Float	V	4	R
213	40532						
214	40533	Max voltage A-N date	year: 00~99 month: 1~12	byte	year, month	2	R
215	40534		day: 1~31	word	day	2	R
216	40535	Max voltage A-N time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
217	40536		second: 00~59	word	second	2	R
218	40537	Max voltage B-N	0.000 ~ 99999.999	Float	V	4	R
219	40538						
21A	40539	Max voltage B-N date	year: 00~99 month: 1~12	byte	year, month	2	R
21B	40540		day: 1~31	word	day	2	R
21C	40541	Max voltage B-N time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
21D	40542		second: 00~59	word	second	2	R
21E	40543	Max voltage C-N	0.000 ~ 99999.999	Float	V	4	R
21F	40544						
220	40545	Max voltage C-N date	year: 00~99 month: 1~12	byte	year, month	2	R
221	40546		day: 1~31	word	day	2	R
222	40547	Max voltage C-N time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
223	40548		second: 00~59	word	second	2	R
224	40549	Max current A	0.000 ~ 99999.999	Float	A	4	R
225	40550						

226	40551	Max current A date	year: 00～99 month: 1～12	byte	year, month	2	R
227	40552		day: 1～31	word	day	2	R
228	40553	Max current A time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
229	40554		second: 00～59	word	second	2	R
22A	40555	Max current B	0.000 ~ 99999.999	Float	A	4	R
22B	40556						
22C	40557	Max current B date	year: 00～99 month: 1～12	byte	year, month	2	R
22D	40558		day: 1～31	word	day	2	R
22E	40559	Max current B time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
22F	40560		second: 00～59	word	second	2	R
230	40561	Max current C	0.000 ~ 99999.999	Float	A	4	R
231	40562						
232	40563	Max current C date	year: 00～99 month: 1～12	byte	year, month	2	R
233	40564		day: 1～31	word	day	2	R
234	40565	Max current C time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
235	40566		second: 00～59	word	second	2	R
236	40567	Max current N	0.000 ~ 99999.999	Float	A	4	R
237	40568						
238	40569	Max current N date	year: 00～99 month: 1～12	byte	year, month	2	R
239	40570		day: 1～31	word	day	2	R
23A	40571	Max current N time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
23B	40572		second: 00～59	word	second	2	R
23C	40573	Max frequency	0.0000 ~ 99.9999	Float	Hz	4	R
23D	40574						
23E	40575	Max frequency date	year: 00～99 month: 1～12	byte	year, month	2	R
23F	40576		day: 1～31	word	day	2	R
240	40577	Max frequency time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
241	40578		second: 00～59	word	second	2	R
242	40579	Max power factor	0.00000 ~ 1.00000	Float		4	R
243	40580						
244	40581	Max power factor date	year: 00～99 month: 1～12	byte	year, month	2	R
245	40582		day: 1～31	word	day	2	R
246	40583	Max power factor time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
247	40584		second: 00～59	word	second	2	R
248	40585	Max active power total	0.000 ~ 99999.999	Float	kW	4	R
249	40586						

24A	40587	Max active power total date	year: 00～99 month: 1～12	byte	year, month	2	R
24B	40588		day: 1～31	word	day	2	R
24C	40589	Max active power total time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
24D	40590		second: 00～59	word	second	2	R
24E	40591	Max reactive power total	0.000 ~ 99999.999	Float	kVAR	4	R
24F	40592						
250	40593	Max reactive power total date	year: 00～99 month: 1～12	byte	year, month	2	R
251	40594		day: 1～31	word	day	2	R
252	40595	Max reactive power total time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
253	40596		second: 00～59	word	second	2	R
254	40597	Max apparent power total	0.000 ~ 99999.999	Float	kVA	4	R
255	40598						
256	40599	Max apparent power total date	year: 00～99 month: 1～12	byte	year, month	2	R
257	40600		day: 1～31	word	day	2	R
258	40601	Max apparent power total time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
259	40602		second: 00～59	word	second	2	R
3. Minimum Values: 0300 ~ 03FF							
300	40769	Min voltage A-B	0.000 ~ 99999.999	Float	V	4	R
301	40770						
302	40771	Min voltage A-B date	year: 00～99 month: 1～12	byte	year, month	2	R
303	40772		day: 1～31	word	day	2	R
304	40773	Min voltage A-B time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
305	40774		second: 00～59	word	second	2	R
306	40775	Min voltage B-C	0.000 ~ 99999.999	Float	V	4	R
307	40776						
308	40777	Min voltage B-C date	year: 00～99 month: 1～12	byte	year, month	2	R
309	40778		day: 1～31	word	day	2	R
30A	40779	Min voltage B-C time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
30B	40780		second: 00～59	word	second	2	R
30C	40781	Min voltage C-A	0.000 ~ 99999.999	Float	V	4	R
30D	40782						
30E	40783	Min voltage C-A date	year: 00～99 month: 1～12	byte	year, month	2	R
30F	40784		day: 1～31	word	day	2	R
310	40785	Min voltage C-A time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
311	40786		second: 00～59	word	second	2	R

312	40787	Min voltage A-N	0.000 ~ 99999.999	Float	V	4	R
313	40788						
314	40789	Min voltage A-N date	year: 00~99 month: 1~12	byte	year, month	2	R
315	40790		day: 1~31	word	day	2	R
316	40791	Min voltage A-N time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
317	40792		second: 00~59	word	second	2	R
318	40793	Min voltage B-N	0.000 ~ 99999.999	Float	V	4	R
319	40794						
31A	40795	Min voltage B-N date	year: 00~99 month: 1~12	byte	year, month	2	R
31B	40796		day: 1~31	word	day	2	R
31C	40797	Min voltage B-N time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
31D	40798		second: 00~59	word	second	2	R
31E	40799	Min voltage C-N	0.000 ~ 99999.999	Float	V	4	R
31F	40800						
320	40801	Min voltage C-N date	year: 00~99 month: 1~12	byte	year, month	2	R
321	40802		day: 1~31	word	day	2	R
322	40803	Min voltage C-N time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
323	40804		second: 00~59	word	second	2	R
324	40805	Min current A	0.000 ~ 99999.999	Float	A	4	R
325	40806						
326	40807	Min current A date	year: 00~99 month: 1~12	byte	year, month	2	R
327	40808		day: 1~31	word	day	2	R
328	40809	Min current A time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
329	40810		second: 00~59	word	second	2	R
32A	40811	Min current B	0.000 ~ 99999.999	Float	A	4	R
32B	40812						
32C	40813	Min current B date	year: 00~99 month: 1~12	byte	year, month	2	R
32D	40814		day: 1~31	word	day	2	R
32E	40815	Min current B time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
32F	40816		second: 00~59	word	second	2	R
330	40817	Min current C	0.000 ~ 99999.999	Float	A	4	R
331	40818						
332	40819	Min current C date	year: 00~99 month: 1~12	byte	year, month	2	R
333	40820		day: 1~31	word	day	2	R
334	40821	Min current C time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
335	40822		second: 00~59	word	second	2	R

336	40823	Min current N	0.000 ~ 99999.999	Float	A	4	R
337	40824						
338	40825	Min current N date	year: 00~99 month: 1~12	byte	year, month	2	R
339	40826		day: 1~31	word	day	2	R
33A	40827	Min current N time	hour: 00~23、minute: 00~59	byte	hour, minute	2	R
33B	40828		second: 00~59	word	second	2	R
33C	40829	Min frequency	0.0000 ~ 99.9999	Float	Hz	4	R
33D	40830						
33E	40831	Min frequency date	year: 00~99 month: 1~12	byte	year, month	2	R
33F	40832		day: 1~31	word	day	2	R
340	40833	Min frequency time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
341	40834		second: 00~59	word	second	2	R
342	40835	Min power factor	0.00000 ~ 1.00000	Float		4	R
343	40836						
344	40837	Min power factor date	year: 00~99 month: 1~12	byte	year, month	2	R
345	40838		day: 1~31	word	day	2	R
346	40839	Min power factor time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
347	40840		second: 00~59	word	second	2	R
348	40841	Min total active power	0.000 ~ 99999.999	Float	kW	4	R
349	40842						
34A	40843	Min total active power date	year: 00~99 month: 1~12	byte	year, month	2	R
34B	40844		day: 1~31	word	day	2	R
34C	40845	Min total active power time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
34D	40846		second: 00~59	word	second	2	R
34E	40847	Min total reactive power	0.000 ~ 99999.999	Float	kVAR	4	R
34F	40848						
350	40849	Min total reactive power date	year: 00~99 month: 1~12	byte	year, month	2	R
351	40850		day: 1~31	word	day	2	R
352	40851	Min total reactive power time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
353	40852		second: 00~59	word	second	2	R
354	40853	Min total apparent power	0.000 ~ 99999.999	Float	kVA	4	R
355	40854						
356	40855	Min total apparent power date	year: 00~99 month: 1~12	byte	year, month	2	R
357	40856		day: 1~31	word	day	2	R
358	40857	Min total apparent power time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
359	40858		second: 00~59	word	second	2	R

4. Alarm: 0400 ~ 04FF							
400	41025	Over current alarm status	0: Cleared 1: Triggered	word		2	R
401	41026	Over current alarm counter	1~255	word	times	2	R
402	41027	Over current alarm date	year: 00~99 month: 1~12	byte	year, month	2	R
403	41028		day: 1~31	word	day	2	R
404	41029	Over current alarm time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
405	41030		second: 00~59	word	second	2	R
412	41043	Over voltage L-L alarm status	0: Cleared 1: Triggered	word		2	R
413	41044	Over voltage L-L alarm counter	1~255	word	times	2	R
414	41045	Over voltage L-L alarm date	year: 00~99 month: 1~12	byte	year, month	2	R
415	41046		day: 1~31	word	day	2	R
416	41047	Over voltage L-L alarm time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
417	41048		second: 00~59	word	second	2	R
418	41049	Under voltage L-L alarm status	0: Cleared 1: Triggered	word		2	R
419	41050	Under voltage L-L alarm counter	1~255	word	times	2	R
41A	41051	Under voltage L-L alarm date	year: 00~99 month: 1~12	byte	year, month	2	R
41B	41052		day: 1~31	word	day	2	R
41C	41053	Under voltage L-L alarm time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
41D	41054		second: 00~59	word	second	2	R
41E	41055	Over voltage L-N alarm status	0: Cleared 1: Triggered	word		2	R
41F	41056	Over voltage L-N alarm counter	1~255	word	times	2	R
420	41057	Over voltage L-N alarm date	year: 00~99 month: 1~12	byte	year, month	2	R
421	41058		day: 1~31	word	day	2	R
422	41059	Over voltage L-N alarm time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
423	41060		second: 00~59	word	second	2	R
424	41061	Under voltage L-N alarm status	0: Cleared 1: Triggered	word		2	R
425	41062	Under voltage L-N alarm counter	1~255	word	times	2	R
426	41063	Under voltage L-N alarm date	year: 00~99 month: 1~12	byte	year, month	2	R
427	41064		day: 1~31	word	day	2	R
428	41065	Under voltage L-N alarm time	hour: 00~23 minute: 00~59	byte	hour, minute	2	R
429	41066		second: 00~59	word	second	2	R
436	41079	Over active power alarm status	0: Cleared 1: Triggered	word		2	R
437	41080	Over active power alarm counter	1~255	word	times	2	R
438	41081	Over active power alarm date	year: 00~99 month: 1~12	byte	year, month	2	R
439	41082		day: 1~31	word	day	2	R

43A	41083	Over active power alarm time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
43B	41084		second: 00～59	word	second	2	R
43C	41085	Over reactive power alarm status	0: Cleared 1: Triggered	word		2	R
43D	41086	Over reactive power alarm counter	1～255	word	times	2	R
43E	41087	Over reactive power alarm date	year: 00～99 month: 1～12	byte	year, month	2	R
43F	41088		day: 1～31	word	day	2	R
440	41089	Over reactive power alarm time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
441	41090		second: 00～59	word	second	2	R
442	41091	Over apparent power alarm status	0: Cleared 1: Triggered	word		2	R
443	41092	Over apparent power alarm counter	1～255	word	times	2	R
444	41093	Over apparent power alarm date	year: 00～99 month: 1～12	byte	year, month	2	R
445	41094		day: 1～31	word	day	2	R
446	41095	Over apparent power alarm time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
447	41096		second: 00～59	word	second	2	R
478	41145	Over frequency alarm status	0: Cleared 1: Triggered	word		2	R
479	41146	Over frequency alarm counter	1～255	word	times	2	R
47A	41147	Over frequency alarm date	year: 00～99 month: 1～12	byte	year, month	2	R
47B	41148		day: 1～31	word	day	2	R
47C	41149	Over frequency alarm time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
47D	41150		second: 00～59	word	second	2	R
47E	41151	Under frequency alarm status	0: Cleared 1: Triggered	word		2	R
47F	41152	Under frequency alarm counter	1～255	word	times	2	R
480	41153	Under frequency alarm date	year: 00～99 month: 1～12	byte	year, month	2	R
481	41154		day: 1～31	word	day	2	R
482	41155	Under frequency alarm time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R
483	41156		second: 00～59	word	second	2	R
5. Advanced Settings: 0500 ~ 05FF							
50C	41293	Parameter grouping #1 setting	0x100 ~ 0x18B	word		2	R/W
50D	41294	Parameter grouping #2 setting	0x100 ~ 0x18B	word		2	R/W
⋮	⋮	⋮	0x100 ~ 0x18B	word		2	R/W
515	41302	Parameter grouping #10 setting	0x100 ~ 0x18B	word		2	R/W
552	41363	Reset energy date	year: 00～99 month: 1～12	byte	year, month	2	R
553	41364	Reset energy date	day: 1～31	word	day	2	R
554	41365	Reset energy time	hour: 00～23 minute: 00～59	byte	hour, minute	2	R

555	41366	Reset energy time	second: 00～59	word	second	2	R
6. Parameter Grouping: 0600～06FF							
600	41537	Parameter grouping #1 data				2	R
601	41538	Parameter grouping #2 data				2	R
⋮	⋮	⋮				2	R
609	41546	Parameter grouping #10 data				2	R

Messages of Abnormal Operations

Under abnormal communications, the power meter can send out messages via MODBUS (codes shown below), informing the reason why the main station experienced abnormal situation.

Abnormal Message Code	Name	Description
0x01	Illegal Function	Illegal functional code
0x02	Illegal Data Address	Address of data read or written is illegal
0x03	Illegal Data Value	Illegal data format (such as incorrect data length)
0x04	Slave Device Failure	Commands not supported for Slave device

Based on start / stop status for the 10 types of alarm settings (address location 0x1F ~ 0xB7) under abnormal situations, the power meter records the type and time of the alarm occurred in the register location 0x400 ~ 0x483. The types of alarms and their descriptions are as follows:

Alarm Number	Alarm Type	Description
1	Over-current	Average current is higher than alert value
2	Over voltage L-L	Average voltage L-L is higher than alert value
3	Under voltage L-L	Average voltage L-L is lower than alert value
4	Over voltage L-N	Average voltage L-N is higher than alert value
5	Under voltage L-N	Average voltage L-N is lower than alert value
6	Over active power	Active power is higher than alert value
7	Over reactive power	Reactive power is higher than alert value
8	Over apparent power	Apparent power is higher than alert value
9	Over frequency	System frequency is higher than alert value
10	Under frequency	System frequency is lower than alert value

Specifications

9.1 Specifications

Model Name			DPM-C520
Electrical Characteristics	Measurement Accuracy	Current	±0.2%
		Voltage	±0.5%
		Power	±0.5%
		Active Energy	IEC62053-22 Class 0.5S
		Reactive Energy	±0.5%
		Power Factor	±0.5%
		Frequency	±0.5%
	Measurement Input Characteristics	Wiring Method	1P2W, 1P3W, 3P3W, 3P4W
		Measured Voltage	L-L: 35~690 V_{AC} L-N: 20~400 V_{AC}
		Measured Current	1A/5A
		Frequency Range	45~70 Hz
		Power Supply	80~265 V_{AC} (Max. power consumption 4.6W); 100~300 V_{DC}
Communication	RS-485 port		Baud rate 9600/19200/38400bps , MODBUS
Mechanical Characteristics	IP Degree of Protection	Front Display	IP54
		Meter Body	IP20
Dimensions (W x H x D)			96*96*95.4 mm
Environmental Conditions	Operating Temperature		-20℃ ~ +70℃
	Storage Temperature		-30℃ ~ +80℃
	Humidity Rating		~95% RH
	Altitude		Below 2000 m
Electromagnetic Compatibility	Electrostatic Discharge		IEC 61000-4-2
	Immunity to Radiated Fields		IEC 61000-4-3
	Immunity to Fast Transients		IEC 61000-4-4
	Immunity to Impulse Waves		IEC 61000-4-5
	Conducted Immunity		IEC 61000-4-6
	Immunity to Voltage Dips		IEC 61000-4-11
	Conducted and Radiated Emissions		FCC part 15 EN 55011 class A
	Harmonics Emissions		IEC 61000-3-2
	Flicker Emissions		IEC 61000-3-3

Model Name		DPM-C520
Display	Display Type	LCD
Instantaneour RMS Values	Current	■
	Voltage	■
	Frequency	■
	Real, Reactive and Apparent Power	■
	Power Factor	■
	Active, Reactive and Apparent Energy	■
Power Quality Measurement	Current/Voltage Unbalance	■
	Total Voltage Harmonic Distortion	■
	Total Current Harmonic Distortion	■
Max/Min of Instantaneous Values With Timestamp		Voltage L-N, voltage L-L, current, frequency, active power, reactive power, apparent power, power factor
Alarms		10 types, Over-current, Over voltage L-L, Under voltage L-L, Over voltage L-N, Under voltage L-N, Over active power, Over reactive power, Over apparent power, Over frequency, Under frequency
Communicaton	RS - 485 Port	■
	Parameters Grouping	■
	MODBUS	Modbus RTU

9.2 Communication Specifications

Communication Specifications	
Max distance of communication	1200 m
Max number of connected stations	32
Communication Protocols	MODBUS RTU
Functional Code	03, 06, 10
Baud Rate	9600, 19200, 38400
Data Bit	8
Parity	None, Odd, Even
Stop Bit	1

9.3 MODBUS Communication

9.3.1 Format of MODBUS Communication:

Function Code	MODBUS Name	Description
0x03	Read Holding Registers	Read the contents of read location
0x06	Write Single Holding Registers	Preset the contents of written location
0x10	Write Multiple Holding Registers	Preset the contents of written location

*Note: When the protocol is MODBUS RTU, the maximum address to be gathered with a single MODBUS block read is 50 for function code 0x03, and the maximum address is 48 for function code 0x10.

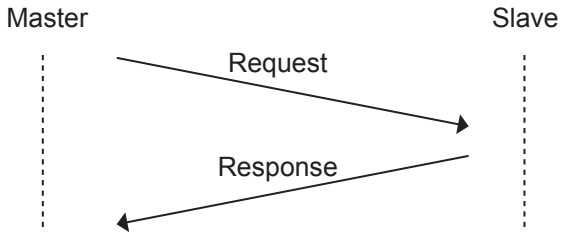
9.3.2 MODBUS Communication Protocols

(1) MODBUS RTU mode is adopted with MODBUS Master sending out the Request, in which the Function Code uses 0x03 to request response from Slave to correspond to values in MODBUS address. In Response, MODBUS Slave responds to the values of MODBUS address in the Master request. The packet format of IEEE754 is used for the address of floating point numbers that corresponds to the register values found in table 7.1, using 2's complement packet format. The format are as follows:

Low Word		High Word	
High Byte	**Low Byte**	**High Byte**	**Low Byte**

The packet formats for the address of integers that corresponds to the register values found in table 7.1 are shown in the example below.

Read :



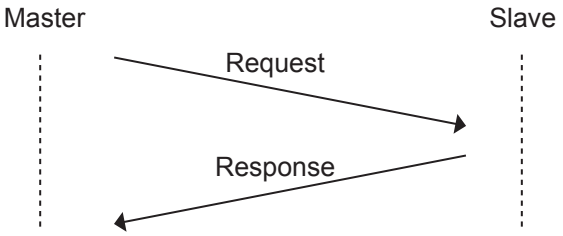
Request

Slave Address	1 ~ 255
Function Code	03h
Start Address (High)	00h ~ FFh
Start Address (Low)	00h ~ FFh
Number of Point (High)	00h
Number of Point (Low)	00h ~ FFh
Error Check (Low)	CRC
Error Check (High)	CRC

Response

Slave Address	1 ~ 255
Function Code	03h
Byte Count	00h ~ FFh
Data (High)	00h
Data (Low)	00h ~ FFh
Error Check (Low)	CRC
Error Check (High)	CRC

Write :



Request

Slave Address	1 ~ 255
Function Code	06h
Start Address (High)	00h ~ FFh
Start Address (Low)	00h ~ FFh
Number of Point (High)	00h
Number of Point (Low)	00h ~ FFh
Error Check (Low)	CRC
Error Check (High)	CRC

Response

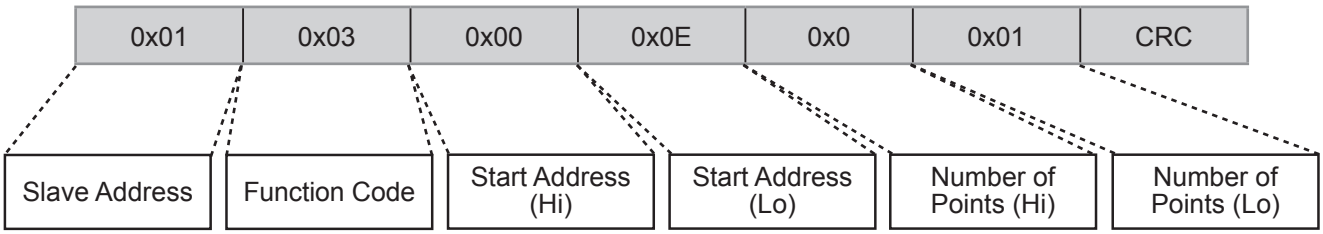
Slave Address	1 ~ 255
Function Code	06h
Start Address (High)	00h ~ FFh
Start Address (Low)	00h ~ FFh
Number of Point (High)	00h
Number of Point (Low)	00h ~ FFh
Error Check (Low)	CRC
Error Check (High)	CRC

Example:

For MODBUS Master, such as PLC or data collector, it uses MODBUS protocol to get the value of CT setting (register address 0x000E) on the power meter (MODBUS Slave) (Slave address 0x1). The register value is 1000.

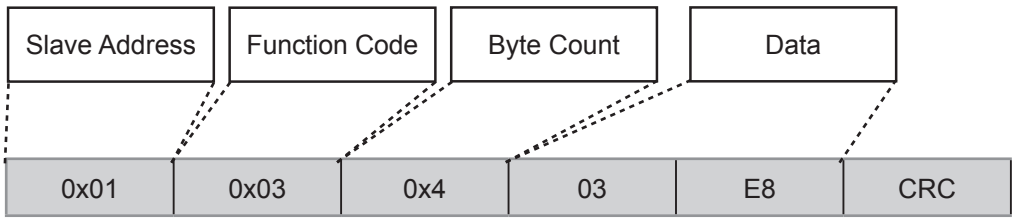
The packet format for Request sent out by MODBUS Master (PLC or data collector) is as follows:

Master Request



The packet format for Response responded by MODBUS Slave (power meter) is as follows:

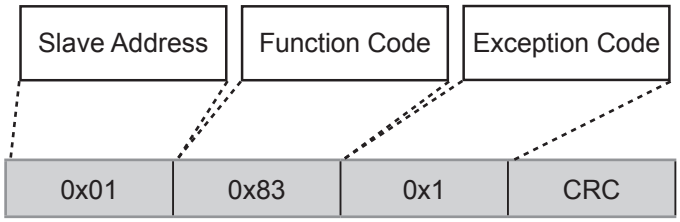
Slave Response



After receiving response from the power meter, MODBUS Master acquires the value of currents from the primary-side current transformer (register address 0x000E), which is 1000.

Should MODBUS Slave (power meter) receive an abnormal Request, the format of the abnormal packet responded is as follows. Refer to Chapter 9 for the abnormal codes.

Slave Response

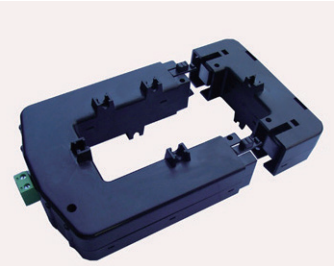


Appendix

Appendix 1: Selecting Accessories

Current Transformer:

Should input current exceed rated current tolerated by the meter specifications, the power meter needs to be used together with a current transformer (CT). Users can select a suitable CT according to the table below.



Model	Primary Current (A)	Secondary Current (A)	Burden (VA)	Accuracy (%)	Size (mm)	
DCT-S301C	100A	5A	1.5VA	1.0%	Outer frame Inner frame	115*89*51 32*21*32
DCT-S211C	200A	5A	1.0VA	0.5%	Outer frame Inner frame	115*89*51 32*21*32
DCT-S221C	300A	5A	1.5VA	0.5%	Outer frame Inner frame	115*89*51 32*21*32
DCT-S231C	400A	5A	2.5VA	0.5%	Outer frame Inner frame	115*89*51 32*21*32
DCT-S241C	500A	5A	2.5VA	0.5%	Outer frame Inner frame	145*116*51 80*50*32
DCT-S251C	600A	5A	2.5VA	0.5%	Outer frame Inner frame	145*116*51 80*50*32
DCT-S261C	750A	5A	3VA	0.5%	Outer frame Inner frame	145*116*51 80*50*32
DCT-S271C	1000A	5A	5VA	0.5%	Outer frame Inner frame	145*116*51 80*50*32
DCT-S281C	1500A	5A	7.5VA	0.5%	Outer frame Inner frame	196*146*51 122*80*32
DCT-S291C	2000A	5A	10VA	0.5%	Outer frame Inner frame	250*186*51.4 160.5*81*32
DCT-S2A1C	2500A	5A	15VA	0.5%	Outer frame Inner frame	250*186*51.4 160.5*81*32
DCT-S2B1C	3000A	5A	20VA	0.5%	Outer frame Inner frame	250*186*51.4 160.5*81*32

*All models are not UL-certified.

Notes on selecting a current transformer

1. For the current transformer, the model with a closer maximal current on the primary side should be select ed according to the maximal current actually input.
   For example: When the maximal current input is 700 A, DCT-S261C can be selected.
2. Wire over-length on the secondary side of the current transformer causes decrease in accuracy.

Appendix 2: Abbreviations

AMP	Ampere
ALA	Alarm
BD	Baud rate
COM	Communication
CT	Current Transformer
DAT	Date
DEF	Factory Default
DPF	Displacement Power Factor
ENG	Energy
FW	Firmware Version
HZ	Frequency
I	Current
ID	Slave ID
INF	Meter Information
IT	THD current
MAX	Maximum
MD	Meter Model
MIN	Minimum
P	Active Power
PF	Power Factor
PQS	Active power, reactive power, apparent power
PR	Parity

PT	Potential Transformer
PWR	Power
Q	Reactive Power
RST	Reset
S	Apparent Power
SYS	System Parameter
THD	Total Harmonic Distortion
TIM	Time
V	Voltage
VLN	Voltage L-N
VLL	Voltage L-L
VT	THD Voltage
UNB	Current unbalance
ULN	Voltage L-N unbalance
ULL	Voltage L-L unbalance
+Ph	Active Energy Delivered
-Ph	Active Energy Received
+Qh	Reactive Energy Delivered
-Qh	Reactive Energy Received
+Sh	Apparent Energy Delivered
-Sh	Apparent Energy Received

Smarter. Greener. Together.

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