Multi-function Power Meter

User Manual

Applied to:
Sfere720A
Sfere720B

JIANGSU SFERE ELECTRIC CO., LTD.

Safety instructions

	**Dangerous voltage!** **Danger to life or risk of serious injury. Disconnect system and device from power supply before beginning work.**
	**Caution:** **Please follow the documentation. This symbol warns of possible danger that can arise during installation, commissioning work.**

CAUTION:

◆ Make sure only the qualified technicians perform the installation and maintenance;
◆Before performing wiring operation to the meter, make sure the CT input signal and the power supply are switched off;
◆The electrical parameters supplied should be within the rated range;

The following situations may result in damages to the meter or cause mistakes in the operation of the meter.
◆The voltage of the auxiliary power supply goes beyond the rated range.
◆The frequency of the power distribution system goes beyond the rated range.
◆The input polarity of the voltage or the current is incorrect.
◆Remove or connect the communication plugs without powering off.
◆Wrongly connected the signal terminal wires to power supply source.

Please don’t touch the rear terminals when the meter is in operation!

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1. Product description

1.1 Compliance with standards

International standards

IEC62053-22:2003 Electricity metering equipment (a.c.)-Particular requirements-Part 22: Static meters for active energy (classes 0,2S and 0,5S).

IEC62053-23:2003 Electricity metering equipment (a.c.)-Particular requirements-Part 23: Static meters for reactive energy (classes 2 and 3).

IEC61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements.

IEC 61000-2-11 Electromagnetic compatibility (EMC)- Part 2-11

IEC60068-2-30 Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12h+12h cycle)

1.2 General

SFERE720A/B multi-function power meters can measure voltage, current, frequency, power, power factor, energy, harmonics and demand, record SOE events, and realize off-limit alarm. They also have the functions such as communication, digital input, relay output and energy pulse output. As an advanced smart digital front-end acquisition components for grid, they are widely applied in many kinds of control systems, energy management systems, substation automation systems, power distribution automation systems, smart distributors and switch cabinets. This series of products provide many wiring methods and convenient operation methods which can meet different requirements at field.

1.3 Model selection

		SFERE720A	SFERE720B
Appearance and accuracy	Display mode	LCD	LCD
	Installation mode	Panel mounting	Panel mounting
	Active energy accuracy	0.5S	0.5S
	Reactive energy accuracy	2S	2S
Real-time measurement	U/I/P/Q/S/PF/F	■	■
	Demand	■	■
	Neutral current	-	■
Energy metering	Bi-directional energy	■	■
	Four-quadrant reactive energy	■	■
	Spare energy	-	■
	Tariff energy	-	■
Power quality	Voltage/current THD	-	■
	Sub-harmonic content	-	2^{nd} - 51^{st}
	Sequence component and phase position of voltage and current	-	■
	Voltage and current unbalance	-	■
	Crest factor, current K factor	-	■
Data record	Meter/load running time	■	■
	Demand/max./min. Value record	-	■
	Off-limit record	-	■
	SOE event record	-	■
Input and output	Energy pulse output	■	■
	RS485 communication interface	■	■
	Digital input	-	■
	Relay output	-	■

Note: ■ Yes;

— No

2. Technical parameters

2.1 Technical specification

Working environment	
Working temperature	-10°C to 55°C
Storage temperature	-25°C to 70°C
Relative humidity	≤95% RH, no condensation
Working altitude	≤2500m
Protection degree	Front case IP64, rear case IP20.
Insulation	Between signal, power supply, output terminal to case resistance >100MΩ
Working power supply	
Rated range	AC/DC（20～300）V
Power consumption	≤5VA
Withstand voltage	≥2kV
Voltage input	
Rated range	230V/400V（continuous: 1.2Un）
Resolution	0.1 V
Impedance	1.6 MΩ/per phase
Power consumption	≤0.1 VA /per phase
Over voltage	Instantaneous：2 times/10s
Frequency	45-65 Hz
Current input	
Range	5A/1A, (continuous: 1.2In)
Resolution	1 mA
Impedance	≤20mΩ/per phase
Power consumption	≤0.2 VA/per phase
Over current	Instantaneous：10 times/5s
Relay output	
Capacity	5A/250 VAC; 5A/30 VDC

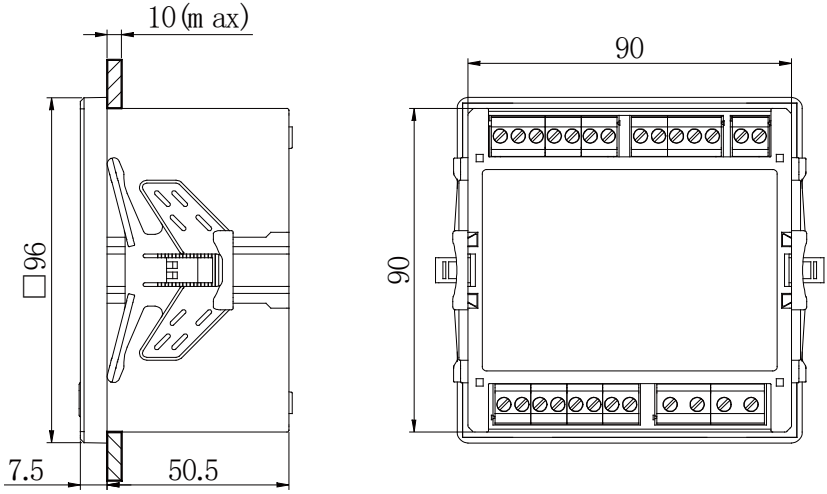
Isolation voltage	Between contact and coil: 2000 VAC / min
Action time	10 ms max
Release time	5 ms max
Mechanical service life	10^6 times
Energy pulse output	
Pulse width	80ms±20%
Max. terminal voltage	35V
Max. terminal current	10mA
Pulse frequency	≤10Hz
Digital input	
Sensitivity	ON:140～270V AC, OFF: <110 V AC
Isolation voltage	5000 VAC (1 min)
Scanning time	1 ms
Wave filtering time	30 ms
Communication interface	
Physical interface	RS-485
Communication speed	Up to 115.2 kbps
Communication protocol	Modbus-RTU
Isolation voltage	2000 VAC (1 min)
Real-time clock	
Error	≤0.5s/day
Electromagnetic compatibility	
Electrostatic discharge immunity: IEC 61000-4-2-III Radiated, radio-frequency, electromagnetic field immunity: IEC 61000-4-3-III Electrical fast transient/burst immunity: IEC 61000-4-4-IV Surge immunity: IEC 61000-4-5-IV Immunity to conducted disturbances, induced by radio-frequency fields: IEC 61000-4-6-III Power frequency magnetic field immunity: IEC 61000-4-8-III Voltage dips, short interruptions and voltage variations immunity: IEC 61000-4-11-III	

2.2 Function parameters

Functions	Sign	Accuracy	Range	Display range
Voltage	U	0.5	10--380 V	0--999.9 kV
Current	I	0.5	0--5 A	0--99.99 kA
Active power	P	0.5	0—5.7 kW	0--9999 MW
Reactive power	Q	0.5	0—5.7 kvar	0--9999 Mvar
Apparent power	S	0.5	0—5.7 kVA	0--9999 MVA
Power factor	PF	0.5	0--1.00	0--1.000
Frequency	F	±0.01Hz	45--65 Hz	45.00Hz-65.00 Hz
Active energy	EP	0.5s	--	0--99999999 MWh
Reactive energy	EQ	2	--	0--99999999 Mvarh
Voltage THD	THDu	Class A	51	0--99.99 %
Current THD	THDi	Class A	51	0--99.9 9%
Voltage sub-harmonic content	HRU_h	Class A	51	0--99.99 %
Current sub-harmonic content	HRI_h	Class A	51	0--99.99 %
Voltage unbalance	Uunb	Class B	--	--
Current unbalance	Iunb	Class B	--	--
Voltage sequence component	U1, U2, U0	0.5	--	--
Voltage phase position	$\theta_{U\,L1}$,$\theta_{U\,L2}$, $\theta_{U\,L3}$	±0.1°		
Current sequence component	I1, I2, I0	0.5	--	--
Current phase position	$\theta_{I\,L1}$, $\theta_{I\,L2}$,$\theta_{I\,L3}$	±0.1°		
Extreme value	Max/Min	0.5	--	--
Demand	--	0.5	--	--

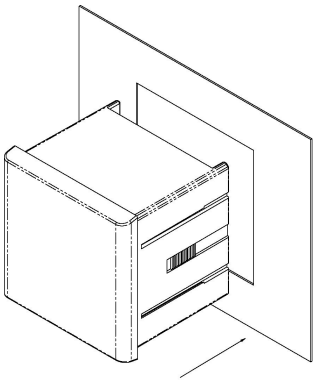
3. Installation and wiring

3.1 Meter dimensions

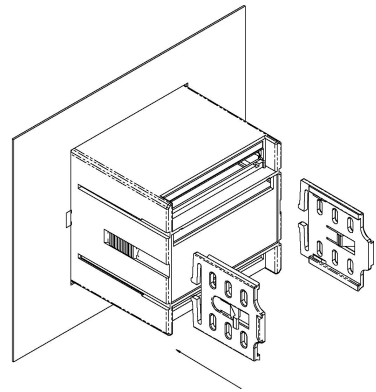


Picture 3-1 Meter dimensions

3.2 Installation method



Picture 3-2 Front view



Picture 3-3 Back view

1) Open a 91×91（mm）hole on fixed switch gear；

2) Take the fixing claps off the meter；

3) Insert the meter to the cut-out；

4) Place the fixing claps, insert, fasten and fix the meter firmly on the panel.

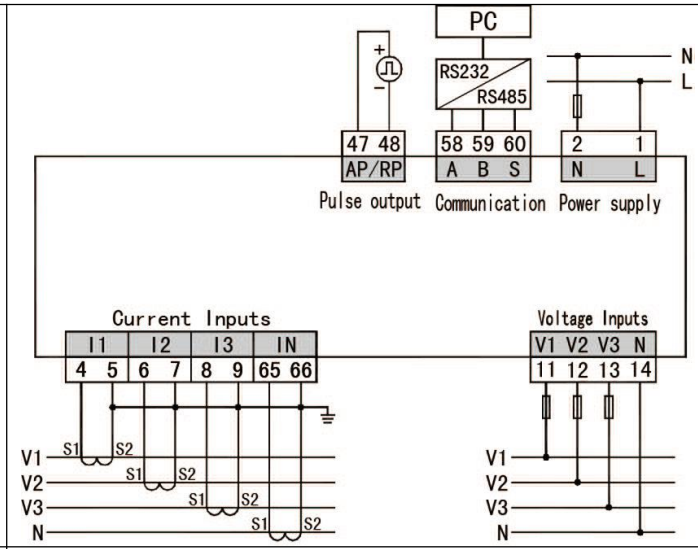
3.3 Functions of wiring terminals

Function wiring terminals adopt the following numbers:

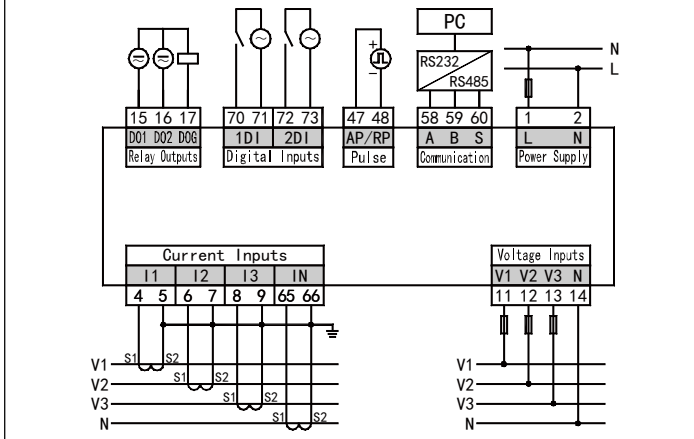
Power supply	1, 2	For AC and DC
Current signals	4, 5, 6, 7, 8, 9, 65, 66	Current input
Voltage signals	11, 12, 13, 14	Voltage input
Relay output	15—17	Two relay outputs
Energy pulse output	47, 48	Energy pulse output
RS485 communication	58, 59, 60	A, B and S severally.
Digital input	70—71, 72—73	Two digital inputs

Typical wiring diagram

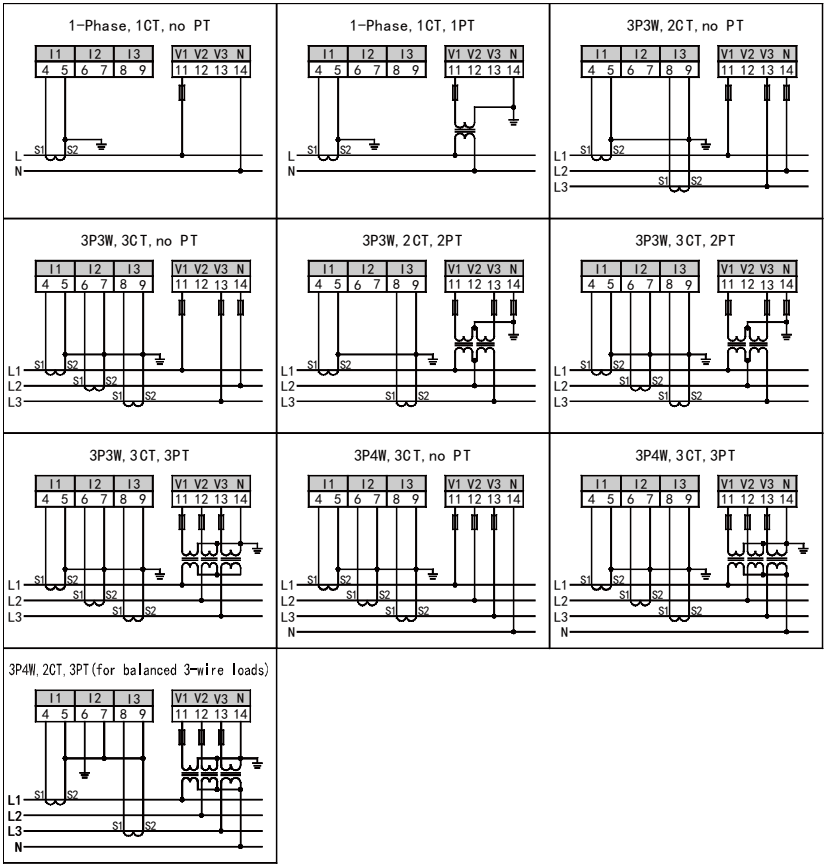
Sfere720A



Sfere720B



3.4 Signal input wiring diagram



(a) Input voltage can not be higher than the rated input voltage (100V or 380V) of the product, or PT shall be considered to be used. For ease of maintenance, we recommend to use the terminal block.

(b) Input current can not be higher than the rated input current (5A or 1A) of the product, or CT shall be considered to be used. If the external CT is connected with other meters, the tandem way shall be used for wiring. Before removing the product's current input wiring please cut off CT primary circuit or short-circuit secondary circuit. For ease of maintenance, we recommend to use

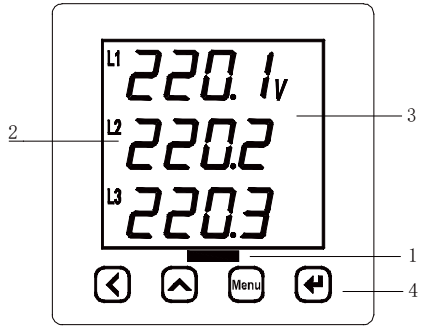
the terminal block.

(c) To ensure the input three-phase voltage corresponding to the current, the phase sequence and direction shall be consistent, or there will be numerical and symbol error.

(d) External wiring must be same with the internal wiring setting of meter, otherwise there will be a larger deviation for data measured by meter.

4. Display

4.1 Panel description



1—Model;

2—Phase indication;

3—Measured information and relevant information display;

4—Keys for switching display pages and setting parameters.

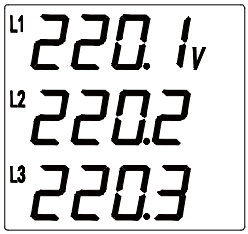
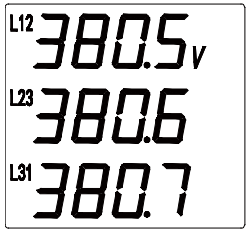
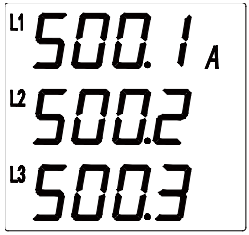
4.2 Electrical variables display

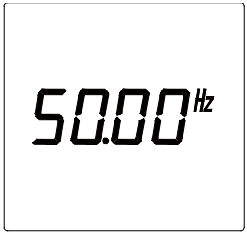
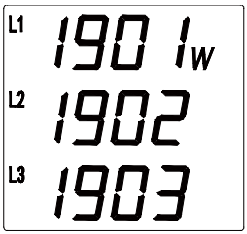
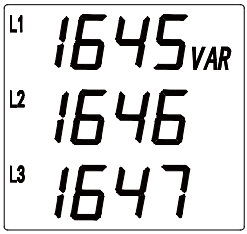
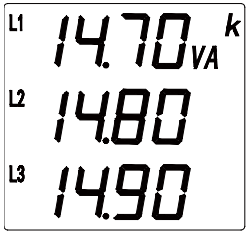
Meter measures and shows data of different types which are basic electrical variables, bi-directional energy, spare energy, harmonics, demand, extreme value, tariff energy and time. Press "<" or "^" to check the data of one type in cycle sequence. Press "Menu" to switch display pages between different types of data.

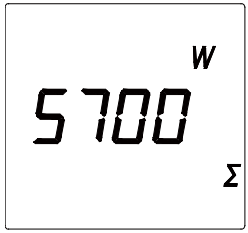
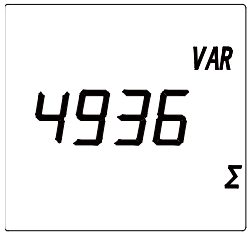
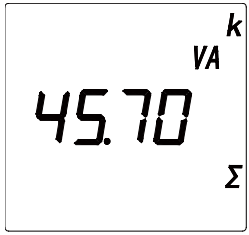
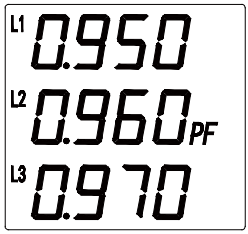
4.2.1 Electrical variables display

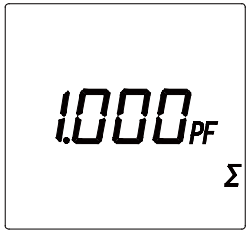
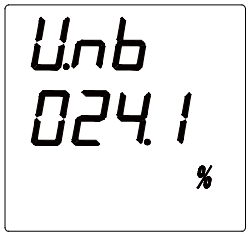
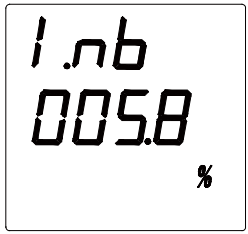
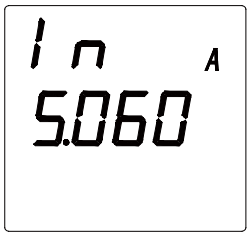
Electrical variables display pages show voltage, current, active power, reactive power, apparent power, power factor, frequency and switch status. The detailed instruction is shown as follows.

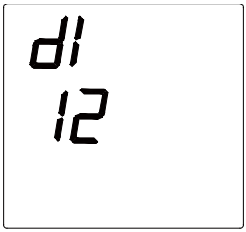
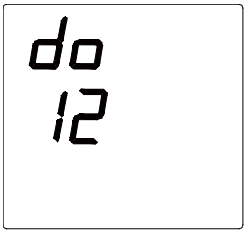
Table 4-1 Electrical variables display pages

Electrical variables display	Instruction
	Three-phase voltage U L1＝220.1V U L2＝220.2V U L3＝220.3V
	Three-line voltage U L12＝380.5V U L23＝380.6V U L31＝380.7V
	Three-phase current I L1＝500.1A I L2＝500.2A I L3＝500.3A

	Frequency. F＝50.00Hz
	Three-phase active power, P L1＝1901W P L2＝1902W P L3＝1903W
	Three-phase reactive power. Q L1＝1645var Q L2＝1646var Q L3＝1647var
	Three-phase apparent power. S L1＝14.7kVA S L2＝14.8kVA S L3＝14.9kVA

	Total active power, P＝5700W
	Total reactive power. Q＝4936var
	Total apparent power S＝45.7kVA
	Three-phase power factor PF L1＝0.950 PF L2＝0.960 PF L3＝0.970

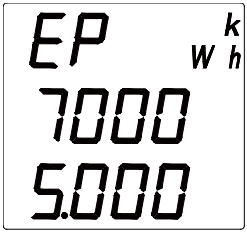
	Total power factor PF＝1.000
	Voltage unbalance Uunb＝24.1%
	Current unbalance I unb＝5.8%
	Neutral current In＝5.06A Note: if neutral current ratio is “0”, this page will not be shown.

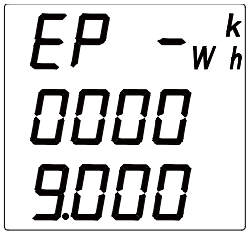
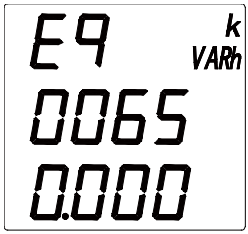
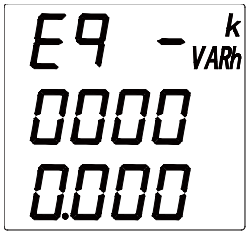
	Digital input. 1 and 2 correspond to two digital inputs severally. If a digital input acts, the corresponding number will flash.
	Relay output. 1 and 2 correspond to two relay outputs severally. If one relay output acts, the corresponding number will flash.

4.2.2 Energy display

Energy display pages show bi-directional active and reactive energy, active and reactive generator energy. The detailed instruction is shown as follows,

Table 4-2 Energy display pages

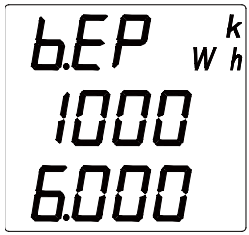
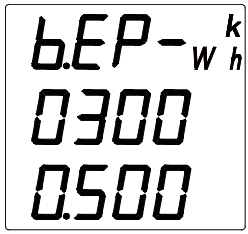
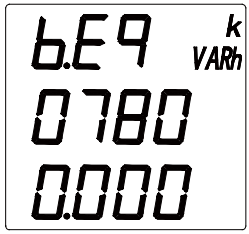
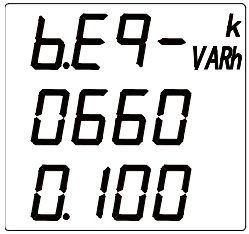
Energy display	Instruction
	Import total active energy. EP＝70005kWh

	Export total active energy. EP-＝9kWh
	Import total reactive energy. EQ＝650kvarh
	Export total reactive energy. EQ-＝0kvarh

4.2.3 Spare energy display

Spare energy display pages show active and reactive spare energy. When spare energy metering starts, total energy metering will stop. The detailed instruction is shown as follows,

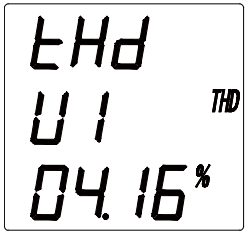
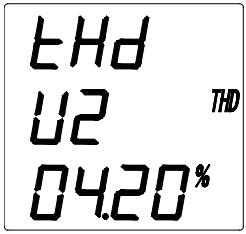
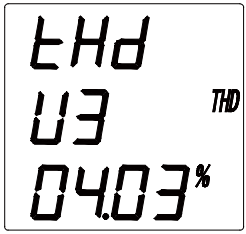
Table 4-3 Spare energy display pages

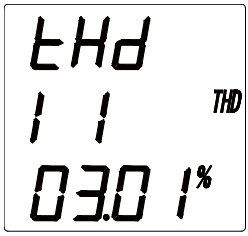
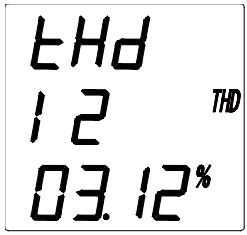
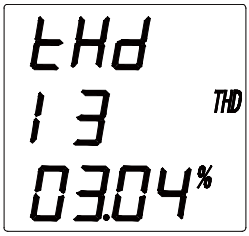
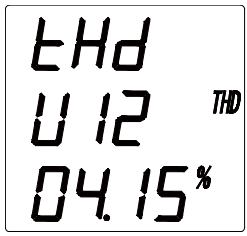
Spare energy display	Instruction
	Total import active spare energy, BEP＝10006kWh。
	Total export active spare energy, BEP-＝3000.5kWh
	Total import reactive spare energy, BEQ-＝7800kvarh。
	Total export reactive spare energy, BEQ-＝6600.1kvarh。

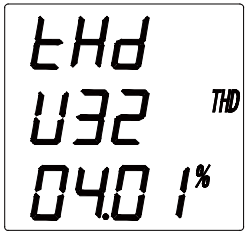
4.2.4 Harmonics display pages

Harmonics display pages show total harmonic content of voltage and current of each phase. Sub-harmonics are read through communication. The detailed instruction for display pages is shown as follows,

Table 4-4 Harmonics display pages

Harmonics display	Instruction
	Voltage THD. U1 THDv=4.16%
	Voltage THD. U2 THDv=4.20%
	Voltage THD. U3 THDv=4.03%

	Current THD. I1 THDi=3.01%
	Current THD. I2 THDi=3.12%
	Current THD. I3 THDi=3.04%
	Voltage THD in three phase three wire mode. U12 THDv＝4.15%.

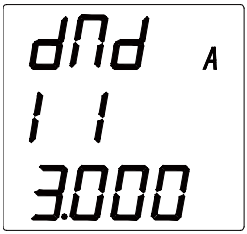
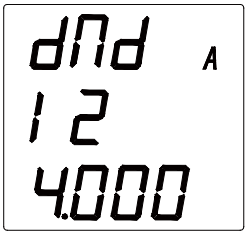
	Voltage THD in three phase three wire mode. U32 THDv＝4.01%.

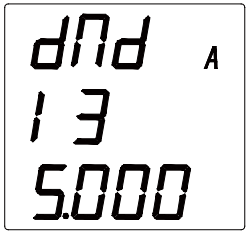
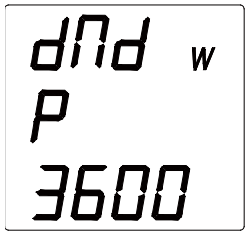
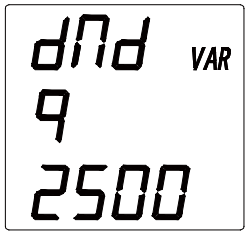
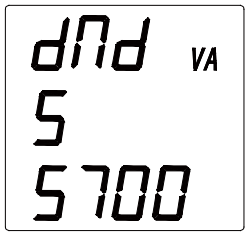
4.2.5 Demand value display pages

Demand display pages show the demand value of three-phase current and power.

The detailed instruction for demand display pages is shown as follows,

Table 4-5 Demand value display pages

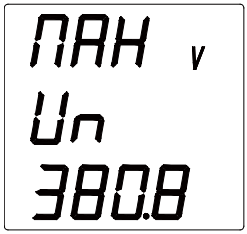
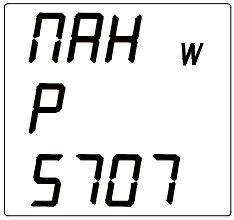
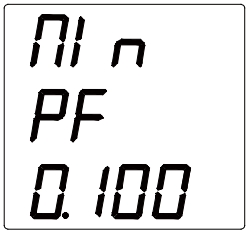
Demand value display	Instruction
	Max. demand of I_1=3A
	Max. demand of I_2=4A

	Max. demand of I_3=5A
	Max. demand of P=3600W
	Max. demand of Q=2500var
	Max. demand of S=5700VA

4.2.6 Extreme value display

Demand display pages show the maximum and minimum values of phase voltage, line voltage, current, active power, reactive power, apparent power and power factor. The detailed instruction is shown as follows,

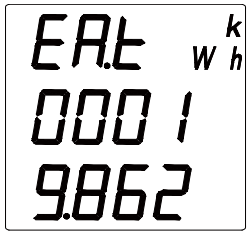
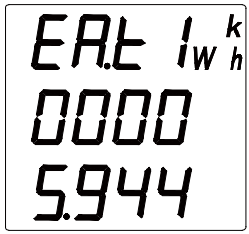
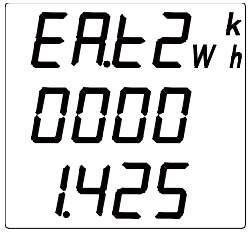
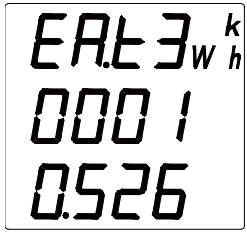
Table 4-6 Extreme value display pages

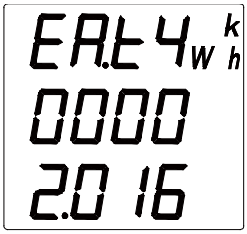
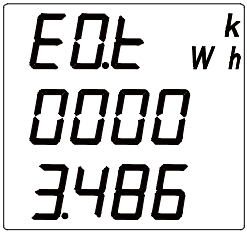
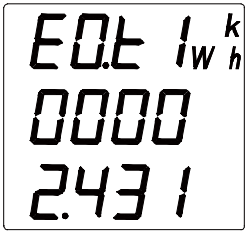
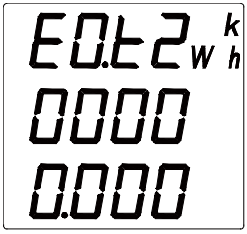
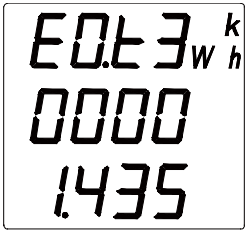
Extreme value display	Instruction
	Maximum value of phase voltage, Max. Un=380.8V.
	Maximum value of total active power, Max. P=5707W.
	Minimum value of power factor, Min. PF=0.10.

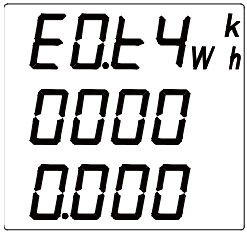
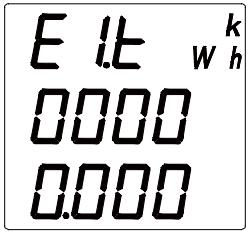
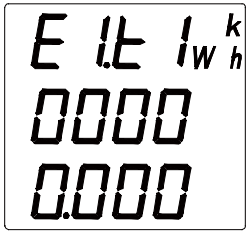
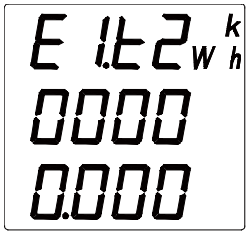
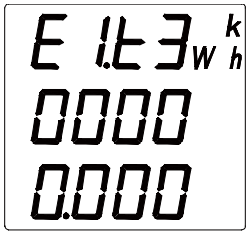
4.2.7 Tariff energy display pages

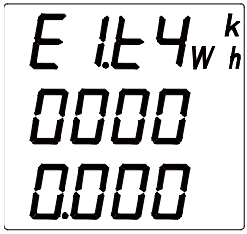
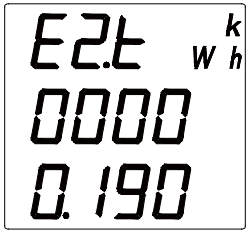
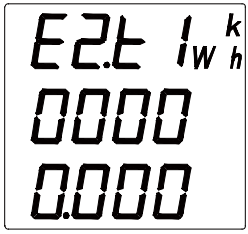
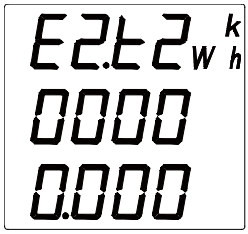
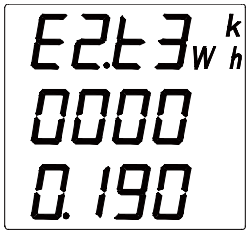
The meter can measure the energy of four types of tariffs in twelve time zones. The detailed instruction of display pages is shown as follows,

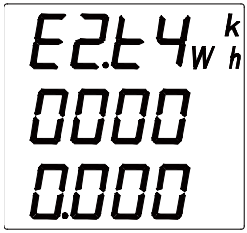
Table 4-7 Tariff energy display pages

Tariff energy display	Instruction
	Import total active energy EA.T= 19.862kWh
	Import total active energy of T1 EA.T1= 5.944kWh
	Import total active energy of T2 EA.T2= 1.425kWh
	Import total active energy of T3 EA.T3= 10.526kWh

	Import total active energy of T4 EA.T4= 2.016kWh
	Total energy of present month E0.T = 3.486kWh
	Energy of T1 of present month E0.T1 =2.431kWh
	Energy of T2 of present month E0.T2= 0.000kWh
	Energy of T3 of present month E0.T3 = 1.435kWh

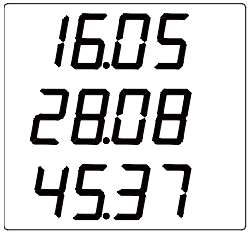
	Energy of T4 of present month E0.T4=0.000kWh
	Total energy of last month E1.T =0.000kWh
	Energy of T1 of last month E1.T1=0.000kWh
	Energy of T2 of last month E1.T2=0.000kWh
	Energy of T3 of last month E1.T3 =0.000kWh

	Energy of T4 of last month E1.T4=0.000kWh
	Total energy of the month before last month E2.T=0.190kWh
	Energy of P1 of the month before last month E2.T1=0.000kWh
	Energy of T2 of the month before last month E2.T2=0.000kWh
	Energy of T3 of the month before last month E2.T3=0.190kWh

	Energy of T4 of the month before last month E2.T4=0.000kWh

4.2.8 Time display

Table 4-8 Time display page

Time display	Instruction
	The left picture shows 16(year), 05(month), 28(day), 08(hour), 45(minute),37(second)

4.3 Operation instruction for keys on panel

Press "Menu" for 3s（minimum）and then release it, the display will show "rEAd". Press "<" or "^" once, the display shows "ProG". Press "↵", enter your password (defaulted as 0001) through pressing "<" or "^", and then press

"↵". If the password is correct, you can enter the programming menu, however, if the display does not change, it means that you have failed to enter programming menu. Please try again. Be careful if the password is changed, and do not forget it, as no programming is allowed if the correct password is not entered.

Function of four keys in programming mode. Press "<" or "^" to switch to different programming menus or change values; Press "Menu" key to revert to upper level of menu; Press " ↵ " key to enter programming menu and confirm modification.

To change values, press "<" key to select a bit, and press "^" key to change the number at the selected bit.

To change the position of decimal point, keep pressing "<" key until no number flashes, and then press " ^ " key to change the position of decimal point in flashing status, press "<" key to confirm the position.

After the value or item of third-level menu is changed, press "↵" key to confirm the modification and revert to second-level menu. However, if "Menu" key is pressed, the modification will not be effective.

To exit programming mode, please revert to first-level of menu at first, and then press " Menu ", the meter will display "SAVE--YES". Below are three kinds of operations optional.

1) Saving the edited settings: Press "↵";

2) Not saving the edited settings: Press "<" or "^", the display will show "SAVE--no", and then press "↵";

3) Staying in the programming mode: Press "Menu".

4.3.1 Parameter setting menu structure

Parameter setting menu adopts hierarchical structure. Three rows from up to down corresponds to first, second and third levels of menu severally. The menu structure diagram is as follow,

Table 4-7 Detailed instruction for parameter setting menu

First level	Second level	Third level	Instruction
System setting SYS	Password CodE	0000～9999	User password
	Cyclic display CYC	no / YES	NO：no cyclic display YES：cyclic display, three seconds interval time
	Backlight time LIGH	0-180	Backlight duration time
	Display item dISP	Voltage, current etc.	First display page after power on
	Flashing alarm ALr	0 30～120	0：off 30～120：limit value
	Energy pulse PULS	AP / rP	AP：active energy pulse rP：reactive energy pulse
	Clear energy CLr.E	no / YES	NO：not clear energy YES：clear energy

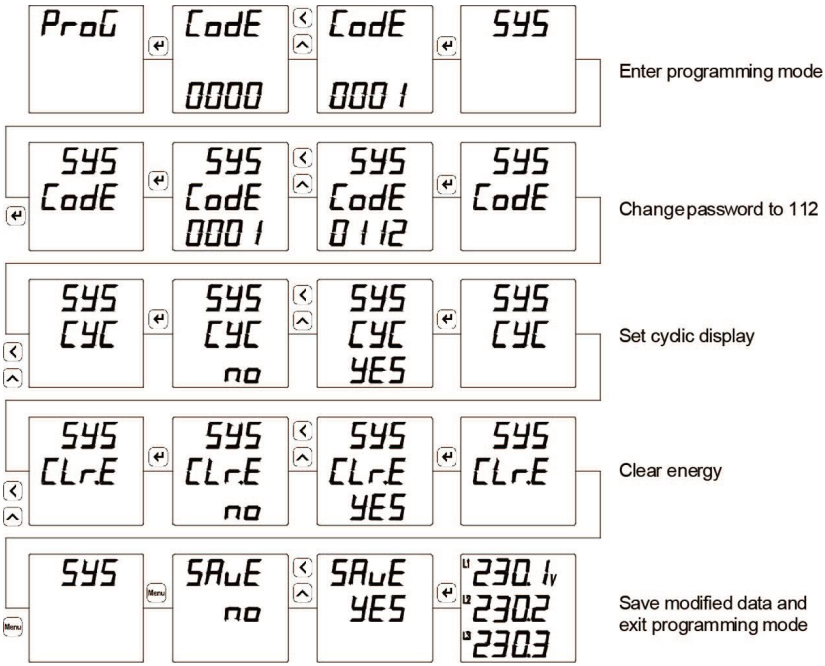
	Clear demand CLr.d	no / YES	NO：not clear demand YES：clear demand
	Clear record CLr.r	no / YES	NO：not clear record YES：clear record
Signal input InPt	Wiring mode nEt	n.33 n.34 n.12	n.33：three phase three wire n.34：three phase four wire n.12：single phase
	Primary voltage Pt. 1	0～9999 kV	Primary voltage
	Secondary voltage Pt. 2	0～690 V	Secondary voltage
	Primary current Ct. 1	0～9999 kA	Primary current
	Secondary current Ct. 2	0～6 A	Secondary current
	Neutral current InCt	0000～9999	Neutral current ratio. If it is “o”, the neutral current will not be shown.
	F Frequency	50HZ / 60HZ	Grid frequency
First communication Com1	Meter address Addr	0001～0247	Meter address range: 1～247
	Baud rate bAUd	2.400～115.2	Select baud rate：2400, 4800, 9600, 19200...
	Data format dAtA	n.8.1 o.8.1 E.8.1 n.8.2	n.8.1：no check, one stop bit o.8.1：odd check E.8.1：even check n.8.2：no check, two stop bits

Demand dMd	Item tYPE	I P9S	I P9S: current and power
	Work mode ModE	SLI P FI H	SLI P: slip mode FI H: fixed mode
	Update time t	0001～9999	Update time
	Time zone nt	0001～9999	Time zone
Digital input dI	Switch channels dI - 1 ～dI -2	bEn StA	bEn: Spare energy StA: status
Alarm setting do- 1	Work mode ModE	oFF rEM ALr	oFF: off rEM: remote control ALr: alarm
	Pulse width tI ME	0～99.99s	Pulse width
	Item I tEM	UL. H...	Alarm item
	Alarm value uAL	0～9999	Alarm value
	Hysteresis value HyS	0～9999	Hysteresis value
	Delay time dELy	0～99.99s	Delayed response
F 1.0 1/ F2.0 1 ... F 1. 12/ F2. 12	00.00 Time	t 1～t 4 tariffs	Select time zone and corresponding tariff

Tariffs for different time zones			
F.Mon Month tariff	M.01... M.12	F1...F2	Select tariff mode for every month
CoPy Meter reading	d. H Day, hour	00～31	Select meter reading time, day and hour of every month
tIME Meter reading time	Year. month Day. hour Minute. second	00～99	Set time

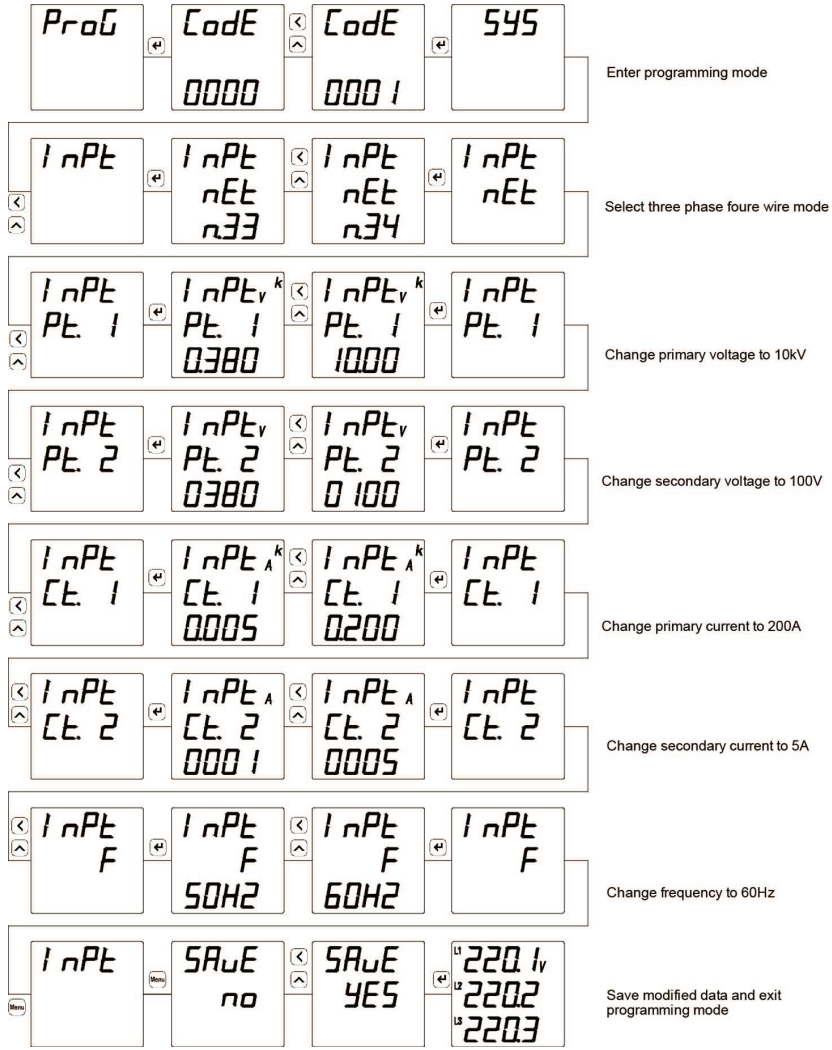
4.3.2 System setting

To change password to 112, select cyclic display and clear energy data, the operation process is as follows,



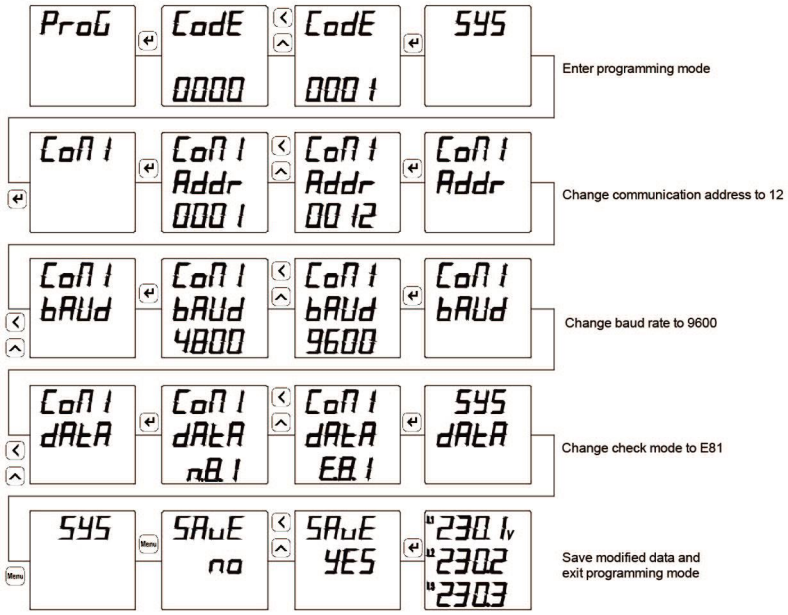
4.3.3 Signal input setting

To set signal as 10kV/100V and 2000A/5A, set frequency to be 60Hz, the operation process is as follows,



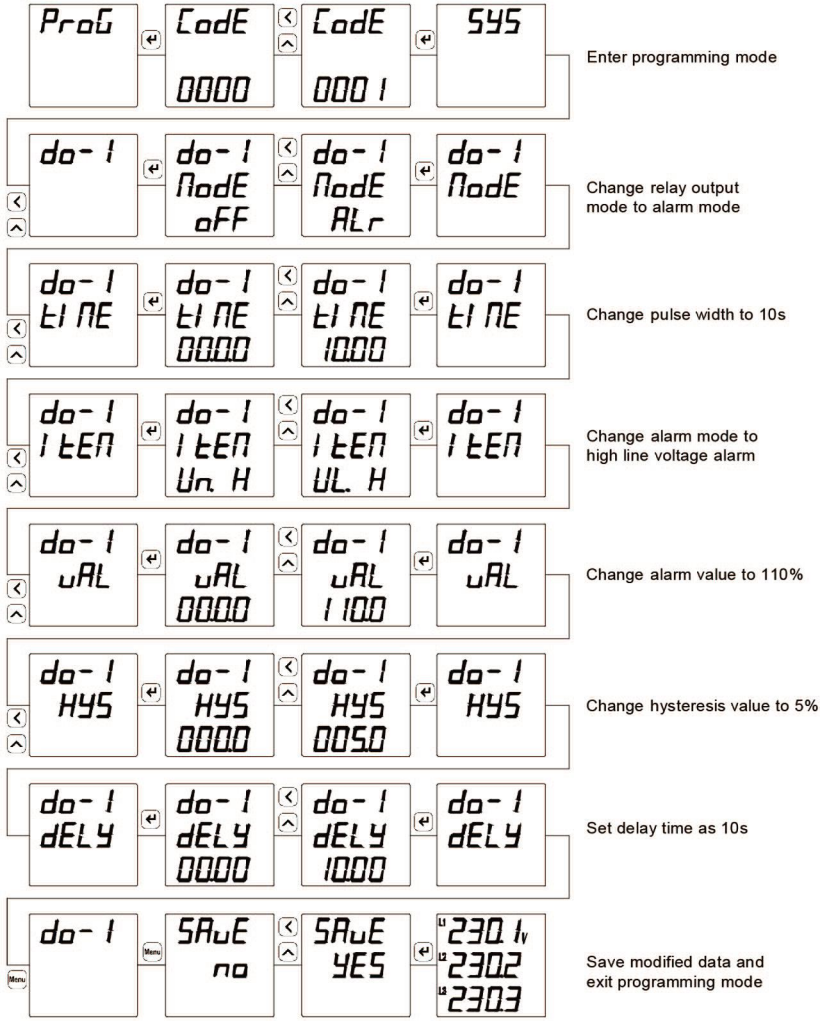
4.3.4 Communication setting

To change communication address to 12, to set baud rate as 9600bps, to select data format as E81, the operation process is as follows,



4.3.5 Relay output setting

To set line voltage high alarm output, when line voltage ＞110V, first relay output acts, that is first relay closes, the operation instruction is as follows,



5. Communication

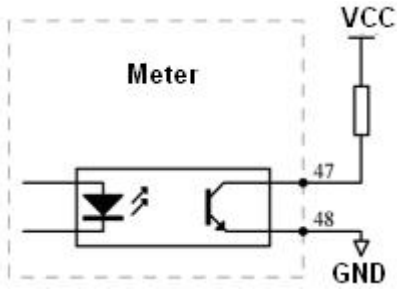
This meter is defaulted to be equipped with one RS485 communication interface with Modbus-RTU protocol. User can add one communication interface via connecting extended module to the meter.

As for detailed information, please refer to the communication manual.

6. Extended function

6.1 Energy pulse output

The meter provides one energy pulse output which can be selected as active or reactive energy pulse via setting so as to realize verification and remote transmission of energy data. With energy pulse of open circuit optocoupler, the energy accumulation metering can be realzied by collecting energy pulse from the meter from the remote computer terminal, PLC and DI switch collection module. The output mode of the meter adopts energy accuracy inspection mode (National Meteorological Regulation: The Comparative Method for Pulse Error of the Standard Meter).



Picture 5-3 Energy pulse output

A. Electrical features：VCC≤35V, Iz≤10mA;

B. Pulse constant： 5000 imp/kWh (380V/5A range), 20000 imp/kWh （380V/1A, 100V/5A range）, 80000 imp/kWh （100V/1A range）. The meaning is when the meter accumulates 1kWh, the number of output pulse is 5000. It must be emphasized that 1kWh is secondary side energy data. If the meter is connected

with PT or CT, relevant pulse data 5000 corresponds to primary side energy data 1kWh×voltage ratio PT × current ratio CT.

C. Application example： the pulse counting device is used for PLC terminal. Supposing during the period with the length of t, the number of collected pulse is N; the input of meter is 10kV/100V, 400A/5A, thus the accumulated energy of meter during this period is N/5000×100×80 degrees of energy.

6.2 Digital input

Meter supports two digital inputs. Input signal is AC220V.

There are three working modes for digital inputs:

a. Status monitoring: meter receives the status of terminal contact point and shows it on front panel. The changing of status will be shown immediately.

b. Spare energy: terminal status is synchronous signal. Spare energy metering starts when the signal is received, meanwhile, basic energy metering stops.

6.3 Relay output

This device provides two relay outputs.

The relay output has two different work modes: alarm mode and remote control mode. Work mode, alarm item and alarm range of each relay output can be set in programming operation.

Remark: the format of alarm range data is secondary grid integer data. Specific format refers to the following table. ("H" indicate high alarm, while "L" indicates low alarm)

Table 5-1 Alarm item and unit of relevant alarm threshold value

Item	Format	Instruction
Un. H	xxx.x V	Any phase voltage high alarm
Un. L	xxx.x V	Any phase voltage low alarm
Ul . H	xxx.x V	Any line voltage high alarm
Ul . L	xxx.x V	Any line voltage low alarm
I. H	x.xxx A	Any phase current alarm
I. L	x.xxx A	Any phase current low alarm
In. H	x.xxx A	Neutral current high alarm
In. L	x.xxx A	Neutral current low alarm
P. H	xxxx W	Total active power high alarm
P. L	xxxx W	Total active power low alarm
Q. H	xxxx var	Total reactive power high alarm
Q. L	xxxx var	Total reactive power low alarm
S. H	xxxx VA	Total apparent power high alarm
S. L	xxxx VA	Total apparent power low alarm
PF. H	x.xxx	Total power factor high alarm
PF. L	x.xxx	Total power factor low alarm
F. H	xx.xx Hz	Grid frequency high alarm
F. L	xx.xx Hz	Grid frequency low alarm
UTH.H	xx.xx	Voltage THD high alarm
UTH.L	xx.xx	Voltage THD low alarm
ITH.H	xx.xx	Current THD high alarm
ITH.L	xx.xx	Current THD low alarm
D.IA.H	x.xxx A	Phase A current present demand high alarm
D.IA.L	x.xxx A	Phase A current present demand low demand
D.IB.H	x.xxx A	Phase B current present demand high alarm
D.IB.L	x.xxx A	Phase B current present demand low demand
D.IC.H	x.xxx A	Phase C current present demand high alarm

D.IC.L	x.xxx A	Phase C current present demand low demand
D.I. H	x.xxx A	Current present demand high alarm
D.I. L	x.xxx A	Current present demand low alarm
D.P. H	xxxx W	Total active power present demand high alarm
D.P. L	xxxx W	Total active power present demand low alarm
D.Q. H	xxxx var	Total reactive power present demand high alarm
D.Q. L	xxxx var	Total reactive power present demand low alarm
D.S. H	xxxx VA	Total apparent power present demand high alarm
D.S. L	xxxx VA	Total apparent power present demand low alarm
D1-1	--	#1 digital input – 1 action
D1-0	--	#1 digital input – 0 action
D2-1	--	#2 digital input – 1 action
D2-0	--	#2 digital input – 0 action

Notes:

1. High/low alarm

Low alarm means when the measured value of low alarm item is lower than alarm threshold value, the relay activates; high alarm means that when the measured value is higher than the alarm threshold, the relay activates.

2. Remotely-controlled relay

If relay output is in remotely-controlled mode, the alarm function should be off.

If the setting value is 0000, the relay output is normal level mode.

6.4 Max./Min. value demand

Meter can record max./min. value of voltage, current, power and harmonics, and save these data of present month, last month and the month before last month. Please refer to communication list for detailed recording parameters.

Meter can measure the demand of three-phase current, total active power, total reactive power and total apparent power. Demand measurement modes can be set through communication.

6.5 Event recording

This device supports event recording function. Reading the information of record and setting relevant parameters only can be realized through communication. Please refer to communication list for detailed instruction.

SOE recording include 32 pieces of events which contain activation time of digital input and relay output. The resolution is 1ms.

Off-limit alarm recording includes 10 pieces each of voltage, current and active power which are judged every 1 second. When any phase voltage and phase current or total active power is higher or lower than a threshold value, the relevant event will be recorded. Alarm value can be changed.

7. Common problems and troubleshooting

7.1 About communication

1) The meter does not send data back

First make sure the communication setting information of the meter such as subordinate machine address, baud rate and check mode corresponds to the requirements of host computer. If several meters on spot do not send data back, please check whether the communication bus on spot is connected correctly and whether RS485 converter works normally.

If there is only one meter or a few meters communicate abnormally, related communication bus is also needed to be checked. You may check whether there is an error in the host computer by exchanging the subordinate machine addresses of normal meter and abnormal meter. Besides you may check whether there is a fault in the meter by exchanging the installation positions of normal and abnormal meters.

2） the data sent back by the meter is incorrect

Communication data which is opened to users includes primary grid “float” type data and secondary grid “int/long” type data. Please read the instruction for data storage address and format in communication address table carefully, and make sure to transmit data according to relative format.

It is suggested to download testing software MODSCAN for MODBUS-RTU communication protocol from our homepage. This software adopts standard MODBUS-RTU protocol which can display data in the formats such as integer, float and hexadecimal, so that you can compare the data with measured data displayed on the meter directly.

7.2 Measurements about U, I and P are incorrect

First make sure that the meter has been input right voltage and current. The multi-meter is used for measuring voltage and current, and the clip-on meter is used for measuring current signal. Second make sure the signal wire is connected correctly, for example the dotted terminals of current signal (i.e. inlet) as well as the phase sequence of each phase should be correct. Observe power display interface of the meter, and its power symbol is displayed positive under normal condition and negative only when it is under reverse transmission which is caused by wrong connection of inlet-outlet lines or wrong phase sequence connection.

What's more, electric quantity displayed on the meter is the value of primary grid; it may lead to wrong electric quantity display if the ratio of voltage and current transformer does not conform to that of transformer in-service. The defaulted voltage and current range is not allowed to be modified after delivery. Connection network is available to be modified according to actual connection on spot, but the connection mode set in programming shall correspond with the actual connection method, otherwise it may lead to wrong display.

7.3 About incorrect power running

Energy is accumulated on the basis of power measurement; check whether power value displayed is consistent with actual load. As the product supports bidirectional energy measurement, energy will be accumulated to backward energy instead of forward one if wires are not connected properly or total active power is negative. The most common problem on spot is inlet and outlet wire of current transformer are in reverse connection. Observe signed active power in split phase, and it may be negative because of wrong connection, and what's more, wrong phase

sequence may lead to wrong running.

7.4 Meter does not work

Ensure proper auxiliary supply is connected to the auxiliary supply terminal. As the meter may be damaged by auxiliary supply voltage which is beyond the rated range and it can not recover. Use multi-meter to measure the voltage of auxiliary supply, if the meter does not display when the voltage is proper, please electrify it again, then if the meter can not display normally, please contact with our technical service department.

7.5 The meter does not respond to any operation

If the meter gives no response after pressing the keys on the panel, electrify it again after cutting off the power, please contact our technical service department if it can not return to normal yet.

7.6 Other abnormal phenomena

Please contact our technical service department to give a detailed description of the field condition. Our technicians will analyze possible causes according to your description. The company will appoint technicians to deal with problems on spot as soon as possible if the problem can not be settled after oral communication.

The information in this document is subject to change without further notice.

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