3-Phase Power Meter

Phase multi–function power meter

Product Executive Standard:GB/T22264. 3-2008

User’s Manual v1.0

Thanks for choosing the 3–Phase Intelligent Power Meter developed by our company. To facilitate your safe, correct and efficient use of the meter, please read this manual carefully and pay attention to the following points during use:

Caution

◆This meter shall be installed and maintained by professionals

◆The input signal and power shall be cut off before any internal or external operations to this meter

◆Proper voltage detection device is always required to confirm that there is no voltage in any part of the meter

◆The electrical parameters provided to this meter shall be within the scope of rated range

The following conditions may result in damage to the meter or abnormity during its operation:

◆Auxiliary power supply voltage is out of scope

◆Frequency of power distribution system is out of scope

◆Polarity of electric current and voltage input is not correct

◆The communication plug is unplugged with electricity

◆Terminal is not wired as required

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

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Phase multi-function power meter

1. Product Introduction

1.1 Quoted Standards (Reference Standards):

GB/T13850–1998 Electrical Measuring Transducers for Converting AC Electrical Quantities to Analogue or Digital Signals

Executive Standards:

GB/T22264.1–2008 Mounted Digital Display Electric Measuring Instruments–Part 1: Definitions and general requirements common to all parts

GB/T22264.2–2008 Mounted Digital Display Electric Measuring Instruments–Part 2: Special requirements for ammeters and voltmeters

GB/T22264.3–2008 Mounted Digital Display Electric Measuring Instruments–Part 3: Special requirements for wattmeters and varmeters

GB/T22264.1–2008 Mounted Digital Display Electric Measuring Instruments–Part 4: Special requirements for frequency meters

GB/T22264.5–2008 Mounted Digital Display Electric Measuring Instruments–Part 5: Special requirements for phase meters and power factor meters

GB/T22264.7–2008 Mounted Digital Display Electric Measuring Instruments–Part 7: Special requirements for multi–function instruments

GB/T22264.8–2008 Mounted Digital Display Electric Measuring Instruments–Part 8: Recommended test methods

1.2 Product Overview

Designed for intelligent electric control requirements of electric system, industrial and mining enterprises, public facilities and intelligent buildings, the 3–phase intelligent power meter can measure the common electric power

parameters in 3–phase power grid accurately. It can detect the 3–phase voltage, 3–phase current, active power, reactive power, apparent power, frequency, power factor and on–off input; meanwhile, it has the functions such as communication interface, analog output and relay output control, etc.

The 3–phase intelligent power meter has various extended input and output methods: 1–path communication interface, 3–path analog output, 4–path relay output, local or remote switch signal monitoring and control output function ("remote signaling" and "remote control" functions), 4–path switch monitoring function.

With extremely high cost performance, the 3–phase intelligent power meter can directly replace conventional power transmitter, measurement indicator, electric energy measuring meter and relevant auxiliary units. As a kind of advanced, intelligent and digitalized collecting element in the front end of power grid, it has been widely applied in various control systems, SCADA system and energy management system, as well as substation automation, distribution network automation, power monitoring in communities, industrial automation, intelligent building, intelligent distributor and switch cabinet. It has the network organization with easy installation, wiring and maintenance as well as small work amount, field programmability for parameter input; it can complete different PLC in the industry, and industrially control computer communication software.

2. Function Introduction (See Table 1)

Table 1

Measuring Function		Remarks
Real–time measurement	3–phase voltage	Basic functions
	3–phase current	
	Power	
	Frequency	
	Power factor	

Transmitting output	4–20mA/0–5V	Extended functions
Switching input	Master node without source	
Relay output	AC250V5A Remote control/alarm	
Communication	RS485 interface MODBUS–RTU	
Display modes		LED digital, LCD liquid crystal display

3. Technical Parameters (See Table 2)

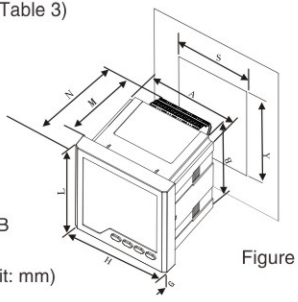
Table 2

Measuring Function			Parameters
Signal input	Wiring		3–phase 4–wire/3–phase 3–wire
	Voltage	Range	380V/100V
		Overload	Continuous: 1.2 times; instant: 2 times
		Power consumption	<1VA
	Current	Range	5A/1A
		Overload	Continuous: 1.2 times; instant: 2 times
		Power consumption	<1VA
	Frequency		45~65Hz
Power supply			AC/DC85~265V.AC220V<5VA

Power supply	AC/DC85~265V.AC220V<5VA
Communication	RS48 communication interface, isolation of physical layer Meet international standard MODBUS-RTU protocol Communication speed 1200~9600 Verification mode N81, E81,081
Analog output	0/4~20mA or 0-5/10V transmitting output Programmable to set transmission items and corresponding value
Relay output	Programmable remote control/alarm relay output Capacity 5A/250VAC5A/30VDC Programmable electric quantity alarming, switching input, analog output or remote control
Remote measuring switch	Remote measurement of switching input, master mode input without source Programmable related alarm output
Measuring level	Level 0.5
Display modes	LED digital, LCD liquid crystal display
Environment	Working temperature: -10 ~ + 55 ° C Storage temperature: -20 ~ + 75 ° C Relative humidity: <80% RH
Safety	Insulation: signal, power, output terminal housing resistance> 5MΩ Voltage withstand: housing between signal input, power supply and output > AC2KV

4. Installation and Wiring

4.1 Meter Size (See Table 3)



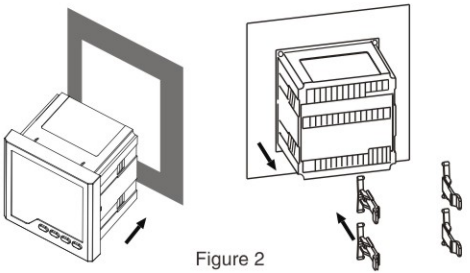
Installation size: A × B
Hole size: S × Y
Panel size: L × H (unit: mm)

Figure 1

Table 3

Dimension (L × H)Unit(mm)	Fit dimension of screen installation (A × B) Unit(mm)	Hole size (S × Y) Unit(mm)	Total length (N)mm	Depth (M) mm
120 × 120	120 × 120	111 × 111	93	78
96 × 96	96 × 96	92 × 92	93	78
80 × 80	80 × 80	76 × 76	93	78
80 × 80	80 × 80	68 × 68	93	78
48 × 48	48 × 48	45 × 45	90	84
80 × 160	80 × 160	152 × 76	93	78
60 × 120	60 × 120	114 × 56	93	78
48 × 96	48 × 96	92 × 45	93	78

4.2 Installation Diagram (See Figure 2)



Front view

Figure 2

Rear view

4.3 Terminal Function Description (see Table 4)

Table 4

Power supply	1, 2	AC/DC85–265V.AC220V
Current signal	4, 5, 6, 7, 8, 9	4, 6, 8 are the inlet terminals of 3–phase current
Voltage signal	11, 12, 13, 14	Respectively 3–phase voltage input UA, UB, UC, UN
Relay output	15–22	4–path relay output
Transmitting output	30–34	4–path 4–20mA transmitting output, 30 is public terminal
RS485 communication	58, 59	Respectively A+, B–
Switching input	70–74	4–path switching input, 70 is public terminal

Instructions:

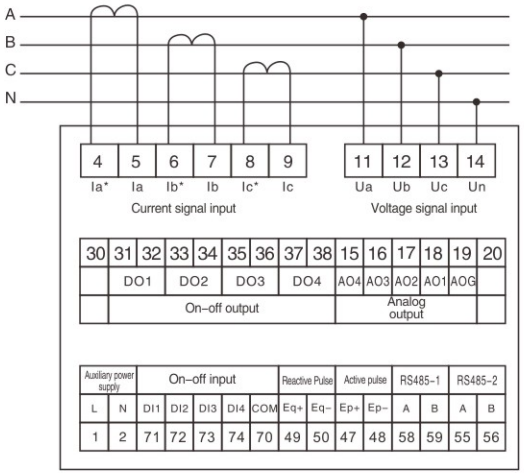
(a) 1, 2 are the auxiliary power supplies of the meter; please ensure that power supply provided is applicable to such series products so as to prevent damage to products.

(b) 4, 6, 8 are the inlet terminals of current transformer, and "*" represents the inlet terminal of current.

(c) 3–phase 3–wire connection: connection is not required for B–phase current in 3–phase 3–wire network, UB is connected to terminal No.14, and the specific wiring can refer to 4.4 Wiring.

(d) Please refer to wiring diagram on product shell for detailed use of terminal.

4.4 Wiring (See Figure 3)



4.4.2 For Input Signal Connection (See Figure 4)

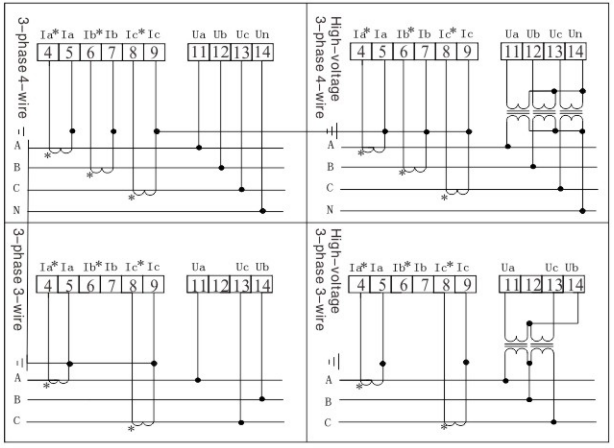


Figure 4

Wiring Description:

(a) Voltage input: The input voltage shall not exceed the rated input voltage (100VbK400V), or it is necessary to consider using PT. For easy maintenance, it is suggested using terminal block.

(b) Current input: The standard rated input current is 5A, and the external CT shall be used in case it is greater than 5A. If the CT used is connected to other meters, tandem connection shall be adopted. CT–sub–circuit shall be cut off or secondary circuit be shorted before the current input wire is removed. For easy maintenance, it is suggested using terminal block.

(c) The input voltage and current shall be corresponding, the phase sequences and the directions shall be same; otherwise, there would be errors in number and symbol (power and electric energy).

(d) The meter can work in 3–phase 4–wire mode or 3–phase 3–wire mode. Users shall select appropriate mode of connection according to field situation. In case of no centerline, 3–phase 3–wire mode shall be used, while 3–phase 4–wire mode shall be used in case of centerline. In 3–phase 3–wire mode, only 2 CTs are installed (Phase A and C). In 3–phase 4–wire mode, 3 CTs (another phase current can be synthesized in case of only 2 CTs) are required.

Note: Two connection modes can be set in the meter. The actual mode of connection shall be in line with the mode set in the meter; otherwise, the measurement data of meter would be inaccurate.

For specific connection mode, pulse constant and other technical parameters, the random wiring diagram of product shall prevail.

5. Programming Operation

In programming mode, the menu in layered structure is used for digital display interface. The meter provides 3–row or single–row digital display: (see Figure 5)

The first row is the first–layer menu information;

The second row is the second–layer menu information;

The third row is the third–layer menu information;

For instance: as shown in Figure 5: First layer: INPT signal input; Second layer: CT current conversion ratio;

Third layer: CT value of current 5, namely, the current standard CT value= 25/5A=50

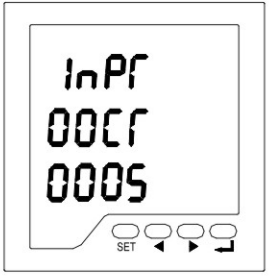


Figure 5

The structure of digital display interface is shown below. Users can select appropriate setting parameters according to actual situation. (See Table 5)

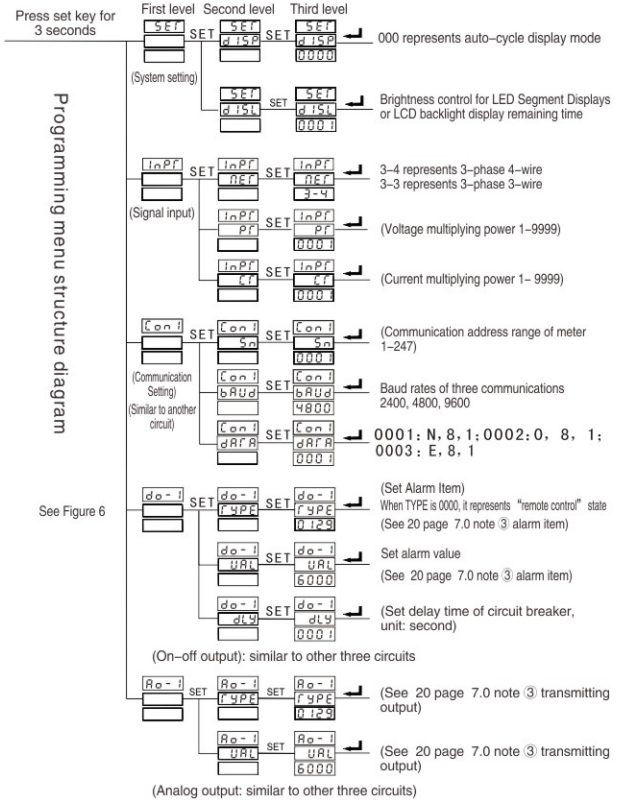
Table 5

First layer	Second layer	Third layer	Description
System Setting SET	Display DISP	0000–0003	0000 represents auto–cycle display mode
	DISL	0001–0003 or 0000–0120	0001–0003 is brightness control for LED Segment Displays; 0000–9999 is the remaining time of LCD backlight display
Signal input INPT	Mode of connection NET	3–3 or 3–4	3–3 represents 3–phase 3–wire 3–4 represents 3–phase 4–wire
	Ratio of voltage transformation, PT	1–9999	PT value= primary value of transformer/secondary value
	Ration of current transformation, CT	1–9999	CT value= primary value of transformer/secondary value

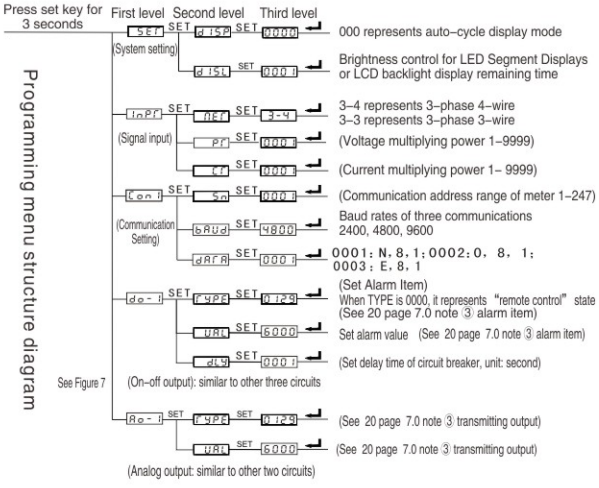
Communication setting CONi (i is 1~2)	Address SN	1~247	Address range of meter 1–247
	Communication speed BAUD	2400–9600	Baud rates of three communications 2400, 4800 and 9600
Relay output setting D0–i (i is 1–4)	Select alarm item or close alarm (see 7.0 note ③ relay output)	Set specific threshold value of alarm item	Select alarm item and set corresponding threshold value (setting is not required when the alarm item is switching value). Once the alarm condition is met, the switch output will be turned on.
Transmitting output setting A0–i (i is 1– 4)	Select transmitting item or close transmitting output (see 7.0 note ③ transmitting output)	Set full scale value of transmitting item	Select transmitting item and corresponding electric quantity parameter (Namely 0–20mA, 4–20mA, 4–12–20mA). For example, "Ao–1" "TYPE" 0142 "UAL" 3300 indicates the transmitting output signal of first path 4–20mA is corresponded to 3–phase total power 0–3300W.

Note: The above menu items are in case of complete functions. If users find some menu items are lost or fail to work, it indicates that the product selected does not support such functions.

Programming steps (48 × 48, 80 × 80, 96 × 96, 120 × 120 three–row display)
See Figure 6



Programming steps (48 × 96, 60 × 120, 80 × 160 single–row display) See Figure 7



Operating Instruction:

(a) The change of data (options) in third–level menu will take effect after " ↵ " is pressed to return to the second–level menu.

(b) The mode of connection can be modified according to actual field connection mode.

(c) Generally, the type parameter and factory setting parameter of the meter have been specified in the rear label of the meter; users can reset the meter according to actual needs.

(d) When it's required to change values, increase or decrease by " ◀ " and " ▶ ", and displace by " SET ".

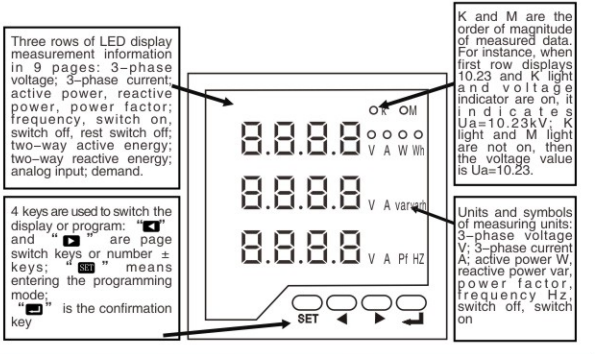
(e) When 3–phase phase voltage is displayed in front, you can simultaneously press " ◄ " and " ◄ " to display 3–phase line voltage.

(f) When parameters such as "PT", "CT" and "UAL" are changed, you can simultaneously press " ◄ " and " ► " to change the number of decimal places.

6. Panel Description and Measurement Information Display

If there is no relevant information or relevant information does not work during display switch, it indicates that this model does not have the function.

6.1 48X48, 80X80, 96X96, 120X120 three–row display (See Figure 8)



Single–row digital display of measurement information: 3–phase active

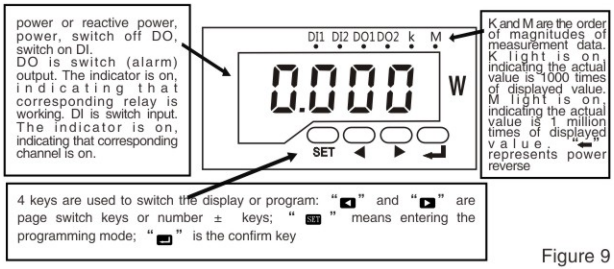


Figure 9

7. Communication Protocol of Multifunctional Meter

This meter adopts internationally common Modbus–RTU communication protocol to achieve RS485 half–duplex operation. Reading function number 0x03; writing function number 0x10. Adopt 16–digit CRC. The meter does not return the verification error.

Data Frame Format:

Start bit	Data bit	Stop bit	Check bit
1	8	1	None

Communication error handling

In case of abnormal response, set the highest bit of function number to 1. For instance, the request function number of host is 0x64, so the corresponding item of function number returned by the slave is 0x84.

Error type code:

0x01 ––– Illegal function code: the meter does not support received function number.

0x02 ––– Illegal data location: the data location specified by the host exceeds the corresponding data range.

0x03 ––– Illegal data value: the data value sent by the host exceeds the range of the meter.

7.1. Reading More Register

For instance: the host reads A–phase voltage value (220V)

The address code of A–phase voltage is 0x000, the data length is 4 bytes, and it occupies 2 data registers, and the coefficient is 0.001

Host request (Reading More Register)							
1 Meter address	2 Function number	3 Initial address High bit	4 Initial address Low bit	5 Data length High bit	6 Data length Low bit	7 Low bit of CRC code	8 High bit of CRC code
0×01	0×03	0×00	0×00	0×00	0×02	0×C1	0×0B

Slave normal response (Reading More Register)							
1 Meter address	2 Function number	3 Initial address High bit	4 Initial address Low bit	5 Data length High bit	6 Data length Low bit	7 Low bit of CRC code	8 High bit of CRC code
0×01	0×03	0×04	0×03	0×5B	0×03	0×31	0×2B

Then actual data = reading data* 0.01

Abnormal response of function number (for instance, function number of host request is 0x04)

Slave abnormal response (Reading More Register)				
1 Meter address	2 Function number	3 Error code	4 Low bit of CRC code	5 High bit of CRC code
0×01	0×84	0×01	0×82	0×c0

7.2. Writing More Register

For instance: host writes voltage rate of transformation PT (writing data is 100)

The address code of voltage ratio is 0x0039, because PT occupies 4 bytes, namely 2 data registers. The writing data is 100*1000, namely 100,000

Host request (Writing More Register)												
1	2	3	4	5	6	7	8	9	10	11	12	13
Meter address	Function number	High bit of initial	Low bit of i address nitial	High bit of data length	Low bit of data length	Data byte length	High bit of data 1	Low bit of data 1	High bit of data 2	Low bit of data 1	Low bit of CRC	High bit of CRC
0×01	0×10	0×00	0×39	0×00	0×02	0×04	0×00	0×01	0×86	0×A0	0×03	0×09

Slave normal response (Writing More Register)							
1	2	3	4	5	6	7	8
Meter address	Function number	8 higher bits of initial	8 lower bits of initial address	High bit of data length	Low bit of data length	Low bit of CRC code	High bit of CRC code
0×01	0×10	0×00	0×39	0×00	0×02	0×91	0×C5

Error response of data location (for instance: the request of host for writing address is indexed as 0x0050)

Slave abnormal response (Reading More Register)				
1	2	3	4	5
Meter Address	Function number	Error code	Low bit of CRC code	High bit of CRC code
0×01	0×90	0×02	0×CD	0×C1

Address Mapping Table of Relevant Parameters

Note: Index of address number equivalent to variable array

1. Fixed data address

No	Address mapping	Variable Name	Default	Length	Value range	Read/write permitted	Coefficient	Remarks
1	0x0000	Phase voltage Ua	0.000	2	0~9999	R	0.001	
2	0x0002	Phase voltage Ub	0.000	2	0~9999	R	0.001	
3	0x0004	Phase voltage Uc	0.000	2	0~9999	R	0.001	
4	0x0006	Line voltage Uab	0.000	2	0~9999	R	0.001	
5	0x0008	Line voltage Ubc	0.000	2	0~9999	R	0.001	
6	0x000A	Line voltage Uca	0.000	2	0~9999	R	0.001	
7	0x000C	Phase current Ia	0.000	2	0~9999	R	0.001	
8	0x000E	Phase current Lb	0.000	2	0~9999	R	0.001	
9	0x0010	Phase current Ic	0.000	2	0~9999	R	0.001	
10	0x0012	A-phase active power Pa	0.000	2	0.000~9999	R	0.001	
11	0x0014	B-phase active power Pb	0.000	2	0.000~9999	R	0.001	
12	0x0016	C-phase active power Pc	0.000	2	0.000~9999	R	0.001	
13	0x0018	Total active power Ps	0.000	2	0.000~9999	R	0.001	
14	0x001A	A-phase reactive power Qa	0.000	2	0.000~9999	R	0.001	
15	0x001C	B-phase reactive power Qb	0.000	2	0.000~9999	R	0.001	
16	0x001E	C-phase reactive power Qc	0.000	2	0.000~9999	R	0.001	
17	0x0020	Total reactive power Qs	0.000	2	0.000~9999	R	0.001	
18	0x0022	Power factor PFa	0.000	2	0.000~9999	R	0.001	
19	0x0024	Power factor PFb	0.000	2	0.000~9999	R	0.001	
20	0x0026	Power factor PFc	0.000	2	0.000~9999	R	0.001	
21	0x0028	Total power factor PFs	0.000	2	0.000~9999	R	0.001	
22	0x002A	A-phase apparent power VAa	0.000	2	0~1.0	R	0.001	
23	0x002C	B-phase apparent power VAb	0.000	2	0~1.0	R	0.001	
24	0x002E	C-phase apparent power VAc	0.000	2	0~1.0	R	0.001	
25	0x0030	Total apparent power VAs	0.000	2	0~1.0	R	0.001	
26	0x0032	Frequency	0.000	2	0.0~500	R	0.001	
27	0x0034	Voltage unbalance	0.000	2	0.000~9999	R	0.001	
28	0x0036	Current unbalance	0.000	2	0.000~9999	R	0.001	
29	0x0038	Total active electric energy	0.000	2	0.00Kwh-99.999999Mwh	R	0.001	
30	0x003A	Forward active electric energy	0.000	2	0.00Kwh-99.999999Mwh	R	0.001	
31	0x003C	Reverse active electric energy	0.000	2	0.00Kwh-99.999999Mwh	R	0.001	

No	Address mapping	Variable Name	Default	Length	Value range	Read/write permitted	Coefficient	Remarks
32	0x003E	Total reactive electric energy	0.000	2	0.00Kvarh-99.999999Mvarh	R	0.001	
33	0x0040	Forward reactive electric energy	0.000	2	0.00Kwh-99.999999Mwh	R	0.001	
34	0x0042	Reverse reactive electric energy	0.000	2	0.00Kwh-99.999999Mwh	R	0.001	
35	0x0044	Mode of connection Link	0	1	0-1	R/W	1	Note①
36	0x0045	Ratio of voltage transformation PT	1000	2	1000-9999000	R/W	0.001	
37	0x0047	Ratio of current transformation CT	1000	2	1000-9999000	R/W	0.001	
38	0x0049	Meter address Add	1	1	0-255	R/W	1	
39	0x004A	Baud rate bAUd	1	1	0-2	R/W	1	Note②
40	0x004B	Meter address Add2	1	1	0-255	R/W	1	
41	0x004C	Baud rate bAUd2	1	1	0-2	R/W	1	Note②
42	0x004D	1-path alarm delay setting	0	1	0-60	R/W	1	
43	0x004E	1-path alarm mode setting	0	1	0-29	R/W	1	Note ③
44	0x004F	1-path alarm value AL1	1000	2	-1999000-9999000	R/W	0.001	
45	0x0051	2-path alarm delay setting	0	1	0-60	R/W	1	
46	0x0052	2-path alarm mode setting	0	1	0-29	R/W	1	Note ③
47	0x0053	2-path alarm value AL2	1000	2	-1999000-9999000	R/W	0.001	
48	0x0055	3-path alarm delay setting	0	1	0-60	R/W	1	
49	0x0056	3-path alarm mode setting	0	1	0-29	R/W	1	Note ③
50	0x0057	3-path alarm value AL2	1000	2	-1999000-9999000	R/W	0.001	
51	0x0059	4-path alarm delay setting	0	1	0-60	R/W	1	
52	0x005A	4-path alarm mode setting	0	1	0-29	R/W	1	Note ③
53	0x005B	4-path alarm value AL2	1000	2	-1999000-9999000	R/W	0.001	
54	0x005D	1-path transmission mode setting	0	1	0-13	R/W	1	Note ③
55	0x005E	1-path transmission value setting	1000	2	-1999000-9999000	R/W	0.001	
56	0x0060	2-path transmission mode setting	0	1	0-13	R/W	1	Note ③
57	0x0061	2-path transmission value setting	1000	2	-1999000-9999000	R/W	0.001	
58	0x0063	3-path transmission mode setting	0	1	0-13	R/W	1	Note ③
59	0x0064	3-path transmission value setting	1000	2	-1999000-9999000	R/W	0.001	
60	0x0066	4-path transmission mode setting	0	1	0-13	R/W	1	
61	0x0067	4-path transmission value setting	1000	2	-1999000-9999000	R/W	0.001	
62	0x0069	On-off output DO	0x0000	1	0-0xFFFF	R	1	Note④
63	0x006A	On-off input DI	0x0000	1	0-0xFFFF	R	1	Note⑤
64	0x006B	Meter name	0x0A01	1	0x0000-0xFFFF	R	1	
65	0x006C	Banked relay 1	0x0000	1	当报警模式数值设置为29时，写	W	1	
66	0x006D	Banked relay 2	0x0000	1	0xAAAA继电器1动作，	W	1	

Note ①: mode of connection

Communication value	0	1
Menu display	3–4	3–3

Note ②: Baud rate

Communication value	0	1	2
Menu display	2400	4800	9600

Note ③: Comparison in electric parameters between alarm output and transmission output

No	Item	On–off output (alarm)		4–20mA output (transmission)
		Corresponding parameter (low alarm)	Corresponding parameter (high alarm)	Corresponding parameter
1	0000: switch–on control relay output			
2	Ua (A–phase voltage)	1	129	129
3	Ub (B–phase voltage)	2	130	130
4	Ub (B–phase voltage)	3	131	131
5	Uab (AB–phase voltage)	4	132	132
6	Unc (BC–phase voltage)	5	133	133
7	Uca (CA–phase voltage)	6	134	134
8	La (A–phase current)	7	135	135
9	Lb (B–phase current)	8	136	136
10	Lc (C–phase current)	9	137	137
11	Pa (A–phase active power)	10	138	138
12	Pb (B–phase active power)	11	139	139
13	Pc (C–phase active power)	12	140	140
14	Ps (Total active power)	13	141	141
15	Qa (A–phase reactive power)	14	142	142
16	Qb (B–phase reactive power)	15	143	143
17	Qc (C–phase reactive power)	16	144	144
18	Qs (Total reactive power)	17	145	145
19	PFa (A–phase power factor)	18	146	146
20	PFb (B–phase power factor)	19	147	147
21	PFc (C–phase power factor)	20	148	148
22	PFs (Total power factor)	21	149	149
23	Sa (A–phase apparent power)	22	150	150
24	Sb (B–phase apparent power)	23	151	151
25	Sc (C–phase apparent power)	24	152	152
26	Ss (Total apparent power)	25	153	153
27	F frequency	26	154	154
28	Voltage unbalance		155	155
29	Current unbalance		156	156
30	29: communication control relay output			

Analog (switching value) to factory default setting: analog (switching value) output is calculated by the secondary current

Path 1 is A–phase current, TYPE is 135, UAL is 5.000; 5.000 corresponding to secondary side current 5A

Path 2 is B–phase current, TYPE is 136, UAL 5.000; 5.000 corresponding to secondary side current 5A

Path 3 is C–phase current, TYPE is 137, UAL 5.000; 5.000 corresponding to secondary side current 5A

Path 4 is A–phase voltage, TYPE is 129, UAL 380.0; 380.0 corresponding to secondary side voltage 380.0V

Total active power: TYPE is 141, UAL 3300; 3300 corresponding to secondary power 3300W

Total power factor: TYPE is 149, UAL 1.000; 1.000 corresponding to secondary power factor 1.000

Frequency: TYPE is 154, UAL is 5M0; 5M0 corresponding to secondary frequency 50.00HZ

Notes: (a) When TYPE is set to 0000, it represents "remote control" state

(B) When UAL parameter is set, simultaneously press " ◀ " and " ▶ " to modify the number of decimal places

Note ④: Switching output state

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
												Alarm 4	Alarm 3	Alarm 2	Alarm 1

Note: When the corresponding bit is read as 1, it indicates that the relay is acting; when it is read as 0, it indicates the relay has been out of action

Note⑤: Switch input state

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
												Switch on 4	Switch on 3	Switch on 2	Switch on 1

Note: When the corresponding bit is read as 1, it indicates the switch is off; when it is read as 0, it indicates the switch is on.

8. Function Output

8.1 Energy measurement and Electric energy pulse output

This series of the meters display electric energy by 1 row of 10 digits. The specific display mode of electric energy parameter refers to table 6. The constant of electric energy pulse is 7200 imp/kwh.

8.2 Digital and Transmitting Part

This series of the meters provide 4–way digital input function and 4–way digital output function. 4 way digital input method uses stem node resistance switch signal input. These meters are equipped with 12V power supply without external power supply. When external connected, the input status shows absorption; when external connected, it shows broken off. Digital input module not only can collect and display local information, but also can achieve the remote transmission function which is named remote function through the digital interface RS485. The digital output function of 4–way optocoupler relays can be used in various places, such as alarm indication, control protection. When the digital output is valid, the relay connected, then output status shows absorption; when the digital output is turned off, the relay disconnected, then it shows broken off.

8.2.1 Electrical Parameters

Digital Input: On resistor R < 5000; Off resistor > 100 KQ

Digital Output: AC 250V; 0.1 A

8.2.2 Application Example

A. Digital Input Function

The digital module has 1 2 way input collection function. When collect and input signal, the meters will show "connected 1" or "disconnected 0". It can be used to monitor local digital signal. When switch to digital information display status, its indicator of "D1" is on.

It can transmit the information of digital information register D1 0 to a remote computer terminal by RS485 interface.

B. Digital Output and Analog Output Function

Remote Control Function: Write control information to the information register D1 0 through the host computer, so that it can control the on and off of the 4–way digital output port. "1" corresponds to "on" state; "0" corresponds to "off" state. For example, if write a binary number 10110000, it means 1,3 and 4 way digital output port is on and 2 way digital output port is off. This function can't be used with the alarm output function at the same time. In order to use the remote control function, it's necessary to set the parameter of the power consumption to 0 which means to close the alarm output function. Thus, the second line parameter of digital output function setting is 0.

Alarm Output: First set a range of electrical parameters. If the measuring parameters exceed this range, the panel will show "1" ("on" state) which means the corresponding port is conducted. If not, it will show "0" ("off" state).

The internal DOSi of the meter is the digital set register. It can achieve alarm output function by writing parameters through the interface. Besides, it can set the alarm object and alarm value through the button operation.

Item	On–off output (alarm)		4–20mA output (transmission)
	Corresponding parameter (low alarm)	Corresponding parameter (high alarm)	Corresponding parameter
Ua (A–phase voltage)	1	129	129
Ub (B–phase voltage)	2	130	130
Ub (B–phase voltage)	3	131	131
Uab (AB–phase voltage)	4	132	132
Unc (BC–phase voltage)	5	133	133
Uca (CA–phase voltage)	6	134	134
La (A–phase current)	7	135	135
Lb (B–phase current)	8	136	136
Lc (C–phase current)	9	137	137
Pa (A–phase active power)	10	138	138
Pb (B–phase active power)	11	139	139
Pc (C–phase active power)	12	140	140
Ps (Total active power)	13	141	141
Qa (A–phase reactive power)	14	142	142
Qb (B–phase reactive power)	15	143	143
Qc (C–phase reactive power)	16	144	144
Qs (Total reactive power)	17	145	145
PFa (A–phase power factor)	18	146	146
PFb (B–phase power factor)	19	147	147
PFc (C–phase power factor)	20	148	148
PFs (Total power factor)	21	149	149
Sa (A–phase apparent power)	22	150	150
Sb (B–phase apparent power)	23	151	151
Sc (C–phase apparent power)	24	152	152
Ss (Total apparent power)	25	153	153
F frequency	26	154	154
Voltage unbalance		155	155
Current unbalance		156	156

Analog (digital) factory default settings: Analog (digital) output according to the calculation of the secondary current

Circuit 1 is A phase current, TYPE 135, UAL 5.000; 5.000 corresponds to secondary current 5A

Circuit 2 is B phase current, TYPE 136, UAL 5.000; 5.000 corresponds to secondary current 5A

Circuit 3 is C phase current, TYPE 137, UAL 5.000; 5.000 corresponds to secondary current 5A

Circuit 4 is A phase voltage, TYPE 129, UAL 380.0; 380.0 corresponds to secondary voltage 380.0V

Total active power: TYPE 141, UAL 3300; 3300 corresponds to secondary power 3300W

Total power factor: TYPE 149, UAL1.000; 1.000 corresponds to secondary power factor 1.000

Frequency: TYPE 154, UAL50.00; 50.00 corresponds to secondary frequency 50.00Hz

Remarks: (a) Type “0000” corresponds to “remote control” state

(b) When set “UAL”, press “” and “” at once can modify the number of decimal places

Menu Description

(a) "-F" is frequency bi-directional transmission, it means the frequency transmission range is 50±X Hz (0~10~20mA or 4~12~20mA). For example, set a full scale threshold 6000, then the frequency transmission range will be 40.00~50.00~60.00Hz which correspond to 0~10~20mA or 4~12~20mA transmission.

(b)”-Ps” is power bi-directional transmission, 0~10~20mA or 4~12~20mA. For example, 3 phase 4 wire, input signal 380V 5A, and the full scale threshold is 5700W. It corresponds to -5700W~0W~+5700W (0~10~20mA or 4~12~20mA) transmission.

© ”-PF” is power factor bi-directional transmission. The full scale threshold is 1000 which corresponds to power factor -1~0~+1(0~10~20mA or 4~12~20mA) transmission.

9. FAQ and Answers

9.1 About Communication

1) The meter does not send data back

A: First ensure the communication settings of the meter, such as slave address, baud rate and verification mode, are in line with the host requirements;

If the communication data of several meters in field is not sent back, detect whether the connection of communication bus is correct and reliable, and whether RS485 converter is normal. If the communication of only one or few meters is abnormal, it is necessary to check corresponding communication lines. Test, remove or confirm the software problem of the host by modifying and changing the addresses of abnormal and normal meter slaves, or test, remove or confirm the meter failure by replacing the installation location of normal and abnormal meters.

2) Data sent back by the meter is inaccurate

A: Data opened by the communication of this series of three–phase intelligent power meter to the customer is divided into primary grid float data and secondary grid int/long data. Please read the instructions on data storage address and storage format in the communication address table, and ensure conversion is in line with appropriate data format.

9.2 About Inaccurate Measurement of U, I and Power

A: Firstly, ensure that correct voltage and current signals have been connected to the meter. Use the universal meter to measure voltage signal. If necessary, use clamp meter to measure current signal. Secondly, ensure the connection of signal line is correct, for instance, whether dotted terminal of current signal (inlet terminal) and the phase sequence are wrong. make sure the correct voltage and current signals are connected to the instrument, you can use a multi–meter to measure the voltage signal is set, when necessary, using a clamp meter to measure current signals lizard. Second, make sure the connection signal lines are correct, such as the dot end of the current signal (ie into the line side), and the phases of the phase sequence is wrong. The observable power interface of the meter displays that in case of reverse power transmission, the active power is negative. In general, the active power is

positive. If active power is negative, it is possible that connection of current inlet or outlet lines is wrong. Of course, the wrong connection of phase sequence will result in abnormal power.

In addition, it is necessary to note that the electric quantity displayed by the meter is the primary grid value. If the multiplying power of voltage and current transformer in the meter is not in line with actual multiplying power of the transformer, it will result in inaccurate electric quantity displayed by the meter. It is not allowed to modify the range of current and voltage in the meter. The wiring network can be modified according to actual mode of connection. The setting of connection in the programming menu shall be in line with actual mode of connection, or it will result in wrong displayed information.

9.3 The light of meter is not on

A: Ensure that suitable auxiliary power sully (see specification label of product) has been connected to the terminal of the meter. The auxiliary supply voltage that exceeds specified range may damage the meter and the meter cannot be recovered. Use the universal meter to measure the voltage of auxiliary power supply. If the supply voltage is normal and the meter does not display, users can consider cutting off electricity and re–electrifying. If the meter still cannot display normally, please contact technical service department of the company.

9.4 The meter does not respond to any operation

A: If pressing the meter keys “SET”, “◄”, “►” and “↵”, the meter does not respond. Users can consider cutting off electricity and re–electrifying. If the meter still cannot display normally, please contact technical service department of the company.

9.5 Other Abnormalities

A: Please contact the technical service department of the company. Users shall make a detailed record of field situation. The technical personnel of the company will analysis possible reasons according to feedback information. If the problem is not solved through communication, the company will arrange technical personnel to solve the problem on site as soon as possible.