

AMC200(L) AC Multi-loop Intelligent Power Collection and Monitoring Device

Installation Instruction V1.1

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1 Overview

AMC200(L) AC multi-loop intelligent power acquisition and monitoring device is mainly used for the measurement of full electrical parameters of multiple loops, and can access the current input of up to 8 three-phase loops or 24 single-phase loops at the same time. Can measure voltage and current, power, power factor and other parameters.

2 Product Type and Function

2.1 Meter Type and Function

Table 1 Meter model functions

Meter Type	Basic Function
AMC200L-4E3	Can access 4 three-phase AC circuits at the same time, can directly measure the voltage, current, power, power factor and other parameters, 6 switching input (2 active, 4 passive), 2 switching output, 1 RS485, 4 NTC temperature, 1 temperature and humidity measurement, with liquid crystal display
AMC200L-8E3	Can access 8 three-phase AC circuits at the same time, can directly measure the voltage, current, power, power factor and other parameters, 6 switching input (2 active, 4 passive), 2 switching output, 1 RS485, 4 NTC temperature, 1 temperature and humidity measurement, with liquid crystal display

2.2 Product Detail Function

- 1、 maximum 8 three-phase or 24 single-phase circuit full electric parameter measurement, current transformer external;
- 2、 monitor the phase voltage/current, zero sequence current, frequency;
- 3、 monitor the phase power, total power (active power, reactive power, apparent);
- 4、 monitoring each phase power factor, total power factor, four-quadrant power statistics;
- 5、 the use of simplified Chinese characters LCD display, with historical power data and historical alarm information storage function:
 - a. By default, historical data is saved once a day at 0 o'clock. Each channel and each item of data (total active power, total active power, and three-phase current) can be stored 1000 times.
 - b. The interval for storing historical data onsite is 15 minutes. Each channel and each item of data (total active energy, total active power, three-phase current) can be stored 5000 times.
 - c. 24 pieces of historical electricity data are stored on the monthly meter reading day.
 - d. Historical alarms are stored in real-time mode. A maximum of 500 historical alarms can be stored.
- 6、 support over voltage, over current, phase break, DI linkage alarm output;
- 7、 four passive switching input, two active switching input, two switching output;
- 8、 standard RS485 communication, optional Modbus-RTU protocol or YD/T 1363 protocol;
- 9、 support 4G communication or NB communication;
- 10、 one loop temperature and humidity measurement, 4 loops NTC measurement;

3 Matching Transformer

The current transformer is a crystal connector, and the primary current ranges from 50A to 600A. If the current transformer is different, customers can modify the current ratio through the instrument interface or communication according to the actual use. The transformer is shown in Figure 1, Figure 2; supporting current transformer as shown in Table 2.



Figure 1

The total length is 1+0.5M, and in the 0.5M section, it is divided into three lines: red, green, and yellow. Among them, yellow is phase A, green is phase B, and red is phase C. The connection terminal with the instrument adopts the network cable port, and the definition of the terminal is as follows:

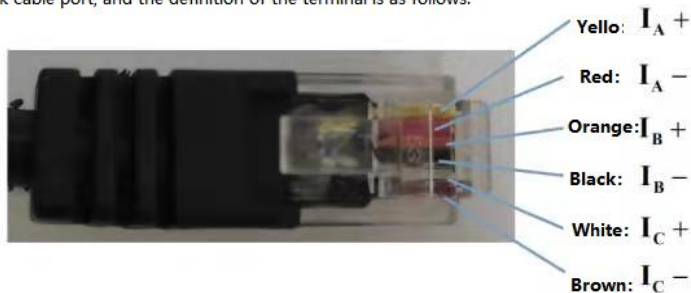


Figure 2

Table 2 AMC200(L) matching current transformer

Type	Ratio	Wire length	Accuracy	Installation method
AKH-0.66/W-9NY 50A/20mA	50A/20mA	(1+0.2) m	0.2 Class	Closed type, RJ interface
AKH-0.66/K-Φ10N 50A/20mA	50A/20mA	(1+0.2) m	0.5 Class	Split type, RJ interface
AKH-0.66 Z-3/Φ15Y(1/0.5) 100A/50mA	100A/50mA	(1+0.5) m	0.2 Class	Closed type, trinity, RJ interface
AKH-0.66/W-12NY 100A/50mA	100A/50mA	(1+0.2) m	0.2 Class	Closed type, RJ interface
AKH-0.66/K-Φ16N 100A/50mA	100A/50mA	(1+0.2) m	0.5 Class	Split type, RJ interface
AKH-0.66/W-20Y 200A/50mA	200A/50mA	(1+0.5) m	0.2 Class	Closed type, RJ interface
AKH-0.66/K-Φ24N 200A/50mA	200A/50mA	(1+0.5) m	0.5 Class	Split type, RJ interface
AKH-0.66/W-20Y(1/0.5) 250A/50mA	250A/50mA	(1+0.5) m	0.2 Class	Closed type, RJ interface
AKH-0.66/W-30NY 250A/50mA	250A/50mA	(1+0.5) m	0.2 Class	Closed type, RJ interface
AKH-0.66/K-Φ24N 250A/50mA	250A/50mA	(1+0.5) m	0.5 Class	Split type, RJ interface
AKH-0.66-TD-Φ60-NY	400A/50mA	(1+0.5) m	0.2 Class	Closed type, RJ interface
AKH-0.66/K-Φ36N 400A/50mA	400A/50mA	(1+0.5) m	0.5 Class	Split type, RJ interface
AKH-0.66-TD-Φ60-NY	600A/50mA	(1+0.5) m	0.2 Class	Closed type, RJ interface
AKH-0.66/K-Φ36N 600A/50mA	600A/50mA	(1+0.5) m	0.5 Class	Split type, RJ interface

Note: Special transformers can be contacted for specific consultation.

4 Technical Parameter

Table 3 Technical Parameters

Technical Parameter		Technical Indicator
Input	Frequency	45~65Hz;
	Voltage	Rating: AC 3×220V/380V;
		Overload: 1.2 times rated (continuous); 2 times rating value/1 second;
		Power consumption: ≤0.5VA (per channel);
	Current	Rating: AC xxxA/50mA, need external transformer;
		Overload: 1.2 times rated (continuous); 10 times rating value /1 second;
		Power consumption: ≤0.5VA (per channel);
Function	Pulse Output	Output mode: open collector optocoupler pulse (default 400imp/kWh);
	Communication	Modbus-RTU or YD/T 1363 protocol(use in China);Baud rate 1200~38400;
	Switch	Input
		4 dry contact inputs and 2 active wet contact inputs (AC 220V).

	Output	Output mode: relay normally open contact output; Contact capacity: AC 250V/3A or DC 30V/3A;
	NTC Temperature Measurement	Temperature: -20~100°C (accuracy $\pm 2^{\circ}\text{C}$);
	Temp&Humidity Measurement	Temperature: -20~100°C (accuracy $\pm 2^{\circ}\text{C}$); Humidity: 20-90%RH (accuracy $\pm 5\%\text{RH}$)
Measurement accuracy		Frequency 0.05Hz, voltage and current 0.5 level, active power 1 level;
Auxiliary power supply		AC/DC 85 ~ 265V; Power consumption $\leq 10\text{VA}$;
Security	Power Frequency Withstand Voltage	>AC 2kV/1min;
	Insulation Resistance	Input and output end to the housing >100M Ω ;
Environment		Operating temperature: -20°C ~ +60°C; Storage temperature: -40°C ~ +70°C; Relative humidity: $\leq 95\%$ no condensation; Altitude: $\leq 2500\text{m}$;
Electromagnetic compatibility		Surge (impact) immunity test level 4
		Electrostatic discharge immunity test level 3
		Electrical fast transient pulse group immunity test level 3

5 Dimensions and Wiring Instructions

5.1 Overall Dimension

(Unit: mm)

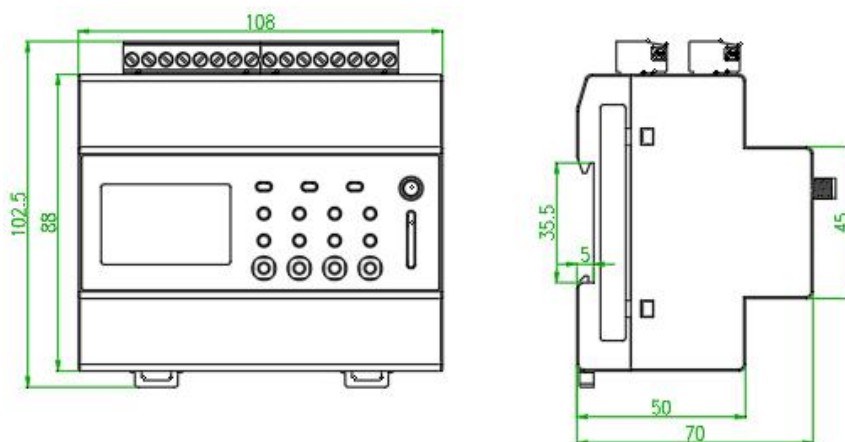


Figure 3 AMC200(L) Outline-Dimensions

5.2 Installation Mode

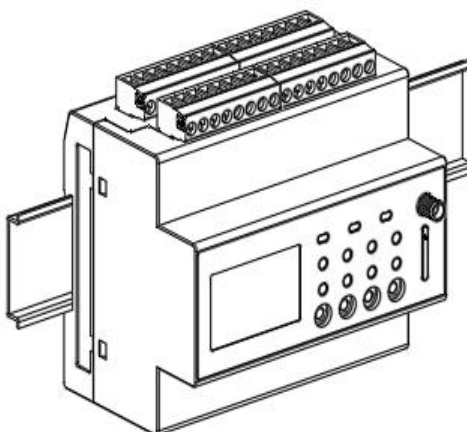


Figure 4 AMC200(L) installation mode

5.3 Wiring

The following pictures describe the wiring terminals and connections

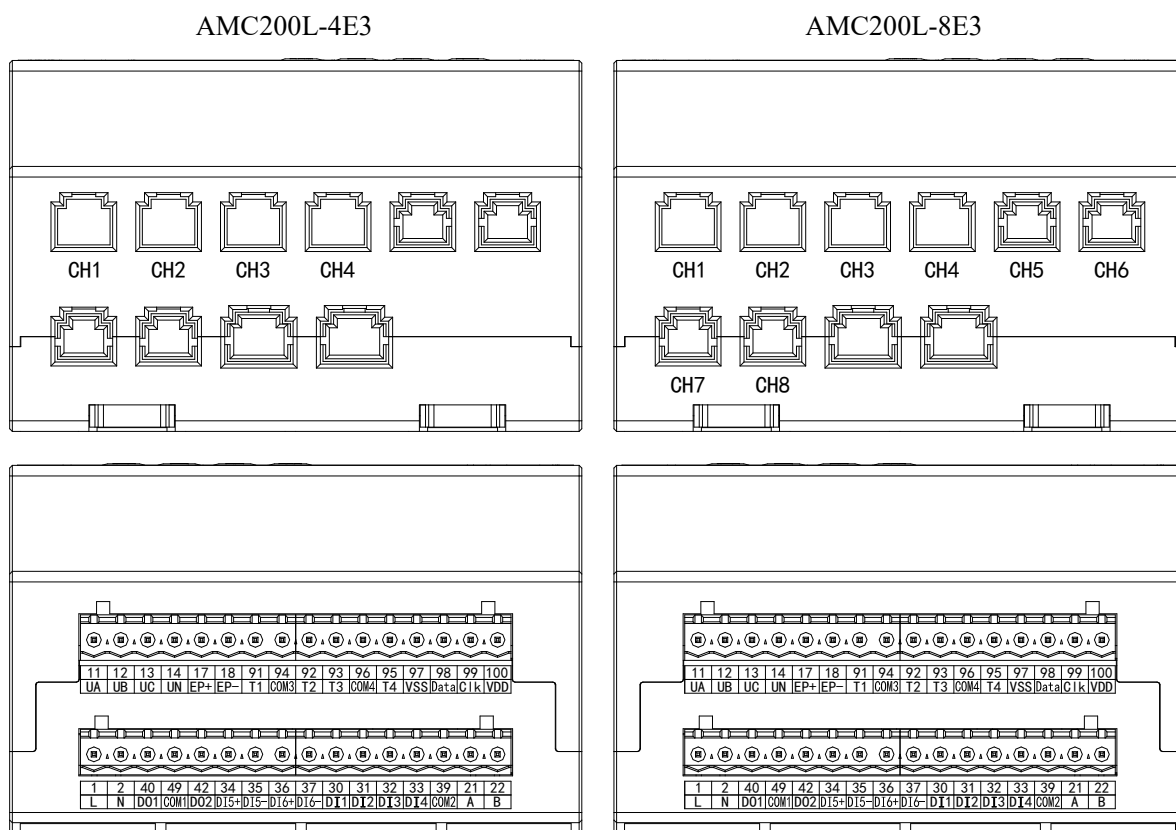


Figure 5 AMC200(L) AC terminal diagram

Table 4 Description of wiring terminals

Terminal Number	Definition	Specification	Remark
1	L	Auxiliary power supply	AC/DC 85-265V
2	N		
11	UA	Voltage Input	AC 3*220V/380V
12	UB		
13	UC		
14	UN		
17	EP+	Pulse Output	Pulse Constant:400imp/kwh
18	EP-		
21	A	Communication	RS485 communication
22	B		
30	DI1	Switch Input	Passive dry contact input
31	DI2		
32	DI3		
33	DI4		
39	COM2		
34	DI5+	Active switching input	AC 220V mains or oil engine signal access
35	DI5-		

36	DI6+	Replay Output	Normally open contact output; Contact capacity: AC 250V/3A DC 30V/3A;
37	DI6-		
40	D01		
42	DO2		
49	COM1	NTC Temperature Measurement	Temperature measuring range -20-100°C (accuracy $\pm 2^{\circ}\text{C}$)
91	T1		
94	COM3		
92	T2		
93	T3		
96	COM4		
95	T4	Temp&Humidity Measurement	Temperature: -20-100°C (accuracy $\pm 2^{\circ}\text{C}$) Humidity: 20-90%RH (accuracy $\pm 5\%\text{RH}$)
97	VSS		
98	Data		
99	Clk		
100	VDD	Current Loop Numbers	CHx represents a three-phase current loop, AMC200L-4E3 is connected to a maximum of 4 three-phase loops; AMC200L-8E3 access up to 8 three-phase circuits;
	CH1-CH8		

Wiring mode (The following figure takes four circuits as an example)

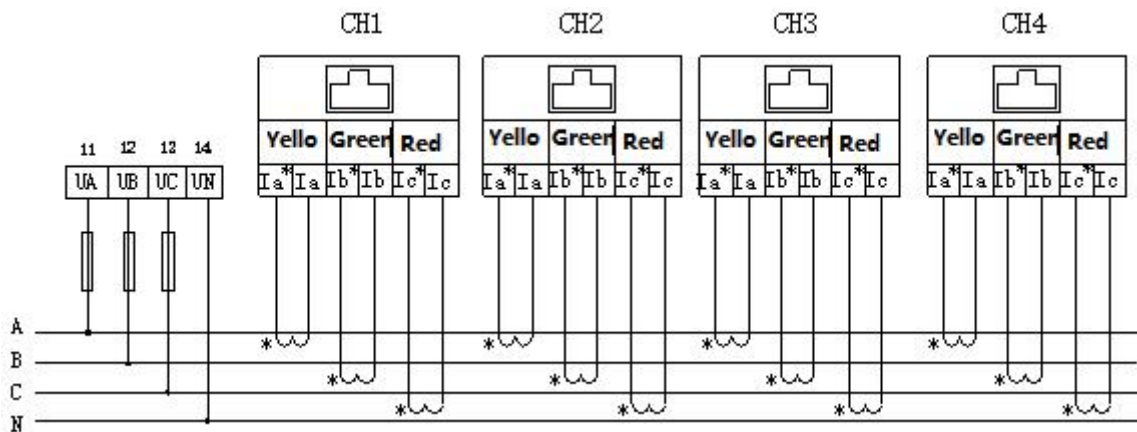


Figure 6 Three-phase four-wire voltage and current direct access

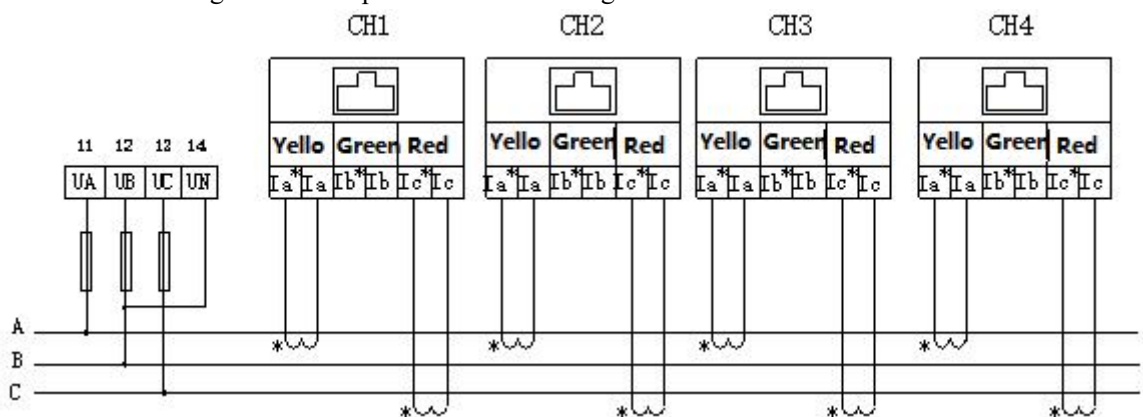


Figure 7 Direct access of three-phase three-wire voltage and current

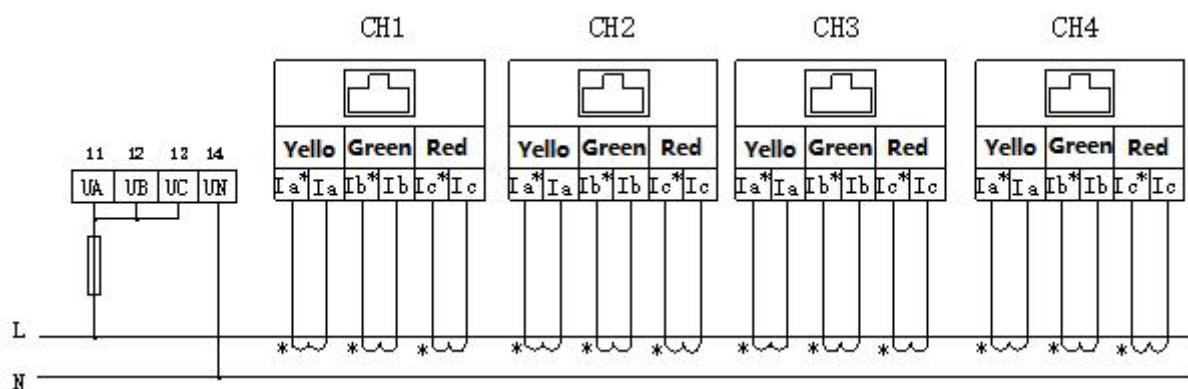


Figure 8 Single-phase voltage and current direct access

6 Operation Direction

6.1 Description of Panel and Key Functions

6.1.1 Panel Description



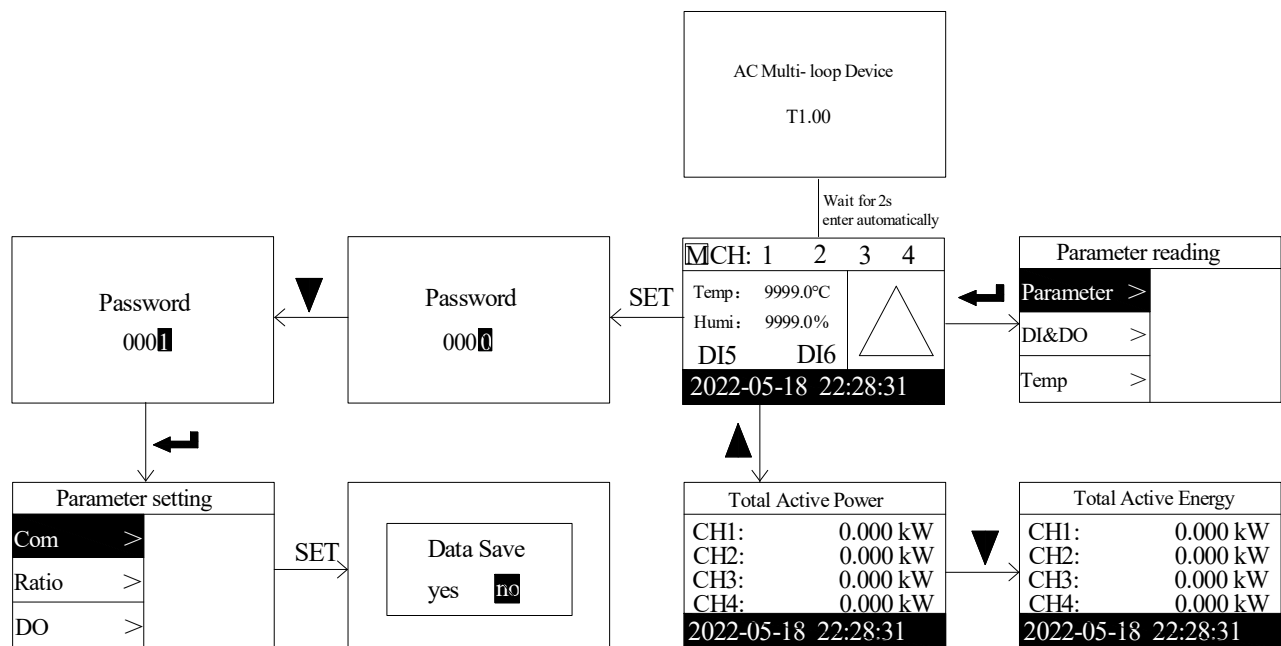
6.1.2 Button Function Description (for meters with LCD models)

SET KEY(SET)	In the measurement mode, press this key to enter the parameter setting mode, and the instrument prompts you to enter the password PASS. After entering the correct password (0001), you can set the parameter of the instrument. In parameter mode, press this key to save data or not to return to the upper-level menu.
Up KEY(▲)	In measurement mode, it is used to switch display items; In parameter setting mode, it is used to select menu items and switch bits of parameters.
Down KEY(▼)	In measurement mode, it is used to switch display items; In parameter setting mode, it is used to select menu items and increase the value of each digit.
Enter KEY(↵)	In measurement mode, it is used to view parameters; In parameter setting mode, it is used to confirm the selection of menu items and the modification of parameters.

Note: The difference between the AMC200L-4E3 interface and the AMC200L-8E3 interface is that the current circuit has a maximum of four channels (CH1-CH4) and eight channels (CH1-CH8). The following describes the four channels in 6.2-6.4.

6.2 Boot Operation and Display Instructions

After power-on, the startup interface displays as an AC multi-loop device; After 2 seconds, the circuit automatically enters to the main interface: (1) Press the SET key to enter the password screen, press the key to enter the password 0001, press Enter to enter the parameter setting screen (Parameter setting options are described in 6.4), press the SET key to enter the data saving screen, you can switch the cursor to select whether to save. (2) Press the up key to enter the parameter display interface of total active power; (3) Press the down key to enter the parameter display interface of total active power; (4) Press Enter to enter the main interface (main interface measurement options will be specified in 6.3). The operation flow chart is shown in the figure below.



See the following figure for the description of the first screen

CH1-CH4: four circuit

(**1** : When displayed as white text on a black background, it indicates power display)

M	CH: 1	2	3	4
Temp :	9999.0°C			
Humi :	9999.0%			
DI5	DI6			
2022-05-18 22:28:31				

M: means the selected protocol ;

M:Modbus,T:Tower YD/T1363

After inserting the temperature and humidity module, the measured values of temperature and humidity will be displayed

⚠: Exclamation mark will be displayed when alarming

Modbus display as DI5 、 DI6 ,

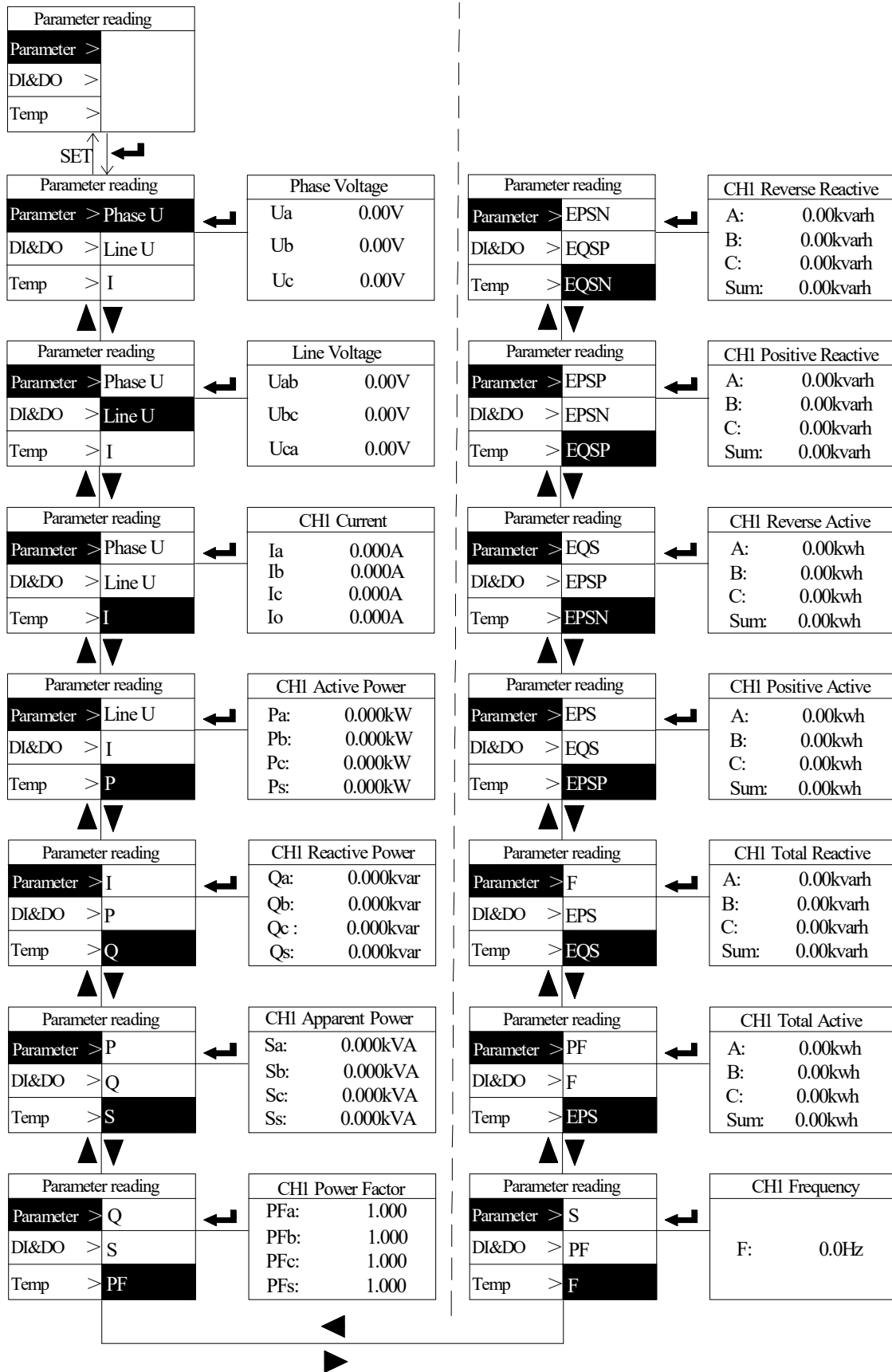
Tower YD/T1363 display as oil engine, mains power

(**DI5** : When there are white characters on a black background, it means that there is a signal in the active input)

6.3 Parameter Measurement Interface Description

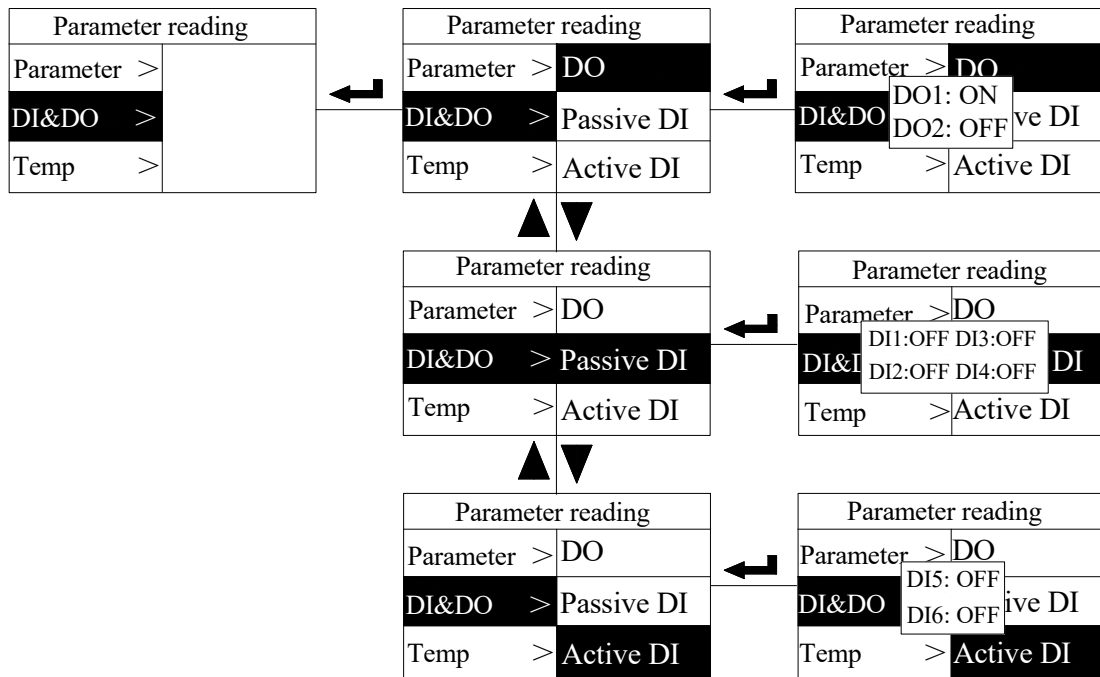
6.3.1 Parameter Interface Description

The main interface is displayed. the cursor is on the parameter screen by default. Press Enter to view the power parameter screen. The power parameter column contains phase voltage, line voltage, current, active power, reactive power, apparent power, power factor, frequency, total active power, total reactive power, forward active power, reverse active power, forward reactive power, reverse reactive power (you can view the specific information of each parameter by the enter key and the up and down key, the default display is the first way).



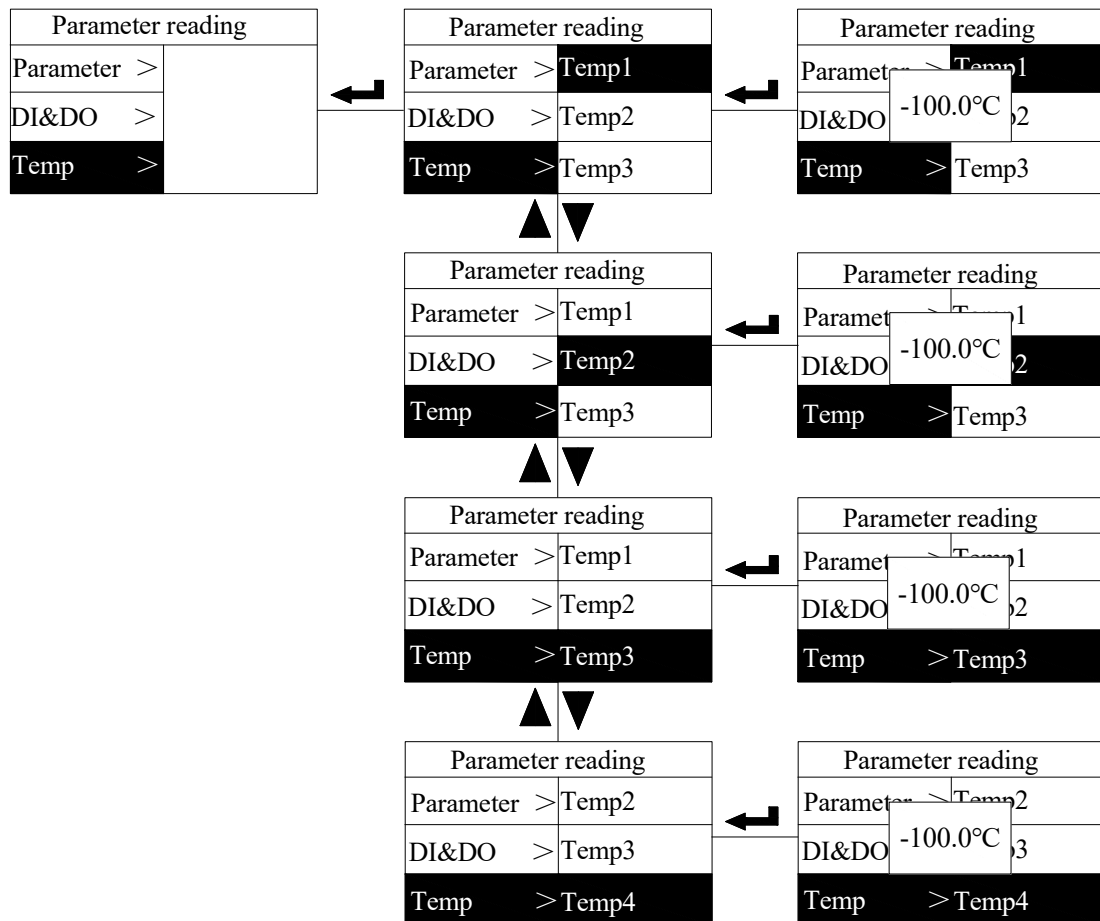
6.3.2 DI&DO Interface Description

Press the up key or down key to move the cursor to the DI&DO interface. Press Enter key to view DO, passive DI, active DI three categories. Press Up/down key and Enter key to pop up the corresponding window, which is the data record of the DO1,DO2,DI1-DI4.



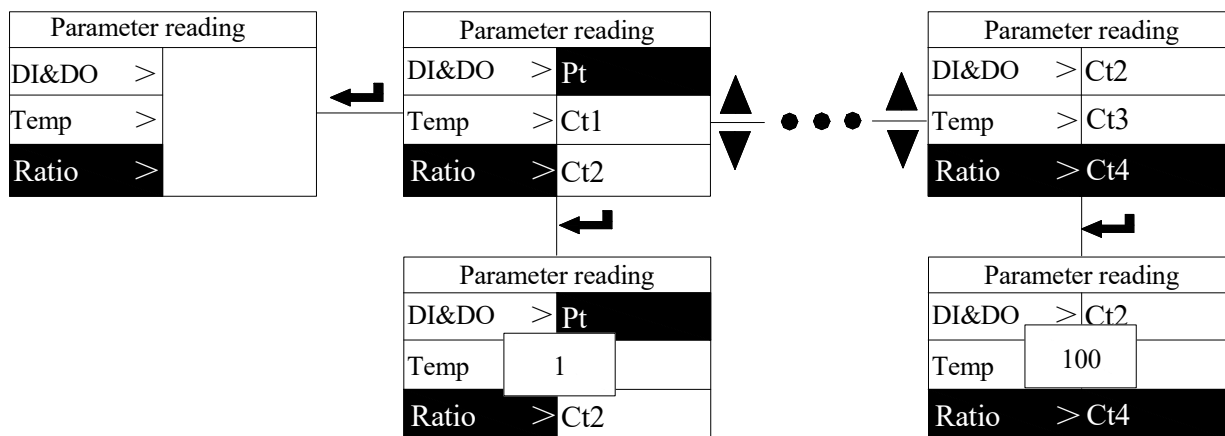
6.3.3 Temperature Display Interface Description

Press the up or down key to move the cursor to the temp interface. Press Enter to view the four categories of temp 1 to temp 4. Press Enter to view the specific temperature value. When the probe is not connected, the temperature is displayed as -100°C, and when the probe is short-circuited, the temperature is displayed as 200°C.



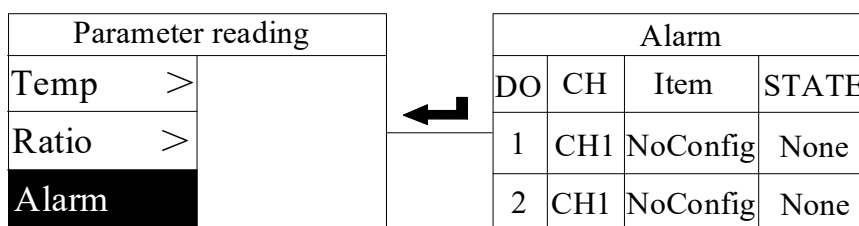
6.3.4 Ratio Interface Description

Press the up or down key to move the cursor to the ratio interface. Press Enter to view the Pt,Ct1-Ct4, and press Enter to view each ratio. The default voltage ratio is "1" and the default current ratio is "100".



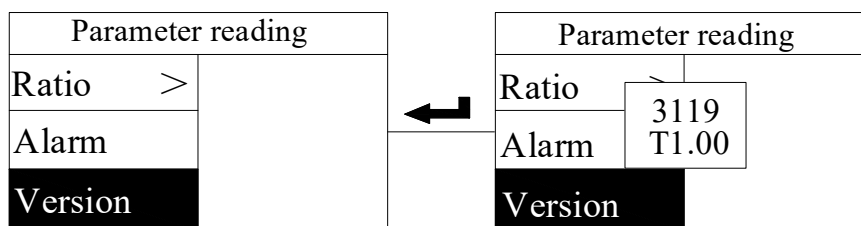
6.3.5 Alarm Information Interface Description

Press the up or down key to move the cursor to the alarm information screen, and press Enter to view the real-time alarm information of the DO.



6.3.6 Version Information Interface Description

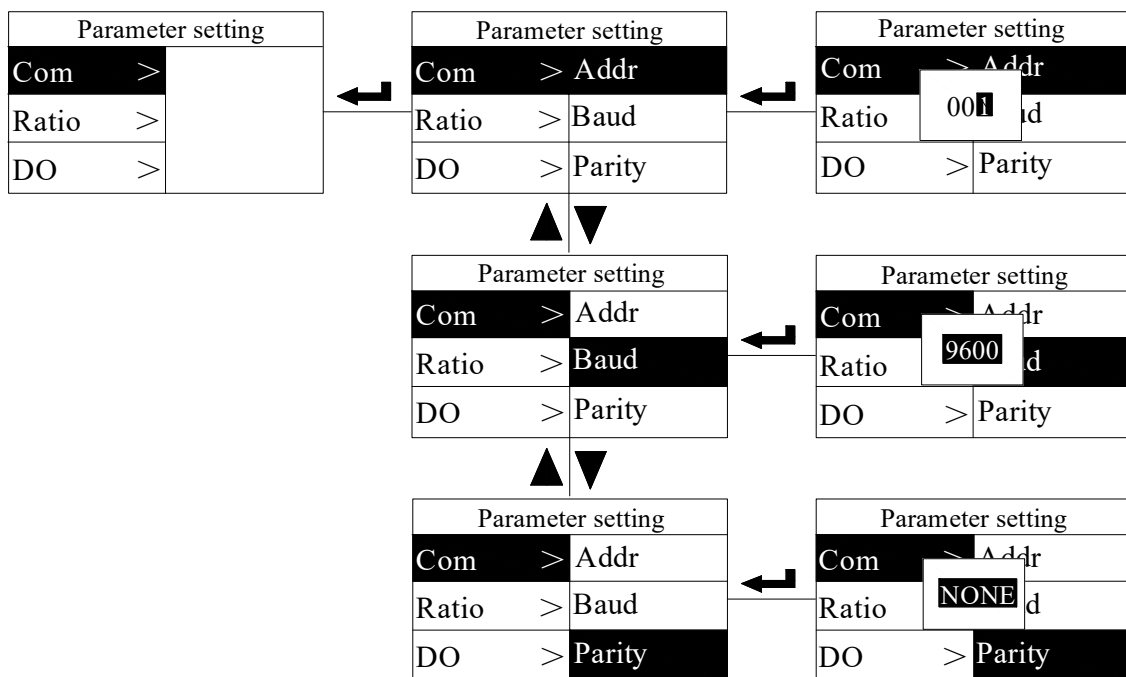
Press the up or down key to move the cursor to the version information screen. Press Enter to directly view the program number and version information.



6.4 Parameter Settings Interface Description

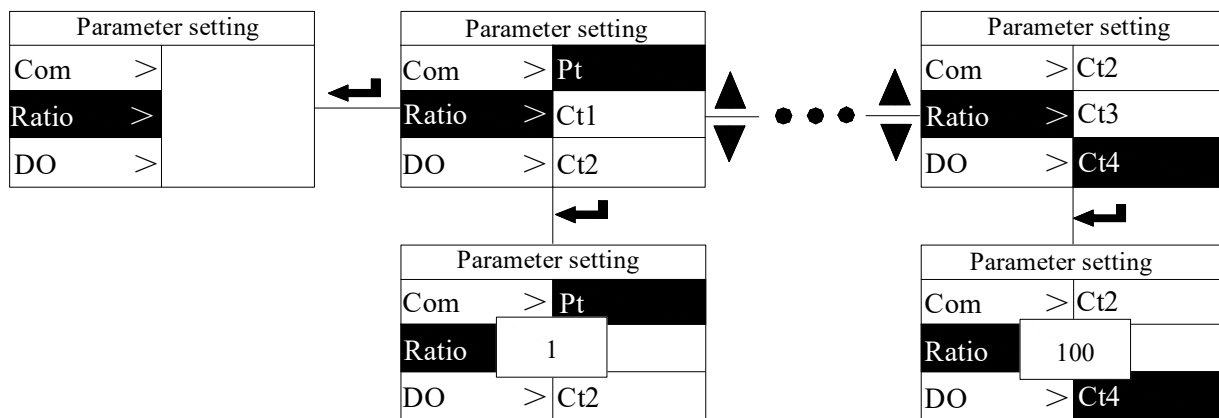
6.4.1 Communication Parameter Setting

Enter the parameter setting interface, the cursor stops in the communication setting by default, press Enter to see the address, baud rate, check bit three categories, then press Enter will pop up all kinds of configurable parameter interface; Press the up/down key to switch the Settings of the address, baud rate, and parity bit. The address can be set to 1-247. The baud rate can be set to 1200, 2400, 4800, 9600, 19200, 38400; The parity bit can be set to EVEN(even), ODD(odd), or NONE(none).



6.4.2 Ratio Parameter Setting

Press the up key or down key, move the cursor to the ratio setting, press the Enter key to see the Pt,Ct1-Ct4 five categories, then press the enter key will pop up all kinds of configurable parameters. The default voltage ratio is 1, which represents phase voltage AC 200V and line voltage AC 380V. **The current ratio can be set based on primary current. For example, the transformer specification is 200A/50mA and the current ratio is 200. The transformer specification is 50A/20mA and the current ratio is 125.**

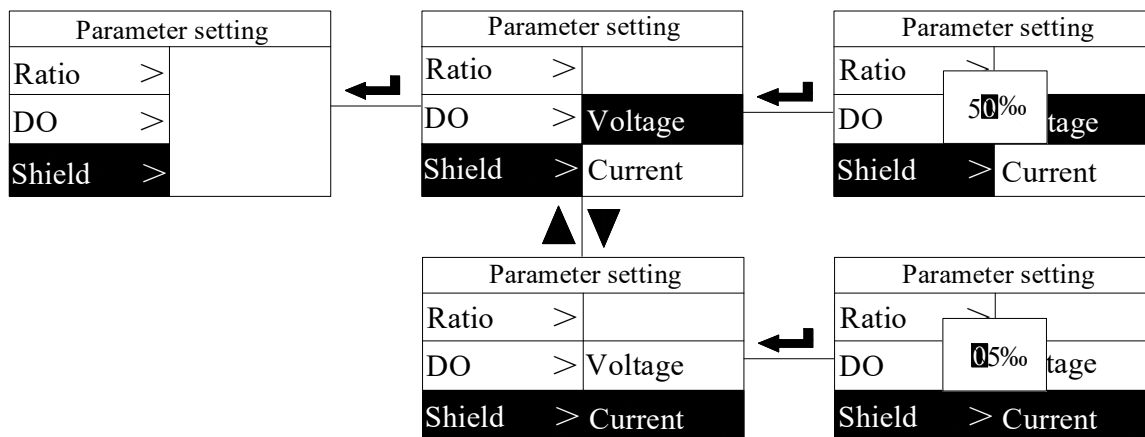


6.4.3 DO Parameter Setting

Press up or down key, move the cursor to DO setting, press Enter key to see DO1 set, DO2 set, press Enter key will pop up all kinds of configurable parameters such as channel, item, alarm upper limit, alarm lower limit, DO control, alarm delay, output mode, zero alarm enable, hysteresis. The parameters for DO1 and D02 are the same. DO mode can be set to remote control and alarm; The output can be set to both level (0 or 1) and pulse ; Delay can be set to 1-999; The upper limit of alarm can be set to 204, the lower limit of alarm can be set to 105; All alarm options can be found in the supplementary instructions.

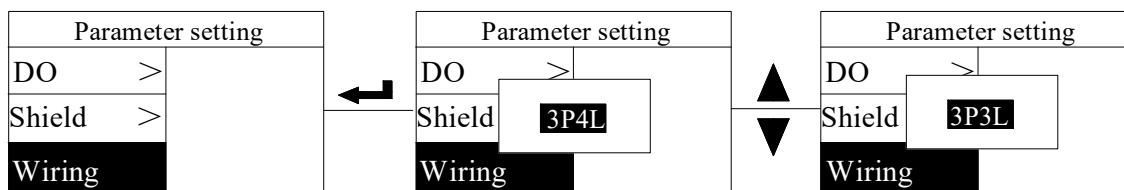
6.4.4 Shield Parameter Setting

Press the up or down key, move the cursor to the shield, and press Enter to see two categories of voltage and current. Then press the Enter key to set the voltage shield value to 50 % by default, and the current shield value to 5 % by default.



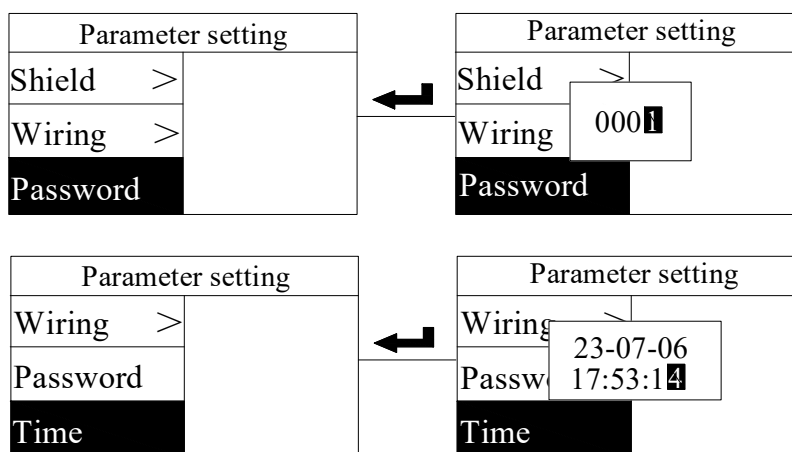
6.4.5 Wiring Method Setting

Press the Up key or down key, move the cursor to the wiring mode, press the Enter key to display the configurable mode window, press the left and right keys to switch the Settings of 3P4L(three-phase four-wire) and 3P3L(three-phase three-wire) wiring modes.



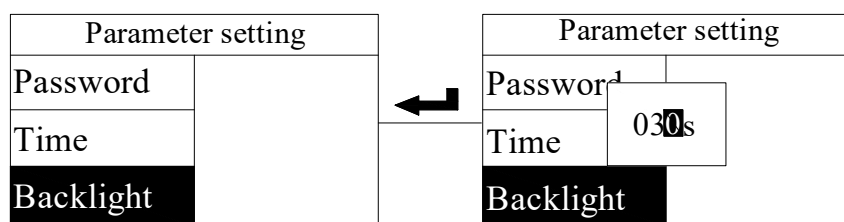
6.4.6 Password and Time Setting

Press the up key or down key to move the cursor to the password setting or time setting, and press Enter to enter the password setting or time setting interface. The password can be set to 1-9999, and the time can be set to the year, month, day, minute and second by the up or down key.



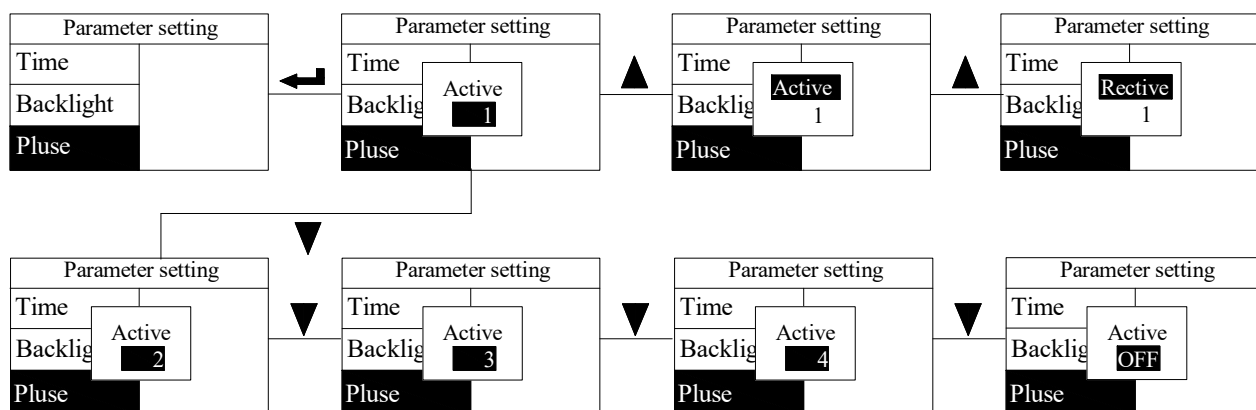
6.4.7 Backlight Time Setting

Press the up or down key to move the cursor to the backlight time, and press Enter to enter the backlight time setting interface. The backlight time can be set to 0-300s. "0" indicates that the backlight time is steady on.



6.4.8 Pulse Select Setting

Press the up or down key, move the cursor to pulse selection, press Enter to enter the pulse selection screen, you can set active pulse, reactive pulse, 1-4 indicates the pulse of a certain loop.



7 Communication Description

ADD	decimal	Content	Data Type	Byte	RE/W R	Unit	Remark
0	0	ADD	uint16_t	2	R/W		1-247
1	1	Baud	uint16_t	2	R/W		0: 1200; 1: 2400; 2: 4800; 3: 9600; 4: 19200; 5: 38400;
2	2	Check Bit	uint16_t	2	R/W		0: none 1: odd 2: even
3	3	Type	uint16_t	2	R/W		0: AMC300L_4E3; 1: AMC300L_4E3_4G 2: AMC300L_4E3_NB; 3: AMC300L_6E3 ; 16: AMC200_4E3; 17: AMC200_4E3_4G; 18: AMC200_4E3_NB; 19: AMC200_8E3; 20: AMC200_8E3_4G; 21: AMC200_8E3_NB; 22: AMC200L_4E3; 23: AMC200L_4E3_4G; 24: AMC200L_4E3_NB; 25: AMC200L_8E3; 26: AMC200L_8E3_4G; 27: AMC200L_8E3_NB;
4	4	Wiring Method	uint16_t	2	R/W		0: 3P4L 1: Reserve 2: 3P3L
5	5	Channel number	uint16_t	2	R		4: 4 loops 6: 6 loops; 8: 8 loops
6	6	Onsite storage interval	uint16_t	2	R/W	Minute	Default: 15 minutes
7	7	Time	uint16_t	2	R/W		Hex Example: 0x00 0x15 -> 0x00 Give up 21 years

8	8		uint16_t	2	R/W		Hex example: 0x01 0x03-> January 3rd
9	9		uint16_t	2	R/W		Hex example: 0x03 0x15-> Wednesday at 21 o'clock
A	10		uint16_t	2	R/W		Hex example: 0x01 0x03-> One minute, three seconds
B	11	Protocol selection	uint16_t	2	R/W		0: Modbus 1: Tower protocol Default: Modbus
C	12	Page countdown	uint16_t	2	R/W	Second	Default: 180 seconds Maximum 65536 seconds
D	13	Voltage zero shield value	uint16_t	2	R/W		Example: 3 represents 3 thousandths and the range is thousandths (3-99)
E	14	Current zero shield value	uint16_t	2	R/W		Example: 3 represents 3 thousandths and the range is thousandths (3-99)
F	15	Home current display	uint16_t	2	R/W		1: The home page displays the first current
10	16	DO1 alarm upper limit	uint32_t	2	R/W		DO1 alarm upper limit value>0
11	17						
12	18	DO1 alarm lower limit	uint32_t	2	R/W		DO1 alarm upper limit value $\geq$ 0
13	19						
14	20	System password	uint16_t	2	R/W		1-9999
15	21	Meter reading day	uint16_t	2	R/W		Hex such as: 0x15 0x02 -> 02:00 on the 21st
16	22	Meter number	uint32_t	2	R/W		
17	23						
18	24	DO2 alarm upper limit	uint32_t	2	R/W		DO1 alarm upper limit value > 0
19	25						
1A	26	DO2 alarm lower limit	uint32_t	2	R/W		DO1 alarm upper limit value $\geq$ 0
1B	27						
1C	28	Backlight time	uint16_t	2	R/W	Second	The default is 30 seconds and the range is (0-300)
1D	29	Pulse constant	uint16_t	2	R/W		Default: 400
1E	30	Pulse selection	uint16_t	2	R/W		Low 8 bits: pulse selection; 0: close pulse output 1-8 which specific pulse output High 8 bits: pulse mode selection; 0: active pulse; 1: reactive pulse
1F	31	Rated Voltage	uint16_t	2	R	V	Default: 220V
20	32	Rated Current	uint16_t	2	R	A	Default: 100A
21	33	Rated Frequency	uint16_t	2	R	Hz	Default: 50Hz
22	34	DI1-6 status	uint16_t	2	R		1: closed 0: open bit0:DI5 ;bit1:DI6 bit2:DI1 bit3:DI2 ;bit4:DI3 bit5:DI4
23	35	DO1-2 status	uint16_t	2	R		1: closed 0: open bit0:DO1 ;bit8:DO2
24	36	DO1-2 control	uint16_t	2	W		1: closed 0: open bit0:DO1 ;bit8:DO2

25	37	DO1_TOWER configuration	uint32_t	4	R/W	bit0:DI5;bit1:DI6;bit2:DI1; bit3:DI2 ;bit4:DI3;bit5:DI4 bit6: Ua voltage is too high; bit7: Ua voltage is too high; bit8: Ua voltage is too low; bit9: Ub voltage is too high; bit10: Ub voltage is too high; bit11: Ub voltage is too low; bit12: Uc voltage is too high; bit13: Uc voltage is too high; bit14: Uc voltage is too low; bit15: frequency is too high; bit16: frequency is too low ; bit17: smart meter failure bit18: reserved; bit19: output (0: pulse 1: level); bit20: remote control or alarm mode selection (0: remote control 1: alarm) bit21-bit30: pulse width (s)
26	38					
27	39	DO2_TOWER configuration	uint32_t	4	R/W	bit0:DI5;bit1:DI6;bit2:DI1; bit3:DI2 ;bit4:DI3;bit5:DI4 (Priority bit0 is the highest) bit0:DI5;bit1:DI6;bit2:DI1; bit3:DI2 ;bit4:DI3;bit5:DI4 bit6: Ua voltage is too high; bit7: Ua voltage is too high bit8: Ua voltage is too low bit9: Ub voltage is too high; bit10: Ub voltage is too high bit11: Ub voltage is too low bit12: Uc voltage is too high; bit13: Uc voltage is too high bit14: Uc voltage is too low bit15: frequency is too high; bit16: frequency is too low bit17: smart meter failure bit18: reserved; bit19: output (0: pulse 1: level); bit20: remote control or alarm mode selection (0: remote control 1: alarm) bit21-bit30: pulse width (s)
28	40					
29	41	PT ratio	uint16_t	2	R/W	
2A	42	CT1	uint16_t	2	R/W	
2B	43	CT2	uint16_t	2	R/W	
2C	44	CT3	uint16_t	2	R/W	
2D	45	CT4	uint16_t	2	R/W	
2E	46	CT5	uint16_t	2	R/W	

2F	47	CT6		uint16_t	2	R/W		
30	48	CT7		uint16_t	2	R/W		
31	49	CT8		uint16_t	2	R/W		
32	50	Print log flag		uint16_t	2	R/W		1: On; 0: Off
33	51	IP		uint16_t	2	R/W		Example: 0x23 0x70 0x1A 0x1E means IP: 112.35.30.26
34	52							
35	53	Port		uint16_t	2	R/W		Example: 0x1ADF means port number: 6879
36	54	RSSI		uint16_t	2	R		Signal value
37	55	Link 1 tag		uint16_t	2	R		Connect to Acrel Fire Cloud Platform flag 1: Link 0: Not connected
38	56	Switch status	Grid loop power supply status	uint16_t	2	R		00H: Power on; 01H: Power off; 02H: not configured
39	57		Grid loop switch status	uint16_t	2	R		00H: close; 01H: open; 02H: not configured
3A	58		Engine loop power supply status	uint16_t	2	R		00H: Power on; 01H: Power off; 02H: not configured
3B	59		Engine LOOP switch status	uint16_t	2	R		00H: close; 01H: open; 02H: not configured
3C	60	Gateway Serial ID	SN	char	20	R/W		The SN number is 14 digits and the last 6 digits are reserved Default: acrel000000001000000 The high bit in the register is followed by the low bit; example: the sixteen-bit data stored in register 60 is 0x636
3D	61							
3E	62							
3F	63							
40	64							
41	65							
42	66							
43	67							
44	68							
45	69							
46	70	Reserve						
47	71	Clear data		uint16_t	2	W		Clear power: 0x6601: the first channel 0x6602: the second channel and so on; 0x66FF: all Clear historical data: 0x7701: 15-minute historical data 0x7702: Daily zero-hour historical data; 0x7703: Alarm historical data 0x7704: Meter reading day historical data; 0x7705: Monthly frozen historical data 0x77FF: all
48	72		AC voltage	uint32_t	4	R/W	V	Default: 265

49	73	Electrical	high threshold					
4A	74	parameter threshold	AC voltage					
4B	75		ultra-high threshold	uint32_t	4	R/W	V	Default:275
4C	76		AC current low					
4D	77		Threshold	uint32_t	4	R/W	V	Default:175
4E	78		AC frequency					
4F	79		input upper limit	uint32_t	4	R/W	Hz	Default:55
50	80		AC frequency					
51	81		input lower limit	uint32_t	4	R/W	Hz	Default:45
52	82	Temperature	Temperature T1	uint16_t	2	R	°C	NTC miss connection display -100°C short connection display -200°C
53	83		Temperature T2	uint16_t	2	R	°C	NTC miss connection display -100°C short connection display -200°C
54	84		Temperature T3	uint16_t	2	R	°C	NTC miss connection display -100°C short connection display -200°C
55	85		Temperature T4	uint16_t	2	R	°C	NTC miss connection display -100°C short connection display -200°C
56	86	Temperature and humidity	Temperature	float	4	R	°C	Unconnected display 9999°C
57	87							
58	88		Humidity	float	4	R	%	Missed show 9999%
59	89							
5A	90	Software	Software Number	uint16_t	2	R		Hex such as: 0x07 0x1F -> 1823
5B	91		Version number	uint16_t	2	R		Hex such as: 0x00 0x64 ->V100
5C	92	DO1_Modbus Configuration_1		uint16_t	2	R/W		(Priority bit0 is the highest) bit0:UA; bit1:UB; bit2:UC; bit3:Umax; bit4:UAB; bit5:UBC; bit6:UCA; bit7:U`max; bit8:IA; bit9:IB; bit10:IC; bit11:Imax; bit12:PA; bit13:PB; bit14:PC; bit15:Psum;
5D	93	DO1_Modbus configuration_2		uint16_t	2	R/W		(Priority bit0 is the highest) bit0:QA; bit1:QB; bit2:QC; bit3:Qsum; bit4:SA; bit5:SB; bit6:SC; bit7:Ssum; bit8:PFA; bit9:PFB; bit10:PFC;

						bit11:PFsum; bit12:T1; bit13:T2; bit14:T3; bit15:T4;
5E	94	DO1_Modbus Configuration_3	uint16_t	2	R/W	bit0:F; bit1: zero alarm enable; bit2: reserved; bit3: reserved; bit4-bit11: alarm hysteresis; bit12-bit15: loop number;
5F	95	DO2_Modbus Configuration_1	uint16_t	2	R/W	(Priority bit0 is the highest) (Priority bit0 is the highest) bit0:UA; bit1:UB; bit2:UC; bit3:Umax; bit4:UAB; bit5:UBC; bit6:UCA; bit7:U`max; bit8:IA; bit9:IB; bit10:IC; bit11:Imax; bit12:PA; bit13:PB; bit14:PC; bit15:Psum;
60	96	DO2_Modbus Configuration_2	uint16_t	2	R/W	(Priority bit0 is the highest) bit0:QA; bit1:QB; bit2:QC; bit3:Qsum; bit4:SA; bit5:SB; bit6:SC; bit7:Ssum; bit8:PFA; bit9:PFB; bit10:PFC; bit11:PFsum; bit12:T1; bit13:T2; bit14:T3; bit15:T4;
61	97	DO2_Modbus configuration_3	uint16_t	2	R/W	bit0:F; bit1: zero alarm enable; bit2: reserved; bit3: reserved; bit4-bit11: alarm hysteresis; bit12-bit15: loop number;

Loop 1-2 telemetry data

AD D	Decimal	Content		Data Type	Byte	RE/ WR	Unit	Remark
6A	106	First Loop	AB line AC voltage Uab	float	4	R	V	
6B	107							
6C	108		BC line AC voltage Ubc	float	4	R	V	
6D	109							
6E	110		CA line AC voltage Uca	float	4	R	V	
6F	111							
70	112		A phase AC voltage Ua	float	4	R	V	
71	113							
72	114		B phase AC voltage Ub	float	4	R	V	

73	115						
74	116						
75	117		C phase AC voltage Uc	float	4	R	V
76	118						
77	119		A phase AC current Ia	float	4	R	A
78	120						
79	121		B Phase AC current Ib	float	4	R	A
7A	122						
7B	123		C Phase AC current Ic	float	4	R	A
7C	124						
7D	125		Zero sequence current Io	float	4	R	A
7E	126						
7F	127		Total power factor PF	float	4	R	
80	128						
81	129		A phase power factor PFa	float	4	R	
82	130						
83	131		B phase power factor PFb	float	4	R	
84	132						
85	133		C phase power factor PFc	float	4	R	
86	134						
87	135		Frequency F	float	4	R	Hz
88	136						
89	137		Total active power psum	float	4	R	kW
8A	138						
8B	139		A Phase active power pa	float	4	R	kW
8C	140						
8D	141		B Phase active power pa	float	4	R	kW
8E	142						
8F	143		C Phase active power pa	float	4	R	kW
90	144						Phase A apparent power
91	145		Total reactive power qsum	float	4	R	kvar
92	146						
93	147		A phase reactive power qa	float	4	R	kvar
94	148						
95	149		B phase reactive power qb	float	4	R	kvar
96	150						
97	151		C phase reactive power qc	float	4	R	kvar
98	152						
99	153		Total apparent power	float	4	R	kVA
9A	154						
9B	155		A phase apparent power	float	4	R	kVA
9C	156						
9D	157		B phase apparent power	float	4	R	kVA

9E	158		C phase apparent power	float	4	R	kVA	
9F	159							
A0	160		Total active energy eps	float	4	R	kWh	
A1	161							
A2	162		A phase total active energy epa	float	4	R	kWh	
A3	163							
A4	164		B phase total active energy epb	float	4	R	kWh	
A5	165							
A6	166		C phase total active energy epc	float	4	R	kWh	
A7	167							
A8	168		Total reactive energy eqs	float	4	R	kvarh	
A9	169							
AA	170		A phase total reactive energy eqa	float	4	R	kvarh	
AB	171							
AC	172		B phase total reactive energy eqb	float	4	R	kvarh	
AD	173							
AE	174		C phase total reactive energy eqc	float	4	R	kvarh	
AF	175							
B0	176		Forward total active energy epsp	float	4	R	kWh	
B1	177							
B2	178		Forward A phase total active energy epap	float	4	R	kWh	
B3	179							
B4	180		Forward B phase total active energy epbp	float	4	R	kWh	
B5	181							
B6	182		Forward C phase total active energy epcp	float	4	R	kWh	
B7	183							
B8	184		Reverse total active energy epsn	float	4	R	kWh	
B9	185							
BA	186		Reverse phase A total active energy epan	float	4	R	kWh	
BB	187							
BC	188		Reverse phase B total active energy epbn	float	4	R	kWh	
BD	189							
BE	190		Reverse phase C total active energy epcn	float	4	R	kWh	
BF	191							
C0	192		Forward total reactive energy eqsp	float	4	R	kvarh	
C1	193							
C2	194		Forward A-phase total reactive energy eqap	float	4	R	kvarh	
C3	195							
C4	196		Forward B-phase total reactive energy eqbp	float	4	R	kvarh	
C5	197							
C6	198		Forward C-phase total reactive energy eqcp	float	4	R	kvarh	
C7	199							
C8	200		Reverse total reactive energy eqsn	float	4	R	kvarh	
C9	201							

CA	202		Reverse A phase total reactive energy eqan	float	4	R	kvarh	
CB	203							
CC	204		Reverse B phase total reactive energy eqbn	float	4	R	kvarh	
CD	205							
CE	206		Reverse C phase total reactive energy eqcn	float	4	R	kvarh	
CF	207							
D0	208	Second Loop	AB line AC voltage Uab	float	4	R	V	
D1	209							
D2	210		BC line AC voltage Ubc	float	4	R	V	
D3	211							
D4	212		CA line AC voltage Uca	float	4	R	V	
D5	213							
D6	214		A phase AC voltage Ua	float	4	R	V	
D7	215							
D8	216		B phase AC voltage Ub	float	4	R	V	
D9	217							
DA	218		C phase AC voltage Uc	float	4	R	V	
DB	219							
DC	220		Phase A AC current Ia	float	4	R	A	
DD	221							
DE	222		Phase B AC current Ib	float	4	R	A	
DF	223							
E0	224		Phase C AC current Ic	float	4	R	A	
E1	225							
E2	226		Zero sequence current Io	float	4	R	A	
E3	227							
E4	228		Total power factor PF	float	4	R		
E5	229							
E6	230		A phase power factor PFa	float	4	R		
E7	231							
E8	232		Phase B power factor PFb	float	4	R		
E9	233							
EA	234		C phase power factor PFc	float	4	R		
EB	235							
EC	236		Frequency F	float	4	R	Hz	
ED	237							
EE	238		Total active power	float	4	R	kW	
EF	239							
F0	240		A phase active power	float	4	R	kW	
F1	241							
F2	242		B phase active power	float	4	R	kW	
F3	243							
F4	244		C phase active power	float	4	R	kW	
F5	245							

F6	246		Total reactive power	float	4	R	kvar	
F7	247							
F8	248		A phase reactive power	float	4	R	kvar	
F9	249							
FA	250		B phase reactive power	float	4	R	kvar	
FB	251							
FC	252		C phase reactive power	float	4	R	kvar	
FD	253							
FE	254		Total apparent power	float	4	R	kVA	
FF	255							
100	256		A phase apparent power	float	4	R	kVA	
101	257							
102	258		B phase apparent power	float	4	R	kVA	
103	259							
104	260		C phase apparent power	float	4	R	kVA	
105	261							
106	262		Total active energy eps	float	4	R	kWh	
107	263							
108	264		A phase total active energy epa	float	4	R	kWh	
109	265							
10A	266		B phase total active energy epb	float	4	R	kWh	
10B	267							
10C	268		C phase total active energy epc	float	4	R	kWh	
10D	269							
10E	270		Total reactive energy eqs	float	4	R	kvarh	
10F	271							
110	272		A phase total reactive energy eqa	float	4	R	kvarh	
111	273							
112	274		B phase total reactive energy eqb	float	4	R	kvarh	
113	275							
114	276		C phase total reactive energy eqc	float	4	R	kvarh	
115	277							
116	278		Forward total active energy epsp	float	4	R	kWh	
117	279							
118	280		Forward A phase total active energy epap	float	4	R	kWh	
119	281							
11A	282		Forward B phase total active energy epbp	float	4	R	kWh	
11B	283							
11C	284		Forward C phase total active energy epcp	float	4	R	kWh	
11D	285							
11E	286		Reverse total active energy epsn	float	4	R	kWh	
11F	287							
120	288		Reverse phase A total active energy epan	float	4	R	kWh	
121	289							

122	290		Reverse phase B total active energy epgn	float	4	R	kWh	
123	291							
124	292		Reverse phase C total active energy epcn	float	4	R	kWh	
125	293							
126	294		Forward total reactive energy eqsp	float	4	R	kvarh	
127	295							
128	296		Forward A-phase total reactive energy eqap	float	4	R	kvarh	
129	297							
12A	298		Forward B-phase total reactive energy eqbp	float	4	R	kvarh	
12B	299							
12C	300		Forward C-phase total reactive energy eqcp	float	4	R	kvarh	
12D	301							
12E	302		Reverse total reactive energy eqsn	float	4	R	kvarh	
12F	303							
130	304		Reverse A phase total reactive energy eqan	float	4	R	kvarh	
131	305							
132	306		Reverse B phase total reactive energy eqbn	float	4	R	kvarh	
133	307							
134	308		Reverse C phase total reactive energy eqcn	float	4	R	kvarh	
135	309							

Loop 3-4 Telemetry Data

ADD	Decimal	Content		Data Type	Byte	RE/WR	Unit	Remark
136	310	Third Loop	AB line AC voltage Uab	float	4	R	V	
137	311							
138	312		BC line AC voltage Ubc	float	4	R	V	
139	313							
13A	314		CA line AC voltage Uca	float	4	R	V	
13B	315							
13C	316		A phase AC voltage Ua	float	4	R	V	
13D	317							
13E	318		B phase AC voltage Ub	float	4	R	V	
13F	319							
140	320		C phase AC voltage Uc	float	4	R	V	
141	321							
142	322		A phase AC current Ia	float	4	R	A	
143	323							
144	324		B Phase AC current Ib	float	4	R	A	
145	325							
146	326		C Phase AC current Ic	float	4	R	A	
147	327							
148	328		Zero sequence current Io	float	4	R	A	
149	329							
14A	330		Total power factor PF	float	4	R		

14B	331						
14C	332						
14D	333	A phase power factor PFa	float	4	R		
14E	334						
14F	335	B phase power factor PFb	float	4	R		
150	336						
151	337	C phase power factor PFc	float	4	R		
152	338						
153	339	Frequency F	float	4	R	Hz	
154	340						
155	341	Total active power psum	float	4	R	kW	
156	342						
157	343	A Phase active power	float	4	R	kW	
158	344						
159	345	B Phase active power	float	4	R	kW	
15A	346						
15B	347	C Phase active power	float	4	R	kW	
15C	348						
15D	349	Total reactive power qsum	float	4	R	kvar	
15E	350						
15F	351	A phase reactive power	float	4	R	kvar	
160	352						
161	353	B phase reactive power	float	4	R	kvar	
162	354						
163	355	C phase reactive power	float	4	R	kvar	
164	356						
165	357	Total apparent power	float	4	R	kVA	
166	358						
167	359	A phase apparent power	float	4	R	kVA	
168	360						
169	361	B phase apparent power	float	4	R	kVA	
16A	362						
16B	363	C phase apparent power	float	4	R	kVA	
16C	364						
16D	365	Total active energy eps	float	4	R	kWh	
16E	366						
16F	367	A phase total active energy epa	float	4	R	kWh	
170	368						
171	369	B phase total active energy epb	float	4	R	kWh	
172	370						
173	371	C phase total active energy epC	float	4	R	kWh	
174	372						
175	373	Total reactive energy eqs	float	4	R	kvarh	
176	374						
		A phase total reactive energy eqa	float	4	R	kvarh	

177	375						
178	376		B phase total reactive energy eqb	float	4	R	kvarh
179	377						
17A	378		C phase total reactive energy eqc	float	4	R	kvarh
17B	379						
17C	380		Forward total active energy epsp	float	4	R	kWh
17D	381						
17E	382		Forward A phase total active energy epap	float	4	R	kWh
17F	383						
180	384		Forward B phase total active energy epbp	float	4	R	kWh
181	385						
182	386		Forward C phase total active energy epcp	float	4	R	kWh
183	387						
184	388		Reverse total active energy epsn	float	4	R	kWh
185	389						
186	390		Reverse phase A total active energy epan	float	4	R	kWh
187	391						
188	392		Reverse phase B total active energy epbn	float	4	R	kWh
189	393						
18A	394		Reverse phase C total active energy epcn	float	4	R	kWh
18B	395						
18C	396		Forward total reactive energy eqsp	float	4	R	kvarh
18D	397						
18E	398		Forward A-phase total reactive energy eqap	float	4	R	kvarh
18F	399						
190	400		Forward B-phase total reactive energy eqbp	float	4	R	kvarh
191	401						
192	402		Forward C-phase total reactive energy eqcp	float	4	R	kvarh
193	403						
194	404		Reverse total reactive energy eqsn	float	4	R	kvarh
195	405						
196	406		Reverse A phase total reactive energy eqan	float	4	R	kvarh
197	407						
198	408		Reverse B phase total reactive energy eqbn	float	4	R	kvarh
199	409						
19A	410		Reverse C phase total reactive energy eqcn	float	4	R	kvarh
19B	411						
19C	412	Forth Loop	AB line AC voltage Uab	float	4	R	V
19D	413						
19E	414		BC line AC voltage Ubc	float	4	R	V
19F	415						
1A0	416		CA line AC voltage Uca	float	4	R	V
1A1	417						
1A2	418		A phase AC voltage Ua	float	4	R	V

1A3	419						
1A4	420						
1A5	421	B phase AC voltage Ub	float	4	R	V	
1A6	422						
1A7	423	C phase AC voltage Uc	float	4	R	V	
1A8	424						
1A9	425	Phase A AC current Ia	float	4	R	A	
1AA	426						
1AB	427	Phase B AC current Ib	float	4	R	A	
1AC	428						
1AD	429	Phase C AC current Ic	float	4	R	A	
1AE	430						
1AF	431	Zero sequence current Io	float	4	R	A	
1B0	432						
1B1	433	Total power factor PF	float	4	R		
1B2	434						
1B3	435	A phase power factor PFa	float	4	R		
1B4	436						
1B5	437	B phase power factor PFb	float	4	R		
1B6	438						
1B7	439	C phase power factor PFc	float	4	R		
1B8	440						
1B9	441	Frequency F	float	4	R	Hz	
1BA	442						
1BB	443	Total active power	float	4	R	kW	
1BC	444						
1BD	445	A phase active power	float	4	R	kW	
1BE	446						
1BF	447	B phase active power	float	4	R	kW	
1C0	448						
1C1	449	C phase active power	float	4	R	kW	
1C2	450						
1C3	451	Total reactive power	float	4	R	kvar	
1C4	452						
1C5	453	A phase reactive power	float	4	R	kvar	
1C6	454						
1C7	455	B phase reactive power	float	4	R	kvar	
1C8	456						
1C9	457	C phase reactive power	float	4	R	kvar	
1CA	458						
1CB	459	Total apparent power	float	4	R	kVA	
1CC	460						
1CD	461	A phase apparent power	float	4	R	kVA	
1CE	462						
		B phase apparent power	float	4	R	kVA	

1CF	463						
1D0	464	C phase apparent power	float	4	R	kVA	
1D1	465						
1D2	466	Total active energy eps	float	4	R	kWh	
1D3	467						
1D4	468	A phase total active energy epa	float	4	R	kWh	
1D5	469						
1D6	470	B phase total active energy epb	float	4	R	kWh	
1D7	471						
1D8	472	C phase total active energy epc	float	4	R	kWh	
1D9	473						
1DA	474	Total reactive energy eqs	float	4	R	kvarh	
1DB	475						
1DC	476	A phase total reactive energy eqa	float	4	R	kvarh	
1DD	477						
1DE	478	B phase total reactive energy eqb	float	4	R	kvarh	
1DF	479						
1E0	480	C phase total reactive energy eqc	float	4	R	kvarh	
1E1	481						
1E2	482	Forward total active energy epsp	float	4	R	kWh	
1E3	483						
1E4	484	Forward A phase total active energy epap	float	4	R	kWh	
1E5	485						
1E6	486	Forward B phase total active energy epbp	float	4	R	kWh	
1E7	487						
1E8	488	Forward C phase total active energy epcp	float	4	R	kWh	
1E9	489						
1EA	490	Reverse total active energy epsn	float	4	R	kWh	
1EB	491						
1EC	492	Reverse phase A total active energy epan	float	4	R	kWh	
1ED	493						
1EE	494	Reverse phase B total active energy epbn	float	4	R	kWh	
1EF	495						
1F0	496	Reverse phase C total active energy epcn	float	4	R	kWh	
1F1	497						
1F2	498	Forward total reactive energy eqsp	float	4	R	kvarh	
1F3	499						
1F4	500	Forward A-phase total reactive energy eqap	float	4	R	kvarh	
1F5	501						
1F6	502	Forward B-phase total reactive energy eqbp	float	4	R	kvarh	
1F7	503						
1F8	504	Forward C-phase total reactive energy eqcp	float	4	R	kvarh	
1F9	505						
1FA	506	Forward C-phase total reactive energy eqcp	float	4	R	kvarh	

1FB	507						
1FC	508						
1FD	509		Reverse A phase total reactive energy eqan	float	4	R	kvarh
1FE	510						
1FF	511		Reverse B phase total reactive energy eqbn	float	4	R	kvarh
200	512						
201	513		Reverse C phase total reactive energy eqcn	float	4	R	kvarh

Loop 5-6 Telemetry Data

ADD	Decima l		Content	Data Type	Byte	RE/W R	Unit	Remark
202	514		AB line AC voltage Uab	float	4	R	V	
203	515							
204	516		BC line AC voltage Ubc	float	4	R	V	
205	517							
206	518		CA line AC voltage Uca	float	4	R	V	
207	519							
208	520		A phase AC voltage Ua	float	4	R	V	
209	521							
20A	522		B phase AC voltage Ub	float	4	R	V	
20B	523							
20C	524		C phase AC voltage Uc	float	4	R	V	
20D	525							
20E	526		A phase AC current Ia	float	4	R	A	
20F	527							
210	528		B Phase AC current Ib	float	4	R	A	
211	529							
212	530	Fifth Loop	C Phase AC current Ic	float	4	R	A	
213	531							
214	532		Zero sequence current Io	float	4	R	A	
215	533							
216	534		Total power factor PF	float	4	R		
217	535							
218	536		A phase power factor PFa	float	4	R		
219	537							
21A	538		B phase power factor PFb	float	4	R		
21B	539							
21C	540		C phase power factor PFc	float	4	R		
21D	541							
21E	542		Frequency F	float	4	R	Hz	
21F	543							
220	544		Total active power	float	4	R	kW	
221	545							
222	546		A Phase active power	float	4	R	kW	

223	547						
224	548						
225	549	B Phase active power	float	4	R	kW	
226	550						
227	551	C Phase active power pa	float	4	R	kW	
228	552						
229	553	Total reactive power qsum	float	4	R	kvar	
22A	554						
22B	555	A phase reactive power qa	float	4	R	kvar	
22C	556						
22D	557	B phase reactive power	float	4	R	kvar	
22E	558						
22F	559	C phase reactive power	float	4	R	kvar	
230	560						
231	561	Total apparent power	float	4	R	kVA	
232	562						
233	563	A phase apparent power	float	4	R	kVA	
234	564						
235	565	B phase apparent power	float	4	R	kVA	
236	566						
237	567	C phase apparent power	float	4	R	kVA	
238	568						
239	569	Total active energy eps	float	4	R	kWh	
23A	570						
23B	571	A phase total active energy epa	float	4	R	kWh	
23C	572						
23D	573	B phase total active energy epb	float	4	R	kWh	
23E	574						
23F	575	C phase total active energy epc	float	4	R	kWh	
240	576						
241	577	Total reactive energy eqs	float	4	R	kvarh	
242	578						
243	579	A phase total reactive energy eqa	float	4	R	kvarh	
244	580						
245	581	B phase total reactive energy eqb	float	4	R	kvarh	
246	582						
247	583	C phase total reactive energy eqc	float	4	R	kvarh	
248	584						
249	585	Forward total active energy epsp	float	4	R	kWh	
24A	586						
24B	587	Forward A phase total active energy epap	float	4	R	kWh	
24C	588						
24D	589	Forward B phase total active energy epbp	float	4	R	kWh	
24E	590						
		Forward C phase total	float	4	R	kWh	

24F	591		active energy epcp					
250	592		Reverse total active energy	float	4	R	kWh	
251	593		epsn					
252	594		Reverse phase A total	float	4	R	kWh	
253	595		active energy epan					
254	596		Reverse phase B total	float	4	R	kWh	
255	597		active energy epbn					
256	598		Reverse phase C total	float	4	R	kWh	
257	599		active energy epcn					
258	600		Forward total reactive	float	4	R	kvarh	
259	601		energy eqsp					
25A	602		Forward A-phase total	float	4	R	kvarh	
25B	603		reactive energy eqap					
25C	604		Forward B-phase total	float	4	R	kvarh	
25D	605		reactive energy eqbp					
25E	606		Forward C-phase total	float	4	R	kvarh	
25F	607		reactive energy eqcp					
260	608		Reverse total reactive	float	4	R	kvarh	
261	609		energy eqsn					
262	610		Reverse A phase total	float	4	R	kvarh	
263	611		reactive energy eqan					
264	612		Reverse B phase total	float	4	R	kvarh	
265	613		reactive energy eqbn					
266	614		Reverse C phase total	float	4	R	kvarh	
267	615		reactive energy eqcn					
268	616	Sixth Loop	AB line AC voltage Uab	float	4	R	V	
269	617							
26A	618		BC line AC voltage Ubc	float	4	R	V	
26B	619							
26C	620		CA line AC voltage Uca	float	4	R	V	
26D	621							
26E	622		A phase AC voltage Ua	float	4	R	V	
26F	623							
270	624		B phase AC voltage Ub	float	4	R	V	
271	625							
272	626		C phase AC voltage Uc	float	4	R	V	
273	627							
274	628		A phase AC current Ia	float	4	R	A	
275	629							
276	630		B phase AC current Ib	float	4	R	A	
277	631							
278	632		C phase AC current Ic	float	4	R	A	
279	633							
27A	634		Zero sequence current Io	float	4	R	A	

27B	635						
27C	636						
27D	637	Total power factor PF	float	4	R		
27E	638						
27F	639	A phase power factor PFa	float	4	R		
280	640						
281	641	B Phase power factor PFb	float	4	R		
282	642						
283	643	C phase power factor PFc	float	4	R		
284	644						
285	645	Frequency F	float	4	R	Hz	
286	646						
287	647	Total active power	float	4	R	kW	
288	648						
289	649	A phase active power	float	4	R	kW	
28A	650						
28B	651	B phase active power	float	4	R	kW	
28C	652						
28D	653	C phase active power	float	4	R	kW	
28E	654						
28F	655	Total reactive power	float	4	R	kvar	
290	656						
291	657	A phase reactive power	float	4	R	kvar	
292	658						
293	659	B phase reactive power	float	4	R	kvar	
294	660						
295	661	C phase reactive power	float	4	R	kvar	
296	662						
297	663	Total apparent power	float	4	R	kVA	
298	664						
299	665	A phase apparent power	float	4	R	kVA	
29A	666						
29B	667	B phase apparent power	float	4	R	kVA	
29C	668						
29D	669	C phase apparent power	float	4	R	kVA	
29E	670						
29F	671	Total active energy eps	float	4	R	kWh	
2A0	672						
2A1	673	A phase total active energy epa	float	4	R	kWh	
2A2	674						
2A3	675	B phase total active energy epb	float	4	R	kWh	
2A4	676						
2A5	677	C phase total active energy epc	float	4	R	kWh	
2A6	678						
		Total reactive energy eqs	float	4	R	kvarh	

2A7	679						
2A8	680		A phase total reactive energy eqa	float	4	R	kvarh
2A9	681		B phase total reactive energy eqb	float	4	R	kvarh
2AA	682		C phase total reactive energy eqc	float	4	R	kvarh
2AB	683		Forward total active energy epsp	float	4	R	kWh
2AC	684		Forward A phase total active energy epap	float	4	R	kWh
2AD	685		Forward B phase total active energy epbp	float	4	R	kWh
2AE	686		Forward C phase total active energy epcp	float	4	R	kWh
2AF	687		Reverse total active energy epsn	float	4	R	kWh
2B0	688		Reverse phase A total active energy epan	float	4	R	kWh
2B1	689		Reverse phase B total active energy epbn	float	4	R	kWh
2B2	690		Reverse phase C total active energy epcn	float	4	R	kWh
2B3	691		Forward total reactive energy eqsp	float	4	R	kvarh
2B4	692		Forward A-phase total reactive energy eqap	float	4	R	kvarh
2B5	693		Forward B-phase total reactive energy eqbp	float	4	R	kvarh
2B6	694		Forward C-phase total reactive energy eqcp	float	4	R	kvarh
2B7	695		Reverse total reactive energy eqsn	float	4	R	kvarh
2B8	696		Reverse A phase total reactive energy eqan	float	4	R	kvarh
2B9	697		Reverse B phase total reactive energy eqbn	float	4	R	kvarh
2BA	698		Reverse C phase total reactive energy eqcn	float	4	R	kvarh
2BB	699						
2BC	700						
2BD	701						
2BE	702						
2BF	703						
2C0	704						
2C1	705						
2C2	706						
2C3	707						
2C4	708						
2C5	709						
2C6	710						
2C7	711						
2C8	712						
2C9	713						
2CA	714						
2CB	715						
2CC	716						
2CD	717						

Loop 7-8 telemetry data

ADD	Decimal	Content	Data Type	Byte	RE/W R	Unit	Remark
2EE	750	Sevent	AB line AC voltage Uab	float	4	R	V

2EF	751	h Loop						
2F0	752		BC line AC voltage Ubc	float	4	R	V	
2F1	753							
2F2	754		CA line AC voltage Uca	float	4	R	V	
2F3	755							
2F4	756		A phase AC voltage Ua	float	4	R	V	
2F5	757							
2F6	758		B phase AC voltage Ub	float	4	R	V	
2F7	759							
2F8	760		C phase AC voltage Uc	float	4	R	V	
2F9	761							
2FA	762		A phase AC current Ia	float	4	R	A	
2FB	763							
2FC	764		B phase AC current Ib	float	4	R	A	
2FD	765							
2FE	766		C phase AC current Ic	float	4	R	A	
2FF	767							
300	768		Zero sequence current Io	float	4	R	A	
301	769							
302	770		Total power factor PF	float	4	R		
303	771							
304	772		A phase power factor PFa	float	4	R		
305	773							
306	774		B phase power factor PFb	float	4	R		
307	775							
308	776		C phase power factor PFc	float	4	R		
309	777							
30A	778		Frequency F	float	4	R	Hz	
30B	779							
30C	780		Total active power	float	4	R	kW	
30D	781							
30E	782		A Phase active power	float	4	R	kW	
30F	783							
310	784		B phase active power	float	4	R	kW	
311	785							
312	786		C phase active power	float	4	R	kW	
313	787							
314	788		Total reactive power	float	4	R	kvar	
315	789							
316	790		A phase reactive power	float	4	R	kvar	
317	791							
318	792		B phase reactive power	float	4	R	kvar	
319	793							
31A	794		C phase reactive power	float	4	R	kvar	

31B	795						
31C	796						
31D	797	Total apparent power	float	4	R	kVA	
31E	798						
31F	799	A phase apparent power	float	4	R	kVA	
320	800						
321	801	B phase apparent power	float	4	R	kVA	
322	802						
323	803	C phase apparent power	float	4	R	kVA	
324	804						
325	805	Total active energy eps	float	4	R	kWh	
326	806						
327	807	A phase total active energy epa	float	4	R	kWh	
328	808						
329	809	B phase total active energy epb	float	4	R	kWh	
32A	810						
32B	811	C phase total active energy epc	float	4	R	kWh	
32C	812						
32D	813	Total reactive energy eqs	float	4	R	kvarh	
32E	814						
32F	815	A phase total reactive energy eqa	float	4	R	kvarh	
330	816						
331	817	B phase total reactive energy eqb	float	4	R	kvarh	
332	818						
333	819	C phase total reactive energy eqc	float	4	R	kvarh	
334	820						
335	821	Forward total active energy epsp	float	4	R	kWh	
336	822						
337	823	Forward A phase total active energy epap	float	4	R	kWh	
338	824						
339	825	Forward B phase total active energy epbp	float	4	R	kWh	
33A	826						
33B	827	Forward C phase total active energy epcp	float	4	R	kWh	
33C	828						
33D	829	Reverse total active energy epsn	float	4	R	kWh	
33E	830						
33F	831	Reverse phase A total active energy epan	float	4	R	kWh	
340	832						
341	833	Reverse phase B total active energy epbn	float	4	R	kWh	
342	834						
343	835	Reverse phase C total active energy epcn	float	4	R	kWh	
344	836						
345	837	Forward total reactive energy eqsp	float	4	R	kvarh	
346	838						
		Forward A-phase total	float	4	R	kvarh	

347	839		reactive energy eqap					
348	840		Forward B-phase total	float	4	R	kvarh	
349	841		reactive energy eqbp					
34A	842		Forward C-phase total	float	4	R	kvarh	
34B	843		reactive energy eqcp					
34C	844		Reverse total reactive energy	float	4	R	kvarh	
34D	845		eqsn					
34E	846		Reverse A phase total reactive	float	4	R	kvarh	
34F	847		energy eqan					
350	848		Reverse B phase total reactive	float	4	R	kvarh	
351	849		energy eqbn					
352	850		Reverse C phase total reactive	float	4	R	kvarh	
353	851		energy eqcn					
354	852	Eighth Loop	AB line AC voltage Uab	float	4	R	V	
355	853							
356	854		BC line AC voltage Ubc	float	4	R	V	
357	855							
358	856		CA line AC voltage Uca	float	4	R	V	
359	857							
35A	858		A phase AC voltage Ua	float	4	R	V	
35B	859							
35C	860		Phase B AC voltage Ub	float	4	R	V	
35D	861							
35E	862		C phase AC voltage Uc	float	4	R	V	
35F	863							
360	864		A phase AC current Ia	float	4	R	A	
361	865							
362	866		B phase AC current Ib	float	4	R	A	
363	867							
364	868		C phase AC current Ic	float	4	R	A	
365	869							
366	870		Zero sequence current Io	float	4	R	A	
367	871							
368	872		Total power factor PF	float	4	R		
369	873							
36A	874		A phase power factor PFa	float	4	R		
36B	875							
36C	876		B Phase power factor PFb	float	4	R		
36D	877							
36E	878		C phase power factor PFc	float	4	R		
36F	879							
370	880		Frequency F	float	4	R	Hz	
371	881							
372	882		Total active power	float	4	R	kW	

373	883					
374	884					
375	885	Total active power	float	4	R	kW
376	886					
377	887	B phase active power	float	4	R	kW
378	888					
379	889	C phase active power	float	4	R	kW
37A	890					
37B	891	Total reactive power	float	4	R	kvar
37C	892					
37D	893	A phase reactive power	float	4	R	kvar
37E	894					
37F	895	B phase reactive power	float	4	R	kvar
380	896					
381	897	C phase reactive power	float	4	R	kvar
382	898					
383	899	Total apparent power	float	4	R	kVA
384	900					
385	901	A phase apparent power	float	4	R	kVA
386	902					
387	903	B phase apparent power	float	4	R	kVA
388	904					
389	905	C phase apparent power	float	4	R	kVA
38A	906					
38B	907	Total active energy eps	float	4	R	kWh
38C	908					
38D	909	A phase total active energy epa	float	4	R	kWh
38E	910					
38F	911	B phase total active energy epb	float	4	R	kWh
390	912					
391	913	C phase total active energy epc	float	4	R	kWh
392	914					
393	915	Total reactive energy eqs	float	4	R	kvarh
394	916					
395	917	A phase total reactive energy eqa	float	4	R	kvarh
396	918					
397	919	B phase total reactive energy eqb	float	4	R	kvarh
398	920					
399	921	C phase total reactive energy eqc	float	4	R	kvarh
39A	922					
39B	923	Forward total active energy epsp	float	4	R	kWh
39C	924					
39D	925	Forward A phase total active energy epap	float	4	R	kWh
39E	926					
		Forward B phase total active	float	4	R	kWh

39F	927		energy epbp					
3A0	928		Forward C phase total active	float	4	R	kWh	
3A1	929		energy epcp					
3A2	930		Reverse total active energy	float	4	R	kWh	
3A3	931		epsn					
3A4	932		Reverse phase A total active	float	4	R	kWh	
3A5	933		energy epan					
3A6	934		Reverse phase B total active	float	4	R	kWh	
3A7	935		energy epbn					
3A8	936		Reverse phase C total active	float	4	R	kWh	
3A9	937		energy epcn					
3AA	938		Forward total reactive energy	float	4	R	kvarh	
3AB	939		eqsp					
3AC	940		Forward A-phase total	float	4	R	kvarh	
3AD	941		reactive energy eqap					
3AE	942		Forward B-phase total	float	4	R	kvarh	
3AF	943		reactive energy eqbp					
3B0	944		Forward C-phase total	float	4	R	kvarh	
3B1	945		reactive energy eqcp					
3B2	946		Reverse total reactive energy	float	4	R	kvarh	
3B3	947		eqsn					
3B4	948		Reverse A phase total reactive	float	4	R	kvarh	
3B5	949		energy eqan					
3B6	950		Reverse B phase total reactive	float	4	R	kvarh	
3B7	951		energy eqbn					
3B8	952		Reverse C phase total reactive	float	4	R	kvarh	
3B9	953		energy eqcn					

Loop alarm information

ADD	Decimal		Content	Data type	Byte	RE/WR	Unit	Remark
2CE	718	First Loop	A phase AC voltage Ua+	uint16_t	1	R		Phase voltage warning description 00H: normal 01H: Below the lower limit 02H: Above upper limit (too high) 03H: above upper limit (super high) 04H: phase loss Description of frequency alarm 00H: normal 01H: Below the lower limit 02H: above upper limit SPD warning description
			B phase AC voltage Ub					
2CF	719		C phase AC voltage Uc+					
			input frequency					
2D0	720	Second Loop	SPD fault + SPD circuit breaker disconnected	uint16_t	1	R		
2D1	721		Smart Meter Failure	uint16_t	1	R		
2D2	722		A Phase AC voltage Ua+	uint16_t	1	R		
			B phase AC voltage Ub					
2D3	723		C phase AC voltage Uc+	uint16_t	1	R		
			input frequency					
2D4	724		SPD fault + SPD circuit breaker disconnected	uint16_t	1	R		
2D5	725		Smart Meter Failure	uint16_t	1	R		

2D6	726	Third Loop	A Phase AC voltage Ua+ B phase AC voltage Ub	uint16_t	1	R	00H: normal E2H: SPD failure Description of the alarm for disconnection of the circuit breaker of the lightning arrester 00H: normal 05H: switch off Smart Meter Fault Warning Description 00H: normal E3H: Smart Meter Failure
2D7	727		C phase AC voltage Uc+ input frequency	uint16_t	1	R	
2D8	728		SPD fault + SPD circuit breaker disconnected	uint16_t	1	R	
2D9	729		Smart Meter Failure	uint16_t	1	R	
2DA	730	Forth Loop	A Phase AC voltage Ua+ B phase AC voltage Ub	uint16_t	1	R	
2DB	731		C phase AC voltage Uc+ input frequency	uint16_t	1	R	
2DC	732		SPD fault + SPD circuit breaker disconnected	uint16_t	1	R	
2DD	733		Smart Meter Failure	uint16_t	1	R	
2DE	734	Fifth Loop	A Phase AC voltage Ua+ B phase AC voltage Ub	uint16_t	1	R	
2DF	735		C phase AC voltage Uc+ input frequency	uint16_t	1	R	
2E0	736		SPD fault + SPD circuit breaker disconnected	uint16_t	1	R	
2E1	737		Smart Meter Failure	uint16_t	1	R	
2E2	738	Sixth Loop	A Phase AC voltage Ua+ B phase AC voltage Ub	uint16_t	1	R	
2E3	739		C phase AC voltage Uc+ input frequency	uint16_t	1	R	
2E4	740		SPD fault + SPD circuit breaker disconnected	uint16_t	1	R	
2E5	741		Smart Meter Failure	uint16_t	1	R	
2E6	742	Seventh Loop	A Phase AC voltage Ua+ B phase AC voltage Ub	uint16_t	1	R	
2E7	743		C phase AC voltage Uc+ input frequency	uint16_t	1	R	
2E8	744		SPD fault + SPD circuit breaker disconnected	uint16_t	1	R	
2E9	745		Smart Meter Failure	uint16_t	1	R	

2EA	746	Eighth Loop	A Phase AC voltage Ua+ B phase AC voltage Ub	uint16_t	1	R		
2EB	747		C phase AC voltage Uc+ input frequency	uint16_t	1	R		
2EC	748		SPD fault + SPD circuit breaker disconnected	uint16_t	1	R		
2ED	749		Smart Meter Failure	uint16_t	1	R		

8 Common Troubleshooting

Analysis and troubleshooting of common faults

Fault content	Analysis	Remark
No display after power on	Check whether the power supply voltage is within the working voltage range	
Incorrect readings such as voltage, current and energy	Check whether the voltage-to-current ratio setting is correct Check whether the wiring mode setting is consistent with the actual Check whether the voltage transformer and current transformer are in good condition	
Incorrect power or power factor	Check whether the wiring mode setting is consistent with the actual Check whether the voltage and current phase sequence is correct Check if the wiring is correct	
Communication is abnormal	Check whether the address, baud rate, check digit, etc. in the communication settings are consistent with the host computer Check whether the RS485 converter is normal Check that the instrument is using the correct protocol The communication terminal is connected in parallel with a resistance of more than 120 ohms Check if the wiring is correct	