Digital Power Meter User Manual

DPM380/DPM380B

Mikro®

DPM380_ver1.0

HAZARD CATAGORIES AND SPECIAL SYMBOL

Read all instructions carefully and check the device before installing or service it. The following safety alert symbol may appear throughout this manual or on the device to warn of potential hazards or to call for attention.

PLEASE NOTE

The power meter should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

BEFORE YOU BEGIN

- Apply appropriate personal protective equipment and follow safe electrical work practices.
- NEVER work alone.
- Turn-off all power supplying the power meter and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Before closing all covers and doors, carefully inspect the work area for tools and objects that may have been left inside the equipment.
- NEVER bypass external fusing.
- NEVER open circuit a CT; use the shorting block to short circuit the leads of the CT before removing the connection from the power meter.
- Before performing hi-pot testing on any equipment in which the power meter is installed, disconnect all input and output wires to the power meter. High voltage testing may damage electronic components contained in the power meter.
- The power meter should be installed in a suitable electrical enclosure.

Failure to follow this instruction may result in serious injury

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FIGURES

TABLE

1. Parts of Power Meter

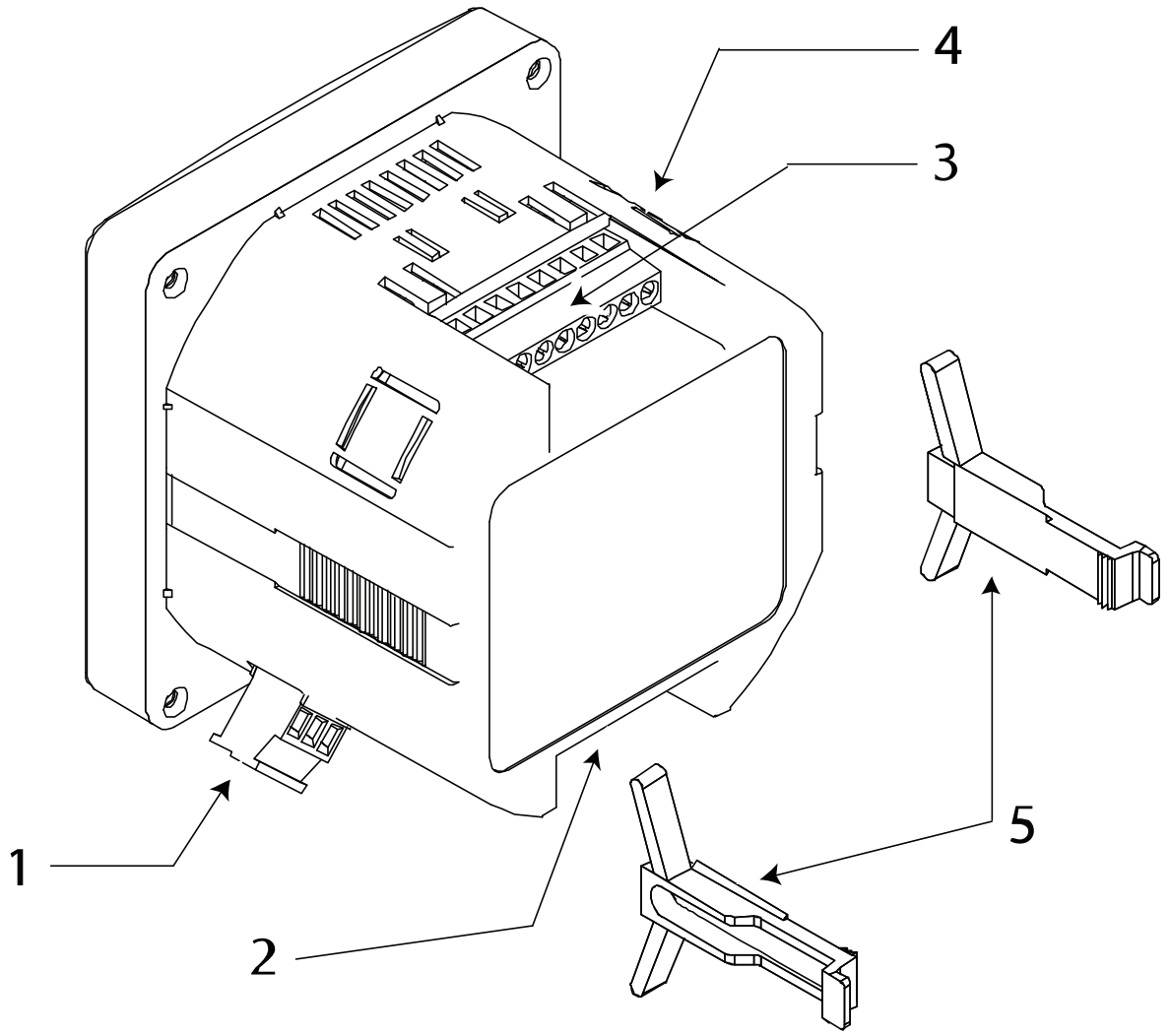


Table 1: Meter Parts

Number	Part	Description
1	Power supply connector	Connection to power the meter.
2	Voltage inputs	Voltage metering connections.
3	Current inputs	Current metering connections.
4	RS485 port (COM1)*	The RS485 port is used for communication with remote monitoring and control system.
5	Retainer clips	Used to hold power meter in place.

*- Applicable for DPM380 only

Model Information	
DPM380-415AD	Auxiliary 90~415VAC or 100~300VDC; with Modbus
DPM380B-415AD	Auxiliary 90~415VAC or 100~300VDC; without Modbus

2. Installation Guide

2.1. Mounting

Insert the power meter through a 91mmx91mm or 101.6mm radius hole as shown in figure 2 below:

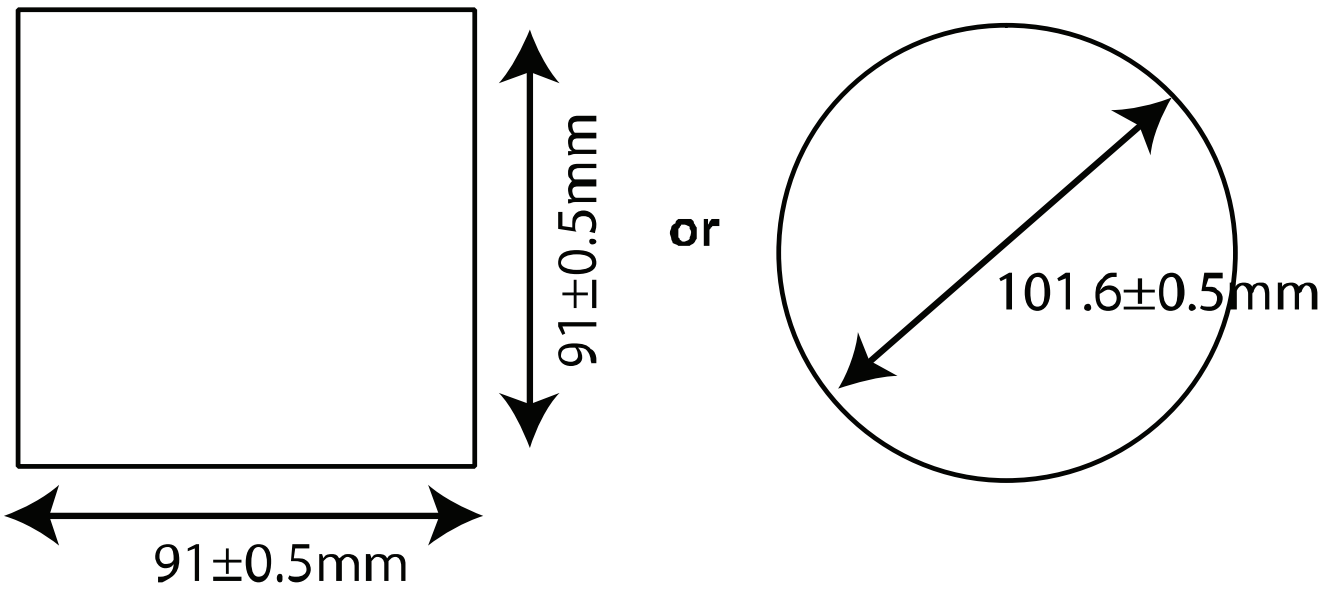


Figure 2: Recommended cut-out

Attach the two retainer clips to the power meter using the retainer slots at the rear side.

2.2. Wiring

Polarity marks must be followed as shown for CTs (S1 and S2).

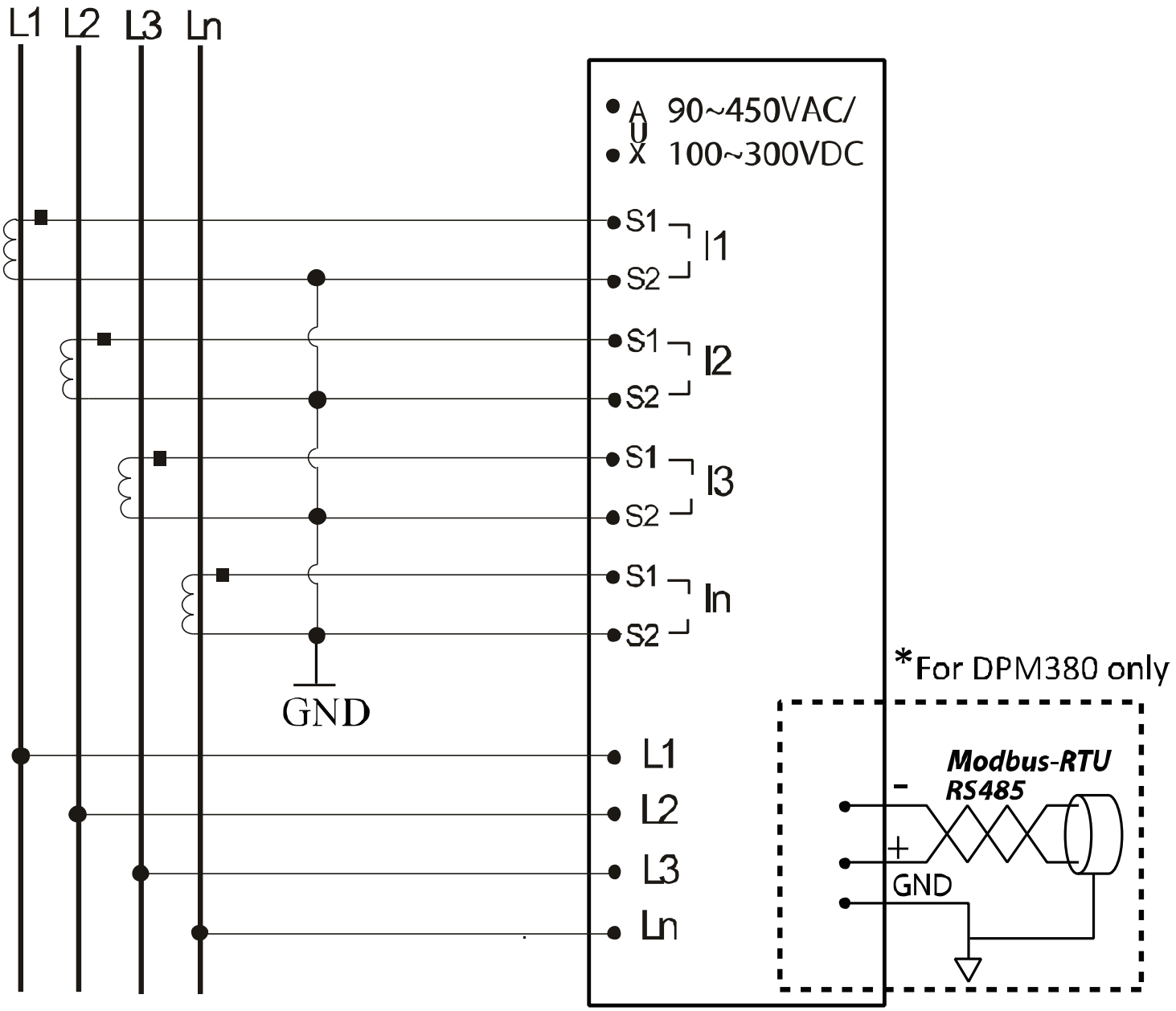


Figure 3: 3 Phase 4-Wire System with 4CTs connection

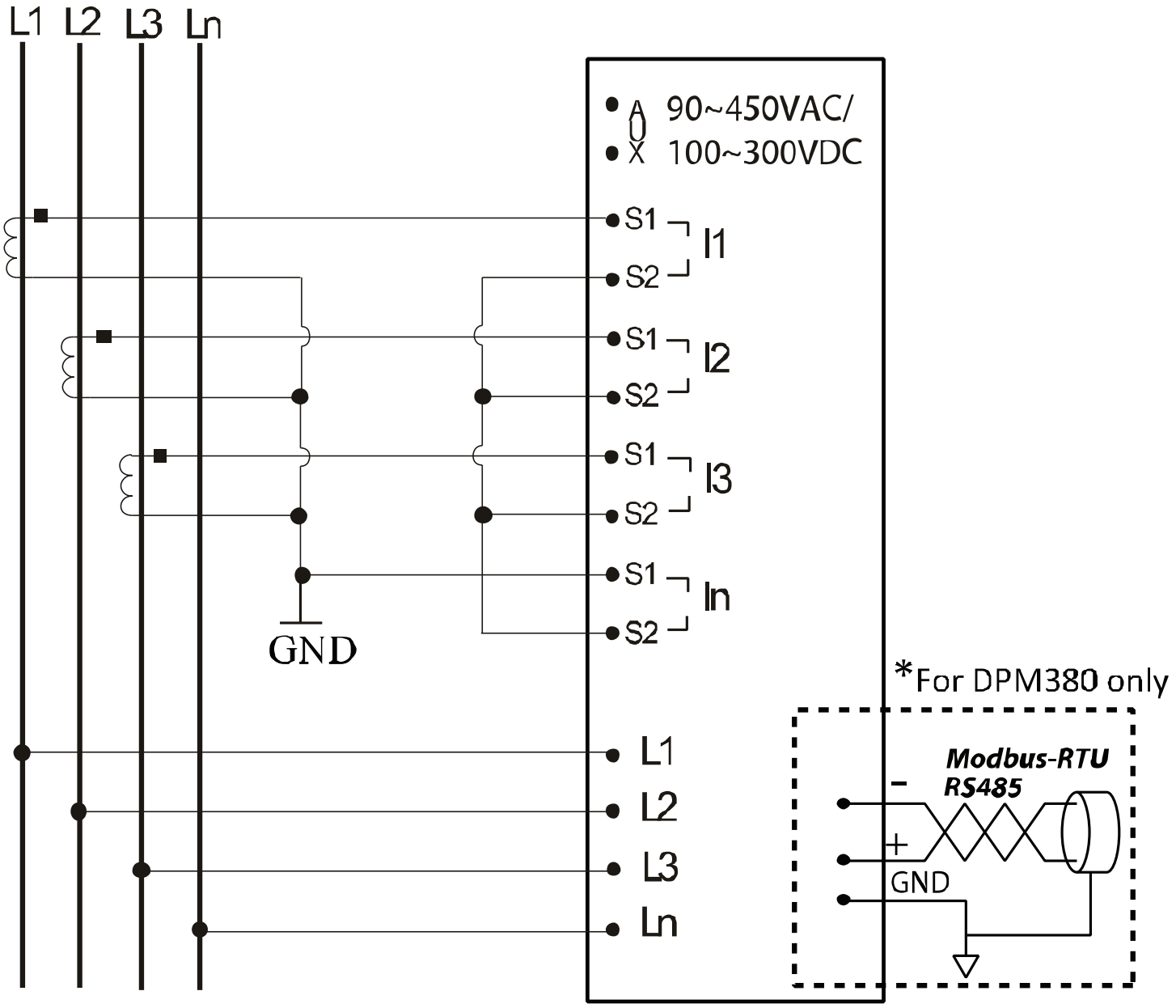
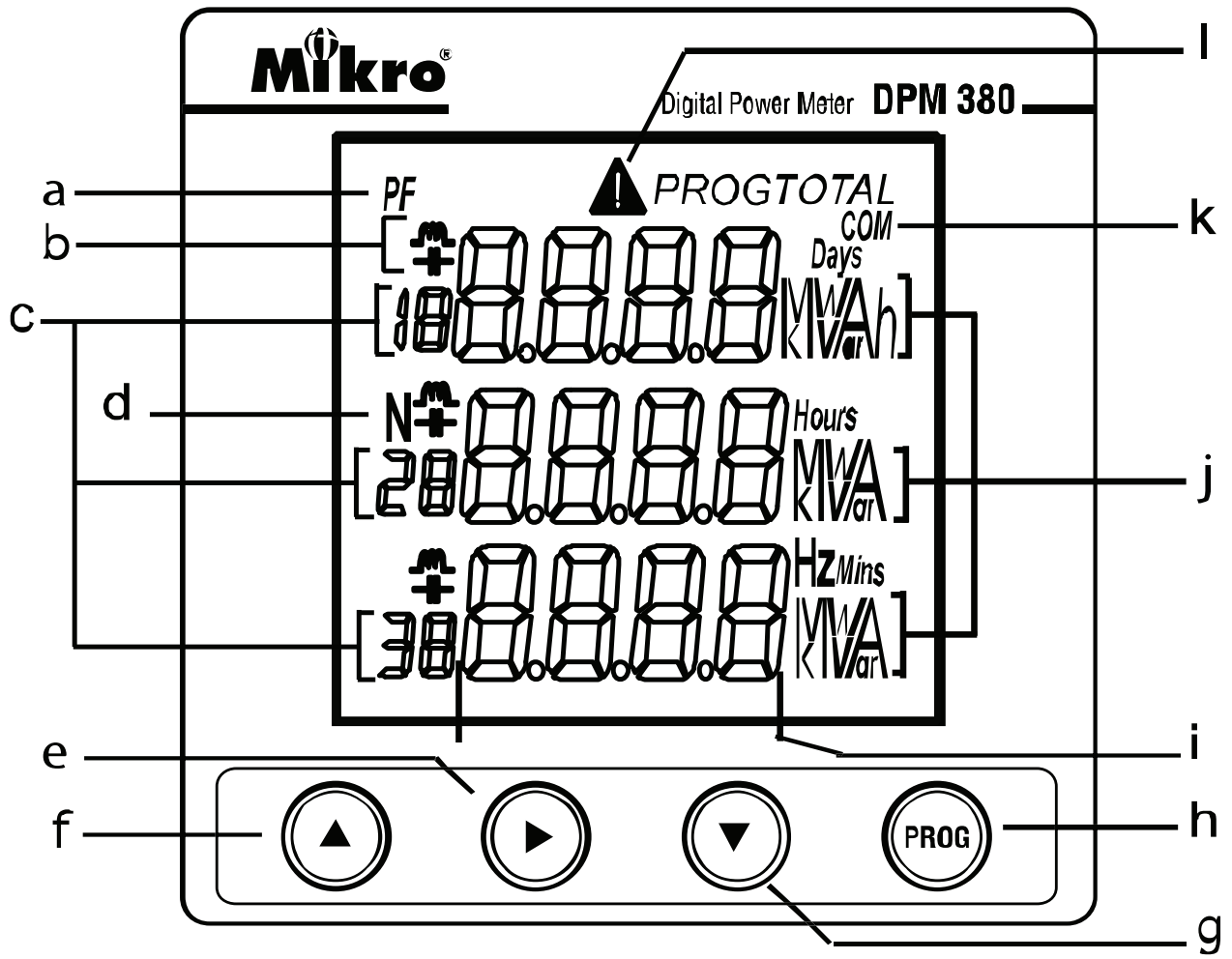


Figure 4: 3-Phase 4-Wire System with 3CTs connection

NOTE:

Neutral current measurement is based on the vector sum of 3 CTs.

3. Display and Buttons



a. Power Factor Indicator

b. Capacitive/Inductive Indicator

c. Phase Indicator

d. Neutral Line Indicator

e. 'NEXT' button

f. 'UP' button

g. 'DOWN' button

h. 'PROG' button

i. 4-digit display

j. Unit Indicator

k. RS485 Setting Indicator

l. Warning Sign Indicator

4. Function

Figure 5 below shows menu map for the power meter. It includes the setting and measurement display for the power meter. These menus can be accessed by pressing NEXT, UP, PROG & DOWN buttons.

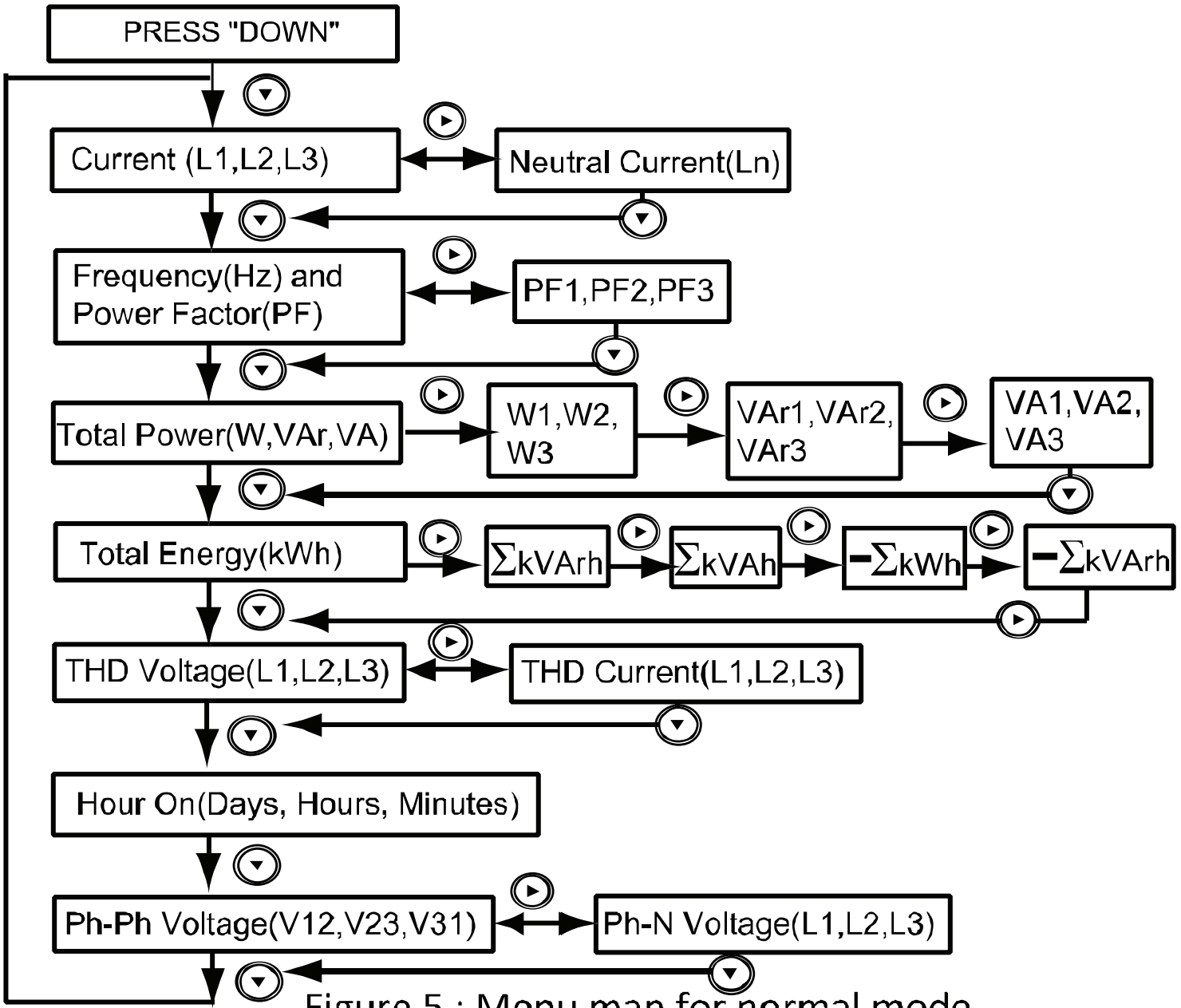
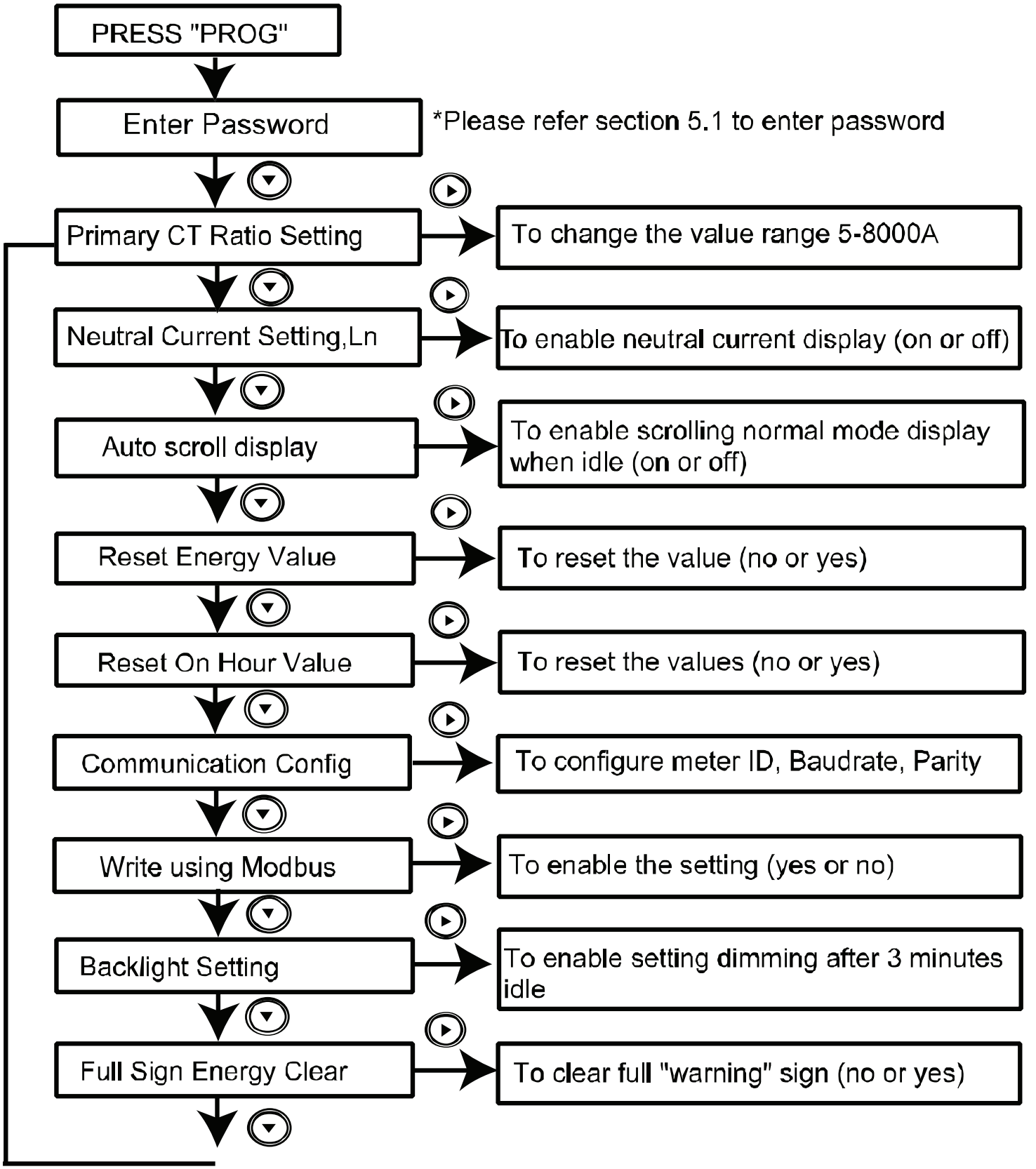


Figure 5 : Menu map for normal mode.

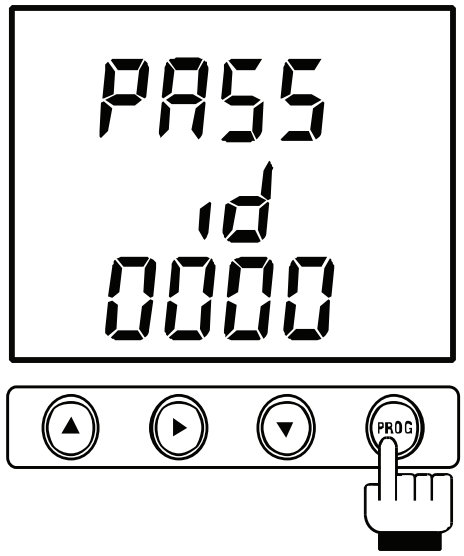
Figure 6 : Menu map for programming mode



5. Setting up

The power meter comes with factory default settings. These values may be changed by navigating to the appropriate screens and entering new values. Use the instructions in the following sections to change the values.

5.1.Access Programming Mode



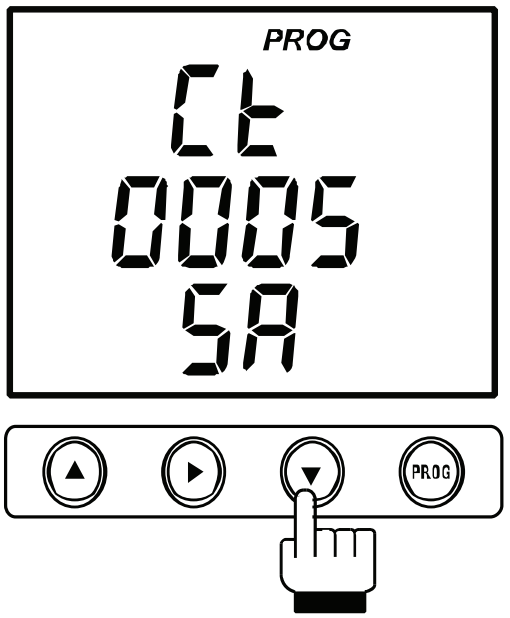
a. Press the PROG button to key in the password. The first number will blink.

b. Use the ▲ button to change display value and the ▶ button to shift to next number. The default setting is "1000".

c. Press the PROG button to confirm and enter programming mode. Setup CT ratio display will appear with the "PROG" symbol.

d. Press the PROG button to exit to display mode without changing any settings.

5.2. Setup CT Ratio



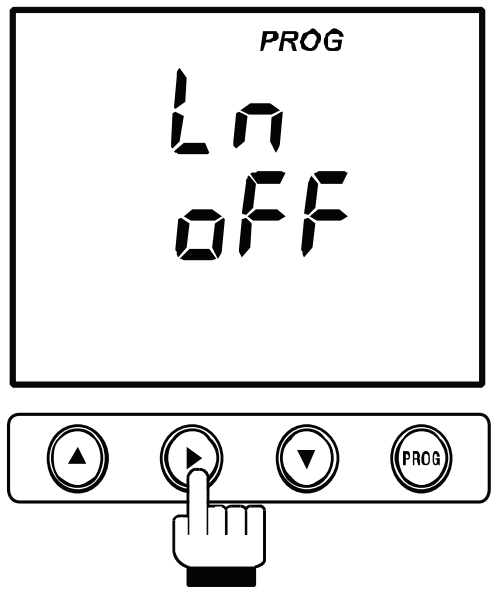
a. CT ratio setting is the first item display in programming mode.

b. To change setting, press the ▶ button. The "PROG" symbol will blink.

c. Use the ▲ button or the ▼ button to change the primary CT value.

d. Press the ▶ button to save the setting.

5.3. Enable Neutral Current



a. To enable, scroll in programming mode **until** "Ln" is displayed using the ▲ or the ▼ button.

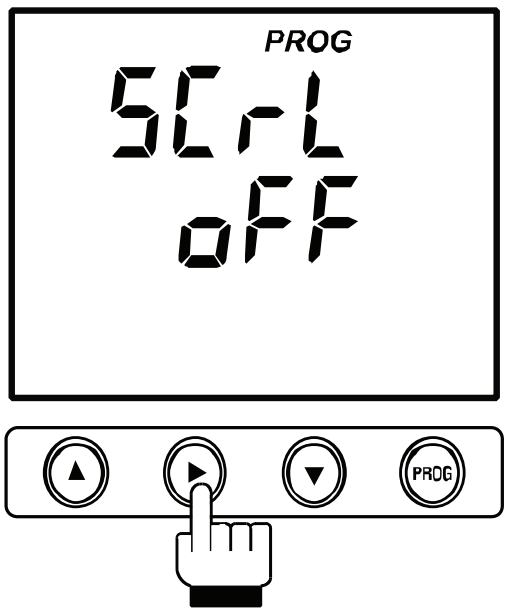
b. It allows the user to display neutral current if the neutral current input (In) is connected.

c. To enable, press the ▶ button. The "PROG" symbol will blink.

d. Press the ▲ button to change the symbol "YES" or "NO".

e. Once confirmed, press the ▶ button to save.

5.4. Enable Scroll Mode



a. In programming mode, scroll until the "SCrL" symbol is displayed using the ▲ or ▼ button.

b. This function enables automatic display scrolling at every 10 second interval time.

c. To enable, press the ▶ button. The "PROG" symbol will blink.

d. Use the ▲ or ▼ button to select the "ON" or "oFF" symbols.

e. Press the ▶ button to confirm.

NOTE: The scroll mode display flow is shown in figure 7.

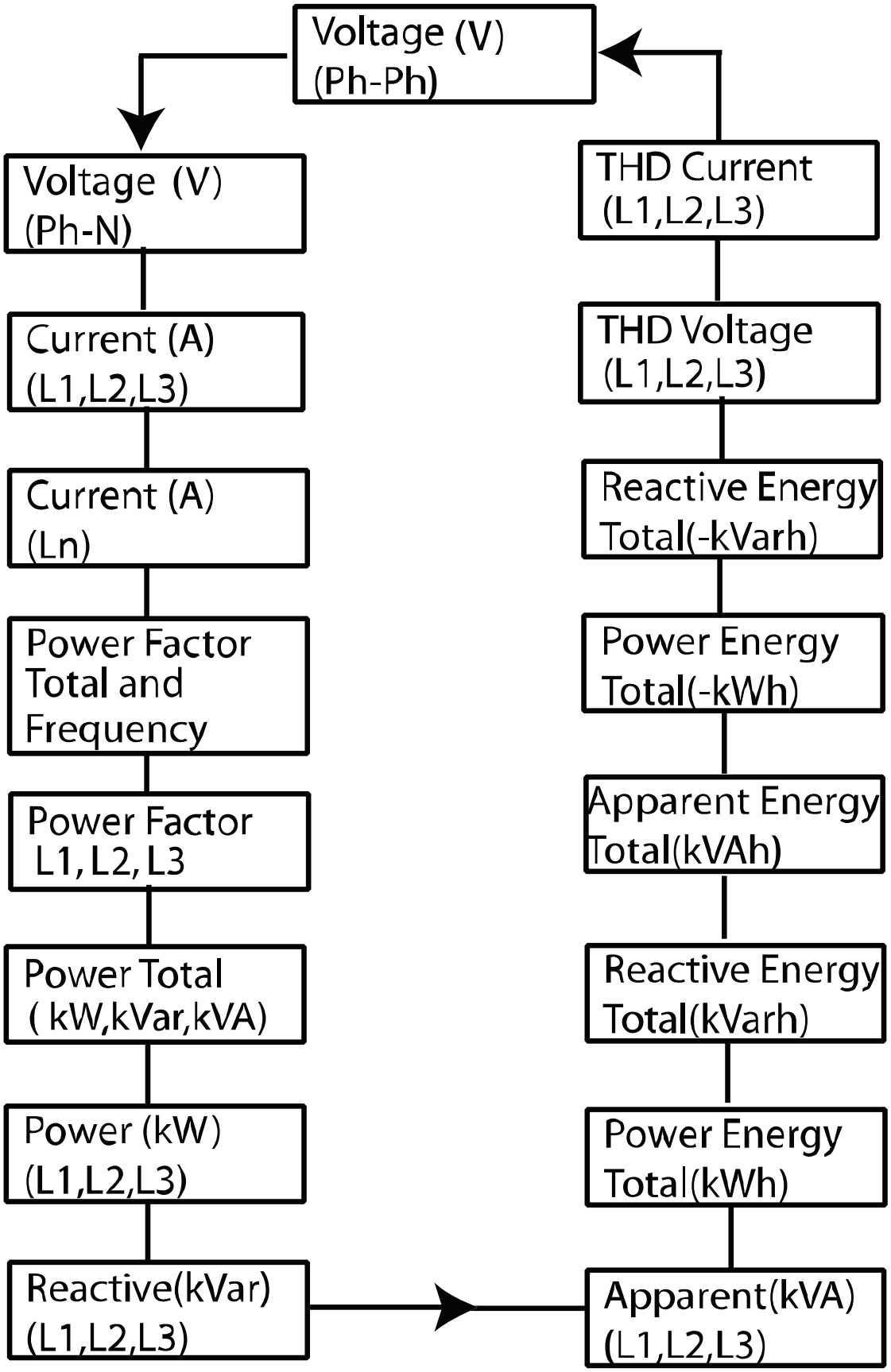
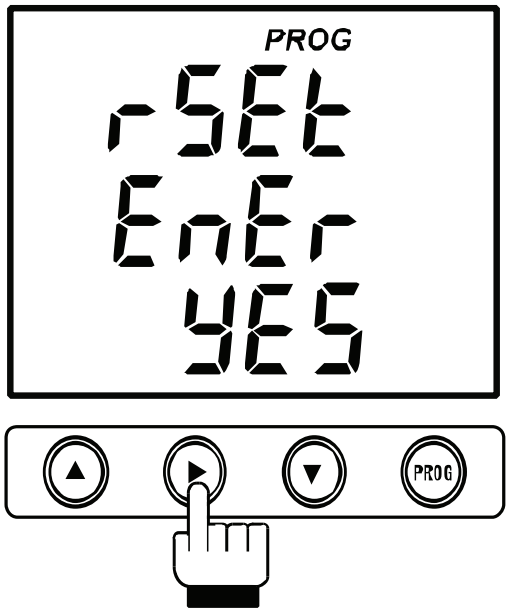


Figure 7: Automatic display scrolling

5.5. Reset All Energy



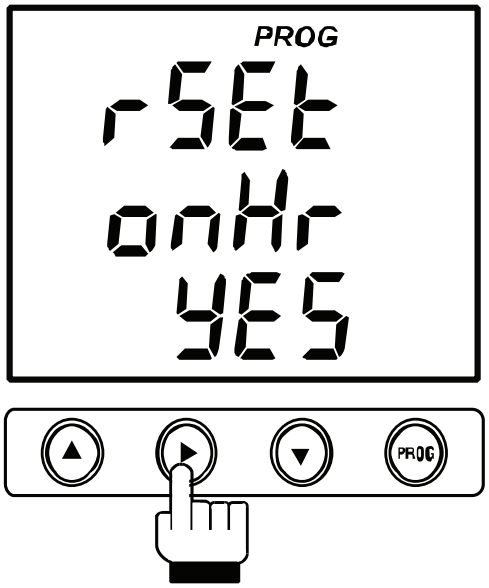
a. Use the ▼ or the ▲ button to scroll until the "rSET EnEr" symbol is displayed.

b. This function is to clear all energy register.

c. Press the ▶ button to reset. The "PROG" symbol will blink and the "YES" symbol will be displayed. Use the ▼ or ▲ button to select "YES" or "NO" symbols.

d. Press the ▶ button to clearing all energy register.

5.6. Reset On Hour

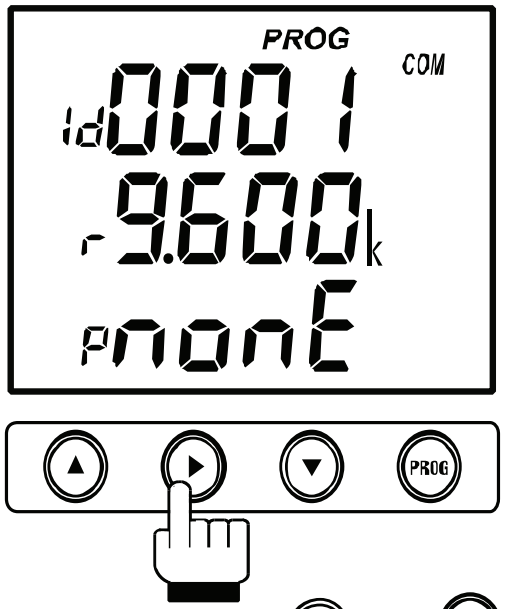


a. Press the ▼ or ▲ button until the "rSET onHr" symbol is displayed.

b. To clear the on-hour timer, press the ▶ button. The "PROG" symbol will blink and the "YES" symbol will be displayed. Use the ▼ or ▲ button to select the "YES" or "NO" symbols.

c. Press the ▶ button to confirm.

5.7. Setup Communication Configurations



a. Scroll using the ▼ or ▲ button until the "COM" symbol is displayed.

b. To change the device ID, press the ▶ button. The "PROG" and "id" symbols will blink.

c. Press the ▲ or ▼ button to change the device ID.

d. Next, press the ▶ button and the "r" and "PROG" symbols will blink. This allows the user to change the baudrates.

e. Use the ▲ or ▼ button to select the baudrates.

f. Next, press the ▶ button and the "P" and "PROG" symbols will blink. This allows the user to change the parity bit.

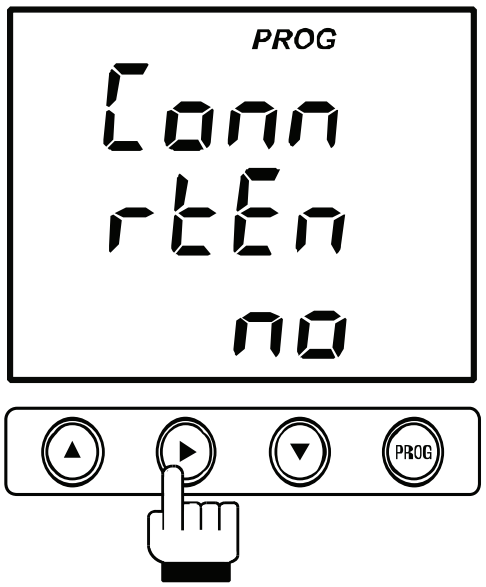
g. Use the ▲ or ▼ button to select the parity bit.

h. Press the ▶ button to save the settings and displayed will stop blinking.

NOTE:

Default value for the communication ID is 0001, baudrate is 38400 bps and parity set to none.

5.8. Communication Write Enable

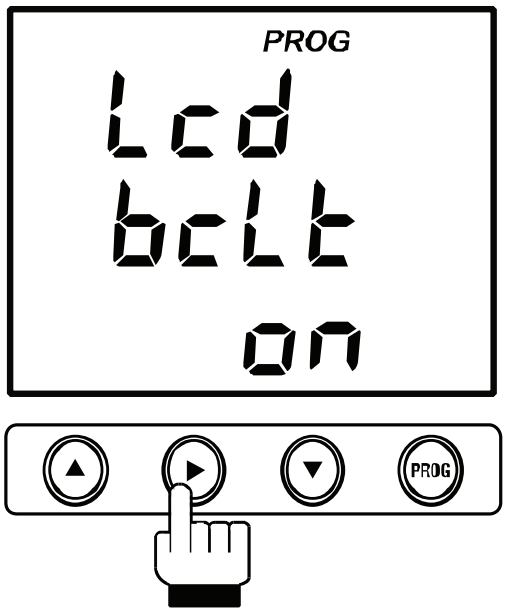


a. Press the ▼ or ▲ button until the "Conn rtEn" symbol is displayed.
b. To enable, press the ▶ button. The "PROG" symbol will blink.
c. To select the "YES" symbol press the ▼ or ▲ button.
d. Press the ▶ button to save.

NOTE:

To write/change the setting using modbus fuction code (0x06) , this setting needs to be enabled.

5.9. LCD Backlight Auto Off Setting



a. Use the ▼ or ▲ button until the "Lcd bcLt" symbol is displayed.

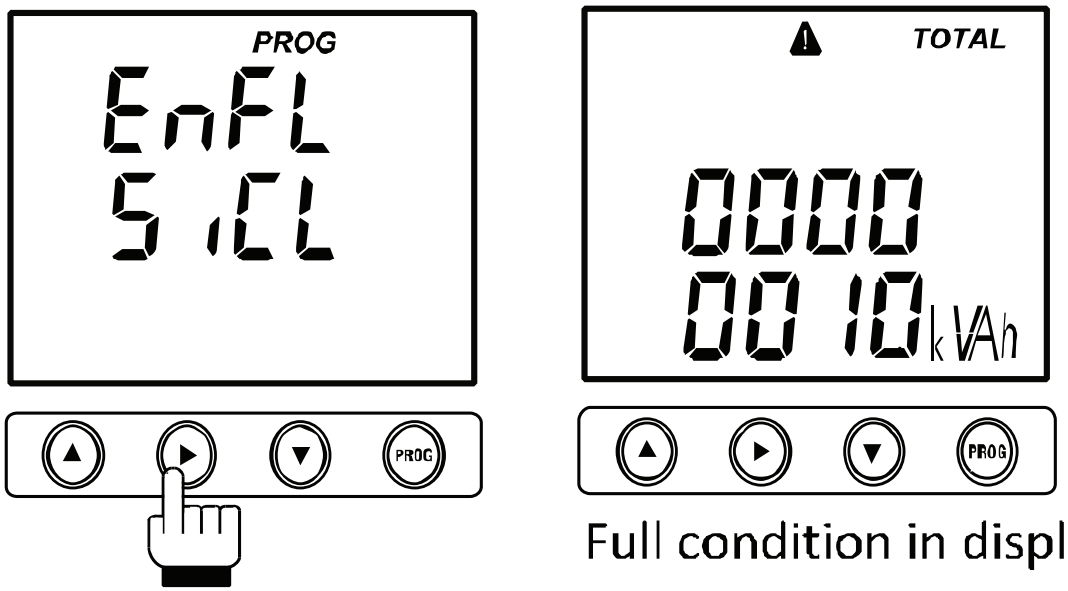
b. This is to allow the user to turn on the backlight permanently or turn off backlight automatically after 5 minutes idle.

c. To change the setting, press the ▶ button. The "PROG" symbol will blink.

d. Use the ▼ or ▲ button to select the symbols "ON" or "OFF".

e. Press the ▶ button to save.

5.10. Clear Full Energy Sign



Full condition in display mode

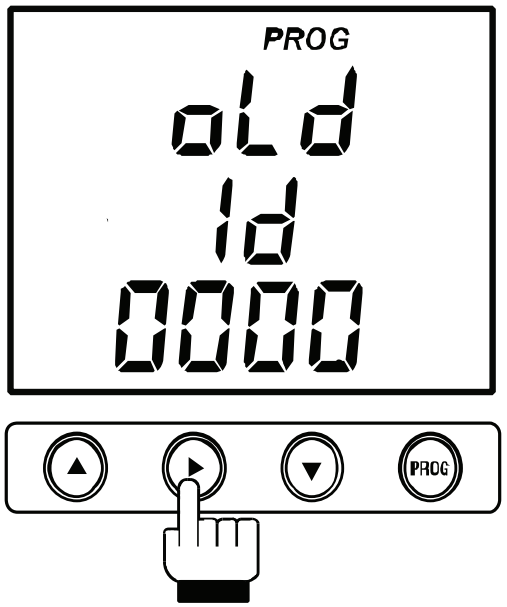
a. Use the ▼ or ▲ button to scroll the display until the "EnFL SiCL" symbol is displayed.

b. This function is to allow the user to turn off all the full (⚠) symbol . This will happen when an energy display reaches the maximum limit, 99999999 mega unit.

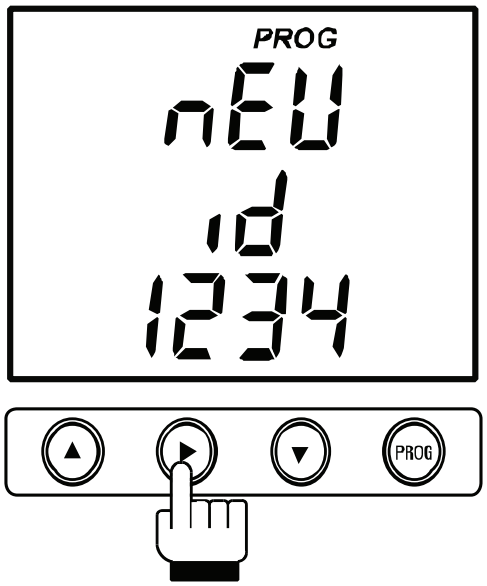
c. To turn of the symbol, press the ▶ button. The "PROG" symbol will blink and the "YES" symbol will be displayed.

d. Press this ▶ button to clear.

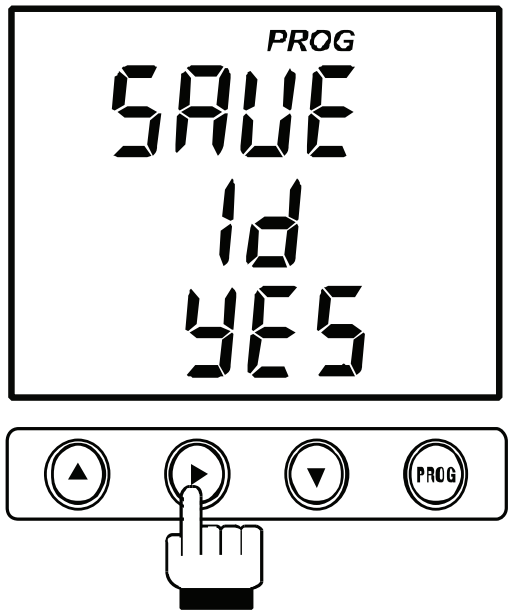
5.11. Setup the Passwords



a. Press the ▼ and PROG buttons simultaneously until the password ID request window is displayed. Key in the current password. Refer to section 5.1 on how to do this.



b. After pressing the PROG button, the new id window will be displayed. At this stage, the user needs to key in the new password. Use the ▼ button to change the digit value and the ▶ button to shift to next digit. Once confirmed, press the PROG button.



c. Next, the new password will be displayed. Use the ▼ or ▲ buttons to toggle the “YES” and “NO” symbols. Once confirmed, press the ▶ button and the meter will return to normal display mode.

6. Specifications

Electrical Characteristic	
System	3-phase 4-wire
Current	
Display	Three phase current & neutral(selectable)
CT Primary	5-8000A
CT Secondary	5A
Accuracy	0.5% (from 1A to 6A secondary)
Sustained overload	6A
Voltage measurement	
Line Voltage	35~520VAC
Phase Voltage	20~300VAC
Accuracy	0.50%
Power (kW,kVAR,kVA) measurement	
Display	each phase & total
Accuracy	1.00%

Power factor measurement	
Display	each phase & total
Accuracy	1.00%
Frequency measurement	
Range	45~65Hz
Accuracy	0.50%
Energy measurement	
Active	IEC62053-21:Class 1
Reactive	IEC62053-23:Class 2
Communication	
Hardware Interface	Isolated RS485
Protocol	Modbus-RTU
ID	1 to 127
Baudrate	2400, 4800, 9600, 19200, 38400
Parity	None, even, odd

Operating Condition	
Auxiliary Supply	90~450VAC or 100~300VDC
Operating Temperature	-10C~+55C
Storage Temperature	-20C~+70C
Data update rate	1 second
Operating time (on hour)	Up to 9999 days, 23 hours, 59 minutes.
Mechanical Characteristic	
Dimension	
Case	L96mmxW96mmxH83mm
Mounting type	Panel
LCD view area	55mmx48mm
Weight	400g
Electromagnetic Compatibility (EMC)	
Part 6-2: Generic Standards IEC61000-6-2	Immunity for industrial environments
Part 6-4: Generic Standards IEC61000-6-4	Emission standard for industrial environments

7. Register List

Read Only (Function 0x03 or 0x04)		
Register	**Description**	**Min unit**
4000-4001	reserved,always return 0	
4002-4003	Real energy	1kWh
4004-4005	reserved,always return 0	
4006-4007	Apparent energy	1kVAh
4008-4009	reserved,always return 0	
4010-4011	Reactive energy	1kVArh
4012	reserved,always return 0	
4013	Total real power	1kW
4014	reserved,always return 0	
4015	Total apparent power	1kVA
4016	reserved,always return 0	
4017	Total reactive power	1kVAR
4018	Total power factor	0.001
4019	Frequency	0.01
4020	reserved,always return 0	

Read Only (Function 0x03 or 0x04)		
4021	Instantaneous Current L1	0.001A
4022	reserved,always return 0	
4023	Instantaneous Current L2	0.001A
4024	reserved,always return 0	
4025	Instantaneous Current L3	0.001A
4026	reserved,always return 0	
4027	Instantaneous Current Ln	0.001A
4028	reserved,always return 0	
4029	Voltage Phase L12	0.1V
4030	reserved,always return 0	
4031	Voltage Phase L23	0.1V
4032	reserved,always return 0	
4033	Voltage Phase L31	0.1V
4034	reserved,always return 0	
4035	Voltage Phase L1	0.1V
4036	reserved,always return 0	
4037	Voltage Phase L2	0.1V
4038	reserved,always return 0	

Read Only (Function 0x03 or 0x04)		
4039	Voltage Phase L3	0.1V
4040	reserved,always return 0	
4041	Real Power L1	1kW
4042	reserved,always return 0	
4043	Real Power L2	1kW
4044	reserved,always return 0	
4045	Real Power L3	1kW
4046	reserved,always return 0	
4047	Apparent Power L1	1kVA
4048	reserved,always return 0	
4049	Apparent Power L2	1kVA
4050	reserved,always return 0	
4051	Apparent Power L3	1kVA
4052	reserved,always return 0	
4053	Reactive Power L1	1kVAR
4054	reserved,always return 0	
4055	Reactive Power L2	1kVAR
4056	reserved,always return 0	

Read Only (Function 0x03 or 0x04)		
4057	Reactive Power L3	1kVAR
4058-4081	reserved,always return 0	
4082	THD Current L1	0.10%
4083	THD Current L2	0.10%
4084	THD Current L3	0.10%
4085	THD Voltage L1	0.10%
4086	THD Voltage L2	0.10%
4087	THD Voltage L3	0.10%
4088	Scale real energy	0=1 1=10 2=100 3=1000
4089	Scale apparent energy	0=1 1=10 2=100 3=1000
4090	Scale reactive energy	0=1 1=10 2=100 3=1000

Read Only (Function 0x03 or 0x04)		
4091	Scale total real power	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4092	Scale total apparent power	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4093	Scale total reactive power	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4094-4096	reserved,always return 0	
4097	Scale Instantaneous Current L1	0=0.001 1=0.01 2=0.1 3=1
4098	Scale Instantaneous Current L2	0=0.001 1=0.01 2=0.1 3=1

Read Only (Function 0x03 or 0x04)		
4099	Scale Instantaneous Current L3	0=0.001 1=0.01 2=0.1 3=1
4100	Scale Instantaneous Current Ln	0=0.001 1=0.01 2=0.1 3=1
4101	Scale Real Power L1	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4102	Scale Real Power L2	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4103	Scale Real Power L3	0=0.0001 1=0.001 2=0.01 3=0.1 4=1

Read Only (Function 0x03 or 0x04)		
4104	Scale Apparent Power L1	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4105	Scale Apparent Power L2	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4106	Scale Apparent Power L3	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4107	Scale Reactive Power L1	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
4108	Scale Reactive Power L2	0=0.0001 1=0.001 2=0.01 3=0.1 4=1

Read Only (Function 0x03 or 0x04)		
4109	Scale Reactive Power L3	0=0.0001 1=0.001 2=0.01 3=0.1 4=1
1000	device ID*	1-127
1001	Parity*	1=none 2=even 3=odd
1002	Baudrate*	1=2400 2=4800 3=9600 4=19200 5=38400
0-1	reserved	
2	DeviceType_Hi	'30'
3	DeviceType_Lo	'1'
4	Version_Hi	'0'
5	Version_Lo	'1'

*-Applicable for DPM380 only

Read or write (Function 0x03,0x04 or 0x06)		
Register	**Description**	**Range**
100-101	reserved,always return 0	
102	CT ratio primary	5-8000A
103-108	reserved,always return 0	
109	System scroll	0 or 1
110	Neutral setting	0 or 1
111	Minutes	0-59
112	Hours	0-23
113	Days	0-9999

NOTE:

Register list is based on firmware version 1.0

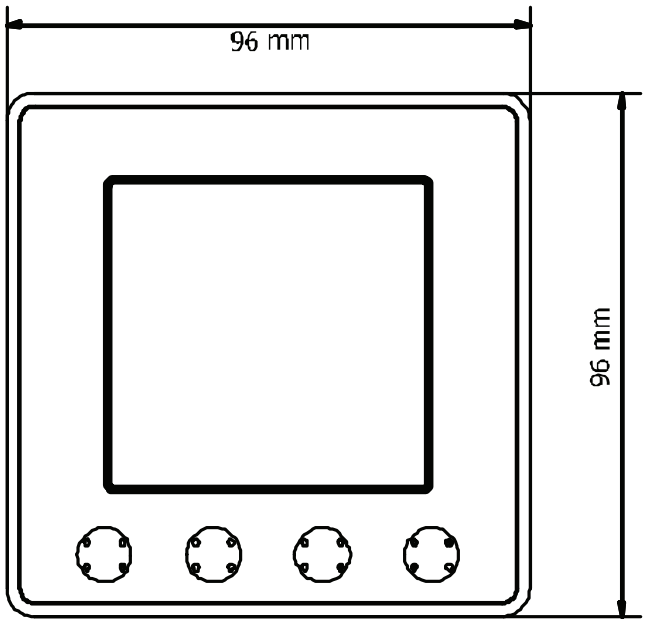
8. Maintenance and Troubleshooting

The power meter does not contain any user-serviceable parts. If the power meter requires service, please contact your local sales representative. Do not open the power meter. Opening the power meter voids the warranty.

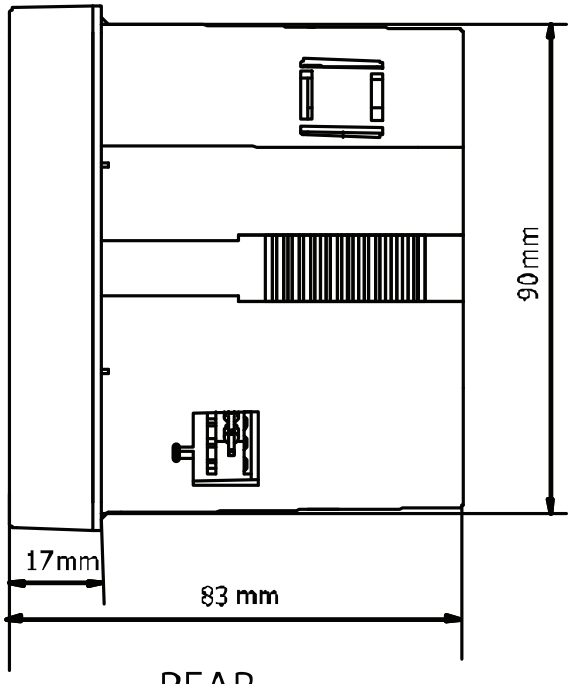
NOTE:

We reserve the right to alter or modify the information contained herein at any time in line with our product development without prior notification. We also reserve the right to discontinue production & delivery of product.

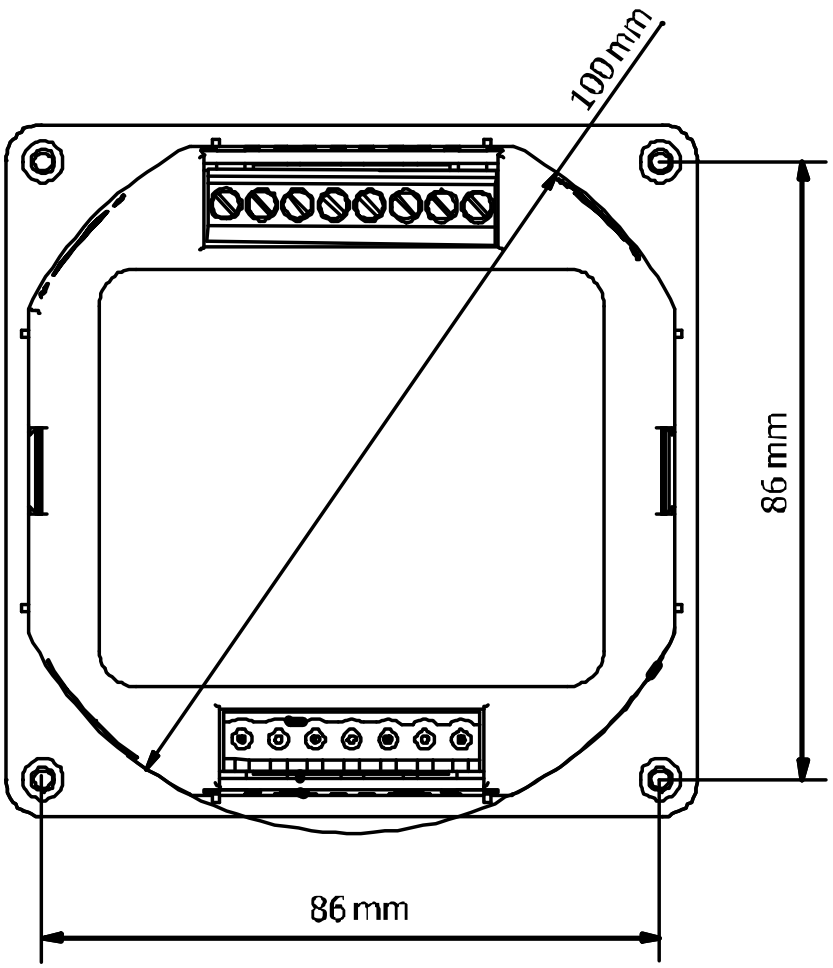
9. Meter Dimension



FRONT



REAR



BACK

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