Three phase four wire din-rail energy meter

New type with Modbus communication function

Model 1 (S type)

（Note :this model has no button Settings）

Model 2 (U type)

Model 3 (S type)

User manual

1.1 Safety Instructions

1.2 Foreword

1.3 Environmental indicators

1.4 Technical parameters and display types

1.5 Basic error

1.6 Installation

1.7 Product outline drawing and wiring diagram

1.8 User guide and function introductioning

1.9 Troubleshooting

1.10 Ket menu operation instructions

1.11 Techniacal Support

1.1 Safety Instructions

Information related to your personal safety

Due to different conditions or requirements,it is not possible to cover all the safety issues related to the operation of this instrument,however,it is important to understand the following items to ensure your personal safety and to prevent damage to the instrument.these items are highlighted with a triangular safety symbol, depending on the level of potential hazard they indicate.

Dangerous

● This symbol indicates that failure to observe the relevant regulations will result in serious damage to the instrument, serious personal injury or death.

Warning

● This symbol indicates the risk of electric shock, failure to take appropriate safety precautions may result in serious injury to the instrument,serious personal injury or death.

Qualified personnel

Only qualified personnel should perform the procedures described in this manual for this instrument.in this manual,qualified personnel shall refer,in particular,to authorized and authorized professional technicians who can correctly install and commission the instrument in accordance with the power safety management standard.

Use range

The instrument can only be used in the specific areas specified in this manual and catalog,and can only be connected to devices or components recommended or approved by the company.

Reasonable operation

Reasonable transportation, storage and proper installation and maintenance of this product is a necessary condition for the normal operation of this product.when this product is working,some components will be with a dangerous voltage,improper handling will damage the instrument and threat to your safety.

- ●Must use insulation tools.
- ●Can not be installed in the case of electricity.
- ●Place the meter in a dry place.
- ●Do not expose the meter to dusty,mildew or insects.
- ●Make sure that the wire current used does not exceed the maximum current of the meter.
- ●Make sure the wiring is correct before using the meter.
- ●In order to prevent electric shock,do not use hands,metal,etc. to directly contact the meter connection clamp.
- ●Do not forget to install protective covers.
- ●Only qualified personnel should install,maintain and service this product.
- ●Only maintain the integrity of the front cover and cover in order to ensure the normal work of the meter and enjoy the relevant after-sales service.
- ●Wrestling,bump this product will damage the internal precision components.

Disclaimer

Although we have carefully reviewed the contents of this manual and have made our description as accurate as possible,we can not guarantee that our description is completely accurate because of differences in the way or standard of description.we are not responsible for any potential errors described below,depending on the product.at the same time we will continue to check the errors and will be corrected in the subsequent version, if you can provide us with the description of the recommendations,we will be very grateful!

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1.2 Foreword

Thank you for purchasing a three-phase four-wire orbital watt-hour meter.the meter has the following features, the meter with large-screen LCD display,the meter with RS485/communication protocol MODBUS-RTU remote meter reading function,can accurately measure the active energy.

The meter type according to the national standard GB/T17215.321-2008*1 and 2 static AC active watt-hour meter",the international IEC62053-21 design,the use of advanced ultra-low power LSI technology and SMT manufacturing process of the high-tech products,the key components use international renowned brands of long-life devices,improve product reliability and longevity.

Product circuit measurement part of a dedicated measurement chip,high reliability,high precision and accurate measurement of active energy.the product adopts the linear power supply,the metering chip converts the electric energy into pulse respectively.the microprocessor completes the functions of power collection,power calculation, power pulse output and LCD display processing.the data security adopts redundant design, and the data adopts multiple backup to ensure reliable measurement data.

We can supply a wide range of products suitable for 100VAC to 380VAC (50 or 60Hz). In addition to our regular power meters,we have developed our own prepaid smart card form,prepaid smart track card form,rechargeable smart card as well as a complete set of PC-based pre-paid management operating system.for more information, please contact us.this product warranty period of 18 months,man-made damage will not be included in the scope of warranty.

1.3 Environmental indicators:

Working humidity	⩽ 75%
Storage humidity	⩽ 95%
Operating temperature	-10 ℃ ~ +50 ℃
Storage temperature	-30 ℃ ~ +70℃
International standard	IEC 62053-21
Domestic standard	GB / T17215.321-2008
Accuracy	Class 1
Dustproof and waterproof	IP 51
Protective insulating enclosing instrument type	II

1.4 Technical parameters and display types:

Reference voltage (Un)	220/380V 230/400V 240/415V
Operating voltage	181/279V -300/500V AC(-) -1
Rated current (Ib)	1.5 5A 10A 15A 20A 5A 30A
Maximum current (Imax)	6A 20A 40A 60A 80A 100A 100A
Starting current	⩽ 0.004b
Tolerance overload current	30Imax ⩽ 0.1s
Working frequency	50Hz ± 10%
Normal power consumption	⩽2W / 10VA
Pulse constant	400imp/1600imp
Data storage time	> 20years

1.5 Basic Error:

Three-phase balanced load

0.05Ib	Cosφ = 1	±1.5%
0.1Ib	Cosφ = 0.5L	±1.5%
	Cosφ = 0.8C	±1.5%
0.1Ib～Imax	Cosφ = 1	±1.0%
	Cosφ = 0.5L	±1.0%
0.2Ib～Imax	Cosφ = 0.8C	±1.0%

1.6 Installation

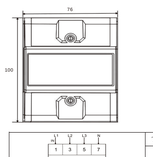
Danger

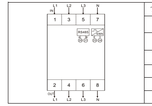
● Only qualified personnel familiar with the relevant procedures and procedures should be able to install the meter.
● Insulation tools should be used for installation.
● Do not force power when the fuse, fuse is disconnected or the circuit breaker can not be closed.

● Before installation,turn off all related power supplies.
● Be ensure that use a measuring instrument the power supply is turned off.

1.7 Product outline drawing and wiring diagram

Model 1(S Type)





Terminal	Notice
1/2	Ia Input/output
3/4	Ib Input/output
5/6	Ic Input /output
7/8	Neutral line
20/21	RS485 port
23/ 24	Pulse port

Model 1.Wiring Diagram(Direct Access)

● The meter connection should be selected in accordance with the overload current device in the circuit,the performance of the circuit-breaker and the relevant local codes.

● In the selection of external air switches or circuit breakers,should be in accordance with local. standards and the current construction of the electricity design and should be outside the air switch or circuit breaker installed in the meter line,use it in a meter power equipment,and pay attention to the place near the meter in order to facilitate the operation.

● In the choice of external fuses,fuses as overload protection devices,should be in accordance with local standards and the current construction of the power design and should be external fuse,fuse in the meter into the meter line used as a broken meter electrical equipment and pay attention to the place near the meter in order to facilitate the operation.

● The meter can be installed either directly in the indoor or waterproof case can be installed in the outdoors.

● The specific situation according to the relevant local standards.

● Please install a padlock or similar device to prevent stealing.

● This meter must be installed on a firmware wall.

● This meter must be installed in a ventilated and dry place.

● Be sure place the meter in a protective case when it is necessary to install the meter in a location that is dusty or dangerous.

● The meter must be tested,stamped and affixed with a qualified sign before installation.

● Place this meter in a convenient location for reading.

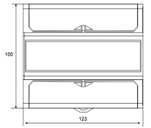
● When the meter installed in the interference of many places,such as multi-mined areas,welding machines,converters,please install anti-jamming device.

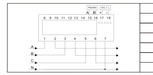
● After the installation is complete,please close the meter to prevent stealing.

● Please follow the wiring diagram below to connect the meter circuit.

1.7 Product outline drawing and wiring diagram

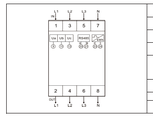
Model 2(U Type)





Terminal	Notice
1/2	Ia Input/output
3/4	Ib Input/output
5/6	Ic Input /output
7/8	Neutral line
20/21	RS485 port
23/ 24	Pulse port

Model 2.Wiring Diagram (Direct Access)



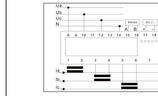
Terminal	Notice
1/2	Ia Input/output
3/4	Ib Input/output
5/6	Ic Input /output
9/11/13	A Voltage/B Voltage/ C Voltage
7/8	Neutral line
20/21	RS485 Port
23/24	Pulse port

Model 1. Wiring Diagram（CT Access）

Model 2(U Type)

Terminal	Notice
1/2	Ia Input/Output
3/4	Ib Input/Output
5/6	Ic Input Output
7	Neutral Line
15/16	RS485 Port
17/ 18	Pulse Output

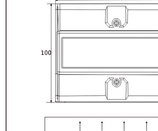
Model 2.Wiring Diagram（Direct Access）



Terminal	Notice
1/2	Ia Input/Output
3/4	Ib Input/Output
5/6	Ic Input Output
7	Neutral Line
15/16	RS485 Port
17/ 18	Pulse Output

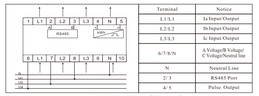
Model 2.Wiring Diagram（Direct Access）

Model 3(S Type)



Terminal	Notice
1 L1/1	Ia Input /Output
L2 1/2	Ib Input/Output
L3 1/3	Ic Input/Output
N	Neutral Line
2/ 3	RS485 Port
4/ 5	Pulse Output

Model 3.Wiring Diagram（Direct Access）



Terminal	Notice
1,1 L1	Ia Input Output
L2 1,2	Ib Input Output
L3 1,3	Ic Input Output
6-7/ 6 N	A Voltage/B Voltage/ C Voltage/Neutral line
N	Neutral Line
2/ 3	RS485 Port
4/ 5	Pulse Output

Model 3.Wiring Diagram（CT Access）

1. 5 User guide and function introduction

1.8.1 Electricity indication

Three phase four wire meter on the front panel of the four led lights,A、B、C three phase power indicator and pulse indicator(red).

1.8.2 Features

The meter has RS485 remote reading meter function,the meter has the following optional features,the meter can be with power failure,can be with back light,with a switch output,can display the total power,current, voltage,power,power factor ,frequency, etc.) can accurately measure the active energy.Energy meter using large-screen LCD display.

1.8.3 Pulse output and RS485 output

Model 1: S type the terminal 23 and 24 is pulse output,the 20 and 21 is RS485 output.
Model 2: U type the terminal 17 and 18 is pulse output,the 15 and 16 is RS485 output.
Model 3: U type the terminal 4 and 5 is pulse output,the 2 and 3 is RS485 output.

1.8.4 RS485 communication meter reading application (communication protocol) and register address.

The energy meter through it is RS485 interface to achieve long-range copy of the table,such as electricity energy data.And through its infrared communication interface with a handheld computer to achieve close-up copy of the table of energy data .Encoding format,parity (even parity) and data transmission (eight data bits, a stop bit) in line with MODBUS-RTU standards.Communication baud rate defaults to 1200bps,2400bps, 4800bps,9600bps.

MODBUS-RTU communication protocol Description:

1.the data format:

Address + function code + data + CRC check code.

2.the register type

This meter uses two types of registers, individually addressed.

The first is the data register,read-only,using the command code 0x04 to read.

The second category is the parameter register,readable and writable,using the command code 0x03 read, write parameters using 0x10.

3.the data format

Float type data.Read the internal data within the meter in line with IEEE-754 standard floating-point number, data format is 32-bit 4-byte single-precision floating-point data format.

4. Data register list

Data register address	Register Description			
HI BYte	LO Byte	Description	Unit	Format	Mode
00	00	A Phase Voltage	V	Floating Point	Read-only
00	02	B Phase Voltage	V	Floating Point	Read-only
00	04	C Phase Voltage	V	Floating Point	Read-only
00	08	A Line Current	A	Floating Point	Read-only
00	0A	B Line Current	A	Floating Point	Read-only
00	0C	C Line Current	A	Floating Point	Read-only
00	10	Total Active Power	Kwh	Floating Point	Read-only
00	12	A Phase Active Power	Kwh	Floating Point	Read-only
00	14	B Phase Active Power	Kwh	Floating Point	Read-only
00	16	C Phase Active Power	Kwh	Floating Point	Read-only
00	18	Total Reactive Power	KVar	Floating Point	Read-only
00	1A	A Phase Reactive Power	Var	Floating Point	Read-only
00	1C	B Phase Reactive Power	Var	Floating Point	Read-only
00	1E	C Phase Reactive Power	Var	Floating Point	Read-only
00	2A	A Phase Power Factor		Floating Point	Read-only
00	2C	B Phase Power Factor		Floating Point	Read-only
00	2E	C Phase Power Factor		Floating Point	Read-only
00	36	Frequency	Hz	Floating Point	Read-only
01	00	Total Active Electricity Power	Kwh	Floating Point	Read-only
04	00	Total Reactive Electricity Power	Kvarh	Floating Point	Read-only

5. Parameters register list

Data register address	Register Description			
HI BYte	LO Byte	Description	Format	Mode
00	00	Baud Rate（1200 2400 4800 9600）	Floating Point	Read & Write
00	02	Check Digit (0 Even 1 Odd 2 None)	Floating Point	Read & Write
00	08	Communications Address(Meter No:1-247)	Floating Point	Read & Write
00	10	Relay Control(1:Switch on 2:Switch out)	Floating Point	Read & Write

6. Illustrating

(1)The first category register (data register) read and operation

Read voltage:

Issued data (HEX): 01 04 00 00 00 02 71 CB

Data Descriptions:

Data	Detailed description
01	Instrument address
04	Function code,read data register
00 00	Reading the data from the 0000 meter internal register address
00 02	Read data length for two words,4 bytes of data
71 CB	CRC checksum data for the front,where the high front and low in the post

Returns: 01 04 04 43 6B 58 0E 25 D8

Data Description:

Data	Detailed description
01	Instrument address
04	Return function code
04	Returned data length is 4 bytes of data length
43 6B 58 0E	The data returned as a 4-byte data type float
25 D8	Return CRC checksum

(2)The second category register (parameter register) read and operate read the meter Address:

Issued data (HEX):01 03 00 08 00 02 45 C9

Data Description:

Data	Detailed description
01	Instrument address
03	Function code,read parameter register
00 08	Reading the data from the 08 meter internal register address
00 02	Read data length for two words(four bytes)of data
45 C9	CRC checksum data for the front,where the high front and low in the post

Returns: 01 03 04 40 00 00 00 EF F3

Data Description:

Data	Detailed description
01	Instrument address
03	Return function code
04	Returned data length is 4 bytes of data length
40 00 00 00	The data returned as a 4-byte data type float
EF F3	Return CRC checksum

(3)The second category register (parameter register) write and operation

Modify the meter address:

Read voltage:(HEX):01 10 00 08 00 02 04 40 00 00 00 E7 C9 (meter address modification 02)

Data Descriptions:

Data	Detailed description
01	Instrument address
10	Function code,writing instruments internal register data
00 08	Write the data from the instruments internal register address 00 08
00 02	Write data length for two words,4 bytes of data
04	Write data length of 4bytes of data
40 00 00 00	Write the meter address,4 bytes of data,floating-point data
E7 C9	CRC checksum

Return 01 10 00 08 00 02 C0 0A

Indicates that the return setting was successful.

Modify the meter communication speed:Issued data (HEX): 01 10 00 00 00 02 04 44 96 00 00 07 73

(Change meter communication baud rate:1200bps)

Data Descriptions:

Data	Detailed description
01	Instrument address
10	Function code,writing instruments internal register data
00 00	Write the data from the instruments internal register address 00 00
00 02	Register number,2 (4 bytes)
04	Byte numbers,4 bytes
44 96 00 00	Write the meter communication speed,4 bytes of data,floating point data
25 7B	CRC checksum

Returns data.01 10 00 00 00 02 41 C8

Indicates that the return setting was successful.

1.9 Troubleshooting

Fault condition check solution

Warning

● Please do not use hand,with metal,bare wire contact meter wiring,so that to prevent electric shock in the maintenance or maintenance process.
● Be sure disconnect the power supply to the meter and disconnect the power supply from the meter installation before servicing.

Danger

● Only qualified personnel who are familiar with the relevant operation and procedures can carry out maintenance for the meter.
● Turn off the power supply when maintenance.
● Ensure that the power cover is restored after repairing
● Do not damage the meter seal.

Fault condition	Examination	Solve
Communication No indication	Whether the meter has power supply	Check the internal power supply
	Whether or not connected to communications equipment	The LED will blink only when an external RS485 device connected to the RS485 or the infrared port
	There may be a problem with the internal circuit	Please contact your technical support staff for a meter change
Rs485 No transmission	Meter ID is correct	Check the ID number of the meter (factory setting is NO of meter front panel)
	Whether the baud rate of the meter is wrong	Verify that the meter baud rate matches the baud rate of the other devices it
	Whether the distance too far	Communicates with the transmission distance can not exceed 1200m
	Bus on the meter is too much	There can not be more than 247 meters in bus
	Wiring is correct	Make sure that the A and B signal cables of RS485 are connected correctly
LCD does not take the word	Whether the power meter connected to the power	Detection of the pulse signal is not flashing
	The power consumption is too low	When the power is too low,LCD screen to be separated by a long time to change the numbers please contact your technical
	There may be a problem with the internal circuit	Support for the meter
No pulse output	Whether connected to the DC power supply Is the pulse port connected correctly	Check that the external voltage is 5-27V DC tighten again to ensure that do not connect the positive and negative pulse terminals wrong
	There may be a problem with the internal circuit	Please contact your technical support staff for a meter
Pulse output error	There may be a problem with the internal circuit	Please contact your technical support staff for a meter

RS-485 Network common problems and solutions

RS-485The communication distance.

RS-485 and RS-422,the maximum transmission distance of about 1219 meters,the maximum transmission rate of 0Mb/s.balanced twisted pair length and transmission rate is inversely proportional,below 100kb/s rate,it is possible to us the provisions of the most long cable length Only in a very short distance we get the highest rate of transmission.general 100 m twisted pair maximum transfer rate only 1Mb/s

RS-485 Network Topology

RS-485 Network topology generally uses terminal-matched bus-based architecture,does not support ring or star network.It is best to use a bus topology,connect the nodes and the length of the lead-out from the bus to each node should be as short as possible so that reflected signal in the lead-out line has the least impact on the bus signal. In short,should be provided a single,continuous signal path as a bus.

RS-485 Terminal matching resistance

RS-485 Two terminal matching resistors are required and the resistance requirement is equal to the characteristic impedance of the transmission cable. In most cases,the terminal matches between 100Ω and 120Ω.The transmission distance is less than 300 meters when no terminal matching resistor is required. The terminating resistor is connected to both ends of the transfer bus.

RS-485 The polarity of the cable

RS-485 Use two wires for transmission two wires are different,labeled as line A and line B respectively. Line A is the one with a higher voltage in the idle state.

RS-485 Select the cable

RS-485 You can use international and chinese standard communication cables,the international cable standard ı the diameter is larger than AWG18.the chinese standard is RVVP1x 2 x 0.5mm.

RS-485 Communication line isolation and anti-interference

Shielded twisted pair shields should be connected to each RS-485 device's shielded terminal.shielding layer is only allowed to be ground slightly.

1.10 Key menu operation instructions

This operation is for only the key type with keys,the first key is the turn key, the second key is the set key

1.When it's not in the set state, short press the turn (turn) button, you can flip short press the set button, no action.

2. In the setting state,long press the turn key to cancel the function, long press the set (set) key for the set function.

How to set parameters

1.Press the set button,enter the password on the screen interface,the password is 4 digits,you can use the short press (turn) key to flash a bit plus a operation,with short press (set)key to toggle the flashing bits,after entering, use the long press set button to enter the setting parameter mode.

2.After entering the setup mode,use the short press the turn button to toggle the setting item.when you need to set an item.press the set key to enter this parameter this parameter will flash.the operation is similar to step1.

3.When set up,you can press the set (set) button to set,set the correct will show good,set the unsuccessful display Err.

4.When setting the status,press the turn key to indicate exit or cancel and the menu will return to the previous menu.

5.Enter the setup key to display the description.

PASS	0000	Login password
Addr	001	Meter address
bd	9600	Baud rate
PrtY	E	Check digit
Scrl.	S	Circle show
SEt	PASS	Modify password

1.11 Techniacal Support

Please contact your supplier .