HPD606

Three-phase Digital Display Combination and Multifunction Meter

User Manual

Before installing and using this product, please carefully read this manual, and keep it for reference

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1 Overview

Three-phase multifunction and combination meters adopt large-scale integrated circuit, digital sampling processing technology and SMT process, designed and manufactured to meet the power monitoring needs in power system, industrial and mining enterprises, public utilities, intelligent building and intelligent community. This meter can be used for high-accuracy measurement of all common power parameters, such as Three-phase voltage, Three-phase current, active power, reactive power, frequency, power factor, active electric energy, reactive electric energy and four-quadrant electric energy. Long-life LED or LCD display can show the measured parameters of meter and the power grid system running information. The meter has high-speed 485 communication interface, and uses Modbus protocol. Four programming keys on the meter panel are used for switching the display information conveniently by users themselves on the site. Meter parameters can be programmed and set with strong flexibility.

Three-phase multifunction and combination meter has multiple extended function modules for selection: one-way analog (0~20) mA / (4~20) mA output function can realize the power transmission output function; four-way switch input and four-way switch output function can realize the local or remote switch signal monitoring and control output functions ("remote communication" and "remote control" function).

Due to its very high performance-cost ratio, theThree-phase multifunction and combination meter can be used directly instead of conventional power transformer, measurement indicator, electric energy metering instrument and relative auxiliary units.

2 Features

Long-life LED or LCD display with intuitive reading;
High accuracy, good full-scale linear;
Steady operation, reliable performance.

3 Purpose

Three-phase multifunction power measuring meter can be widely used in energy management system, substation automation, distribution automation system, community power monitoring, industrial automation, intelligent building, and intelligent distribution cabinet. Featuring with convenient installation, simple wiring, convenient maintenance, and small engineering amount. Parameters can be programmed and set on site, meter can realize network by connecting with any industry PLC and communication software in industrial control computer.

4 Reference code expression

HPD□□-□-□-□

- Auxiliary code, indicating display mode: 4: Three-row nixie tube display; 3Y: three-phase LCD display
- Auxiliary code, indicating function T: RS485 communication
- Auxiliary code, indicating outline dimensions: 72: 72 square (72x72); 6: 6 square (80x80); 96: 96 square (96x96); 42: 42 square (120x120)
- Auxiliary code, indicating input type: L: AC signal input
- National registration model: D: Mounted digital display three-phase multifunction and combination meters

5 Model and specification, see Table 1.

Table 1 Model & Specification

Model	Name	
HPD□L-72□□	Mounted digital display three-phase multifunction and combination meters	Voltage direct connection: AC100V, 220V, and 380V External voltage transformer connection (secondary voltage is 100V): AC500V-380kV Current direct connection: AC5A; External current transformer connection (secondary current is 5A): AC5A~10kA
HPD□L-96□□		

(Note: Special specification can be customized)

6 Working environment and conditions

6.1 Ambient temperature: -10℃~ 45℃;
6.2 Relative humidity: ≤93%RH;
6.3 Working power supply: AC 220V;
6.4 Altitude: ≤2000m.

7 Main technical parameters, see Table 2

Table 2 Main technical parameters

Item			Technical Parameters
Signal input	Wiring network		three-phase three-wire / three-phase four-wire
	Voltage	Range	AC100V, AC220V, AC380V
		Overload	Continuous: 1.2 times; Instantaneous: 2 times / s
		Power consumption	< 1VA per phase
	Current	Range	AC1A, AC5A
		Overload	Continuous: 1.2 times; Instantaneous: 10 times / 5s
		Power consumption	< 1VA per phase
	Frequency		45~65Hz
Aux. power supply	Power supply		AC220V (default), AC/DC (85~265)V
	Power consumption		<5VA
Display			LED display, LCD display (optional)
Accuracy class			Voltage, current, active power, reactive power, power factor: class 0.5
			Active energy: class 0.5; reactive energy: class 2.0
Input and output	Communication		RS-485 MODBUS-RTU Protocol
	Electric energy pulse		Pulse constant: 8000imp/kwh, 8000imp/kvarh
	Switch input		4-way switch input, optocoupler isolation, passive dry contact (optional)
	Switch output		4-way switch output, relay, contact capacity AC250/1A (optional)
	Analog output		One-way analog output (4~20)mA
Environment	Working environment		(-10~45) ℃
	Storage environment		(-20~50) ℃
	Humidity		≤93%RH, non-frosting, no corrosive gas
	Altitude		≤2000m
Safety	Voltage withstand		Input and auxiliary power supply >2kV/50Hz/1min
			Output and auxiliary power supply >2kV/50Hz/1min
			Input and output >1kV/50Hz/1min
	Insulation resistance		Auxiliary power supply, input, output to meter housing >100M

8 Outline and installation dimensions (unit: mm), see Table 3.

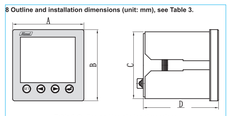


Table 3 Outline and installation dimensions

Model	A	B	C	D	Installation hole size	Remarks
HPD□L-72□□	72	72	66	88	68×68	
HPD□L-96□□	96	96	90	88	92×92	

(Note: Special specification requires to be customized)

9 Installation and Application

9.1 Before use, please carefully read this manual. Installation must be performed by the professional electrician. Before installation, ensure that all parts of the meter is not electrified. Do not operate the live part to prevent electric shock.

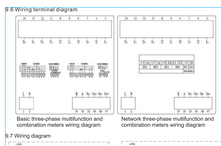
9.2 Voltage input: The input voltage should not be higher than the rated input voltage (100V or 400V) of the product, otherwise PT should be used. 1A fuse must be connected at the input side of the voltage.

9.3 Current input: The standard rated input current is 5A. If greater than 5A, the external CT should be used. If the used CT is connected to other meter, the connection should be in series. Before the removal of the product current input connection, the loop on the primary side of the CT must be disconnected or the loop on the secondary side must be short circuit. The terminal block is recommended, and CT is not directly connected which is easy for installation and removal.

9.4 Ensure that the input voltage and current are corresponded each other with consistent phase sequence in the consistent direction, otherwise the value and symbol error will occur;

9.5 The meter working power voltage cannot be out of the specified range. To prevent damage to the meter, it is recommended to install 1A fuse at the live line side when using AC power supply. In the area where is the poor power quality, it is recommended to install surge protector and fast transient burst suppressor in the power circuit.

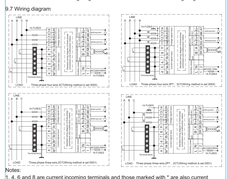
9.6 Wiring terminal diagram



Basic three-phase multifunction and combination meters wiring diagram

Network three-phase multifunction and combination meters wiring diagram

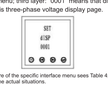
9.7 Wiring diagram



Notes:
1. 4, 6 and 8 are current incoming terminals and those marked with * are also current incoming terminals.
2. In three-phase three-wire power grid, no connection is required for Phase B current. Line B voltage Ub is connected to 1## terminal (Ub is connected to Un). For details, refer to the wiring diagram;
3. The detailed wiring refers to the wiring diagram on meter enclosure

10 Program and operation, see Table 4

10.1 At the programming state, the interface uses hierarchical menu. The meter provides three-row digital display.
The first row shows the menu information of the first layer; the second row shows the menu information of the second layer, and the third row shows the menu information of the third layer;
First layer shown in figure as below: SET is a "Set" menu; second layer: dISP is "page display set" menu; third layer: "0001" means that display is locked on the first page.. which is three-phase voltage display page.



The organizational structure of the specific interface menu sees Table 4: user can set parameters according to the actual situations.

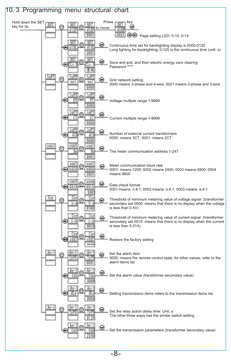
Table 4 Organizational structure of Menu

First layer	Second layer	Third layer	Description
SET: System setting	dISP: Display page		LCD: 0-10; LED: 0-14	The menu 0 interface displays in the cycle way, and other values are locked on the Read interface
	dISP		(0~120)s	LCD backlight display continuous time (unit: s)
	CLrE: Electric energy zero clearing		****Password	Clear all electric energy information
	NET: network	0000 or 0001		0000: means 3-phase 4-wire wiring; 0001: means 3-phase 4-wire wiring
	PT: Voltage transmission ratio	1-9999		Set the transmission ratio of the voltage transformer = 1 scale / 2 scales, eg: 220V / 220V = 1
	CT: Current transmission ratio	1-9999		Set the transmission ratio of the current transformer = 1 scale / 2 scales, eg: 100A/5A=20
	dIS	0000 or 0001		0000: means 3-phase 4-wire 3CT wiring; 0001: means 3-phase 4-wire 2CT wiring.
con1: Communication setting	Sn: communication address	1-247		Meter address range
	bAUd: communication baud rate	0001, 0002, 0003, 0004		0001: means 1200; 0002: means 2400; 0003: means 4800; 0004: means 9600
	dAtA: data format	0001, 0002, 0003		n.8.1 No parity, e.8.1 Even parity, o.8.1 Odd parity

First layer	Second layer	Third layer	Description
Cor: Threshold of minimum metering value	U-0: Threshold of minimum metering value of voltage	1-9999	Transformer secondary set 0500: means that there is no display if voltage is less than 0.5V
	I-0: Threshold of minimum metering value of current		Transformer secondary set 0010: means that there is no display if current is less than 0.1A
Switch output set do-1~4	Select an alarm item or close an alarm item	Set the specific threshold of the alarm	When alarm conditions are met, the switch will be on or off (for details, refer to the switch setting)
Analog output set	Select the transmission item and the range of transmission output	Set value corresponds to transmission range	One-way analog output (4~20)mA (for details, refer to the analog setting)

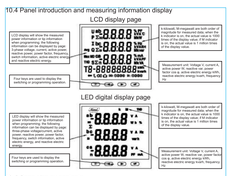
10.2 Programming key introduction
Four programming keys on the panel:
Description on key functions:
Menu key: enter the next menu, and move the item;
Left key: subtract the value and page up the menu
Right key: add the value and page down the menu
Confirm key: return to the previous menu, confirming save and exit operation.

10. 3 Programming menu structural chart



10.4 Panel introduction and measuring information display

LCD display page



10.5 Page display contents

Display page description

Page	LCD display content	LED display content	Description
DISP=1			LCD: Display the phase voltage Ua, Ub, and Uc (three -phase four-wire), and positive active electric energy, respectively Left figure shows: Ua=220.2V, Ub=220.1V, Uc=220.8V Positive active electric energy = 9.56kWh
DISP=2			LCD: Display the phase voltage Ua, Ub, and Uc (three -phase four-wire), and positive active electric energy, respectively Left figure shows: Ua=220.0V, Ub=220.1V, Uc=220.9V
DISP=3			LCD: Display the line voltage Uab, Ubc, Uca and positive active electric energy, respectively Left figure shows: Uab=380.4V, Ubc=380.0V, Uca=381.4V Positive active electric energy = 8.88kWh LED: display the line voltages Uab, Ubc and Uca Left figure shows: Uab=380.4V, Ubc=380.0V, Uca=381.4V

Page	LCD display content	LED display content	Description
DISP=4			LCD: Display the three-phase current Ia, Ib, and Ic (30A/5), and positive reactive electric energy, respectively Left figure shows: Ia=30.51A, Ib=30.00A, Ic=30.00A Positive reactive electric energy = 6.63kWh
DISP=5			LED: Display the three-phase current Ia, Ib, and Ic (30A/5), respectively Left figure shows: Ia=30.51A, Ib=30.00A, Ic=30.00A LCD: Display the total active power, total reactive power, and total apparent power, respectively: P:+ 3.200kW, Q:+0.000var, S:+3.200kVA Negative reactive electric energy =0.00kvarh
DISP=6			LED: Display the total active power, total reactive power, and total apparent power, respectively: P: +3.300kW, Q:+0.000var, PF:+0.999 LCD: Display the Phase A active power, reactive power, and apparent power, respectively: Pa= 1.100kW, Qa=0.000var, Sa=1.100kVA Positive active electric energy =6.096kWh
DISP=7			LED: Display the Phase A active power, reactive power, and power factor, respectively: Pa=1.100kW, Qa=0.000var, PFa=0.999 LCD: Display the Phase B active power, reactive power, and apparent power, respectively: Pb= 1.100kW, Qa=0.000var, Sa=1.100kVA Positive active electric energy =5.016kWh
DISP=8			LED: Display the Phase B active power, reactive power, and power factor, respectively: Pb=1.100kW, Qb=0.000var, PFb=0.999 LCD: Display the Phase C active power, reactive power, and apparent power, respectively: Pc= 1.100kW, Qc=0.000var, Sc=1.100kVA Positive active electric energy =5.00kWh
DISP=9			LED: Display the Phase C active power, reactive power, and power factor, respectively: Pc=1.100kW, Qc=0.000var, PFc=0.999 LCD: Display the total power factor, frequency PF, =1.000, frequency = 50.00HZ, Positive active electric energy = 8.08kWh LED: Display frequency =50.00Hz

Page	LCD display content	LED display content	Description
DISP=0			LCD: Display the Phase A power factor, Phase B power factor, and Phase C power factor PFa= 1.999, PFb= 1.999, PFc= 1.999 negative active electric energy=0.01kWh, respectively LED: Display the Phase A power factor, Phase B power factor, and Phase C power factor PFa= 1.999, PFb= 1.999, PFc= 1.999, respectively
DISP=10			Switch information: 0: OFF; 1: ON Switch output information DO: 1001 means the 1st way and 4th way are at ON output state, and the 2nd way and 3rd way are OFF. Switch input information DI: 0101 means that the 2nd way and 4th way are at ON input state, and the 1st way and 3rd way are OFF.
DISP=11			LED: Positive active electric energy=6.096kWh
DISP=12			LED: Negative active electric energy=5.01kWh
DISP=13			LED: Positive reactive electric energy=6.00kWh
DISP=14			LED: Positive active electric energy=6.08kWh

11 Communication protocol

11.1 Introduction

RS485 communication interface is available on the three-phase multifunction and combination meters, and Modbus communication protocol is used. One communication line, up to 32 meters can be connected at one time.

Communication address for each meter can be set, and the different series of meter has different communication wiring terminal number. Communication connection should use shielded twisted wirings with copper net, which the wire diameter is not less than 0.5mm. When wiring, the communication line should be far away from the high-voltage cable or other high-voltage electric field. The maximum transmission distance is 1200m, and the typical network connection is shown in Fig. 2. User can select other appropriate connection method according to the specific situations.

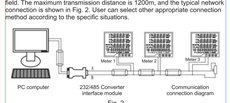


Fig. 2

Modbus protocol uses the communication connection of the master-slave response way on one communication line. First, the signal from the main computer is addressed to the terminal equipment (slave) with a unique address, and then the response signal issued from the terminal equipment is transmitted to the host in the opposite direction; that is, half-duplex mode.

Modbus protocol only allows the communication between the host (PC, PLC) and the terminal equipment, and the host can "talk" with different terminal equipment, respectively. Therefore, each terminal equipment will not occupy the communication line during initialization, and only response to the query signal reached to this machine is limited.

11.2 Physical layer

11.2.1 RS485 communication interface, asynchronous half-duplex mode;

11.2.2 Communication speed: 4800/9600bps can be set, and the default from the factory is 9600bps;

11.2.3 Byte transmission format: 1start bit, 8 data bits, parity (n81, e81, o81) can be optional, factory default: n81, 1 stop bit (with parity bit) or 2 stop bits (without parity bit).

11.3 Data frame format

Address code	Function code	Data code	Check code
1byte	1byte	nbyte	2byte

11.3.1 Address code (Address)

The address code is used to identify which slave is communicated with the host. Each slave has the unique address code. The address code issued by the host indicates the slave address that it is sent to, and the address code issued by the slave indicates the slave address that it is returned. The address that can be used by user is 1~247, and other addresses are reserved.

11.3.2 Function code (Function)

Function code indicates which function that is executed by slave. The table below lists all supported function codes and their definitions and specific operations.

Function code	Definition	Operation
03/04 H	Read register	Read data on one or more registers
10H	Write one or more continuous registers	Write in 16-bit binary into n continuous registers

11.3.3 Data field (Data)

With the different function code, the data field is also different. Those data can be the value or the reference address. For example: Function code 03H informs the meter the value read from the register, so the data field must contain the starting address and the read length which the register is to be read.

11.3.4 Check code

Check code is used to judge whether the data received by host or slave is wrong or not, making the system communication more reliable.

Modbus-RTU uses CRC-16 (16-bit cyclical redundancy check code) check method, containing 16-bit binary. CRC check code is calculated by the sender, placed at the rear of the sent information. The receiver will re-calculate the check code of the received information, and compare this code with the received check code. If two codes are inconsistent, this indicates communication error. The calculation method of CRC-16 check code is that 16-bit register is preset to 1 and each 8-bit data information is gradually processed. In calculation of CRC code, only 8 data bits are used in the CRC code calculation; start bit, stop bit, parity bit (if any) are not available in CRC code calculation.

In calculating the CRC code, 8-bit data is XOR with data in the register, then the obtained result moves one bit to the lower position, and 0 filled in the highest bit. Check the lowest bit. If the lowest bit is 1, the content of the register is XOR with the preset number; if the lowest bit is 0, XOR is not required.

This process is always repeated 8 times. After moving eighth times, the next 8 bits will be XOR with the content of the existing register. This process is also repeated 8 times. When all data information is processed, the content of the last register is CRC code value.

11.3.5 Function code

Inform the addressed terminal to execute its corresponding function. The table below lists all supported function codes and their meanings and functions.

Function code	Meaning	Action
01	Read the relay output state	Obtain the relay output state
02	Remotely measure the switch input state	Obtain the switch input information
03	Read the data register value	Obtain the run data information
05	Remotely control the output action of single relay	Control the ON/OFF of relay
06	Write a single register	Preset the data in one register
0F	Remote control for the output actions of multiple relays	Preset the switch information of one or more registers
10	Write multiple preset registers	Preset the data into the corresponding multiple registers

11.3.6 Message instruction format

Read the relay output state instruction 0x01

Host request command			Slave response command	
Slave address	1Byte	1-247	Slave address	1Byte
Function code	1Byte	0x01	Function code	1Byte
Start relay address	2Byte	0x0000(fixed)	Number of register bytes	1Byte
Number of relays	2Byte	0x0004(max.)	Register value	N Byte
CRC check code	2Byte		CRC check code	2Byte

Remote control switch input state instruction 0x02

Host request command			Slave response command	
Slave address	1Byte	1-247	Slave address	1Byte
Function code	1Byte	0x02	Function code	1Byte
Start switch address	2Byte	0x0000(fixed)	Number of register bytes	1Byte
Number of remote control switches	2Byte	0x0004(max.)	Register value	N Byte
CRC check code	2Byte		CRC check code	2Byte

Read the data register instruction 0x03

Host request command			Slave response command	
Slave address	1Byte	1-247	Slave address	1Byte
Function code	1Byte	0x03	Function code	1Byte
Start register address	2Byte		Number of register bytes	1Byte
Number of registers	2Byte		Register value	N Byte
CRC check code	2Byte		CRC check code	2Byte

Remote control single-way relay output instruction 0x05

Host request command			Slave response command	
Slave address	1Byte	1-247	Slave address	1Byte
Function code	1Byte	0x05	Function code	1Byte
Start relay address	2Byte	0x0000-0x0003	Start relay address	1Byte
Relay action value	2Byte	0xFF00/0x0000	Relay action value	2Byte
CRC check code	2Byte		CRC check code	2Byte

Remote multi-way relay output instruction 0x0F

Host request command			Slave response command	
Slave address	1Byte	1-247	Slave address	1Byte
Function code	1Byte	0x0F	Function code	1Byte
Start relay address	2Byte	0x0000(fixed)	Start relay address	2Byte
Number of relays	2Byte	0x0004(fixed)	Number of relays	2Byte
Number of data bytes	1Byte	0x01	CRC check code	2Byte
Multiple relay action value	1Byte			
CRC check code	2Byte			

11.3.7 Message example

Read the remote control / alarm relay output state (function code 0x01)

Host request	0x01	0x01	0x00 0x00	0x00 0x04	0x3D 0xC9
Slave response	0x01	0x01	0x01	0x03	0x11 0x89

Note: The value read by register is 0x03. For binary "0000 0011", 1 means ON and 0 means OFF, indicating that relays of the 1st way and 2nd way are ON and of the 3rd way and 4" way are OFF.

Remote measuring switch input state (function 0x02)

Host request	0x01	0x02	0x00 0x00	0x00 0x04	0x79 0xC9
Slave response	0x01	0x02	0x02	0x03	0x8A 0xE8

Note: The value read by register is 0x03. For binary "0000 0011", 1 means ON and 0 means OFF, indicating that there are switch signal input in the 1st and 2" ways, and there are no switch signal input in the 3rd and 4" ways.

Remote measuring single relay output (function 0x05)

Host request	0x01	0x05	0x00 0x00	0xFF 0x00	0x8C 0x3A
Slave response	0x01	0x05	0x0000	0xFF00	0x8C 0x3A

Notes: Remote control for the relay output of the 1st way. 0xFF00 means the relay is ON and 0x0000 means the relay is OFF. Note that the relay must work in the remote control mode before issuing the remote control command.

Remote measuring for the multi-way output of the relay (function 0x0F)

Host request	0x01	0x0F	0x00 0x04	0x01 0x0F	0x7E 0x92
Slave response	0x01	0x0F	0x0004	0x54 0x08	

Notes: Remote control for the 4-way relay output. 0x0F means all relays are ON and 0x00

means the relay is OFF. Note that the relay must work in the remote control mode before issuing the remote control command.

Read the data frame

Inquire the data frame（host）: read three-phase current data frame

Address	Command	High-order bit of the start register	Low-order bit of the start register	High-order bit of the number of register	Low-order bit of the number of register	CRC low order bit	CRC high order bit
0CH	03H	00H	2BH	00H	03H	74H	DEH

Response data frame（slave）

Address	Command	Data length	Data: Ia, Ib, Ic (1 2 3 4 5 6)			CRC low order bit	CRC high order bit
0CH	03H	06H	1380H.	1390H.	1370H	74H	DEH

Note：Ia=1380H(4.992)，Ib=1390H(5.008)，Ic=1370H(4.976).

Present the data frame

Inquire the data frame（host）: write the data frame of the current transmission ratio, e.g. 400A/5A=80

Address	Command	High-order bit of the start register	Low-order bit of the start register	High-order bit of the number of register	Low-order bit of the number of register	Number of characters	Write the data	CRC high-order bit	CRC high-order bit
0CH	10H	00H	04H	00H	01H	02H	050xH	FFH	78H

Response data frame（slave）, indicating that data has been written.

Address	Command	High order bit of the start register	Low order bit of the start register	High order bit of the number of register	Low-order bit of the number of register	CRC high-order bit	CRC high-order bit
0CH	10H	00H	04H	00H	01H	41H	15H

11. 3. 8 Communication address list, see Table 5.

Table 5 Communication address table

Address Hex	Item	Description	Data format	Data length (byte)	Read / Write	Remarks
00Z0	OZ	Meter address	char	1	R/W	1~247
00Z1	TXK	Communication control word	char	1	R/W	Refer to the control instruction
00Z2	KF1	Power display selection	char	1	R/W	Reserved
00Z3	SRS	Wiring method selection	char	1	R/W	Refer to the control instruction
0003	PT	Voltage ratio	ie16	2	R/W	PT=Primary voltage / secondary voltage (1~9999)
0004	CT	Current ratio	ie16	2	R/W	CT= Primary current / secondary current (1~9999)
0005	D001	Corresponding item of relay output 1	char	1	R/W	Refer to corresponding items table of the switch (analog) output
	D002	Corresponding item of relay output 2	char	1	R/W	
0006	D003/K	Corresponding item of relay output 3/ Frequency value	char	1	R/W	Set four bits as action threshold
0007	D004/K	Corresponding value of relay output 2	ie16	2	R/W	
0008	D005	Corresponding item of relay output 3	char	1	R/W	Refer to corresponding items table of the switch (analog) output
	D004	Corresponding item of relay output 4	char	1	R/W	
0009	D003/K	Corresponding value of relay output 3	ie16	2	R/W	Set four bits as action threshold
000A	D004/K	Corresponding value of relay output 4	ie16	2	R/W	
000B	DISP	Switch-on display page	char	1	R/W	Switch-on display content (page)
	DISL	Backlighting delay	char	1	R/W	Backlighting delay time
000C	dLy1	Relay output 1 delay time	char	1	R/W	Time from reaching alarm threshold to switching action (0~255 can be set)
	dLy2	Relay output 2 delay time	char	1	R/W	
0002	dLy3	Relay output 3 delay time	char	1	R/W	
	dLy4	Relay output 4 delay time	char	1	R/W	
000E	RLn1	Hysteresis set for Alarm 1	ie16	2	R/W	Difference between alarm value and switch action value
000F	RLn2	Hysteresis set for Alarm 2	ie16	2	R/W	
0013	RLn3	Hysteresis set for Alarm 3	ie16	2	R/W	
0014	RLn4	Hysteresis set for Alarm 4	ie16	2	R/W	
0015	Reserved	Reserved	ie16	2	R/W	Reserved
	A001	Corresponding item of transmission output 1	ie16	2	R/W	Refer to corresponding items table of the switch (analog) output
0016	A001K	Corresponding value of transmission output 1	ie16	2	R/W	Set four bits as the value of transmission range

Table 5 Communication address table

Address Hex	Item	Description	Data format	Data length (byte)	Read / Write	Remarks
0020		Reserved				
0021	Dst	Switch state information	ie16	2	R	1 means ON; 0 means OFF
0023	DPT	Voltage decimal point position	ie16	2	R	
	DCT	Current decimal point position				
0024	DPQ	Power Decimal Point position	ie16	2	R	R0-T bits of SrQIn means Pa, Pb, Pc, P, Qa, Qb, Qc, Q, Sa, Sb, Sc, S, PF, Pa, Pb, Pc, P, Qa, Qb, Qc and Qn, 1: means negative and 0 means positive
	SrQIN	Power sign bit				
0025	Ua	Phase A voltage	ie16	2	R	Data format: 2-byte power register and 2-byte decimal point register are used to indicate the electric parameter data. Data calculation: Voltage=power register value*10(dL)-10 DPT (Power of the corresponding decimal point register 10) Current = (power register value*10(dL) *10 DCT (Power of the corresponding decimal point register 10) Power = (power register value*10(dL) *10 DPQ (Power of the corresponding decimal point register 10) Frequency = power register value/100 Power factor = power register value/1000;
0026	Ub	Phase B voltage	ie16	2	R	
0027	Uc	Phase C voltage	ie16	2	R	
0028	Uab	Line AB voltage	ie16	2	R	
0029	Ubc	Line BC voltage	ie16	2	R	
002A	Uca	Line CA voltage	ie16	2	R	
002B	Ia	Phase A current	ie16	2	R	
002C	Ib	Phase B current	ie16	2	R	
002D	Ic	Phase C current	ie16	2	R	
002E	Pa	Phase A active power	ie16	2	R	
002F	Pb	Phase B active power	ie16	2	R	
0030	Pc	Phase C active power	ie16	2	R	
0031	Pz	Total active power	ie16	2	R	
0032	Qa	Phase A reactive power	ie16	2	R	
0033	Qb	Phase B reactive power	ie16	2	R	
0034	Qc	Phase C reactive power	ie16	2	R	
0035	Qz	Total reactive power	ie16	2	R	
0036	PFa	Phase A power factor	ie16	2	R	
0037	PFb	Phase B power factor	ie16	2	R	
0038	PFc	Phase C power factor	ie16	2	R	
0039	PFz	Total power factor	ie16	2	R	
003A	Sa	Phase A apparent power	ie16	2	R	
003B	Sb	Phase B apparent power	ie16	2	R	
003C	Sc	Phase C apparent power	ie16	2	R	
003D	Sz	Total apparent power	ie16	2	R	
003E	F	Frequency	ie16	2	R	

Table 5 Communication address table

Address Hex	Item	Description	Data format	Data length (byte)	Read / Write	Remarks
003F0	EPP	Positive active electric energy on secondary side	long	4	R	For electric energy, high-order byte first, low-order byte first. When the voltage is used, Data format presents result, unit is kWh/varh.
0041 0042	EPN	Negative active electric energy on secondary side	long	4	R	
0044	EQP	Positive reactive electric energy on secondary side	long	4	R	
0045 0046	EQN	Reverse reactive electric energy on secondary side	long	4	R	
0047 0048	WPP	Positive active electric energy on primary side	float	4	R	The first side power transformer adopts secondary side decimal point format, unit kWh/varh
0049 004A	VPN	Negative active electric energy on primary side	float	4	R	
004B 004C	WQP	Positive reactive electric energy on primary side	float	4	R	Note: The default is 3 decimal places
004D 004E	WQN	Negative reactive electric energy on primary side	float	4	R	

Control word		
Parameter	Meaning	
Communication control word BIT: 7654321 0 Function: Baud rate, data format	Data format BIT5 BIT4	00: n, 8,1
		10: o, 8,1
	Communication rate BIT1 BIT0	00: 9600bps
		01: 4800bps
		10: 2400bps
		11: 1200bps
Watt meter work mode sign SRS	Wiring method BIT7	0: three-phase four wire 1: three-phase three-wire

12 Function output

12. 1 Electric energy metering and pulse output

This series of meter uses 8 bit digit to display the measured electric energy on the primary side. The meter provides two circuits of passive photoelectric pulse. The pulse constant is 8000imp, and its meaning is as follows: When the meter is accumulated to 8000 pulses, the actual total power energy is 1kwh. It is noted that 1kwh is the electric energy data measured on the secondary side. Under the condition of PT and CT existing, the N pulses corresponds to the measured electric energy on the primary side is 1kWh x PT x CT.

12. 2 Switch and transmission part

This series of meter provides 4 way switch input function, 4-way switch output function, and 1-way analog transmission output functions. The

switch input uses the passive dry contact switch signal connection.

When the external switch signal is connected, the meter DI collection the module will connect the information, corresponding display will be 1; If no signal is connected, 0 will be displayed. 4-way relay switch output function can be used for various alarm indications and protection control. When there is switch output, the relay output will be ON and the meter displays 1; when there is no switch output, the meter will display 0. The display way is shown in the page display part. One-way analog transmission uses DC voltage small signal or DC current small signal.

12. 2. 1 Electrical parameters

Switch input DI: switch-on resistance≤500Ω; switch-off resistance≥100Ω

Switch output DO: Switch contact capacity AC250V/1A;

Transmission output A0: 4~20mA; load resistance≤600Ω; overload is 1.2 times

12. 2. 2 DI and DO registers（byte address：0024H）

This register means 4-way switch output and 4-way switch input state information, as listed in Table 6.

Table 6 DI and DO registers

DI0 register	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Corresponding switch port	DO4	DO3	DO2	DO1	DI4	DI3	DI2	DI1
Reset	0	0	0	0	0	0	0	0
DI0 information:	High 4 bits means switch output information