TIANJIN GREWIN TECHNOLOGY CO.,LTD.

Tianjin Grewin Technology Co.Ltd
Web:www.grewin-tech.com .
Add:DongLi Distr Tianjin City, China
Phone: +86-22-84943756
WhatsApp:+86-13072088960
Email:salesmanager@grewin-tech.com

EPM300A-1BY

Multiple function power meter

User Guide

Attention

User should read this manual carefully before preparing to install, operate, serve or maintain. Below special words will across all the manual, or will stick onto the instructions to remind the potentially dangerous or to mark the important points.

⚠ **DANGE**
‘⚠DANGER’ SHOWS AN DIRECT DANGER.IF CAN’T BE AVOIDED,IT WILL LEAD TO IMMEDIATE DEATH OR BAD INJURED!

⚠ **WARNIN**
‘⚠ WARNING’SHOWS A POTENTIALLY DANGER.IF CAN’T BE AVOIDED,IT COULD LEAD TO DEATH OR BAD INJURED!

⚠ **NOTICE**
'⚠NOTICE' SHOWS A POTENTIALLY DANGER.IF CAN’ T BE AVOID,IT COULD LEAD TO SMALL OR MODERATE INJURED!

NOTICE
‘NOTICE’ SHOWS A POTENTIALLY DANGER.IF CAN’ T BE AVOID,IT COULD LEAD TO DIRECT PROPERTY DAMAGE

Declaration

Electrical equipment should be installed, operated, used and maintained by professional staffs. This manual is not guidance to the staffs without professional training. This company will be not liable to any adverse consequence caused by violating the rules.

This company reserve right of content amending without notify again. All the products and service warranty are in the attached guarantee list.
This company is not liable to the technical error or the textual error and textual error in this manual.
Unless the copy right authorization , this manual is strictly prohibited to be copied, quoted and translated without written approval.

Safety Instruction

This part includes the safety instructions which should be complied before installing, serving and maintaining the equipment.

⚠WARNING!

Danger Of Electric Shock,Fire And Exploding.

- Only profession staffs could install this equipment after complete read the manual.
- Don’t work alone.
- Power dump before equipment testing and maintaining.
- Supposing the circuit is live before making sure it’s fully discharged
- Pay special attention to the power source.Considering all the source, including the possibility of inversely feeding.
- Cut off the power when work on or in the equipment.
- Use the right tester to make sure the power is fully cut off.
- Be careful of the potential danger. Do personal protective and check whether other tools or things leave over.
- Don’t touch the live busbar.
- Right and safe operation make equipment running well and to avoid the damage.
- Cut off all the connecting in-out lines with the equipments when insulation testing to avoid the damage to the instrument.

If don't execute above instructions could lead body injured and death.

Catalogue

1.Introduction

1.1Introduction

EPM300A-1BY is intelligent multi-purpose power meter which integrates the remote measuring, and remote communication functions.

This meter could test, display and Remote Transfer all the common power parameters,4-ch digital inputs,2-ch relay output, multi tariff statistics, SOE record, Off-limit Alarm, over-limit alarming ,max.& min. value statistics. And communicate with the computer to be a intelligent monitoring system.

1.2Functions

1.2.1 Basic function

1.2.1.1 Display & measure

- Voltage
- Current
- Voltage unbalance degree
- Current unbalance degree
- Current load degree
- Active power, reactive power and apparent power
- Power factor
- Frequency
- Total active energy absolute ,total reactive energy absolute
- Input active energy absolute, input reactive energy absolute
- Output active energy absolute, output reactive energy absolute
- 4 quadrants reactive energy

1.2.1.2 Load type:

Indicate the current load type:

Capacitive load or Inductive load

1.2.1.4 Remote transfer:

2DI real time switch-status monitoring, electric level and impulse output setting

1.2.1.5 Remote signaling:

2 channel DI real time switch-status monitoring

1.2.1.6 Off-limit alarm style

Support over current, low voltage, over voltage, low frequency, over frequency, low power factor off-limit alarm

1.2.1.7 Remote communications

- Communication interface:RS485
- ModBUS-RTU protocol

1.2.1.8 SEO record: max. 64 alarms and DI events

1.2.1.9 Demand record: record the max. Demand of total active power(+/-), demand and occurrence time of the max. Demand of total reactive power(+/-) of this month and the last month.

1.2.1.10 The mix./min. Value of the current,voltage,frequency,power factor, active/reactive/apparent power and the occurrence time of the max./min. value.

1.2.1.11 Multi-tariff: max. 8 schedules and 4 tariffs

1.2.1.12 Display: real time parameter, DI status, communication status.

1.2.1.13 Factors setting and register when power off suddenly

1.2.2 function description

1.2.2.1 Off-limit alarm

Support over current, under voltage, over voltage, under frequency, over frequency, under power factor off-limit alarm and SOE

When the parameter is beyond limit, the alarm time is over the TK, and will trigger with position alarm and record the SOE. Otherwise, alarm will disappear. Reference fig.1

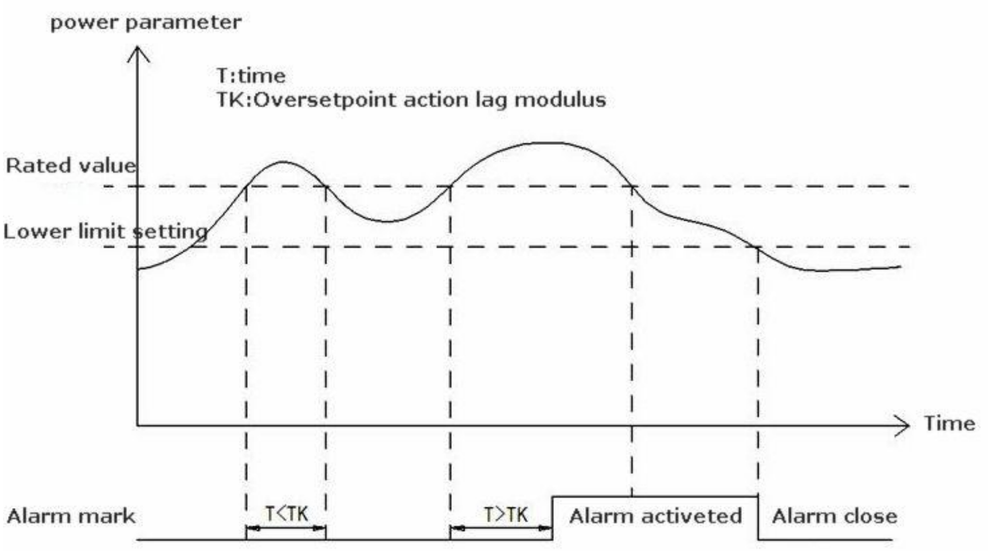


Fig. 1 Off-limit work principle

1.2.2.2 Demand statistic

Record the max. Demand of total active power (+/-), demand and occurrence time of the max. Demand of total reactive power(+/-)and the occurrence time.

Adopt sliding window mode, interval is 15 min. The demand value is the average value of the 15 times sampling value in the last calculated period. Display data update one time for every minute. Save the max. value of month in the MAX DEMAND UNIT of last Month when the end of every month and at the same time, this max. value will be cleared.

1.3 Specification

ITEMS			NOTES
Input Test Display	Web		3P3L,3P4L Configuration
	Voltage	Rated value	AC400V or AC100V Optional
		Overload	Measurement:1.2 times, Instantaneous 2 times/10s
		Consumption	<1VA per phase
		Impedance	>400kΩ
		Precision	RMS measurement Precision ±0.2%
	Current	Rated value	AC5A or AC1A
		Overload	Continued 1.2 times Instantaneous 10 times/10s
		Consumption	<0.4VA per phase
		Impedance	<20mΩ
		Precision	RMS measurement Precision ±0.2%
	Frequency		40~60Hz Precision ±0.02Hz
	Power		Active power, reactive power, apparent power Precision ±0.5%
	Energy		● Total active energy absolute .Total reactive energy absolute ● Input active energy absolute. Input reactive energy absolute ● Output active energy absolute ● Output reactive energy absolute ● 4 quadrants reactive energy ● Precision active-energy ±0.5%,reactive-energy ±1%
	Display		● LCD display ● Modbus communication to change the display interface
Digital input	Input		2-ch input, opto-isolator, passive idle contact input(2DI,optional functions)
	Isolation Voltage		2500Vrms
SOE	Resolution		1ms
	Record numbers		Max.64
Comm.	Interface		RS485
	Protocol		ModBUS-RTU
	Baud rate		2400/4800/9600/19200bps
	Data format		Odd parity check, even parity check, none parity check
Working power	Working voltage		AC:85V～265V or DC:100V～360V
	Power consumption		≤2VA
Work environment	Work temperature		-20℃～55℃
	Storage temperature		-40℃～85℃
	Humidity		0～95％ non-condensate
Safe	Insulating strength		Between input/output/hull/power supply: 2kV Acrms，1 min.
Dimension weight	Size		96mm×96mm×71 mm
	Weight		0.4kg

1.4.EMC Standard

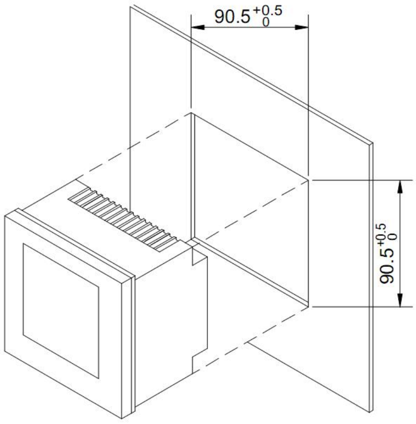
TEST ITEMS	LEVEL	STANDARD
high frequency anti-jamming test	Ⅲ，Ⅳ	GB/T 15153.1/1998
electrostatic discharge anti-jamming test	Ⅲ	GB/T 15153.1/1998
electrical fast transient anti-jamming test	Ⅳ	GB/T 17626.4-2008
surge anti-jamming test	Ⅳ	GB/T 15153.1/1998
power frequency magnetic fields anti-jamming test	Ⅳ，Ⅴ）	GB/T 17626.8-2006

2.Installation

2.1 Installation

2.1.1 Dimension

- Meter dimension size:96*96*71mm
- Panel size:96*96mm
- Slot size:90.5 $_{-0.0}^{+0.5}$ mm × 90.5 $_{-0.0}^{+0.5}$ mm
- Min. depth is 80mm



2.1.2 Installation steps:

- Slots on the switchgear should be 90.5 $_{-0.0}^{+0.5}$ mm × 90.5 $_{-0.0}^{+0.5}$ mm
- Take down the fixed mount of the meter
- Put the meter into the slots and insert the fixed mount

Fig.1 Installation schematic diagram

Notice

Avoid close to the system with electromagnetic interference

2.2 Terminal wiring

2.2.1 Terminal definition

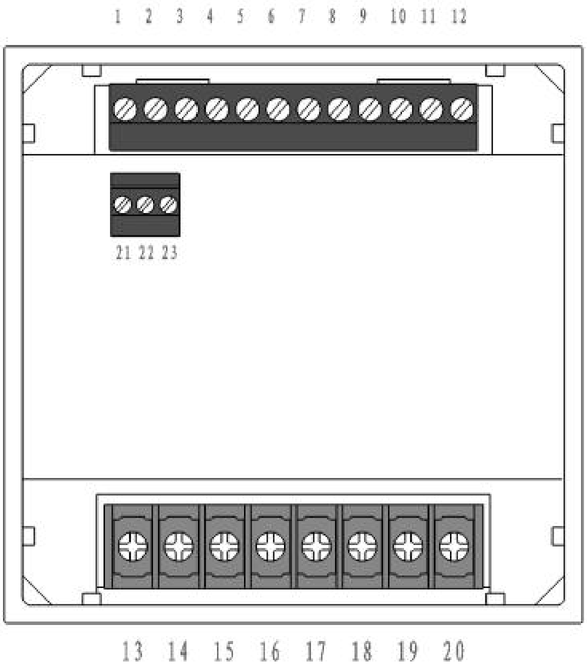


Fig.2 Terminal definition

Terminal definition LIST

VOLTAGE INPUT	1	UA	CURRENT INPUT	13	I11
	2	UB		14	I12
	3	UC		15	I21
	4	UN		16	I22
POWER SUPPLY	5	L/+		17	I31
	6	N/-		18	I32
	7	PE		19	I41
	8	NC		20	I42
	9	NC	COMMUNICATION	32	A+
REMOTE SIGNALING	10	DI1		33	B-
	11	DI2		34	SHLD
	12	COM			

2.3 Terminal wiring

2.3.1 Voltage and current input wiring

Introduction:

- UA :A phase voltage input
- UB :B phase voltage input
- UC :C phase voltage input
- UN :N phase voltage input

- L/+ :Power supply+
- N/- :Power supply -
- DI1 :Digital input 1
- DI2 :Digital input 2
- COM :Digital input common point
- I11 :A phase current input
- I12 :A phase current output
- I21 :B phase current input
- I22 :B phase current output
- I31 :C phase current input
- I32 :C phase current output
- NC :No wiring
- Rs485+
- Rs485-

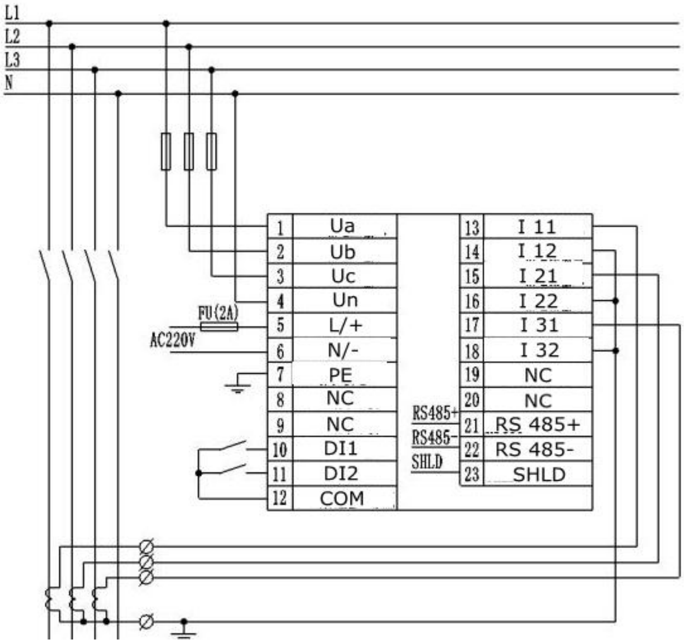


Fig.2.3.1.1 3 phase 4 wire 3PT-3CT wiring

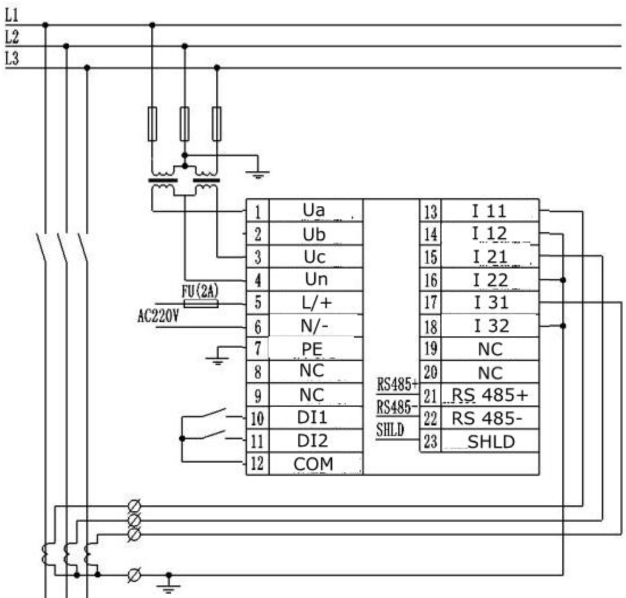


Fig.2.3.1.2 3 phase 3 wire 2PT-3CT wiring

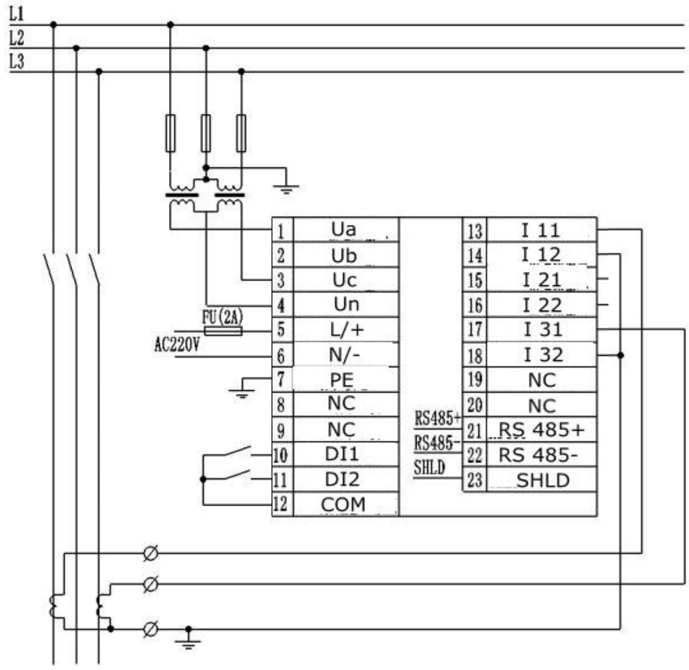


Fig.2.3.1.3 3 phase 3 wire 2PT-2CT voltage wiring

Fig.2.3.1.1 The connect method should be setted as 3 phase 4 wire

Fig.2.3.1.2&2.3.1.3 should be 3 phase 3 wire

Notice

1.The input voltage should not exceed the nominal input voltage.Otherwise must use PT.Short circuit is forbidden for the PT to avoid the high current.1A fuse is must in the voltage input end

2. If there are other meters on the CT,pls use the combination method.Pls first disconnect the CT primary loop or short circuit the secondary circuit before remove the current input of meter.CT is forbidden to open circuit to avoid high voltage.

3.It's better to use the wire connect bank but not to connect the CT directly for easy dismounting

4.Make sure the voltage and current is same phase and same direction

2.3.2 Communication wiring

Communication wiring,and the impedance value that matching the resistance is 120Ω,as fig.2.3.2.1 Communication loop wiring as fig.2.3.2.2

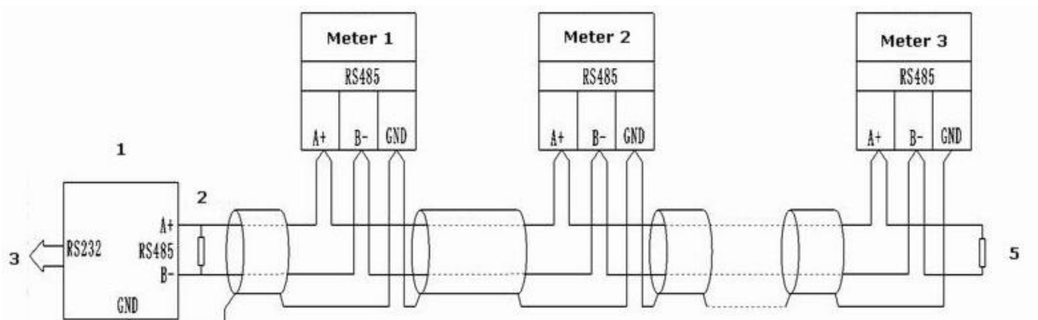


Fig.2.3.2.1 Straight-line wiring method

1:RS485/RS232 converter
2:Matched resistance
3:Computer communication port
4:Single point grounding

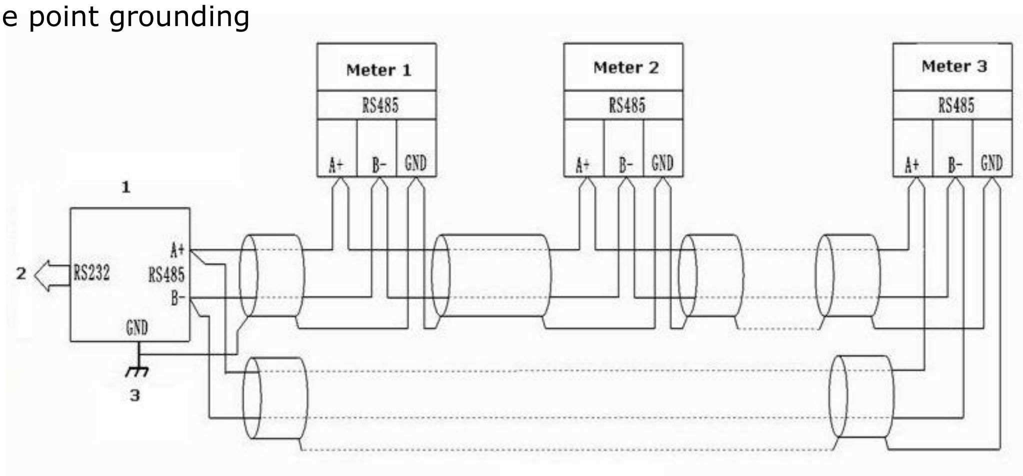


Fig.2.3.2.2 Loop wiring method

1:RS485/RS232 converter
2:Computer communication port
3:Single point grounding

2.3.3 DI wiring

Monitoring the switch value and digital value of two branch nodes.Opto-isolated input.The isolated voltage is 1500VAC.Isolated 24VDC output from the inner supply input loop power for the branch nodes. The wiring diagram as below:

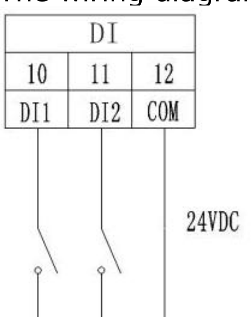


Fig.2.3.3 DI input

Notice

1.The conductor cross section of the connection wire to the device should meet the following requirements: the cross section of current wires is less than 2.5mm^2,the cross section of voltage wires is less than 1.0mm^2

2.In order to reduce the impact of current at startup, it is recommended for each power wire connects not more than 40 devices.

3.The communication wire must adopt the shielded twisted pair line. The PS485+,RS485-of the communication wire should be connected correctly.

4.When straight-line wiring method is used,100~120Ω matching resistance should be connected between RS485+and RS485-terminals.

5.When the baud rate is 9600bps,the length of the

3.Operation guidance

3.1 Illustration of the screen display

Introduction:

1.Current parameter:

U:voltage

I:current

F:frequency and power factor

P/Q/S: power

2.Max.& Min. value

3.Three phase unbalance factor

4.Load:

Capacitance load(upper)

Inductive load(below)

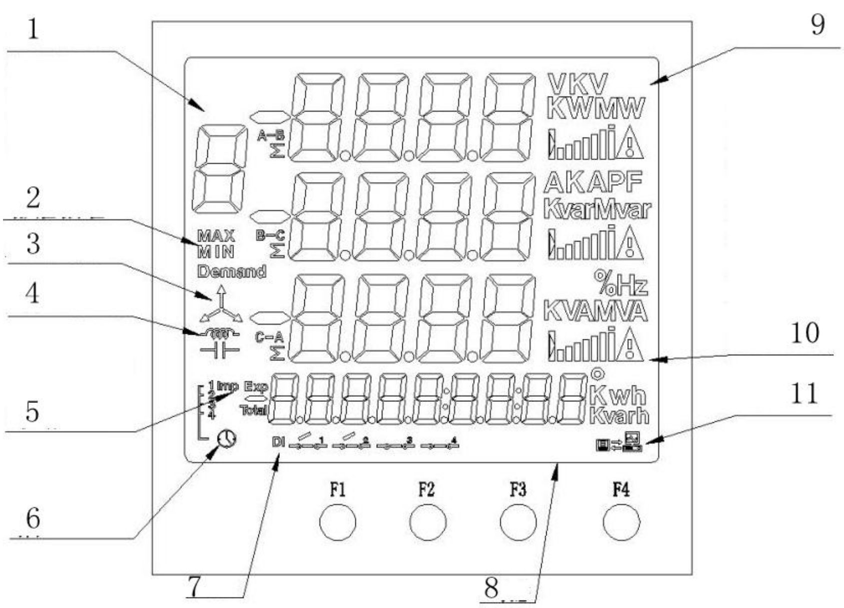
5.Electrical degree:

Lmp:depleting

Exp:issue

Total:total

6.Time



7.DI condition
8.DO condition
9.Units:
Current:A KA
Voltage:V KV
Power factor:PF
Frequency:Hz
Active power:KWA
Apparent power:KVA
Active electric energy:KWh
Reactive electric energy:Kvarh
Three phase unbalance degree:%
10.Current load rate
11.Communication condition

Fig.3.1 Screen display

3.2 Buttons:

Introduction: There are total four buttons,F1,F2,F3,F4
It's different functions under the different work mode. Short press and long press is also different.
Short press: press and loosen in 1s
Long press: press last more than 1s

3.2.1 Button function list

Work mode	-	F1	F2	F3	F4
Measure mode	Short press	Zone 1 switch	Zone 2 switch	Zone 3 switch	Energy switch
	Long press	Esc			
Setup mode	Short press		+	-	Shifting
	Long press	Esc			Enter

Work mode	-	F1+F2	F1+F3		
Measure mode	Short press	Zone 5 switch	Zone 6 switch		
	Long press				
Setup mode	Short press		+		
	Long press				

3.2.2 Zone display list

Zone	Display
1	Voltage/current load rate, current unbalance degree, phase voltage, wire voltage, voltage unbalance degree
2	Total phase power factor& frequency, per-phase power factor,
3	Per-phase active power, per-phase reactive power, per-phase apparent power, total

	active power, total reactive power, total apparent power
4	Active energy absolute, Reactive energy absolute, Total active energy+, Total active energy-, Phase 1 reactive, Phase 2 reactive Phase 3 reactive Phase 4 reactive Tip period energy, Peak period energy, Flat period energy, Date, Time
5	the current month active max. demand+/-,the current month reactive max. demand, the last month active max. demand+/-,the last month reactive max. demand, max. per-phase phase voltage value, min. per-phase phase voltage value, max. per-phase wire voltage value, min. per-phase wire voltage value, max. per-phase current value, min. per-phase current value,max. frequency& power factor value, min. frequency& power factor value, max. per-phase power factor value, min. per-phase power factor value, max. active energy value, min. per-phase active energy value, max. reactive energy value, min. per-phase reactive energy value, max. reactive energy value, min. per-phase reactive energy value, max. three phase power value,min. three phase power value.
6	SOE evens query

3.3 Measure mode

After power on, the meter enter the measure mode. Under this mode, we could check all the measurement parameters.

3.3.1 Zone 1 display:

Total 5 pages and display:

Current and current load rate, current unbalanced degree, phase voltage, wire voltage, voltage unbalanced degree. Short press F1 to select different pages.*Pls notice, when 3 Phase 3 Wire, it can't display the voltage page, the wire voltage can't display the Uca.

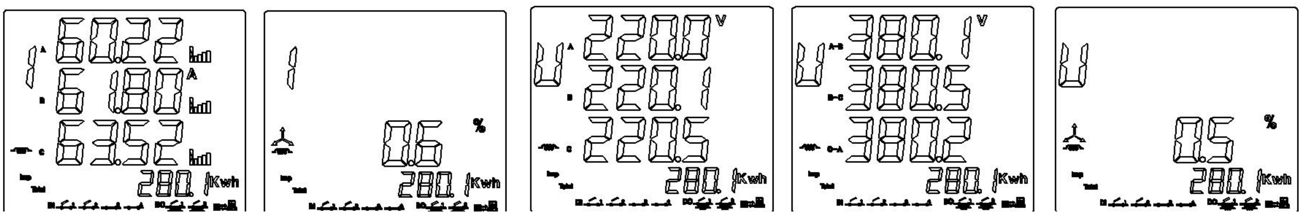


Fig.3.3.1.1 Segregated current Current unbalanced degree Segregated phase voltage Segregated wire voltage Voltage unbalanced degree

Load rate indication:

Secondary current percentage rate of the CT2 setting value, from 0%~120%

When segregated current display, the load rate of all phase display. The function as below. If over the CT2 setting value,the alarm mark will display.

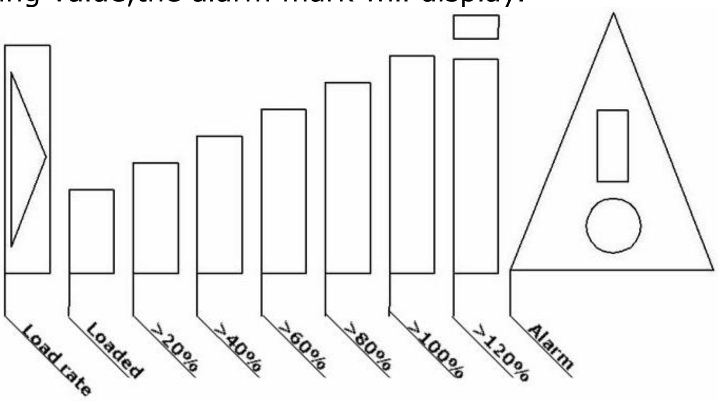


Fig.3.3.1.2 Load rate display

3.3.2 Zone 2 display:

Total phase power factor & frequency, per-phase power factor.
Short press F2 to check all the pages.
*Pls notice when 3 Phase 3 Wire, it can’t display per-phase power factor.

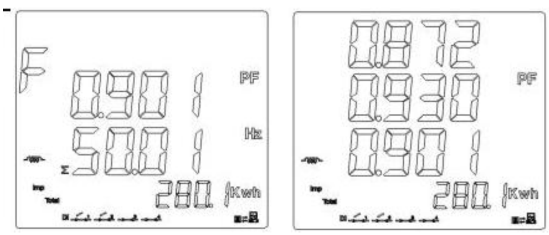
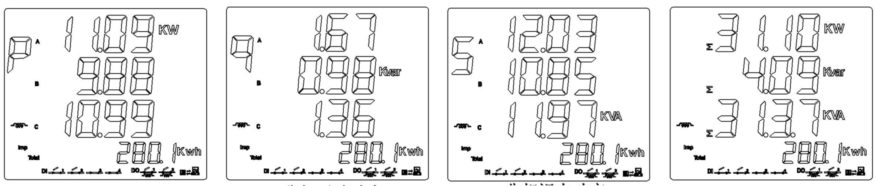


Fig.3.3.1.3 Total phase power factor per-phase power factor

3.3.4 Zone 3 display

Total 4 pages to display:the per-phase active power, per-phase reactive power, per-phase apparent power, total active power, total reactive power, total apparent power.
Short press F3 to check all the pages.

*Pls notice when 3 Phase 3 Wire, it can only display total active power, total reactive power, total apparent power. Reference fig.3.3.3



split-phase active power | split-phase reactive power | split-phase apparent power | Total active/reactive/apparent power

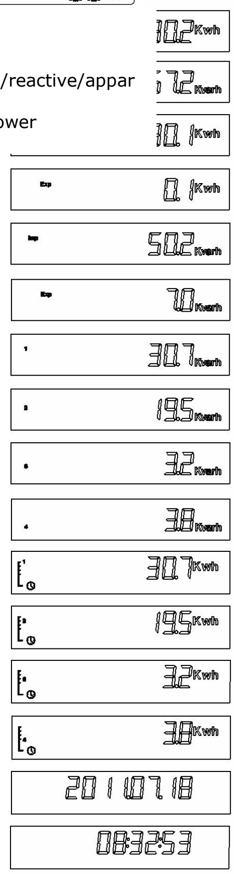
Fi cti

3.3.4 Zone 4 display

Short press F4 to check the pages.
As fig.3.3.4
Freeze electrical degree don't effect the real-time display.
The degree collected by the Modbus is not updated but will be real-time data after unfreeze.

3.3.5 Zone 5 display

This page displays:



Total active energy+
Total active energy-
Total reactive energy+
Total reactive energy-
Phase 1 reactive
Phase 2 reactive
Phase 3 reactive
Phase 4 reactive
Phase 4 reactive
Tip period energy
Peak period energy
Normal period energy
Date
Time

the current month active max. demand+/-,
the current month reactive max. demand,
the last month active max. demand+/-
the last month reactive max. demand, max. per-phase phase voltage value, min. per-phase phase voltage value,
max. per-phase wire voltage value,
min. per-phase wire voltage value,
max. per-phase current value,
min. per-phase current value,
max. frequency& power factor value,
min. frequency& power factor value,
max. per-phase power factor value,
min. per-phase power factor value,
max. active energy value,
min. per-phase active energy value,
max. reactive energy value,
min. per-phase reactive energy value,
max. reactive energy value,
min. per-phase reactive energy value,
max. three phase power value,min. three phase power value.

Fig.3.3.4 Zone 4

Example:

Demand display

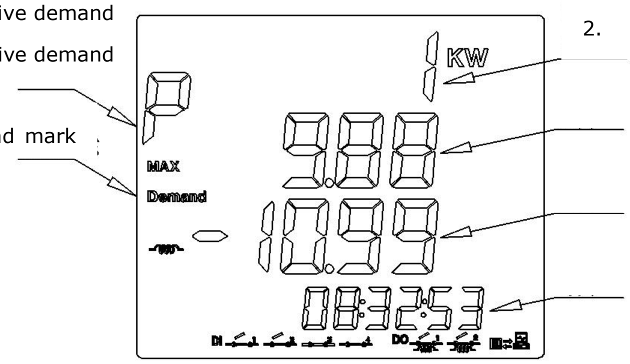


Fig.3.3.5.1 Zone 5 demand display

Min.&max value display

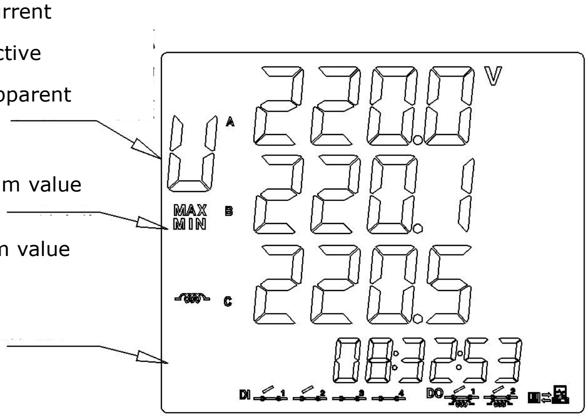


Fig.3.3.5.2 Zone 5 min.&max. value display

Operation：

Short press F1+F2 to enter zone 5.Long press F1 or short press F1+F2 to exit.
Short press F1 to modify the selected parameter. The time is the occurrence time when max./min. value occurred. Time and date cyclic display.

3.3.6 Zone 6 display

This zone is for events query.Refer below pic.3.3.6

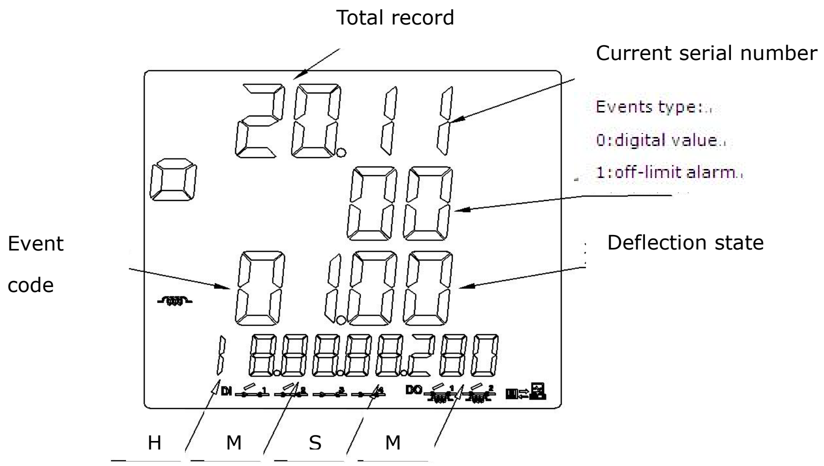


Fig.3.3.5.2 Zone 6 Zone 6

Total record: this power meter support 64 pcs SOE events record. Digital value and off-limit alarm SOE is public.

Current serial number: show the current SOE record number. It's sorted according the SOE occur time

Events type: 0: digital value   1:off-limit alarm

Events code: events codes instead the SOE record events, details as below list.3.3.6

Events state: 0: DI turn from close to break. 1: DI turns to close from break.The off-limit alarm SOE is default as 0

Date and time: show the time when SOE occur. Cyclic display

NO.	Explain	NO.	Explain
0	DI1	15	A phase low power factor
1	DI2	18	B phase current off-limit alarm
2	DI3	19	B phase /BC line voltage overvoltage
3	DI4	20	B phase/BC line voltage overvoltage
10	A phase current off-limit alarm	23	B phase low power factor
11	A phase /AB line voltage overvoltage	26	C phase current off-limit alarm
12	A phase /AB line voltage low voltage	27	C phase /CA line voltage overvoltage
13	A phase over frequency	28	C phase /CA line voltage low voltage
14	A phase low frequency	31	C phase low power factor

Operation：

Short press F1+F3 to enter Zone 6. Long press F1 to short press F1+F3 to exit. If no SOE record, It will display NO SOE and exit SOE interface automatically.

Short press F2 to enter the next page.

Short press F3 to back to the previous page

3.3.7 Communication mark

When the power meter receive the data from master computer, below mark will icon will appear.

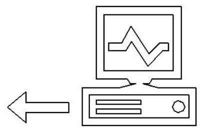


Fig.3.3.7.1 Data receiving

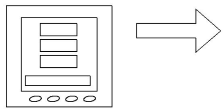


Fig.3.3.7.2 Data transferring

3.3.8 Digital value display

The digital value will displayed in the screen, refer fig.3.3.8 (DI3,DI4 is unused)

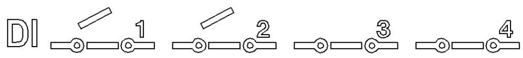


Fig.3.3.8 Digital value condition

3.4 Setting mode

Long press F4 to enter the setting mode.
First enter the password. Default is 0000,then short press F2(+function) &F3(-function) to choose the item. Long press F4 to enter the sub-menu and choose the details entry or enter the value.
Long press F4 to enter, long press F1 to exit and auto go back.
When enter the details value, short press F4 to move to the positions that need to modify. When it's shine, short press F2(+function) or F3(-function)to modify the value. Long press F4 to enter, and will display 'save' for select whether save or not. Long press F4 to save or long press F1 to exit.
If the enter value is out the fixed range, 'ERRN' error information will display and ask to enter again.

3.4.1 Data storage:
After modify the parameter, we could operate as below to save. Refer fig.3.4.1
In the pic., we modify the connection mode to the 3 Phase 4 Wire and save.
Steps:

- After modify, long time press F4,it will show ‘Save or not’, long press F4,screen will display 'Yes' and this will mean save successfully. Or long time press F1 to exit and back to previous menu.

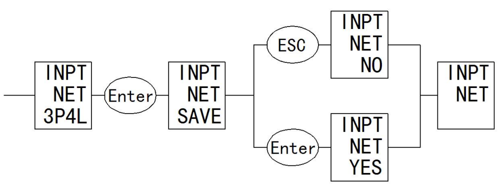


Fig.3.4.1 Parameter save

Samples:

- Modify CT1,CT2,PT1,PT2

Set voltage rated primary PT1 value as 35KV, rated secondary PT2 value as 100V.

PT1 rated value = set value x10

Set voltage rated primary PT1 value as 35KV, modify the rated value as 3500 as below reference fig.3.4.2

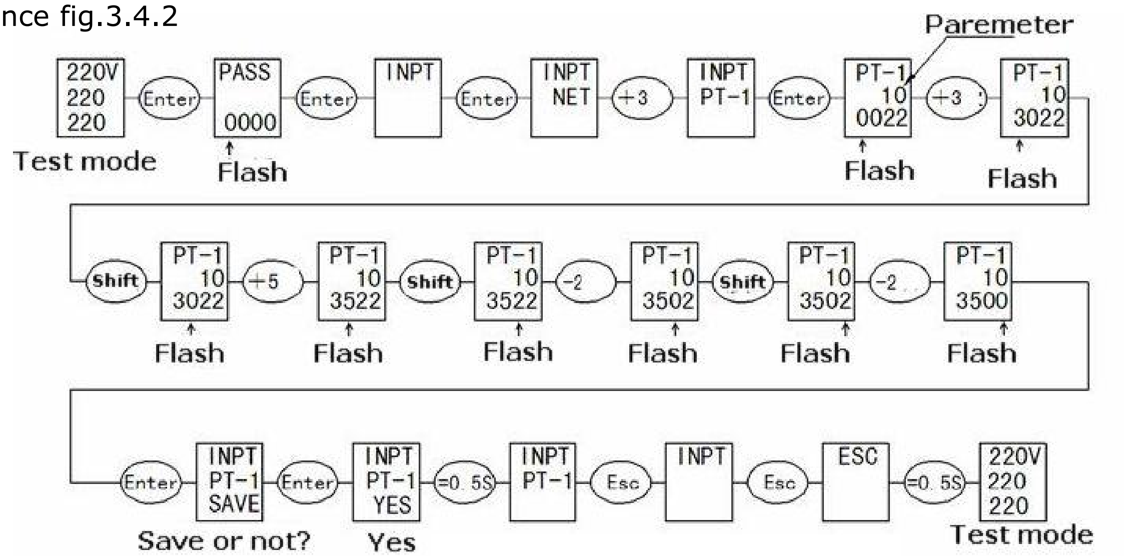


Fig.3.4.2 PT1 setting samples

Set voltage rated secondary PT2 value as 100V,refer fig.3.4.3

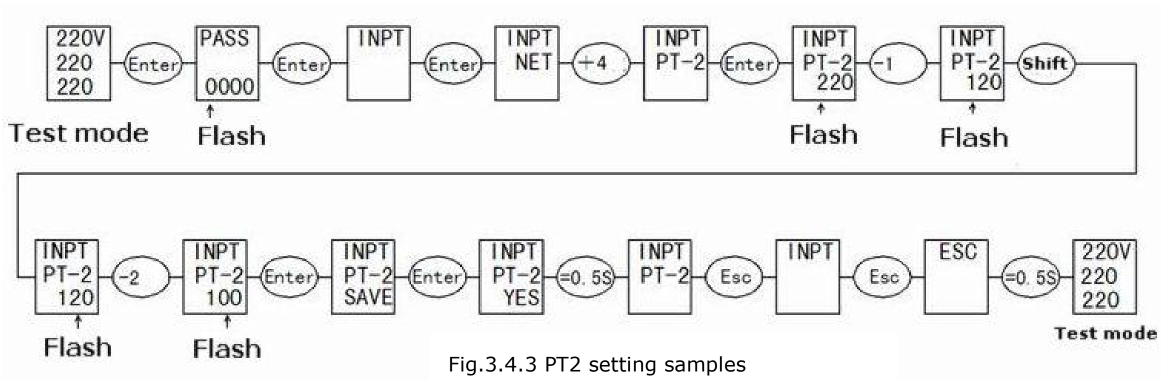


Fig.3.4.3 PT2 setting samples

CT1,CT2 set steps similar as PT2

- Modify communication parameter

Change the communication addr. from 254 to 251.Refer fig.3.4.4

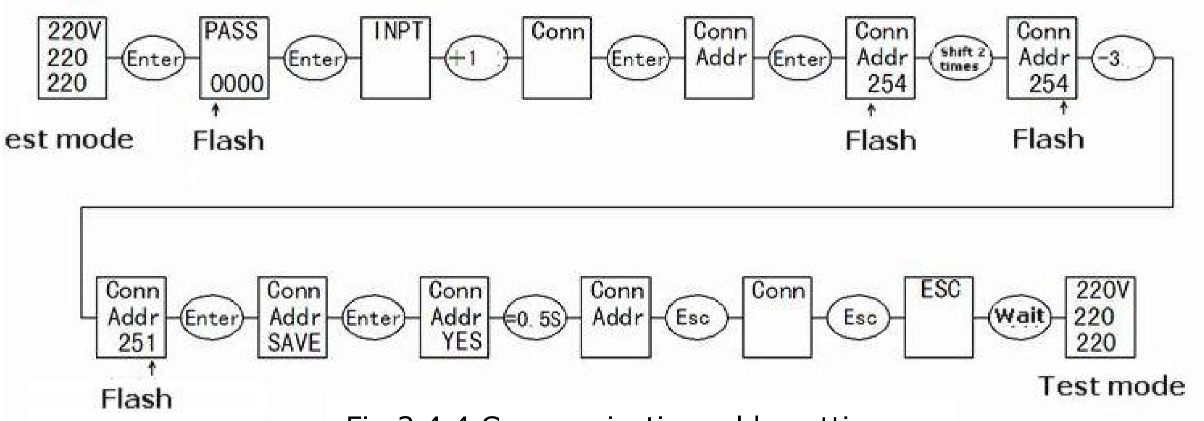


Fig.3.4.4 Communication addr. setting

- Modify connection mode

Change the connection mode from 3 Phase 4 Wire to 3 Phase 3 Wire.Refer fig.3.4.5

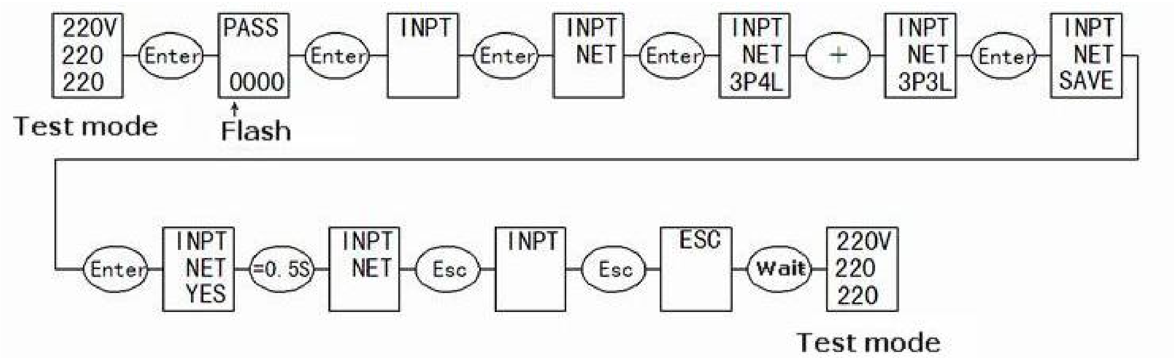


Fig.3.4.5 Connection mode setting

- Multi-tariff setting

  Support max.8-periods,4-tariffs

  Period setting:

  Period is default as 0:00,can't be changed.If don't use one period,it should be same as the last period.Separate hour and minute by '.'

  Tariff setting:

1	2	3	4
tip	peak	Usual	valley

This period tariff is tariffof this period until the next period.For example,period 8 tariff is the tariff from period 8 until period 1.Check below case:

A company plan to execute different tariffs:

Tip period:18:00~22:00

Peak period:8:00~12:00

Usual period:12:00~18:00   22:00~24:00

Valley period:0:00~8:00

Power meter setting:

Period	Tariff	Time	Setting
1	4	00.00（default and can't be changed）	00.00~08.00 Tariff 4
2	2	08.00	08.00~12.00 Tariff 2
3	3	12.00	12.00~18.00 Tariff 3
4	1	18.00	18.00~22.00 Tariff 1
5	3	22.00	22.00~22.00 Tariff 3
6	3	22.00	22.00~22.00 Tariff 3
7	3	22.00	22.00~22.00 Tariff 3
8	3	22.00	22.00~00.00 Tariff 3

Items setting:

First level menu	Second level menu		Third level menu
	Display	Explain	
INPT Signal input	NET	fan-in network	Optional:3P4L or 3P3L
	CT-1	rated primary current	Input：1~5000A
	CT-2	rated secondary current	Optional:5A/1A
	PT-1	rated primary voltage	Input：10~（3500×M）unit V（coefficient M=10）
	PT-2	rated secondary voltage	Input：100~400V
CONN Communication	ADDR	Slave address	Input：1-254
	BAUD	Bit rate	Optional：24/48/96/192According bit rate：2400/4800/9600/19200bps
	DATA	Data pattern	Optional ：N82（None parity，8 digit data,2 end bits），E81（Dual parity，8 digit data,1 end bit），O81（Odd parity，8 digit data,1 end bit），N81（None parity，8 digit data,1 end bits）。
EPEQ Energy	CLR	Energy clear	Optional：YES/NO
SYS System	B.L	Back light	Input ：0-30（0is defaulted to always light）
	PASS	Passport setting	input：0000-9999（default is 0000）
	RST	System reset	Reset the power meter
T.J Min.& max value	RST	Min./max. value reset	Select ：NO/YES Reset the min./max value as the current tested value
	TIME	Period of the most value statistics	Input ：1~1440 minutes
SOE	CLR	SOE clear to zero	select：NO/YES clear SOE
DEMD Demand	CLR	Demand clear	select：NO/YES clear demand

DATA	YEAR	Year	Input ：2000~2099
	MON	Month	Input ：1~12
	DAY	Date	Input ：1~31
TIME	HOUR	Hour	Input ：0~23
	MINU	Minute	Input ：0~59
	SEC	Second	Input ：0~59
A IH Over current alarm	EN	Energy use state	Optional ：OFF/ON
	A-VL	The value above the limit	Input ：0~6000A
	R-VL	Return value	Input ：0~6000A
	DLY	Over limit time	Input ：1~600S
A UL Low voltage alarm	EN	Energy use state	Select ：OFF/ON
	A-VL	The value above the limit	Input ：0~（4200×M）unit V（coefficient M=10）
	R-VL	Return value	Input ：0~（4200×M）unit V（coefficient M=10）
	DLY	Over limit time	Input ：1~600S
A UH Over voltage alarm	EN	Energy use state	Select ：OFF/ON
	A-VL	The value above the limit	Input ：0~（4200×M）unit V（coefficient M=10）
	R-VL	Return value	Input ：0~（4200×M）unit V（coefficient M=10）
	DLY	Over limit time	Input：1~600S
A FL Low frequency alarm	EN	Energy use state	Select：OFF/ON
	A-VL	The value above the limit	Input：0~99.99Hz
	R-VL	Return value	Input：0~99.99Hz
	DLY	Over limit time	Input：1~600S
A FH Over frequency alarm	EN	Energy use state	Select：OFF/ON
	A-VL	The value above the limit	Input：0~99.99Hz
	R-VL	Return value	Input：0~99.99Hz
	DLY	Over limit time	Input:1~600S
APFL Low power factor alarm	EN	Energy use state	Select：OFF/ON
	A-VL	The value above the limit	Input：0~1.000
	R-VL	Return value	Input：0~1.000
	DLY	Over limit time	Input：1~600S
TE0.1 Period 1	TARIFF	Tariff	Select：1~4。Representative as tip, peak, flat and valley
	TIME	Time	Unchangeable, fixed as 00.00
TE0.2~ TE0.8 Period 2~ period 8	TARIFF	Tariff	Select：1~4。Representative as tip, peak, flat and valley
	TIME	Time	Input：00.00~23.59

4. Communication

4.1 MODBUS protocol

MODBUS-RTU communication protocol is common protocol which is master-slave responding connection. Master station transmit signal and address some terminal equipment.The terminal equipment transmit the responding signal to the master station.

4.2 Communication protocol address table and introduction

4.2.1 Communication protocol address table

- Digital quantity address table. Support the function code 02 read

Address	Type	Name	Register
10100	RO	DI1	1
10101	RO	DI2	1

- System information address table. Support the function code 03,04 read and the function code06,10 setting

Address	Type	Name	Value range	Remark	Register
40010	RO	ASCII code is the hardware version no.			1
40011	RO	ASCII code is the software version no.			1
40012	RO	ASCII code is model no.			1
40013～40017	RO	ASCII code is product serial no.			5 sequential read
40020	RW	System time year and month		Support full-write& broadcast full-write	1
40021	RW	System time date and hour			1
40020	RW	System time minute and second			1
40021	RW	System time millisecond			1
40025	RW	Password	0000~9999	Default:0000	1
40030	RW	Communication address	1～254	Default:254	1
40032	RW	Communication bit rate	3~6	Default:5	1
40034	RW	Communication verity mode	0～3	Default:0	1
40050	RO	Subsite state			1
40055	WO	Subsite setting			1

40057	WO	Display interface setting	0		1
40060	RO	Electrical degree frozen and unfrozen state			1

- System parameter address table.Support function code 03,04 reading and function code 06,10 setting

Address	Type	Name	Value range	Remark	Register
40065	RW	Min.max value statistic interval	1~1440min	default：10	1
40071	RW	Telemetering wiring method	1/3	default：1	1
40073	RW	PT rated primary voltage	100~35KV	default：220/220	2 （Sequential Write)
40074	RW	PT rated secondary voltage	100～400V		
40076	RW	bit14-bit0 instead of CT rated primary current bit15=0/1 instead secondary is 5A/1A	rated primary current: 1～5000A	default：0x5 （5：5）	1
40096	RW	Backlight light time	0~30 minutes	default：5	1
40098～40105	RW	The first set tariff setting		default：0	8 Sequential Write 8 sequence read
40106	RW	The first set tariff select		default：0	1

- Basic electric parameter address table. Support function code 03,04 reading.

Address	Type	Data definition	Register
40120	RO	Line voltage: Uab	1
40121	RO	Line voltage: Ubc	1
40122	RO	Line voltage: Uca	1
40123	RO	Average value of line voltage: ULLAvg	1
40124	RO	Phase voltage Uan	1
40125	RO	Phase voltage Ubn	1
40126	RO	Phase voltage Ucn	1
40127	RO	Average value of line voltage ULNAvg	1
40128	RO	Current Ia	1
40129	RO	Current Ib	1
40130	RO	Current Ic	1
40131	RO	Average value of current IAvg	1
40132	RO	Reserve read as 0	1
40133	RO	Total frequency（F）	1

40134	RO	Total power factor（PF）	1
40135	RO	Total active power（W）	1
40136	RO	Total reactive power（Q）	1
40137	RO	Total apparent power（S）	1
40138	RO	A phase power factor（PFa）	1
40139	RO	B phase power factor（PFb）	1
40140	RO	C phase power factor（PFc）	1
40141	RO	A phase active power（Wa）	1
40142	RO	B phase active power（Wb）	1
40143	RO	C phase active power（Wc）	1
40144	RO	A phase reactive power（Qa）	1
40145	RO	B phase reactive power（Qb）	1
40146	RO	C phase reactive power（Qc）	1
40147	RO	A phase apparent power（Sa）	1
40148	RO	B phase apparent power（Sb）	1
40149	RO	C phase apparent power（Sc）	1

*Note:

3 phase 3 wire,the data between 40122,40124~40127,40138~40149 is data invalid

1) The correspondence of above data and actual value is as below:
   Voltage:U=(Ai/100)*(PT1/PT2)，Ai is a unsigned integer which unit is V
   Current:I=(Ai/1000) *(CT1/CT2)，Ai is a unsigned integer which unit is A
   Active power:P=Ai*(PT1/PT2)*(CT1/CT2)，Ai is signed integer which unit is W
   Reactive power:Q=Ai*(PT1/PT2)*(CT1/CT2)，Ai is signed integer which unit is var
   Apparent power:S=Ai*(PT1/PT2)*(CT1/CT2)，Ai is a unsigned integer which unit is VA
   Power factor:S=Ai*(PT1/PT2)*(CT1/CT2)，Ai is a unsigned integer with no unit
   Frequency:F=Ai/100, Ai is a unsigned integer which unit is Hz
2) Average value computing method
   - ✓ Line voltage average value:
     3P4W:ULLAvg = (Uab + Ubc + Uac）/3
     3P3W:ULLAvg = (Uab + Ubc）/2
   - ✓ Phase voltage average vaule:
     3P4W:ULNAvg = (Uab + Ubc + Uac）/3
     3P3W:ULNAvg = 0
   - ✓ Current average value:
     3P4W:IAvg = (Ia+Ib+Ic)/3。
     3P3W:IAvg = (Ia+Ib+Ic)/3

- Electrical degree address table. Support function code 03,04 reading and function code 10 setting.

Address	Type	Data definition	Register
40200	RW	Total active power absolute electrical degree cumulative value	2
40202	RW	Total reactive power absolute electrical degree cumulative value	2
40216	RO	Total active power(+) absolute electrical degree cumulative value	2

40218	RO	Total tip tariff active power(+) absolute electrical degree cumulative value	2
40220	RO	Total peak tariff active power(+) absolute electrical degree cumulative value	2
40222	RO	Total flat tariff active power(+) absolute electrical degree cumulative value	2
40224	RO	Total valley tariff active power(+) absolute electrical degree cumulative value	2
40226	RO	Total active power(-) absolute electrical degree cumulative value	2
40236	RO	Total reactive power(+) absolute electrical degree cumulative value	2
40246	RO	Total reactive power(-) absolute electrical degree cumulative value	2
40256	RO	Ⅰ phase total reactive power absolute electrical degree cumulative value	2
40266	RO	IV phase total reactive power absolute electrical degree cumulative value	2
40276	RO	II phase total reactive power absolute electrical degree cumulative value	2
40286	RO	III phase total reactive power absolute electrical degree cumulative value	2

***Note:**

1) The correspondence of above data Ai and actual value is as below:

Active energy: Ep=Ai/10, Ai a unsigned long integer(0~999,999,999),unit is kWh

Reactive energy: Eq=Ai/10, Ai a unsigned long integer(0~999,999,999),unit is kvarh

2) Table bottom setting don't affect the frozen degree data.

- Remote signaling and over limit alarm address table. Support function code 03,04 reading

Address	Type	Data definition	Register
40520	RO	Digital input remote signaling	1
40521	RO	Power parameter over limit alarm remote signaling	2(Sequential Read)

- System parameter address table, support function code 03,04 reading and function code 06,10 setting

Address	Type	Name	Value range	Remark	Register
40530	RW	Current off-limit value	0~6000A	6	1
40531	RW	Current return value	0~6000A	5	1
40532	RW	Delay time	1s~600s	600	1
40533	RW	Enabled	0x000(disabled);0xCC33H(enabled)	0x0000	1

40535	RW	Low-voltage off-limit value	0~42000V	0	1
40536	RW	Low-voltage off-limit value	0~42000V	50	1
40537	RW	Delay time	1s~600s	600	1
40538	RW	Enabled	0x000(disabled);0xCC33H(enabled)	0x0000	1
40540	RW	Over-voltage off-limit value	0~42000V	260	1
40541	RW	Over-voltage return value	0~42000V	220	1
40542	RW	Delay time	1s~600s	600	1
40543	RW	Enable	0x000(disabled);0xCC33H(enabled)	0x0000	1
40550	RW	Over-frequency off-limit value	0—99.99Hz	55.0	1
40551	RW	Over-frequency return value	0—99.99Hz	54.0	1
40552	RW	Delay	1s~600s	600	1
40553	RW	Enable	0x000(disabled);0xCC33H(enabled)	0x0000	1
40555	RW	Over-power factor off-limit value	0—1.0	0.5	1
40556	RW`	Over-power factor return value	0—1.0	0.6	1
40557	RW	Delay	1s~600s	600	1
40558	RW	Enable	0x000(disabled);0xCC33H(enabled)	0x0000	1

***Note:**

1:The off-limit value and return value are primary setting values.

2: The data of alarm parameters:

- The current off-limit value,current return value and time.The off-limit value and return value are multiplied by 1,time data is multiplied by 1,Units are:A, A, ms.
- The voltage off-limit value, voltage return value and time.The off-limit value, return value and time data are multiplied by 1, Units are: V, V, s.
- The frequency off-limit value, frequency return value and time. The off-limit value and return value are multiplied by 100, time data is multiplied by 1, Units are: Hz, Hz, s.
- The power factor off-limit value, power factor return value and time. The off-limit value and return value are multiplied by 1000, time data is multiplied by 1, Unit: s.

- Power quality address table,support function code 03,04 reading

Address	Type	Data definition	Register
40760	RO	Voltage unbalance degree	1
40761	RO	Current unbalance degree	1

***Note:**

The corresponding relationship of the above data (Ai) and the actual data:

Unbalanced degree:Ai/10,Ai/10, Ai = unsigned integer, unit :%.

- Demand statistics, support 03 and 04 function code

Address	Type	Data definition	Register
40770	RO	Positive total active power maximum demand	2
40772	RO	Negative total active power maximum demand	2
40774	RO	Positive total reactive power maximum demand	2
40776	RO	Negative total reactive power maximum demand	2
40778	RO	Last month positive total active power maximum demand	2
40780	RO	Last month negative total active power maximum demand	2
40782	RO	Last month positive total reactive power maximum demand	2
40784	RO	Last month negative total reactive power maximum demand	2
40800	RO	Occurrence time of positive total active power maximum demand	3
40803	RO	Occurrence time of negative total active power maximum demand	3
40806	RO	Occurrence time of positive total reactive power maximum demand	3
40809	RO	Occurrence time of negative total reactive power maximum demand	3
40812	RO	Last month occurrence time of positive total active power maximum demand	3
40815	RO	Last month occurrence time of negative total active power maximum demand	3
40818	RO	Last month occurrence time of positive total reactive power maximum demand	3
40821	RO	Last month occurrence time of negative total reactive power maximum demand	3

***Note:**

Active power maximum demand: P=Ai/10, Ai denote unsigned integer, unit: W

Reactive power maximum demand: Q=Ai/10, Ai denote unsigned integer, unit: var.

- Electric parameter statistics address table. Support 03,04 function code.

Address	Type	Data definition	Register
41000	RO	Maximum value of Line-to-line voltage Uab	1
41001	RO	Maximum value of Line-to-line voltage Ubc	1
41002	RO	Maximum value of Line-to-line voltage Uca	1
41003	RO	Maximum value of Line-to-neutral voltage Uan	1
41004	RO	Maximum value of Line-to-neutral voltage Ubn	1
41005	RO	Maximum value of Line-to-neutral voltage Ubn	1
41006	RO	Maximum value of current Ia	1
41007	RO	Maximum value of current Ib	1
41008	RO	Maximum value of current Ic	1
41009	RO	(reserved, reading as zero)	1
41010	RO	Maximum value of total frequency(F)	1
41011	RO	Maximum value of total power factor(PF)	1
41012	RO	Maximum value of A-phase power factor(PFa)	1

41013	RO	Maximum value of B-phase power factor(PFb)	1
41014	RO	Maximum value of C-phase power factor(PFc)	1
41015	RO	Maximum value of A-phase active power(Wa)	1
41016	RO	Maximum value of A-phase reactive power(Qa)	1
41017	RO	Maximum value of A-phase apparent power(Sa)	1
41018	RO	Maximum value of B-phase active power(Wb)	1
41019	RO	Maximum value of B-phase reactive power(Qb)	1
41020	RO	Maximum value of B-phase apparent power(Sb)	1
41021	RO	Maximum value of C-phase active power(Wc)	1
41022	RO	Maximum value of C-phase reactive power(Qc)	1
41023	RO	Maximum value of C-phase apparent power(Sc)	1
41024	RO	Maximum value of total active power(W)	1
41025	RO	Maximum value of total reactive power(Q)	1
41026	RO	Maximum value of total apparent power(S)	1
41030	RO	Minimum value of Line-to-line voltage Uab	1
41031	RO	Minimum value of Line-to-line voltage Ubc	1
41032	RO	Minimum value of Line-to-line voltage Uca	1
41033	RO	Minimum value of Line-to-neutral voltage Uan	1
41034	RO	Minimum value of Line-to-neutral voltage Ubn	1
41035	RO	Minimum value of Line-to-neutral voltage Ucn	1
41036	RO	Minimum value of current Ia	1
41037	RO	Minimum value of current Ib	1
41038	RO	Minimum value of current Ic	1
41039	RO	(reserved, reading as zero)	1
41040	RO	Minimum value of total frequency(F)	1
41041	RO	Minimum value of total power factor(PF)	1
41042	RO	Minimum value of A-phase power factor(PFa)	1
41043	RO	Minimum value of B-phase power factor(PFb)	1
41044	RO	Minimum value of C-phase power factor(PFc)	1
41045	RO	Minimum value of A-phase active power(Wa)	1
41046	RO	Minimum value of A-phase reactive power(Qa)	1
41047	RO	Minimum value of A-phase apparent power(Sa)	1
41048	RO	Minimum value of B-phase active power(Wb)	1
41049	RO	Minimum value of B-phase reactive power(Qb)	1
41050	RO	Minimum value of B-phase apparent power(Sb)	1
41051	RO	Minimum value of C-phase active power(Wc)	1
41052	RO	Minimum value of C-phase reactive power(Qc)	1
41053	RO	Minimum value of C-phase apparent power(Sc)	1
41054	RO	Minimum value of total active power(W)	1
41055	RO	Minimum value of total reactive power(Q)	1
41056	RO	Minimum value of total apparent power(S)	1

41060	RO	Occurrence time of Line-to-line voltage (Uab) maximum Value	3
41063	RO	Occurrence time of Line-to-line voltage (Ubc) maximum Value	3
41066	RO	Occurrence time of Line-to-line voltage (Uca) maximum Value	3
41069	RO	Occurrence time of Line-to-neutral voltage (Uan) maximum value	3
41072	RO	Occurrence time of Line-to-neutral voltage (Ubn) maximum value	3
41075	RO	Occurrence time of Line-to-neutral voltage (Uca) maximum value	3
41078	RO	Occurrence time of current Ia maximum value	3
41081	RO	Occurrence time of current Ib maximum value	3
41084	RO	Occurrence time of current Ic maximum value	3
41087	RO	(reserved, reading as zero)	3
41090	RO	Occurrence time of total frequency(F)maximum value	3
41093	RO	Occurrence time of total power factor(PF)maximum value	3
41096	RO	Occurrence time of phase A power factor (PFa) maximum value	3
41099	RO	Occurrence time of phase B power factor (PFa) maximum value	3
41102	RO	Occurrence time of phase C power factor (PFa) maximum value	3
41105	RO	Occurrence time of phase A active power (Wa) maximum value	3
41108	RO	Occurrence time of phase A reactive power (Qa)maximum value	3
41111	RO	Occurrence time of phase A apparent power (Sa)maximum value	3
41114	RO	Occurrence time of phase B active power (Wb) maximum value	3
41117	RO	Occurrence time of phase B reactive power (Qb) maximum value	3
41120	RO	Occurrence time of phase B apparent power (Sb) maximum value	3
41123	RO	Occurrence time of phase C active power (Wc) maximum value	3
41126	RO	Occurrence time of phase C reactive power (Qc) maximum value	3
41129	RO	Occurrence time of phase C apparent power (Sc) maximum value	3
41132	RO	Occurrence time of total active power (W) maximum value	3
41135	RO	Occurrence time of total reactive power(Q)maximum value	3
41138	RO	Occurrence time of total apparent power(S)maximum value	3
41150	RO	Occurrence time of Line-to-line voltage (Uab) minimum value	3
41153	RO	Occurrence time of Line-to-line voltage (Ubc) minimum value	3
41156	RO	Occurrence time of Line-to-line voltage (Uca) minimum value	3
41159	RO	Occurrence time of Line-to-neutral voltage (Uan) minimum value	3
41162	RO	Occurrence time of Line-to-neutral voltage (Ubn) minimum value	3
41165	RO	Occurrence time of Line-to-neutral voltage (Ucn) minimum value	3
41168	RO	Occurrence time of current Ia minimum value	3
41171	RO	Occurrence time of current Ib minimum value	3
41174	RO	Occurrence time of current Ic minimum value	3
41177	RO	(reserved, reading as zero)	3
41180	RO	Occurrence time of total frequency (F) minimum value	3
41183	RO	Occurrence time of total power factor (PF) minimum value	3
41186	RO	Occurrence time of phase A power factor (PFa) minimum value	3
41189	RO	Occurrence time of phase B power factor (PFb) minimum value	3
41192	RO	Occurrence time of phase C power factor (PFc) minimum value	3

41195	RO	Occurrence time of phase A active power (Wa) minimum value	3
41198	RO	Occurrence time of phase A reactive power (Qa) minimum value	3
41201	RO	Occurrence time of phase A apparent power (Sa) minimum value	3
41204	RO	Occurrence time of phase B active power (Wb) minimum value	3
41207	RO	Occurrence time of phase B reactive power (Qb) minimum value	3
41210	RO	Occurrence time of phase B apparent power (Sb) minimum value	3
41213	RO	Occurrence time of phase C active power (Wc) minimum value	3
41216	RO	Occurrence time of phase C reactive power (Qc) minimum value	3
41219	RO	Occurrence time of phase C apparent power (Sc) minimum value	3
41222	RO	Occurrence time of total active power (W) minimum value	3
41225	RO	Occurrence time of total reactive power (Q) minimum value	3
41228	RO	Occurrence time of total apparent power(S)minimum value	3

***Note:**

The corresponding relationship of the above data(Ai) and the actual data:

Voltage: U= (Ai/100) × (PT1/PT2), Ai denote unsigned integer, unit is V

Current: I= (Ai/1000) × (CT1/CT2), Ai denote unsigned integer, unit is A

Active power: P= Ai × (PT1/PT2) × (CT1/CT2),Ai denote signed integer, unit is W

Reactive power: Q= Ai × (PT1/PT2) × (CT1/CT2), Ai denote signed integer, unit is var

Apparent power: S= Ai × (PT1/PT2) × (CT1/CT2), Ai denote unsigned integer, unit is VA

Power factor: PF=Ai/1000,Ai is unsigned integer, no unit.

Frequency: F=Ai/100,Ai is unsigned integer, unit is Hz.

- Electric parameter statistics. Support 03,04 function code.

Address	Type	Data definition	Register
42000	RO	Remote signal 1	1
42001	RO	Remote signal 2	1
42002	RO	Current Ia	2
42004	RO	Current Ib	2
42006	RO	Current Ic	2
42008	RO	(reserved, reading as zero)	2
42010	RO	Line-to- line voltage Uab	2
42012	RO	Line-to- line voltage Ubc	2
42014	RO	Line-to- line voltage Uca	2
42016	RO	Line-to-neutral Uan(valid in 3-phase,4-wire system)	2
42018	RO	Line-to-neutral Ubn(valid in 3-phase,4-wire system)	2
42020	RO	Line-to-neutral Ucn(valid in 3-phase,4-wire system)	2
42022	RO	Frequency（F）	2
42024	RO	Total active power（W）	2
42026	RO	Total reactive power（Q）	2
42028	RO	Total apparent power（S）	2
42030	RO	Total power factor（PF）	2
42032	RO	Total active electric energy（Ep）	2
42034	RO	Total reactive electric energy（Eq）	2

42036	RO	CT	1
42037	RO	Temperature	1
42038	RO	Voltage unbalance degree PU	1
42039	RO	Current unbalance degree PI	1

***Note:**

1. In the 3-phase 3-wire system, the data in 42014~42020 are invalid and value is 0

2.The corresponding relationship of the above data(Ai) and the actual data:

Voltage: U= (Ai/10), Ai denote unsigned integer, unit is V

Current: I= (Ai/1000), Ai denote unsigned integer, unit is A

Active power: P= Ai/10, Ai denote signed integer, unit is W

Reactive power: Q= Ai/10, Ai denote signed integer, unit is var

Apparent power: S= Ai/10, Ai denote unsigned integer, unit is VA

Power factor PF= Ai /1000, Ai denote signed integer, no unit

Frequency: F=Ai/100, Ai denote unsigned integer, unit is Hz.

Active electric energy: Ep=Ai/10,Ai denote unsigned long integer(0~999,999, 999),unit is kWh

Reactive electric energy: Eq=Ai/10,Ai denote unsigned long integer(0~999,999,999),unit is Kvarh

Temperature: T=(Ai/10),Ai denote unsigned integer, unit is ℃

Voltage unbalance degree: PU=Ai/10, Ai denote unsigned integer, unit is %

Current unbalance degree: PI=Ai/10, Ai denote unsigned integer, unit is %

- Temperature address table, support function code 03,04 reading

Address	Type	Data definition	Register
48000	RO	Temperature	1

***Note:**

1. The corresponding relationship of the above data(Ai) and the actual data:

Temperature T=(Ai/10), Ai denote signed integer, unit is ℃

4.2.2 Register address introduction

- Hardware version register 40010:stored in the program storage
- Software version register 40011:stored in the program storage
- Product mode no.40012:stored in the program storage
- Product serial no. 40013~40017:download in the E2PROM after production inspection
- System time—Register for Year and Month (40020): high bytes denote year, from 00 to 99, low bytes denote month, from 1 to12
- System time—Register for Day and Hour (40021): high byte denotes day, from 1 to 31; low byte denotes hour, from 0 to 23.
- z System time—Register for minute and second (40022): high byte denotes minute, from 00 to 59; low byte denotes second, from 00 to 59.
- System time—Millisecond Register (40023): from 0 to 999.
- Communication address (40030): from 1 to 254, 0 and 254 are reserved as broadcast address. The default is 254.
- Communication baud rate(40032) from 1 to 7, as shown below: Communication

Communication bit rate	Introduction
1	Reverse (setting void)
2	Reverse (setting void)
3	2400 bps
4	4800 bps
5	9600 bps
6	19200 bps
7	Reverse (setting void)

- Communication transfer format(40034):range 0~3,this mean the verify mode

Verify mode code	Introduction
0	No parity verify,2 end bit
1	Even verify,2 end bit
2	Odd verify,1 end bit
3	No parity verify,1 end bit

- Register for Slave station status (40050)

Bit site	Definition	Default	Note
Bit0	Remote signal shift sign	0	Zero clearing after remote signal inquiry
Bit1	Existence sign of SOE	0	Zero clearing after communication SOE inquiry
Bit2	Reserved	0	Zero clearing after action reset or communication inquiry
Bit3	Sign of checking time	1(Time was not ticked when power-up)	Zero clearing after remote time tick
Bit4	Reserved	0	
Bit5	Reserved	0	
Bit6	Reserved	0	
Bit7	Reserved	0	
Bit8	Reserved	0	
Bit9	Reserved	0	
Bit10	Reserved	0	
Bit11	Reserved	0	
Bit12	Reserved	0	
Bit13	Reserved	0	
Bit14	Reserved	0	
Bit15	Reserved	0	

- Register for Slave station settings (40055)

Bit site	Definition	Default
Bit0	Clear SOE	0

Bit1	Reserved	0
Bit2	Clear all the pulse count	0
Bit3	Reserved	0
Bit4	Reserved	0
Bit5	Reserved	0
Bit6	Reserved	0
Bit7	Reserved	0
Bit8	Freeze all the electric energy	0
Bit9	Unfreeze all the electric energy	0
Bit10	Reserved	0
Bit11	Clear demand	0
Bit12	Reserved	0
Bit13	Reserved	0
Bit14	MAX/MIN value revert	0
Bit15	Reset device	0

***Note:**

1. It needn't to return messages when broadcast freeze or unfreeze. After sending the freeze command by the upper computer, all of the reading electric energy values are equal to the electric accumulated value of the frozen moment, but the internal measurement of electric energy value continues to accumulate. If you want to refresh the reading total value of electric energy, the upper computer must sending the unfreeze command.

System display inner electric energy, but not freeze energy。

- Power meter display setting 40057:

40057 high byte: electrical degree page setup

Code	Introduction
0	No operation
1	Total active power absolute electrical degree cumulative value
2	Total reactive power absolute electrical degree cumulative value
3	Total active power(+) absolute electrical degree cumulative value
4	Total active power(-) absolute electrical degree cumulative value
5	Total reactive power(+) absolute electrical degree cumulative value
6	Total reactive power(-) absolute electrical degree cumulative value
7	Ⅰ phase total reactive power absolute electrical degree cumulative value
8	II phase total reactive power absolute electrical degree cumulative value
9	III phase total reactive power absolute electrical degree cumulative value
10	IV phase total reactive power absolute electrical degree cumulative value
11	Tip rate absolute electrical degree cumulative value
12	Peak rate absolute electrical degree cumulative value
13	flat rate absolute electrical degree cumulative value
14	Valley rate absolute electrical degree cumulative value
15	Date

16	Time

40057 low byte: basic display page setting

Code	Introduction
0	No operation
1	Three phase current
2	Current unbalance degree
3	Three phase phase- neutral voltage
4	Three phase line-line voltage
5	Voltage unbalance degree
6	Frequency
7	Power factor
8	Three phase power factor
9	Three phase active power
10	Three phase reactive power
11	Three phase apparent power
12	Total active power, total reactive power, total apparent power

- Electric degree frozen/unfrozen state register 40060

High bits is 00.Low bits BIT0 means the frozen/unfrozen status of remote pulse.BIT0 means the degree status of frozen/unfrozen, 1 is frozen,0 is unfrozen

- Remote signaling connection mode 40071:1~5 as below:

Connection mode no.	Introduction
1	3 Phase 4 wire 3CT(3P4W/3PT+3CT)
2	Reserve (No setting)
3	3 Phase 3 wire 3CT(3P3W/3PT+3CT)
4	Reserve
5	Reserve

***Note:**

1. Time of backlighting(40096): 0~30 minutes, 0 denotes LCD constant ON.
2. The time-Period setting(40098~40105):set 4 rates,8 period

- Period rate setting:

Register	Period	default	Note
40098	Period 1	0(00:00)（fixed as 0000）	The first two units is the hour,the last two is the minutes. For example,1245 = 12:45 2356=23:56
40099	Period 2	0(00:00)	
40100	Period 3	0(00:00)	
40101	Period 4	0(00:00)	
40102	Period 5	0(00:00)	
40103	Period 6	0(00:00)	
40104	Period 7	0(00:00)	
40105	Period 8	0(00:00)	

***Note:**

1. The high period should larger than the low period. The first period is fixed as 00:00.
2. The blank period should be set as the last period.

- Register 40106 the first rate setting

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
40092	Period 8		Period 7		Period 6		Period 5		Period 4		Period 3		Period 2		Period 1	

Every two units denote period rate

00	01	10	11
Tip	Peak	Flat	Valley

***Note:**

1. The period N~N+1 execute the rate setting of period N

- 4 DI (40520): read the remote signaling state, low byte 0~3 is the 1st ~4th remote signaling input. Other digit zero fill.

Byte digit	7	6	5	4	3	2	1	0
40520 high byte(zero fill)	0	0	0	0	0	0	0	0
40520 low byte	0	0	0	0	0	0	DI2	DI1

- Protection remote signals(40521~40522):read line alarm status. Explained as follows:

Bit site	7	6	5	4	3	2	1	0
40520Hi	0	0	0	0	0	0	0	0
40520Lo	Under power factor phase A	Under-fre quency	Over-freq uency	Under-v oltage phase A,A-B	Over-vol tage phase A,A-B	Off-limit Current phase A	Reserved	Reserved
40521Hi	Under power factor phase B	Reserved	Reserved	Under-v olt age phase B,B-C	Over-vol tage phase B, B-C	Off-limit current phase B	Reserved	Reserved
40521Lo	Under power factor phase C	Reserved	Reserved	Under-v olt age phase C,C-A	Over-vol tage phase C,C-A	Off-limit Current phase C	Reserved	Reserved

- Register of demand occurrence time. Register 40800,40801 and 40802:

The high order bits of register 40800 denote year, range: 0 ~99

The low order bits of register 40800 denote month, range: 1~12

The high order bits of register 40801 denote day, range: 1~31

The low order bits of register 40801 denote hour, range: 0~23
The high order bits of register 40802 denote minute, range: 0~59
The low order bits of register 40802 denote second, range: 0~59.

- Register of quick remote signal inquiryʊʊRegister 42000 and 42001:

Byte digit	7	6	5	4	3	2	1	0
42000 Hi	0	0	0	0	0	0	DI2	DI1
42000 Lo	Under power factor phase A	Under-frequency	Over-frequency	Under-voltage phase A,A-B	Over-voltage phase A,A-B	Off-limit Current phase A	Reserved	Reserved
42001 Hi	Under power factor phase B	Reserved	Reserved	Under-volt age phase B,B-C	Over-voltage phase B, B-C	Off-limit current phase B	Reserved	Reserved
42001 Lo	Under power factor phase C	Reserved	Reserved	Under-volt age phase C,C-A	Over-voltage phase C,C-A	Off-limit Current phase C	Reserved	Reserved

4.2.3 SOE communication format:
The function code of SOE inquiry is 55H which is the extension part of MODBUS RTU protocol. These function codes are used to ask SOE in the nominated address and do not support broadcasting command.
The communication format is as follows:

- Query:

For example:

Field Name	Example(HEX)
Slave Address	FE
Function	55
CRC16Lo	81
CRC16Hi	EF

- Response:

The length of the data-structure is 8 bytes:

Information	Year	Month	Day	Hour	Minute	Second	high byte of millisecond	Low byte of millisecond

Information Byte: BIT7, BIT6 denote the status of remote signal

BIT7	BIT6	Definition
0	0	Remote signal from OFF to ON (0-->1)
1	1	Remote signal from ON to OFF (1-->0)

1	0	Off-limit alarm caused by the device (0-->1)
0	1	Undefined

BIT0~BIT5 denote the number of remote signal: single 0-7

No.	Note	No.	Note
0	DI1	15	Low-power factory phase A
1	DI2	18	Off-limit current phase B
2	Reserve	19	Over-voltage phase B,B-C
3	Reserve	20	Under-voltage phase B,B-C
10	Off-limit current phase A	23	Low-power factory phase B
11	Over-voltage phase A,A-B	26	Off-limit current phase C
12	Under-voltage phase A,A-B	27	Over-voltage phase C,C-A
13	Over-frequency phase A	28	Under-voltage phase C,C-A
14	Low-frequency phase A	31	Low-power factory phase C

Year byte: 00~99, represent the year from 2000 to 2099;

Month byte: 01~12;

Day byte: 01~31;

Hour byte: 00~23;

Minute byte: 00~59;

Second byte:00~59

Millisecond High byte 0~255(together with the millisecond high byte to constitute millisecond, range from 0~999)

Millisecond Low byte: 0~255; (together with the millisecond low byte to constitute millisecond, range from 0~999)

For example, (One piece of SOE, the length of the data-structure is 8 bytes. Described time is 2002-3-25 10:32:24 300 millisecond. Status of the third remote signal change from ON to OFF.)

Field Name	Example(Hex)
Slave Address	FE
Function	55
Byte Count	0A
SOE Status	00
SOE0-information	C2
SOE0-year	02
SOE0-month	03
SOE0-date	19
SOE0-hour	0A
SOE0-minute	20
SOE0-second	18
SOE0-millisecond high	01
SOE0-millisecond low	2C
CRC16 Lo	52
CRC16 Hi	BE

The data length is decided by the SOE-number (M) and the SOE-data-structure, the range of M is from 0 to 4. The slave station transmit 4 SOE each time when M beyond 4.If M less than 4, all the SOE will be transmitted at one time. If there is no SOE transmitted, fill 0 in Byte-Count field. Otherwise SOE-Status will be followed by the Byte-Count. The lowest-bit of SOE-Status (BIT0) indicate whether there is any other SOE or not. When BIT0 is 1, it means there are some SOE waiting for the master station inquire. The other remaining bits (BIT1~BIT7) are reserved.

5. Self-check

When the power meter has below problems, customers could check and try to solve:

- Tested data corruption: try by power-off then re-up the power meter
- Communication error: check the slave computer address to make sure the address is only. Check whether the communication parameter setting is right, whether the communication cable is right connection, and whether there’s serious interference.
- If the communication address is right but still communication error, and different to say where the error happened, we suggest to contact the power meter with a small cable and run the configuration software to test. If communication is normal, the problem is the cable or the upper computer.