Smarter. Greener. Together.

Industrial Automation Headquarters

Delta Electronics, Inc.
Taoyuan Technology Center
No.18, Xinglong Rd., Taoyuan District,
Taoyuan City 33068, Taiwan
TEL: 886-3-362-6301 / FAX: 886-3-371-6301

Asia

Delta Electronics (Shanghai) Co., Ltd.
No.182 Minyu Rd., Pudong Shanghai, P.R.C.
Post code : 201209
TEL: 86-21-6872-3988 / FAX: 86-21-6872-3996
Customer Service: 400-820-9595

Delta Electronics (Japan), Inc.
Tokyo Office
Industrial Automation Sales Department
2-1-14 Shibadaimon, Minato-ku
Tokyo, Japan 105-0012
TEL: 81-3-5733-1155 / FAX: 81-3-5733-1255

Delta Electronics (Korea), Inc.
Seoul Office
1511, 219, Gasan Digital 1-Ro., Geumcheon-gu,
Seoul, 08501 South Korea
TEL: 82-2-515-5305 / FAX: 82-2-515-5302

Delta Energy Systems (Singapore) Pte Ltd.
4 Kaki Bukit Avenue 1, #05-04, Singapore 417939
TEL: 65-6747-5155 / FAX: 65-6744-9228

Delta Electronics (India) Pvt. Ltd.
Plot No.43, Sector 35, HSIIDC Gurgaon,
PIN 122001, Haryana, India
TEL: 91-124-4874900 / FAX : 91-124-4874945

Delta Electronics (Thailand) PCL.
909 Soi 9, Moo 4, Bangpoo Industrial Estate (E.P.Z),
Pattana 1 Rd., T.Phraksa, A.Muang,
Samutprakarn 10280, Thailand
TEL: 66-2709-2800 / FAX : 662-709-2827

Delta Energy Systems (Australia) Pty Ltd.
Unit 20-21/45 Normanby Rd., Notting Hill Vic 3168, Australia
TEL: 61-3-9543-3720

Americas

Delta Electronics (Americas) Ltd.
Raleigh Office
P.O. Box 12173, 5101 Davis Drive,
Research Triangle Park, NC 27709, U.S.A.
TEL: 1-919-767-3813 / FAX: 1-919-767-3969

Delta Greentech (Brasil) S/A
São Paulo Office
Rua Itapeva, 26 – 3˚ Andar - Bela Vista
CEP: 01332-000 – São Paulo – SP - Brasil
TEL: 55-11-3530-8642 / 55-11-3530-8640

Delta Electronics International Mexico S.A. de C.V.
Mexico Office
Vía Dr. Gustavo Baz No. 2160, Colonia La Loma,
54060 Tlalnepantla Estado de Mexico
TEL: 52-55-2628-3015 #3050/3052

EMEA

Delta Electronics (Netherlands) BV
Eindhoven Office
De Witbogt 20, 5652 AG Eindhoven, The Netherlands
MAIL: Sales.IA.EMEA@deltaww.com
MAIL: Sales.IA.Benelux@deltaww.com

Delta Electronics (France) S.A.
ZI du bois Chaland 2 15 rue des Pyrénées,
Lisses 91056 Evry Cedex, France
MAIL: Sales.IA.FR@deltaww.com

Delta Electronics Solutions (Spain) S.L.U
Ctra. De Villaverde a Vallecas, 265 1˚ Dcha Ed.
Hormigueras – P.I. de Vallecas 28031 Madrid
C/Llull, 321-329 (Edifici CINC) | 22@Barcrelona, 08019 Barcelona
MAIL: Sales.IA.Iberia@deltaww.com

Delta Electronics (Italy) Srl
Ufficio di Milano Via Senigallia 18/2 20161 Milano (MI)
Piazza Grazioli 18 00186 Roma, Italy
MAIL: Sales.IA.Italy@deltaww.com

Delta Electronics (Germany) GmbH
Coesterweg 45, D-59494 Soest, Germany
MAIL: Sales.IA.DACH@deltaww.com

Delta Energy Systems LLC (CIS)
Vereyskaya Plaza II, office 112 Vereyskaya str.
17 121357 Moscow, Russia
MAIL: Sales.IA.RU@deltaww.com

Delta Greentech Elektronik San. Ltd. Sti. (Turkey)
Serifali Mah. Hendem Cad. Kule Sok. No: 16-A
34775 Umraniye / Istanbul
MAIL: Sales.IA.Turkey@deltaww.com

Delta Energy Systems AG (Dubai BR)
P.O. Box 185668, Gate 7, 3rd Floor, Hamarain Centre,
Dubai, United Arab Emirates
MAIL: Sales.IA.MEA@deltaww.com

DPM-093AB20-01

2018/08/30

DI/DO type Power Meter DPM-C501L Operation Manual

DI/DO type Power Meter
DPM-C501L Operation Manual

www.deltaww.com

DELTA
Smarter. Greener. Together.

DPM-C501L Operation Manual

Revision History

Version	Revision	Date
1st	The first version was published.	2018/08/30

DPM-C501L Operation Manual

Table of Contents

1

Chapter 1 Product Introduction

Table of Contents

1.1 Preface

Thank you for choosing this product. This manual provides installation instructions for the DPM-C501L power meter. The multifunction power meter DPM-C501L is an obvious choice for any application in terms of power monitoring and control. It also can be used for measurement category CAT III.

Before using the meter, read this manual carefully to ensure proper use of this meter. Before you finish reading this manual, observe the following notes.

- The installation environment must be free of water vapor, corrosive and flammable gas.
- Follow the instructions on the diagram in this manual for wiring the device.
- Grounding must be performed correctly and properly according to provisions for related electric work regulations currently effective in the country.
- Do not disassemble the meter or alter its wiring when the power is on.
- When the power is on, do not touch the terminal area to avoid electric shock.

If you still experience issues when using the device, please contact your distributor or our customer service center. As the product is updated and improved, changes to the specifications will be included in the newest version of the manual which you can get by contacting your distributor or downloading it from the Delta Electronics website (http://www.delta.com.tw/ia/).

1.2 Overview

The DPM-C501L is equipped with a large, back-lit LCD display that displays up to four lines of information.

1.3 Safety Precautions

- **Installation Notes**

- Install the power meter according to instructions on the manual. Use appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- Only qualified electrical workers should install this equipment. Such work should be performed only after reading the entire set of installation instructions.
- Operate the power meter according to instructions on the manual. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.
- This equipment should be installed in a suitable insulated and fireproof enclosure.

- **Operation Notes**

- DO NOT work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all electric power sources.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- Carefully inspect the work area for tools and objects that may have been left inside the equipment.

- **Operation Notes**

- Never short the secondary of a Power Transformer (PT).
- Never open circuit a Current Transformer (CT)
- Ensure that the CT secondary winding is fixed securely on the equipment. It may damage the equipment if the secondary winding becomes loose during operation.
- When used with CTs, make sure the CTs are UL2808 listed in America and Canada and meet or exceed the accuracy specifications for IEC61869-2 class or accepted by authority having jurisdiction (AHJ) in other areas.

- **Wiring Notes**

- When the measured current is higher than the rated specification for the device, consider using an external current transformer (CT).
- When the measured voltage is higher than the rated specification for the device, consider using an external potential transformer (PT) (line voltage: 35 to 690V AC L-L or phase voltage: 20 to 400V AC L-N).
- Connect only one cord to one plug on the quick connector.
- For the device is accidently unplugged, check the connecting cord and restart.

- **Maintenance and Inspection Notes**

- While cleaning the equipment, be sure to unplug all external power sources first. Use a dry cloth to clean the equipment's exterior. DO NOT open the equipment or touch the wiring inside to prevent personal injury as well as damage to electrical equipment or other property. DO NOT use aerosol sprays, solvents, or abrasives.

MEMO

2

Chapter 2 Product Specifications

Table of Contents

2.1 Electrical Characteristics

Measurement Accuracy					
Electric quantities	Voltage, current	± 0.5%	Electric energy	Real power	± 0.5%
	Real power, reactive power, apparent power	± 0.5%		Reactive power	± 0.5%
Power factor		± 0.5%	Total Harmonic Distortion for Current		± 1%
Real power		± 0.5%	Total Harmonic Distortion for Voltage		± 1%
Reactive power		± 0.5%	Frequency		± 0.5%
Apparent power		± 0.5%	Harmonic		± 1%

Input		
Voltage Connection	1PH2W, 1 CT	3PH3W, Δ connection, 3 CT, 2 PT
	1PH3W, 2 CT	3PH4W, Y connection, 3 CT, No PT
	3PH3W, Δ connection, 3 CT, No PT	3PH4W, Y connection, 3 CT, 3 PT
	3PH3W, Δ connection, 2 CT, No PT	3PH4W, Y connection, 2 CT, 3 PT
Rated Voltage	Line voltage: 35–690 VAC (L-L) Phase voltage: 20–400 VAC (L-N)	
Rated Current	1 A/5 A	
Frequency	50/60 Hz	
Voltage Input	Measuring Category: CAT III	
Alarm	Set up multi-level alarms	10 multi-level alarms
Maximum / Minimum	15/15 types	With timestamp
Power	Operating range	80–265 VAC (maximum power: 4.6 W) 100–300 VDC
Frequency	Operating frequency	50/60 Hz
Communication	RS-485 port	Modbus-RTU
		Baud rate 9600 / 19200 / 38400 bps
Mechanical Characteristics	Dimension (W x H x D)	96 x 96 x 91.8 mm
	IP Degree of Protection	IP52 (front display), IP20 (meter body)

Environment	Ambient operating temperature	-20–50°C (-4–122°F)
	Storage temperature	-30–60 °C (-22–140°F)
	Relative Humidity	5–95% RH
	Altitude	Below 2000 meters
Display		
Screen Type	LCD	
Backlight	Blue LED	

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 Magnetic Fields	IEC 61000-4-8
Immunity to Voltage Dips	IEC 61000-4-11
Radiated Emissions	FCC Part 15 Class A, EN55011 Class A
Conducted Emissions	FCC Part 15 Class A, EN55011 Class A
Harmonics	IEC 61000-3-2
Flicker Emissions	IEC 61000-3-3

2.2 Communications Specifications

Communications	
RS-485	Modbus-RTU
Baud rate	9600 / 19200 / 38400 bps

2.3 Operating the Display

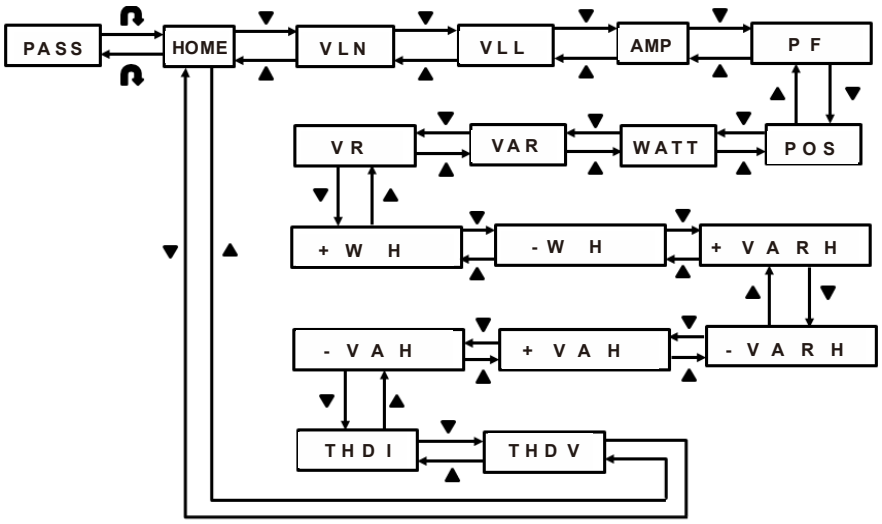
A	Enable / Disable	H	UP Key
B	Screen Title	I	DOWN Key
C	Load percentage	J	NEXT Key
D	Item	K	Operating status
E	Enable / disable digital input	L	Unit
F	INDEX Key	M	Value
G	BACK Key		

Button	Basic Mode	Setting Mode
INDEX Key	Return to the previous screen	Return to the previous screen
BACK Key	Go to setting mode or return to the previous screen	Return to the previous screen without saving the current setting
UP Key	Select item or page	Increment the number
DOWN Key	Select item or page	Decrement the number
NEXT Key	See more options	Go to setting mode and go to the next setting

2.3.1 Menu Tree

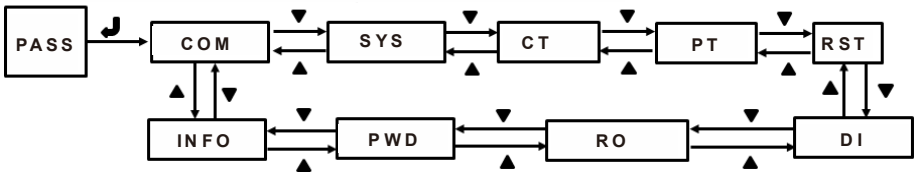
- **Display Menu Tree**

You can always use this button to return to HOME.



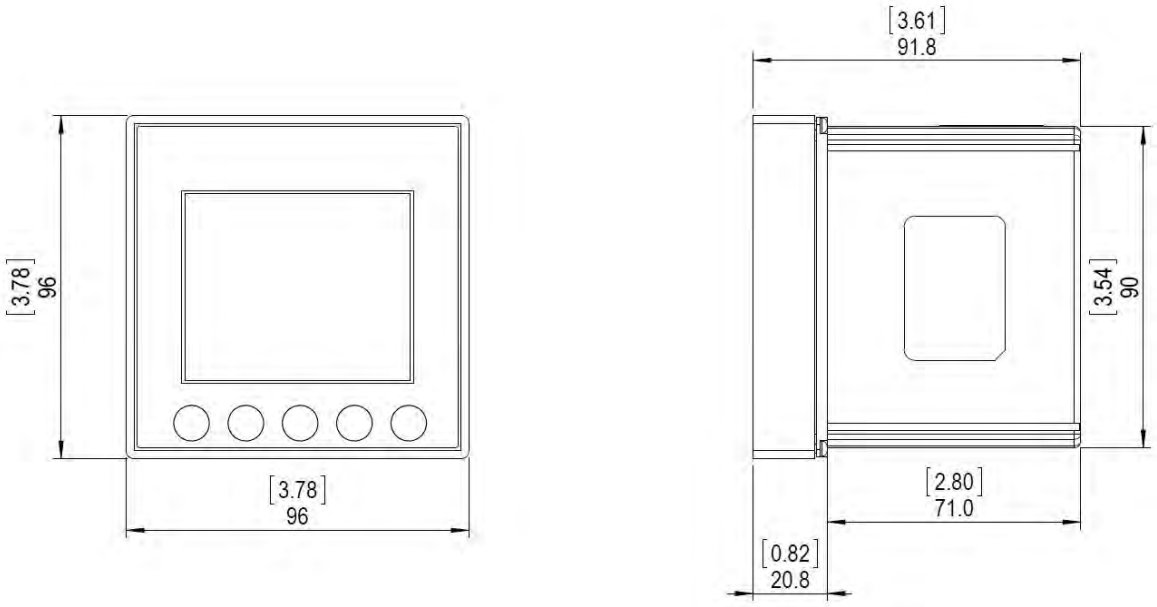
- **Setting Menu Tree**

You can always use this button to return to HOME.



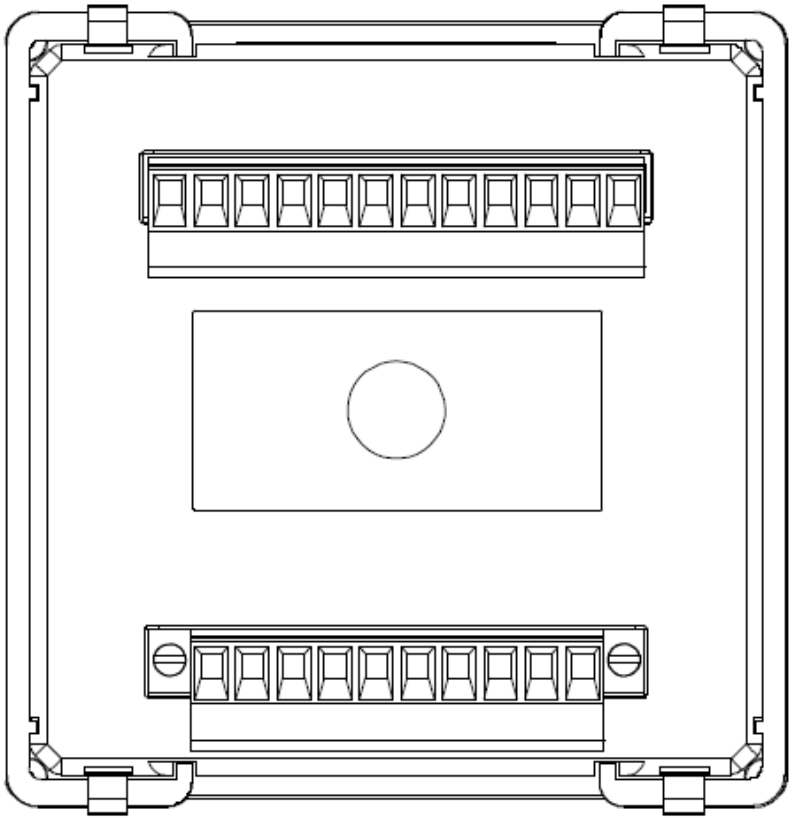
2.4 Dimensions

- **Front**



Unit: mm

- **Back:**



3

Chapter 3 Installation

Table of Contents

3.1 Installation

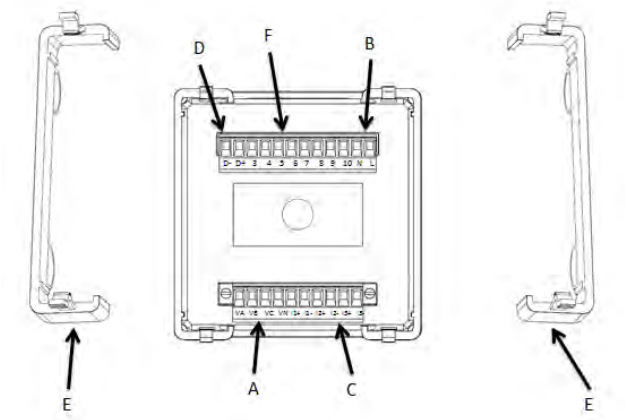
3.1.1 Installation Environment

Keep the product in the shipping carton before installation. Store the product properly when it is not to be used for an extended period of time to retain the warranty coverage. Some storage suggestions are listed below.

- Store the power meter in a clean, dry, and controlled environment.
- Store in an ambient temperature range of -30–60°C (-22–140°F).
- Store in a relative humidity range of 10–90%, non-condensing.
- Do not store the product in a place subjected to corrosive gases or liquids.
- Place the product on a solid and durable surface.
- Do not mount the product near heat-radiating elements; or in a location subjected to corrosive gases, liquids, airborne dust or metallic particles; or where it can be subjected to high levels of electromagnetic radiation.

3.1.2 Installation Notes

- Follow the instruction when installing the product to prevent equipment breakdown.
- To increase the cooling efficiency, install the product with sufficient space between adjacent objects and baffles and walls to prevent poor heat dissipation.



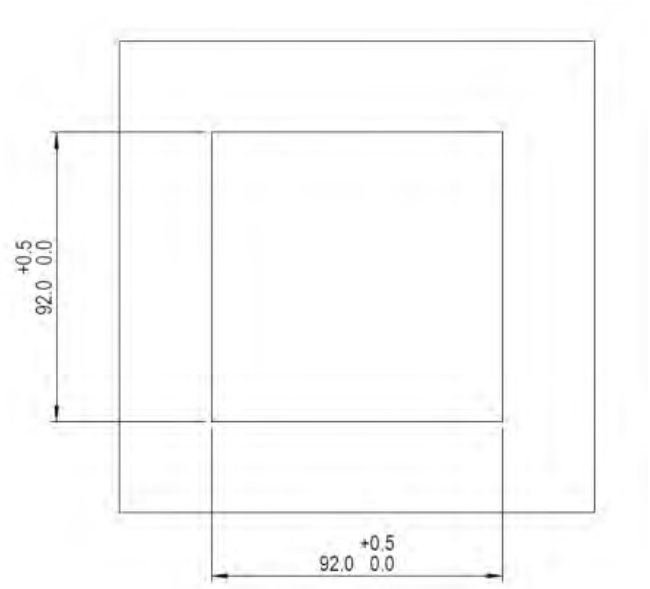
A. Voltage measurement
B. Operating voltage
C. Current measurement
D. RS-485 port
E. Securing bracket
F. DI/DO

- **Installation**

  1. This multi-functional power meter package comes with securing brackets for easier mounting and removing.
  2. The mounting hole dimension is 92x92 mm (see the figure below)
  3. Slide the securing bracket into the hole and then push the meter in. The maximum panel thickness should be 4.0 mm.

  Note: wall mount (The installation panel or cabinet surface should be flat and in good condition.)

- **Mounting Hole Dimensions**



Panel Hole
Thickness : 0.8~4.0mm

Unit: mm

3.2 Basic Checks

Items	Contents
General Check	■ Regularly check for mounting looseness where the power meter and device are connected. ■ Prevent foreign objects, such as oil, water, or metal powder entering the device through the ventilation holes. Prevent drill shavings or other debris entering the power meter. ■ If the power meter is installed at a location with harmful gas or dust, prevent those materials from entering the power meter.
Pre-operation Check (not supplied with power)	■ Insulate the connections at the wiring terminals. ■ Communications wiring should be done properly to prevent abnormal operations. ■ Check for the presence of conducive and flammable objects, such as screws or metal pieces in the power meter. ■ If electronic devices near to the power meter experience electromagnetic interference, take steps to reduce the electromagnetic interference. ■ Check for the correct voltage level for the power supplied to the power meter.
Pre-running Check (supplied with power)	■ Check if the power indicator light is lit. ■ Check if communication between every device is normal. ■ If there is any abnormal response from the power meter, contact your distributor or our customer service center.

3.3 Wiring

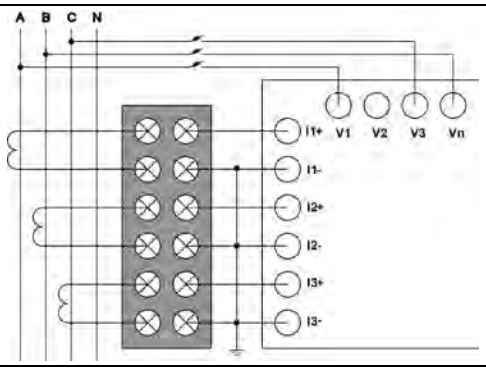
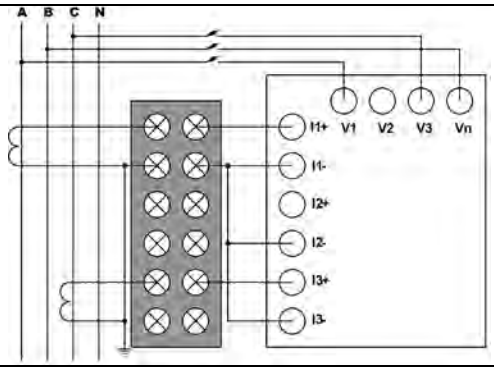
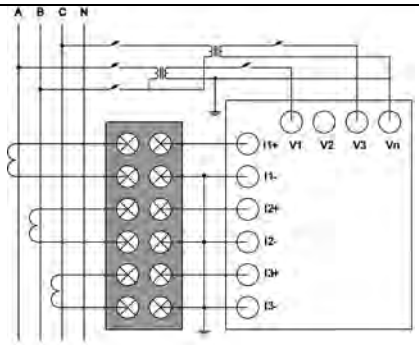
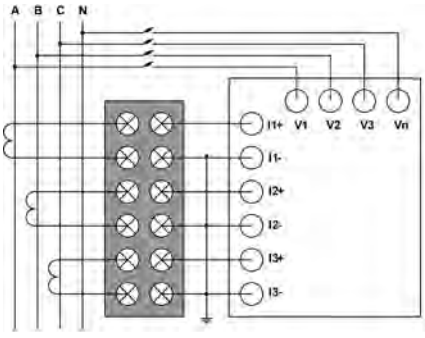
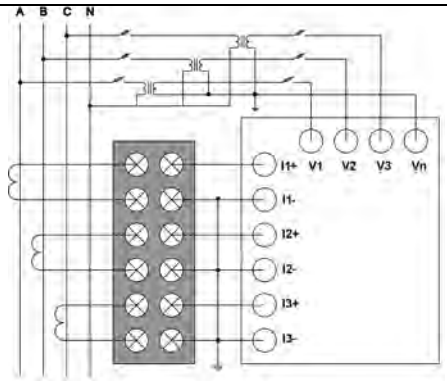
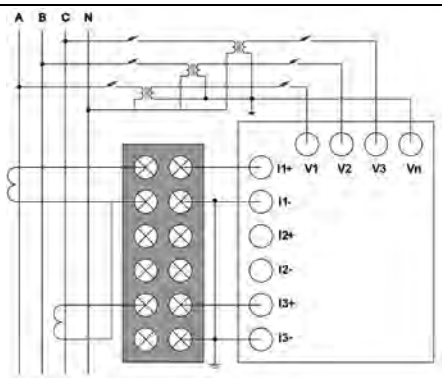
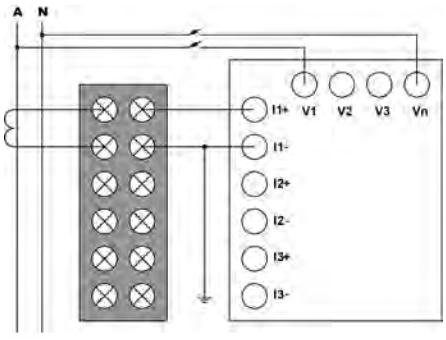
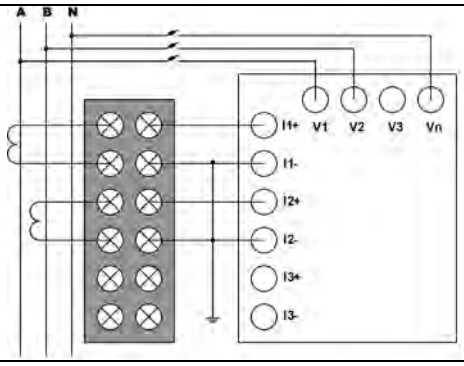
3.3.1 Wiring Diagrams

- To avoid electric shock, do not change the wiring when the power is on.
- Install a breaker switch on the power cord for the meter because there is no power switch on the power meter.
- When the measured voltage is higher than the rated specification for the device, it is necessary to use an external potential transformer (PT).
- When the measured current is higher than the rated specification for the device, it is necessary to use an external current transformer (CT).

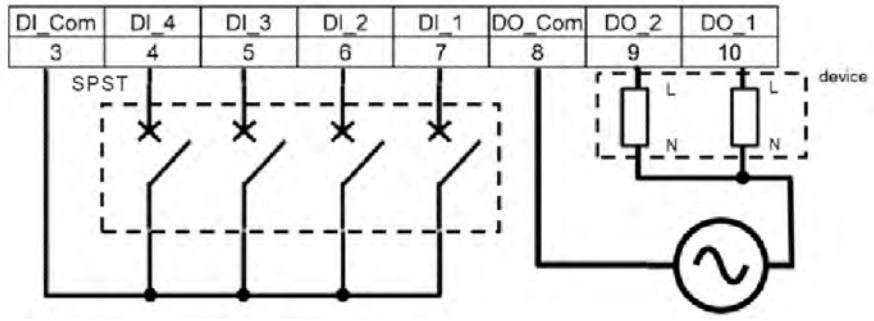
The following table shows the recommended wiring materials.

Connecting Terminals	Wire Diameters	Screw Turning Torque	Temperature rating
Operating power	AWG 10–24	8.0 kgf-cm (0.8 N·m)	above 70°C
Voltage Measurement			
Current Measurement			
RS-485			
DI/DO			

- **Connection**

3PH3W, Δ connection, 3 CT, No PT	3PH3W, Δ connection, 2 CT, No PT
	
3PH3W, Δ connection, 3 CT, 2 PT	**3PH4W, Y connection, 3 CT, No PT**
	
3PH4W, Y connection, 3 CT, 3 PT	**3PH4W, Y connection, 2 CT, 3 PT**
	
1PH2W, 1 CT	**1PH3W, 2 CT**
	

- **DI/DO Connection**



The following table lists the symbols used in the diagram.

Symbol					
Description	Grounding	Current transformer	Terminal block	Voltage transformer	Fuse

3.3.2 Communication Characteristics

- **Communications Specifications:**

Max. Communication Distance	1200 m	**Baud Rate**	9600, 19200, 38400
Max. Connection Number	32	**Data Length**	8
Communication Protocols	MODBUS RTU	**Parity**	None, Odd, Even
Function Code	03, 06, 10	**Stop Bit**	1

- Use shielded twisted-pair cables for RS485 communication.
- Connect the D+ communication terminal for all devices on the same twisted pair cable. Connect the D- terminals on the other twisted pair cable. Ground the cable shield. Install a terminal resistor on the terminal device.
- Use cables with a diameter of 14–28 AWG.

4

Chapter 4 Operation

Table of Contents

4.1 General Operation

1. Use the UP and DOWN keys to switch among setting pages.
2. Use the BACK or INDEX keys to go back to HOME page.

   Note 1: Use the BACK key in the HOME page to enter the setting page.

   Note 2: Press the NEXT key for 3 seconds in the HOME page to switch the language display between Chinese and English.

4.1.1 Setting Menu

- HOME page (HOME): Voltage values measured by the power meter, including THD voltage (VT), THD current (IT), total potential transformer (PT), positive active energy (ET).
- Phase voltage (VLN): Phase voltage values measured by the power meter, including phase A voltage (AN), phase B voltage (BN), phase C voltage (CN) and average phase voltage (T).
- Line voltage (VLL): Line voltage values measured by the power meter, including A-B line voltage (AB), B-C line voltage (BC), C-A line voltage (CA), and average line voltage (T).
- Electric current page (AMP): Electric current measured by the power meter, including phase A current (A), phase B current (B), phase C current (C) and average current (T).
- Power factor page (PF): Power factors measured by the power meter, including phase A (A), phase B (B), and phase C (C) power factors; and total power factor (T).
- Active power, reactive power, and apparent power page (PQS): Values measured by the power meter, including total active power (P), total reactive power (Q), total apparent power (S) and frequency (Hz).
- Active power page (WATT): Active power value measured by the power meter, including phase A (A), phase B (B), and phase C (C) active power; and total active power (T).
- Reactive power page (VAR): Reactive power value measured by the power meter, including phase A (A), phase B (B), and phase C (C) reactive power; and total reactive power (T).
- Apparent power page (VA): Apparent power value measured by the power meter, including phase A (A), phase B (B), and phase C (C) apparent power; and total apparent power (T).
- Positive active energy page (+WH): Positive active energy measured by the power meter, including positive active energy (PH).
- Reversed active energy page (-WH): Reversed active energy measured by the power meter, including reversed active energy (PH).
- Positive reactive energy page (+VARH): Positive reactive energy measured by the power meter, including positive reactive energy (QH).
- Reversed reactive energy page (-VARH): Reversed reactive energy measured by the power meter, including reserved reactive energy (QH).
- Positive apparent energy page (+VAH): Positive apparent energy measured by the power meter, including positive apparent energy (SH).

- Reversed apparent energy page (-VAH): Reversed apparent energy measured by the power meter, including reversed apparent energy (SH).
- Total harmonic current distortion page (THD I): Current harmonic distortion measured by the power meter, including phase A current (A), phase B current (B), and phase C current (C) harmonic distortion; and total harmonic distortion for current (T).
- Total harmonic voltage distortion page (THD I): Voltage harmonic distortion measured by the power meter, including phase A voltage (A), phase B voltage (B), and phase C voltage (C) harmonic distortion; and total harmonic distortion for voltage (T).

4.2 Setups

4.2.1 Set up the Password (PASS)

- Password: You must enter the password (default 0000) before using power meter.
- Steps
    1. Press NEXT until the first digit starts blinking.
    2. Use UP and DOWN to select the first digit of the password.
    3. Press ENTER to confirm the selected digit and move to set the next digit.
    4. Repeat steps 2–3 to complete setting the 4-digit password.
    5. After you set the 4-digit password, press ENTER to go to the parameter setting page.

Note 1: If you need to edit the password setting, press BACK and the digit stops blinking.
Press NEXT until the first digit starts blinking again and then follow steps 2–3 to set a new password.

Note 2: Press BACK to exit the password page and go to HOME page.

4.2.2 Set up Communication (COM)

- Address (ID): Device ID; the address range is 1–254 (default: 1); 255 is the broadcast ID.
- Baud Rate (BR): Transmission speed; options are 9600 kbps (default), 19200 bps, and 38400 bps.
- Parity setting (PA): Odd and even communication parity checking bit; options are None (8n1) (default), Even (8E1), and Odd (8o1).
- Steps
    1. Press NEXT until the first digit starts blinking
    2. Use UP and DOWN to select the device ID.
    3. Press NEXT to save the setting and then set the next device ID.
    4. Repeat steps 2–3 to complete setting the 3-digit device ID. Press NEXT to set the baud rate.
    5. When the option starts blinking, use UP and DOWN to select the baud rate.
    6. Press NEXT to save the setting and set the parity.
    7. When the option starts blinking, use UP and DOWN to select the parity.
    8. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK anytime, whether you have completed or canceled the setting.

4.2.3 Set up the System (SYS)

- Wiring methods (WR): Options are one-phase two-wire (1PH2W), one-phase three-wire (1PH3W), three-phase three-wire (3PH3W), and three-phase four-wire (3PH4W); default: three-phase four-wire.
- Number of current transformers (CT): Options are 1, 2 and 3; default: 3.
- Number of potential transformers (PT): Options are 0, 2 and 3; default: 3.
- Steps
    1. Press NEXT until the option starts blinking.
    2. Use UP and DOWN to select the wiring method.
    3. Press NEXT to save the setting and then set the number of current transformers (CT).
    4. When the option starts blinking, use UP and DOWN to select the number of current transformers.
    5. Press NEXT to save the setting and set the number of potential transformers (PT).
    6. When the option starts blinking, use UP and DOWN to select the number of potential transformers.
    7. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK anytime, whether you have completed or canceled the setting.

4.2.4 Set up the Current Transformer (CT)

- Ampere for the primary-side current transformer; 1–9999 A, 5 A is default.
- Ampere for the secondary-side current transformer; options are 1 and 5 A; 5 A is default.
- Steps
    1. Press NEXT until the first digit starts blinking
    2. Use UP and DOWN to select the number for the primary-side current transformer.
    3. Press NEXT to confirm the setting and then set the next number for the primary-side current transformer.
    4. Repeat steps 2–3 to complete setting the 4-digit number for the primary-side current transformer. Press NEXT to set the secondary-side current transformer.
    5. When the option starts blinking, use UP and DOWN to select the number of the secondary-side current transformer.
    6. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK anytime, whether you have completed or canceled the setting.

4.2.5 Set up the Potential Transformer (PT)

- Voltage for the primary-side potential transformer; 1– 65535 V, 1 V is default.
- Voltage for the secondary-side potential transformer; 1–9999 V, 1 V is default.
- Steps
    1. Press NEXT until the first digit starts blinking
    2. Use UP and DOWN to select the number for the primary-side potential transformer.
    3. Press NEXT to confirm the setting and then set the next number for the primary-side potential transformer.
    4. Repeat steps 2–3 to complete setting the 5-digit number for the primary-side potential transformer. Press NEXT to set the secondary-side potential transformer.
    5. When the option starts blinking, use UP and DOWN to select the number of the secondary-side potential transformer.
    6. Press NEXT to confirm the setting and then set the next number for the primary-side potential transformer.
    7. Repeat steps 5–6 to complete setting the 4-digit number for the primary-side potential transformer.
    8. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK anytime, whether you have completed or canceled the setting.

4.2.6 Set up Reset (RST)

- No action (nonE): Do not reset.
- Restore to defaults (dEF): Restore the power meter parameters to the default settings.
- Reset the accumulated value of electric energy (PH) on the meter to zero.
- Clear all detected alarm (ALA) logs on the meter.
- Steps
    1. Press NEXT until the option starts blinking.
    2. Use UP and DOWN to select the reset options.
    3. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK anytime, whether you have completed or canceled the setting.

4.2.7 Digital Input (DI)

- Digital input #1 (D1): Enable (on) or disable (oFF) the first digital input, default: disable (oFF)
- Digital input #2 (D2): Enable (on) or disable (oFF) the second digital input, default: disable (oFF)
- Digital input #3 (D3): Enable (on) or disable (oFF) the third digital input, default: disable (oFF)
- Digital input #4 (D4): Enable (on) or disable (oFF) the fourth digital input, default: disable (oFF)
- Steps

1. Press NEXT until the option starts blinking.
2. Use UP and DOWN to select ON or OFF.
3. Press NEXT to save the setting and then set the next digital input.
4. When the option starts blinking, use UP and DOWN to select ON or OFF.
5. Press NEXT to save the setting.
6. Repeat steps 4-5 to complete setting the last digital input.
7. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK anytime, whether you have completed or canceled the setting.

4.2.8 Relay Output (RO)

- Relay output#1 (R1): Enable (on) or disable (oFF) the first relay output; default: OFF (oFF)
- Relay output#1 (R2): Enable (on) or disable (oFF) the second relay output; default: OFF (oFF)
- The following table lists the relay output descriptions on the LCD.

LCD display	Item	Description
	Disable	This function is disabled.
	Over current alarm	If the over current alarm is triggered, the corresponding relay closes. If the over current alarm is canceled, the corresponding relay opens.
	Over line voltage alarm	If the over line voltage alarm is triggered, the corresponding relay closes. If the over line voltage alarm is canceled, the corresponding relay open.
	Under line voltage alarm	If the under line voltage alarm is triggered, the corresponding relay closes. If the under line voltage alarm is canceled, the corresponding relay opens.
	Over phase voltage alarm	If the over phase voltage alarm is triggered, the corresponding relay closes. If the over phase voltage alarm is canceled, the corresponding relay opens.

	Under phase voltage alarm	If the under phase voltage alarm is triggered, the corresponding relay closes. If the under phase voltage alarm is canceled, the corresponding relay opens.
	Over active energy alarm	If the over active energy alarm is triggered, the corresponding relay closes. If the over active energy alarm is canceled, the corresponding relay opens.
	Over reactive energy alarm	If the over reactive energy alarm is triggered, the corresponding relay closes. If the over reactive energy alarm is canceled, the corresponding relay opens.
	Over apparent power alarm	If the over apparent power alarm is triggered, the corresponding relay closes. If the over apparent power alarm is canceled, the corresponding relay opens.
	Over frequency alarm	If the over frequency alarm is triggered, the corresponding relay closes. If the over frequency alarm is canceled, the corresponding relay opens.
	Under frequency alarm	If the under frequency alarm is triggered, the corresponding relay closes. If the under frequency alarm is canceled, the corresponding relay opens.
	Digital input 1	If the digital input 1 receives a higher potential, the corresponding relay is closed. If the digital input 1 receives a lower potential, the corresponding relay is opened.
	Digital input 2	If the digital input 2 receives a higher potential, the corresponding relay closes. If the digital input 1 receives a lower potential, the corresponding relay opens.

	Digital input 3	If the digital input 3 receives a higher potential, the corresponding relay closes. If the digital input 1 receives a lower potential, the corresponding relay opens.
	Digital input 4	If the digital input 4 receives a higher potential, the corresponding relay closes. If the digital input 1 receives a lower potential, the corresponding relay opens.
	Communication	Write 1 in Modbus register 0x594, the relay #1 closes. Write 0 in Modbus register 0x594, the relay #1 opens. Write 1 in Modbus register 0x595, the relay #2 closes. Write 0 in Modbus register 0x594, the relay #2 opens.

- Steps
  1. Press NEXT until the option starts blinking.
  2. Use UP and DOWN to select the setting options.
  3. Press NEXT to save the setting and then set the next relay output.
  4. When the option starts blinking, use UP and DOWN to select the setting options.
  5. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK anytime, whether you have completed or canceled the setting.

4.2.9 Edit the Password (PWD)

- Edit the password (default 0000)
- Steps
  1. Press NEXT until the first digit starts blinking
  2. Use UP and DOWN to select the first digit of the password
  3. Press NEXT to confirm the setting and then set the next digit of the password.
  4. Repeat steps 2–3 to complete setting the 4-digit password.
  5. Press NEXT to save the setting.

Note: You can go back to the previous setting item by pressing BACK key anytime, whether you have completed or canceled the setting.

4.2.10 Meter Information (INFO)

- Model: C501L
- Firmware version: 1XXXX
- Firmware release date: XXXXYYZZ (XXXX: year, YY: month, ZZ: day)

4.3 Power Analysis Values

4.3.1 Total Harmonic Distortion Measurement

The total harmonic distortion (THD) is a measurement of the harmonic distortion and is defined as the ratio between the power of the harmonic frequencies above the base frequency and the power of the base frequency. The total harmonic distortions for current and voltage are calculated using the following formulas.

Total Harmonic Distortion for Current	$THD_I = \frac{1}{\lvert I_{fund} \rvert} \sqrt{\sum_{n=2}^{31} \lvert I_{n.Harm} \rvert^2}$
Total Harmonic Distortion for Voltage	$THD_U = \frac{1}{\lvert U_{fund} \rvert} \sqrt{\sum_{n=2}^{31} \lvert U_{n.Harm} \rvert^2}$

MEMO

5

Chapter 5 Parameters and Functions

Table of Contents

5.1 Overview of Parameters

MODBUS Address		Item	Range	Data Type	Unit	Data Size (byte)	Read (R) / Write (W)
Hex	Modicom Format						
0. System Parameters: 0001 – 00FF							
1	40002	Present date	Year: 00–99 Month: 1–12	byte	Year, Month	2	R/W
2	40003		Date: 1–31 Week: Sun–Sat	byte	Date, Week	2	R/W
3	40004	Present time	Hour: 00–23 Minute: 00–59	byte	Hour, 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 6: C501L	word		2	R
7	40008	Total running time of the meter	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	Firmware release date	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
B	40012		Date: 1–31	word	Date	2	R
C	40013	Reserved					
D	40014	Power system configuration	0: 3φ4W	word		2	R/W

			1: 3φ3W 2: 1φ2W 3: 1φ3W				
E	40015	Primary CT (A)	1 – 9999	uint	A	2	R/W
F	40016	Secondary CT (A)	0：1A 1：5A	word	A	2	R/W
10	40017	Primary PT	1 – 65535	uint	V	2	R/W
11	40018	Secondary PT	1 – 9999	uint	V	2	R/W
12	40019	Transformer quantities	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	Backlight delay	1 – 99	word	Second	2	R/W
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	Stop bit	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	Reset	0: None 1: Reset to factory default 2: Reset value of energy 3: Reset alarm times 4: Reset max./min. value	word		2	W
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 value exceeding this value triggers alarm)	0.000 – 99999.999	float	A	4	R/W
21	40034						
22	40035	Reserved					
23	40036	Dropout setpoint (current value below this value clears alarm)	0.000 – 99999.999	float	A	4	R/W
24	40037						
Alarm – Over Voltage L-L							
34	40053	Alarm enable	0: Disable 1: Enable	word		2	R/W
35	40054	Pickup setpoint (line	0.000 – 99999.999	float	V	4	R/W

36	40055	voltage value exceeding this value triggers alarm)					
37	40056	Reserved					
38	40057	Dropout setpoint (line voltage value below this value clears alarm)	0.000 – 99999.999	float	V	4	R/W
39	40058						
3A	40059	Reserved					
Alarm – Under Voltage L-L							
3B	40060	Alarm enable	0: Disable 1: Enable	word		2	R/W
3C	40061	Pickup setpoint (line voltage value below this value triggers alarm)	0.000 – 99999.999	float	V	4	R/W
3D	40062						
3E	40063	Reserved					
3F	40064	Dropout setpoint (line voltage value exceeding this value clears alarm)	0.000 – 99999.999	float	V	4	R/W
40	40065						
41	40066	Reserved					
Alarm – Over Voltage L-N							
42	40067	Alarm enable	0: Disable 1: Enable	word		2	R/W
43	40068	Pickup setpoint (phase voltage value exceeding this value triggers alarm)	0.000 – 99999.999	float	V	4	R/W
44	40069						
45	40070	Reserved					
46	40071	Dropout setpoint (phase voltage value below this value clears alarm)	0.000 – 99999.999	float	V	4	R/W
47	40072						

48	40073	Reserved					
Alarm – Under Voltage L-N							
49	40074	Alarm enable	0: Disable 1: Enable	word		2	R/W
4A	40075	Pickup setpoint (phase voltage value below this value triggers alarm)	0.000 – 99999.999	float	V	4	R/W
4B	40076						
4C	40077	Reserved					
4D	40078	Dropout setpoint (phase voltage value exceeding this value clears alarm)	0.000 – 99999.999	float	V	4	R/W
4E	40079						
Alarm – Over Active Power							
5E	40095	Alarm enable	0: Disable 1: Enable	word		2	R/W
5F	40096	Pickup setpoint (total active power value exceeding this value triggers alarm)	0.000 – 99999.999	float	kW	4	R/W
60	40097						
61	40098	Reserved					
62	40099	Dropout setpoint (total active power value below this value clears alarm)	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 (total reactive power value exceeding this value;alarm	0.000 – 99999.999	float	kVAR	4	R/W
67	40104						

		triggered)					
68	40105	Reserved					
69	40106	Dropout setpoint (total reactive power value below this value clears alarm)	0.000 – 99999.999	float	kVAR	4	R/W
6A	40107						
6B	40108	Reserved					
Alarm – Over Apparent Power							
6C	40109	Alarm enable	0: Disable 1: Enable	word		2	R/W
6D	40110	Pickup setpoint (total apparent power value exceeding this value triggers alarm)	0.000 – 99999.999	float	kVA	4	R/W
6E	40111						
6F	40112	Reserved					
70	40113	Dropout setpoint (total apparent power value below this value clears alarm)	0.000 – 99999.999	float	kVA	4	R/W
71	40114						
72	40115	Reserved					
Alarm – Over Frequency							
AB	40172	Alarm enable	0: Disable 1: Enable	word		2	R/W
AC	40173	Pickup setpoint (frequency value exceeding this value triggers alarm)	0.0000 – 99.9999	float	Hz	4	R/W
AD	40174						
AE	40175	Reserved					
AF	40176	Dropout setpoint (frequency value below this value clears alarm)	0.0000 – 99.9999	float	Hz	4	R/W
B0	40177						

B1	40178	Reserved					
Alarm – Under Frequency							
B2	40179	Alarm enable	0: Disable 1: Enable	word		2	R/W
B3	40180	Pickup setpoint (frequency value below this value triggers alarm)	0.0000 – 99.9999	float	Hz	4	R/W
B4	40181						
B5	40182	Reserved					
B6	40183	Dropout setpoint (frequency value 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	Phase A voltage	0.000 – 99999.999	float	V	4	R
101	40258						
102	40259	Phase B voltage	0.000 – 99999.999	float	V	4	R
103	40260						
104	40261	Phase C voltage	0.000 – 99999.999	float	V	4	R
105	40262						
106	40263	Average phase voltage	0.000 – 99999.999	float	V	4	R
107	40264						
108	40265	A–B line voltage	0.000 – 99999.999	float	V	4	R
109	40266						
10A	40267	B–C line voltage	0.000 – 99999.999	float	V	4	R
10B	40268						
10C	40269	C–A line voltage	0.000 – 99999.999	float	V	4	R

10D	40270						
10E	40271	Average line voltage	0.000 – 99999.999	float	V	4	R
10F	40272						
110	40273	Phase A voltage unbalance	0.00 – 99.99	float	%	4	R
111	40274						
112	40275	Phase B voltage unbalance	0.00 – 99.99	float	%	4	R
113	40276						
114	40277	Phase C voltage unbalance	0.00 – 99.99	float	%	4	R
115	40278						
116	40279	Phase voltage unbalance	0.00 – 99.99	float	%	4	R
117	40280						
118	40281	A–B line voltage unbalance	0.00 – 99.99	float	%	4	R
119	40282						
11A	40283	B–C line voltage unbalance	0.00 – 99.99	float	%	4	R
11B	40284						
11C	40285	C–A line voltage unbalance	0.00 – 99.99	float	%	4	R
11D	40286						
11E	40287	Line voltage unbalance	0.00 – 99.99	float	%	4	R
11F	40288						
120	40289	Phase A current	0.000 – 99999.999	float	A	4	R
121	40290						
122	40291	Phase B current	0.000 – 99999.999	float	A	4	R
123	40292						
124	40293	Phase C current	0.000 – 99999.999	float	A	4	R

125	40294						
126	40295	Three–phase average current	0.000 – 99999.999	float	A	4	R
127	40296						
128	40297	Neutral line current	0.000 – 99999.999	float	A	4	R
129	40298						
12A	40299	Phase A current unbalance	0.00 – 99.99	float	%	4	R
12B	40300						
12C	40301	Phase B current unbalance	0.00 – 99.99	float	%	4	R
12D	40302						
12E	40303	Phase C current unbalance	0.00 – 99.99	float	%	4	R
12F	40304						
130	40305	Current unbalance	0.00 – 99.99	float	%	4	R
131	40306						
132	40307	Total power factor	0.00000 – 1.00000 (positive: lag; negative: lead)	float		4	R
133	40308						
134	40309	Power factor of phase A	0.00000 – 1.00000 (positive: lag; negative: lead)	float		4	R
135	40310						
136	40311	Power factor of phase B	0.00000 – 1.00000 (positive: lag; negative: lead)	float		4	R
137	40312						
138	40313	Power factor of phase C	0.00000 – 1.00000 (positive: lag; negative: lead)	float		4	R
139	40314						
13A	40315	Total displacement power factor	0.00000 – 1.00000 (positive: lag; negative: lead)	float		4	R
13B	40316						
13C	40317	Total displacement power	0.00000 – 1.00000	float		4	R

13D	40318	factor of phase A	(positive: lag; negative: lead)				
13E	40319	Total displacement power factor of phase B	0.00000 – 1.00000 (positive: lag; negative: lead)	float		4	R
13F	40320						
140	40321	Total displacement power factor of phase 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	Total instantaneous active power	0.000 – 99999.999	float	kW	4	R
145	40326						
146	40327	Instantaneous active power of phase A	0.000 – 99999.999	float	kW	4	R
147	40328						
148	40329	Instantaneous active power of phase B	0.000 – 99999.999	float	kW	4	R
149	40330						
14A	40331	Instantaneous active power of phase C	0.000 – 99999.999	float	kW	4	R
14B	40332						
14C	40333	Total instantaneous reactive power	0.000 – 99999.999	float	kVAR	4	R
14D	40334						
14E	40335	Instantaneous reactive power of phase A	0.000 – 99999.999	float	kVAR	4	R
14F	40336						
150	40337	Instantaneous reactive power of phase B	0.000 – 99999.999	float	kVAR	4	R
151	40338						
152	40339	Instantaneous reactive power of phase C	0.000 – 99999.999	float	kVAR	4	R
153	40340						
154	40341	Instantaneous apparent	0.000 – 99999.999	float	kVA	4	R

155	40342	power					
156	40343	Instantaneous apparent power of phase A	0.000 – 99999.999	float	kVA	4	R
157	40344						
158	40345	Instantaneous apparent power of phase B	0.000 – 99999.999	float	kVA	4	R
159	40346						
15A	40347	Instantaneous apparent power of phase C	0.000 – 99999.999	float	kVA	4	R
15B	40348						
15C	40349	Active energy of three-phase delivered	0 - 4294967295	uint	Wh	4	R
15D	40350						
15E	40351	Active energy of three-phase received	0 - 4294967295	uint	Wh	4	R
15F	40352						
160	40353	Reactive energy of three-phase delivered	0 - 4294967295	uint	VARh	4	R
161	40354						
162	40355	Reactive energy of three-phase received	0 - 4294967295	uint	VARh	4	R
163	40356						
164	40357	Apparent energy of three-phase delivered	0 - 4294967295	uint	VAh	4	R
165	40358						
166	40359	Apparent energy of three-phase received	0 - 4294967295	uint	VAh	4	R
167	40360						
174	40373	Total harmonic distortion for phase A current	0.000 – 999.999	float	%	4	R
175	40374						
176	40375	Total harmonic distortion for phase B current	0.000 – 999.999	float	%	4	R
177	40376						
178	40377	Total harmonic distortion for	0.000 – 999.999	float	%	4	R

179	40378	phase C current					
17A	40379	Total harmonic distortion for neutral line current	0.000 – 999.999	float	%	4	R
17B	40380						
17C	40381	Total harmonic distortion for phase A voltage	0.000 – 999.999	float	%	4	R
17D	40382						
17E	40383	Total harmonic distortion for phase B voltage	0.000 – 999.999	float	%	4	R
17F	40384						
180	40385	Total harmonic distortion for phase C voltage	0.000 – 999.999	float	%	4	R
181	40386						
182	40387	Total harmonic distortion for phase A–B voltage	0.000 – 999.999	float	%	4	R
183	40388						
184	40389	Total harmonic distortion for phase B–C voltage	0.000 – 999.999	float	%	4	R
185	40390						
186	40391	Total harmonic distortion for phase C–A voltage	0.000 – 999.999	float	%	4	R
187	40392						
188	40393	Total harmonic distortion for current	0.000 – 999.999	float	%	4	R
189	40394						
18A	40395	Total harmonic distortion for voltage	0.000 – 999.999	float	%	4	R
18B	40396						
2. Maximum: 0200 – 02FF							
200	40513	Maximum A–B line voltage	0.000 – 99999.999	float	V	4	R
201	40514						
202	40515	Date of maximum A–B line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R

203	40516		Date: 1–31	word	Date	2	R
204	40517	Time of maximum A–B line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
205	40518		Second: 00–59	word	Second	2	R
206	40519	Maximum B–C line voltage	0.000 – 99999.999	float	V	4	R
207	40520						
208	40521	Date of maximum B–C line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
209	40522		Date: 1–31	word	Date	2	R
20A	40523	Time of maximum B–C line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
20B	40524		Second: 00–59	word	Second	2	R
20C	40525	Maximum C–A line voltage	0.000 – 99999.999	float	V	4	R
20D	40526						
20E	40527	Date of maximum C–A line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
20F	40528		Date: 1–31	word	Date	2	R
210	40529	Time of maximum C–A line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
211	40530		Second: 00–59	word	Second	2	R
212	40531	Maximum phase A voltage	0.000 – 99999.999	float	V	4	R
213	40532						
214	40533	Date of maximum phase A voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
215	40534		Date: 1–31	word	Date	2	R

216	40535	Time of maximum phase A voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
217	40536		Second: 00–59	word	Second	2	R
218	40537	Maximum phase B voltage	0.000 – 99999.999	float	V	4	R
219	40538						
21A	40539	Date of maximum phase B voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
21B	40540		Date: 1–31	word	Date	2	R
21C	40541	Time of maximum phase B voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
21D	40542		Second: 00–59	word	Second	2	R
21E	40543	Maximum phase C voltage	0.000 – 99999.999	float	V	4	R
21F	40544						
220	40545	Date of maximum phase C voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
221	40546		Date: 1–31	word	Date	2	R
222	40547	Time of maximum phase C voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
223	40548		Second: 00–59	word	Second	2	R
224	40549	Maximum phase A current	0.000 – 99999.999	float	A	4	R
225	40550						
226	40551	Date of maximum phase A current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
227	40552		Date: 1–31	word	Date	2	R
228	40553	Time of maximum phase A	Hour: 00–23	byte	Hour,	2	R

		current	Minute: 00–59		Minute		
229	40554		Second: 00–59	word	Second	2	R
22A	40555	Maximum phase B current	0.000 – 99999.999	float	A	4	R
22B	40556						
22C	40557	Date of maximum phase B current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
22D	40558		Date: 1–31	word	Date	2	R
22E	40559	Time of maximum phase B current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
22F	40560		Second: 00–59	word	Second	2	R
230	40561	Maximum phase C current	0.000 – 99999.999	float	A	4	R
231	40562						
232	40563	Date of maximum phase C current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
233	40564		Date: 1–31	word	Date	2	R
234	40565	Time of maximum phase C current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
235	40566		Second: 00–59	word	Second	2	R
236	40567	Maximum neutral line current	0.000 – 99999.999	float	A	4	R
237	40568						
238	40569	Date of maximum neutral line current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
239	40570		Date: 1–31	word	Date	2	R
23A	40571	Time of maximum neutral line current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R

23B	40572		Second: 00–59	word	Second	2	R
23C	40573	Maximum frequency value	0.0000 – 99.9999	float	Hz	4	R
23D	40574						
23E	40575	Date of maximum frequency value	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
23F	40576		Date: 1–31	word	Date	2	R
240	40577	Time of maximum frequency value	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
241	40578		Second: 00–59	word	Second	2	R
242	40579	Maximum total power factor	0.00000 – 1.00000	float		4	R
243	40580						
244	40581	Date of maximum total power factor	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
245	40582		Date: 1–31	word	Date	2	R
246	40583	Time of maximum total power factor	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
247	40584		Second: 00–59	word	Second	2	R
248	40585	Maximum total active power	0.000 – 99999.999	float	kW	4	R
249	40586						
24A	40587	Date of maximum total active power	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
24B	40588		Date: 1–31	word	Date	2	R
24C	40589	Time of maximum total active power	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
24D	40590		Second: 00–59	word	Second	2	R

24E	40591	Maximum total reactive power	0.000 – 99999.999	float	kVAR	4	R
24F	40592						
250	40593	Date of maximum total reactive power	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
251	40594		Date: 1–31	word	Date	2	R
252	40595	Time of maximum total reactive power	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
253	40596		Second: 00–59	word	Second	2	R
254	40597	Maximum total apparent power	0.000 – 99999.999	float	kVA	4	R
255	40598						
256	40599	Date of maximum total apparent power	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
257	40600		Date: 1–31	word	Date	2	R
258	40601	Time of maximum total apparent power	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
259	40602		Second: 00–59	word	Second	2	R
3. Minimum: 0300 – 03FF							
300	40769	Minimum A–B line voltage	0.000 – 99999.999	float	V	4	R
301	40770						
302	40771	Date of minimum A–B line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
303	40772		Date: 1–31	word	Date	2	R
304	40773	Time of minimum A–B line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
305	40774		Second: 00–59	word	Second	2	R

306	40775	Minimum B–C line voltage	0.000 – 99999.999	float	V	4	R
307	40776						
308	40777	Date of minimum B–C line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
309	40778		Date: 1–31	word	Date	2	R
30A	40779	Time of minimum B–C line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
30B	40780		Second: 00–59	word	Second	2	R
30C	40781	Minimum C–A line voltage	0.000 – 99999.999	float	V	4	R
30D	40782						
30E	40783	Date of minimum C–A line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
30F	40784		Date: 1–31	word	Date	2	R
310	40785	Time of minimum C–A line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
311	40786		Second: 00–59	word	Second	2	R
312	40787	Minimum phase A voltage	0.000 – 99999.999	float	V	4	R
313	40788						
314	40789	Date of minimum phase A voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
315	40790		Date: 1–31	word	Date	2	R
316	40791	Time of minimum phase A voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
317	40792		Second: 00–59	word	Second	2	R
318	40793	Minimum phase B voltage	0.000 – 99999.999	float	V	4	R

319	40794						
31A	40795	Date of minimum phase B voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
31B	40796		Date: 1–31	word	Date	2	R
31C	40797	Time of minimum phase B voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
31D	40798		Second: 00–59	word	Second	2	R
31E	40799	Minimum phase C voltage	0.000 – 99999.999	float	V	4	R
31F	40800						
320	40801	Date of minimum phase C voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
321	40802		Date: 1–31	word	Date	2	R
322	40803	Time of minimum phase C voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
323	40804		Second: 00–59	word	Second	2	R
324	40805	Minimum phase A current	0.000 – 99999.999	float	A	4	R
325	40806						
326	40807	Date of minimum phase A current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
327	40808		Date: 1–31	word	Date	2	R
328	40809	Time of minimum phase A current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
329	40810		Second: 00–59	word	Second	2	R
32A	40811	Minimum phase B current	0.000 – 99999.999	float	A	4	R
32B	40812						

32C	40813	Date of minimum phase B current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
32D	40814		Date: 1–31	word	Date	2	R
32E	40815	Time of minimum phase B current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
32F	40816		Second: 00–59	word	Second	2	R
330	40817	Minimum phase C current	0.000 – 99999.999	float	A	4	R
331	40818						
332	40819	Date of minimum phase C current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
333	40820		Date: 1–31	word	Date	2	R
334	40821	Time of minimum phase C current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
335	40822		Second: 00–59	word	Second	2	R
336	40823	Minimum neutral line current	0.000 – 99999.999	float	A	4	R
337	40824						
338	40825	Date of minimum neutral line current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
339	40826		Date: 1–31	word	Date	2	R
33A	40827	Time of minimum neutral line current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
33B	40828		Second: 00–59	word	Second	2	R
33C	40829	Minimum frequency value	0.0000 – 99.9999	float	Hz	4	R
33D	40830						
33E	40831	Date of minimum frequency	Year: 00–99	byte	Year,	2	R

		value	Month: 1–12		Month		
33F	40832		Date: 1–31	word	Date	2	R
340	40833	Time of minimum frequency value	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
341	40834		Second: 00–59	word	Second	2	R
342	40835	Minimum total power factor	0.00000 – 1.00000	float		4	R
343	40836						
344	40837	Date of minimum total power factor	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
345	40838		Date: 1–31	word	Date	2	R
346	40839	Time of minimum total power factor	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
347	40840		Second: 00–59	word	Second	2	R
348	40841	Minimum total active power	0.000 – 99999.999	float	kW	4	R
349	40842						
34A	40843	Date of minimum total active power	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
34B	40844		Date: 1–31	word	Date	2	R
34C	40845	Time of minimum total active power	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
34D	40846		Second: 00–59	word	Second	2	R
34E	40847	Minimum total reactive power	0.000 – 99999.999	float	kVAR	4	R
34F	40848						
350	40849	Date of minimum total reactive power	Year: 00–99 Month: 1–12	byte	Year, Month	2	R

351	40850		Date: 1–31	word	Date	2	R
352	40851	Time of minimum total reactive power	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
353	40852		Second: 00–59	word	Second	2	R
354	40853	Minimum total apparent power	0.000 – 99999.999	float	kVA	4	R
355	40854						
356	40855	Date of minimum total apparent power	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
357	40856		Date: 1–31	word	Date	2	R
358	40857	Time of minimum total apparent power	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	Alarm status of over current	0: Cleared 1: Triggered	word		2	R
401	41026	Alarm times of over current	1–255	word	times	2	R
402	41027	Alarm date of over current	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
403	41028		Date: 1–31	word	Date	2	R
404	41029	Alarm time of over current	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
405	41030		Second: 00–59	word	Second	2	R
412	41043	Alarm status of over line voltage	0: Cleared 1: Triggered	word		2	R
413	41044	Alarm times of over line	1–255	word	times	2	R

		voltage					
414	41045	Alarm date of over line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
415	41046		Date: 1–31	word	Date	2	R
416	41047	Alarm time of over line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
417	41048		Second: 00–59	word	Second	2	R
418	41049	Alarm status of under line voltage	0: Cleared 1: Triggered	word		2	R
419	41050	Alarm times of under line voltage	1–255	word	times	2	R
41A	41051	Alarm date of under line voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
41B	41052		Date: 1–31	word	Date	2	R
41C	41053	Alarm time of under line voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
41D	41054		Second: 00–59	word	Second	2	R
41E	41055	Alarm status of over phase voltage	0: Cleared 1: Triggered	word		2	R
41F	41056	Alarm times of over phase voltage	1–255	word	times	2	R
420	41057	Alarm date of over phase voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
421	41058		Date: 1–31	word	Date	2	R
422	41059	Alarm time of over phase voltage	Hour: 00–23	byte	Hour, Minute	2	R

			Minute: 00–59				
423	41060		Second: 00–59	word	Second	2	R
424	41061	Alarm status of under voltage	0: Cleared 1: Triggered	word		2	R
425	41062	Alarm times of under phase voltage	1–255	word	times	2	R
426	41063	Alarm date of under phase voltage	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
427	41064		Date: 1–31	word	Date	2	R
428	41065	Alarm time of under phase voltage	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
429	41066		Second: 00–59	word	Second	2	R
436	41079	Alarm status of over active energy	0: Cleared 1: Triggered	word		2	R
437	41080	Alarm times of over active energy	1–255	word	times	2	R
438	41081	Alarm date of over active energy	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
439	41082		Date: 1–31	word	Date	2	R
43A	41083	Alarm time of over active energy	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
43B	41084		Second: 00–59	word	Second	2	R
43C	41085	Alarm status of over reactive energy	0: Cleared 1: Triggered	word		2	R
43D	41086	Alarm times of over reactive energy	1–255	word	times	2	R

43E	41087	Alarm date of over reactive energy	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
43F	41088		Date: 1–31	word	Date	2	R
440	41089	Alarm time of over reactive energy	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
441	41090		Second: 00–59	word	Second	2	R
442	41091	Alarm status of over apparent power	0: Cleared 1: Triggered	word		2	R
443	41092	Alarm times of over apparent power	1, 255	word	times	2	R
444	41093	Alarm date of over apparent power	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
445	41094		Date: 1–31	word	Date	2	R
446	41095	Alarm time of over apparent power	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R
447	41096		Second: 00–59	word	Second	2	R
478	41145	Alarm status of power factor (lead)	0: Cleared 1: Triggered	word		2	R
479	41146	Alarm times of power factor (lead)	1, 255	word	times	2	R
47A	41147	Alarm date of power factor (lead)	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
47B	41148		Date: 1–31	word	Date	2	R
47C	41149	Alarm time of power factor (lead)	Hour: 00–23 Minute: 00–59	byte	Hour, Minute	2	R

47D	41150		Second: 00–59	word	Second	2	R
47E	41151	Alarm status of power factor (lag)	0: Cleared 1: Triggered	word		2	R
47F	41152	Alarm times of power factor (lag)	1–255	word	times	2	R
480	41153	Alarm date of under frequency	Year: 00–99 Month: 1–12	byte	Year, Month	2	R
481	41154		Date: 1–31	word	Date	2	R
482	41155	Alarm time of under frequency	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	Setting group 1	0x100 – 0x1E7	word		2	R/W
50D	41294	Setting group 2	0x100 – 0x1E7	word		2	R/W
⋮	⋮	⋮	0x100 – 0x1E7	word		2	R/W
515	41362	Setting group 10	0x100 – 0x1E7	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	Date: 1–31	word	Date	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
588	41417	Setting of digital input #1	0: Disable 1: Enable	word		2	R/W
589	41418	Setting of digital input #2	0: Disable	word		2	R/W

			1: Enable				
58A	41419	Setting of digital input #3	0: Disable 1: Enable	word		2	R/W
58B	41420	Setting of digital input #4	0: Disable 1: Enable	word		2	R/W
58C	41421	Setting of relay output #1	Alarms: 0: Disable 1: Over current 2: Over line voltage 3: Under line voltage 4: Over phase voltage 5: Under phase voltage 6: Over active energy 7: Over reactive energy 8: Over apparent power	word		2	R/W
58D	41422	Setting of relay output #2	9: Over frequency 10: Under frequency 11: Digital input #1 12: Digital input #2 13: Digital input #3 14: Digital input #4 15: Communication (when set for Relay Output #1, register 0x594 is writable) (when set for Relay Output #2, register 0x595 is writable)	word		2	R/W
590	41425	Status of digital input #1	0: Low	word		2	R

			1: High 255: Disable				
591	41426	Status of digital input #2	0: Low 1: High 255: Disable	word		2	R
592	41427	Status of digital input #3	0: Low 1: High 255: Disable	word		2	R
593	41428	Status of digital input #4	0: Low 1: High 255: Disable	word		2	R
594	41429	Status of relay output #1	0: Open 1: Closed Note: register 0x58C can only be written when the value is set to 15	word		2	R/W
595	41430	Setting of relay output #2	0: Open 1: Closed Note: register 0x58D can only be written when the value is set to 15	word		2	R/W
6. Parameter Group: 0600 – 06FF							
600	41537	Read data from group 1				2	R
601	41538	Read data from group 2				2	R
⋮	⋮	⋮				2	R
609	41546	Read data from group 10				2	R

MEMO

6

Chapter 6 Error Codes

Table of Contents

6.1 Error Codes

When an error occurs during operation, the power monitor sends an error code through Modbus. The following table lists the error codes and causes.

Error Code	Name	Description
0x01	Illegal function	Incorrect function code
0x02	Illegal data address	Incorrect data address to read or write
0x03	Illegal data value	Incorrect data format (for example, data length)
0x04	Slave device failure	Slave cannot execute the command.

Appendix A Accessories

Table of Contents

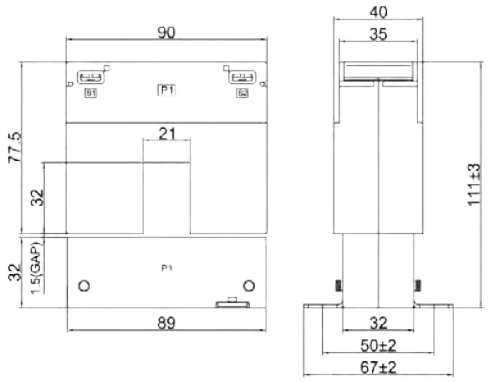
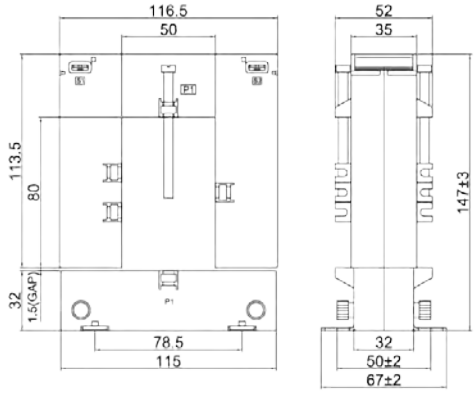
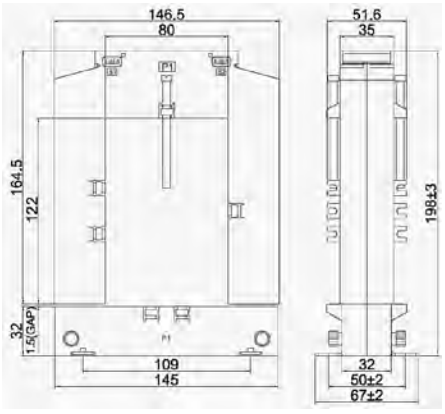
When measured current is higher than the rated specification for the device, use of an external current transformer (CT) is necessary.

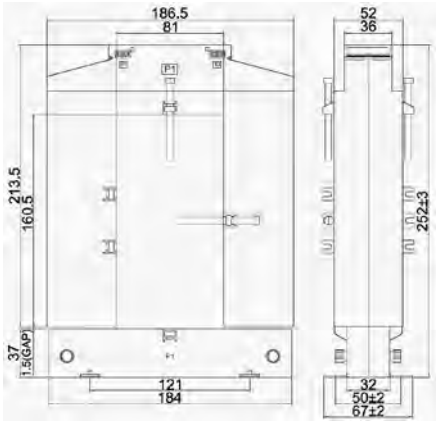
A.1 DCT1000 Series

Electromagnetic Compatibility: CE-marking, IEC61869-2.

Model Number	Measurement Accuracy	Primary Current	Secondary Current	Rated Burden (VA)	External Dimension*1 (mm)	Size of Opening*1 (mm)
DCT-S301C	1.0%	100 A	5 A	1.5	90 x 40 x 111	21 x 32
DCT-S211C	0.5%	200 A	5 A	1		
DCT-S221C	0.5%	300 A	5 A	1.5		
DCT-S231C	0.5%	400 A	5 A	2.5		
DCT-S241C	0.5%	500 A	5 A	2.5	116.5 x 52 x 147	50 x 80
DCT-S251C	0.5%	600 A	5 A	2.5		
DCT-S261C	0.5%	750 A	5 A	2.5		
DCT-S271C	0.5%	1000 A	5 A	5		
DCT-S281C	0.5%	1500 A	5 A	7.5	146.5 x 51.6 x 198	80 x 122
DCT-S291C	0.5%	2000 A	5 A	10	186.5 x 52 x 252	81 x 160.5
DCT-S2A1C	0.5%	2500 A	5 A	15		
DCT-S2B1C	0.5%	3000 A	5 A	20		

*1: See the following table for detailed information on the external dimensions and sizes of opening.

Model Number	Dimension (mm)	
DCT-S301C DCT-S211C DCT-S221C DCT-S231C	External Dimension: 90 x 40 x 111 Size of Opening: 21 x 32 	
DCT-S241C DCT-S251C DCT-S261C DCT-S271C	External Dimension: 116.5 x 52 x 147 Size of Opening: 50 x 80 	
DCT-S281C	External Dimension: 146.5 x 51.6 x 198 Size of Opening: 80 x 122 	

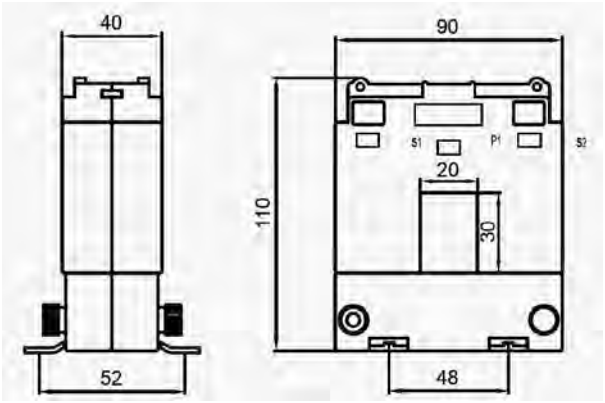
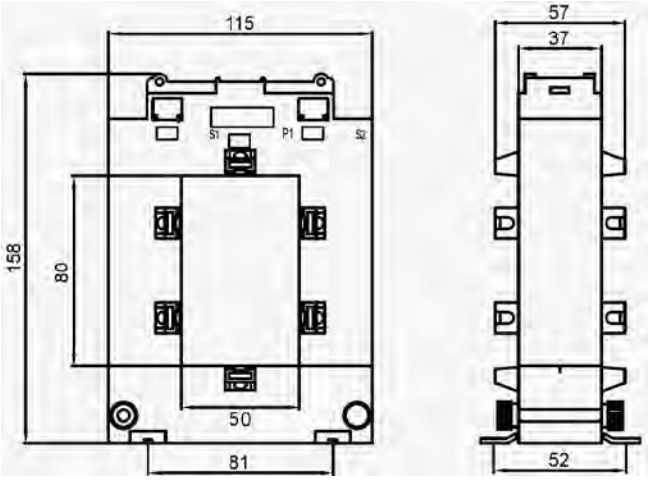
DCT-S291C DCT-S2A1C DCT-S2B1C	External Dimension: 186.5 x 52 x 252 Size of Opening: 81 x 160.5 	

A.2 DCT2000 Series

Electromagnetic Compatibility: UL, UL2808.

Model Number	Measurement Accuracy	Primary Current	Secondary Current	Rated Burden (VA)	External Dimension*1 (mm)	Size of Opening*1 (mm)
DCT-S201B	1.0%	100 A	5 A	1	90 x 40 x 110	20 x 30
DCT-S211B	0.5%	200 A	5 A	1		
DCT-S221B	0.5%	300 A	5 A	1.5		
DCT-S231B	0.5%	400 A	5 A	1.5	115 x 57 x 158	50 x 80
DCT-S241B	0.5%	500 A	5 A	2.5		
DCT-S251B	0.5%	600 A	5 A	2.5		
DCT-S261B	0.5%	750 A	5 A	2.5		
DCT-S2C1B	0.5%	800 A	5 A	3.75		
DCT-S271B	0.5%	1000 A	5 A	5		

*1: See the following table for detailed information on the external dimensions and sizes of opening.

<table>
<tr><th>Model Number</th><th colspan="2">Dimension (mm)</th></tr>
<tr><td>DCT-S201B
DCT-S211B
DCT-S221B</td><td>External Dimension:
90 x 40 x 110
Size of Opening:
20 x 30
  </td><td> 
</td></tr>
<tr><td>DCT-S231B
DCT-S241B
DCT-S251B
DCT-S261B
DCT-S2C1B
DCT-S271B</td><td>External Dimension:
115 x 57 x 158
Size of Opening:
50 x 80
  </td><td> 
</td></tr>
</table>

MEMO