# KPM83MD Motor Protection & Monitoring Deivice

## User Manual

HENAN COMPERE SMART TECHNOLOGY CO., LTD.

## Application

Suitable for protection and monitoring of power system equipment below 35KV.

## Hardware

- Back plugging and unplugging module, separated the High and Low voltage; the reinforced unit chassis is designed to resist strong vibration and interference. It can be decentralized mounted in the switch cabinet for running
- 32-bit microcomputer processor, large-capacity RAM and Flash Memor y, strong ability of data processing, logic operation and information storage, fast running speed and high reliability
- 16-bit high-precision A/D, high measurement accuracy
- Running and event reports can be saved no less than 32 recent events
- Graphic LCD, menu operation

## Main Features

- Multi-tasking operating system, modular programming; good real-time performance and high reliability.
- Standard communication protocol for easy communication with PC monitoring or gateway.
- Complete circuit breaker operation loop, setting the remote control function of the circuit breaker.
- Protection and measurement and control integration, single device interval complete main function.

**Our company reser ves the right to modify this manual; if the product does not conform to the manual, please refer to the actual product description.**

2021.4

# Contents

# 1 Summary

## 1.1 Scope of application

KPM83MD is applicable to the protection, measurement and control of asynchronous motors of ungrounded system, resistance grounding system and direct grounding system with voltage below 10kV, as well as 2000kW and above asynchronous motors with differential protection. It can be installed on the panel or locally in the switchgear.。

## 1.2 Protection characteristics

- Humanized design interface: large screen LCD display, real-time display of current, voltage, power, frequency and other electrical quantities, Chinese operation menu is simple and easy to use, clearly display the whole process of protection action, and make the action process transparent.
- Superior sampling performance: the protection circuit and measurement circuit have independent sampling circuit, which not only ensures the monitoring accuracy, but also ensures the anti saturation performance of the protection.
- Independent outlet: all outlet relays use a channel separately to facilitate the input and exit of protection. Remote control opening and closing, protection tripping, accident signal, warning signal and other special signal outlets can be configured separately.
- Strong self-protection function: each circuit breaker corresponds to an operation circuit, and the switch can be operated directly in case of emergency; In addition, the device has the circuit breaker tripping and closing coil protection function to avoid burning the circuit breaker coil due to mechanical refusal.
- Strong substitutability: the protection device has powerful function and "four remote" function, which can completely replace the protection of conventional relay. The fully embedded digital platform structure greatly reduces the amount of maintenance.
- Flexible design: according to the site conditions, it can be designed into centralized panel type or dispersed in the switchgear.
- Reliable operation: perfect self-test system, hardware detection and relay tripping outlet all adopt reliable element.

## 1.3 Protection configuration

### 1.3.1 Protection function configuration

- Differential quick break （trip）
- Ratio differential （trip）
- Differential current out of limit alarm
- CT disconnection （alarm，CT disconnection locking ratio differential）
- Quick break （trip）
- Time limited quick break （trip）
- Overcurrent （trip，with low voltage locking）
- Overcurrent inverse time limit （trip average / extraordinary / extreme / retreat）
- Overload （alarm / trip）

- Locked rotor protection （trip）
- Negative sequence section I （trip）
- Negative sequence section II （alarm /trip optional）
- Inverse time limit of negative sequence section II （trip，general / extraordinary / extreme optional）
- Zero sequence overcurrent （alarm /trip optional）
- Overheat protection alarm （alarm）
- Overheat protection trip （trip）
- Over frequency protection （trip）
- Under frequency unloading protection （trip）
- Overvoltage protection （trip）
- Under voltage protection （trip）
- PT disconnection （alarm）
- PT voltage loss （alarm）
- Non electric quantity protection （temperature rise, over temperature, electrical accident）
- System power loss （trip）
- Control loop disconnection （alarm）

**1.3.2 Measurement and control function**

- Measuring voltage：Uab、Ubc、Uca、Ua、Ub、Uc；
- Measuring current：Ia、Ib、Ic；
- Power：P、Q、COS；
- Frequency：f；
- Electric energy：EP+、EP-、EQ+、EQ-；
- With 14 channels of remote signal input acquisition；
- 10 relay outlets (including 1 alarm / trip respectively), which can be expanded by 3; Power loss signal of 1-way device；
- Event SOE record；

**1.3.3 Communication function**

- Communication interface：

  1-way Ethernet port

  1-way 485 port

  1 channel B code timing port (also used as the second channel 485 communication port)

- Communication protocol：103 communication protocol, Modbus RTU protocol。

#### 1.3.4 GPS timing function

Support IRIG-B timing.

#### 1.3.5 Protection information function

- Remote viewing of device description.
- Remote viewing of equipment parameter settings.
- Remote viewing and modification of protection setting value and area code.
- Remote viewing, remote control and local on-off functions of soft pressing plate status.
- Remote viewing of device protection input status.
- Remote viewing of device operation status (including the status of protection action elements, self inspection alarm information, etc.).
- Remote device signal reset.

# 2 Technical parameter

## 2.1 Environmental parameters

- Normal operating temperature： -10 ～ 55 ℃
- Limit operating temperature： -20 ～ 60 ℃
- Storage and transportation： -30 ～ 70 ℃
- Atmospheric pressure： 60 ～ 110 Kpa

## 2.2 Rated electrical parameters

- Frequency： 50Hz
- AC current： 5A or 1A（rated current: In）
- AC voltage： 100V or 57.7V（rated voltage: Un）
- AC / DC working power ：AC：AC85V~265V；50Hz±0.5Hz；Harmonic distortion rate not greater than 15%

  DC：DC85V~265V，Ripple coefficient not greater than 5%
- Digital system operating voltage： +5V， Allowable deviation： ±0.15V
- Operating voltage of relay circuit：+24V， Allowable deviation： ±2V
- Power waste：

  AC voltage circuit： Un = 57.7V，Each phase is not greater than 0.5VA

  AC current circuit： In = 5A，Each phase is not greater than 1VA

  In = 1A，Each phase is not greater than 0.5VA

  In = 0.3A，Each phase is not greater than 0.5VA

  DC power circuit： During normal operation，not greater than 15W

  During protection action，not greater than 25W
- Overload capacity of protection circuit：

AC voltage circuit： 1.2 times rated voltage, continuous operation

AC current circuit： 2 times rated current, continuous operation

10 times rated power supply, 10s allowed

40 times rated power supply, 1s allowed

DC power circuit： 80 ～ 115% rated voltage，continuous operation

After the device is subjected to the above overload current / voltage, the insulation performance will not decline.

## 2.3 Main technical indicators

- Setting accuracy

  Current setting error： ≤±5%

  Frequency setting error： ≤±0.01Hz

  When the excitation amount is ≥ 1.2 times the fixed value, the action time of the instantaneous action section： ≤35ms

  Discrete error of action time in delayed action section： ≤30ms

  Return time of each protection section： ≤25ms

- Remote measurement metering level

  current、voltage： Class 0.2

  frequency： ±0.01Hz

  other： Class 0.5

- Remote signaling quantity

  Remote signaling resolution： less than 1ms

  working voltage： DC220V/DC24V；***（DC220V shall be indicated when ordering, and the default is DC24V）***

  Input mode：Active contact or passive contact；***（The default is passive contact）***

- Relay output

  Output mode：Passive contact；

  Impact overcurrent capacity：6A@3s；15A@0.5s；30A@0.2s ；

  Action time：<8ms；

  Return time：<5ms；

- Electromagnetic compatibility

  Electrostatic discharge： comply with GB / t14598.14-1998 Level 3

  Radiated electromagnetic field interference：comply with GB/T14598.9-2002 Level 3

  Fast transient interference： comply with GB/T14598.10-2007 Level B

  1MHz burst interference： comply with GB/T14598.13-2008 Level 3

  Surge immunity： comply with GB/T14598.18-2001 Level 3

- Insulation test

The insulation, withstand voltage, damp heat resistance, vibration resistance, impact resistance and collision resistance of the device shall comply with relevant international standards of GB / t7261-2000 (insulation ≥ 20m Ω).

# 3 Protection menu description

## 3.1 Protection on / off menu

| Number | Code | Protection Name | Setting Type | Explain of Protection Name |
|---|---|---|---|---|
| 01 | RLP01 | Differential quick break | ON /OFF | |
| 02 | RLP02 | Ratio differential | ON /OFF | |
| 03 | RLP03 | Differential current out of limit alarm | ON /OFF | |
| 04 | RLP04 | CT disconnection | ON /OFF | |
| 05 | RLP05 | CT disconnection locking differential | ON /OFF | Blocking ratio differential |
| 06 | RLP06 | Quick break | ON /OFF | |
| 07 | RLP07 | Time limited quick break | ON /OFF | Open this function after the motor is started. |
| 08 | RLP08 | Overcurrent | ON /OFF | Open this function after the motor is started. |
| 09 | RLP09 | Low voltage blocking overcurrent | ON /OFF | |
| 10 | RLP10 | Overcurrent inverse time | General/Very / Extreme/ Exit | Open this function after the motor is started. |
| 11 | RLP11 | Overload | Alarm/Trip /Exit | Open this function after the motor is started. |
| 12 | RLP12 | Blocking protection | ON /OFF | Open this function after the motor is started. |
| 13 | RLP13 | Negative sequence overcurrent protection I | ON /OFF | |
| 14 | RLP14 | Negative sequence overcurrent protection II | ON /OFF | |
| 15 | RLP15 | Inverse time limit of negative sequence section II | General/Very / Extreme/ Exit | |
| 16 | RLP16 | Zero sequence overcurrent | Alarm/Trip /Exit | |
| 17 | RLP17 | Overheat Alarm | ON /OFF | |
| 18 | RLP18 | Overheat Trip | ON /OFF | |
| 19 | RLP19 | Over frequency | ON /OFF | |
| 20 | RLP20 | Under frequency unloading | ON /OFF | |
| 21 | RLP21 | Over Voltage | ON /OFF | |

| | | | | |
|---|---|---|---|---|
| 22 | RLP22 | Under Voltage | Alarm/Trip /Exit | |
| 23 | RLP23 | PT disconnection | ON /OFF | |
| 24 | RLP24 | PT voltage loss | ON /OFF | |
| 25 | RLP25 | Temperature rise | ON /OFF | |
| 26 | RLP26 | The temperature is too high | ON /OFF | |
| 27 | RLP27 | Electrical accident | Alarm/Trip /Exit | |
| 28 | RLP28 | System power loss protection | Alarm/Trip /Exit | |
| 29 | RLP29 | Control loop disconnection | ON /OFF | |

**Change Password：1000**

## 3.2 Protection setting menu

| Number | Code | Setting Value name | Range of Value | Setting Value Description |
|---|---|---|---|---|
| 00 | | Number of fixed value sets | 1~3 | 1 |
| 01 | Kv1 | PT Ratio/10 | 0.01~300.00 | PT transformation ratio / 10, input voltage level value (unit: kV) |
| 02 | Ki1 | CT Ratio/10 | 0.01~300.00 | CT transformation ratio / 10, If the CT transformation ratio is 200 / 5, it is set to 4 |
| 03 | Kijd | Terminal CT transformation ratio | 0.01~300 | The default value is 1. According to the actual transformation ratio setting, if the CT transformation ratio at the machine end and tail is inconsistent, it needs to be converted when calculating the difference flow. |
| 04 | Kijw | Tail CT transformation ratio | 0.01~300 | |
| 05 | Icddz | Differential speed determination value | 0.01~100A | |
| 06 | Icdqd | Differential current starting value | 0.1~100 A | Starting current threshold |
| 07 | Igd | Inflection point value | 0.1~100A | |

| | | | | |
|---|---|---|---|---|
| 08 | Kb1 | Ratio differential braking coefficient | 0.1~0.9 | General setting: 0.5 |
| 09 | Ictdx | CT disconnection value | 0.1~100A | |
| 10 | Tctdx | CT disconnection delay | 0~100s | |
| 11 | Tqd | Motor start time | 0~300s | |
| 12 | Ie | Rated current of motor | 0.1~10A | |
| 13 | Idz0 | Quick break value | 0.1~100A | |
| 14 | Idz1 | Time limited quick break value | 0.1~100A | |
| 15 | Tzd1 | Time limited quick break delay | 0~100s | |
| 16 | Idz2 | Overcurrent value | 0.1~100A | |
| 17 | Tzd2 | Overcurrent delay | 0~100s | |
| 18 | Ubsqd | Low voltage blocking overcurrent value | 1~400V | |
| 19 | Idz3 | Overload value | 0.1~100A | |
| 20 | Tzd3 | Overload delay | 0~100s | |
| 21 | Idz4 | Locked rotor current value | 0.1~100A | |
| 22 | Tzd4 | Locked rotor current delay | 0~100s | |
| 23 | I2dz1 | Negative sequence overcurrent I value | 0.1~100A | |
| 24 | T2zd1 | Negative sequence overcurrent I delay | 0~100s | |

| | | | | |
|---|---|---|---|---|
| 25 | I2dz2 | Negative sequence overcurrent II value | 0.1~100A | |
| 26 | T2zd2 | Negative sequence overcurrent II delay | 0~100s | |
| 27 | I0dz1 | zero sequence current value | 0.01~100A | |
| 28 | T0zd1 | zero sequence current delay | 0~100s | |
| 29 | K2 | Negative sequence current heating coefficient | 2~10 | |
| 30 | Heat | Heating time constant | 0~100 | |
| 31 | Cool | Heat dissipation time constant | 1~5 | |
| 32 | GRBJ | Overheat alarm level | 0.3~1 | |
| 33 | Fdz1 | Frequency too high value | 35Hz~64.99Hz | |
| 34 | Tfzd1 | Frequency too high delay | 0~100s | |
| 35 | Fdz2 | Low frequency load shedding value | 35Hz~64.99Hz | |
| 36 | Tfzd2 | Low frequency load shedding delay | 0~100s | |
| 37 | Udz1 | Overvoltage value | 50~600V | |
| 38 | Tuzd1 | Overvoltage delay | 0~100s | |
| 39 | Udz2 | Low voltage value | 30~400V | |
| 40 | Tuzd2 | Low voltage delay | 0~100s | |
| 41 | Upt1 | PT disconnection value | 10~400V | |

| | | | | |
|---|---|---|---|---|
| 42 | Tupt1 | PT disconnection delay | 0~100s | |
| 43 | Upt2 | PT voltage loss value | 0.1~160V | High voltage system：0.1~90V |
| 44 | Tupt2 | PT voltage loss delay | 0~100s | |
| 45 | Tkzdx | Control loop disconnection delay | 0~100s | |

**Change Password：1000**

# 4 Protection Principle

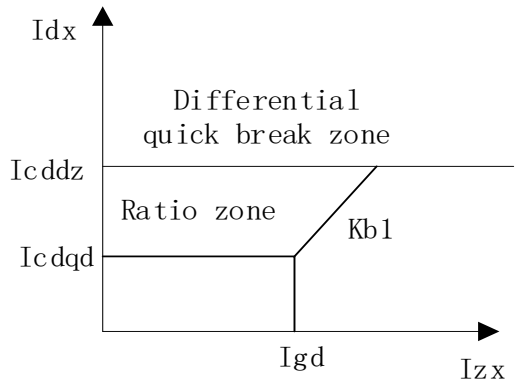
If the CT of the end side and tail side of the motor are inconsistent, we also need to normalize the current before calculating the differential current. When processing, refer to the high side current as the reference, and the low side current is converted as follows: (take phase A as an example)

ia2’=ia2*Kijw/Kijd

Where ia2 is the secondary value of tail current directly collected by the protection device, and ia2 ’is the actual current value after tail current normalization;

Kijd and kijw are the CT transformation ratios set at the machine end and tail side respectively; If the CT transformation ratio on both sides is the same, kijw / kijd = 1.

**Note: whether the protection current is taken from the machine end or the tail can be set in the last bit of system Set1 in the factory setting (see the device instructions for setting). It is taken from the machine end by default when leaving the factory.**




## 4.1 Judgment of motor startup and shutdown

**1. Motor starting conditions**

When one of the three-phase protection currents is greater than 0.2 times the rated current ie of the

motor, the device starts timing and displays "motor start....." on the device. When the timing time is greater than the motor start time TQD, set the start completion flag, display the "m" icon in the upper right corner of the LCD, and open the time limit quick break, overcurrent, overcurrent inverse time limit, overload and locked rotor protection.

**2. The judgment condition for motor shutdown is**

①The opening of the circuit breaker is R1 = 0 and R2 = 1.

②The three-phase protection current is less than 0.1*Ie

As long as any of the above conditions is met, the device judges that the motor state is shutdown, and the "m" icon displayed on the LCD disappears.

## 4.2 Differential quick break

1．RLP01 Differential quick break－“ON”;

2．Any phase of differential current（Ida、Idb、Idc）≧ Differential quick break value（Icddz）;

Ida=|ia1+ia2*Kijw/Kijd|， Idb=|ib1+ib2*Kijw/Kijd|， Idc=|ic1+ic2*Kijw/Kijd| — Vector calculation

If the above conditions are met, the protection immediately exports 3j (C7 / C8), 4J (C9 / C10), 5J (C11 / C12), and drives the accident signal relay 11j (C1 / C3) (the relay does not return until manual reset), and the panel accident light is on. The return value of differential quick break is 9 / 10 of the determined value of differential quick break. The logic block diagram of action is shown in 4-1:

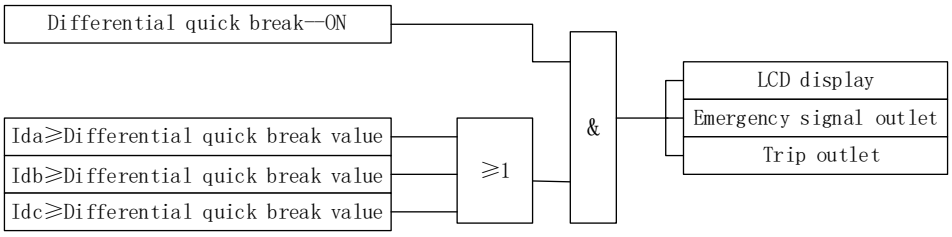



Figure 4-1: action logic diagram of differential quick break protection

## 4.3 Ratio differential

1．RLP02 Ratio differential－“ON”;

2．The action criterion is：

When the braking current Izx is less than the inflection point current Igd, Idx>Icdqd；

When the braking current Izx is greater than or equal to the inflection point current Igd, Idx-Icdqd>(Izx-Igd)*Kb1；

Among them：x=a，b，c

Ida=|ia1+ia2*Kijw/Kijd|， Idb=|ib1+ib2*Kijw/Kijd|， Idc=|ic1+ic2*Kijw/Kijd| — Vector calculation

Iza=|ia1-ia2*Kijw/Kijd|/2， Izb=|ib1-ib2*Kijw/Kijd|/2， Izc=|ic1-ic2*Kijw/Kijd|/2——Vector calculation

Kb1 is the ratio braking coefficient；

Idx is the differential current of phase a or phase B or phase C；

Izx is the braking current of phase a or phase B or phase C；

3．If RLP05 CT disconnection locking ratio differential is input, it is required that CT has no instantaneous disconnection；

4．Differential quick break does not act；

If the above conditions are met, the protection immediately exports 3j (C7 / C8), 4J (C9 /

C10), 5J (C11 / C12), and drives the accident signal relay 11j (C1 / C3) (the relay does not return until manual reset), and the panel accident light is on. Return condition of ratio differential: differential current < 9 / 10 of the starting setting value of differential current. The logic block diagram of the action is shown in 4-2:

**Instantaneous CT disconnection judgment conditions：**

If one of the following three conditions is met, the instantaneous CT disconnection judgment will not be carried out:

1．The maximum phase current before startup is less than 0.2Ie

2．The maximum phase after startup is greater than 1.2Ie

3．The current on either side after startup is higher than that before startup

If the following two conditions are met at the same time, it is judged as instantaneous disconnection：

1．One phase or two-phase current is less than 0.3A

2．The current of other two phases or one phase is consistent with that before startup

**CT disconnection locking differential：**

1．RLP05　CT disconnection locking differential－“ON”;

2．Simultaneous input　“Ratio differential”;

After the above conditions are met, the ratio differential protection will be locked in case of instantaneous CT disconnection.

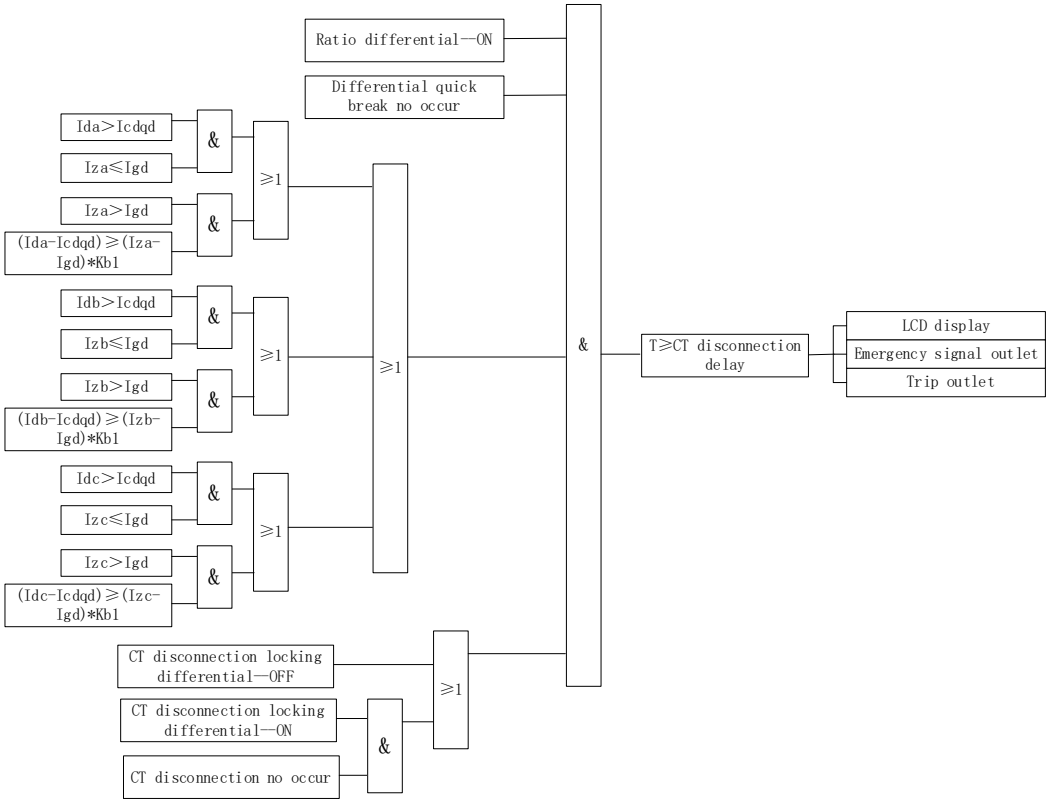



Figure 4-2：Operation logic diagram of ratio differential protection

## 4.4 Differential current over-limit alarm

1．RLP03　Differential current over-limit alarm－“ON”;

2．Differential current Idx > Icdqd/2　(x=a，b，c);

3．Differential quick break, the ratio differential does not act;

4．Duration of meeting the above conditions ≧ 10S；

When the above conditions are met, the device reports an over-limit alarm of the error current, and drives the alarm signal relay 12J (C2/C3) (the relay does not return until manual reset), and the panel alarm light is on. The logic block diagram of the action is shown in 4-3：

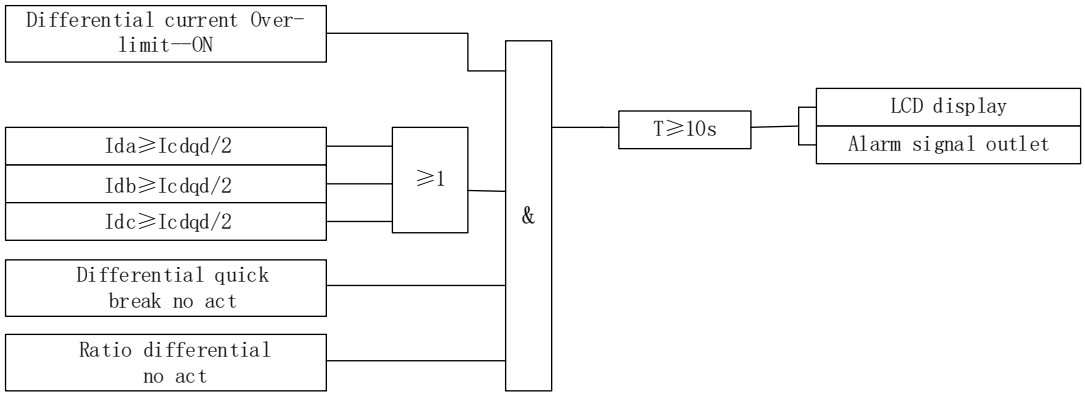



Figure 4-3: Action logic diagram of differential current over-limit protection

## 4.5 CT disconnection

1．RLP04　CT disconnection－“ON”;

2．Terminal current（ia1、ib1、ic1）maximum phase current >CT disconnection value（Ictdx），Simultaneous minimum phase current <0.2A；Or tail current（ia2、ib2、ic2）maximum phase current >CT disconnection value（Ictdx），Simultaneous minimum phase current <0.2A；

3．The current does not increase after starting and the maximum current <6A；

4．Duration of meeting the above conditions ≧ CT disconnection delay（Tctdx）;

When the above conditions are met, the device reports a CT disconnection alarm, and drives the alarm signal relay 12J (C2/C3) (the relay does not return until manual reset), and the panel alarm light is on. The logical block diagram of the action is shown in 4-4:

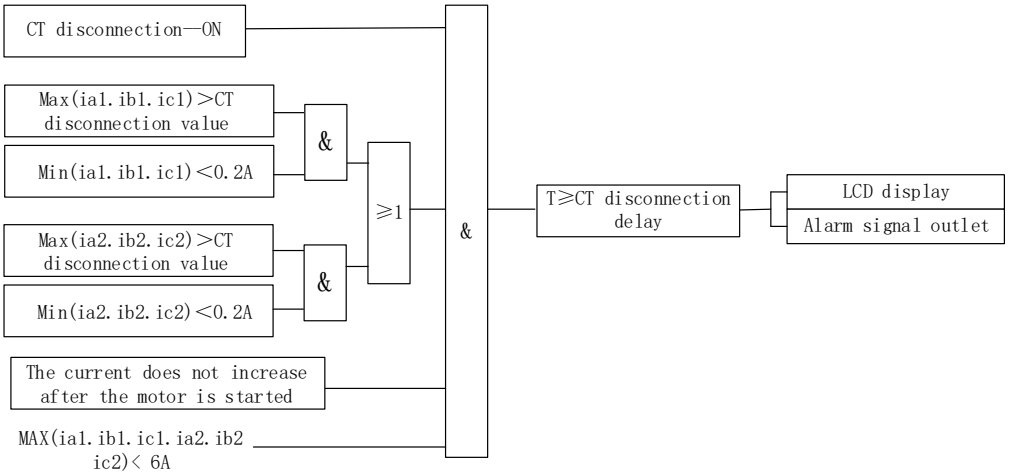



Figure 4-4: CT disconnection protection action logic diagram

Note: It can be judged that a CT disconnection occurs during 2CT.

## 4.6 Quick break

1．RLP06　Quick break－“ON”;

2．Protection current ia、ib、ic any phase ≧ Quick break value（Idz0）;

Meet the above conditions, the protection immediately exports 3J (C7/C8), 4J (C9/C10), 5J

(C11/C12), and drives the accident signal relay 11J (C1/C3) at the same time (the relay will not return until manual reset), LCD The alarm information is displayed, and the panel accident light is on. The logical block diagram of the action is shown in 4-5:

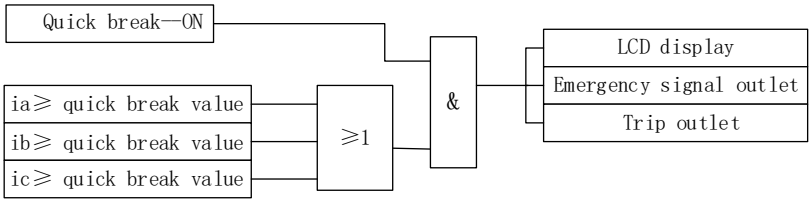



Figure 4-5: Logic diagram of quick-break protection action

## 4.7 Time-limited quick break

1．RLP07　Time-limited quick break－“ON”;

2．Protection current ia、ib、ic any phase ≧ Time-limited quick break value（Idz1）;

3．The motor has been started;

4．Duration of meeting the above conditions ≧ Time-limited quick break value（Tzd1）;

Meet the above conditions, the protection immediately exports 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drives the accident signal relay 11J (C1/C3) at the same time (the relay will not return until manual reset), LCD The alarm information is displayed, and the panel accident light is on. The logical block diagram of the action is shown in 4-6:

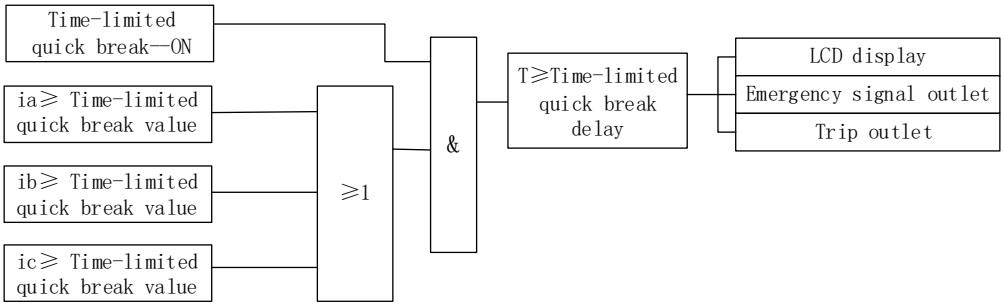



Figure 4-6: Action logic diagram of time-limited quick-break protection

## 4.8 Overcurrent

1．RLP08　Overcurrent－“ON”;

2．Protection current ia、ib、ic any phase ≧ Overcurrent value（Idz2）;

3．The motor has been started;

4．Duration of meeting the above conditions ≧ Overcurrent value（Tzd2）;

Meet the above conditions, the protection immediately exports 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drives the accident signal relay 11J (C1/C3) at the same time (the relay will not return until manual reset), LCD The alarm information is displayed, and the panel accident light is on. The logical block diagram of the action is shown in 4-7:

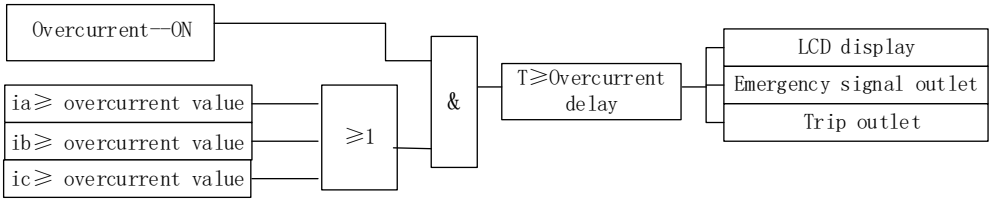



Figure 4-7: Logic diagram of over-current protection action

## 4.9 Overcurrent inverse time limit

The device provides three inverse time characteristics (according to the IEC225-4 standard)：

1）General inverse time limit：

$$t = \frac{0.14}{(I/Ip)^{0.02}-1} Tp$$

2）Very inverse time limit：

$$t = \frac{13.5}{(I/Ip)-1} Tp$$

3）Extreme inverse time limit：

$$t = \frac{80}{(I/Ip)^{2}-1} Tp$$

In the above formula, Ip is the current inverse time limit current value, and tp is the current inverse time limit time value.

**Note: The overcurrent inverse time protection uses the overcurrent protection setting and the overcurrent delay. When the overcurrent inverse time protection and the overcurrent are turned on at the same time, the inverse time protection is invalid.**

The action logic block diagram is shown in Figure 4-8：

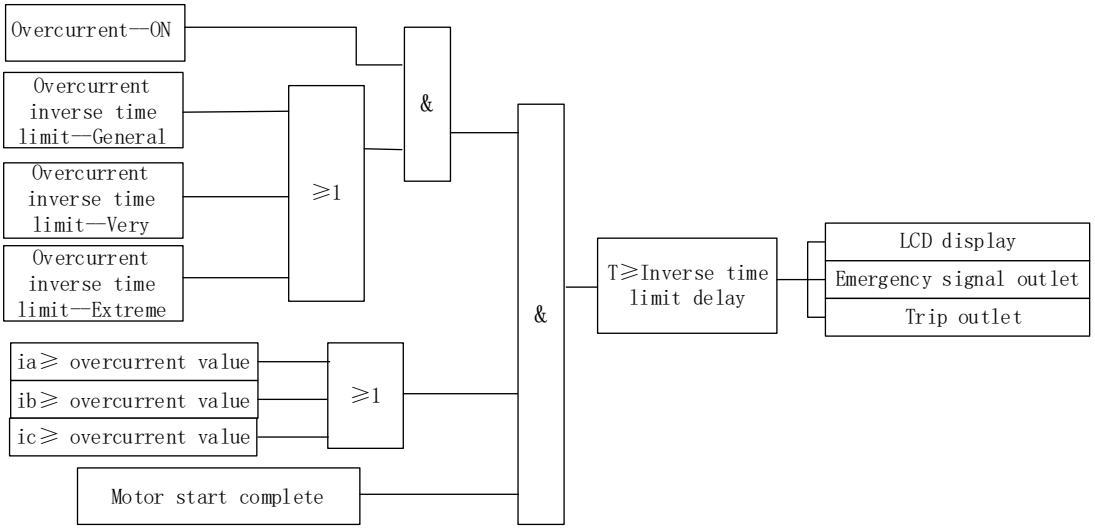



Figure 4-8: Over-current inverse time action logic diagram

## 4.10 Low voltage blocking over current protection

Low-voltage components take the voltage components in the following table as the criterion. If one of the two line voltages is lower than the fixed value, the current protection will be opened; the use of low-voltage components can ensure that the device is in non-fault conditions such as reverse charging of the motor There is no malfunction under the condition of 90° low-voltage component voltage and the corresponding relationship between phases as shown in 4-9:

| Phase voltage | Line voltage |
|---|---|
| Phase A | Uab、Uca |
| Phase B | Ubc、Uab |
| Phase C | Uca、Ubc |

**Explain：**

**If you cast "PT disconnection", when the PT disconnection occurs, the low voltage does not block the current protection.**

**If “PT loss of voltage” is selected, when PT loss of voltage occurs, the low voltage does not block the current protection.**

Taking the over-current A phase criterion as an example, the logic diagram of the protection is drawn as shown in 4-10：

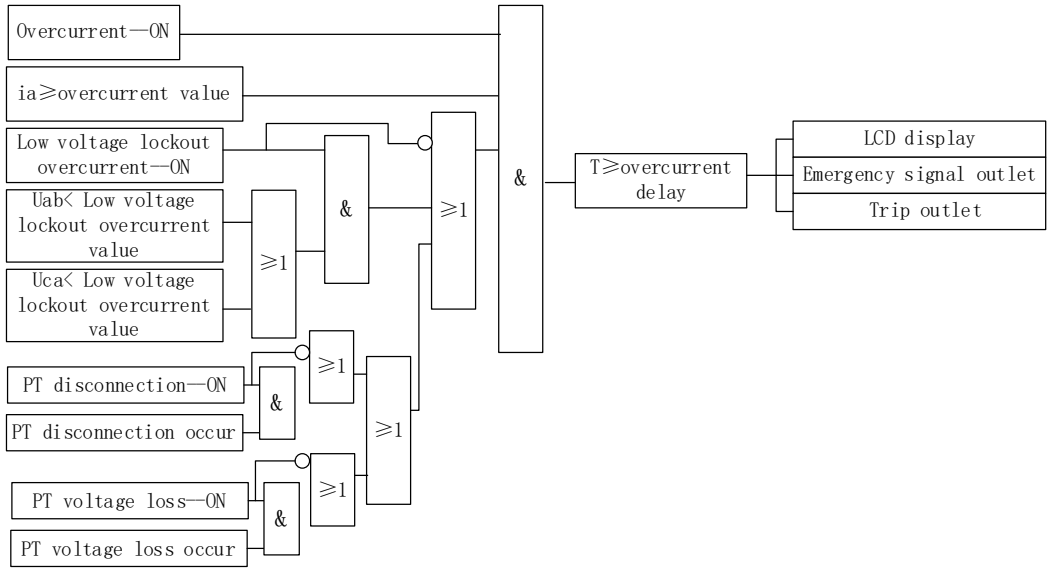



Figure 4-10: Logic diagram of phase A of low voltage blocking overcurrent

## 4.11 Overload

1．RLP11　Overload－“alarm/trip”；

2．Protection current ia、ib、ic any phase ≧ Overload value（Idz4）；

3．The motor has been started；

4．Duration of meeting the above conditions ≧ Overload delay（Tzd4）；

If the above conditions are met, if the "trip" protection is turned on, immediately export 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drive the accident signal relay 11J (C1/C3) at the same time (until manual reset, the relay Only return), the liquid crystal displays the action information, the panel accident light is on; if the "alarm" protection is turned on, the alarm signal relay 12J (C2/C3) is driven (until the manual reset, the relay does not return), the liquid crystal display reports the action information, and the panel warning light is on . The logical block diagram of the action is shown in 4-11:

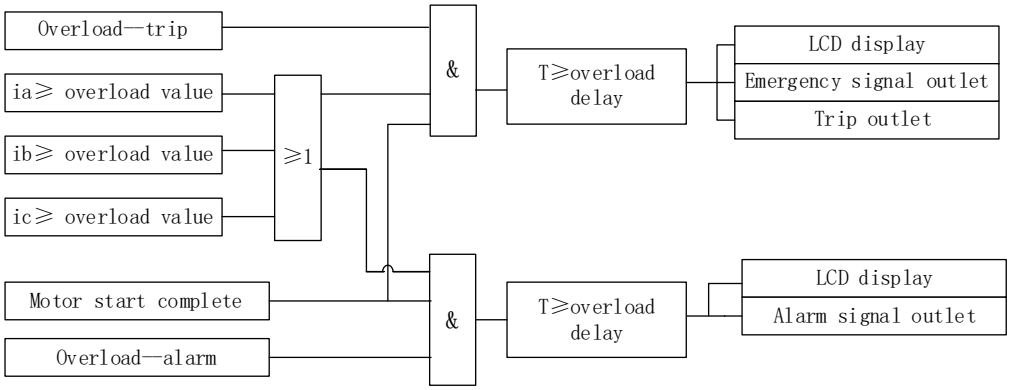



Figure 4-11: Logic diagram of overload protection action

## 4.12 Locked-rotor protection

1．RLP12　Locked-rotor protection－“ON”;

2．Positive sequence current i1 ≧ Locked-rotor protection value（Idz4）;

3．Motor start completed;

4．Duration of meeting the above conditions ≧ Locked-rotor protection delay（Tzd4）;

If the above conditions are met, the protection immediately exports 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drives the accident signal relay 11J (C1/C3) (until manual reset, the relay will not return), the panel The accident light is on. The logical block diagram of the action is shown in 4-12:

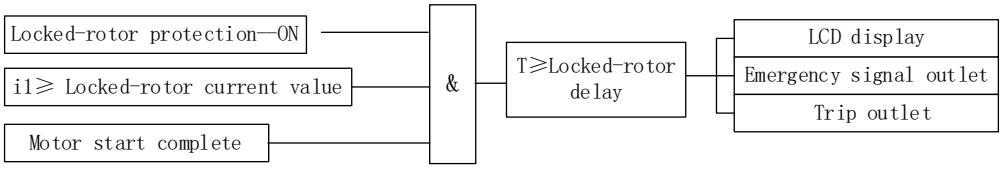



Figure 4-12: Blocked-rotor protection action logic diagram

## 4.13 Negative sequence overcurrent section I

1．RLP13　Negative sequence overcurrent section I－“ON”;

2．Negative sequence current i2≧ Negative sequence overcurrent section I value（I2dz1）;

3．Duration of meeting the above conditions ≧Negative sequence overcurrent section I delay（T2zd1）

If the above conditions are met, the protection immediately exports 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drives the accident signal relay 11J (C1/C3) (until manual reset, the relay will not return), the panel The accident light is on. The logical block diagram of the action is shown in 4-13:

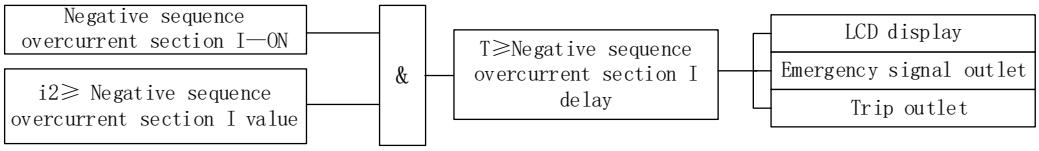



Figure 4-13: Logic diagram of negative sequence overcurrent section I protection action

## 4.14 Negative sequence overcurrent section II

1．RLP14　Negative sequence overcurrent section III－“alarm/trip”;

2．Negative sequence current i2 ≧ Negative sequence overcurrent section II value（I2dz2）;

3．Duration of meeting the above conditions ≧Negative sequence overcurrent section II delay（T2zd2）;

If the above conditions are met, if the "trip" protection is turned on, immediately export 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drive the accident signal relay 11J (C1/C3) at the same time (until manual reset, the relay Only return), the panel accident light is on; if the "alarm" protection is turned on, the alarm signal relay 12J (C2/C3) is driven (the relay does not return until manual reset), and the panel warning light is on. The logical block diagram of the action is shown in 4-14:

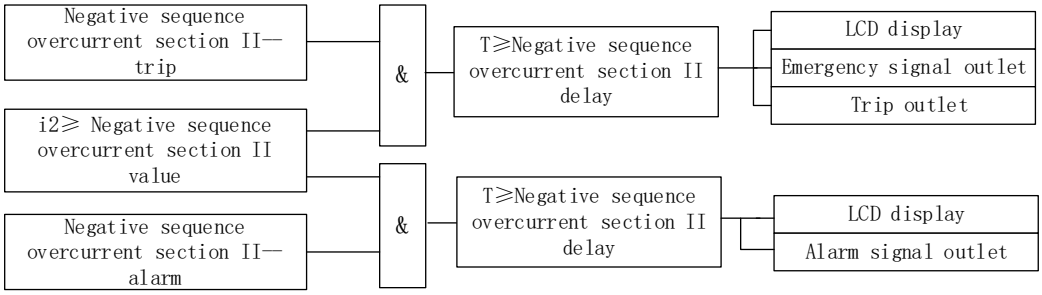



Figure 4-13: Logic diagram of negative sequence overcurrent section II protection action

## 4.15 Negative sequence overcurrent section II inverse time limit

1．Three kinds of inverse time limits are provided, which are consistent with the current inverse time limit calculation formula.

2．The setting value and delay of the negative sequence II stage inverse time limit and the negative sequence II stage overcurrent adopt the same set of set values.

## 4.16 Zero sequence overcurrent

1．RLP16　Zero sequence overcurrent－“alarm/trip”;

2．Zero sequence overcurrent i0 ≧ Zero sequence overcurrent value（I0dz4）;

3．Duration of meeting the above conditions ≧ Zero sequence overcurrent delay（T0zd4）;

If the above conditions are met, if the "trip" protection is turned on, immediately export 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drive the accident signal relay 11J (C1/C3) at the same time (until manual reset, the relay Only return), the liquid crystal displays the action information, the panel accident light is on; if the "alarm" protection is turned on, the alarm signal relay 12J (C2/C3) is driven (until the manual reset, the relay does not return), the liquid crystal display reports the action information, and the panel warning light is on . The logical block diagram of the action is shown in 4-15:

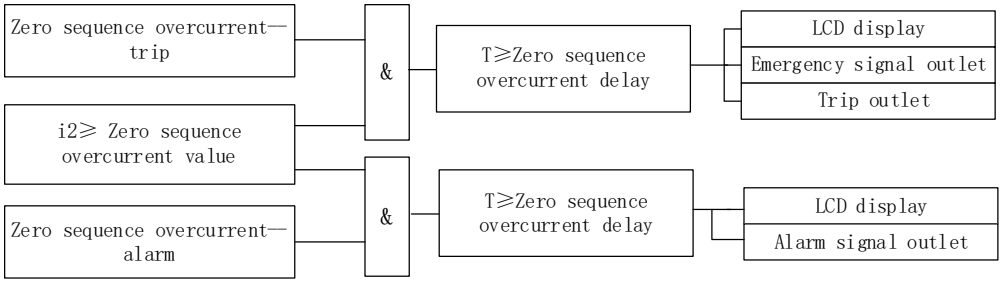



Figure 4-15: logic diagram of zero sequence overcurrent protection action

## 4.17 Overheat protection alarm/ trip

The following heating models are used to realize the overheating protection of the motor:

$T= t-c / ( K1*(I1/Ie)^2 + K2*(I2/Ie)^2 –(1.05)^2)$

t-c=Heat*60

Among them：Heat is the heating time constant, which needs to be set in the fixed value.

I1 is the positive sequence current component, I2 is the negative sequence current component

K1 = 0.5 when the motor is started, = 1.0 after a successful start

K2 is the heating coefficient of negative sequence current, which needs to be set in the fixed value

Ie is the rated current of the motor, which also needs to be set in the fixed value

Protection action criterion： $\sum\{t*( K1*(I1/Ie)^2 + K2*(I2/Ie)^2 –(1.05)^2)\}>$ Heat

The protection device discretizes the time t and accumulates heat every 2.5ms.

1．If the RLP17 overheating protection alarm is set to ON in the “Return” word, when the cumulative value ≥ Heat*GRBJ (overheat alarm level), the device will send an alarm signal, drive 12J (C2/C3), and the panel warning light will be on. The logical block diagram of the action is shown in 4-16:

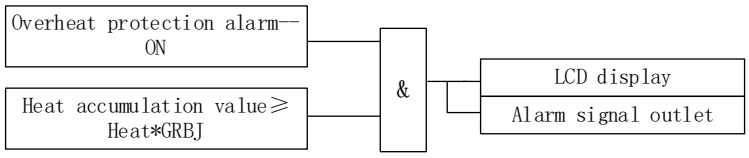



Figure 4-16: Logic diagram of overheating protection alarm action

2．If the RLP18 overheating protection trip is set in the throw-back word, when the cumulative value ≧ Heat, the device will trip, drive 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drive the accident signal 11J (C1/C3), the panel accident light is on. The logical block diagram of the action is shown in 4-17:

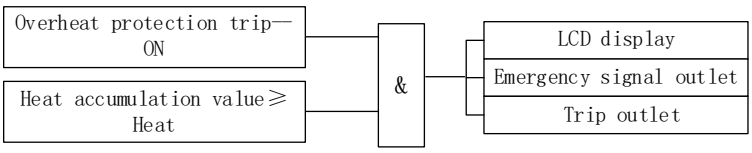



Figure 4-17: Logic diagram of overheating protection tripping action

3．After the trip or the motor stops, the device will decay heat according to the time set in the heat dissipation time constant.

**Note: When the binary input value R6=1, the heat accumulation value displayed on the LCD will be cleared. This binary input value is only used for debugging occasions.**

## 4.18 Over frequency protection

1．RLP19　Over frequency protection－“ON”;

2．Measuring frequency ≧ Over frequency value（Fdz1）;

3．Phase A voltage Ua>5V (high voltage system); Phase A voltage Ua>50V (low voltage system);

4．The circuit breaker is closed, that is R1=1;

5．35HZ≦f<65HZ;

6．Duration of meeting the above conditions ≧ High frequency delay（Tfzd1）;

If the above conditions are met, the protection immediately exports 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drives the accident signal relay 11J (C1/C3) (until manual reset, the relay will not return), The accident light on the panel turns on. The logic block diagram of the action is shown in 4-18 (high voltage system):

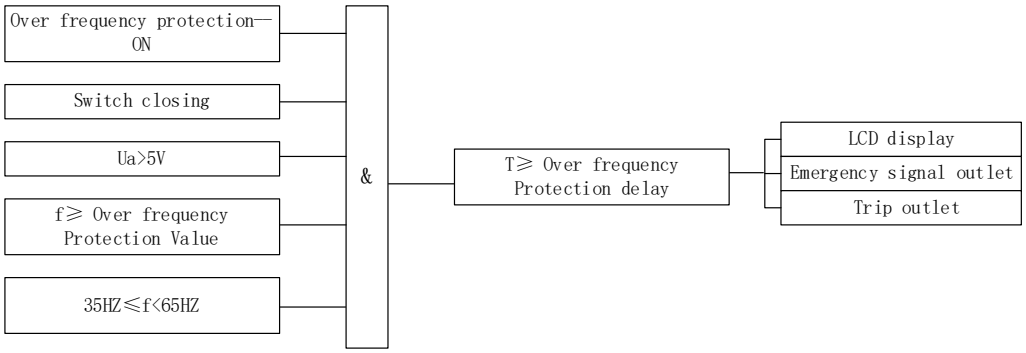



Figure 4-18: Logic diagram of over-frequency protection action

## 4.19 Low frequency load shedding

1．RLP20　Low frequency load shedding－“ON”;

2．Phase A voltage Ua>5V（High voltage system）; Phase A voltage Ua >50V（Low voltage system）;

3．35HZ ≦f <65HZ;

4．The circuit breaker is closed, that is R1=1;

5．Protection device frequency f sampling value ≦ Low-frequency load shedding value（Fdz2）;

6．Duration of meeting the above conditions ≧ Low-frequency load shedding delay（Tfzd2）;

Meet the above conditions, the protection immediately exports 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drives the accident signal relay 11J (C1/C3) at the same time (the relay will not return until manual reset), the panel The accident light is on. The logical block diagram of the action is shown in 4-19:

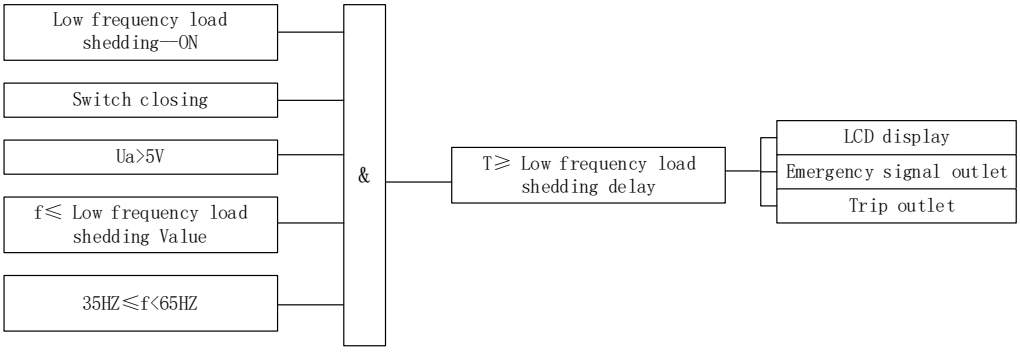



Figure 4-19: Logic diagram of low-frequency load shedding protection action

## 4.20 Overvoltage

1．RLP21　Overvoltage－“ON”;

2．In line voltage Uab、Ubc、Uca，There are one or more sampled values ≧ Overvoltage value（Udz1）;

3．Duration of meeting the above conditions ≧ Overvoltage delay（Tuzd1）;

If the above conditions are met, the protection immediately drives outlets 3J (C7/C8), 4J

(C9/C10), 5J (C11/C12), and drives the accident signal relay 11J (C1/C3) at the same time (the relay does not return until manual reset), The panel accident light is on. The logical block diagram of the action is shown in 4-20:

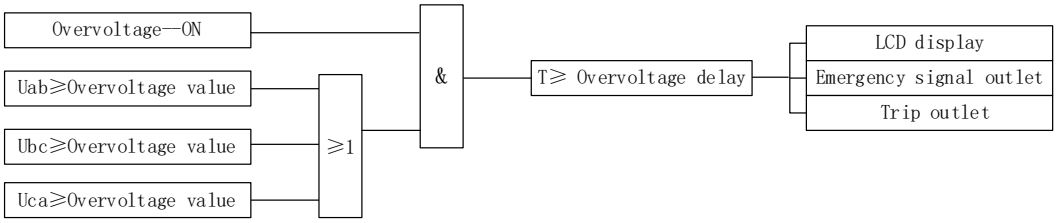



Figure 4-20: Logic diagram of over-voltage protection action

## 4.21 Low voltage

1．RLP22　low voltage－“alarm/trip”;

2．The sampling values of line voltage Uab, Ubc, Uca are all at the same time ≦ low voltage value（Udz2）;

3. All line voltage ≧30V（High voltage system）; All line voltage ≧60V（Low voltage system）;

4．Duration of meeting the above conditions ≧low voltage delay（Tuzd2）;

If the above conditions are met, if the "trip" protection is turned on, immediately export 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drive the accident signal relay 11J (C1/C3) at the same time (until manual reset, the relay Only return), the liquid crystal displays the action information, the panel accident light is on; if the "alarm" protection is turned on, the alarm signal relay 12J (C2/C3) is driven (until the manual reset, the relay does not return), the liquid crystal display reports the action information, and the panel warning light is on . The logical block diagram of the action is shown in 4-21 (high-voltage system):

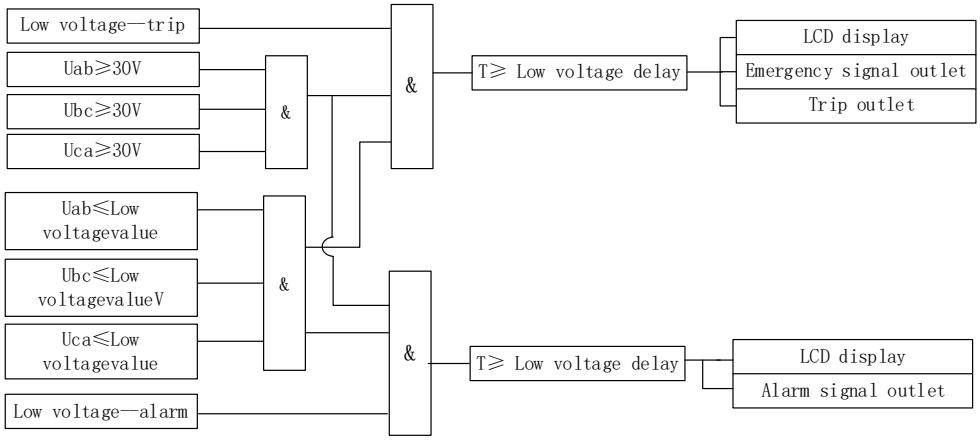



Figure 4-21: Logic diagram of low voltage protection action

## 4.22 PT disconnection

1．RLP23　PT disconnection－“ON”;

2. A sampled value of the line voltage Uab, Ubc, Uca ≧ PT disconnection value（Upt1）, Another line voltage sampled value < PT disconnection value（Upt1）;

3．Duration of meeting the above conditions ≧ PT disconnection delay（Tupt1）;

When the above conditions are met, the device generates a PT disconnection alarm, and drives the alarm signal relay 12J (C2/C3) (the relay does not return until manual reset), and the panel alarm light is on. The logical block diagram of the action is shown in 4-22:

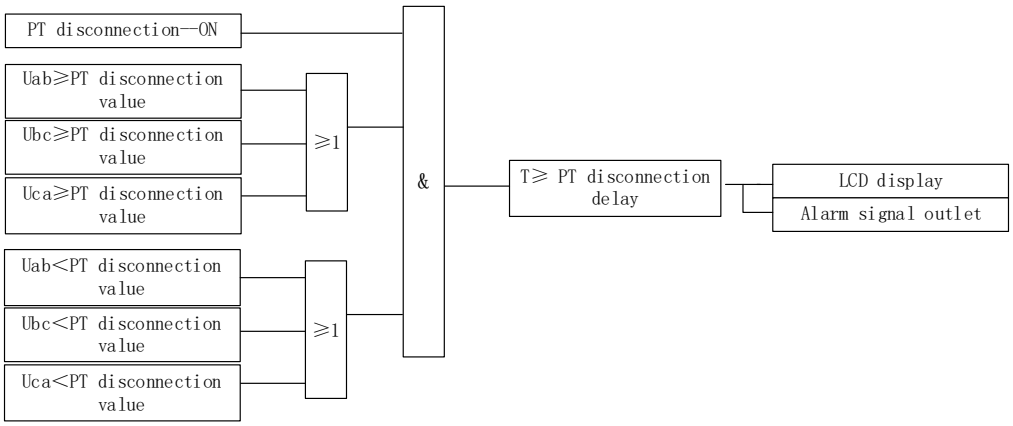



Figure 4-22: Logic diagram of PT disconnection protection action

## 4.23 PT voltage loss

1．RLP24　PT voltage loss－“ON”;

2．All line voltage Uab, Ubc, Uca ≦ PT voltage loss value(Upt2);

3．Any phase of protection current ia, ib, ic ≧ 0.1A;

4．Duration of meeting the above conditions ≧ PT voltage loss delay（Tupt2）;

If the above conditions are met, the device generates a PT loss-of-voltage alarm, and drives the alarm signal relay 12J (C2/C3) (the relay does not return until it is manually reset), and the panel alarm light is on.

High voltage system PT loss return condition: one of the line voltages is greater than or equal to 60V, or the protection current is less than 0.1A.

Low voltage system PT loss of voltage return conditions: one of the line voltages is greater than or equal to 160V, or the protection current is less than 0.1A.

If the return conditions are met, the warning information, warning lights, and signal outlets displayed on the LCD can all be reset manually. The logical block diagram of the action is shown in 4-23:

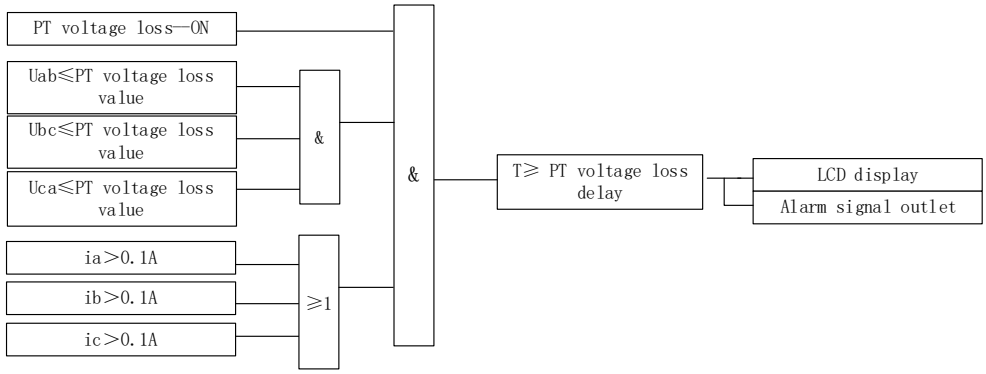



Figure 4-23: Logic diagram of PT loss-of-voltage protection action

## 4.24 System lose power

1．RLP28　System lose power－“alarm/trip”;

2. All line voltages ≦30V（High voltage system）; All line voltages≦60V（Low voltage system）;

3．Any phase of protection current ia, ib, ic ≦0.1A;

4．The switch is in the closed position;

5．System voltage flag = 1 (when all line voltages of the high voltage system voltage are greater

than or equal to 30V (all line voltages of the low voltage system voltage are greater than or equal to 60V), set the voltage flag = 1, the quantile signal is monitored and all lines When the voltage is less than (30V for high-voltage system; 60V for low-voltage system), this mark is cleared);

If the above conditions are met, if the "trip" protection is turned on, immediately export 3J (C7/C8), 4J (C9/C10), 5J (C11/C12), and drive the accident signal relay 11J (C1/C3) at the same time (until manual reset, the relay Only return), the panel accident light is on; if the "alarm" protection is turned on, the alarm signal relay 12J (C2/C3) will be driven (the relay will not return until manual reset), and the panel warning light will be on. The logic block diagram of the action is shown in 4-24 (high-voltage system):

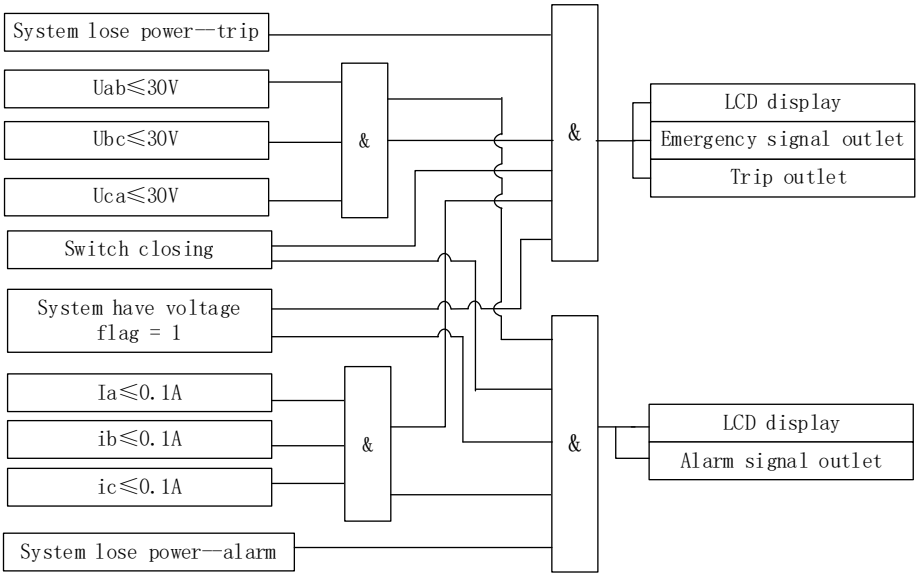



Figure 4-24: Logic diagram of system power failure protection action

## **4.25** Control loop disconnection

1．RLP29　Control loop disconnection－“ON”;

2．The quantile and inclusive signals are collected at the same time, or the quantile and inclusive signals cannot be collected at the same time;

3．Duration of meeting the above conditions ≧ Control loop disconnection delay（Tkzdx）;

When the above conditions are met, the device generates a control loop disconnection alarm protection, and drives the alarm signal relay 12J (C2/C3) (until the manual reset, the relay does not return), and the panel alarm light is on. The logical block diagram of the action is shown in 4-25:

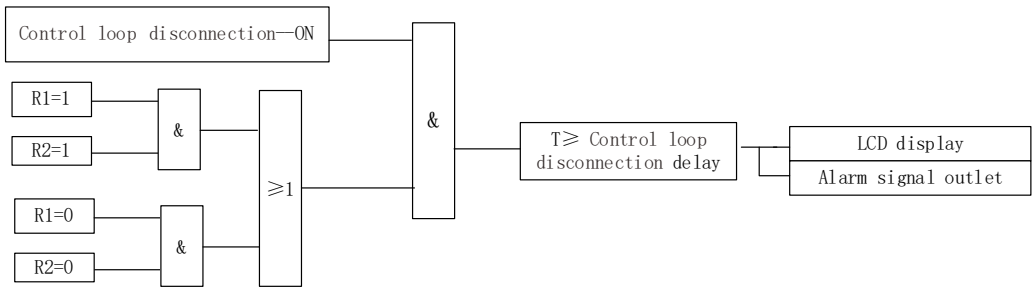



Figure 4-25: Logic diagram of control circuit disconnection protection action

## 4.26 Non-electricity protection

**Temperature rise**

1．RLP25　Temperature rise－“ON”;

2．R4 input is 1；

After the above conditions are met, the temperature of the device rises, and the alarm signal relay 12J (C2/C3) is driven (until the manual reset, the relay does not return), and the panel warning light is on.

**Temperature too high**

1．RLP26　Temperature too high－“ON”；

2．R3 input is 1；

Meet the above conditions, the protection immediately exports 6J (C13/C14), 7J (C15/C16), 8J (C17/C18), and drives the accident signal relay 11J (C1/C3) at the same time (the relay will not return until manual reset), the panel The accident light is on.

**Electrical accident**

1．RLP27　Electrical accident－“alarm/trip”；

2．R5 input is 1；

If the above conditions are met, if the "trip" protection is turned on, immediately exit 6J (C13/C14), 7J (C15/C16), 8J (C17/C18), and drive the accident signal relay C1/C3 (until manual reset, the relay will not return) , The panel accident light is on; if the "alarm" protection is turned on, the alarm signal relay C2/C3 is driven (the relay does not return until manual reset), and the panel warning light is on.

The logical block diagram of the action is shown in 4-26:

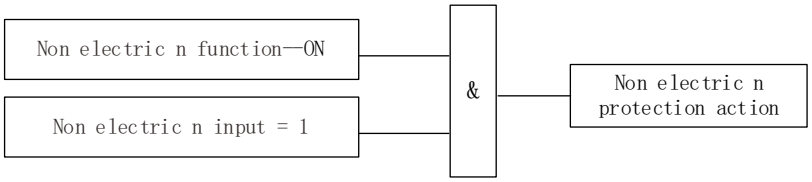
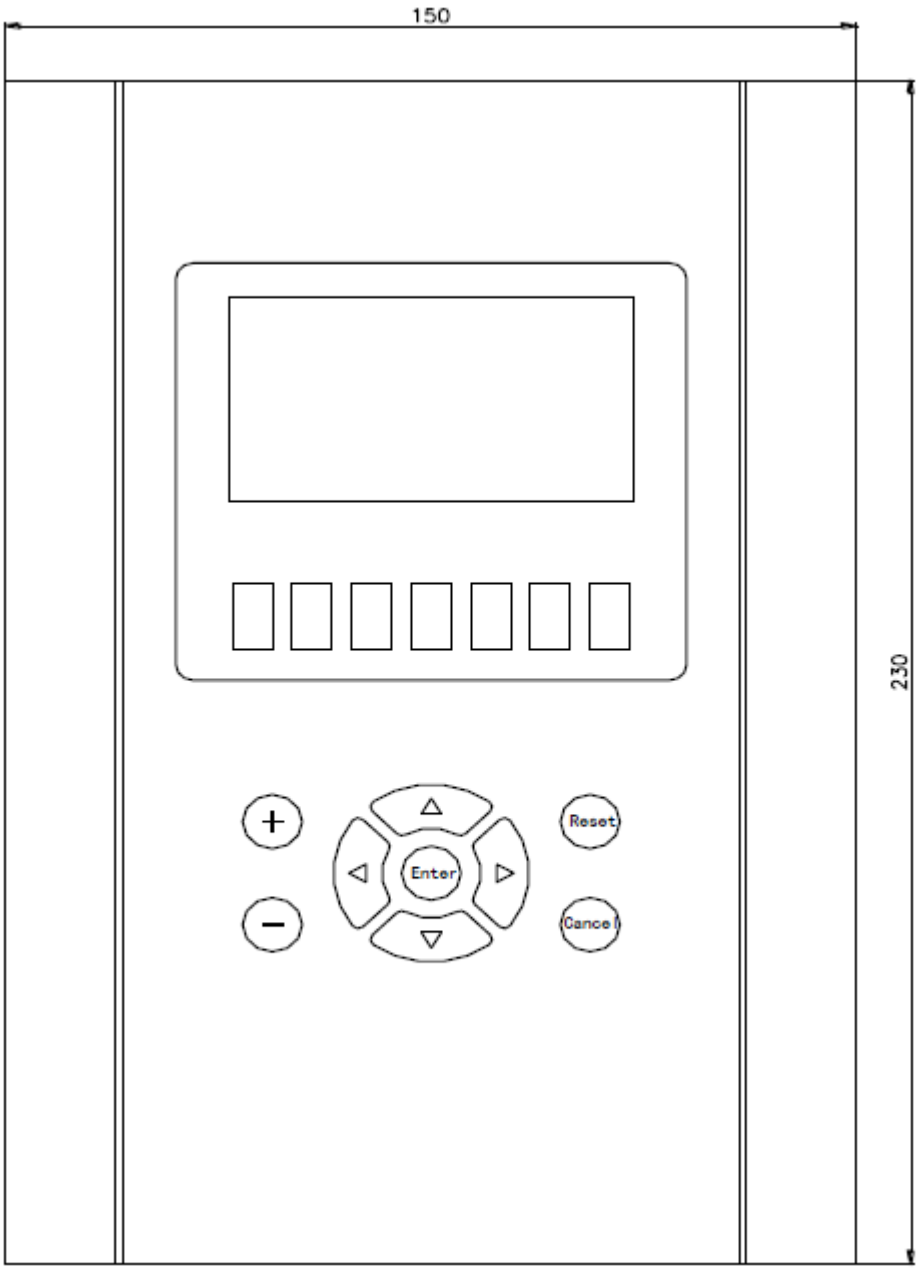


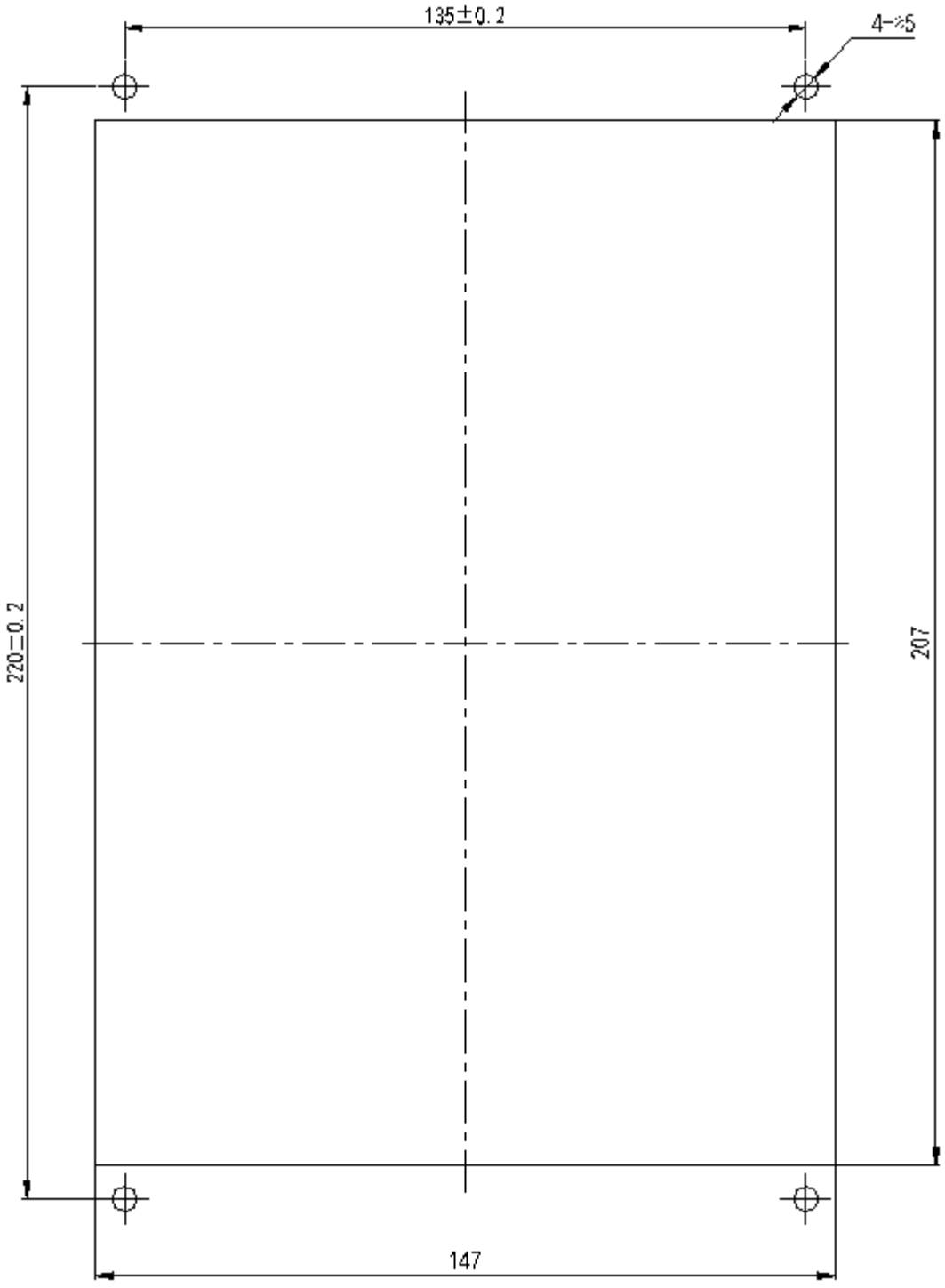

Figure 4-26: Non-electricity protection action logic diagram

# 5 Hardware principle description

## 5.1 Panel size diagram of the device



## 5.2 Hole diagram of the device



## 5.3 Device terminal diagram description

<table>
<tr><td colspan="6">AC circuit</td><td colspan="2">Control loop</td><td colspan="2">Communication loop</td></tr>
<tr><td>terminal</td><td>definition</td><td>Explain</td><td>terminal</td><td>definition</td><td>Explain</td><td>terminal</td><td>Explain</td><td>terminal</td><td>Explain</td></tr>
<tr><td>Z1</td><td>Ua*</td><td rowspan="2">Bus voltage</td><td>F1</td><td>Ub*</td><td rowspan="2">Bus voltage</td><td>P1</td><td>Positive power +</td><td>T1</td><td>485A</td></tr>
<tr><td>Z2</td><td>Uc*</td><td>F2</td><td>Un</td><td>P2</td><td>Negative power -</td><td>T2</td><td>485B</td></tr>
<tr><td>Z3</td><td>Ia*</td><td rowspan="3">Measure current input</td><td>F3</td><td>Ia</td><td rowspan="3">Measure current output</td><td>P3</td><td>GND</td><td>T3</td><td>IRIG-B+</td></tr>
<tr><td>Z4</td><td>Ib*</td><td>F4</td><td>Ib</td><td>P4</td><td>Anti jump negative power</td><td>T4</td><td>IRIG-B-</td></tr>
<tr><td>Z5</td><td>Ic*</td><td>F5</td><td>Ic</td><td>P5</td><td>Control positive power</td><td>T5</td><td>spare</td></tr>
<tr><td>Z6</td><td>ia1*</td><td rowspan="3">Terminal current input</td><td>F6</td><td>ia1</td><td rowspan="3">Terminal current output</td><td>P6</td><td>Closing circuit</td><td>T6</td><td>spare</td></tr>
<tr><td>Z7</td><td>ib1*</td><td>F7</td><td>ib1</td><td>P7</td><td>Closing coil HQ</td><td>T7</td><td rowspan="2">Device power loss （ Normally closed point）</td></tr>
<tr><td>Z8</td><td>ic1*</td><td>F8</td><td>ic1</td><td>P8</td><td>Trip circuit</td><td>T8</td></tr>
<tr><td>Z9</td><td>i0*</td><td>zero sequence input</td><td>F9</td><td>i0</td><td>zero sequence output</td><td>P9</td><td>Trip coil TQ</td><td colspan="2" rowspan="2">  <br>以太网口</td></tr>
<tr><td>Z10</td><td>ia2*</td><td rowspan="3">Tail current input</td><td>F10</td><td>ia2</td><td rowspan="3">Tail current output</td><td>P10</td><td>TWJ to HQ</td></tr>
<tr><td>Z11</td><td>ib2*</td><td>F11</td><td>ib2</td><td colspan="2" rowspan="2">Relay outlet</td><td colspan="2" rowspan="2">Input acquisition</td></tr>
<tr><td>Z12</td><td>ic2*</td><td>F12</td><td>ic2</td></tr>
<tr><td colspan="6">Device wiring instructions</td><td>terminal</td><td>explain</td><td>terminal</td><td>explain</td></tr>
<tr><td colspan="6" rowspan="2">1. The above wiring is standard wiring mode;<br>2. If the voltage adopts V-V wiring, UA * is connected to Z1, UB * is connected to</td><td>C1</td><td>Accident signal</td><td>R1</td><td>Closing signal</td></tr>
<tr><td>C2</td><td>Alarm signal</td><td>R2</td><td>Opening signal</td></tr>
</table>

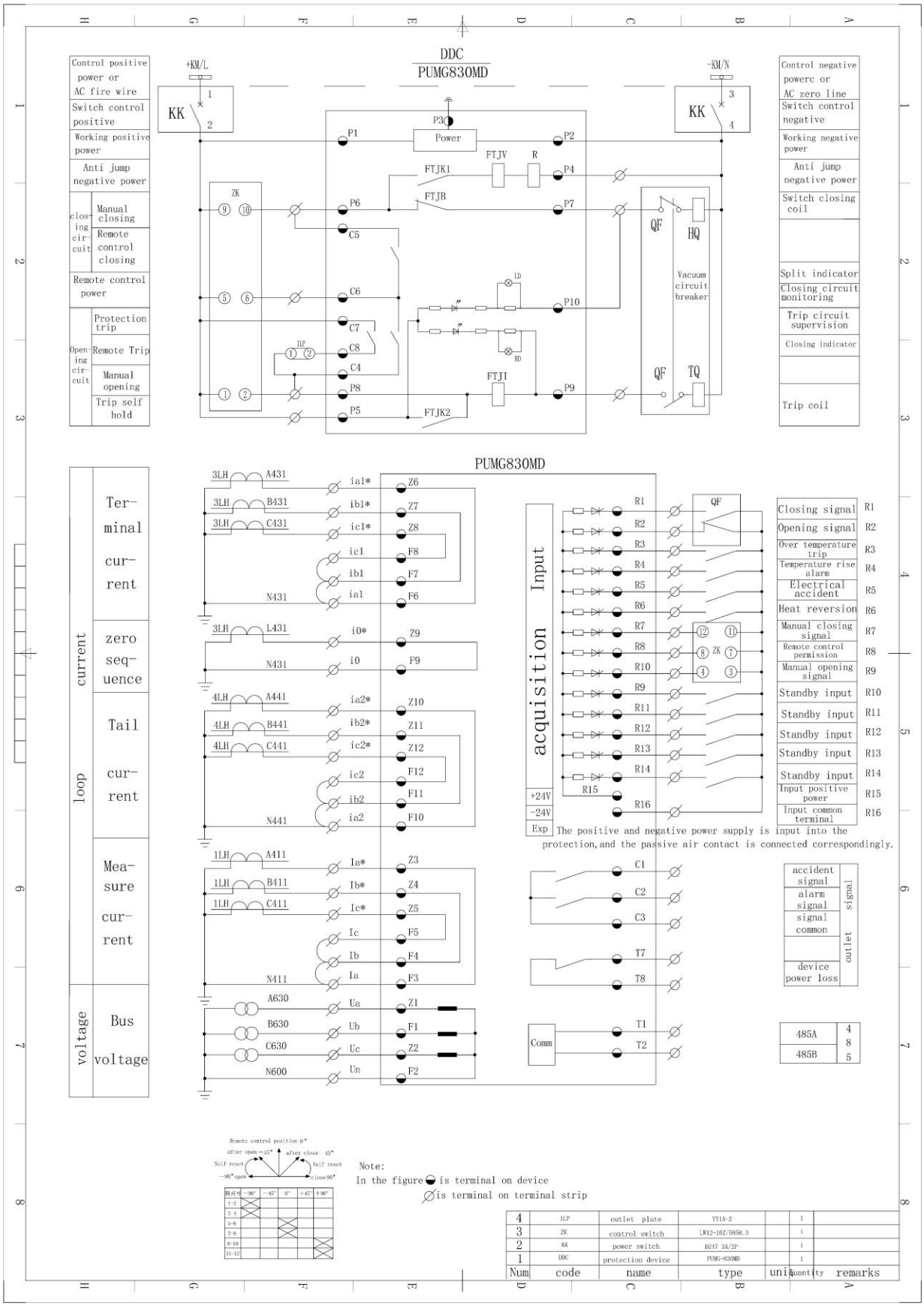
F2, and UC * is connected to Z2.

3. If there is no zero sequence current transformer, the I0 position is not wired, that is, Z9 / F9 is empty.
4. If the protection device uses AC power supply, P1 / P5 is connected to the live line and P2 / P4 is connected to the zero line.
5. Input R1 / R2 / R3 / R4 / R5 has been defined, while others before R14 are general input, without special definition.
6. If the protection is not provided with anti tripping circuit, P4 is not connected.

**Important tips:** This manual is applicable to the case that the power supply of the device is AC220V, dc220v and dc110v, and the input is passive input. If the device power supply is DC24V or DC48V and the input is active input, the situation shall be explained when ordering, and our company shall provide relevant drawings.

| | | | |
|---|---|---|---|
| **C3** | Signal common | **R3** | Over temperature trip |
| **C4** | Remote opening | **R4** | Temperature rise alarm |
| **C5** | Remote closing | **R5** | Electrical accident |
| **C6** | Remote common | **R6** | Heat reversion |
| **C7** | Protection jump Machine end | **R7** | Manual closing signal |
| **C8** | | **R8** | Remote control permission |
| **C9** | Protection jump excitation | **R9** | Manual opening signal |
| **C10** | | **R10** | Standby input |
| **C11** | Standby trip | **R11** | Standby input |
| **C12** | | **R12** | Standby input |
| **C13** | Non electric jump Machine end | **R13** | Standby input |
| **C14** | | **R14** | Standby input |
| **C15** | Non electric jump excitation | **R15** | Input positive power |
| **C16** | | **R16** | Input common |
| **C17** | Non electric trip Standby side | | |
| **C18** | | | |

## 5.4 Description of device schematic diagram



# 6. Device instructions

The protection consists of power supply and relay module, AC sampling module, CPU and input module, bus module, man-machine interface module, etc. The CPU adopts DSP chip, and the circuit breaker operation module replaces all the operations of the original switch cabinet. Each device is equipped with an independent box. The LCD, keys, operation indicator, circuit breaker position indicator and power indicator are installed on the panel for easy operation and observation.

## 6.1 Panel indicator description

Lights On The Panel (from right to left):

1). run (green)
2). power (green)
3). fault (red)
4). closed (red)
5). open (green)
6). alarm (red)
7). Accident (red)

## 6.2 Key instructions

↑ (+): It is the upward movement key of the cursor on the LCD. Press this key to move the cursor from bottom to top. At the same time, this key is also used as the increase key of the setting number. Press once and the number will be increased by 1.

↓ (-): he downward movement key of the cursor on the LCD. Press this key to move the cursor from top to bottom; At the same time, this key is also used as the decrease key of the setting number. Press it once and the number will be reduced by 1.

← : The left movement key of the cursor on the LCD. Press this key to move the cursor from right to left; At the same time, this key is also used as the change key of protection on / off status. Press it once to change the protection on / off status: "on" → "back" or "back" → "on".

→ : The right movement key of the cursor on the LCD. Press this key to move the cursor from left to right; At the same time, this key is also used as the change key of protection on / off status. Press it once to change the protection on / off status: "on" → "back" or "back" → "on".

Return: Press this key to reset the "signal" displayed on the LCD. When the cursor is "yes", press the confirm key, and the alarm and accident indicators will go out. If the alarm indicator is still on after resetting, this information can be reset only after normal processing.

Enter: After executing the command, press this key to proceed to the next step.

Cancel: Press this key to return to the previous menu.

## 6.3 LCD description

Display On LCD:

UA UB UC UAB UBC UCA IA IB IC ΣP ΣQ COSΦ f Heat

ia1 ib1 ic1 ia2 ib2 ic2 i0 Ida Idb Idc Iza Izb Izc u2 i1 i2

Explain：

UA、UB、UC： the first three phase voltage;

UAB UBC UCA: the first line voltage;

IA、IB、IC： the first three phase measurement current;

ΣP： the firs three phase total active power;

ΣQ： the firs three phase total reactive power;

COSΦ： power factor;

f： frequency;

u0： the zero sequence voltage;

i0： the zero sequence current;

ia、ib、ic： the secondary three phase protective current。

i1: the positive sequence current.

i2： the negative sequence current.

Heat: Heat accumulator

i0：Zero sequence current;

ia1、ib1、ic1：Protection current value at this side;

ia2、ib2、ic2：Protection current value at opposite side;

Ida、Idb、Idc：Differential current;

Iza、Izb、Izc：Braking current;

u2：Negative sequence voltage;

i1/i2：Positive / negative sequence current;

## 6.4 Device menu function description

| | |
|---|---|
| 01. Protection on & off | Protection function on / off selection |
| 02. Protection setting | Corresponding setting value of protection function |
| 03. Event record | Storage and recording of protection / signal/self inspection events |
| 04. Input & output | Verification of input and output |
| 05. Sampling value | Secondary sampling data display |
| 06.Measure & monitor | Display the values of primary & secondary voltage, current,etc |
| 07.Electric energy monitor | Storage of electric energy |
| 08. Real time clock | Device time setting and event time |
| 09. Factory settings | The device parameters are restored to the initial state |
| 10. Equipment information | Model, version number and other information of device |

## 6.4.1 Protection on & off

When the cursor (dark part) is on "protection on & off", press "OK" to enter the "protection on / off" menu, and the following is displayed: off The operation instructions are as follows:
press the "→" key，then off become on ，press the "OK" key，Then display：PASSWORD1：0000
press the "↑" key once，then 0000 become 1000，
Press"OK"， The protection "differential quick break" is saved from "off" to "on"，Then "differential quick break" is put into operation.
If you want to put all required protection functions into operation at one time, the operation is as follows:
Press the " ↓ " key, Select the protection to be put into operation. When the cursor moves to the protection to be put into operation, Press the "→"key，Then the protection changes from off to on，then press the "↓" key，Select the protection to be put into operation, When the cursor moves to the required protection, Press the "→" key，Then the selected protection changes from off to on，Repeat the above steps to change all the required protection from "off" to "on", and then press the "OK" key to display:

PASSWORD1：0000

As described above, Change 0000 to 1000，Press the "OK" key，Then save all the selected protection to be input from "off" to "on", and the input protection will operate.

**Note: the password of all factory modified "protection on & off" is "1000".**

## 6.4.2 Protection setting operation

When the cursor (shadow part) is on the "protection setting value", Press the "OK" key to enter the "protection setting value" menu, Display:
Number of protection setting sets：**00：001.00**
00（serial number）：001（Integer bit）.00（Decimal places），This is the first set of setting values
Primary Pt transformation ratio / 10 (actual voltage level value 6kV → 6, 10kV → 10, 35kV → 35110kV → 110, etc.):KV1 **01：000.00** （KV1 is the ratio coefficient of primary voltage; 01: is the serial number and 000.00 is the numerical digit）
If the primary system is a 6kV station, the primary voltage proportional coefficient is set to 6.00, and the operation steps are as follows:
Press the right key "→" three times to move the cursor to the third "0", It is displayed as: **01：000.00**
After pressing the up key " ↑ " six times (or pressing the " ↓ " key four times), it becomes:**01：006.00**
Press "OK" to display：PASSWORD1：0000
After changing 0000 to 1000 ， Press "OK" again , then Save the data 0**06.00**.
Move the cursor down once to:
Primary CT ratio / 10 (measure the transformation ratio of current transformer divided by 10; dividing by 10 is to prevent setting value overflow)
The transformer setting of 200 / 5 is 4 = 200 / 5 / 10; Setting of 75 / 5 (1.5 = 75 / 5 / 10):

Ki1 **02：000.00**（200 / 5 transformer）Set to**： 02：004.00**

**The modification methods of other constant value data are the same as above.**
**Special note: all protection setting values are secondary values. If the setting department gives the primary setting value, the secondary value can be obtained by dividing it by the transformer ratio. Enter the secondary setting value.**

## 6.4.3 Event record query

Press the "OK" key to enter the menu, as shown below:

1. Protection event
2. Remote signaling event
3. Self test event
4. Event clearing

**Protection event：** Record 64 event records of protection actions with the record number of 0000 ~ 0063. Press the "OK" key to enter the protection event record menu (the smaller the number, the closer the record occurrence time): Display

**No.0000 14－03－06** （No.0000 is the event record number，14－03－06 is the date of the event:：year / month / day）

**Time 15：56：19.406**（Event records of 15hours 56minites 19 seconds 406milliseconds respectively）

**Remote signaling event：** 64 remote signaling events can be recorded, and the displacement information of input quantity is recorded.

**No.0000 14－04－10** （Same definition as protection event）

**Time 10：12：19.406**（Same definition as protection event）

**Self test event：** 8 pieces of device fault information can be recorded.

**No.0000 14－04－10** （Same definition as protection event）

**Time 10：12：19.406**（Same definition as protection event）

**Self inspection record：**

**Relay start failure** （Device fault type）

**Event clearing：** Previous event records can be deleted. After pressing the OK key, the display is as follows:

Event clearing：
Protection event
Remote signaling event
Self test event

## 6.4.4 Input / output query and operation

Press the "OK" key to enter the main menu, move the cursor to "input / output" through the " ↓ " key, and press the "OK" key to display:

1. **Input**（Switching value acquisition query）
2. **Output**（Relay output query）

3. **Export type（Relay type inquiry, signal or trip）**
4. **Output configuration（Query which relays are driven by a protection）**

**When the cursor is：1. Input ， Press "OK" to display:**

Input：

123456789ABCDE

0000000000 0 000

1 Switch closing signal

Corresponding to input quantity 1-14, the fourth row displays the input quantity number and name at the cursor position. After the channel collects the input, the corresponding position changes from "0" to "1".

**Note: the power supply of input quantity is DC24V, which is supplied internally, and what should be connected externally must be passive nodes. If the input power supply is dc220v or dc110v, the power supply is provided by the outside, the common terminal is -220V, and the input signal is + 220V. If the input power supply is non internal supply 24V, it shall be explained when ordering.**

**Move the cursor through " ↓ " to：2.Output , press "OK" key to display:**

Output

123456789ABC

000000000000

Press the OK key again, as shown below：

Output

123456789ABC

000000000000

Configure outlet 1

There is no cursor when you first enter the opening interface. Press the OK key to display the cursor and stay on the first outlet "0", Where：123456789ABC is the sequence number of outlet relay, Represent 1-12J respectively，The third row is the relay corresponding to the outlet, The output can be edited by pressing " ↑ " ↓ "→" ← ". "1" means to drive the corresponding output relay, "0" means not to drive the corresponding output relay. After editing, press the "OK" key. After verifying that the correct password "2000" is entered, press the "OK" key again, and the corresponding relay can export or return. The information in the fourth row is the definition of the relay where the cursor is located. If "configuration outlet" is written, it means that the outlet can set whether the outlet type is signal type or trip type and whether a protection function wants to drive the relay through "outlet type" and "output configuration".

**Move the cursor through " ↓ " to: 3.** Outlet type ， **press "OK" key to display:**

Outlet type

123456789ABC

000000000011

0=Trip 1= Signal

Number in the second row 123456789ABC indicates the sequence number of the outlet relay，Represent 1-12j respectively; The number in the third row indicates whether the relay corresponding to the cursor position belongs to the signal type or trip type. It can only be 0 or 1. 0 indicates the trip type and 1 indicates the signal type. Generally, the relay of trip type

will return only after the fault is removed. The relay of signal type is maintained for a long time and must be reset manually. The above display shows that 11J and 12J are signal outlets, and other outlets are trip outlets. The exit type can be changed manually, and the password is 2000.

**Move the cursor through " ↓ " to: 4. Output configuration ， Press "OK" to display:**

| |
|---|
| Event selection：xx<br>Event name<br>Outlet yyyyyyyyyyyy |

First select the event number XX, the second row is the event name corresponding to each number XX, and the third row y is the exit corresponding to the selected event. When the set bit is 1, the relay will exit after the event. It has been set before leaving the factory and generally does not need to be set. The setting password is 2000.

Outlet is defined as follows：

123456789ABC

000000000000

The previous row corresponds to the next row.

"1": 1J(C4/C6) Configure outlet 1 (default: Remote Trip outlet);

"2": 2J(C5/C6) Configure outlet 2 (default: remote closing outlet);

"3": 3J(C7/C8) Configure outlet 3 (default: protection trip the terminal outlet);

"4": 4J(C9/C10) Configure outlet 4 (Default: protection trip excitation side outlet);

"5": 5J(C11/C12) Configure outlet 5 (Default: protection trip standby side exit);

"6": 6J(C13/C14) (Default: non electric trip the terminal outlet);

"7": 7J(C15/C16) (Default: non electric trip excitation side outlet);

"8": 8J(C17/C18) (Default: the non electric quantity trips the standby side exit);

"B": 11J(C1/C3) accident signal outlet; "C": 12J(C2/C3) alarm signal outlet;

**Note: the factory setting of passwords for opening test, modifying exit type and modifying opening configuration is 2000, which is different from the password for modifying fixed value.**

## 6.4.5 Sampling value query（the secondary value）

Uab Line voltage

Ubc Line voltage

Uca Line voltage

ia1 Terminal phase A protection current

ib1 Terminal phase B protection current

ic1 Terminal phase C protection current

ia2 Neutral point phase A protection current

ib2 Neutral point phase B protection current

ic2 Neutral point phase C protection current

i0 Zero sequence current

Ia Phase A measured current

Ib Phase B measured current

Ic Phase C measured current

After entering the sampling value interface, you can press the left key to calibrate the channel. After entering the calibration interface, press the left and right keys to adjust to the channel to be calibrated, and then press the up and down keys to adjust the coefficient. After calibration, press the “OK” key, enter the password 1000, and then press the “OK” key to save it.

## 6.4.6 Measure & monitor query

After pressing the “OK” key, the interface displays:

1 Primary value

2 Secondary value

After selecting the item to be queried, press the “OK” key to see the corresponding current, voltage, active power, reactive power, power factor and other data.

## 6.4.7 Electric energy monitoring query

After pressing the “OK” key, the interface displays:

Positive active electric energy

EP+:0000000.00

Reverse active electric energy

EP-:0000000.00

Positive reactive electric energy

EQ+:0000000.00

Reverse active electric energy

EQ-:0000000.00

## 6.4.8 Real time clock query

The device has the real-time clock function of power down operation. After entering the real-time clock module, the LCD will display the real-time clock of the device, as shown in the above figure：

The clock can be corrected through a simple keyboard. Press the "OK" key to enter the clock editing state. In the editing state, the clock can be edited by pressing " ↑ " ↓ "←" → ". After editing, press the "OK" key to make the modification effective. If you do not want to modify the clock at this time, press the "exit" key to exit the clock editing state. The real-time clock is mainly used as the time basis for event sequence recording.

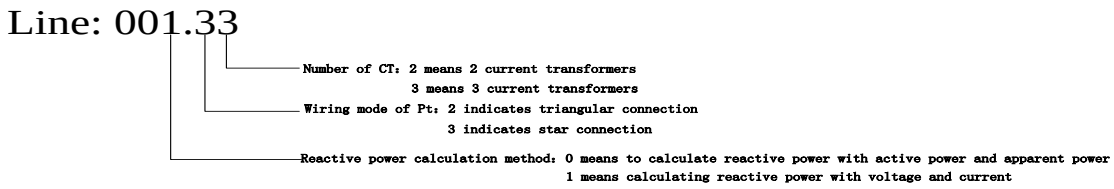
Note: the real-time clock has been set before leaving the factory, and can be checked by GPS astronomical clock on site.

## 6.4.9 Factory settings

The factory setting has been set before the device leaves the factory, and the user usually does not have to change it. Factory setting items are shown in the following table:

| Serial number | Code | Name | Factory value |
|---|---|---|---|
| 00 | Kv2 | Proportional coefficient of secondary protection voltage | 010.55 |
| 01 | Kib | Proportional coefficient of secondary protection current | 009.50 |
| 02 | Kvc | Secondary measurement voltage scale factor | 099.32 |
| 03 | Kic | Secondary measurement current scale factor | 099.45 |
| 04 | Kp | Secondary measurement power scale factor | 099.50 |
| 05 | Line | Wiring mode | 001.33 |
| 06 | Inalarm | Undefined | 000.00 |
| 07 | Disp1 | Scroll item selection 1 | 163.83 |
| 08 | Disp2 | Scroll item selection 2 | 655.35 |
| 09 | PASSWORD1 | First level password | 1000 |
| 10 | PASSWORD2 | Secondary password | 2000 |
| 11 | Address | Device communication address | 1.00 |
| 12 | Baud Rate | Device communication baud rate | 9.60 |
| 13 | Parity | Verification method | 0.02 |
| 14 | Address-2 | Device communication address | 1.00 |
| 15 | Baud Rate-2 | Device communication baud rate | 9.60 |
| 16 | Parity-2 | Verification method | 0.02 |
| 17 | Language | Undefined | 000.00 |
| 18 | System Set1 | System settings 1 | 000.00 |
| 19 | System Set2 | System settings 2 | 000.00 |
| 20 | UDP PortNUM | Device UDP communication port number | 10.32 |
| 21 | TCP PortNUM | Monitoring background TCP communication port number | 10.48 |
| 22 | MAC | MAC address | Factory set，no modification required |
| 23 | IP | IP address settings | 172.020.251.001 |
| 24 | Sub Mask | Subnet mask | 255.255.000.000 |
| 25 | Gateway | Gateway | 172.020.251.055 |

**Factory settings 5：**




**9 and 10 in factory settings:**

Setting 9 is the first level password, and the factory value is set to 1000.

Setting 10 is the secondary password, which is set to 2000 when leaving the factory. This password is used for protection.

**Factory settings 11:**

Device communication address: the setting range of device communication address is 0-244. It shall be set by the protection manufacturer according to the site conditions.

**Factory settings 12:**

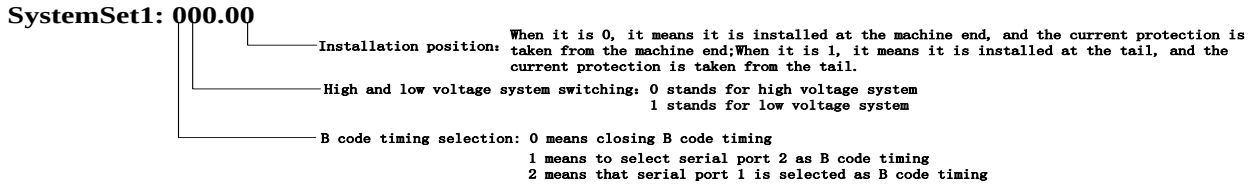
Device communication baud rate, the unit of device communication baud rate is Kbps. It shall be set by the protection manufacturer according to the user's requirements.

The factory setting is generally 9.60, that is 9600bps.

**Factory settings 13:**

0.00: No check 0.01: Odd check 0.02: Even check

**Factory settings 18:**




***Note: 00-10 in the factory setting is generally set and cannot be changed at will.***

# 6.4.10 Equipment information

| |
|---|
| Protection name |
| Protection model |
| Program version number |
| Henan Compere Smart Technology Co., Ltd. |