Multi functional power meter

an instruction manual

1、 Overview

Multi functional power meter is a multifunctional power meter with programmable measurement, display, digital communication, and power pulse output functions, which can complete power measurement. Equipped with communication interface. Adopting the standard RS485 MODBUS-RTU communication protocol, LED/LCD on-site display and remote RS485 digital communication are achieved.。

2、 Technical parameters

performance	parameter	
transport	network	Three phase three wire, three phase four

enter measure amount display show			wire
	Voltage	Rated value	AC25~500V
		Overload	Duration: 1.2 times 2 times rated value/1 second
		power waste	<1VA(Each phase)
		impedance	≥1MΩ
		accuracy	RMS measurement, accuracy level 0.5
	electric current	Rated value	AC25mA~5A
		Overload	Duration: 1.2 times 10 times rated value/1 second
		power waste	<0.4VA(Each phase)
		impedance	<2mΩ
		accuracy	RMS measurement, accuracy level 0.5
	frequency		40~70Hz
	power		Visual power, active power accuracy of 1.0 level, reactive power accuracy of 2.0 level
	electric energy		Four quadrant measurement, active power accuracy level 1.0, reactive power accuracy level 2.0
Power Supply	Scope of work		AC85~265V/DC100-370V
	power waste		≤5VA
output	Digital interface		RS-485、MODBUS-RTUagreement 、5000imp Pulse output
environment	work environment		-10~55℃
	Storage environment		-20~75℃
security	Voltage resistance 压		Input/power>2kV, input/output>2kV, power/output>1kV
	insulation		Input, output, and power supply to the chassis>50M Ω
Electric energy measurement range			The measurement range of active and reactive electricity is from 0 to 9999999999MWh. If the value exceeds this range, the electricity will be counted from 0

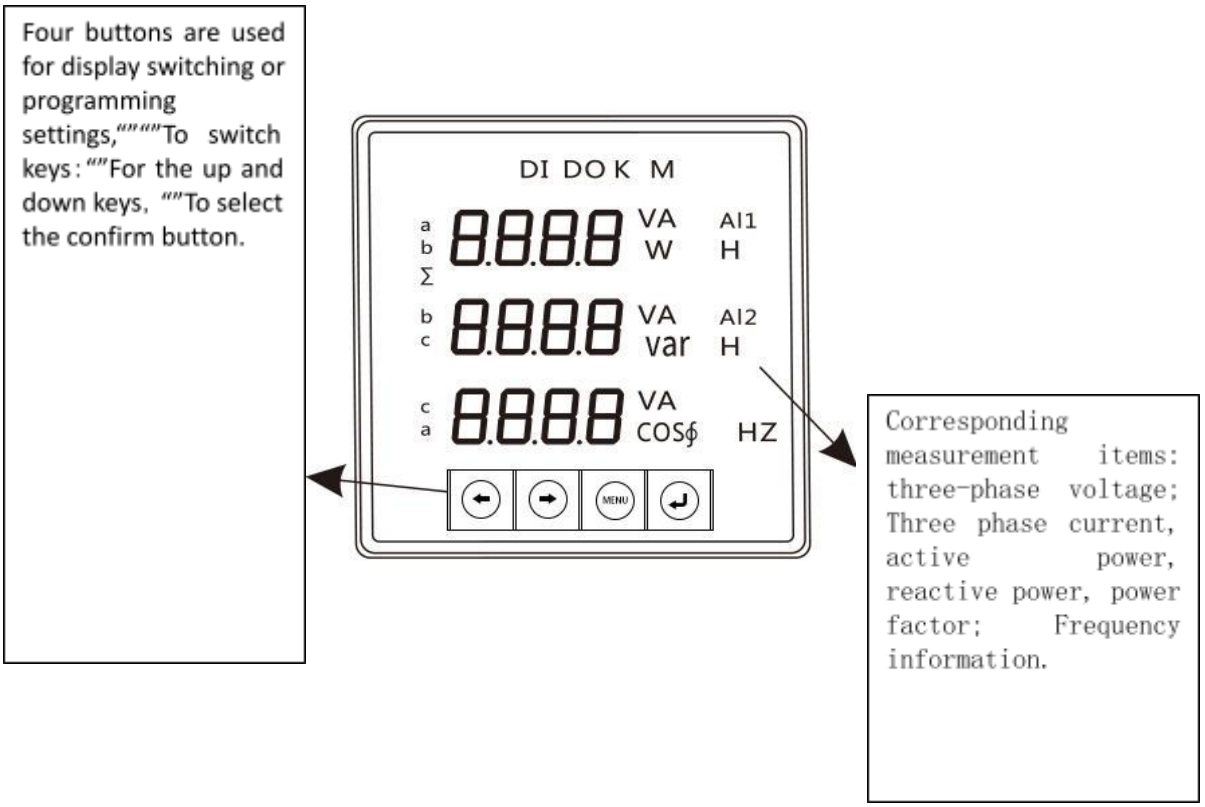
3、 Key definition

enter key : Password entry confirmation and numerical parameter modification confirmation.

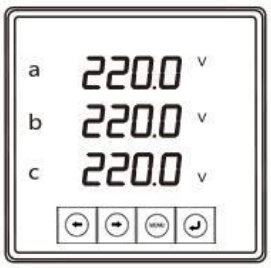
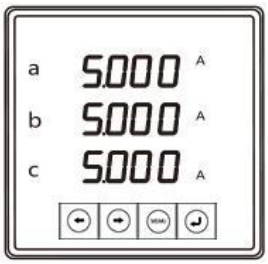
Menu key : Used for selecting menu interfaces, exiting functions, and returning to higher-level menu functions.

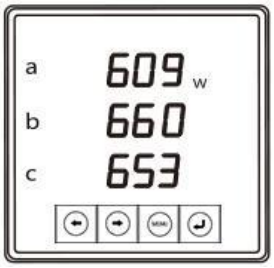
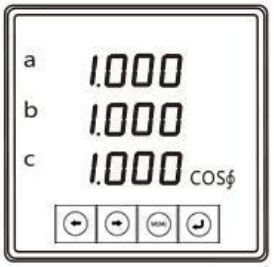
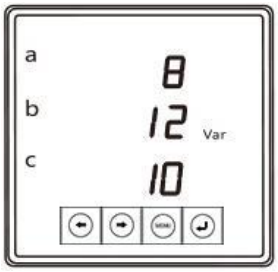
Right arrow key : When measuring display, perform conversion function. When modifying data, this key is a numeric plus key.

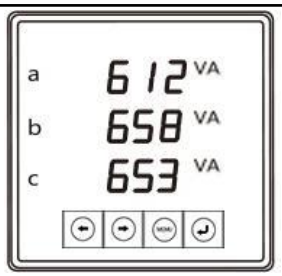
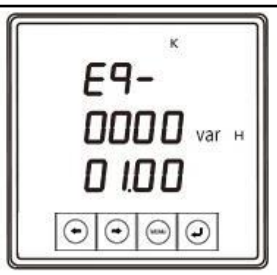
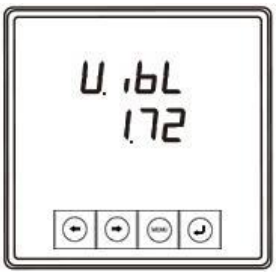
Left : When measuring and displaying, use the conversion function, and when modifying data, use this key as a numeric subtraction key.

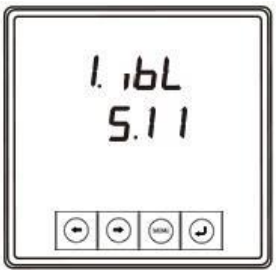
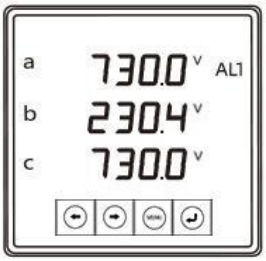
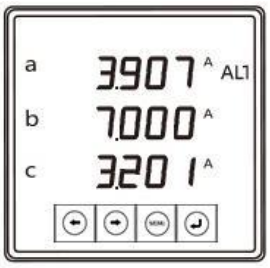
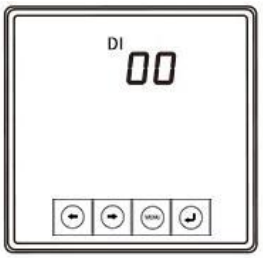


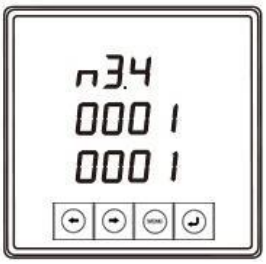
▲The schematic diagram of the display interface takes IED as an example (the page is subject to actual factory production)

page	content	explain
XS1=1		Display the three-phase phase voltages Ua, Ub, Uc separately, and press the " " key to display the line voltages Uab, Ubc, Uca. The content displayed on the left figure is the input voltage value multiplied by the set PT conversion value for one voltage measurement.
XS1=2		Display three-phase currents IA, IB, IC separately In the left image, IA=5.000A IB=5.000A IC=5.000A Display the current as a single value, which is the product of the input current value and the set CT transformation ratio

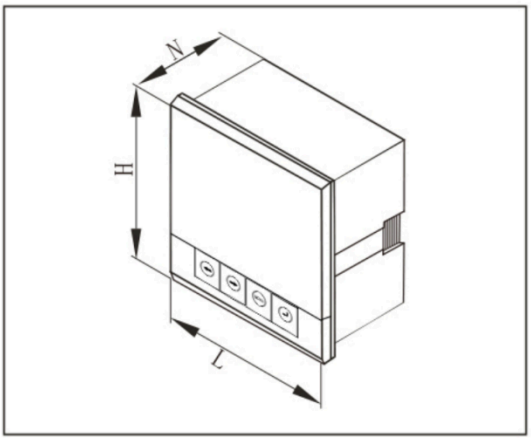
XS1=3		Display power W, reactive power var, apparent power VA KW and Kvar when K is on; In the left figure, P=1650w, Q=2850var, S=3300VA
XS1=4		The left figure represents the total power factor COS ⌀
XS1=5		The left figure represents the frequency Hz
XS1=6		The left figure represents the active power of phase separation
XS1=7		The left figure represents the phase separation power factor
XS1=8		The left figure represents the reactive power of phase separation

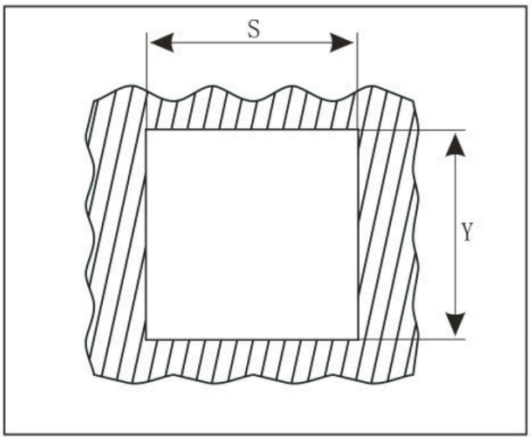
XS1=9		The left figure represents the apparent power of phase division
XS1=10		EP represents positive active energy, and when the second and third rows are connected, the degree on the left graph is 861.09KWH
XS1=11		EP stands for reverse active energy, and when the second and third rows are connected, the degree in the left figure is 861.09KWH
XS1=12		Eq represents forward reactive power, read the second and third rows together, with a degree of 1.09 KvarH in the left figure
XS1=13		Eq - represents reverse reactive power, read the second and third rows together, with a degree of 1.0 KvarH in the left figure
XS1=14		The left figure represents voltage imbalance, 1.72%

XS1=15		The left figure represents current imbalance, 5.11%
XS1=16		The left figure represents the maximum demand for active power
XS1=17		The left figure represents the maximum reactive power demand
XS1=18		The left figure represents the maximum voltage value
XS1=19		The left figure represents the maximum current value
XS1=20		The left image represents 2-channel DI

XS1=21		Left image: First row: RS584 communication baud rate Second row: Modbus communication address Third row: Program version number
XS1=22		Left image: First row: Wiring method Second row: Voltage multiplier Third row: Current multiplication rate

4、 Installation size



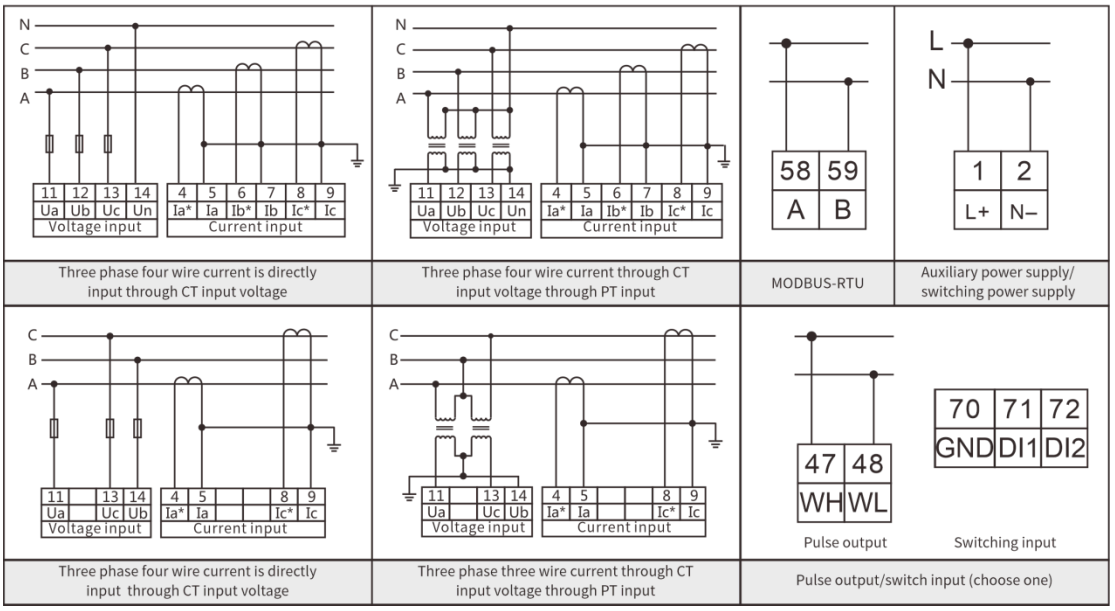


Installation size: S×Y
Hole size: S×Y
Panel size: L×H（单位mm）

Panel size	Hole size	Total length
96*96	91*91	45
80*80	76*76	45
72*72	67*67	45

Installation steps:
1) Remove the side mounting card from the meter
2) Make a hole at the installation location that corresponds to the size of the opening
3) Insert the instrument into the hole, reinstall the installation card onto the meter from the back, and tighten it securely

5、 Wiring diagram

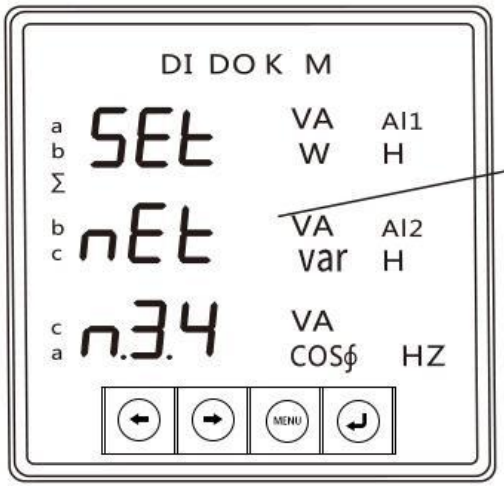


▲Operational programming

Under programming operation, the instrument provides four basic menu items: password verification and modification (CODE), system settings (SET), display settings (DIS), and communication settings (CONN). The hierarchical menu structure management method uses LED display: the first row LED displays the first layer menu information; The second row of LEDs displays the second layer menu information, while the third row of LEDs provides the third layer menu information.

The programming operation of the keyboard adopts a four key operation mode, namely: left and right movement keys “ ” “ ” Key menu rollback key “Menu”, Menu enter/confirm button “ ” To complete all the operations for the above functions.

6、 Programming operation



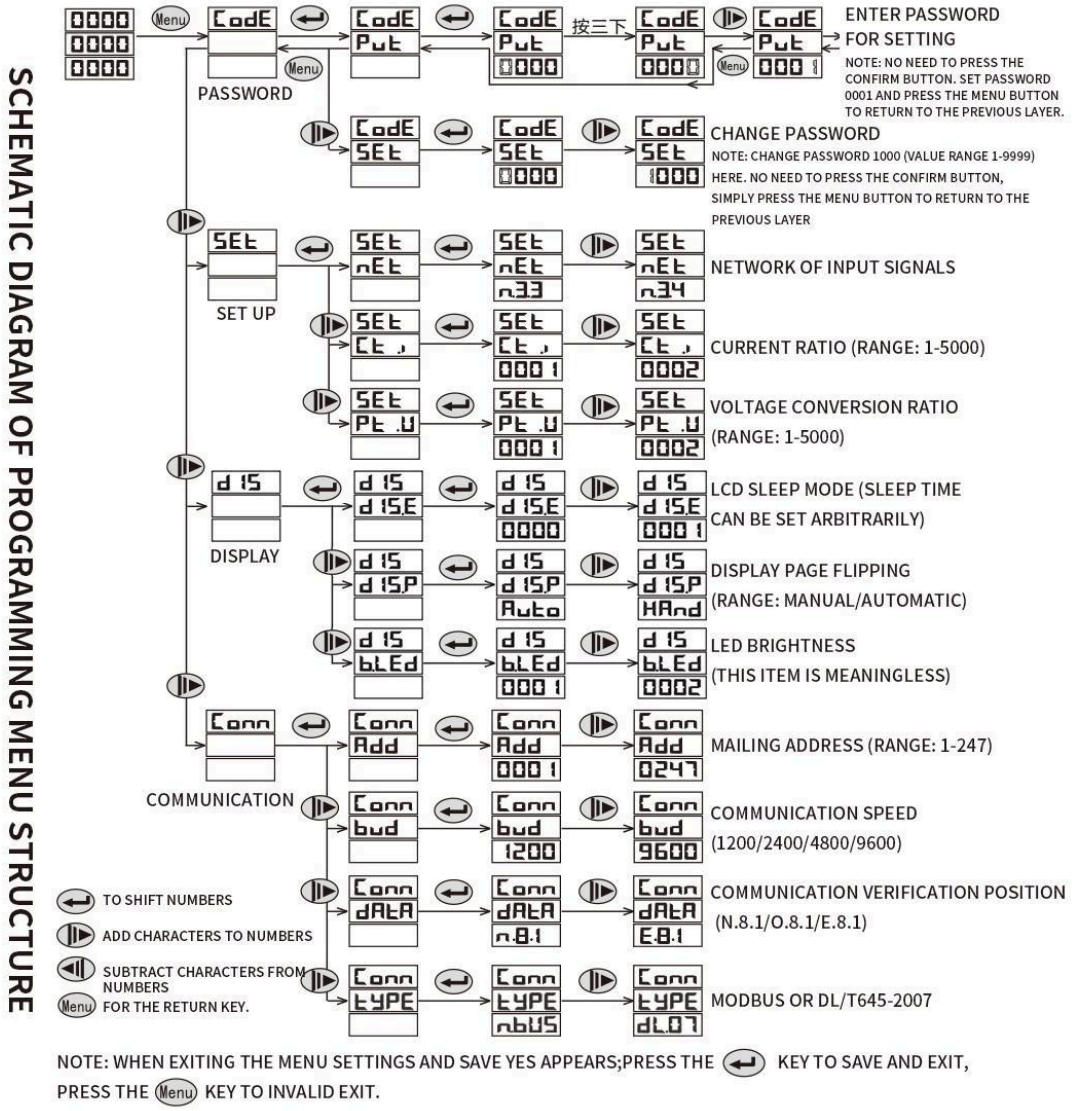
Using a hierarchical menu management approach, the programming items in the figure are: (as shown in the left figure)
First layer: SEt (parameter settings)
Second layer: eEt (wiring system)
Third layer: n.3.4 (three-phase four wire)

The organizational structure of the menu is as follows: Users can choose appropriate programming parameters according to their actual situation.

first floor	The second floor	Third layer	describe
Password CODE	Verify passwordPut	Password data(0~9999)	Programming can only be accessed when the entered password is correct. Default password:0001
	Change PasswordSet	Password data(0~9999)	Password verification must be successful before changing the password
System settings Set	networkNET	N.3.4和N.3.3	Select the input network for measuring signals
	Current ratio CT.I	1~5000	Example of setting current signal ratio to 1/2 scale:200A/5A=40
	Voltage conversion ratio PT.U	1~5000	Example of setting voltage signal ratio to 1/2 scale:10KV/100V=100
Display Settings DIS	Display DIS.E	On/60	Selecting "On" means it will display continuously, selecting "60" means it will not display after 60 seconds, and the button will not display after another 60 seconds (LED has no effect)
	Display page turning DIS.P	Auto/HAnd	Auto:Indicates automatic page flipping, flipping every 2 seconds; Hand; Indicates manual page flipping
	Brightness B.LED	0~7	Adjust the brightness of the digital display, with "0" being the darkest and "7" being the brightest. (LCD has no effect)
Communication paramet	Address Add	1~247	Instrument address range1~247
	Communication speed bud	1200-38400	Baud rate1200、2400、4800、9600、19200、38400

ers CONN	Communication checksum dAtA	N.8.1/o.8.1/ E.8.1	N.8.1:No checksum;o.81:Odd verification;E.8.1:Even verification
	Protocol type tYPE	n.bus/dl.07	MODBUS or DL/T645-2007

The programming menu structure diagram allows users to select appropriate programming settings parameters based on their actual situation



MODBUS-RTU Register Address Table							
address (DEC)	address (Hex)	Data item name	data format	Data length (Byte)	Company	Read/WriteR/W	remarks
Data once							
10	0x0A	A-phase voltage	Float	4	V	R	Ua

12	0x0C	B-phase voltage	Float	4	V	R	Ub
14	0x0E	C-phase voltage	Float	4	V	R	Uc
16	0x10	AB phase line voltage	Float	4	V	R	Uab
18	0x12	BC phase line voltage	Float	4	V	R	Ubc
20	0x14	CA phase line voltage	Float	4	V	R	Uca
22	0x16	A-phase current	Float	4	A	R	Ia
24	0x18	B-phase current	Float	4	A	R	Ib
26	0x1A	C-phase current	Float	4	A	R	Ic
28	0x1C	A-phase active power	Float	4	W	R	Pa
30	0x1E	B-phase active power	Float	4	W	R	Pb
32	0x20	C-phase active power	Float	4	W	R	Pc
34	0x22	Total active power	Float	4	W	R	ΣP
36	0x24	A-phase reactive power	Float	4	Var	R	Qa
38	0x26	B-phase reactive power	Float	4	Var	R	Qb
40	0x28	C-phase reactive power	Float	4	Var	R	Qc
42	0x2A	Total reactive power	Float	4	Var	R	ΣQ
44	0x2C	Total apparent power	Float	4	VA	R	ΣS
46	0x2E	Total power factor	Float	4	0~1.000	R	Σcos∅
48	0x30	Voltage frequency	Float	4	HZ	R	Freq
50	0x32	Positive active energy	Float	4	kWh	R	Ep+
52	0x34	Reverse active energy	Float	4	kWh	R	Ep-
54	0x36	Inductive reactive power	Float	4	kVarh	R	EQ+
56	0x38	Capacitive reactive power	Float	4	kVarh	R	EQ-
58	0x3A	A-phase power factor	Float	4	0~1.000	R	cos∅_A
60	0x3C	B-phase power factor	Float	4	0~1.000	R	cos∅_B
62	0x3E	C-phase power factor	Float	4	0~1.000	R	cos∅_C
64	0x40	A-phase apparent power	Float	4	VA	R	SA

66	0x42	B-phase apparent power	Float	4	VA	R	SB
68	0x44	C-phase apparent power	Float	4	VA	R	SC
Secondary data							
70	0x46	A-phase voltage	uShort	2	0.1V	R	Ua
71	0x47	B-phase voltage	uShort	2	0.1V	R	Ub
72	0x48	C-phase voltage	uShort	2	0.1V	R	Uc
73	0x49	AB phase line voltage	uShort	2	0.1V	R	Uab
74	0x4A	BC phase line voltage	uShort	2	0.1V	R	Ubc
75	0x4B	CA phase line voltage	uShort	2	0.1V	R	Uca
76	0x4C	A-phase current	uShort	2	0.001A	R	Ia
77	0x4D	B-phase current	uShort	2	0.001A	R	Ib
78	0x4E	C-phase current	uShort	2	0.001A	R	Ic
79	0x4F	A-phase active power	Short	2	W	R	Pa
80	0x50	B-phase active power	Short	2	W	R	Pb
81	0x51	C-phase active power	Short	2	W	R	Pc
82	0x52	Total active power	Short	2	W	R	ΣP
83	0x53	A-phase reactive power	Short	2	Var	R	Qa
84	0x54	B-phase reactive power	Short	2	Var	R	Qb
85	0x55	C-phase reactive power	Short	2	Var	R	Qc
86	0x56	Total reactive power	Short	2	Var	R	ΣQ
87	0x57	A-phase apparent power	uShort	2	VA	R	Sa
88	0x58	B-phase apparent power	uShort	2	VA	R	Sb
89	0x59	C-phase apparent power	uShort	2	VA	R	Sc
90	0x5A	Total apparent power	uShort	2	VA	R	ΣS
91	0x5B	Total power factor	Short	2	0~1.000	R	Σcos∅
92	0x5C	Voltage frequency	uShort	2	0.01Hz	R	Freq
93	0x5D	Positive active energy	long	4	Wh	R/W	Ep+
95	0x5F	Reverse active energy	long	4	Wh	R/W	Ep-

97	0x61	Positive reactive power	long	4	Varh	R/W	EQ+
99	0x63	Reverse reactive power	long	4	Varh	R/W	EQ-
101~102	0x65~0x66	retain					
103	0x67	Maximum active power demand	uShort	2	W	R	Pdem
104	0x68	Maximum reactive power demand	uShort	2	Var	R	Qdem
105~106	0x69~0x6A	retain					
107	0x6B	A-phase power factor	Short	2	0~1.000	R	Cos∅_A
108	0x6C	B-phase power factor	Short	2	0~1.000	R	Cos∅_B
109	0x6D	C-phase power factor	Short	2	0~1.000	R	Cos∅_C
110~115	0x6E~0x73	retain					
116	0x74	Voltage imbalance	uShort	2	0.01%	R	U-IBL
117	0x75	Current imbalance degree	uShort	2	0.01%	R	I-1BL
118~121	0x76~0x79	retain					
122	0x7A	Maximum value of A-phase voltage	uShort	2	0.1V	R	Max-Ua
123	0x7B	Maximum value of B-phase voltage	uShort	2	0.1V	R	Max-Ub
124	0x7C	Maximum value of C-phase voltage	uShort	2	0.1V	R	Max-Uc
125	0x7D	Maximum value of A-phase current	uShort	2	0.001A	R	Max-la
126	0x7E	Maximum value of B-phase current	uShort	2	0.001A	R	Max-Ib
127	0x7F	Maximum value of C-phase current	uShort	2	0.001A	R	Max-lc
Set parameters (read)							
301	0x12D	Instrument communication	uShort	2		R	1-247

		address					
302	0x12E	Voltage multiplier	uShort	2		R	PT=1-8000
303	0x12F	Current rate	uShort	2		R	CT=1-8000
304	0x130	Communication baud rate	uShort	2		R	0-1200; 1-2400; 2-4800; 3-9600; 4-19400: 5-38400
305	0x131	Communication data format	uShort	2		R	data format 0-N.8.1 1-0.8.1 2-E.8.1
306	0x132	Wiring system	uShort	2		R	0-Three phase four wire: 1-Three phase three wire 2CT 2- Three phase three wire 3CT
307	0x133	Voltage range	uShort	2		R	0-100V; 1-220V; 2-380V
308	0x134	current range	uShort	2		R	0-5A;1-1A
Set parameters (write)							
1000	0x3E8	Programming password setting	uShort	2		W	1-9999
1001	0x3E9	Instrument communication address	uShort	2		W	1-247
1002	0x3EA	Voltage multiplier	uShort	2		W	PT=1-8000
1003	0x3EB	Current rate	uShort	2		W	CT=1-8000
1004	0x3EC	Communication baud rate	uShort	2		W	0-1200; 1-2400; 2-4800; 3-9600 4-19400; 5-38400
1005	0x3ED	Communication data format	uShort	2		W	data format 0-N.8.1

							1-0.8.1 2-E.8.1
1006	0x3EE	Wiring system	uShort	2		W	0-Three phase four wire; 1-Three phase three wire 2CT 2- Three phase three wire 3CT
Extended Parameters (Read)							
0x137	311	Switch input information	Int	2		R	Bit0~3 1st~2nd input status

Precautions for using an electric meter:

- The device must be installed and maintained by professionals;
- Before wiring the device, the input signal and power must be cut off;
- Always use appropriate voltage monitoring devices to determine whether the absence of voltage in various parts of the instrument will cause damage to the device or abnormal operation of the device;
- Auxiliary power supply, voltage, frequency out of range;
- Incorrect polarity of current or voltage input;
- Plug and unplug communication plugs with power on;
- Not connecting the terminal wiring as required;