Statement：The company reserves to revise or cancel the instruction at any time

The right of no prior notification for the relevant parameters.

The company reserves the final right to explain this instruction.

Three phase （ L E D、L C D)multifunction （Network） instrument

User's Manual

The user's manual of three phase （ L E D、L C D)multifunction （Network）instrument

1.Brief introduction of product

This series of instruments is a kind of intelligent instrument with programmable measurement, display, digital communication and power pulse output, it can complete the electric quantity measurement, electric energy measurement, data display, collection and transmission.It can be widely applied in substation automation, distribution automation, intelligent building, electric energy measurement, management and assessment of the enterprise. The multifunctional network instrument realizes LED field display and remote RS-485 digital interface communication. 2-channel power pulse output and 4 channel analog (DC0~20mA/DC4~20mA) output function can realize local or remote switching signal monitoring and control output function ("RemoteCommunication " and "remote control"), the remote control can be combined to realize the alarm and automatic control functions of multiple power parameters. It is using MODBUS-RTU communication protocol.

Ⅱ, Technical parameters

performance			Parameter（Three phase three wire three-phase four wire network）
Input voltage measurement display	Voltage	Rated value	AC100V、400V（Please explain when you order goods）
		Overload	Continued：1.2 times instantaneous：2 times/10s
		Power waste	<1VA(per phase)
		impedance	>300kΩ
		accuracy	RMS measurement，Accuracy class 0.5 class，1.0 class
	current	Rated value	AC1A、5A（Please explain when you order goods）
		Overload	Continued：1.2 times instantaneous：2 times/10s
		Power waste	<0.4VA(per phase)
		impedance	<20MΩ
		accuracy	RMS measurement，Accuracy class 0.5 class，1.0 class
	frequency		40~60Hz
	function		Active power, reactive power, apparent power, power factor
	electric energy		Four-phase measurement, active power, reactive power measurement, positive and negative phase active power, reactive power

		measurement
	display	Programmable, Switchable, Circulating 2, 3, 4-row LED Display
Power Supply	working range	AC、DC 80~270V
	Power waste	≤5VA
output	Digital interface	RS-485、MODBUS-RTUAgreement
	Pulse output	2 channel power pulse output, opt coupler isolation
Environment	work environment	-10~55°C
	Storage environment	-20~75°C
security	Pressure resistance	Input and power > 2KV, input and output > 2KV, power supply and output > 1KV
	insulation	Input, output and power supply to the chassis >5M
appearance	size	size：120*120*85mm；96*96*85mm 80*80*85mm;72*72*85mm
	weight	0.6Kg

Ⅲ, Installation and wiring

3.1instrument size

Externality Code	Shape size（mm）	Aperture size（mm）	Minimum installation distance horizontal (mm)	vertical (mm)	General length (mm)
2	120×120	111×111	120	120	85
9	96×96	91×91	96	96	85
3	80×80	76×76	80	80	85
A	72×72	67×67	72	72	85

3.2 installation method

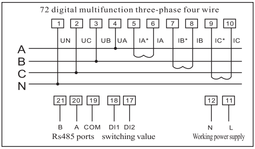
(1) Opening holes of size in fixed distribution cabinets,

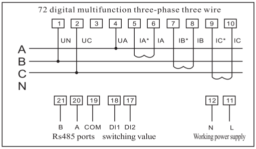
(2)； Take out the instrument, loosen the screw and remove the fixing bracket,

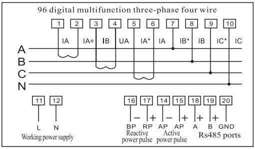
(3)； the instrument is inserted into the installation hole,

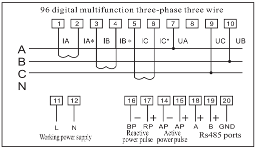
(4)。nsert the instrument fixing bracket and tighten the screw to fix the instrument.

3.3 terminal wiring diagram









(Notes: The same of 80 wiring and 72, 120 wiring and 96 current line asterisk are incoming line, Incoming and outgoing lines are reversed, Electric energy is measured to inverse-phase electric energy)

Ⅳ, Programming operation

4.1 The use of keystrokes in programming operations

Function key SET: Confirm the settings, and go to the next settings or exit settings.

Bit Selection Key ↵: Cyclically select the digital tube to be set, and the selected digital tube is flashing.

Add key←: Change the value of the scintillation digit tube (from 0 to 9 cycles).

Reduce key→: Change the value of the scintillation digit tube (from 0 to 9 cycles).

4.2 Entry and exit programming status

Enter programming state:

When measuring the display status, press SET to enter the password authentication page. "←" and "→" keys to enter the password (Digital display default user password is 9999; LCD default password is 0001), Use the "↵" key to confirm, Then press the "SET" The key enters the programming status page. Note: If the input password press "SET" key, it exits to the measurement display state, the input password is not correct.

Setting current ratio / Voltage ratio

It will show "SET" after entering the programming state, "←" can be adjusted into lnPt and then press the bit key "↵". It enters the settings directory, select with the "→"key, and confirm with the bit selection key "↵".

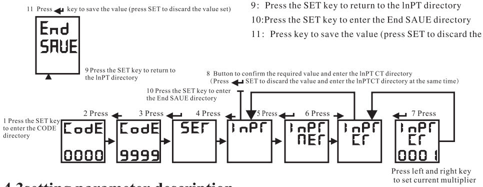
Exit programming state:

It should always press the SET key to exit the programming state, prompting the user to choose whether save the settings value (SAUE), "Yes" saves settings, and "no" does not save settings. Press "↵ to save, and press other keys not to save.

The current change adjustment of digital display multi-function instrument

Operation instructions:

1: Press the SET key to enter the CODE directory
2: Button to adjust the password to 9999 (→)
3: Push the button into the SET directory (↵)
4: Push the button into the lnPT directory (←)
5: Push the button into the lnPT NET directory(↵)
6: Push the button into the lnPT CT directory (→)
7: The button enters the 0001 directory of the lnPT CT directory; (↵)
8: Button to confirm the required value and enter the lnPT CT directory (Press SET to discard the value and enter the lnPTCT directory at the same time)
9: Press the SET key to return to the lnPT directory
10:Press the SET key to enter the End SAUE directory
11: Press key to save the value (press SET to discard the value set)



4.3setting parameter description

menu	Sequence number content description	display	scope
CODE	Enter the menu password	CodE	0~9999
	Description: Enter the password of enter the menu, only the correct password to enter the menu, and factory default value of 9999		
lnPT	Connection mode	NEt	3P3L~3P4L
	Description: 3P3L three-phase three-wire connection, 3P4L three-phase four-wire connection		
lnPT	Voltage multiplying power	Pt	1~9999
	Note: The set rate of PT for the line is 1. If the PT type for the line is 10KV/100V, the set value is 100.		
lnPT	Current multiplying power	Ct	1~9999
	Explanation: This item is set as the multiplier of PT for the line, and the factory preset is 1, for example, the PT type used for the line is 800A/5A, the item is set to 160		
lnPT	secondary voltage rating	USCL	400U、100U
	Description: The selection of secondary voltage rating		
lnPT	secondary current rating	ISCL	5A、1A
	Description: The selection of secondary current rating		
SET	Display mode	diSP	0~8
	Note: 0 is that for automatic page switching; 1 ~ 8 is that for manual switching display items		
SET	Electrical energy	CLrE	yes、no

<table>
<tr><td></td><td>changes to 0</td><td></td><td></td></tr>
<tr><td></td><td colspan="3">Explanation: yes power data changes to 0, no power data unchanged</td></tr>
<tr><td>SET</td><td>Password setting</td><td>CodE</td><td>0~9999</td></tr>
<tr><td></td><td colspan="3">Description: Reset the password to enter the menu, the factory default value is 9999</td></tr>
<tr><td>Conn</td><td>Mailing address</td><td>Addr</td><td>1~247</td></tr>
<tr><td></td><td colspan="3">illustration：Instrument address and multi machine communication are used to identify the machine</td></tr>
<tr><td>Conn</td><td>Communication baud rate</td><td>bAUd</td><td>4800、9600</td></tr>
<tr><td></td><td colspan="3">illustration：Setting the baud rate for RS485 communications, the factory default is 9600</td></tr>
</table>

<table>
<tr><td rowspan="4">Do-1</td><td rowspan="4">output setting of switch quantity 1</td><td>0000</td><td>0~52</td></tr>
<tr><td colspan="2">Set the switch output corresponding signal parameters and upper or lower limit output</td></tr>
<tr><td>2200</td><td>0~9999</td></tr>
<tr><td colspan="2">Set switch quantity limit value of signal parameter output corresponding to switching output</td></tr>
<tr><td rowspan="4">Do-2</td><td rowspan="4">output setting of switch quantity 2</td><td>0000</td><td>0~52</td></tr>
<tr><td colspan="2">Set the switch output corresponding signal parameters and upper or lower limit output</td></tr>
<tr><td>2200</td><td>0~9999</td></tr>
<tr><td colspan="2">Set switch quantity limit value of signal parameter output corresponding to switching output</td></tr>
<tr><td rowspan="4">Do-3</td><td rowspan="4">output setting of switch quantity 3</td><td>0000</td><td>0~52</td></tr>
<tr><td colspan="2">Set the switch output corresponding signal parameters and upper or lower limit output</td></tr>
<tr><td>2200</td><td>0~9999</td></tr>
<tr><td colspan="2">Set switch quantity limit value of signal parameter output corresponding to switching output</td></tr>
<tr><td rowspan="4">Do-4</td><td rowspan="4">output setting of switch quantity 4</td><td>0000</td><td>0~52</td></tr>
<tr><td colspan="2">Set the switch output corresponding signal parameters and upper or lower limit output</td></tr>
<tr><td>2200</td><td>0~9999</td></tr>
<tr><td colspan="2">Set switch quantity limit value of signal parameter output corresponding to switching output</td></tr>
<tr><td rowspan="4">Ao-1</td><td rowspan="4">output setting of analog quantity 1</td><td>0000</td><td>0~52</td></tr>
<tr><td colspan="2">Setting corresponding signal parameters of analog output and output current</td></tr>
<tr><td>2200</td><td>0~9999</td></tr>
<tr><td colspan="2">Setting secondary rating of analog output corresponding signal parameters</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>0000</td><td>0~52</td></tr>
<tr><td colspan="2">Setting corresponding signal parameters of analog output and</td></tr>
</table>

Ao-2	output setting of analog quantity 2	output current	
		2200	0~9999
		Setting secondary rating of analog output corresponding signal parameters	
Ao-3	output setting of analog quantity 3	0000	0~52
		Setting corresponding signal parameters of analog output and output current	
		2200	0~9999
		Setting secondary rating of analog output corresponding signal parameters	
Ao-4	output setting of analog quantity 4	0000	0~52
		Setting corresponding signal parameters of analog output and output current	
		2200	0~9999
		Setting secondary rating of analog output corresponding signal parameters	
SET	Selection of change values for saving parameters	SAVE	Yes、no
	Note: yes expressed saves parameter modification values, no expressed previous parameter values unchanged		

Ⅴ, The display of panel description and measurement information

page	content	explanation
1 three-phase voltage		Display voltage Ua, Ub, Uc (3-phase 4-wire) or Uab, Ubc, Uca (3-phase 3-wire), unit V, in the case of K indicator light for KV. Ua=220.0V, Ub=220.2V, Uc=220.1V in the left. In the 3 phase and 4 lines, the voltage and line voltage switching can be displayed by pressing the button.（↵）
2 Three-phase current		It shows that the 3 phase current la、lb and lc's unit is A. Tn the left figure, lla=5.000A、lb=5.001A、lc=4.998A.

3Active power, reactive power, power factor		Display active power W, reactive power Var, power factor PF. Tn the left figure, W=3.302KW、Var=0.022KVar、PF=0.999.
4 Frequency, route 1-4 access information, route 1-4 access information		Switch input status information (DI), from left to right in turn for the 4th, 3rd, 1st conduction state, the 2nd for the off state. Switch output status information (DO), from left to right in turn for the fourth way, the first way for the closed state, the third way, the second way for the on state. Display frequency. Frequency table HZ=50.00HZ.
5 Positive active power		The positive active power is displayed. The second row is 4 digits high, and the third row is 4 digits low, forming an 8 digit value.The left figure indicates that the active power is 7150.09KWh.
6 Positive reactive power		Display the value of inductive reactive power, the second row of digital tube is high 4, the third row is low 4, and to forming an 8-bit value. The left figure indicates that the reactive power is 620.03KVarh.
7 Reverse active power		Display the value of reverse active power, the second row of digital tube is high 4, the third row is low 4, and to forming an 8-bit value. The left figure indicates that the active power is 7162.09KWh.

8 Reverse reactive power		Display the value of reverse active power, the second row of digital tube is high 4, the third row is low 4, and to forming an 8-bit value. The left figure indicates that inductive reactive power is 120.03KWh.

Ⅵ, function module

6.1 RS485communication

6.1.1physical layer

(1) RS485 communication interface, asynchronous half duplex mode.

(2) Communication baud rate 4800, 9600 BPS can be set, the factory default value is 9600 bps.

(3) Byte transfer format: N81 non-check bits 8 data bits 1 stop bit.

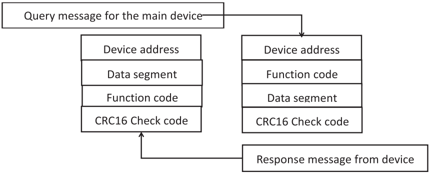
6.1.2 Communication protocol of Modbus-RTU

The instrument provides serial asynchronous semi-duplex RS485 communication interface, using standard MODB US-RTU protocol, all kinds of data information can be transmitted on the communication line. Up to 64 network instruments can be connected on one line at the same time, and each network instrument can set its address. The communication connection should use shielded twisted pair with copper mesh, and the wire diameter should not be less than 0.5mm2. When wiring, the communication line should be far away from the strong electric cable or other strong electric field environment. T-type network connection is recommended, not star or other connection.MODBUS

The MODBUS protocol uses a master-slave reply communication connection on a communication line.Firstly, the signal of host computer is tracked to a terminal device (slave) with a unique address. Then, the response signal from the terminal device is transmitted to the host in the opposite direction.That is signals on a single communication line transmit all communication data streams in opposite directions (half-duplex working mode).The MODBUS protocol only allows communication between the host (PC, PLC, etc.) and the terminal device, instead of allowing the data exchange between the independent terminal devices so that each terminal will not take up the communication line when they are initialized.

It is only limited to the query signal that responds to the machine.

Modbus- protocol query response data flow



Host query: The query message frame includes device address, function code, data information code and check code.The address code indicates the selected slave device;Functional code tells the selected slave device what functions to perform, such as Functional Code 03 requiring the slave device to read registers and return their contents;the data segment contains any additional information about the function to be performed by the slave device, and the check code is used to verify the correctness of a frame of information, the slave device provides a way to verify that the message content is correct, and using CRC16 calibration rules.

Slave response: If a normal response is generated from the device, there are slave address codes, function codes, data information codes, and CRC16 check codes in the response message. The data information codes include data collected from devices, such as register values or states.If any errors occur, we agree that no response is made slave.

We specify the communication data format to be used in this instrument: Bits per byte (1 start, 8 data, no check, and 1 stopposition).

The structure of the data frame that is the message format:

Device address	Function code	Data segment	CRC16 check code
1 byte	1 byte	N byte	2 byte

Device Address: It consists of one byte, only 1-247 is used in our system, and other addresses are reserved.The address of each terminal device must be unique, and only the addressed terminal will respond to the corresponding query.

Function code:Telling the addressed terminal what function is performed.The following table lists the functional codes supported by the series of instruments and their functions.

Function code	Function
03H	Read the values of one or more registers
10H	Write the value of one or more registers

Data segment: It contains the data required by the terminal to perform a specific function or the data collected when interrupting the response query. The contents of the data may be values, reference addresses, or set values.

Check code: CRC16 takes two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmission device and attached to the data frame.The receiving device recalculates the CRC value when it receives the data and then compares it with the value in the received CRC domain.The error occurs if the two values are not equal.

The process of generating a CRC16 is that:

(1)Preset a 16-bit register as OFFFFH (all 1), called the CRC register.

(2)The 8-bit of the first byte in the data frame is executed XOR with the low byte in the CRC register, and the result is saved back to the CRC register.

(3)The CRC register is shifted one bit to the right, the highest bit is filled with 0, and the lowest displacement is detected.

(4)If the lowest is 0: repeat the third step (the next shift); if the lowest bit is 1, the CRC register is different or operation with a predetermined fixed value (OA001H).

(5) It repeats the third step and the fourth step until the 8 shift. This is done with a complete eight bit.

(6) It repeat steps 2 through 5 to process the next eight bits until all byte processing ends.

(7) The value of the final CRC register is the value of the CRC16.

6.1.3 The examples of communication message

(1) The read data register (function code 03H): read three-phase current value, A-phase voltage 218.79V, B-phase voltage 219.79V, C-phase voltage 220.79V, and the instrument address is 1.

Host read data frames：

address	command	Starting address (high- order in front)	Register number (high-order in front)	Check code (low-order in front)
01H	03H	00H,17H	00H,06H	75H,CCH

Instrument responds to data frames：

address	command	Data length	Data segment (12 bytes)	Check code
01H	03H	0CH	435ACC9DH,435BCC9DH,435CCC9DH,	94H,C8H

Host write data frame：

address	command	Starting address	Register number	Bytes	Data segment	Check code
01H	10H	00H，02H	00H，02H	04H	00H,64H,01H,2CH	33H,E4H

Instrument responds to data frames：

address	command	Starting address	Register numbe	Check code
01H	10H	00H，02H	00H，02H	E0H,08H

6.1.4 Modbus Communication register address table

address	Project description	data type	property	explaination
0	Enter the menu password	lnt	R/W	Range：0~9999
1	Communication baud rate	lnt	R/W	2:9600bps 0:4800bps
	Mailing address			Range：1~247
2	Voltage variable ratio PT	lnt	R/W	Range：1~9999
3	Current ratio CT	lnt	R/W	Range：1~9999

4	Electric parameter apparent mode	lnt	R/W	See the menu to set the description
	Connection mode of input signal	lnt		80: Three phase three wire，0: Three phase four wire
5~21	Retain	lnt		
22	Remote letter	lnt	R/W	
23、24	A phase voltage	float	R	Float is in floating-point format, and all data conforming to the ieee 754 standard is primary data. See additional instructions for floating-point format
25、26	B phase voltage	float	R	
27、28	C phase voltage	float	R	
29、30	AB phase line voltage	float	R	
31、32	CA phase line voltage	float	R	
33、34	BC phase line voltage	float	R	
35、36	A phase current	float	R	
37、38	B phase current	float	R	
39、40	C phase current	float	R	
41、42	Active power of A phase	float	R	
43、44	Active power of B phase	float	R	
45、46	Active power of C phase	float	R	
47、48	Total active power	float	R	
49、50	Reactive power of A phase	float	R	
51、52	Reactive power of B phase	float	R	
53、54	Reactive power of C phase	float	R	
55、56	Total reactive power	float	R	
57、58	A phase in power	float	R	
59、60	B phase in power	float	R	
61、62	C phase in power	float	R	
63、64	Total view in power	float	R	
65、66	A phase power factor	float	R	
67、68	B phase power factor	float	R	
69、70	C phase power factor	float	R	
71、72	Total power factor	float	R	
73、74	frequency	float	R	
75、76	Positive active power	float	R	
77、78	Positive reactive	float	R	

	power			
79、80	Reverse active power	float	R	
81、82	Reverse reactive power	float	R	
83	DO switch output	lnt	R	
84	Di switch quantity input	lnt	R	

6.2 Electric energy metering and power pulse output

The digital display multi-function power meter can provide two-way active power, two-way reactive power metering, 2 circuit power pulse output function and the digital interface of RS485 to complete the display and remote transmission of power data. The electric energy pulse of the set of open circuit opt coupler relay can realize the remote transmission of active power and reactive power, and the total amount of pulse can be collected by remote computer terminal, PLC and DI switch acquisition module to realize the accumulative measurement of electric energy. The output mode adopted is the way to check the accuracy of electric energy (National Metrological Regulations: Pulse Error Ratio Kernel Method for Standard Meters).

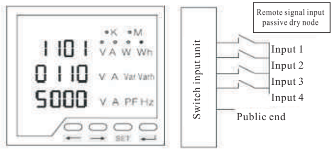
1）Electrical characteristics：In the circuit diagram of pulse acquisition interface, vcc≤48V、lz≤50mA.

2）Pulse constant: 3200 imp/kWh,When the instrument accumulates 1 kWh, the number of pulse outputs is N = 3200. It should be emphasized that 1 kWh is the secondary energy measurement data of electric energy.In the case of PT and CT, the relative N pulse data correspond to 1kWh× VR PT × ER CT.

3) application examples:The PLC terminal uses a pulse counting device, it assumed that the number of pulses collected in a time of T is N,Instrument input: 10kV/100V,，400A/5A，In this period, the electrical energy of the instrument is accumulated as:N/3200 x 100x 80 degree electric energy.

6.3 Switch input part

The switching input part provides four-way one-off input function. Four-channel switch input is the use of dry node resistance switch signal input mode, the instrument is equipped with + 5V internal power supply, without external power supply. When the external switch is on, the input module DI of the instrument switch collects the switch-on information and displays it as 1. When the external disconnection, through the instrument switch input module DI to collect the disconnection information, display 0.



1) Electrical parameters:

Turn on DI: turn on resistance R < 500_; turn off resistance R > 100K_

2) Register:

DI information register: This register represents the state information input by four switches

Di register	BIT15~BIT4	BIT3	BIT2	BIT1	BIT0
Correspondin g switch port		Di4	Di3	Di2	Di1
reset	Unrelated bit	0	0	0	0

The low 4-bit (BIT3, BIT2, BIT1, BIT0) of the DI information register is the switch input status information.If the register content is 0000 0101, it indicates that the input port of the switch is 3-way, 1-way on, 4-way, 2-way off.

3) Application examples:

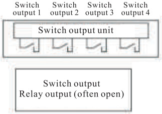
Switch input function:

The switch module has 4 switch input acquisition functions. After collecting input information, the LED of the instrument panel displays its "conduction - 1" or "turn off - 0" information for local monitoring of switching information. It switches the instrument to the switch information display state, when the indicator light on "DI" is on. The top row of the panel displays the status information (DI) entered by the switch.From left to right, channel 4, channel 3, channel 2, channel 1 and right show that channel 4, channel 3, channel 1 are conduction state, channel 2 is off state.

The information of the switch information register (DI) can be transmitted to the remote computer terminal through the instrument RS485 digital interface.

6.4 switch output part

Switch output part:Four-channel relay switch output function, can be used in various places under the alarm indication, protection control and other output functions.When the switch output is valid, the relay output is turned on, and the relay output is turned off when the switch output is turned off.



1) Electrical parameters:

Out of DO：AC250V 1A

2) Register:

DO Information Register: This register represents the state information of the four-channel switch output.

Do register	BIT7~BIT4	BIT3	BIT2	BIT1	BIT0
Correspondin g switch port		Di4	Di3	Di2	Di1
reset	Unrelated bit	0	0	0	0

The low 4 bits of DO information registers (BIT3, BIT2, BIT1, BIT0) are switch output status information.If the register content is 11010000, it indicates that port 1, 3, 4 is on, and port 2 is off. All DO information can be displayed on the LED of the instrument.

project	variable	Setting method
Switch output 1	DO1	BYTE1（1~52），alarm items, even numbers correspond to the corresponding 26 high-power alarms in the meter, the odd number corresponds to 26 low alarms in the energy address meter, and 0 indicates the remote control mode.Please refer to the switch output, transfer output power parameters table. BYTE2（0~9999），The alarm limit parameter is the second value of the power parameter. The data format is shown in the appendix.
Switch output 2	DO2	
Switch output 3	DO3	
Switch output 4	DO4	

Switch output function:

Remote control function:

The host writes data frames:

address	address	Starting address	Register number	Bytes	Data segment	Check code
01H	10H	00H,16H	00H,01H	02H	00H,06H	24H,A4H

The instrument responds to the data frame:

address	address	Starting address	Register number	Check code
01H	10H	00H,16H	00H,01H	E0H,0DH

The control information is written to the YCDO information register (16H) through the upper computer to control the opening and breaking of the 4 way switch output port, the 1 corresponding port is written in, and the 0 corresponding port is turned off.If the binary number 00000110 is written, it means that the output ports of two or three switches are on, and the one or four channels are disconnected.The function cannot be used at the same time with another limit alarm output function of the switch output module. To use the remote control function, the parameters of the electric quantity object should be set to 0, that is to close the alarm output function, and the second line parameter of the instrument is 0 when the switch output is set.The top-right chart in remote control state indicates that the fourth and the first roads are off, and the third and the second roads are on.

Another function of the switch output module is the off-limit alarm output. It sets the range of electrical parameters when the measured electrical parameters exceed the set range, the corresponding switch output port is on state, the corresponding position of the panel display 1, when the signal returns to the parameter range, the display becomes 0.The alarm object and alarm are set directly through the panel button operation.

Contrast Table of Switching Output and Transmitting Output Electricity Parameters				
project	Switch output		Converter output	
	Corresponding parameters (high alarm)	Corresponding parameters (low alarm)	Corresponding parameters （4~20mA）	Corresponding parameters （0~20mA）
Ua (A phase voltage)	1	2	1	2
Ub (B phase voltage)	3	4	3	4
Uc (C phase voltage)	5	6	5	6
Uab (AB line voltage)	7	8	7	8
Ubc (BC line voltage)	9	10	9	10
Uca (CA line voltage)	11	12	11	12
La (A phase current)	13	14	13	14
Lb (B phase current)	15	16	15	16
LC (C phase current)	17	18	17	18
Pa (active power of A phase)	19	20	19	20
Pb (active power of B phase)	21	22	21	22
Pc (active power of C phase)	23	24	23	24
Ps (total active power)	25	26	25	26
Qa (A phase reactive power)	27	28	27	28
Ob (reactive current rate of B cabinet)	29	30	29	30
Qc (C phase	31	32	31	32

reactive power)				
Qs (total reactive power)	33	34	33	34
Sa (A phase in power)	35	36	35	36
Sb (B phase in power)	37	38	37	38
Sc (C phase in power)	39	40	39	40
Ss (always in power)	41	42	41	42
PFa (A phase power factor)	43	44	43	44
PFb (B phase power factor)	45	46	45	46
PFcf (C phase power factor)	47	48	47	48
PFS (total power factor)	49	50	49	50
F (frequency)	51	52	51	52

Calculation method of alarm parameter:

The calculation formula of the limit parameter value for the electrical parameter alarm:

$$\text{Set value} = \frac{\text{Alarm value} \times \text{Secondary rating}}{\text{Primary rating}}$$

The setting value is the same as the secondary rating.

Programming instance: For three phase four wire 10KV/100V,00A/5A is set in the instrument,

The set value should be written as:

Setting requirements	Alarm condition	range		Programming setting parameters	
		One time measurement value	Two time measurement process	Electrical parameters Corresponding parameters	Set value
Voltage alarm	Ua>100V	10KV	100.0	1	1000
	Ub>110V			3	1100
	Uc<80V			6	800
Current alarm	la>400A	400	5.000	13	5000
	lb<360A			16	4500
	lc<40A			18	500

	Ps>12MW	12MW	1500	25	1500
	Pa>4MW	4MW	500	19	500
	Pb<2MW			22	250
Power alarm	PFs＞0.9			49	900
	PFa>0.866	1	1.000	43	866
	PFs<0.5			46	500

6.5 analog variable output module

Analog quantum output module: It provides four channels of analog output and transmitter function, and each channel can choose any of 26 power parameters to set.The output power of analog transmission of electric parameters (0~20mA/4~20mA) is realized by the power of analog transmission module of the instrument itself.The number of corresponding relationships can be set arbitrarily.

1）Electrical parameters：Output 0~20mA, 0~20mA precision grade 0.5%.

Overload:effective output is 120%, maximum current is 24mA, voltage is 12V.

load：Rmax=400Ω

2）register:

Instrument programming keyboard settings are realized of four analog transmitter output settings, including the selection of power items to be transmitted and the full range of 20 mA output corresponding to the power parameters.

project	variable	Setting method
Switch output 1	DO1	BYTE1（1~52），For alarm items, the even number corresponds to 26 alarms corresponding to high power measurement in the electric energy address meter.The odd number corresponds to 26 low alarms in the energy address meter.0 is the mode of remote control. Please refer to the switch output and transfer output power parameters table. BYTE2（0~9999），the alarm limit parameter is thesecondary value of the electric parameter.The data format is shown as the appendix
Switch output 2	DO2	
Switch output 3	DO3	
Switch output 4	DO4	Appendix
Variable output 1	AO1	BYTE1（1~52），For alarm items, the even number corresponds to 26 alarms corresponding to high power measurement in the electric energy address meter.The odd number corresponds to 26 low alarms in the energy address meter, 0~20mA output.Please refer to the output parameter control chart. BYTE2 (0 ~ 9999), 20mA output, corresponding parameter values, data format shown as the appendix.
Variable output 2	AO2	
Variable output 3	AO3	
Variable output 4	AO4	

The calculation of the parameter value for the output parameter of the electric parameter:taking Secondary rating.

Programming example:For three phase four wire 10KV/100V,setting up in the instrument of 400A/5A, The set value should be written as:

Setting requirements	Change condition	range		Programming setting parameters	
		One time measure ment value	Two time measureme nt process	Electrical parameters Correspondin g parameters	Setting value
Voltage transmission	Ua:0-10KV/4-20mA	10KV	100.0	1	1000
	Ub:0-10KV/4-20mA			3	1000
	Uc:0-10KV/0-20mA			6	1000
Electro rheological transmission	La:0-400A/4-20mA	400	5.000	13	5000
	la:0-400A/0-20mA			16	5000
	lb:0-400A/0-20mA			18	5000
Power transmission	Ps:0-12MW/4-12-20mA	12MW	1500	25	1500
	Pa:0-4MW/4-12-20mA	4MW	500	19	500
	Pb:0-4MW/0-10-20mA			22	500
Power factor transmission	PFs:0-1/4-12-20mA	1	1.000	49	1000
	PFa:0-1/4-12-20mA			43	1000
	PFs:0-1/0-10-20mA			46	1000

Secondary rating and secondary value appendix:

(1)Voltage is the voltage value of the secondary measurement, fixed 1 decimal bit.

(2)The current is the current value of the secondary measurement, fixed 3 decimal digits.

(3)Power is the power value of the secondary measurement, fixed 0 decimal digits.

(4) The power factor is fixed with 3 bit decimal digits.

(5) The frequency is fixed in 2 bit decimal places.

The conversion appendix of floating point number:

measured value $=(-1)^{S}\times 2^{E-127}\times(X)$

$E=E1\times128+E2\times64+E3\times32+E4\times16+E5\times8+E6\times4+E7\times2+E8$

$$X=1+\frac{M1}{2}+\frac{M2}{2^2}+......+\frac{M23}{2^{23}}$$

The floating-point data collection takes 4 bytes at a time.Collection is high-order position in front.The first collected is BYTE1 in the front, BYTE4 in the last.

BYTE1							
S	E1	E2	E3	E4	E5	E6	E7
BYTE2							
E8	M1	M2	M3	M4	M5	M6	M7
BYTE3							
M8	M9	M10	M11	M12	M13	M14	M15
BYTE4							
M16	M17	M18	M19	M20	M21	M22	M23