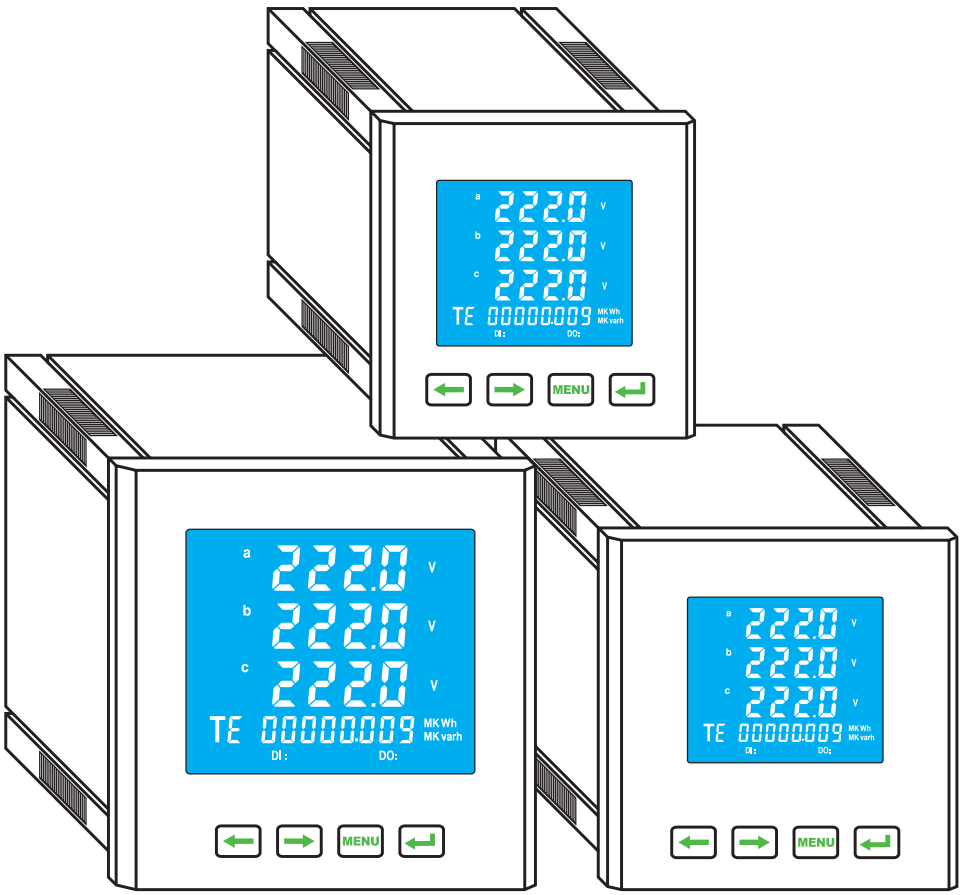
Multifunctional Power Instrument (LCD)



Operational Instruction Manual

CATALOG

Multifunctional Power Instrument(LCD)

Please read through the manual before installment and operation

Chapter 1. Product Function

Ordinary function

- Phase voltage: UA, UB, UC
- Line voltage: UAB, UBC, UCA
- Current: IA, IB, IC
- Active power: phase active power and total active power
- Reactive power: phase reactive power and total reactive power
- Apparent power: phase apparent power and total apparent power
- Power factor: phase power factor and total power factor
- Frequency
- Active electric energy
- Reactive electric energy
- Communication output: RS485

Extended function

- 4 channels analog quantity output
- 4 channels switch value output
- 4 channels switch value input

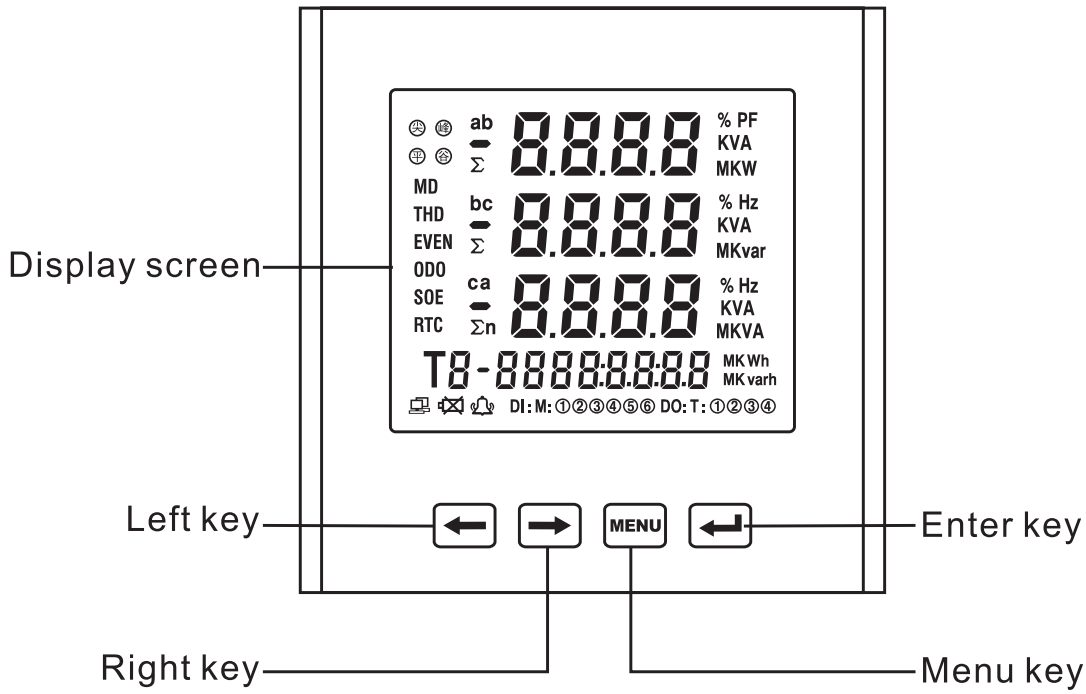
Chapter 2. Technical Parameters

Technical parameters			Index
Input	Net work		Three-phase three-wire, three-phase four- wire
	Voltage	Rated value	AC 0~500V
		Over load	Consistent:1.2 times instantaneous:2 times /30s
		Comsumption	<0.5VA(each phase)
		Impedance	>500kΩ
	Current	Rated value	AC 1A, 5A
		Over load	Consistent:1.2 times instantaneous:2 times /1s
		Impedance	<2mΩ
	Frequency		45~65Hz

Output	Communication	Output mode	RS485
		Protocol	MODBUS_RTU
		Baud rate	1200,2400,4800, 9600
	Analog quantity	Channel quantity	4 channels
		Output mode	0~20mA, 4~20mA
		Load ability	≤400Ω
	Switching value	Channel quantity	4 channels
		Output mode	Normally open relay contact output
		Contact capability	AC 250V/0.1A
	Switching value input		Four channel dry contact input modes
	Display mode		LCD(Blue back lighting)
Measuring accuracy	Voltage, current		±(0.5%FS+one digit)
	Active power, reactive power		±(0.5%FS+one digit)
	Frequency		±0.1Hz
	Power factor		±0.01PF
	Active energy		±0.5%(only for reference, not for meterage)
	Reactive energy		±1.0%(only for reference, not for meterage)
Power	Scope		AC 220V 50/60Hz or AC/DC 85~265V
	Consumption		<5VA
Safety	Withstand voltage	Input and sourse	>2kv50Hz/1min
		Input and output	>1kv50Hz/1min
		Output and sourse	>2kv50Hz/1min
	Insulating resistance		Any two of input, output, source, casing>20MΩ
Environment	Temperature		Operation: -10~50°C
			Storage: -25~70°C
	Humidity		≤85%RH，free of wet and corrosive gas
	Elevation		≤3000m

Chapter 3. Program and usage

3.1 Panel description



3.2 Description of key function

Left key: Under the programming mode. it is used for progressive decrease of parameter value or inter the previous menu. Under the measuring display mode, it is used to enter the previous display mode.

Right key: Under the programming mode. it is used for degressive increase of parameter value or inter the next menu. Under the measuring display mode, it is used to enter the next display mode.

MENU Menu key: under the measuring display status, press this key to enter the program mode. After input the correct password(factory password: 0001) "Code" prompted by the instrument, it is capable of programming and setting. Under the programming mode, it is used to return to previous menu with storing parameters. The instrumen willing display″SAVE-YES″when it return to the measuring display mode from the programming mode, then press the Menu key to save and qiut.

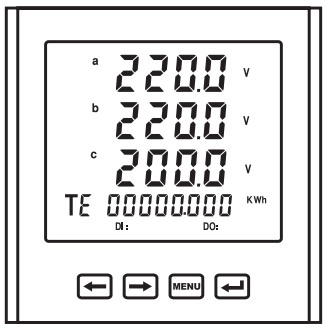
Enter key: Under the programming mode, it is used to return to the previous menu when choosing the menu items.

3. 3 Description of display mode

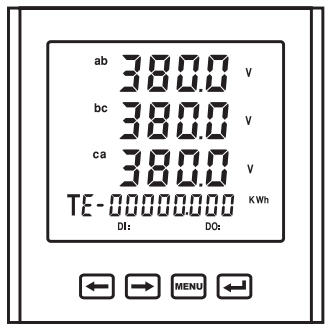
Through programming on the″diSP″parameters of the menu, it can choose one of the display mode and also can manually switch the display modes by″Right key″and″Left key″. ″dISP″value display mode: 1. three-phase phase voltage, positive active energy; 2. three-phase line voltage, opposite active energy; 3. three-phase current, positive reactive energy 4. total active, reactive, apparent power, opposite reactive energy; 5. total power factor, frequency, total current, positive active energy; 6. three-phase power factor, positive active energy; 7. three-phase active power, positive active energy; 8. three-phase reactive power, positive active energy; 9. three-phase apparent power, positive reactive energy. Under the display mode, switch the display object among the different parameters by press the Left key or Right key.

It will auto display the parameters when the ″diSP″value was ″0″.

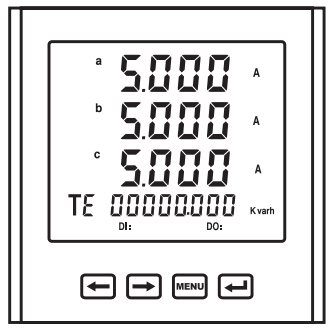
diSP=1



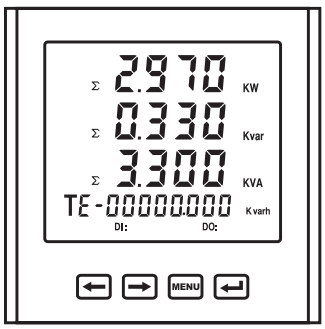
diSP=2



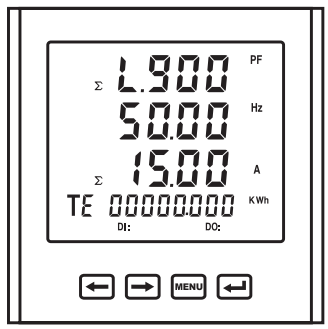
diSP=3



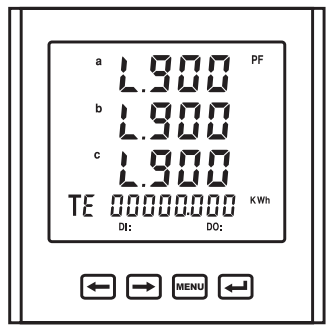
diSP=4



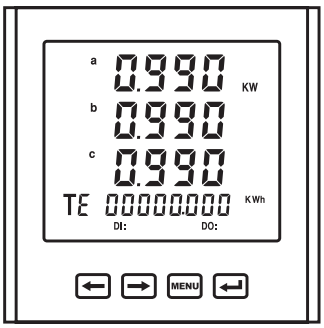
diSP=5



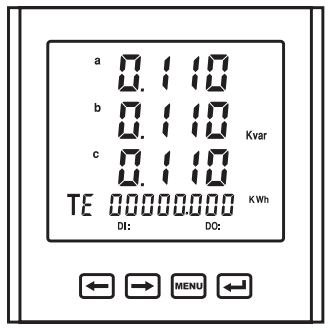
diSP=6



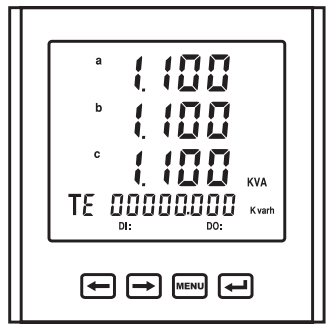
diSP=7



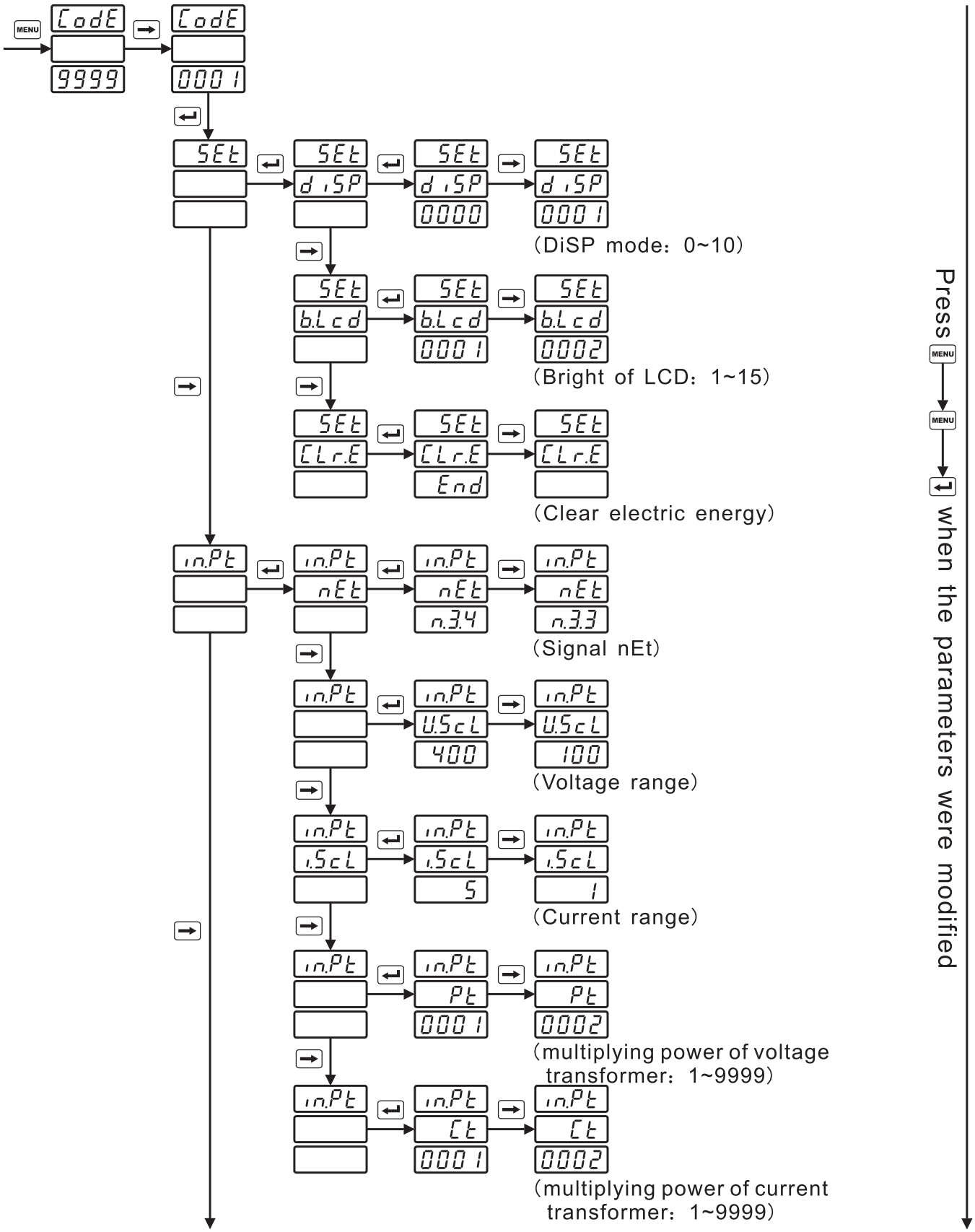
diSP=8

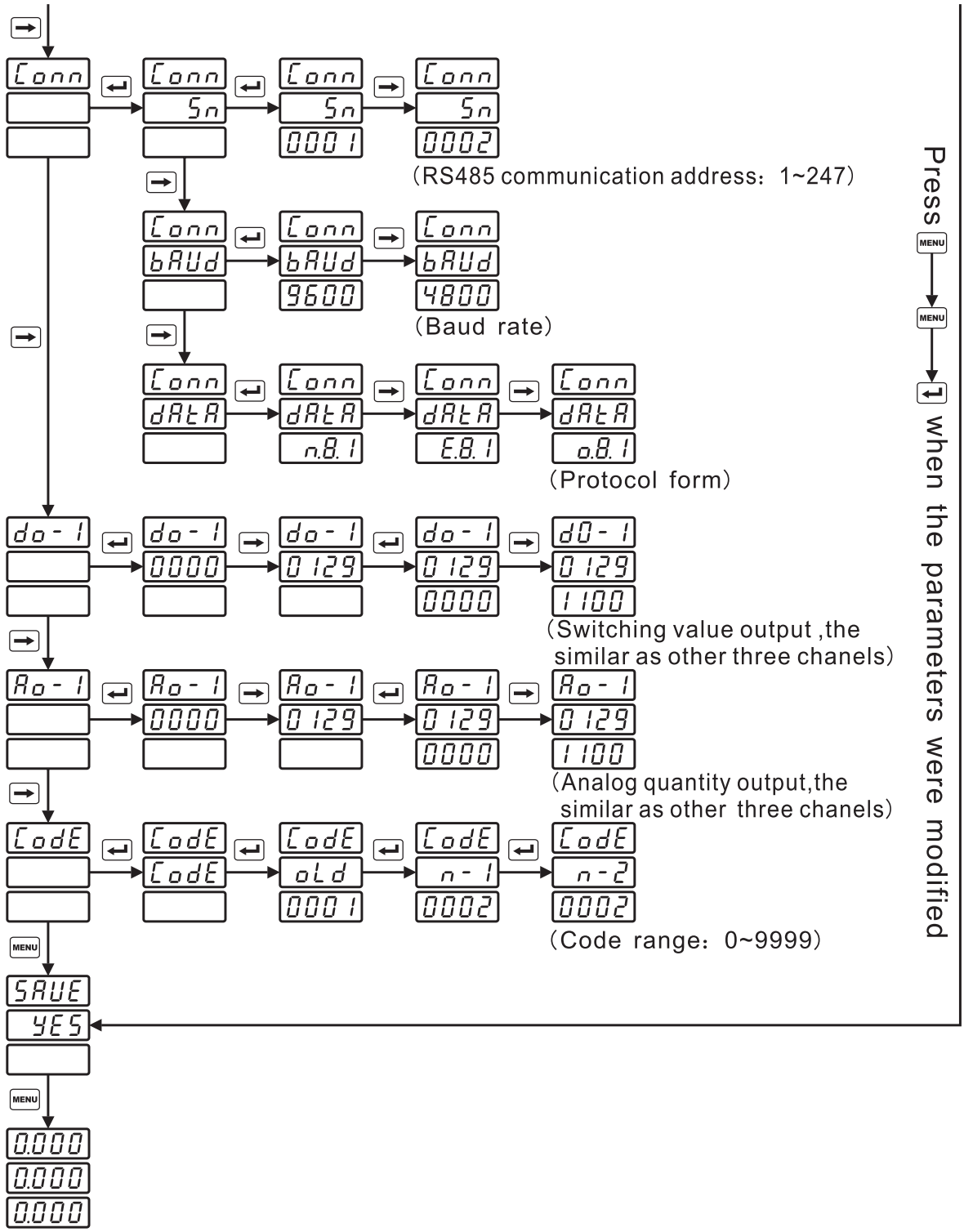


diSP=9



3.4 Menu framework





3.5 Menu significations

Under the programmable mode, four menu setting items including of setting (SEt), input(inPt), communication(Conn), switching value output(do1-4), annlog quantity(Ao1-4), modify password(CodE)and LCD display hierarchical menu

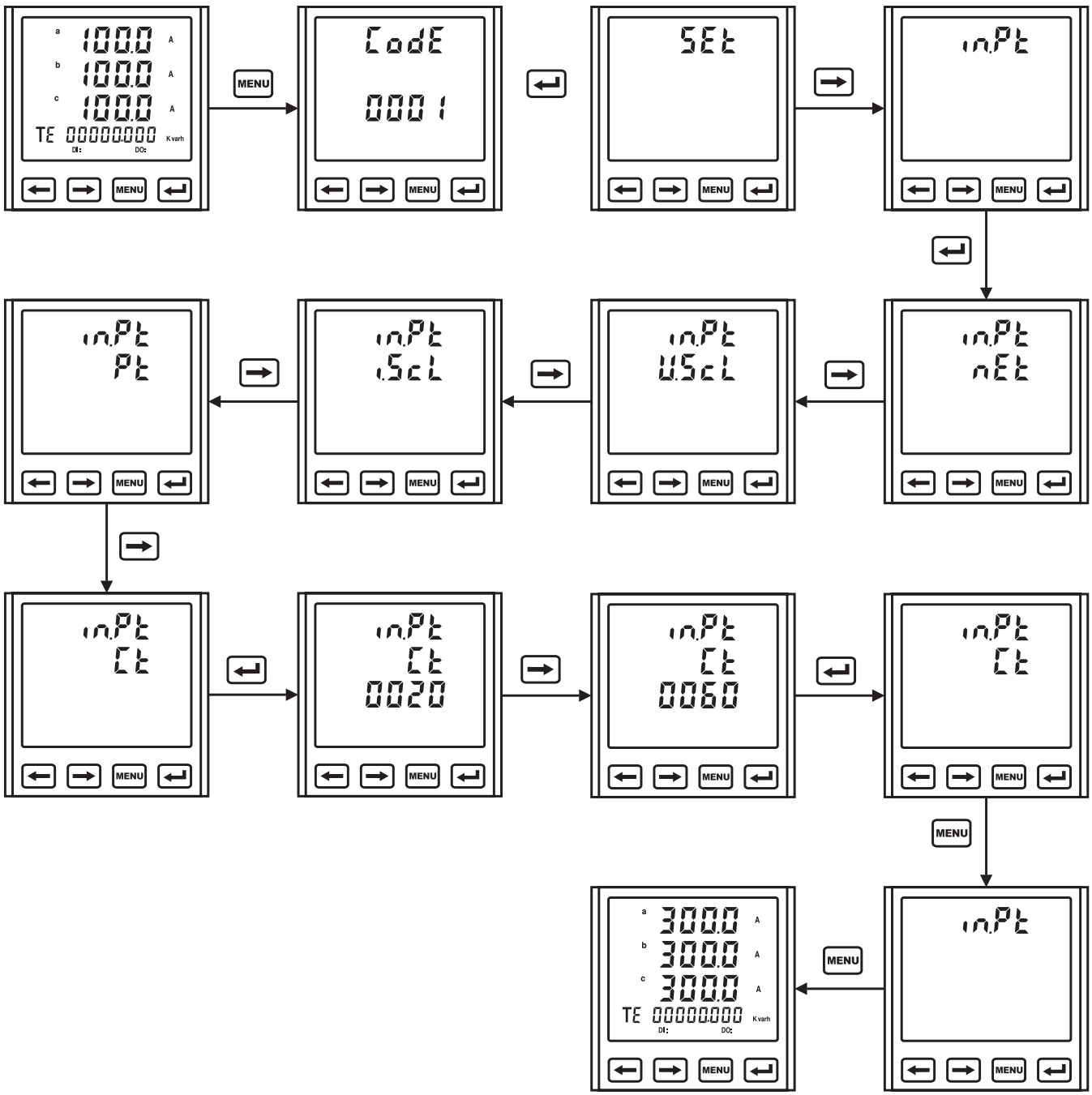
framework management are provided in this instrument. Row 1 displays the first-tier menu; row 2 displays the second-tier menus; row 3 displays the parameter value.

First-tier menu	Second-tier menu	Parameter value	Description
CodE		0~9999	Prompt the input programmable password is codE, and can only enter the programmable mode with correct password.(Factory CodE:0001)
SEt	diSP	0~10	Select display mode “diSP”
	Lcd.t	1~15	Backlight display time, unit: min, 0: always lighting
	CLr.E	End	Pressing“ Enter key”to clear the electric energy data of the instrument
inPt	nEt	n.3.4 n.3.3	Select input network “nEt”,n.3.3: three-phase three-wire n.3.4: three-phase four-wire
	U.ScL	400V 100V	Select measuring range of voltage: 400V or 100V
	i.ScL	5A/1A	Select measuring range of current: 5A or 1A
	Pt	1~9999	Set multiplying power of voltage transformer (Primary value/second value of voltage transformer)
	Ct	1~9999	Set multiplying power of current transformer (Primary value/second value of current transformer)
Conn	Sn	1~247	Set RS485 communication address “Sn”
	bAUd	9600	Select communication baud rate“bAud”:1200,2400,4800 or 9600
	dAtA	n.8 1 o 8 1 E 8 1	Protocol form n.8.1: n-no check, 8-eight data bits, 1-one stop bit o.8.1: o-odd check, 8-eight data bits, 1-one stop bit E.8.1: o-even check, 8-eight data bits, 1-one stop bitt
do-1	0~255	0~9999	Select the first-channel alarm output object , and set the higher and lower limit of alarm output range
Ao-1	0~255	0~9999	Select the first-channel transmitting output object , and set the higher and lower limit of transmitting output range
CodE	oLd	0~9999	Current code
	n-1	0~9999	Input new code first time
	n-2	0~9999	Input new code second time

3.6 Programming operation examples

The measuring range of instruments has been set as the same parameters provided by users at the factory. Users should check if the input network, voltage/ current measuring range and transformer multiplying power are consistent with the actual input again before use.

3.6.1 Set multiplying power of current transformer is 60(CT 300A/5A)



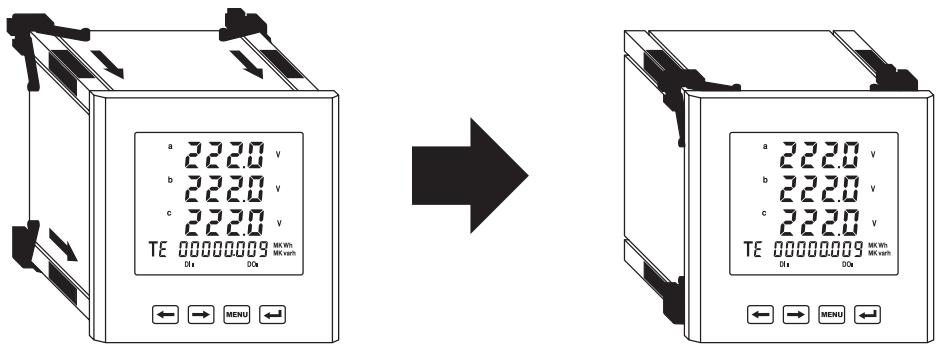
Chapter 4. Installment and wiring

4.1 Shape and cutout hole dimension(unit：mm)

Shape	Panel dimension		Case dimension			Cutout hole dimension	
	W	H	W	H	D	W	H
120×120Square	120	120	110	110	83	112	112
96×96Square	96	96	90	90	83	92	92
80×80Square	80	80	74	74	83	76	76
72×72Square	72	72	66	66	83	68	68

4.2 Method of installation

Choose the corresponding hole cutout dimension according to the instrument dimension from the table above, make a hole in the installation screen, insert the instruments into the hole, place the four clamping pieces into the clamping holder and push and tighten them by hand.



4.3 Terminal arrangement and function declaration of instrument.

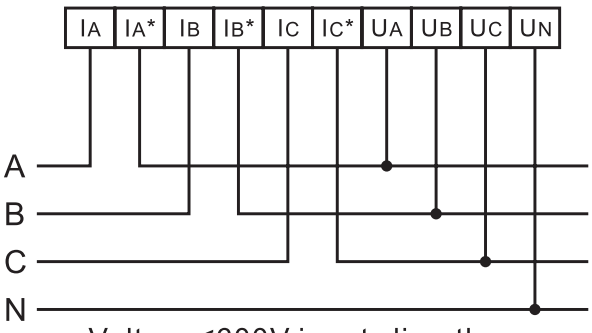
(Note: If it is not the same with the wiring schema of the instrument case, please accord to the one of instrument case.)

4.3.1 Auxiliary power supply(POWER): The voltage range of operational power supply is AC 220V 50/60Hz or AC/DC 85~265V. It is suggested to install a fuse of 1A beside of the live wire when using the AC supply to prevent the damage to the instrument. In the areas with poor power quality, the surge suppressor and quick pulse group suppressor should be installed in the power supply circuit.

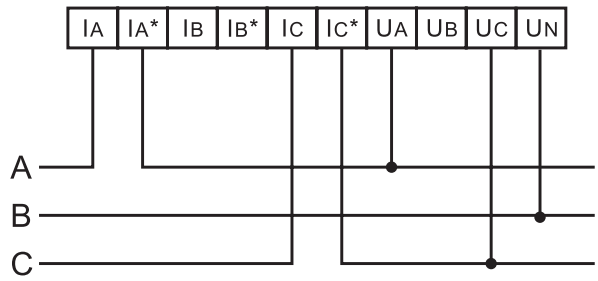
4.3.2 Electrical quantity signal input(I input and U input)： I input is A, B and C three-phase AC current signal input port and U input is A, B and C three-phase AC voltage signal input port. I* is current inlet wire. When connection, please ensure the phase sequence and polarity of input signal respond with the terminals

to avoid indicating value error. When the voltage is higher than the rated input voltage of the product, you should consider of using PT and installing fuse of 1A at the voltage input port; while the current is higher than rated input current of the product, you should consider of using the exterior CT.

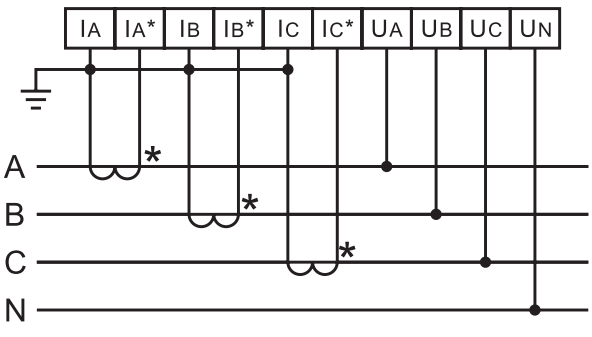
4.3.3 Typical connection



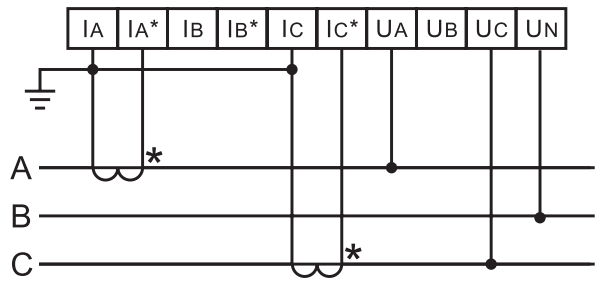
Voltage≤600V,input directly
Current≤5A,input directly



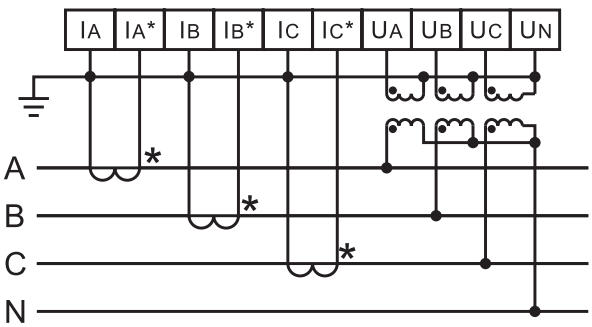
Voltage≤600V,input directly
Current≤5A,input directly



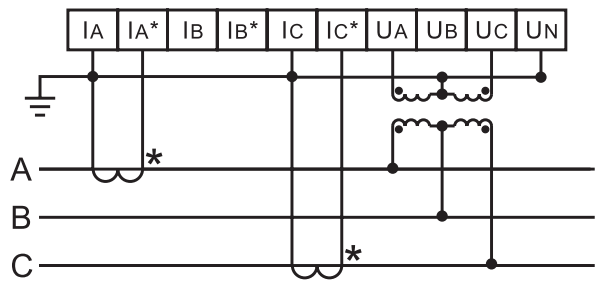
Voltage≤600V,input directly
Current>5A,input via CT



Voltage≤600V,input directly
Current>5A,input via CT



Voltage>600V,input via PT
Current>5A,input via CT



Voltage>600V,input via PT
Current>5A,input via CT

4.3.4 RS485 communication connection

The instrument supplies a RS485 communication interface and applies MODBUS_RTU communication protocol. Up to thirty-two instrument can be connected in one communication line at one time. Each instrument should have

the only communication address in the circuitry. Communication connection should use the shielded twisted paired with copper mesh, whose diameter should be not less than 0.5mm. Communication line should be far away from the high-voltage cables or other highfield environment and the maximum transmission distance is 1200 m. The typical network connections are shown in the following figure and users can choose other suitable connect mode under specific conditions.

4.3.5 Switching value input(DI input):DI1~DI4 are 1~4 way dry contact input port, inside of the instrumentthere is power supply of +5V

4.3.6 Switching output and ananlog transmitting output: can support four-channel switching value output and four-channel analog transmitting output.

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Chapter 5. Communication protocol

5.1 This series instrument are provided with Rs485 communication interface and apply MODBUS_RTU communication protocol.

Start	Address code	Function code	Data sector	CRC code	End
Halt time more than 3.5 bytes	1 byte	1 byte	N byte	2byte	Halt time more than 3.5 bytes

5.2 Communication message transmitting process

When communication instructions transmit from master device to slave device, the slave device with corresponding address code receives communication orders and reads the massage according to functional code and relational requirements. After successful CRC verification without error, the corresponding operation will be conducted and the result (data), including address code, function code, data after execution and CRC verification code, is returned to the master device. In case of CRC verification failure, no message would be returned.

5. 2. 1 Address code:

Address code is the first byte (8 bits) of each communication message frame, from 1 to 247. Every slave device must have the only address code and only the slave device conforming to the address code can respond and return the message. When the slave device returns the message, all of the return data start with each address code. The address code sent by master device shows the receiving address

of slave device, while the address code returned by slave device shows the returning slave address. The responding address code shows where the message comes from.

5. 2. 2 Function code

Function code is the second byte of each communication message frame. The master device sends and tells that what operation the slave device should carry out by means of function code. Then the slave device responds. The functional code returned by slave device is the same as the one sent by master device, which shows that slave device has responded the master device and carry out the relational operation. The instrument supports three function codes as following:

Function code	Operation
03H/04H	Read data of single or multiple resigister
05H	Remote control single relay action
0FH	Remote control multiple relay action
10H	write data of single or multiple resigister

5.2.3 Data sector

Data sector are different following the different function code. These data could be numerical value, reference address and son on. For different slave device, the address and data information are different (There should be communication information table). The master device utilizes the communication order (Function code03H) to read and amend the data register of the slave device. The data length read out or written in should not exceed the effective range of the data register address once.

5. 3 16-bit CRC verification code

Algorithm of CRC code:

5.3.1 Presetting a 16-bit register to hex FFFF (namely 1 for all bits in binary system). The register is called CRC register;

5.3.2 XORing the first 8-bit binary data (the first byte of the communication message frame) with the low 8-bit of 16-bit CRC register, then storing the result in CRC register;

5.3.3 Right-shifting the register data by one bit (towards lower bit) and filling the highest bit with 0, then verificationing the shift-out bit;

5.3.4 If the shift-out bit is 0, repeat step 3 (right-shifting one more bit);If the shift-out bit is1, XOR the CRC register data with polynomial A001 (1010 0000 0000 0001);

5.3.5 Repeating step 3 and step 4 until all of the 8-bit data have been processed

after 8 right-shift operations;

5.3.6 Repeating step 2 to step 5 to process the next byte of the communication message frame;

5.3.7 When calculation procedures of the first 5 bytes in the communication message frame are completed, the 16-bit CRC verification code will be generated in the 16-bit CRC register.

5.4 Communication messages Example

5.4.1 Read data register value(Function code:03H/04H)

Master device request: read three phase current value

Address	Function	Staring register address	Register number	Check code
01H	03H	00H, 45H	00H, 06H	D4H, 1DH

Slave device response:

IA=43556680H(213. 4A), IB=43203040H(213. 4A), IC=42DDCC80H(213. 4A)

Address	Function	Data length	Data	Check code
01H	03H	0CH	43556680H, 43203040H, 42DDCC80H	B5H, DBH

5.4.2 Remote single relay action(Function code:05H): 4 relay address0~3

Master device request: remote single relay output

Address	Function	Register address	Register value	Check code
01H	05H	00H, 00H	FFH, 00H	8CH, 3AH

Slave device response:

Address	Function	Register address	Register value	Check code
01H	05H	00H, 00H	FFH, 00H	8CH, 3AH

5.4.3 Remote multiple relay action(Function code:0FH): 4 relay address0~3

Master device request: remote 1st and 3rd relay output, 2nd and 4th in off

Address	Function	Staring register address	Register number	Data bytes	Register value	Check code
01H	0FH	00H, 00H	00H, 04H	01H	05H	FEH, 95H

Slave device response:

Address	Function	Staring register address	Register number	Check code
01H	0FH	00H, 00H	00H, 04H	54H, 08H

5.4.4 write data register(funtion code：10H)：

master device request：set current rate CT=300，voltage rate PT=100

Address	Function	Staring register address	Register number	Data bytes	Data segment	Check code
01H	10H	00H, 02H	00H, 02H	04H	00H,64H,01H,2CH	33H, E4H

Slave device response：

Address	Function	Staring register address	Register number	Check code
01H	10H	00H, 02H	00H, 02H	E0H, 08H

6.5 MODBUS_RTU address information form(the address is demonstrated with decimal system). Indicate：R/W-read and write，R-only read.

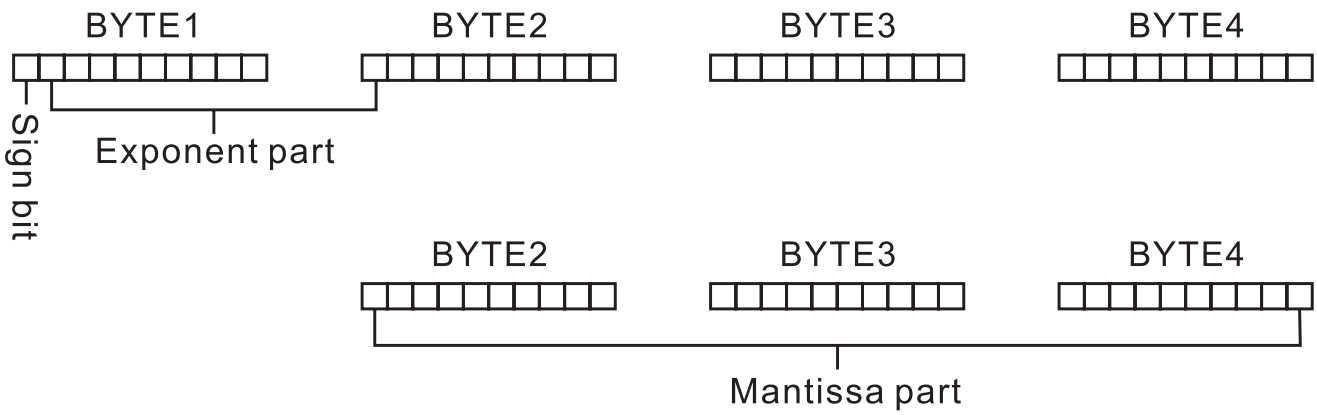
Address	Parameter	Description	Data type	Attribute	Explanation
Programming information					
0	Code	Password	Short	R/W	Range：0~9999
1	disp	Display mode	Short	R/W	
	in.Pt	Connection mode		R/W	Range,0:3P3W,1:3P4W
2	PT	Multiplying power of potential transformer	Short	R/W	Range：1~9999
3	CT	Multiplying power of current transformer	Short	R/W	Range：1~9999
4	Sn	Communication address	Short	R/W	Range：1~247
	bAud	Communication baud rate		R/W	Range0:1200bps~3:9600bps
5	dAtA	Protocol form	Short	R/W	0：n.8.1 1：o.8.1 2：E.8.1
6	Lcd.t	Backlight	Short	R/W	Range：0~9999
7	CLr.E	Clear energy data	Short	R/W	
Switch value output, analog quantity output					
8	DO1-Addr	Switch value output 1	Short	R/W	Chapter 8. Switch value module
9	DO1-Data		Short	R/W	
10	DO2-Addr	Switch value output 2	Short	R/W	
11	DO2-Data		Short	R/W	
12	DO3-Addr	Switch value output 3	Short	R/W	
13	DO3-Data		Short	R/W	
14	DO4-Addr	Switch value output 4	Short	R/W	
15	DO4-Data		Short	R/W	

16	AO1-Addr	Analog quantity output 1	Short	R/W	Chapter 9. Analog quantity module
17	AO1-Data		Short	R/W	
18	AO2-Addr	Analog quantity output 2	Short	R/W	
19	AO2-Data		Short	R/W	
20	AO3-Addr	Analog quantity output 3	Short	R/W	
21	AO3-Data		Short	R/W	
22	AO4-Addr	Analog quantity output 4	Short	R/W	
23	AO4-Data		Short	R/W	
24-46	Reserve				
Power sign information					
47	SING	SING	Short	R	
Data of switch value and electrical quan					
55	DI	Switch value input	Short	R	Switch value input part
56	DO	Switch value output	Short	R	Switch value output
57,58	UA	A-phase voltage	Float	R	2 bytes (4 bytes) floating-point representation data, IEEE-754 data format standard.All data is primary data,then by the ratio of the value. The unit of voltage V, The unit of current A, active power unit KW,reactive power unit Kvar, apparent power unit KVA, the unit of frequency Hz.
59,60	UB	B-phase voltage	Float	R	
61,62	UC	C-phase voltage	Float	R	
63,64	UAB	AB-line voltage	Float	R	
65,66	UBC	BC-line voltage	Float	R	
67,68	UCA	CA-line voltage	Float	R	
69,70	IA	A-phase current	Float	R	
71,72	IB	B-phase current	Float	R	
73,74	IC	C-phase current	Float	R	
75,76	PA	A phase active power	Float	R	
77,78	PB	B phase active power	Float	R	
79,80	PC	C phase active power	Float	R	
81,82	PS	Total active power	Float	R	
83,84	QA	A phase reactive power	Float	R	
85,86	QB	B phase reactive power	Float	R	
87,88	QC	C phase reactive power	Float	R	
89,90	QS	Total reactive power	Float	R	

91,92	SA	A-phase apparent power	Float	R	2 bytes (4 bytes) floating-point representation data, IEEE-754 data format standard.All data is primary data,then by the ratio of the value. The unit of voltage V, The unit of current A, active power unit KW,reactive power unit Kvar, apparent power unit KVA, the unit of frequency Hz.
93,94	SB	B-phase apparent power	Float	R	
95,96	SC	C-phase apparent power	Float	R	
97,98	SS	Total apparent power	Float	R	
99,100	PFA	A-phase power factor	Float	R	
101,102	PFB	B-phase power factor	Float	R	
103,104	PFC	C-phase power factor	Float	R	
105,106	PFS	Total power factor	Float	R	
107,108	FR	Frequency	Float	R	
109,128	Reserve				
electric energy information					
129,130	WPP	Primary positive active energy	Float	R	2 bytes (4 bytes) floating-point representation data, IEEE-754 data format standard.All data is primary data,then by the ratio of the value. The unit of voltage V, The unit of current A, active power unit KW,reactive power unit Kvar, apparent power unit KVA, the unit of frequency Hz.
131,132	WPN	Primary opposite active energy	Float	R	
133,134	WQP	Primary positive reactive energy	Float	R	
135,136	WQN	Primary opposite reactive energy	Float	R	
137,138	EPP	Secondary positive active energy	Float	R	
139,140	EPN	Secondary opposite active energy	Float	R	
141,142	EQP	Secondary positive reactive energy	Float	R	
143,144	EQN	Secondary opposite reactive energy	Float	R	

Note：Description of data format

Data type “float” :four-byte floating data,apply IEEE-754 standard. The level code and mantissa express the magnitude of number.The description according to byte is as following:



Sign bit: SIGN=0 is poative, SIGN=1 is oppsite;
Exponent part: E=Exponent part-126;
Mantissa parts: M = mantissa parts make up the highest bit is 1;
Data results: REAL=SIGN×2^{E}×M/(256×65536).

Chapter 6. Switch value module

The instrument offers 4 channels switch value input function and 4 channel opto-couple relay's switch value output function.4 channels switch value input adopt the way of dry node resistor switch signal input.When it is connected for external part,the module DI via instrument switch input will collect the connecting information and display as 1;when it is disconnected for the external part,the module DI via instrument switch input will collect the disconnecting information and display as 0.The switch value input module can not only collect and display the local switch information,but also can realize the remote transmitting function with the instrument's RS 485 digital connecting interface,it is function of "remote signalling" The switch value outpuf function of 4 channel opto-couple relay,can be used as the alarm caution, output function for protect controlling and so on. When the switch value is effective,relay output is opening and switch value is closed,the relay output will be closed also.

Electric parameter:Switch value input DI:connecting resistor R>100KΩ,Switch value output DO:AC 250V,0.1A

Register:DIO information register:this register show the status information for 4 channel switch value and 4 channel switch value output.

DIO Register	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Switch port	DO4	DO3	DO2	DO1	DI4	DI3	DI2	DI1
Reposition	0	0	0	0	0	0	0	0

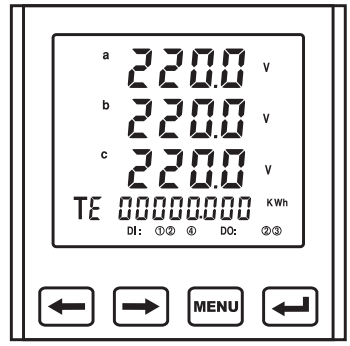
The low 4 byte of the DIO register(BIT3,BIT2,BIT1,BIT0)is the status information for switch value input.If the register display as 0000 0101,it means the channel DI3 and DI1 for switch value input is closed;channel Di4 and DI2 is cut off.

The high 4 byte of the DIO register(BIT7,BIT6,BIT5,BIT4)is the status information for switch value output.If the register display as 1101 000,it means connect with channel DO4, DO3 and DO1;disconnect with channel DO2 .The DIO information can be displayed on the LCD screen of the instrument.

6.1 Examples

6.1.1Switch value input function:

The switch module has the collecting function for 4 channels switch input.When collecting is inputed the signal,the instrument's LCD screen may display. With the RS 485 interface,the users can transmitting the switch register's information to the remote computer's terminal.The picture on the right shows:Channel 1,2 and 4 is on;Channel 3 is off.

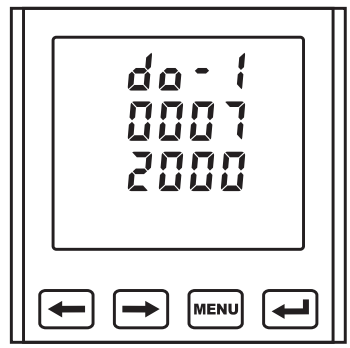


6.1.2 Switch value output function:

The picture shows the channel 1 and 4 is off;channel 2 and 3 is on.The another function of the switch value output module is off-limited alarm output.Set the range for the parameters.When the parameter is off-limited the range,the corresponding switch value output interface is open,the screen will display.When the signal is in the range,the screen will not display.

The internal DOSI(3 bytes) of the instrument is the switch value setting register. Input the parameter via the instrument's connecting interface,the users can realize the alarm setting.Or the users can set the alarm target and alarm data directly via the key-pressing on the plate.

The setting for switch value parameters DOI can also be realized via key programming.In the programming operation,menu DOSI item's parameter is the corresponding DOI parameter.See the right picture:The first line showing DO-1 means the item setted is switch value output module 1;Line 2 showing 0007 is the alarm item,7:IA low alarm.Line 3 showing 2000 means the area of the alarm,when the IA<2000, DO1 output alarm signal,as relay is open.



Switch value output and analog quantity output electric quantity parallel table

Project	Switch value output		analog quantity output	
	Corresponding parameter (lower alarm)	Corresponding parameter (higher alarm)	Corresponding parameter (0~20mA)	Corresponding parameter (4~20mA)
U_A(A-phase voltage)	1	129	1	129
U_B(B-phase voltage)	2	130	2	130
U_C(C-phase voltage)	3	131	3	131
U_{AB}(AB-line voltage)	4	132	4	132
U_{BC}(BC-line voltage)	5	133	5	133
U_{CA}(CA-line voltage)	6	134	6	134
I_A(A-phase current)	7	135	7	135
I_B(B-phase current)	8	136	8	136
I_C(C-phase current)	9	137	9	137
P_A(A-phase active power)	10	138	10	138
P_B(B-phase active power)	11	139	11	139
P_C(C-phase active power)	12	140	12	140
P_S(Total active power)	13	141	13	141
Q_A(A-phase reactive power)	14	142	14	142
Q_B(B-phase reactive power)	15	143	15	143
Q_C(C-phase reactive power)	16	144	16	144
Q_S(Total reactive power)	17	145	17	145
PF_A(A-phase power factor)	18	146	18	146
PF_B(B-phase power factor)	19	147	19	147
PF_C(C-phase power factor)	20	148	20	148
PF_S(Total power factor)	21	149	21	149
S_A(A-phase apparent power)	22	150	22	150
S_B(B-phase apparent power)	23	151	23	151
S_c(C-phase apparent power)	24	152	24	152
S_S(Total apparent power)	25	153	25	153
F(frequency)	26	154	26	154

Alarm parameter calculation method:

Numerical calculation of electrical parameters of alarm limits: take the range 's highest value 4 number, get a 4 bit integer ratio. The alarmValue and range of

values is equal to a set value and reference value ratio

$$\text{Set value} = \frac{\text{Alarm value} \times \text{Reference value}}{\text{Range value}}$$

If the instrument' s parameters are 400V，800A/5A

Setting requirements	Alarm condition	Range value	Reference value	Programming parameters	
				Electricity parameters	Set value
Voltage alarm	UA>400V	400	4000	129	4000
	UB>430V			130	4300
	UC<80V			3	800
Current alarm	IA>800A	800	8000	135	8000
	IB<400A			8	4000
	IC<70A			9	7000
Power alarm	PA>320KW	320K	3200	138	3200
	PS>980KW	960K	9600	141	9800
	PS<560KW			13	5600
Power factor alarm	PFA>0. 866	1	1000	146	866
	PFS>0. 9			149	900
	PFS<0. 5			21	500

Chapter 7. Analog transmitting output module

The instrument can offer the function of four-channel analog transmitting output. Each channel can choose to set any of the 26 parameters,with the instrument's function for analog transmitting output module, to reach the function of parameter 's analog transmitting output(0-20mA/4-20mA).The corresponding relation can be set at random.

7.1 Parameter:output 0-20mA,4-20mA,class:0.5

Overload:120% effective output,the maximum current:24mA,the maximum volt:16V

Load:Rmax=400Ω

7.2 Application example

For 10KV/100V,400A/5A instrument settings: AO1-UA:0~10KV/4~20mA; AO2-IA: 0~400A/4~20mA;AO3-PS:0~12MW/0~20mA; AO4-QS:0~12MVar/0~20mA;

Classification	Analog transmitting output	Control word (high byte first)		
		BYTE2	BYTE1	BYTE0
Analog transmitting output1	UA:4~20mA	128+1=129	1000(03HE8H)	
Analog transmitting output2	IA:4~20mA	128+7=135	4000(0FHA0H)	
Analog transmitting output3	PS:0~20mA	13	1200(04HB0H)	
Analog transmitting output4	QS:0~20mA	17	1200(04HB0H)	

The electrical parameters of transmitting output values are calculated from range: the top 4 bits of the number, a 4 bit integer ratio. Then the transmitting value and range value ratio is equal to the set value and reference value ratio.

$$\text{Set value} = \frac{\text{Transmitting value} \times \text{Reference value}}{\text{Range value}}$$

Note: when the transmission value errors, modify the corresponding set value.

If the instrument' s parameters are 400V，800A/5A

Setting requirements	Transmission condition	Range value	Reference value	Programming parameters	
				Electricity parameters	Set value
Voltage transmitting	UA:0~400V/4~20mA	400	4000	129	4000
	UB:0~420V/4~20mA			130	4300
	UC:0~350V/0~20mA			3	3500
Current transmitting	IA:0~800A/0~20mA	800	8000	7	8000
	IA:0~800A/4~20mA			135	8000
	IB:0~900A/4~20mA			136	9000
Power transmitting	PA:0~320KW/0~20mA	320K	3200	10	3200
	PS:0~960KW/4~20mA	960K	9600	141	9800
Power factor transmitting	PFA:0~1/0~20mA	1	1000	18	1000
	PFS:0~0.9/4~20mA			19	900

The users may set the parameters for the transmitting output via the plate key-pressing setting.In the programming operation,AOSI menu item is the transmitting module parameter setting parameter.See the right picture for parameter setting, programming item AO-1:transmitting output channel 1;0129=128+1:choose

the UA as 4-20mA as the transmitting output,and the corresponding volt for 20mA is 10KV,setting as 1000.

For example,in the internet 10KV/100V,the transmitting output function is finished as:transmitting output loop 1, UA:0-10KV/4-20mA.