

# Electric Power Security Monitor Instructions

## Contents

|                                                               |    |
|---------------------------------------------------------------|----|
| 1. Product Introduction.....                                  | 01 |
| 2. Function introduction.....                                 | 02 |
| 3. Technical Parameters.....                                  | 03 |
| 4. Installation and wiring.....                               | 04 |
| 5. Programming operation.....                                 | 07 |
| 6. Panel description and measurement information display..... | 11 |
| 7. Function output.....                                       | 20 |
| 8. Common questions and solution.....                         | 25 |
| 9. Transportation and storage.....                            | 26 |
| 10. Company Commitment.....                                   | 26 |

# 1. Product introduction

## 1.1 Reference standards

### Reference standards:

DL/T 614 "Multifunctional Electric Energy Meter"

GB/T 17883 "0.2S and 0.5S static AC active energy meters"

GB/T 17882 "Level 2 and Level 3 static AC reactive power meters"

DL/T 645 "Communication Protocol for Multifunctional Electric Energy Meter"

### Implementation standards:

GB/T 22264.1 Installed electrical measuring instruments with digital display Part 1:

Definitions and general requirements

GB/T 22264.2 Installed electrical measuring instruments with digital display Part 2:

Special requirements for ammeters and voltmeters

GB/T 22264.3 Installed electrical measuring instruments with digital display Part 3:

Special features of power meters and reactive power meters request

GB/T 22264.4 Installed electrical measuring instruments with digital display Part 4:

Special requirements for frequency meters

GB/T 22264.5 Installed electrical measuring instruments with digital display Part 5:

Characteristics of phase meters and power factor meters

Special requirements

GB/T 22264.7 Installed electrical measuring instruments with display - Part 7: Definitions and general requirements

GB/T 22264.8 Installed electrical measuring instruments with digital display Part 8: Recommended test methods

GB14287.2-2014 Electrical fire monitoring system Part 2: Residual current electrical fire monitoring detector

GB14287.3-2014 Electrical monitoring system Part 3: Thermometric electrical fire monitoring detector

## 1.2 Product Overview

The power security monitoring instrument is designed to meet the requirements for intelligent power monitoring and energy metering in power systems, industrial and mining enterprises, public facilities, and smart buildings. It is capable of high-precision measurement of all common electrical parameters in a three-phase power grid, including three-phase voltage, three-phase current, active power, reactive power, apparent power, frequency, power factor, four-quadrant energy, UI PQ demand, time-of-use metering, as well as digital input monitoring. It is equipped with communication interfaces, digital output control, energy pulse output, residual current detection, and cable temperature monitoring functions.

The power security monitor has a very high performance-price ratio and can directly replace the measurement instructions. Instruments, energy metering instruments and related auxiliary units. As an advanced intelligent, Digital power grid front-end acquisition components have been widely used in various control systems and SGADA systems and energy management systems, substation automation, distribution network automation, community power monitoring. In industrial automation, smart buildings, smart switchboards, and switch cabinets, it has the characteristics of easy installation, Simple wiring, easy maintenance, small engineering workload, on-site programmable setting of input parameters, and complete. It can form a network for different PLC and industrial control computer communication software in the industry.

## 2. Function introduction (See Table 1)

Table 1

| Meaurement function                                                                                                                                                            |                                                                                                                                            | Remarks            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Real-time measurement                                                                                                                                                          | Three phase voltage                                                                                                                        | Basic functions    |
|                                                                                                                                                                                | Three phase current                                                                                                                        |                    |
|                                                                                                                                                                                | Power,frequency, power factor                                                                                                              |                    |
| Energy metering                                                                                                                                                                | Bidirectional active energy                                                                                                                |                    |
|                                                                                                                                                                                | Bidirectional reactive energy                                                                                                              |                    |
|                                                                                                                                                                                | Bidirectional metering                                                                                                                     |                    |
| Harmonic                                                                                                                                                                       | 2-31 times                                                                                                                                 | Extended functions |
| Energy pulse                                                                                                                                                                   | Passive dry contact                                                                                                                        |                    |
| Residual current measurement                                                                                                                                                   | 0~2A                                                                                                                                       |                    |
| Temperature measurement                                                                                                                                                        | 0~140°C                                                                                                                                    |                    |
| Switching input                                                                                                                                                                | Passive dry contact                                                                                                                        |                    |
| switching output                                                                                                                                                               | Passive dry contact<br>AC250V3A Remote control/alarm                                                                                       |                    |
| COMMUNICATION                                                                                                                                                                  | Standard configuration:<br>RS485 interface, Modbus-RTU protocol;Optional configuration:<br>4G, standard WIFI,Tuya WiFi, Ethernet, Profibus |                    |
| Display                                                                                                                                                                        |                                                                                                                                            | LCD display        |
| <b>Note: When measuring temperature with the temperature sensor, do not allow any part other than the metal lug to come into direct contact with high-temperature objects.</b> |                                                                                                                                            |                    |

### 3. Technical parameters (see Table 2)

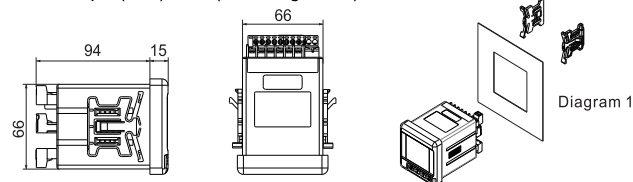
Table 2

| Item              |                                                                                                                                                                                                                                                                | Parameter                                    |                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------|
| Signal input      | Wiring                                                                                                                                                                                                                                                         | Three-phase three-wire/Three-phase four-wire |                                              |
|                   | voltage                                                                                                                                                                                                                                                        | range                                        | AC(5~450V)                                   |
|                   |                                                                                                                                                                                                                                                                | overload                                     | Continuous: 1.2 times Instantaneous: 2 times |
|                   |                                                                                                                                                                                                                                                                | Power consumption                            | <1VA                                         |
|                   | current                                                                                                                                                                                                                                                        | range                                        | AC(20mA~5A)                                  |
|                   |                                                                                                                                                                                                                                                                | Overload                                     | Continuous: 1.2 times Instantaneous: 2 times |
|                   |                                                                                                                                                                                                                                                                | Power consumption                            | <1VA                                         |
|                   | Frequency                                                                                                                                                                                                                                                      | 45~65Hz                                      |                                              |
| power supply      | AC/DC85~265V      <5VA                                                                                                                                                                                                                                         |                                              |                                              |
| Energy pulse      | passive optocoupler collector output fixed pulse width 80mS±20%                                                                                                                                                                                                |                                              |                                              |
| Communication     | RS485 communication interface, physical layer isolation<br>Modbus-RTU, Modbus-TCP protocols that comply with international standards<br>Communication speed 1200~38400 (factory default 9600)<br>Check mode: no check (N81), odd check (O81), even check (E81) |                                              |                                              |
| Switching output  | Programmable remote control/alarm switch, passive dry contact output<br>Capacity 3A/250VAC 3A/30VDC<br>Programmable alarm power/remote control mode                                                                                                            |                                              |                                              |
| Switching input   | remote-control switch input measurement, passive dry contact input<br>Programmable associated alarm output                                                                                                                                                     |                                              |                                              |
| Measurement class | Electrical parameters: 0.5; Frequency: ±0.2Hz<br>Active energy: 1.0<br>Reactive energy: 2.0                                                                                                                                                                    |                                              |                                              |
| Display mode      | LCD display                                                                                                                                                                                                                                                    |                                              |                                              |
| Environment       | Working temperature: -10℃~45℃ Storage temperature: -25℃~55℃<br>Relative humidity: <85%RH                                                                                                                                                                       |                                              |                                              |
| Safety            | Insulation: Signal, power supply, output terminal to shell resistance >5MΩ<br>Withstand voltage: signal input, power supply, output to shell >AC3KV                                                                                                            |                                              |                                              |

### 4. Installation and wiring

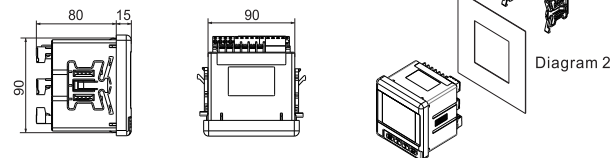
4.1 Frame size(mm): 72×72 Hole size(mm): 67×67

Cabinet depth(mm): 94 (see Diagram 1)



4.2 Frame size(mm): 96×96 Hole size(mm): 91×91

Cabinet depth(mm): 80 (see Diagram 2)



4.3 Wiring terminal function description(see Table 3)

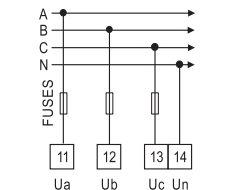
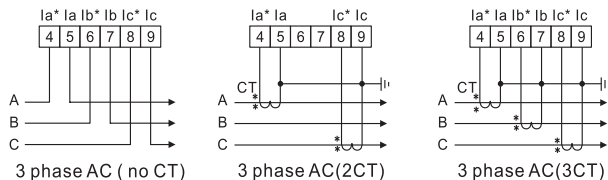
Table 3

|                        |                 |                                                                                                                 |
|------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------|
| power supply           | 1,2             | AC85~265V、DC100~300V <5VA                                                                                       |
| Current signal         | 4,5,6,<br>7,8,9 | 4, 6, and 8 are the three-phase<br>current incoming terminals                                                   |
| Voltage signal         | 11,12,13,14     | Respectively for three-phase<br>voltage input Ua、Ub、Uc、Un                                                       |
| Switching input        | 15-18           | 2-channel switching output                                                                                      |
| Switching output       | 70-74           | 4-channel switching input, 70 is common terminal                                                                |
| Energy pulse           | 47,48           | 47 is the positive terminal of the passive output<br>Connect the positive terminal of the external power supply |
| Temperature input      | 90-96           | 6-channel temperature inputs, 90 is the common terminal                                                         |
| Residual current input | 60,61           | L1+ and L1- (only for size 96*96)                                                                               |
| RS485                  | 58,59           | A、B                                                                                                             |

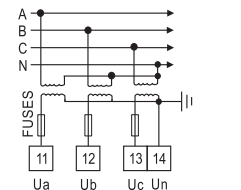
## Operating Instructions

- (a) Terminals 1 and 2 are the auxiliary power supply for meter operation. Ensure the supplied power is suitable for this series to avoid product damage.
- (b) Terminals 4, 6 and 8 are the incoming terminals for current transformers. The \* mark indicates the current incoming terminal.
- (c) Three-phase three-wire connection: In a three-phase three-wire system, Phase B current does not need to be connected. Connect  $U_b$  to Terminal 14. For detailed wiring, refer to Diagram 3.
- (d) Use a slotted screwdriver of the corresponding size with a torque no greater than 0.4 Nm.
- (e) Push the buckle fully into place during installation.

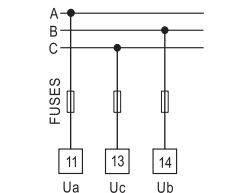
### 4.4 Wiring( See Diagram 3 and Diagram 4 )



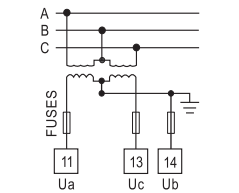
Low Voltage: Three-phase  
Four-wire AC (without PT)



High Voltage: Three-phase  
Four-wire AC (3PT)



Low Voltage: Three-phase  
Three-wire AC (without PT)



High Voltage: Three-phase  
Three-wire AC (2PT)

Diagram 3

## 72\*72 Terminal Diagram

| Active pulse |     | Current input signal |    |     |    |     |    |
|--------------|-----|----------------------|----|-----|----|-----|----|
| Ep+          | Ep- | Ia*                  | Ia | Ib* | Ib | Ic* | Ic |
| 47           | 48  | 4                    | 5  | 6   | 7  | 8   | 9  |

| Switching output |     | Temperature input |    |    |    |       |    |
|------------------|-----|-------------------|----|----|----|-------|----|
| DO1              | DO1 | T-COM             | T1 | T2 | T3 | T-COM | T4 |
| 15               | 16  | 90                | 91 | 92 | 93 | 90    | 94 |
|                  |     |                   |    |    |    |       | T5 |
|                  |     |                   |    |    |    |       | 95 |
|                  |     |                   |    |    |    |       | T6 |
|                  |     |                   |    |    |    |       | 96 |

| RS485 |    | Switching input |     | Voltage signal input |    |    |    | Power supply |   |
|-------|----|-----------------|-----|----------------------|----|----|----|--------------|---|
| B     | A  | DI2             | COM | DI1                  | Un | Uc | Ub | Ua           | N |
| 59    | 58 | 72              | 70  | 71                   | 14 | 13 | 12 | 11           | 2 |
|       |    |                 |     |                      |    |    |    |              | L |
|       |    |                 |     |                      |    |    |    |              | 1 |

## 96\*96 Terminal Diagram

| Voltage signal input |    |    |    | Current input signal |    |     |    |     |
|----------------------|----|----|----|----------------------|----|-----|----|-----|
| Ua                   | Ub | Uc | Un | Ia*                  | Ia | Ib* | Ib | Ic* |
| 11                   | 12 | 13 | 14 | 4                    | 5  | 6   | 7  | 8   |
|                      |    |    |    |                      |    |     |    | 9   |

| Residual current input |     |       |    | Temperature input |    |       |    |    |    |
|------------------------|-----|-------|----|-------------------|----|-------|----|----|----|
| L1+                    | L1- | T-COM | T1 | T2                | T3 | T-COM | T4 | T5 | T6 |
| 60                     | 61  | 90    | 91 | 92                | 93 | 90    | 94 | 95 | 96 |

| RS485 |    | Switching output |     |     |     | Switching input |     |     |     | Active pulse |     | Power supply |   |
|-------|----|------------------|-----|-----|-----|-----------------|-----|-----|-----|--------------|-----|--------------|---|
| B     | A  | DO2              | DO2 | DO1 | DO1 | DI4             | DI3 | DI2 | DI1 | COM          | Ep+ | Ep-          | N |
| 59    | 58 | 18               | 17  | 16  | 15  | 74              | 73  | 72  | 71  | 70           | 47  | 48           | 2 |
|       |    |                  |     |     |     |                 |     |     |     |              |     |              | L |
|       |    |                  |     |     |     |                 |     |     |     |              |     |              | 1 |

Diagram 4

## 5. Programming Operation

In programming mode, the digital display adopts a hierarchical menu structure. The meter provides three rows of digital display (see Diagram 6):

Row 1: Level 1 menu information

Row 2: Level 2 menu information

Row 3: Level 3 menu information

Example (as shown in Diagram 5):

Level 1: INPT Signal Input

Level 2: CT Current Ratio

Level 3: 5 represents the CT value, meaning the current specification is set to CT = 25/5A = 5

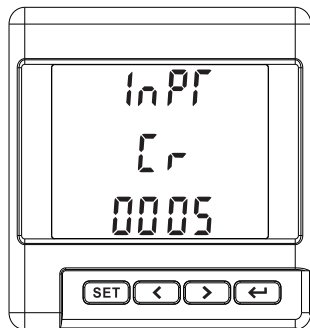


Diagram 5

The organizational structure of the digital display menu is as follows. Users may select appropriate setting parameters according to actual conditions

Table 4

| Level 1           | Level 2               | Level 3   | Description                                                                                |
|-------------------|-----------------------|-----------|--------------------------------------------------------------------------------------------|
| System set<br>SET | Display<br>DISP       | 0000~0083 | 0000 indicates automatic cycle display mode(contents of each screen are shown in Table 6). |
|                   | DISL                  | 0000~0120 | 0000~0120 refers to the LCD backlight hold time(0000 means the backlight is always on)     |
|                   | Energy reset<br>CLr.E | ****      | **** indicates clearing of electric energy;<br>other values are invalid                    |

|                                            |                                     |                                                      |                                                                                                                                                                                                                                            |
|--------------------------------------------|-------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal input<br>INPT                       | Wiring method<br>NET                | 0000 or other value                                  | 0000 means three-phase four-wire<br>Other values represent three-phase three-wire                                                                                                                                                          |
|                                            | voltage ratio<br>PT v               | 1~9999                                               | PT value = transformer<br>primary value/secondary value                                                                                                                                                                                    |
|                                            | current ratio<br>CT a               | 1~9999                                               | CT value = transformer<br>primary value/secondary value                                                                                                                                                                                    |
| Communication<br>set<br>CONi<br>(i is 1~2) | address SN                          | 1~247                                                | address range: 1~247                                                                                                                                                                                                                       |
|                                            | Communication<br>speed BAUD         | 0001~0006                                            | 0001 is 1200; 0002 is 2400;<br>0003 is 4800; 0004 is 9600;<br>0005 is 19200; 0006 is 38400                                                                                                                                                 |
|                                            | Data format<br>DATA                 | 0001~0003                                            | 0001: N,8,1 no check;<br>0002: O,8,1 odd parity;<br>0003: E,8,1 even parity;                                                                                                                                                               |
| witching input set<br>DO-i<br>(i is1~2)    | choose alarm item<br>or close alarm | set the specific<br>threshold value<br>of alarm item | Select the alarm item and set<br>the corresponding threshold<br>value, (when alarm item is a<br>switching value, no need to set<br>the threshold value),<br>once the alarm setting is met, the<br>Diagram 6<br>switch output is turned on. |
| Residual<br>current<br>setL-1              | Alarm value                         | 20~1000                                              | Default residual<br>current 600mA alarm                                                                                                                                                                                                    |
|                                            | Relay output                        | 0000~0002                                            | 0000 is the shutdown output;<br>0001 is the alarm output;<br>0002 is alarm trip output                                                                                                                                                     |
|                                            | Measurement<br>switch               | 0000~0001                                            | 0000 is to turn off measurement<br>0001 is to open measurement                                                                                                                                                                             |
| Temperature                                | Alarm value                         | +20~+150                                             | Default temperature<br>+50 degrees alarm                                                                                                                                                                                                   |
|                                            | Relay output                        | 0000~0002                                            | 0000 is the shutdown output;<br>0001 is the alarm output;<br>0002 is alarm trip output                                                                                                                                                     |
|                                            | Measurement<br>switch               | 0000~0001                                            | 0000 is to turn off measurement<br>0001 is to open measurement                                                                                                                                                                             |

Note: The above menu items are available when all functions are supported. If some menu items are missing or non-functional during use, it means the selected product does not support such functions.

## Programming setting step(See Diagram 6)

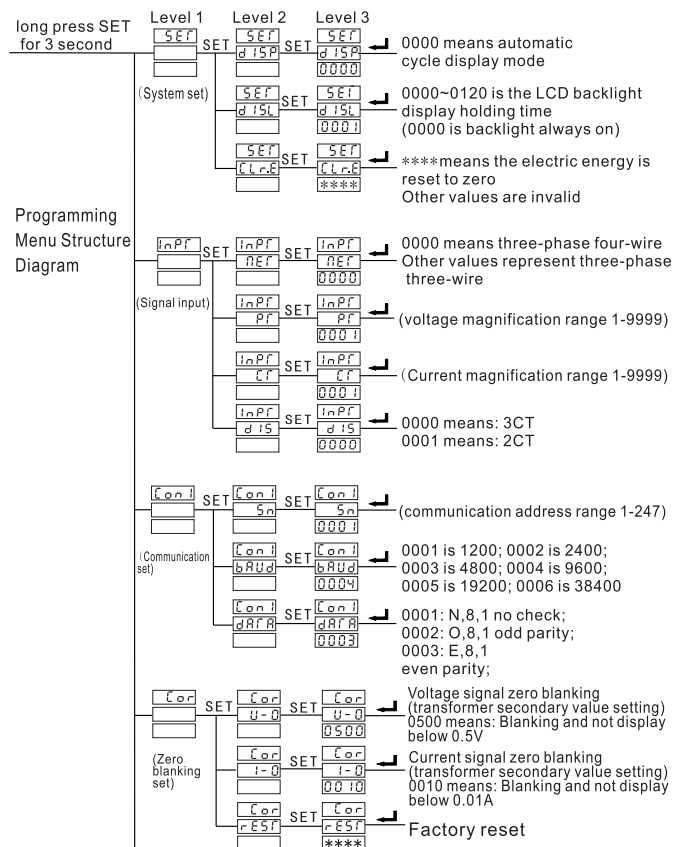
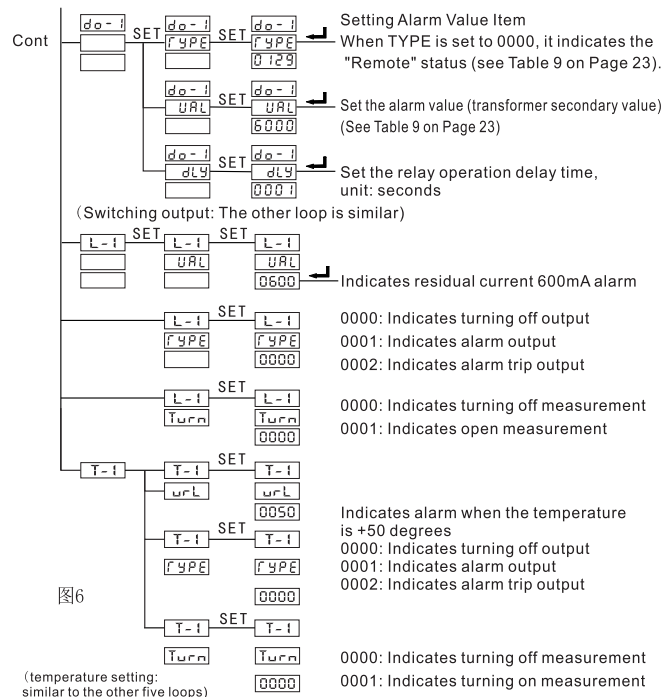


Diagram 6



**Note: For optional communication modes, specific programming and setup steps are described separately.**

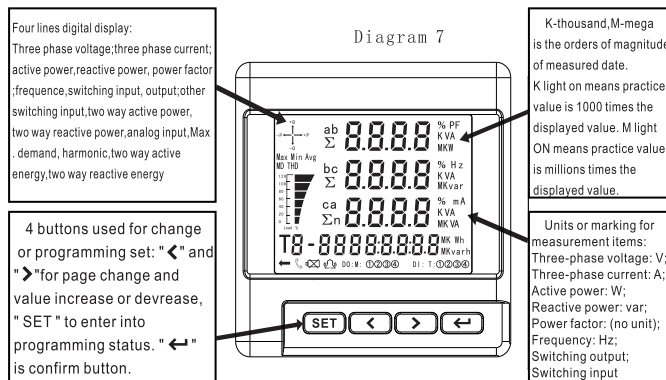
Operating Instructions:

- After changing the data (or options) in the 3rd level menu, press the "ENT" key to exit to the 2nd level menu for the changes to take effect.
- The wiring method can be modified according to the actual on-site wiring.
- Generally, the instrument type parameters and factory default settings are labeled on the label at the back of the instrument. Users can also reprogram the instrument according to actual needs.
- To change values: Use the keys "<" and ">" to increase or decrease, and use the "SET" key to shift the position.

## 6. Panel description and measurement information display

### (1) Panel description (See Diagram 7)

If there is no relative symbol display or the set data not working, It means the product without the relative function.

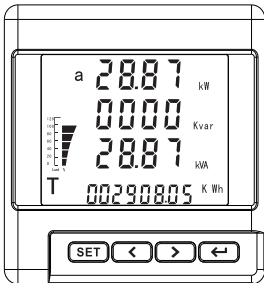
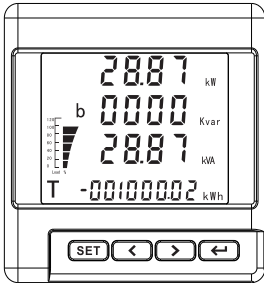
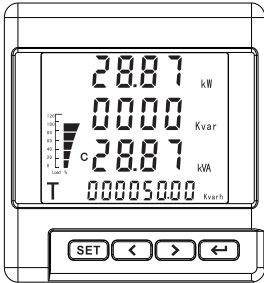


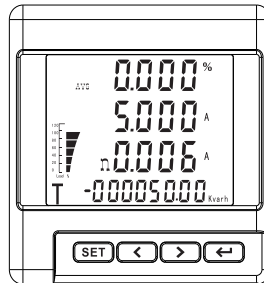
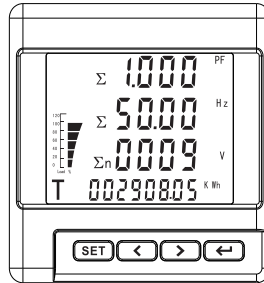
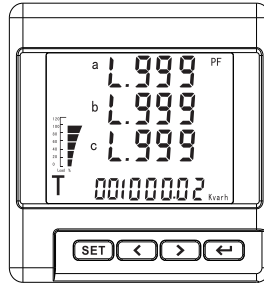
### (2) Page display contents (See Table 5)

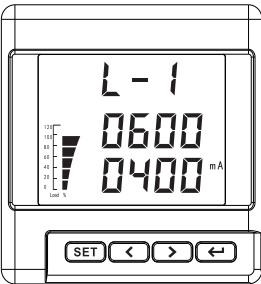
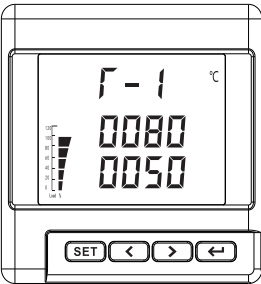
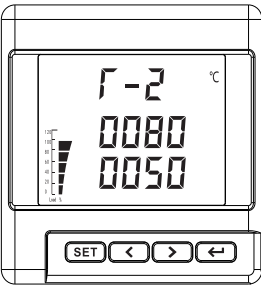
Table 5

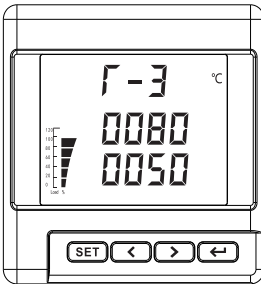
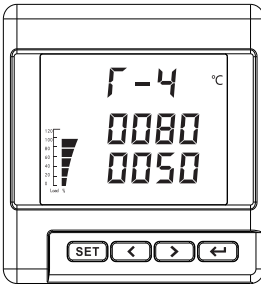
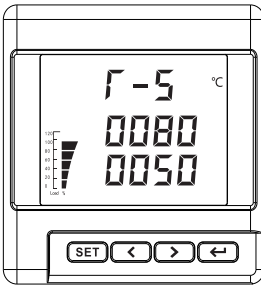
| Page                                                       | Contents | Description                                                                                                                                                                                                   |
|------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DISP=1<br>Three phase<br>voltage<br>total active<br>energy |          | Display voltages<br>Ua, Ub, Uc separately<br>(in three-phase four-wire system)<br>total active energy.<br><br>The left figure shows<br>Ua=5774V<br>Ub=5774V<br>Uc=5774V<br>Total active energy<br>=2908.05kWh |

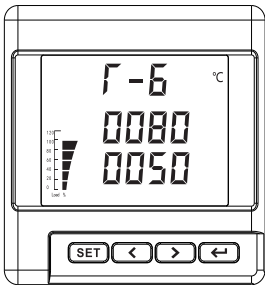
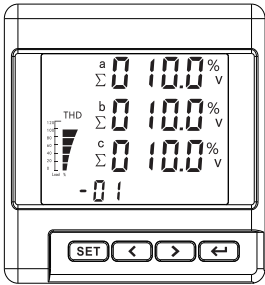
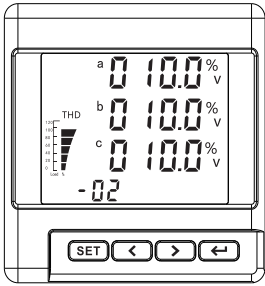
|                                                                                                                     |  |                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DISP=2<br>three phase<br>voltage<br>reverse active<br>energy                                                        |  | Display line voltages Uab,<br>Ubc, Uca separately.<br><br>The left figure shows<br>Uab=10kV<br>Ubc=10kV<br>Uca=10kV<br>reverse active energy<br>=1000.02kWh                  |
| DISP=3<br>3 phase<br>current<br>total active<br>energy                                                              |  | Display three phase current<br>Ia, Ib, Ic, unit: A<br><br>The left figure shows<br>Ia=5A<br>Ib=5A<br>Ic=5A<br>Total active energy<br>=50.00Kvarh                             |
| DISP=4<br>total active<br>power<br>total reactive<br>power<br>total apparent<br>power<br>reverse reactive<br>energy |  | The left figure shows<br>total active power<br>=86.60kW<br>total reactive power<br>=0000Kvar<br>total apparent power<br>=86.60kVA<br>reverse reactive energy<br>=100.08Kvarh |

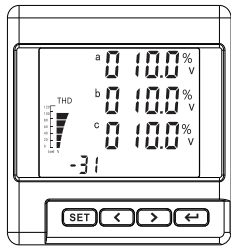
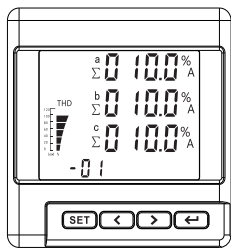
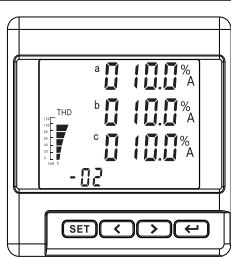
|                                                                                                                                           |                                                                                   |                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>DISP=5</p> <p>Phase A<br/>active power<br/>Phase A<br/>reactive power<br/>Phase A<br/>apparent power<br/>Total active<br/>energy</p>   |  | <p>The left figure shows<br/>Phase A active power<br/>=28.87kW<br/>Phase A reactive power<br/>=0000Kvar<br/>Phase A apparent power<br/>=28.87kVA<br/>Total active energy<br/>=2908.05kWh</p>   |
| <p>DISP=6</p> <p>Phase B<br/>active power<br/>Phase B<br/>reactive power<br/>Phase B<br/>apparent power<br/>Reverse active<br/>energy</p> |  | <p>The left figure shows<br/>Phase B active power<br/>=28.87kW<br/>Phase B reactive power<br/>=0000Kvar<br/>Phase B apparent power<br/>=28.87kVA<br/>Reverse active energy<br/>=1000.02kWh</p> |
| <p>DISP=7</p> <p>Phase C<br/>active power<br/>Phase C<br/>reactive power<br/>Phase C<br/>apparent power<br/>Total active<br/>energy</p>   |  | <p>The left figure shows<br/>Phase C active power<br/>=28.87kW<br/>Phase C reactive power<br/>=0000Kvar<br/>Phase C apparent power<br/>=28.87kVA<br/>Total active energy<br/>=50.00Kvarh</p>   |

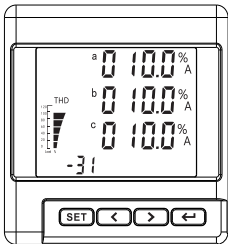
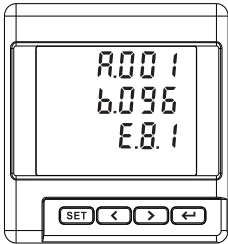
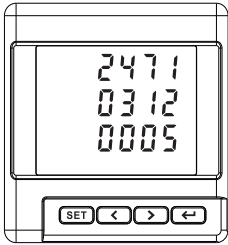
|                                                                                                                                      |                                                                                     |                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>DISP=8</p> <p>Average<br/>current<br/>Zero-sequence<br/>current<br/>Reverse<br/>reactive energy</p>                               |   | <p>The left figure shows Curr<br/>ent unbalance degree<br/>Average current=5A<br/>Zero-sequence current=0.006A<br/>Reverse reactive energy<br/>=50.00Kvarh</p>                       |
| <p>DISP=9</p> <p>Three-phase<br/>total power<br/>factor<br/>frequency,<br/>zero-sequence<br/>voltage<br/>total active<br/>energy</p> |   | <p>The left figure shows<br/>Three-phase total power<br/>factor =1.000<br/>Frequency =50Hz<br/>Zero-sequence voltage=9V<br/>Zero-sequence voltage<br/>=2908.05Kvarh</p>              |
| <p>DISP=10</p> <p>Phase power<br/>factor<br/>Total reactive<br/>energy</p>                                                           |  | <p>The left figure shows<br/>Phase A power factor<br/>=0.999<br/>Phase B power factor<br/>=0.999<br/>Phase C power factor<br/>=0.999<br/>Total reactive energy<br/>=1000.02Kvarh</p> |

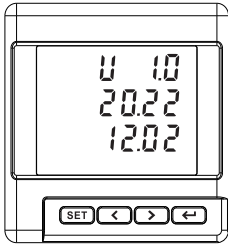
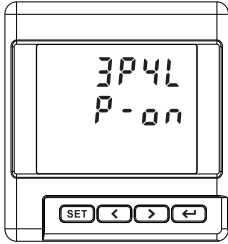
|                                                                                         |                                                                                   |                                                                                                                                               |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <p>DISP=11<br/>Residual<br/>current alarm<br/>value<br/>Residual<br/>current value</p>  |  | <p>The left figure shows<br/>Alarm value of residual<br/>current for Channel 1<br/>=600mA<br/>mA Current residual<br/>current value=400mA</p> |
| <p>DISP=12<br/>Channel 1<br/>temperature<br/>alarm value,<br/>temperature<br/>value</p> |  | <p>The left figure shows<br/>Channel 1 temperature<br/>alarm value =80℃<br/>Current temperature<br/>value =50℃</p>                            |
| <p>DISP=13<br/>Channel 2<br/>temperature<br/>alarm value,<br/>temperature<br/>value</p> |  | <p>The left figure shows<br/>Channel 2 temperature<br/>alarm value=80℃<br/>Current temperature<br/>value=50℃</p>                              |

|                                                                                         |                                                                                    |                                                                                                                    |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <p>DISP=14<br/>Channel 3<br/>temperature<br/>alarm value,<br/>temperature<br/>value</p> |  | <p>The left figure shows<br/>Channel 3 temperature<br/>alarm value =80℃<br/>Current temperature<br/>value =50℃</p> |
| <p>DISP=15<br/>Channel 4<br/>temperature<br/>alarm value,<br/>temperature<br/>value</p> |  | <p>The left figure shows<br/>Channel 4 temperature<br/>alarm value =80℃<br/>Current temperature<br/>value =50℃</p> |
| <p>DISP=16<br/>Channel 5<br/>temperature<br/>alarm value,<br/>temperature<br/>value</p> |  | <p>The left figure shows<br/>Channel 5 temperature<br/>alarm value =80℃<br/>Current temperature<br/>value =50℃</p> |

|                                                                             |                                                                                                                                                                                                                                                                                                    |                                                                                                 |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <p>DISP=17</p> <p>Third loop temperature alarm value, temperature value</p> |  <p>The display shows 'r-6' with a degree Celsius symbol, '0080', and '0050'. A bar graph on the left indicates the alarm level. Below the display are buttons labeled SET, &lt;, &gt;, and a return arrow.</p>   | <p>the left figure shows the sixth loop Temperature alarm value=80℃ Current temperature=50℃</p> |
| <p>DISP=18</p> <p>Total voltage harmonic</p>                                |  <p>The display shows 'a' and 'Σ' followed by '0 100 % v' for three phases. A bar graph on the left indicates the THD level. Below the display are buttons labeled SET, &lt;, &gt;, and a return arrow.</p>       | <p>the left figure shows a、b、c phase voltage the left figure shows Total harmonic=10%</p>       |
| <p>DISP=19</p> <p>2nd total voltage harmonic</p>                            |  <p>The display shows 'a', 'b', and 'c' followed by '0 100 % v' for three phases. A bar graph on the left indicates the THD level. Below the display are buttons labeled SET, &lt;, &gt;, and a return arrow.</p> | <p>the left figure shows a、b、c phase voltage 2nd total harmonic=10%</p>                         |

|                                              |                                                                                                                                                                                                                                                                                                      |                                                                        |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Omitted to                                   | Omitted to                                                                                                                                                                                                                                                                                           | Omitted to                                                             |
| <p>DISP=48</p> <p>31st voltage harmonic</p>  |  <p>The display shows 'a', 'b', and 'c' followed by '0 100 % v' for three phases. A bar graph on the left indicates the THD level. Below the display are buttons labeled SET, &lt;, &gt;, and a return arrow.</p> | <p>the left figure shows a、b、c phase voltage 31st harmonic=10%</p>     |
| <p>DISP=49</p> <p>total current harmonic</p> |  <p>The display shows 'a', 'b', and 'c' followed by '0 100 % A' for three phases. A bar graph on the left indicates the THD level. Below the display are buttons labeled SET, &lt;, &gt;, and a return arrow.</p> | <p>the left figure shows a、b、c phase current total harmonic=10%</p>    |
| <p>DISP=50</p> <p>2nd current harmonic</p>   |  <p>The display shows 'a', 'b', and 'c' followed by '0 100 % A' for three phases. A bar graph on the left indicates the THD level. Below the display are buttons labeled SET, &lt;, &gt;, and a return arrow.</p> | <p>he left figure shows a、b、c phase current 2nd total harmonic=10%</p> |

|                                               |                                                                                   |                                                                                          |            |
|-----------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------|
|                                               | Omitted to                                                                        | Omitted to                                                                               | Omitted to |
| DISP=79<br>31st<br>current<br>harmonic        |  | the left figure shows<br>a、b、c phase current<br>31st total harmonic=10%                  |            |
| DISP=80<br>communication<br>information       |  | the left figure shows<br>communication address=1<br>baud rate=9600bps<br>data format=E81 |            |
| DISP=81<br>12-bit<br>communication<br>address |  | 12-bit unique address<br>used for gate<br>way communication                              |            |

|                                                     |                                                                                     |                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DISP=82<br>Software<br>version<br>information       |   | Software updates shall<br>be made without prior notice.                                                                                                                                                                                                                                                                                                |
| DISP=83<br>Meter wiring<br>type<br>Voltage<br>creep |  | Network Information:<br>3P4L stands for three-phase four-wire.<br>3P3L stands for three-phase three-wire.<br>Creep Information:<br>P-ON indicates current in the circuit.<br>P-OFF indicates no current in the circuit.<br>In the left figure:<br>Grid network = 3P4L (Three-phase four-wire)<br>Voltage creep = P-ON (Current present in the circuit) |

**Note: The communication mode is optional. Specific page display contents will be described separately.**

## 7. Function Output

### 7.1 Energy Metering & Pulse Output

This series of meters adopts one row of 8-digit digits to display primary electric energy.

VH-0 displays total active energy

VH-1 displays reverse active energy

VAH0 displays reverse reactive energy

VAH1 displays reverse reactive energy

The common pulse constant is 8000 imp/kWh.

### 7.2 Switching Input/Output (DI/DO)

This series provides 4-channel switching input and 2-channel switching output functions.

The 4-channel switching input adopts dry contact resistance switching signal input. The meter is equipped with an internal 12V working power supply, requiring no external power supply.

When externally connected, the DI module detects a closed state and displays 1.

When externally disconnected, the DI module detects an open state and displays 0.

The switching input module can not only collect and display local switching status, but also realize remote transmission via the meter's 2-channel relay switching output can be used for alarm indication, protection control and other output functions in various scenarios.

When the output is active, the switching output conducts and displays 1.  
When the output is disabled, the switching output turns off and displays 0.

## 7.2.1 Electrical Parameters

DI Input:

On resistance  $R < 5000\Omega$

Off resistance  $> 100k\Omega$

DO Output:

AC 250 V, 0.1 A

## 7.2.2 Registers (Communication Protocol)

DIO Status Register (Address 33):

This register indicates the status information of 4-channel digital inputs and 4-channel digital outputs (see Table 6).

Table 6

| DIO Register              | BIT15 | BIT14 | BIT13 | BIT12 | BIT11 | BIT10 | BIT9  | BIT8  | BIT7  | BIT6  | BIT5  | BIT4  | BIT3 | BIT2 | BIT1 | BIT0 |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Corresponding switch port | DI1   | DI2   | DI3   | DI4   | Spare | Spare | Spare | Spare | Spare | Spare | Spare | Spare | DO1  | DO2  | DO3  | DO4  |
| reset                     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    |

The lower 4 bits (BIT3, BIT2, BIT1, BIT0) of the DIO information register represent the status of the switch outputs. If the register value is 0000000000000101, it indicates that switch output channels 2 and 4 are ON, while channels 1 and 3 are OFF. The upper 12 bits (BIT15–BIT4) of the DIO information register represent the status of the switch inputs. If the register value is 1101000000000000, it indicates that input channels 1, 2, and 4 are ON, and other channels are OFF.

All DIO information can be displayed on the meter screen.

Each switch alarm output parameter uses 13 consecutive address spaces for storage.

For example, channel 1 uses 3 bytes at addresses 10, 11, and 12 (BYTE2, BYTE1, BYTE0).

The lowest-addressed byte (address 10) stores the parameters of the alarm output object.

For instance, the low alarm parameter for Ua is 1, and the high alarm parameter is 129;

0 indicates remote control mode.

The other two bytes (addresses 11 and 12) store the alarm over-limit parameters.

Refer to the list for the corresponding address spaces.

Table 7

| Item               | Variable | Meaning: DOSi (BYTE2、BYTE1、BYTE0)                                                                                                                                                                                                                                          |
|--------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Switching output 1 | DOS1     | BYTE2 (1~255): Alarm item. 1~26 correspond to the low alarms of the respective 26 measured electric quantities in the electric quantity address. 129~163 (greater than 28) correspond to the relevant high alarms. 0 indicates reserved mode.                              |
| Switching output 2 | DOS2     | For details, refer to the comparison table of switching output and remote control electric quantity parameters. BYTE1 0 (1~9999): Alarm limit parameter. The data format is the same as that of electric quantity information. Pay attention to the decimal point meaning. |

## 7.2.3 Application Examples: A. Switch Input Function:

The switch module features two digital input channels. Upon receiving an input signal, the instrument shows either "On 1" or "Off 0", enabling local monitoring of switch signals. When the instrument is switched to the switch information display mode, the indicator light on "DI" illuminates. Via the instrument's RS485 digital interface, the contents of the switch status register (D10) can be transmitted to a remote computer terminal.

## B. Switch Output Function:

Remote Control Function: By writing control data to the D10 register via a host computer, the on/off status of the four digital output ports can be controlled; writing a '1' corresponds to the port being on, whilst writing a '0' corresponds to the port being off. For example, writing the binary number 1 011 0000 indicates that output ports 1, 3 and 4 are on, whilst port 3 is off. This function cannot be used simultaneously with the switch output module's other out-of-limit alarm output function. To use the remote control function, the power parameter must be set to 0, i.e. the alarm output function must be disabled; in the instrument's digital output function settings, the parameter in the second row is 0. When in remote control mode, the LCD displays DO1, DO2, DO3 and DO4, indicating that channels 4, 1 and 3 are active, whilst channel 2 is deactivated. Another function of the switch output module is the out-of-range alarm output. Set the range of electrical parameters. When the measured electrical parameter exceeds the set range, the corresponding switch output port is in the ON state, and a '1' is displayed at the corresponding position on the panel; when the signal returns to within the parameter range, the display changes to '0'. D01 (3 bytes) inside the instrument is the switch setting register; alarm settings can be configured by writing parameters via the instrument's communication interface; alternatively, the alarm object and alarm value can be set directly using the panel keys.

## 7.2.4 Programming Example (See Table 8)

For a meter with 10kV/100V and 400A/5A specifications, set D01 for  $U > 11.0kV$  alarm, D02 for  $I_a > 400A$  alarm, and D03 for  $F > 51.0Hz$  alarm. The control word shall be written as:

Table 8

| Category        | Alarm condition | Control word (high byte first) |               |       |
|-----------------|-----------------|--------------------------------|---------------|-------|
|                 |                 | BYTE2                          | BYTE1         | BYTE0 |
| Switch Output 1 | $U_a > 11.0kV$  | $128+1=129$                    | 1100 (04H4CH) |       |
| Switch Output 2 | $I_a > 400A$    | $128+7=135$                    | 4000 (13H88H) |       |
| Switch Output 3 | $PF < 0.900$    | 21                             | 900 (03H84H)  |       |
| Switch Output 4 | $F < 51.0Hz$    | $128+26=154$                   | 5100 (13HECH) |       |

The switch value setting parameter DOSi can also be programmed and set via the panel keypad. During programming operations, the parameter values in the DOSi menu items correspond to the relevant DOSi parameters (see Table 9). See Figure 6 for alarm settings: DO-1 0000~0120 refers to the LCD backlight hold time (0000 means the backlight is always on). indicates the configured item is Switch Output Module 1; 9 0129 indicates the selected alarm electrical quantity item is m Ua over-limit alarm; 0 6000 is the alarm threshold value. When  $U_a > 6000$  ( $U_a > 600V$ ), 1 D01 outputs an alarm signal, i.e., the relay turns ON.

Table 9

| item                        | Switching output item TYPE          |                                      |
|-----------------------------|-------------------------------------|--------------------------------------|
|                             | Corresponding Parameter (Low Alarm) | Corresponding Parameter (High Alarm) |
| Ua (A phase voltage)        | 1                                   | 129                                  |
| Ub (B phase voltage)        | 2                                   | 130                                  |
| Uc (C phase voltage)        | 3                                   | 131                                  |
| Uab (AB line voltage)       | 4                                   | 132                                  |
| Ubc (BC line voltage)       | 5                                   | 133                                  |
| Uca (CA line voltage)       | 6                                   | 134                                  |
| Ia(A phase current)         | 7                                   | 135                                  |
| Ib(B phase current)         | 8                                   | 136                                  |
| Ic (C phase current)        | 9                                   | 137                                  |
| Pa (A phase active power)   | 10                                  | 138                                  |
| Pb(B phase active power)    | 11                                  | 139                                  |
| Pc(C phase active power)    | 12                                  | 140                                  |
| Ps(Total active power)      | 13                                  | 141                                  |
| Qa (Aphase reactive power)  | 14                                  | 142                                  |
| Qb (Bphase reactive power)  | 15                                  | 143                                  |
| Qc(Cphase reactive power)   | 16                                  | 144                                  |
| Qs(Total reactive power)    | 17                                  | 145                                  |
| PFa(Aphase power factor)    | 18                                  | 146                                  |
| PFb(Bphase power factor)    | 19                                  | 147                                  |
| PFc(Cphase power factor)    | 20                                  | 148                                  |
| PFs(toal power factor)      | 21                                  | 149                                  |
| Sa(A phase Apparent Power)  | 22                                  | 150                                  |
| Sb(B phase Apparent Power)  | 23                                  | 151                                  |
| Sc(Cphase Apparent Power)   | 24                                  | 152                                  |
| Ss(toal Apparent Power)     | 25                                  | 153                                  |
| F(frequency)                | 26                                  | 154                                  |
| Any Phase Voltage Low Alarm | 38                                  |                                      |
| Any line Voltage Low Alarm  | 39                                  |                                      |
| Any Phase Current Low Alarm | 40                                  |                                      |
| Any Phase Voltage Low Alarm | 41                                  |                                      |
| Any Line Current Low Alarm  | 42                                  |                                      |
| Any Line voltage Low Alarm  | 43                                  |                                      |

| Item                          | Switching output item TYPE          |                                     |
|-------------------------------|-------------------------------------|-------------------------------------|
|                               | Corresponding Parameter (Low Alarm) | Corresponding Parameter(High Alarm) |
| Voltage Unbalance             |                                     | 155                                 |
| Current Unbalance             |                                     | 156                                 |
| Interlock (Close)             |                                     | 157                                 |
| Interlock (Open)              |                                     | 158                                 |
| Residual Current              |                                     | 163                                 |
| Any Phase Voltage High Alarm  |                                     | 166                                 |
| Any Line Voltage High Alarm   |                                     | 167                                 |
| Any Phase Current High Alarm  |                                     | 168                                 |
| All Phase Voltage High Alarm  |                                     | 169                                 |
| All Line Voltage High Alarm   |                                     | 170                                 |
| All Phase Current High Alarm  |                                     | 171                                 |
| Temperature / Leakage Current |                                     | 191                                 |
| Always On                     |                                     | 254                                 |
| Always Closed                 |                                     | 255                                 |

When DO-2 in the alarm menu is set to 191:

1. When the TYPE of the leakage or temperature alarm switch is set to 1, the DO2 relay outputs independently when the leakage or temperature reaches the set alarm value.
2. When the TYPE of the leakage or temperature alarm switch is set to 2, relays DO1 and Do2 output simultaneously when the leakage or temperature reaches the set alarm value.
3. When the leakage or temperature drops below the set alarm value, the relay output will not reset automatically; manual pressing of the 4th keypad button "←" is required to reset the relays.

Factory default settings for switching outputs: Switching output values are calculated based on the secondary side of the instrument transformers.

- Channel 1 (Phase A Current): TYPE = 135, UAL = 5000; 5000 corresponds to 5A secondary current.

Channel 2 (Phase B Current): TYPE = 136, UAL = 5000; 5000 corresponds to 5A secondary current.

Channel 3 (Phase C Current): TYPE = 137, UAL = 5000; 5000 corresponds to 5A secondary current.

Channel 4 (Phase A Voltage): TYPE = 129, UAL = 3800; 3800 corresponds to 380.0V secondary voltage.

Total Active Power: TYPE = 141, UAL = 3300; 3300 corresponds to 3300W secondary power.

Total Power Factor: TYPE = 149, UAL = 1000; 1000 corresponds to 1.000 secondary power factor.

Frequency: TYPE = 154, UAL = 5000; 5000 corresponds to 50.00Hz secondary frequency.

Note: When TYPE is set to 0000, it indicates "remote control" mode.

## 8. Common Problems and Solutions

### 8.1 Communication Issues

#### ●Meter does not return data

Solution: First verify that the meter communication settings (slave address, baud rate, parity mode, etc.) match the requirements of the host computer. If multiple meters on-site return no data, check whether the communication bus connection is correct and reliable, and whether the RS485 converter functions normally. If only one or a few meters have abnormal communication, inspect the corresponding communication cables. You may swap the slave addresses of the faulty and normal meters for testing to rule out or confirm host computer software issues, or swap their installation positions to rule out or confirm meter hardware faults.

#### ●Meter returns inaccurate data

Solution: This series of digital display multifunctional network power meters provides customers with two types of open communication data: a primary grid float-type data and a secondary grid int/long-type data. Please carefully read the instructions on data storage addresses and formats in the communication address table, and ensure data conversion follows the corresponding format.

### 8.2 Inaccurate Measurements of Voltage (U), Current (I), Power (P), etc.

Solution: First confirm that correct voltage and current signals are connected to the meter. Use a multimeter to measure voltage signals and a clamp meter to measure current signals if necessary. Next, check that signal wiring is correct, including the polarity terminals (inlet terminals) of current signals and the phase sequence of each phase. Note that the meter displays primary grid values; mismatched voltage/current transformer ratios set in the meter versus those used on-site will also cause inaccurate readings.

### 8.3 Inaccurate Energy Accumulation

Solution: The meter's energy accumulation is based on power measurement. First check whether the meter's power value matches the actual load. This multifunctional series supports bidirectional energy metering. If wiring is incorrect and total active power is negative, energy will accumulate into reverse active energy instead of forward active energy. The most common on-site issue is reversed inlet/outlet wiring of current transformers. This series displays signed per-phase active power; negative power indicates possible wiring errors. Incorrect phase sequence also causes abnormal energy accumulation.

### 8.4 Meter Display Not Lighting Up

Solution: Ensure a proper auxiliary power supply (see the product specification label) is connected to the meter's auxiliary power terminals. Auxiliary voltage outside the specified range may damage the meter irreversibly. Use a multimeter to measure the auxiliary power voltage. If the voltage is normal but the meter shows no response, power off and restart the meter. If the display still fails, contact our Technical Service Department.

### 8.5 Meter does not respond to any operation

Solution: If the meter does not react when pressing the keypad buttons "SET", "←", "→", "↵", try powering off and restarting the meter. If the meter still cannot return to normal operation, please contact our Technical Service Department.

### 8.6 Other abnormal conditions

Solution: Please contact our Technical Service Department in a timely manner. The user shall describe the on-site conditions in detail, and our technical personnel will analyze possible causes based on the on-site feedback. If the problem cannot be resolved through communication, our company will arrange technical personnel to handle the problem on-site as soon as possible.

## 9. Transportation and Storage

9.1 The product shall not be subjected to severe impact during transportation and unpacking. It shall be transported and stored in accordance with GB/T 25440-2010 "Basic environmental conditions and test methods for transportation and storage of instruments and apparatus", and placed as required on the packaging box.

9.2 Keep the product in its original packaging. The storage ambient temperature shall be -25 °C to +55 °C, the average relative humidity shall not exceed 85%, the storage environment shall be free of corrosive gas, and moisture protection shall be ensured.

9.3 When stored in a warehouse, the product shall be placed on shelves. The stacking height shall not exceed 6 cartons. After unpacking, the stacking height of individually packaged products shall not exceed 10 units.

9.4 If the shell shows obvious damage due to severe impact or high-altitude drop during handling, access or installation, do not power on the meter and contact the supplier as soon as possible.

## 10. Company Commitment

Within 18 months from the product ex-factory date, under the conditions of proper storage, transportation, maintenance and use by the customer and with the company's seal intact and unbroken, if the product fails to operate normally due to manufacturing defects, we will provide "Three Guarantees" service.