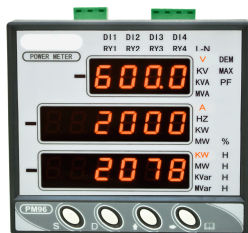


1. Operation Panel



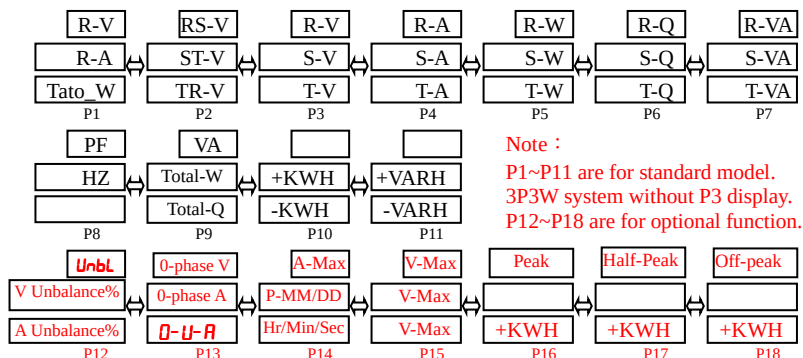
2. Keys

Name	Function	Instruction
S	Setting	Enter setting mode
D	Confirm	Confirm setting
↶	Change number / Page up	Change number / Page up
↷	Change position / Page down	Change position / Page down

3. Display

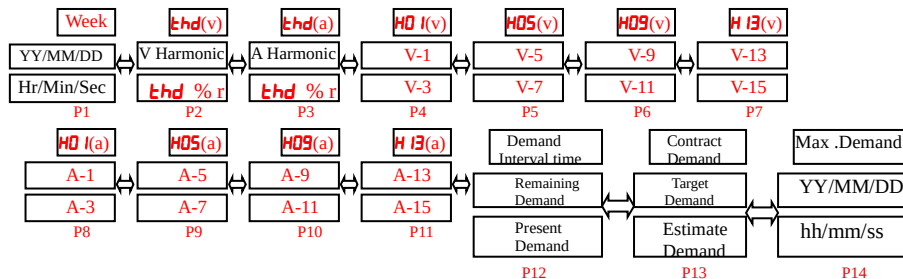
3-1 Display

Press "↶" and "↷" to turn pages.



3-2 Clock/Demand/Harmonic (Optional display)

Press "D" to enter display. Press "↶" and "↷" to turn pages.



P1

4. Parameters Setting

4-1 Setting procedure

Press "S" to enter 01-02-03-04-05-06-07-08-09 function. Press "D" to set.

Display	Function	Instruction
01 → 3P4W	Select system	Press "↶" to select 3P3W-1P2W-1P-3W-3P4W system Press "D" to enter 02.
02 → Pt	Set PT ratio	Press "↶" and "↷" to set PT ratio. Press "D" to enter 03.
03 → U-Unit	Set voltage unit	Press "↶" to select V or KV Press "D" to enter 04.
04 → U-dPt	Set voltage decimal point	Press "↶" to set the position. Press "D" to enter 05.
05 → Ct	Set CT ratio	Press "↶" and "↷" to set CT ratio. Press "D" to enter 06.
06 → R-dPt	Set voltage decimal point	Press "↶" to set the position Press "D" to enter 07
07 → W-Unit	Set Watt unit	Press "↶" to select KW/MW/Kvar/Mvar Press "D" to enter 08
08 → W-dPt	Set watt decimal point	Press "↶" to set the position. Press "D" to enter 09.
09 → 0P-00	Save setting	Press "↶" and "↷" to set as 0P-99. Press "D" . Press "↶" "↷" to key in password 0000. Press "D" to save .

4-2 Example of setting

Ex 1. System: 3P3W PT : 22KV / 110V CT : 1000A / 5A Watt=38.10MW

PT ratio=200 CT ratio=200

Parameter setting:

01	Select 3P3W	05	Set CT ratio as 200
02	Set PT ratio as 200	06	Set no decimal point for A
03	Set V unit as KV	07	Set W unit as MW
04	Set V decimal point as 2 digit after decimal point	08	Set W decimal point as 2 digit after decimal point

EX 2. System: 3P4W 380/220V CT : 600A/5A W=380 x 600 x 1.732 = 396.0KW

PT ratio=1 CT ratio=120

Parameter setting:

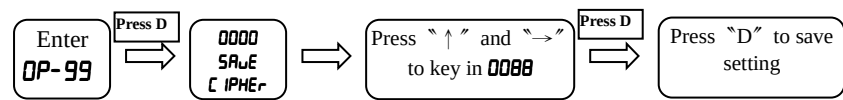
01	Select 3P4W	05	Set CT ratio as 120
02	Set PT ratio as 1	06	Set A decimal point as 1 digit after decimal point
03	Set V unit as V	07	Set W unit as KW
04	Set V decimal point as 1 digit after decimal point	08	Set W decimal point as 1 digit after decimal point

Note : If meter display "9999" and flash, it means decimal point setting is incorrect.

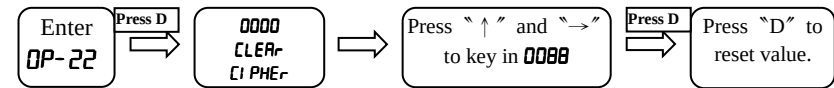
P2

4-3 Save setting (Code:0P-99)

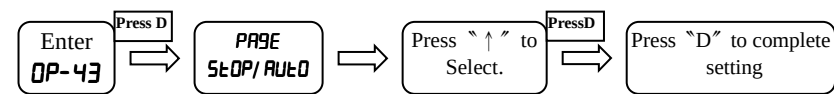
PM96 has password protection function. Key in password to validate setting.
Preset password: 0088



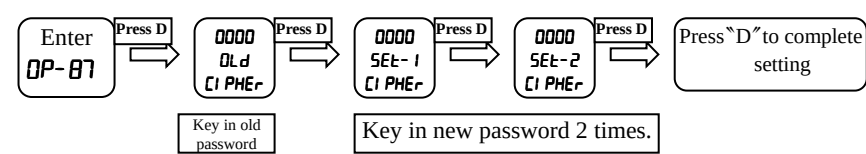
4-4 Accumulated Values Reset (Code:0P-22)



4-5 Auto Page-turning Setting (Code:0P-43)



4-6 Change password (Code:0P-87)

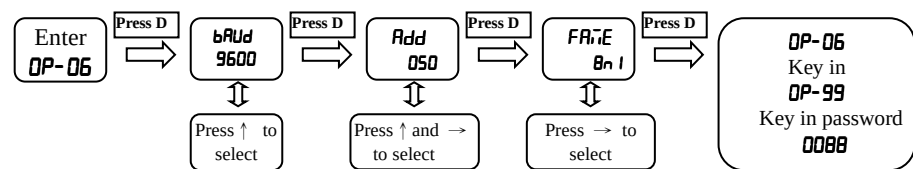


5. Communication Setting

5-1 Function

Baudrate setting: 9600-19200-38400-1200-2400-4800 (selectable)
Communication bit: 8N1/8N2/Even/Odd (selectable)
Communication address: 1-255

5-2 Operation



5-3 Communication Protocol

MODBUS - RTU MODE

Data Format

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

Function Code

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

Example 1. Read R phase voltage of the Meter.

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

Master calls Meter ID number 1 to read address 0001.Data number 0001.

Meter responses to Master				
(ID Number)	Function Code	Data Byte	Data	CRC
1Byte (01H)	1Byte (03H)	1Byte (02H)	2Byte (xx,xxH)	2Byte (xxH,xxH)

Example 2. Read parameters of the Meter

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

Meter responses to Master				
(ID Number)	Function Code	Data Byte	Data	CRC
1Byte (01H)	1Byte (03H)	1Byte (XXH = N)	2Byte (N*2Byte) XxH,xxH.xxH.....	2Byte (xxH,xxH)

Example 3. CT ratio setting: CT ratio=100

(Function Code: 06H ; CT ratio setting address: 40027)

Master sends message to Meter				
(ID Number)	Function Code	Address	Data Number	CRC
1Byte (01H)	1Byte (06H)	2Byte (1BH)	2Byte (0064H)	2Byte (xxH,xxH)

5-4 Parameter/Address Cross-reference

Address	Name	Length	Explanation / Feature / Display range	(R/W)
40002	V1	1Word	R-S Voltage / 0-65535 Integral / 0 ~ 9999 Count	
40003	V2	1Word	S-T Voltage / 0-65535 Integral / 0 ~ 9999 Count	
40004	V3	1Word	T-R Voltage / 0-65535 Integral / 0 ~ 9999 Count	
40005	A1	1Word	R Current / 0-65535 Integral / 0 ~ 9999 Count	
40006	A2	1Word	S Current / 0-65535 Integral / 0 ~ 9999 Count	
40007	A3	1Word	T Current / 0-65535 Integral / 0 ~ 9999 Count	
40008	W1	1Word	R Watt / -32768~32767 Polar / 0~9999 Count	

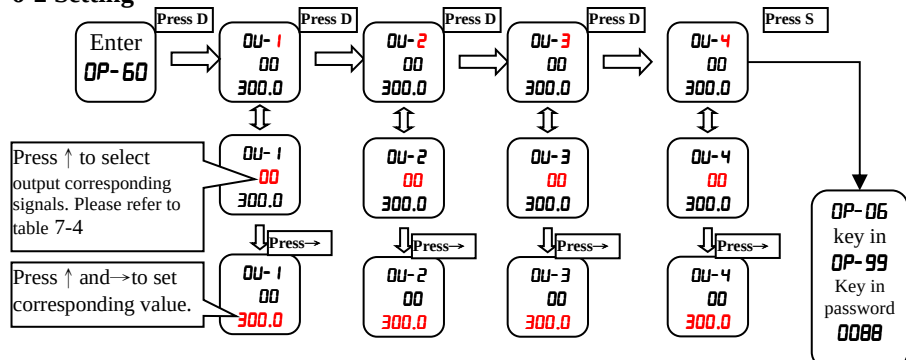
40009	W2	1Word	S Watt / -32768~32767 Polar / 0~9999 Count	R
40010	W3	1Word	T Watt / -32768~32767 Polar / 0~9999 Count	
40011	W	1Word	RST Watt / -32768~32767 Polar / 0~9999 Count	
40012	Q	1Word	RST Var / -32768~32767 Polar / 0~9999 Count	
40013	PF	1Word	Power Factor / 32768 ~ 32767 Polar / - 0.500 ~ 1.000 ~ + 0.500	
40014	HZ	1Word	Frequency / 0-65535 Integral / 0 ~ 9999Count	
40015	+WH	2Word	RST Watthour (+) Long type 40015 Lo-Word 40016 Hi-Word	
40017	-WH	2Word	RST Watthour (-) Long type 40017 Lo-Word 40018 Hi-Word	
40019	+QH	2Word	RST Varhour (+) Long type 40019 Lo-Word 40020 Hi-Word	
40021	-QH	2Word	RST Varhour (-) Long type 40021 Lo-Word 40022 Hi-Word	
40023	W,V,A Point	1Word	(1 Word)0000 0011 0001 0011 W=bit8-bit11 0011 V=bit4-bit7 0001 A=bit0-bit3 0011	R/W
40024	Realy W/V Unit	1Word	Bit7(RY4) Bit6(RY3 Bit5(RY2) Bit4(RY1) Bit2(1=kV 0=V) Bit1(1=MW 0=KW) Bit0(Demand 0=W 1=V/A)	
40025	BaudRate	1Word	0=1200,1=2400,2=4800,3=9600,4=19200,5=38400	
40026	Address	1Word	Address 1-255	
40027	CT	1Word	CT ratio: 0-9999	
40028	PT	1Word	PT ratio: 0-9999	
40029	MODE	1Word	System 0=3P4W 1=1P2W 2=1P3W 3=3P3W	

6. Analog Output Setting (optional)

6-1 Output function

- 1.4 units DC 4~20mA output
- 2.Output >300Ω at 20mA
- 3.DC 4~20mA corresponds to 10 signals (Please refer to table 7-4)

6-2 Setting



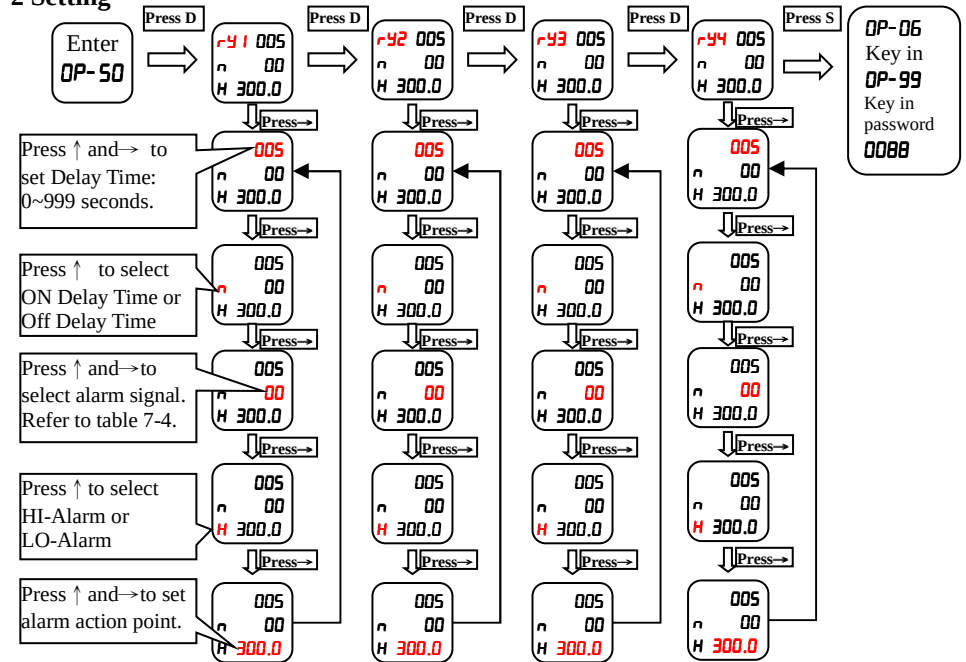
Example1 : HZ : 50HZ±5HZ Set OP-HI as 05-05 ; 4~12~20mA will correspond to 45~50~50HZ
 Example2 : HZ : 60HZ±3HZ Set OP-HI as 06-03 ; 4~12~20mA will correspond to 57~60~63HZ
 Example3 : PF : 1.000±0.5 Set OP-HI as 0.500; 4~12~20mA will correspond to -0.500-1.000-0.500
 Example4 : Total VAR: ±9999 Set OP-HI as 9999; 4~12~20mA corresponds to -9999-0-9999 VAR

7. Alarm Setting Function (Optional)

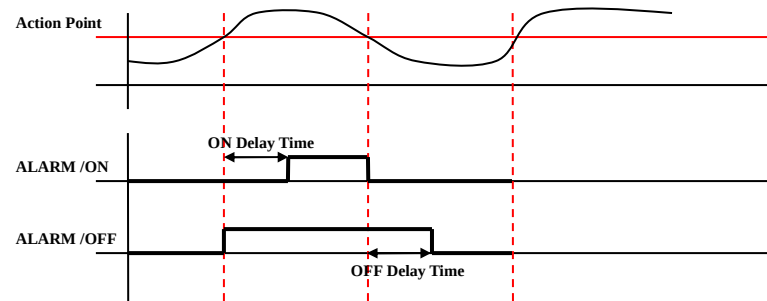
7-1 Function

- 1.4 units of relay outputs
2. Setting: ON /OFF and Delay Time (0-999 Sec)
- 3.Set alarm for 14 signals (Please refer to table 7-4)

7-2 Setting



7-3 ON/OFF Delay Time function instruction.



7-4 Output corresponding signal code

Code	Corresponding Signal	Range	Code	Corresponding Signal	Range
00	A Voltage	9999	07	Total Var	-9999~9999
01	B Voltage	9999	08	Power Factor	-0.5~1~0.5
02	C voltage	9999	09	Frequency	60 ±5HZ /50 ±5HZ
03	A Current	9999	10	Present demand	9999
04	B Current	9999	11	Max. Demand on record	9999
05	C Current	9999	12	Forecast Demand	9999
06	Total Watt	9999	16 / 17	0 phase Voltage/Current	9999

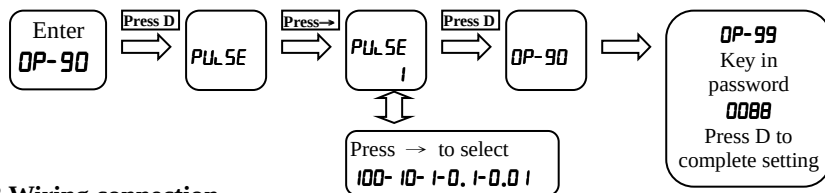
Note :
MA output
without code
10,11,12,16,17

8.(DO)Pulse Output (Optional)

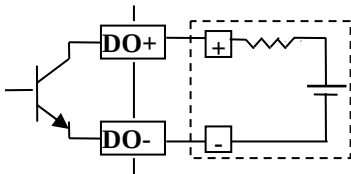
8-1 Function

- 2 units output: DO1 for (+WH) DO2 for (-WH)
- Programmable for: (100-10-1-0.1-0.01) Pulse / wh (secondary)

8-2 Setting



8-3 Wiring connection



9. 3Phase Voltage/Current unbalance(%) (Optional)

1.Display

Press ↑ and → to turn page.

2. Equation:

$$\frac{(MAX - MIN)}{MAX} * 100\%$$

Unbl

V unbalance%

A unbalance%

V0 Voltage

A0 Current

0- -U-A

Week

YY/MM/DD

hh/mm/ss

10. Zero phase Voltage/Current (Optional)

1. Display

Press ↑ and → to turn page.

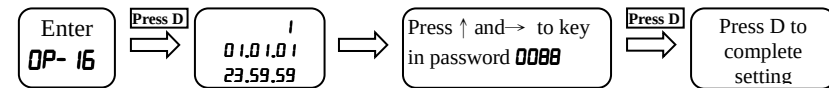
11. Clock (Optional)

1. Display

Press D to enter clock mode. Press ↑ and → to turn page.

Press D to leave.

2.Adjustment



12. Voltage/Current max value record(Optional)

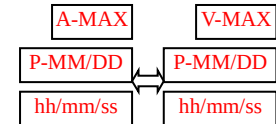
1. Display

Press ↑ and → to turn page.

2. Function

- Record the max.values of 3 phase voltage / current
- Record the MM/DD/hh/mm/ss of the max value.

3. Clear the max value

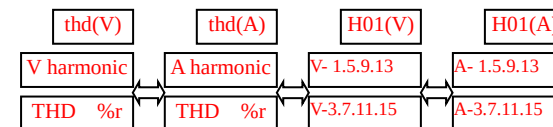


13. Harmonic Analysis (Optional)

- Measure Voltage and Current harmonic (Thd%)
- Up to 31 times harmonic analysis. Display 15 times of odd harmonic.
- Display

Press D to enter , press ↑ and → to turn page.

Press D to leave.



14. Demand Control (Optional)

14-1. Function:

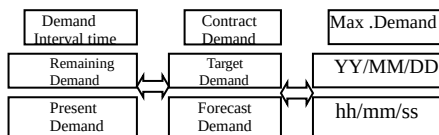
- *Programmable for Demand interval time
- *Set Contract Demand and Target Demand.
- *Record Max.Demand and it's happening date and time.
- *Set alarm for Over Demand

14-2. Term Explanation

- Contract Demand:** During the Demand interval time,the max electricity you can use according to the contract with the power company.
- Target Demand:** Generally,it's set as 75% of the Contract Demand.
- Present Demand:** During the Demand interval time,the electricity that you have used so far.
- Forecast Demand:** During the Demand interval time,according to the load,estimate the electricity you will need.
- Remaining Demand:** During the Demand interval time,the remaining electricity.
- Max. Demand:** During the Demand interval time, the max electricity used on record.

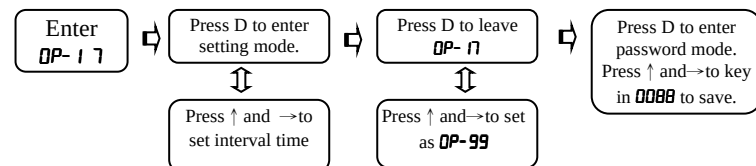
14-3. Display

Press D to enter , press ↑ and → to turn page.
Press D to leave.

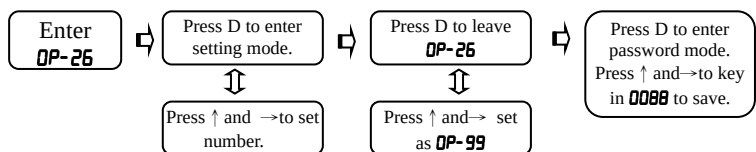


14-4. Basic setting

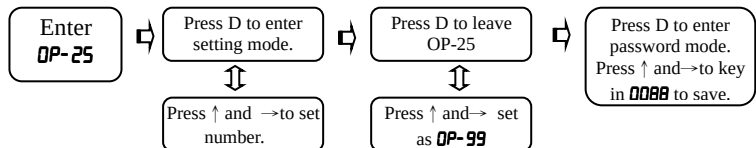
1. Set demand interval time: (0-60 mins)



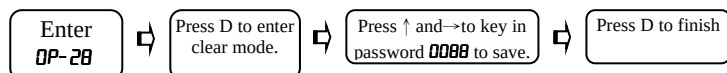
2. Contract Demand Setting



3. Target Demand Setting

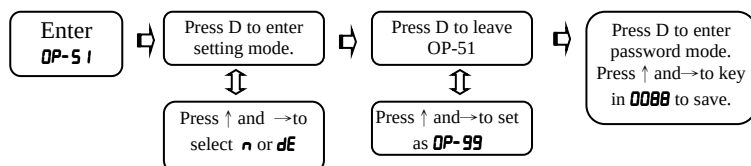


4. Clear Record Demand

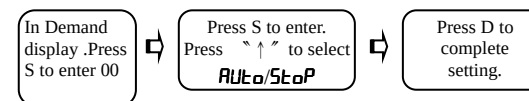


14-5. Demand Alarm Setting

1. Activate Demand Alarm: (N=Off DE=On)

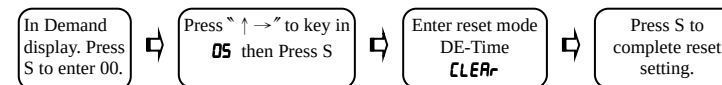


2 Demand Operation: Auto/Stop



3. Reset Demand

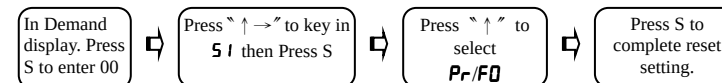
(Make the following setting in STOP mode)



4. Demand alarm setting. (Please refer to 7-2) (Make the following setting in STOP mode)

Set alarm signal corresponding to FO or Pr.

FO = (Forecast Demand Control) Pr = (Present Demand Control)

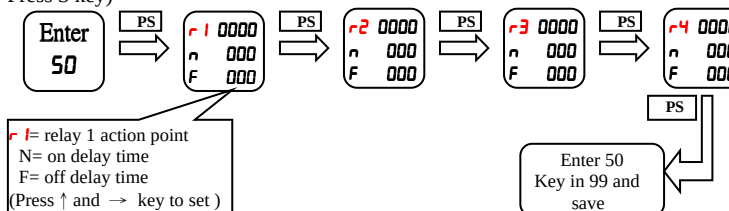


*If you select FO(Forecast Demand):

When Forecast Demand is over Target Demand, 4 alarms will be activated at the same time.
(Note: Only need to set the On and Off delay time for alarm)

*If you select Pr (Present Demand):

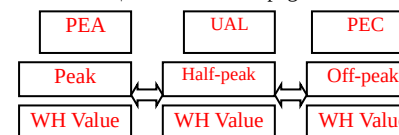
When Present Demand is over the setting point, the 4 alarms will be activated accordingly.
Setting: In demand display, press D to enter 00 , press ↑ and → to key in 50. Press D to enter.
(PS= Press S key)



15. Period Charge (Optional)

15-1.Display

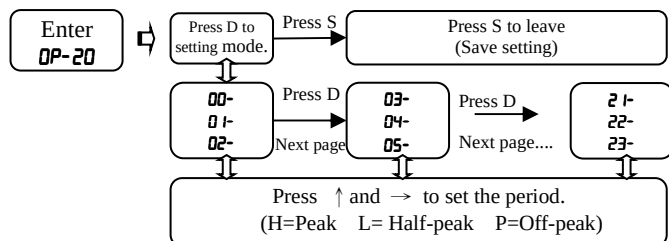
Press ↑ and → to turn page.



15-2.Setting instruction

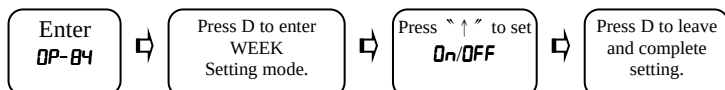
- Set every hour of 24 hours as **Peak**, **Half-peak** or **Off-peak** according to your requirements.
- H=Peak period L= Half-peak period P=Off-peak period**
- The electricity consumption of different periods will be accumulated to 3 different screens

Setting



4. Weekend period charge

If weekend (Saturday & Sunday) has different charge, activate weekend period charge.
Operation:



Note : Set as ON, Saturdays and Sundays have different charge.

Set as OFF, the charge of Saturdays and Sundays is the same as usual days.

5. Weekend period setting

1. Enter OP-18
2. Setting procedure is the same as 15-2.3.

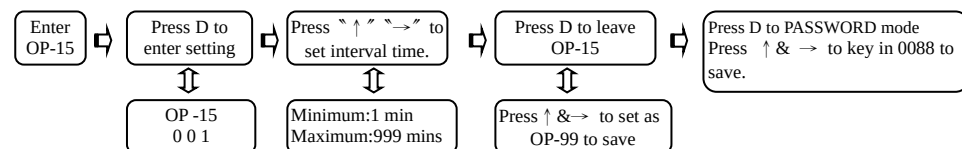
16. Paperless Record (Record 10000 DATA)

16-1 Function:

1. Record 10000 data · 3V-3A-W –Var-PF- +WH
2. Record format: Display: MM/DD/hh/mm – DATA
3. 10 year power-off memory
4. Save interval time: 1~999 min.
5. Meter has to work with AC&M software **UserAcm**.

16-2. Setting

1. Set save interval time:



2. Clear data(**It will take some time)



16-3. UserAcm Installation

1. UserAcm install name: UserAcm2147setup.exe
2. For: win98/win2000/winxp

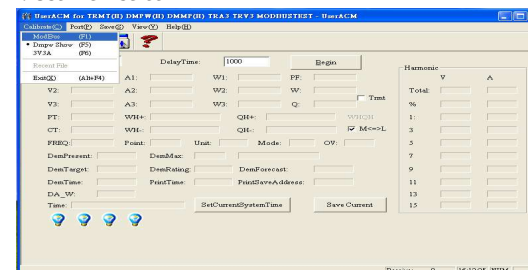
16-4. UserAcm operation

1. Run the program



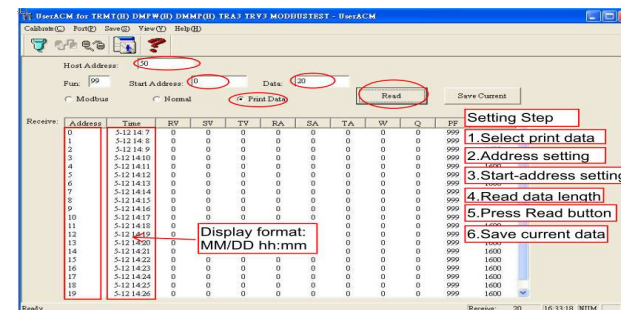
Click on the icon.

2. UserAcm screen



Click Calibrate— select Modbus

3. Display and Setting steps:



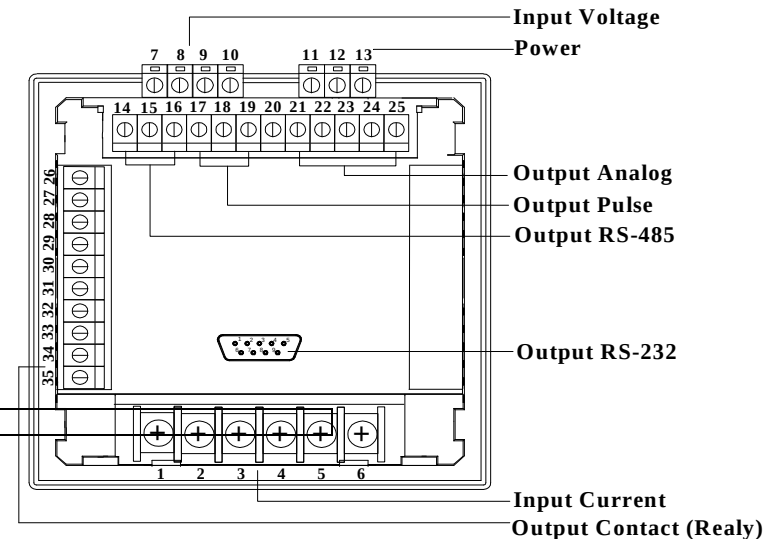
17. Parameter/Address Cross-reference

Address	Name	Note / Feature	Write/Read (R/W))
Demand Control			
40032	MAX DE	Max.Demand on record	R
40033	YY/MM	Max.Demand happening time.	
40034	DD/hh	BCD format.	
40035	mm/ss		
40036	Target Demand		
40037	Contract Demand		
40038	Forcast Demand		
40039	Present Demand		
40040	Demand interval time		
Harmonic Analysis			
40047	V-H1	Voltage 1 time harmonic	R
40048	V-TH-Total	Voltage total harmonic	
40049	V-TH %	Voltage total harmonic %	
40050-56	V-H 3-15	Voltage 3-15 times /odd harmonic 3-5-7-9-11-13-15	
40057	A-H1	Current 1 time harmonic	
40058	A-TH-Total	Current total harmonic	
40059	A-TH %	Current total harmonic %	
40060-66	A-H 3 -15	Current 3-15 times /odd harmonic 3-5-7-9-11-13-15	
VA / Var / PF of each Phase			
40067	S-V1	Total voltage	R
40068	S-A1	Total Current	
40069	Tota-VA	Total VA	
40070	R-VA	R phase VA	
40071	S-VA	S phase VA	
40072	T-VA	T phase VA	
40073	Tota-Q	Total Var	
40074	R-Q	R phase Var	
40075	S-Q	S phase Var	
40076	T-Q	T phase Var	
40077	Tota-PF	Total power factor	
40078	R-PF	R phase power factor	
40079	S-PF	S phase power factor	
40080	T-PF	T phase power factor	
Zero-phase voltage& 3 Phase Voltage/Current unbalance%			
40081	V unbalance	Voltage unbalance	R
40082	A unbalance	Current unbalance	
40083	Zero phase V	Zero phase Voltage	
40084	Zero phase A	Zero phase Current	

Period Charge				
40201	Total(WH)	Total WH Long type	40201 Lo-Word	R
40202			40202 Hi-Word	
40203	1 st period (Peak)	1 st period WH Long type	40203 Lo-Word	
40204			40204 Hi-Word	
40205	2 nd period (Half-peak)	2 nd period WH Long type	40205 Lo-Word	
40206			40206 Hi-Word	
40207	3 rd period (Off-peak)	3 rd period WH Long type	40207 Lo-Word	
40208			40208 Hi-Word	
40221	A-MAX	Current Max.Value		R
40222	Phase	Happening Phase		
40223	MM/DD	Happening Month/Date		
40224	hh/mm	Happening hour/minute		
40225	ss	Happening second		
40226	V-MAX	Voltage Max.Value		
40227	Phase	Happening Phase		
40228	MM/DD	Happening Month/Date		
40229	hh/mm	Happening hour/minute		
40230	ss	Happening second		

18 . Terminals and Connection Diagram

1. Terminals



2. Connection Diagram

