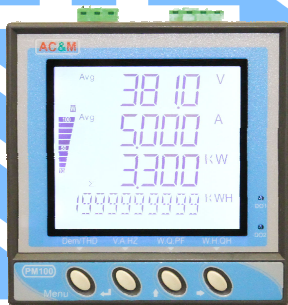


AC&M

Auto Control & Measurement

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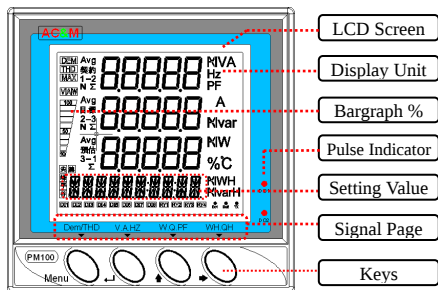


PM100 MANUAL

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1. DISPLAY SCREEN



FEATURES:

- ◆ LCD display screen with backlight.
- ◆ Programmable brightness for backlight
- ◆ Suitable: 1P2W、1P3W、3P3W、3P4W
- ◆ Programmable for PT、CT ratio
- ◆ Measures $\pm$ WH and $\pm$ VARH (10-digit display).
- ◆ Output: 4 Sets 4-20mA、4 Alarm、2 Pulse
- ◆ RS485、RS232、Ethernet
- ◆ Password-protection for unauthorized setting
- ◆ Memory for 10 years

Display Unit:

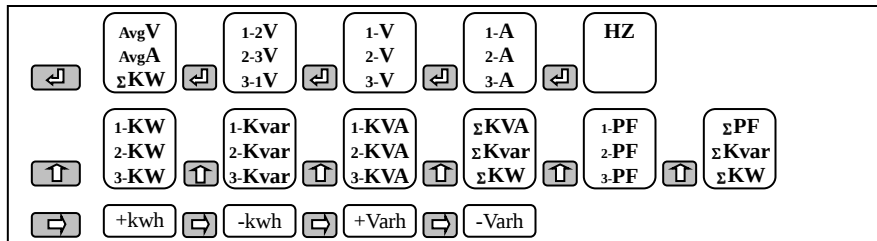
Voltage : V/KV ; Current : A ; Watt/Watthour : KW/MW - KWH/MWH ; Var/Varh : KVar/Mvar-KvarH/MvarH ; Frequency : HZ

2. KEYS & FUNCTIONS

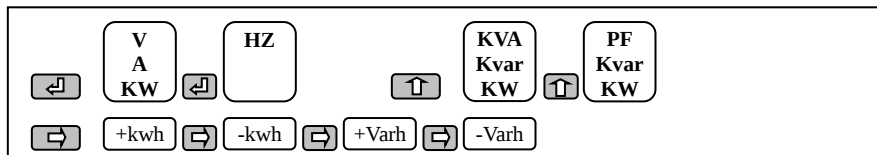
KEYS	FUNCTION	INSTRUCTION
Menu	Menu / Turn page	Turn page for DEMAND and HARMONIC.
	Confirm (Enter) / Turn page	Turn page for V-A-HZ
↶	Change number / Turn page	Turn page for VA-W-VAR-PF
↷	Change position / Turn page	Turn page for WH-VarH
↻		

3. PAGE-TURNING

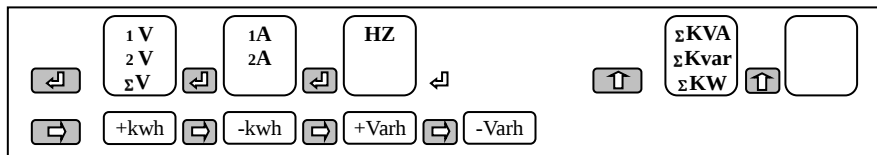
3.1 3PHASE 4WIRE SYSTEM



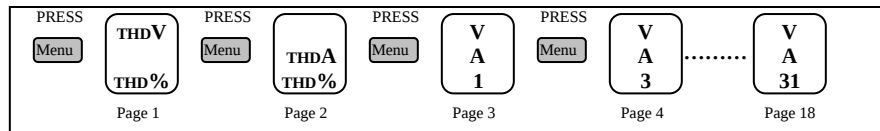
3.2 1PHASE 2WIRE SYSTEM



3.3 1PHASE 3WIRE SYSTEM



3.4 HARMONICS FUNCTION DISPLAY



4. PARAMETER SETTING

4.1 BASIC SETTING

PRESS **Menu**

DISPLAY **Enter**

MENU

DISPLAY

PHASE **3P4W** **Enter**

PT **00001** **Enter**

V- UNIT **V** **Enter**

V-DOT **8888.8** **Enter**

CT **00001** **Enter**

A-DOT **88.888** **Enter**

W-UNIT **KW** **Enter**

W-DOT **88.888** **Enter**

RS-485 **Enter**

PULSE **Enter**

4-20 **Enter**

RELAY **Enter**

FAC CODE **Enter**

QUIT **Enter**

BAUD **9600**

DO1

CH1

CH1

FUN **00**

SAVE **NO** **Enter**

YES **PIN** **0000**

NO **Leave without saving**

Keys and functions

Press → to select 1P2W-1-3W-3P3W-3P4W

Press ↑ and → to set

Press → to select V/KV

Press → to set.

Press ↑ and → to set

Press → to set.

Press → to select KW/MW

Press → to set

Please refer page 13 for the setting.

Please refer page 7 for the setting.

Please refer page 9 for the setting.

Please refer page 11 for the setting.

Advance setting (Factory setting)

Press → to select NO-YES to confirm saving.

Press ↑ and → to key in 0088. Press Enter to save.

(PS : Preset password 0088, refer to page 5 for password change)

4.2 PT & CT RATIO SETTING

PT setting range: 0~6000.0

EX : 22KV/110V PT=22000÷110=200

161KV/110V PT=161000÷110=1463.6

380V/110V PT=380÷110=3.4545

Direct input 55~600 V ,no external PT

SET PT RATIO AS 0200.0

SET PT RATIO AS 1463.6

SET PT RATIO AS 0003.4

SET PT RATIO AS 0001.0

CT setting range: 0~ 60000

EX : 1000/5A CT=1000÷5=200

SET CT RATIO AS 00200

4.3 SETTING EXAMPLE

EX1. 3P3W PT : 22KV / 110V CT : 1000A / 5A W=22000x 1000x1.732= 38.10MW

PT ratio=200 CT ratio=200

Meter display : 22.00KV 1000A 38.10MW

PARAMETER SETTING:

Enter **DISPLAY** ,press **Enter** to enter below setting:

PHASE	3P3W	CT	Set CT=200
PT	Set PT =200	A-DOT	No digit for A
V-UNIT	Set unit as KV	W-UNIT	Set unit as MW
V-DOT	2 digit after decimal point for V	W-DOT	2 digit after decimal point for W

EX2. 3P4W 380/220V CT : 600A/5A W=220 x 600 x 3 = 396.0KW

PT ratio=1 CT ratio=120

Meter display : 380.0V 600.0A 396.0KW

PARAMETER SETTING:

Enter **DISPLAY**, press **Enter** to enter below setting:

PHASE	3P4W	CT	Set CT=120
PT	Set PT=1	A-DOT	1 digit after decimal point for A
V-UNIT	Set unit as V	W-UNIT	Set unit as KW
V-DOT	1 digit after decimal point for V	W-DOT	1 digit after decimal point for W

4.4 CHANGE PASSWORD

Enter **FUN COD**, press **Enter** to enter **FUN 87**

FUN COD

ENTER

DISPLAY

FUN 87

ENTER

OLD 0000

ENTER

NEW 0000

ENTER

NEW 0000

ENTER

SAVE NO

ENTER

MENU



QUIT

ENTER

Keys and functions

Press **↑** and **→** to enter **87**

Press **↑** and **→** to key in old password

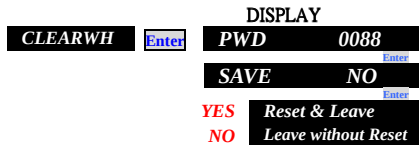
Press **↑** and **→** to key in new password

Press **↑** and **→** to key in new password again

Press **→** to select **NO-YES** to confirm saving

4.5 ACCUMULATED VALUE RESET

Press  for 1 second to enter **CLEAR WH**



Keys and functions

Press  and  to key in password

Press  to select **NO-YES** to confirm saving

Press  and  to key in 0088. Press Enter to save.

(PS : Preset password 0088, refer to page 5 for password change)

4.6 LCD BACKLIGHT SETTING

Press  for 1 second to enter **LCD ON 5**



Keys and functions

Press  to select 0-9 (Dark to Bright)

Press  to select ON/OFF

PS : ON=Energy saving mode on (LCD light will out after 2 minutes)

OFF= Energy saving mode off (LCD light is always lit)

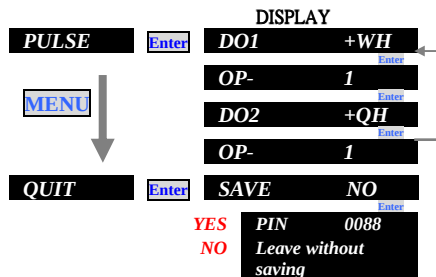
5. PULSE OUTPUT (Optional)

5.1 FUNCTION

1. 2 outputs
2. Set for (+WH、-WH、+VarH、-VarH)
3. Programmable for (100/10/1/0.1/0.01)Pulse / Count

5.2 SETTING

Enter **PULSE** ,press **Enter** to enter setting mode.



Keys and functions

Press→ to select +WH 、-WH 、+VarH 、-VarH

Press→ to select pulse output 100/10/1/0.1/0.01

Press→ to select +WH 、-WH 、+VarH 、-VarH

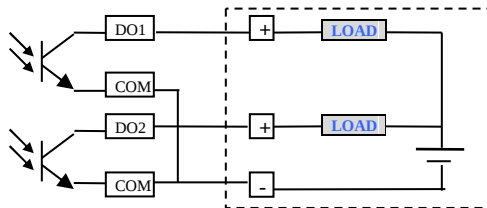
Press→ to select pulse output 100/10/1/0.1/0.01

Press→ to select NO-YES to confirm saving

Press ↑ and → to key in 0088. Press Enter to save.

(PS : Preset password 0088, refer to page 5 for password change)

5.3 CONNECTION



6. DC 4-20 mA OUTPUT (Optional)

6.1 FUNCTION

1. 4 sets of DC 4-20mA
2. Output $>300\Omega$ at 20mA
3. Set for 10 signals

6.2 OUTPUT CORRESPONDING SIGNALS

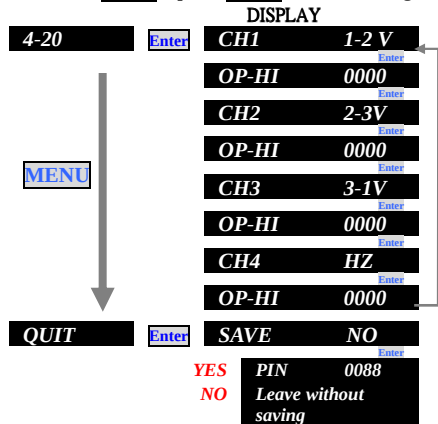
SIGNALS	SETTING RANGE	SIGNALS	SETTING RANGE
1-2V	9999	ΣW	9999
2-3V	9999	ΣQ	-9999~9999(4-12-20)
3-1V	9999	PF	-0.5~1~+0.5(4-12-20)
1A	9999	HZ	50 $\pm$ 5HZ ; 60 $\pm$ 5HZ
2A	9999		EX : 45-55HZ (4-20) 55-65HZ (4-20)
3A	9999		

6.3 CONNECTION DIAGRAM

21 O/P1	22 O/P2	23 O/P3	24 O/P4	25 COM
------------	------------	------------	------------	-----------

6.4 SETTING

Enter **4-20** , press **Enter** to enter setting mode.



Keys and functions

Press → to select V-A-W-Q-PF-HZ...10 SIGNALS

Press ↑ and → to set Max. corresponding value for output

Press → to select V-A-W-Q-PF-HZ...10 SIGNALS

Press ↑ and → to set Max. corresponding value for output

Press → to select V-A-W-Q-PF-HZ...10 SIGNALS

Press ↑ and → to set Max. corresponding value for output

Press → to select V-A-W-Q-PF-HZ...10 SIGNALS

Press ↑ and → to set Max. corresponding value for output

Press → to select NO-YES to confirm saving

Press ↑ and → to key in 0088. Press Enter to save.

(PS : Preset password 0088, refer to page 5 for password change)

Example1 : HZ : 50HZ±5HZ Set OP-HI as 05-05 ; 4~12~20mA will correspond to 45~50~50HZ

Example2 : HZ : 60HZ±3HZ Set OP-HI as 06-03 ; 4~12~20mA will correspond to 57~60~63HZ

Example3 : PF: 1.000±0.5 Set OP-HI as 0.500; 4~12~20mA will correspond to -0.500-1.000-0.500

Example4 : Total VAR: ±9999 Set OP-HI as 9999; 4~12~20mA corresponds to -9999-0-9999 VAR

7. ALARM SETTING (Optional)

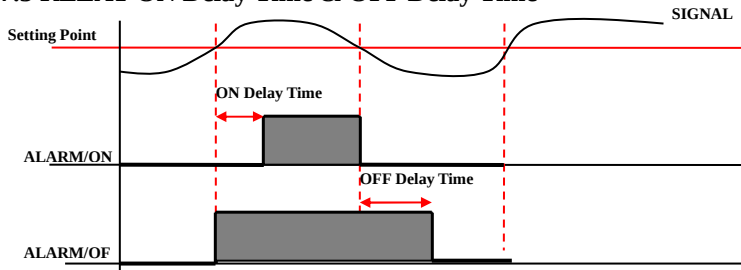
7.1 FUNCTION

- 1.4 relays output
2. Programmable for ON /OFF and Delay Time 0-999 Sec
3. Set for 10 signals

7.2 OUTPUT CORRESPONDING SIGNALS

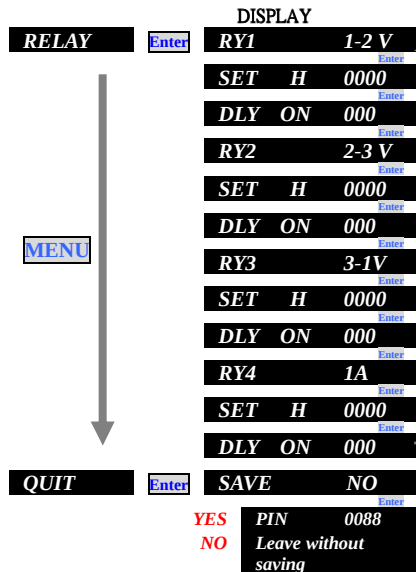
SIGNALS	SETTING RANGE	SIGNALS	SETTING RANGE	SIGNALS	SETTING RANGE
1-2V	9999	3A	9999	*Present Demand	9999
2-3V	9999	ΣW	9999	*Max. Demand on record	9999
3-1V	9999	ΣQ	9999	*Forecast *Demand	9999
1A	9999	PF	-0.5~1~+0.5(4-12-20)		50 $\pm$ 5HZ ; 60 $\pm$ 5HZ
2A	9999	HZ	50 $\pm$ 5HZ ; 60 $\pm$ 5HZ	*For DEMAND function.	

7.3 RELAY ON Delay Time & OFF Delay Time



7.4 SETTING

Enter **RELAY**, press **Enter** to enter setting mode.



Keys and functions

Press → to select V-A-W-Q-PF-HZ ...10 signals

Press ↑ and → to set setting point and HI or LO ALARM

Press ↑ and → to set delay time and ON / OFF DELAY TIME

Press → to select V-A-W-Q-PF-HZ ...10 signals

Press ↑ and → to set setting point and HI or LO ALARM

Press ↑ and → to set delay time and ON / OFF DELAY TIME

Press → to select V-A-W-Q-PF-HZ ...10 signals

Press ↑ and → to set setting point and HI or LO ALARM

Press ↑ and → to set delay time and ON / OFF DELAY TIME

Press → to select V-A-W-Q-PF-HZ ...10 signals

Press ↑ and → to set setting point and HI or LO ALARM

Press ↑ and → to set delay time and ON / OFF DELAY TIME

Press → to select NO-YES to confirm saving

Press ↑ and → to key in 0088. Press Enter to save.

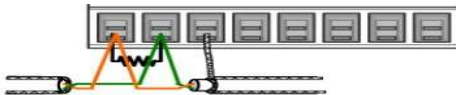
(PS : Preset password 0088, refer to page 5 for password change)

8. COMMUNICATION

8.1 FUNCTION

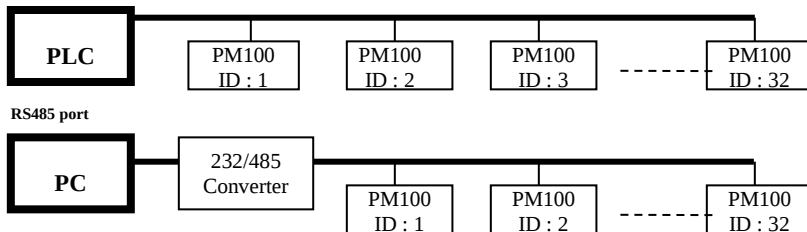
- 1.Mode : RS-485 MODBUS RTU (Half-Duplex) and RS 232
- 2.Baudrate : Programmable for (2400-4800-9600-19200-38400)
- 3.Parity Check : (NONE-ODD-EVEN)
- 4.Address : 1-255
- 5.Start Bit : 1 or 2
6. Data Bit : 8

8.2 COMMUNICATION WIRING



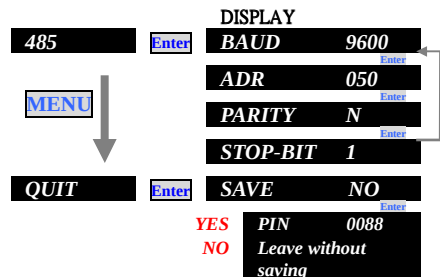
Terminator:

In RS-485 circuit , there can only be 1 meter installed terminator. It's installed in the last meter of the circuit. Terminator :120~150ohm



8.3 SETTING

Enter **485** , Press **Enter** to enter setting mode.



Keys and functions

Press → to select baudrate: 2400-4800-9600-19200-38400

Press ↑ and → to set address: 1-255

Press → to select NONE-ODD-EVEN

Press ↑ to select 1 or 2

Press → to select NO-YES to confirm saving

Press ↑ and → to key in 0088. Press Enter to save.

(PS : Preset password 0088, refer to page 5 for password change)

8.4 COMMUNICATION PROTOCOL

MODBUS - RTU MODE

DATA FORMAT

(ID Number)	(Function Code)	(Data)	CRC
1Byte	1Byte	N Byte	2 Byte

ID Number : The address of the meter (1-255)

Function Code : Order code

Data

CRC : Error check 16Bit CRC

FUNCTION CODE

03 (03H)	Read parameters of meter
06 (06H)	Set parameter

8.5 EXAMPLE

1. Read R phase voltage Master call ID number 1 meter to read address 0001 , Data Number: 0001

Master sends message TX : 01 03 <u>00 01</u> <u>00 01</u> <u>D5 CA</u> (Total :8 Byte)				
(ID Number) 1Byte (03H)	Function Code 1Byte (03H)	Address 2Byte (00 01H)	Data Number 2Byte (00 01H)	CRC 2Byte (D5 CA)

Meter displays 1000

Meter responses to Master RX : 01 03 <u>00 02</u> <u>03 E8</u> <u>B8 FA</u>				
(ID Number) (01H)	Function Code (03H)	Data Byte (02H)	Data (03E8H)	CRC (B8FAH)

2. Read parameters of the meter

Master sends message to Meter (Total :8 bytes)				
(ID Number) 1Byte (01H)	Function Code 1Byte (03H)	Address 2Byte (00 02H)	Data Number 2Byte (xx,xxH = N)	CRC 2Byte (xx xxH)

Meter responses to Master				
(ID Number) (01H)	Function Code (03H)	Data Byte (XXH = N)	Data (N*2Byte) xxH,xxH.xxH.....	CRC (xx xxH)

3. CT ratio setting, set CT ratio as 100 (Function Code: 06H ; CT ratio setting address: 40027)

Master sends message to Meter				
(ID Number) 1Byte (01H)	Function Code 1Byte (06H)	Address 2Byte (1AH)	Data Number 2Byte (0064H)	CRC 2Byte (A9 E6H)

8.6 Parameter/Address Cross-reference

Address		Name	Length (Byte)	Form	Range	Function Code	Note	
Dec	Hex							
00	0000H							
01	0001H	1-2V	2Byte	Unsigned Int	0-9999	03H	Read decimal point 0016H Read unit 0017H (NOTE.1)	
02	0002H	2-3V	2Byte	Unsigned Int	0-9999	03H		
03	0003H	3-1V	2Byte	Unsigned Int	0-9999	03H		
04	0004H	1A	2Byte	Unsigned Int	0-9999	03H	Read decimal point 0016H No read unit (NOTE.2)	
05	0005H	2A	2Byte	Unsigned Int	0-9999	03H		
06	0006H	3A	2Byte	Unsigned Int	0-9999	03H		
07	0007H	1W	2Byte	Signed Int	±9999	03H	Read decimal point 0016H W/Q/VA/WH/ QH Same decimal point Read unit 0017H(NOTE.3)	
08	0008H	2W	2Byte	Signed Int	±9999	03H		
09	0009H	3W	2Byte	Signed Int	±9999	03H		
10	000AH	Σ W	2Byte	Signed Int	±9999	03H		
11	000BH	Σ Q	2Byte	Signed Int	±9999	03H		
12	000CH	PF	2Byte	Signed Int	-500~999~500	03H	3 ditit after decimal point (NOTE.4)	
13	000DH	HZ	2Byte	Unsigned Int	0-9999	03H	2 ditit after decimal point (NOTE.5)	
14	000EH	WH (Receive)(LO word)	4Byte	Unsigned Long	0~ 1999999999	03H	Long integral HI_Word and LO_Word Read decimal point 0016H PS : W/Q/VA/WH/AH Same decimal point	
15	000FH	WH (Receive)(HI word)						
16	0010H	WH (Send)(LO word)	4Byte	Unsigned Long	0~ 1999999999	03H		
17	0011H	WH (Send)(HI word)						
18	0012H	VarH(LAG) (LO word)	4Byte	Unsigned Long	0~ 1999999999	03H		
19	0013H	VarH(LAG) (HI word)						
20	0014H	VarH(LEAD) (LO word)						

21	0015H	VarH(LEAD) (HI word)	4Byte	Unsigned Long	0~1999999999	03H	(NOTE.6)
22	0016H	Decimal Point A (bit0-bit3) V (bit4-bit7) W (bit8-bit11)	2Byte	Unsigned Int		03H 06H	(NOTE.7)
23	0017H	Demand Unit (bit0) W Unit (bit1) RELAY state (bit4-7)	2Byte	Unsigned Int		03H 06H	(NOTE.8)
24	0018H	Baudrate	2Byte	Unsigned Int		03,06H	0=1200 1=2400 2=4800 3=9600 4=19200=38400
25	0019H	Address	2Byte	Unsigned Int	1-255	03,06H	
26	001AH	CT	2Byte	Unsigned Int	1-9999	03,06H	
27	001BH	PT	2Byte	Unsigned Int	1-9999	03,06H	(NOTE.9)
28	001CH	MODE (System setting)	2Byte	Unsigned Int		03,06H	0=3P4W 1=1P2W 2=1P3W 3=3P3W
Other Parameter							
29	001DH	Σ VA (Apparent Power)	2Byte	Signed Int	0-9999	03H	(NOTE.3)
30	001EH	1_VA	2Byte	Signed Int	0-9999	03H	
31	001FH	2_VA	2Byte	Signed Int	0-9999	03H	
32	0020H	3_VA	2Byte	Signed Int	0-9999	03H	
33	0021H	Σ Q	2Byte	Signed Int	0-9999	03H	
34	0022H	1_Q	2Byte	Signed Int	0-9999	03H	
35	0023H	2_Q	2Byte	Signed Int	0-9999	03H	
36	0024H	3_Q	2Byte	Signed Int	0-9999	03H	
37	0025H	Σ PF	2Byte	Signed Int	-500~999~500	03H	3 ditit after decimal point (NOTE.4)
38	0026H	1PF	2Byte	Signed Int	-500~999~500	03H	

39	0027H	2PF	2Byte	Signed Int	-500~999~500	03H	(NOTE.1& 2)
40	0028H	3PF	2Byte	Signed Int	-500~999~500	03H	
41	0029H	Avg-V	2Byte	Unsigned Int	0-9999	03H	
42	002AH	Avg-A	2Byte	Unsigned Int	0-9999	03H	
43	002BH	V unbalance %	2Byte	Unsigned Int	0-9999	03H	
44	002CH	A unbalance %	2Byte	Unsigned Int	0-9999	03H	
45	002DH	Neutral Voltage	2Byte	Unsigned Int	0-9999	03H	
46	002EH	Neutral Current	2Byte	Unsigned Int	0-9999	03H	
47	002FH	V-MAX	2Byte	Unsigned Int	0-9999	03H	
48	0030H	V-MAX group	2Byte	Unsigned Int	0-9999	03H	
49	0031H	A-MAX	2Byte	Unsigned Int	0-9999	03H	Optional
50	0032H	A-MAX group	2Byte	Unsigned Int	0-9999	03H	
Harmonic							
Demand							
Period Charge							

Explanation:

Unsigned Int :0-65535

Signed Int : 0-32767 ; 32768-65535 (-32767)

Note

note1 : If voltage meter displays 22.00KV , 485 reading is 2200

Read decimal point address 0016H(bit4-bit7)2 digit after decimal point 0010 , Read unit 0017H(bit2) reading 0 =V ; 1=KV

note2 : If current meter displays 200.0A , 485 reading is 2000

Read decimal point address 0016H(bit0-bit3) 1 digit after decimal point 0001

note3 : If watt meter displays 6.600MW , 485 reading is 6600 ; If displays -6.600MW , 485 reading is 58936 , **-(65536-58936)

Read decimal point address 0016H(bit8-bit11) 2 digit after decimal point 0011 , Read unit 0017H(bit1)

Reading is 0 =KW ; 1=MW ; W/Q/VA/WH/QH (same unit and decimal point)

note4 : PF is always with 3 digit after decimal point

If power factor meter displays 0.800 , 485 reading is 800

If displays -0.800 , 485 reading is 64736 , ** -(65536-64736) 3 digit after decimal point

note5 : If frequency meter displays 60.00HZ , 485 reading is 6000 , 2 digit after decimal point

note6 : If watthour meter displays 12345.678MW , 485 reading is (000FH) HI_Word=188 (000EH)LO_Word=24910

$(HI_Word) \times 65536 + (LO_Word) = 188 \times 65536 + 24910 = 12345678$

Read decimal point address 0016H(bit8-bit11) 2 digit after decimal point 0011

Read unit address 0017H(bit1) Reading is 0 =KWH ; 1=MWH , W/Q/VA/WH/QH (same unit and decimal point)

note7 : Read decimal point 0016H

If meter displays 22.00KV 200.0A 6600KW PF=0.992 60.00HZ

bit0~bit3 1 digit after decimal point for A Reading is 0001

bit4~bit7 2 digits after decimal point for V Reading is 0010

bit8~bit11 W/Q/VA/WH/QH no decimal point Reading is 0001

PF reading is 992 3 digit after decimal point

HZ reading is 6000 2 digit after decimal point

note8 : Read unit 0017H

bit0 Demand unit , Reading 0=W 1=VA

bit1 W/Q/VA/WH/QH unit , Reading 0=K 1=M

bit2 Voltage unit , Reading 0=V 1=KV

bit3 no function

bit4 RELAY1 state , Reading 0 = no action , Reading 1= relay ON

bit5 RELAY2 state , Reading 0 = no action , Reading 1= relay ON

bit6 RELAY3 state , Reading 0 = no action , Reading 1= relay ON

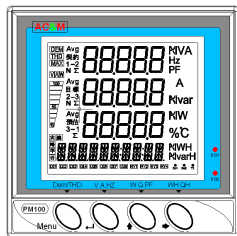
bit7 RELAY4 state , Reading 0 = no action , Reading 1= relay ON

note9 : Read PT 1 digit after decimal point

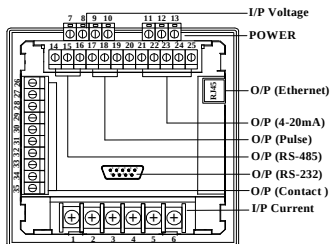
If PT 22KV/110=200 PT setting 200.0 485 reading is 2000 1 digit after decimal point

9.INSTALLATION AND WIRING CONNECTION

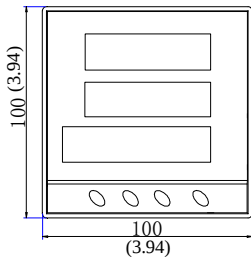
9.1 DIMENSION AND CUT-OUT



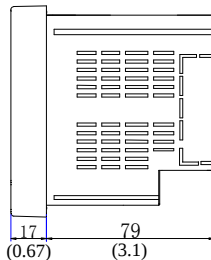
PANEL



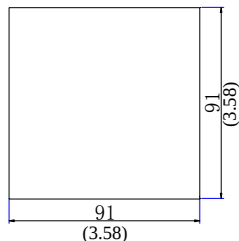
BACK-VIEW



正視圖



側視圖

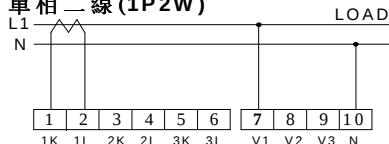


後視圖(開孔尺寸)

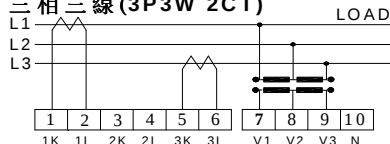
9.2 CONNECTION DIAGRAM

電壓及電流輸入 INPUT Voltage and Current

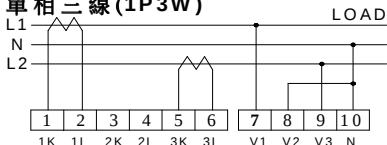
單相二線(1P2W)



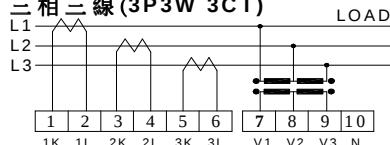
三相三線(3P3W 2CT)



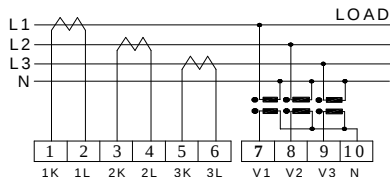
單相三線(1P3W)



三相三線(3P3W 3CT)



三相四線(3P4W)



請確實依照接線圖標示施工配線

輔助電源&輸出

