Table of Contents

ONE、Overview

RWB-200 digital microcomputer protection device is suitable for low current/small resistance grounding system of 35kV and below, which integrates functions of protection、control、communication and monitor. The device uses component programmable design ideas to reduce maintenance workload and spare parts. It can flexibly meet the needs of a variety of applications, and is the ideal replacement production for traditional electromagnetic relay protection.

1.1 Application

RWB-200 digital microcomputer protection device:

- ■ Line(Feeder)Protection
- ■ Bus Coupler Protection
- ■ Transformer Protection
- ■ Motor Protection
- ■ Capacitor Protection
- ■ Single PT protection
- ■ Automatic Transfer Switch

1.2 Main Feature

- The high-performance 32-bit processor provides powerful computing processing, profect circuit design, and industrial-level components to ensure stable and reliable operation.
- Unique component level - engineering level - user level, three level programming mode, component type can be set on site. The digital input and relay output are programmable.
- High-speed and high-precision AC signal measurement with sampling frequency up to 1600Hz. Multiple channels AC signal FFT calculations are done in milliseconds. Sampling values are digitally corrected and can effectively suppress noise and offset.
- A powerful vectorization calculation algorithm can obtain a variety of derived AC signal characteristics, including positive, negative, zero sequence, phase-to-line transformation, angle, impedance, power and so on.
- The device is capable of continuously recording 64 events, with a full event record of the protection action with fault time, type, and peak value.
- Graphic LCD（128x64）, can display graphics, icons and full English&chinese display.
- The main signal process circuit is equipped with an electromagnetic interference absorbing element to meet the working environment in a harsh electromagnetic environment.
- The enhanced MODBUS-RTU communication interface can transmit real-time waveforms, vector data, etc. in addition to normal data.
- Complete self-test function, including tuning parameters, recording, operation loop, current, voltage loop and other abnormal monitoring.

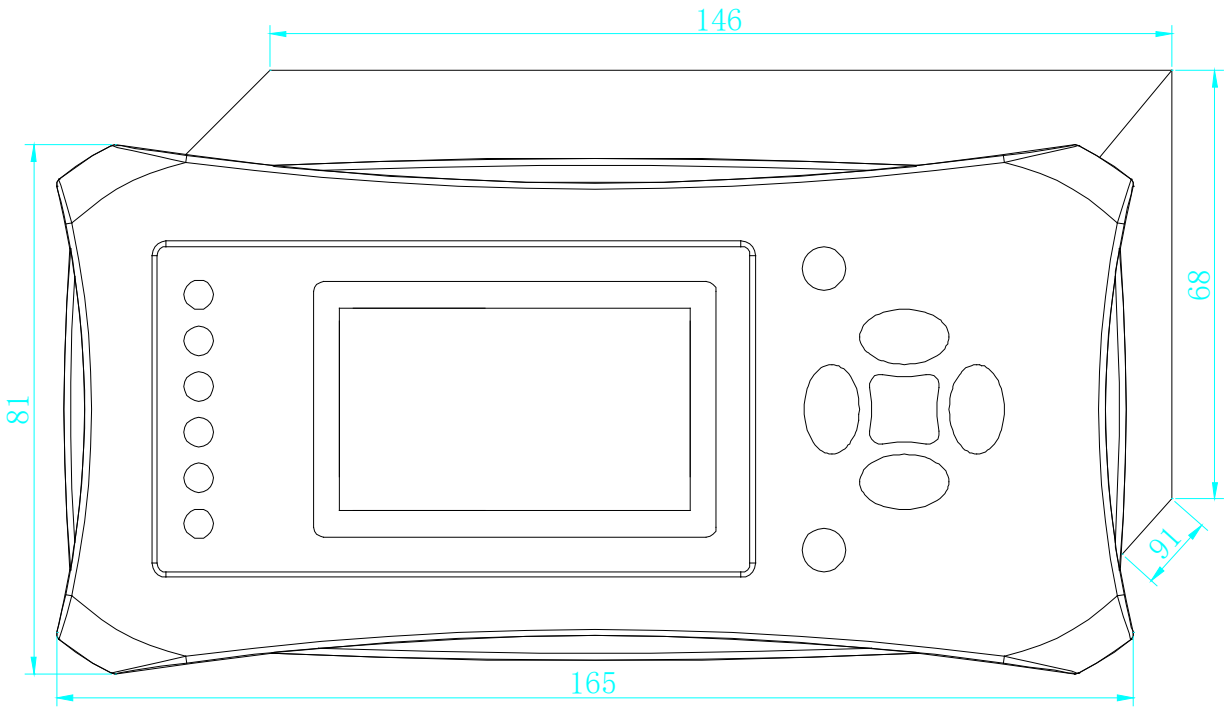
- The fully enclosed thin metal chassis is waterproof and dustproof, and has strong anti-static and electromagnetic interference capability; it can be installed on the switch cabinet in a distributed manner, and can also be grouped.
- SMT technology, important components (such as power supply modules, transformers, relays, LCDs, terminals, etc) adopt mature products from well-known enterprises at inboard and abroad to ensure that the average running time more than 100,000 hours.

1.3 Device Function Configuration

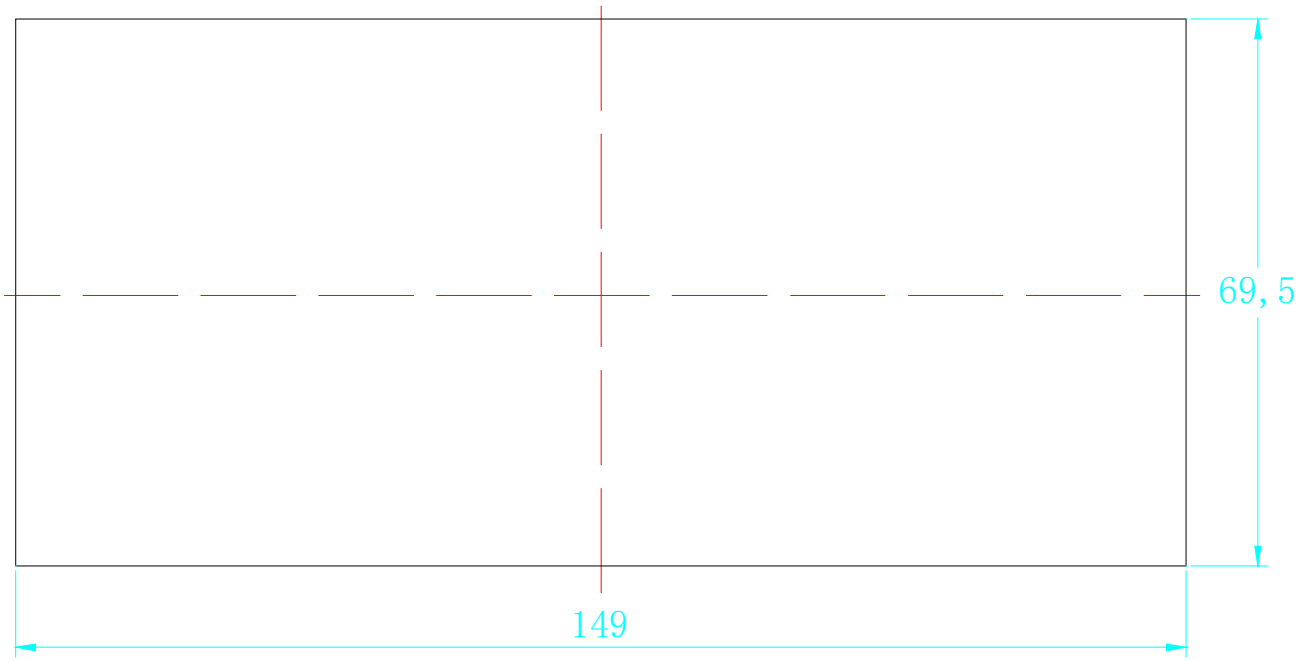
Function		RWB-200
Configuration	Digital input	8 channel passive
	Relay output	4 channel passive
	AC voltage input	4 channel
	AC current input	4 channel
Protection	Over current I protection	■
	Over current II protection	■
	Over current III protection	■
	Time inverse current protection	■
	Overload Protection	■
	Zero sequence current protection	■
	Negative sequence current protection	■
	Low voltage protection	■
	Over voltage protection	■
	Loss voltage protection	■
	Zero sequence voltage protection	■
	Negative sequence voltage protection	■
	Reclose protection	■
	Post acceleration protection	■
	Automatic Transfer Switch [Automatic backup power supply]	■
	Motor startup over current protection	■
	Motor overheating protection	■
	Motor long startup time protection	■
	Non-electricity protection(4 channel)	■
Monitoring	Switching monitoring	■
	Abnormal alarm: CT breaking	
	Abnormal alarm: PT breaking	■
	Abnormal alarm: control loop breaking	
	Event record	■
	Fault Wave ecording	
Control	Anti-jump circuit	
Communication	RS485	■

1.4 Device opening size and terminal definition map

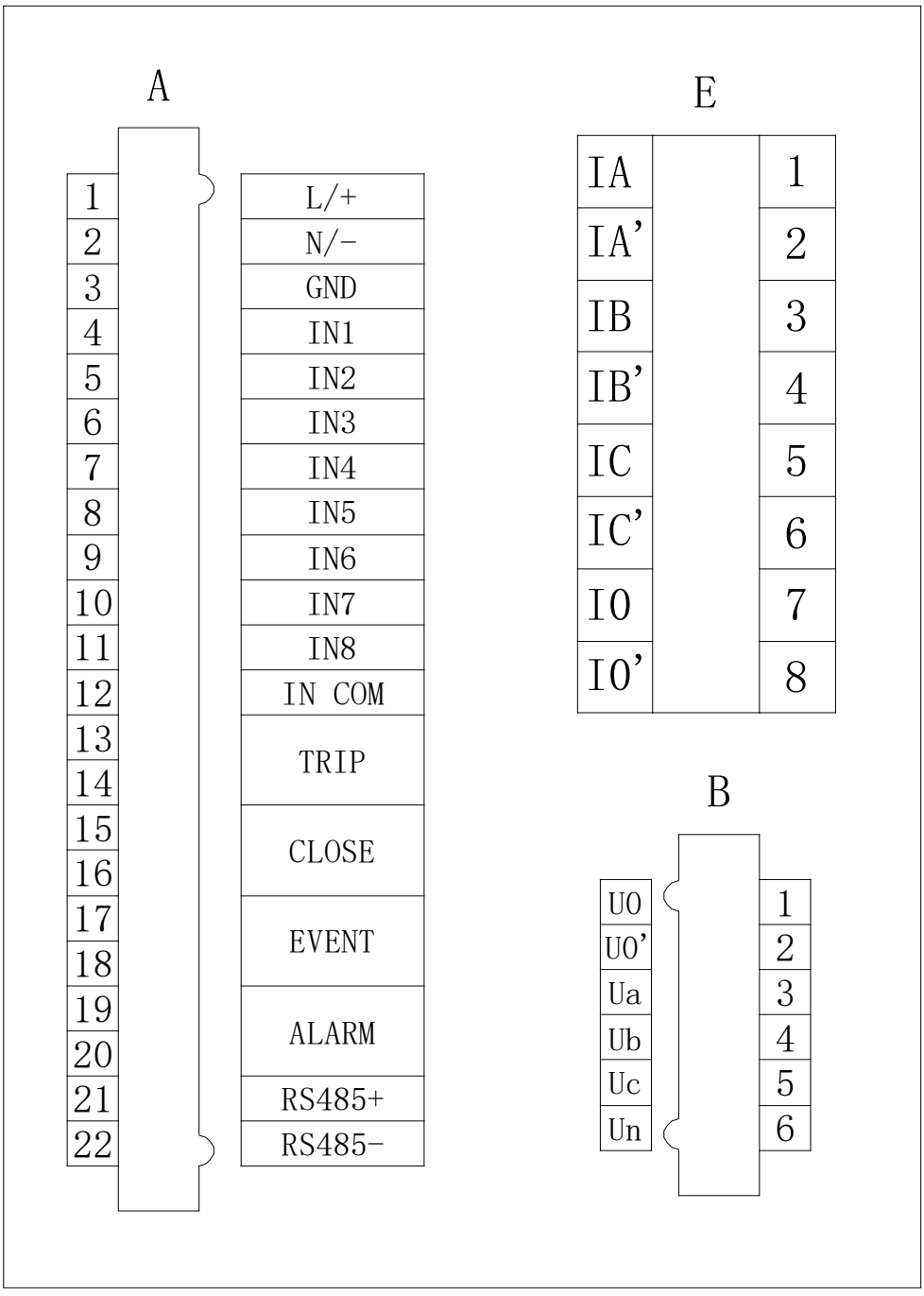
Appearance and size: 165mm (W) / 81mm (H) / 123mm (D) (thickness with panel, including terminal blocks)



Opening size chart



Terminal definition map



TWO、Technical Parameters

2.1 Environmental conditions

Normal temperature: -10℃～55℃
Limited temperature: -30℃～70℃
Storage temperature: -40℃～85℃
Relative humidity: ≦95% No Condensation
Atmospheric pressure: 80Kpa～110Kpa

2.2 Rated data

Power Supply: AC/DC 85~265V ;DC48V
AC Rated data : Current 5A、1A
Voltage 100V
Frequency 50HZ

2.3 Power consumption

AC current loop	Ie=5A	no more than 0.5VA per phase
AC volgate loop	U=100V	no more than 0.5VA per phase
DC power supply loop	normal operation is not greater than5W	
	Protection action is not greater than5W	

2.4 Overload capability

AC current loop	2Ie	Continuously working
	10Ie	Allow work 10S
	40Ie	Allow work 1S
AC volgate loop	1.2Ue	Continuously working
power supply loop	80%~110% Rated Voltage	Continuously working

2.5 Insulation & Withstand voltage performance

AC input to ground is greater than 500 megohms
DC input to ground is greater than 500 megohms
Signal and output to ground greater than 500 megohms
Digital input to ground greater than 500 megohms

Between each loop is greater than 500 megohms

Can withstand 2KV, lasting 1 minute of power frequency withstand voltage and 5KV surge voltage

2.6 EMC

Can withstand the severe discharge test of the severity class III specified in GB/T14598.14-1998 (idt IEC255-22-2).

Can withstand the rigorous class III radiation electromagnetic field interference test specified in GB/T14598. 9-1995 (idt IEC255-22-2).

Can withstand the severe level III 1MHz burst interference test specified in GB/T14598. 9-1995 (idt IEC255-22-2).

Can withstand the severe transient interference test of the severity class III specified in GB/T14598.13-1995 (idt IEC255-22-3).

Can withstand IEC61000-4-5 standardLevel III, Open circuit test voltage 2KV lightning surge interference test.

2.7 Mechanical properties

Can withstand 16.3 of GB/T7261The specified severity rating is Class I vibration endurance test.

Can withstand 17.5 in GB/T7261The required severity rating is Class I impact durability test.

Can withstand the 18th in GB/T7261The severity rating specified in the chapter is a Class I crash test.

THREE、Basic Operation

3.1 Panel Introduction

The RWB-200 series microcomputer protection device panel consists of three parts, one 128*64 graphic dot matrix liquid crystal, six indicator lights and seven operation buttons.

3.1.1 Status Indicator

The status indicator consists of 6 indicator lights, each of which functions as follows:

Indicator light	Features
RUNNING	The RUNNING indicator works when the device is operating normally.
TRIP	The TRIP indicator works when the device self-test error or line fault protection action trips.
ALARM	The ALARM indicator works when various warning signals such as control loop breaking occur.

COM	The COM indicator works When the device communication is action.
Tripping Position	The Tripping Position indicator works when the breaker is in tripping position.
Closing Position	The Closing Position indicator works when the breaker is in Closing position.

3.1.2 keyboard

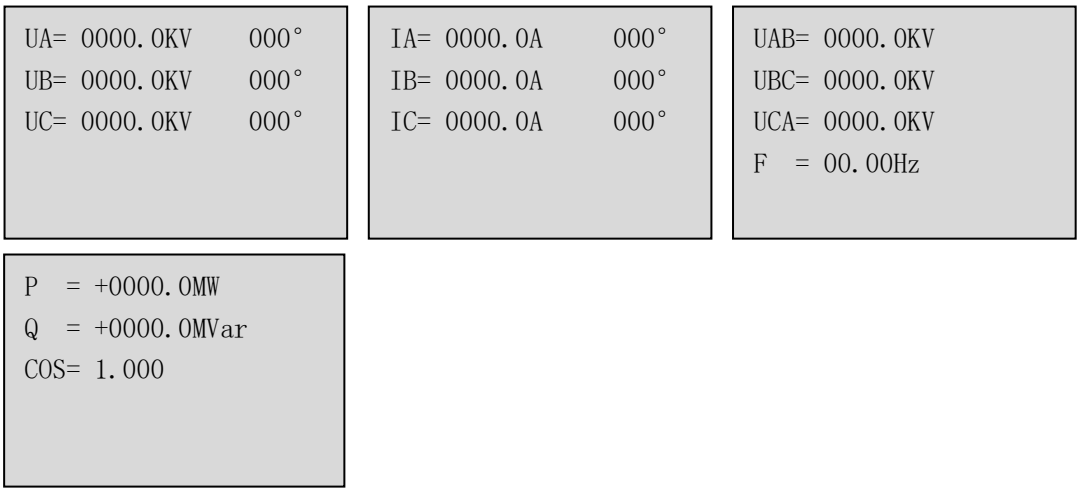
The keyboard consists of 7 keys, each of which functions as follows:

Key	The main function
Enter	Used to save the confirmation after entering the parameters and enter the subdirectory
Esc	Cancel and exit subdirectories after parameter setting
Reset	Used for signal, alarm, and protection actions reset and clear
▲	Up
▼	Down
◀	Left
▶	Right

3.2 Menu

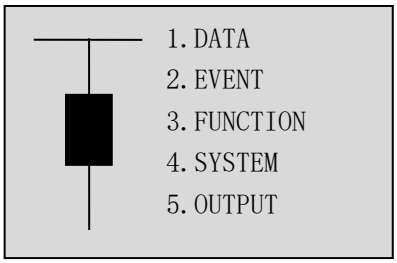
3.2.1 Running Menu

As shown in the figure, when the device is in normal operation, the running menu displays a voltage, primary current, primary power and other information. The running menu can automatically display the information, or press “▲” and “▼” button manually selects the view.



3.2.2 Main Menu

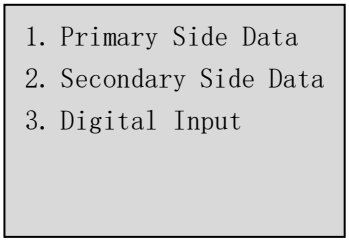
The main menu contents are as follows:
1. DATA
2. EVENT
3. FUNCTION
4. SYSTEM
5. OUTPUT



In the running menu, press the 'Enter' key to enter the main menu and the breaker pattern is filled when the breaker closing position is detected. How to enter each sub-menu: use '▲' '▼' to move the cursor up and down, press the 'Enter' button to enter the submenu .

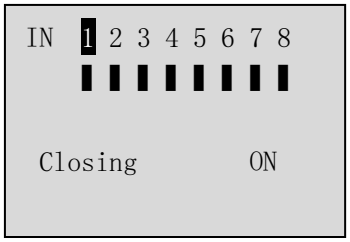
3.2.3 "DATA" Submenu

Go to the "DATA" submenu and the submenu displaying is as shown. The Primary Side Data is consistent with the data of the running menu, which is obtained by multiplying the secondary data by the ratio of the CT and PT. The Secondary Side Data is the data actually sampled by the current protection device and the calculated data. The Digital Input submenu displays the status of the digital input signals.



3.2.3.1 "Digital Input" submenu

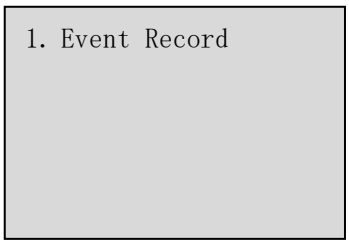
After entering the "Digital Input" submenu, the following is displayed. The first row IN1-8 represents the eight channels of digital input. Pressing the left and right keys to move the cursor to display the name and status of the signal in the third row. The second row of solid squares represents the closure[ON] of the input, and if the input is off, it will be displayed with a hollow square. The third row shows the name and status of the current signal.

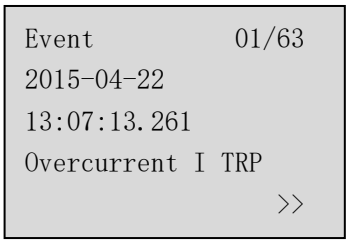


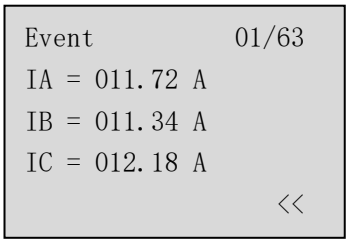
3.2.4 “EVENT” Submenu

After entering the "EVENT" submenu , select "Event Record" to enter the next menu.

“In the Event Record submenu, each event record has a maximum of 2 display pages, which can be changed by left and right keys. The upper right corner of 01/63 indicates that the present event record is the first one. There are 63 event records. When the new event record is generated, the new will be the first one. The remaining event records are incremented by one and the 63rd event record is overwritten. Protect action events, protect alarm events, and device self-test events can be displayed in the main interface of the running interface.

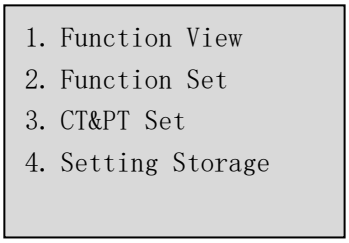






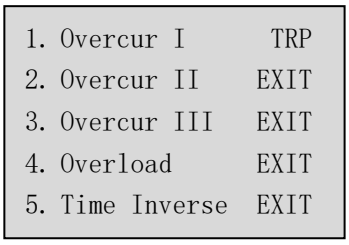
3.2.5 “FUNCTION” Submenu

The “FUNCTION” submenu has 4 options, which are Function View,Function Set, CT&PT Set and Setting Storage.



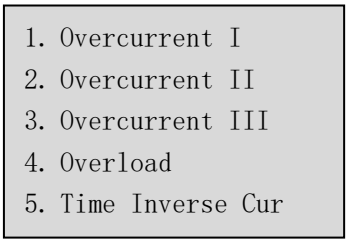
3.2.5.1 “Function View” Submenu

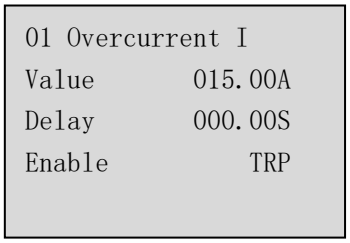
The Function View submenu can display whether each protection function is in the active state (ALM output or TRP output)or the exit state.



3.2.5.2 “Function Set” Submenu

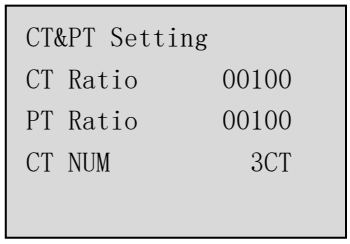
After entering the “Function Set” submenu, press the up and down keys to find the corresponding protection function, and press “Enter” to enter the setting interface corresponding to the function. The current value set by submenu is the secondary current value, and the enable mode can be selected to trip, alarm, and exit. All the protection functions is set to exit as default. After the function value modification is completed, you need to exit the “Function Set” submenu and enter the “Setting Storage” submenu to storage the setting.





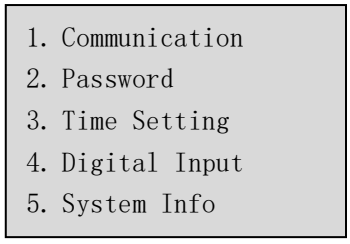
3.2.5.3 “CT&PT Set” Submenu

After entering the “CT&PT Set” submenu, the following figure is displayed. The value of the ratio is the primary value divided by the secondary value. If the CT ratio is 600:5, the CT ratio is set to 120. When the external CT number is 2, the CT NUM is set to 2CT, and as the default is set to 3CT.



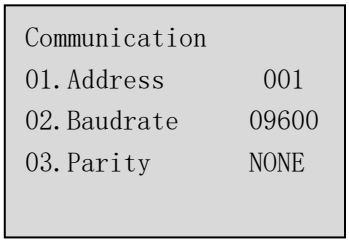
3.2.6 “SYSTEM” Submenu

There are five options for SYSTEM submenu, which are Communication, Password, Time Setting, Digital Input, and System Info.



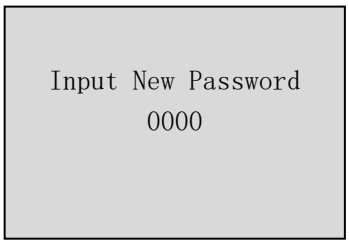
3.2.6.1 “Communication” Submenu

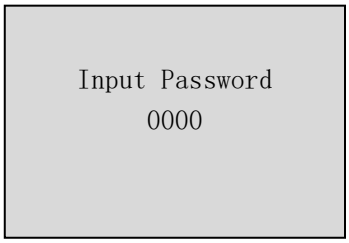
Enter the “Communication” submenu to set the communication address, baudrate, and parity. The communication address range is 001-254. The baudrate supports 2400, 4800, 9600, 19200, 38400, and as default is set to 9600. The parity can be set to none parity, odd parity, even parity, and as default is set to none parity.



3.2.6.2 “Password” Submenu

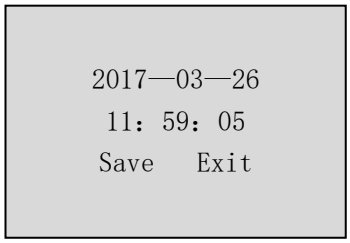
After entering the “Password” submenu, “Input New Password” is displayed. Here you need to enter a new password. Press “Enter” will be displayed “Input Password”. Here you need to enter the old password. If the old password you enter is right,the new password will be saved to the device.





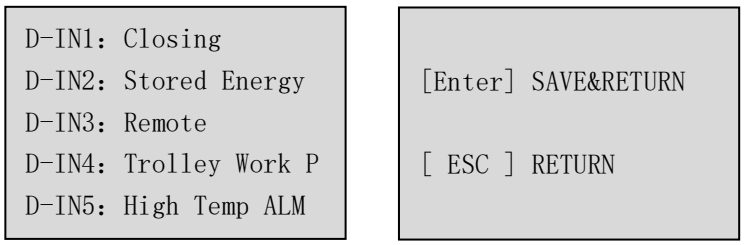
3.2.6.3 “Time Setting” Submenu

After entering the "Time Setting" submenu, the following is displayed. After adjusting to the correct date and time, select Save and enter the password to save.



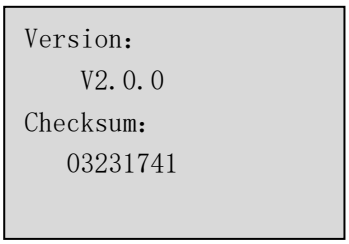
3.2.6.4 “Digital Input” Submenu

After entering the "Digital Input" submenu, the following picture is displayed. Each digital input channel signal can be defined here, but it cannot be defined repeatedly. After the setting is completed, press “ESC” to exit, the confirmation save menu is displayed, press “Enter” to save and return, press “ESC” to return but not save.



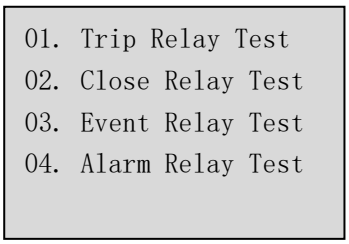
3.2.6.5 “System Info” Submenu

Go to the “System Info” submenu and display the device version and the device checksum.



3.2.7 “OUTPUT” Submenu

When entering the “OUTPUT” submenu, you need to enter the password. After the password is correct, can enter to the “OUTPUT” submenu. As shown in the figure below, select the the relay to test.



FOUR、Protection Function

4.1 List of Protection Function

Num	Name	Settings	Settings Range	Factory default
1	Over Current I Protection	Value Delay Enable	0～100A 0～100.00S EXIT/ALM/TRP	
2	Over Current II Protection	Value Delay Enable	0～100A 0～100.00S EXIT/ALM/TRP	
3	Over Current III Protection	Value Delay Enable	0～100A 0～100.00S EXIT/ALM/TRP	
4	Overload Protection	Value Delay Enable	0～100A 0～100.00S EXIT/ALM/TRP	
5	Time Inverse Current Protection	Value Delay Enable	0～100A 0～100.00S EXIT/ALM/TRP	Action time formula: $t=0.14\tau/[(I/Ie)^{0.02}-1]$
6	Zero Sequence Current Protection	Value Delay Enable	0～100A 0～100.00S EXIT/ALM/TRP	Ungrounded system
7	Negative Sequence Current Protection	Value Delay Fundametnal Negative Enable	0～100A 0～100.00S 0～1 0～9.9 EXIT/ALM/TRP	
8	Motor Startup Current Protection	Value Delay Start Time Cur Multiple Enable	0～100A 0～100.00S 0～99.9S 1～99.9 EXIT/ALM/TRP	
9	Motor Overheating Protection	Current Time Negative Cooling Time Enable	0～100A 0～9999S 0～20 0～999Min EXIT/ALM/TRP	Action time formula: $t=\tau/[K1\ (I1/Ie)^2+K2(I2/Ie)^2-1.05^2]$
10	Low Voltage Protection	Value Delay	5～160V 0～500S	Voltage setting is line voltage

		Enable	EXIT/ALM/TRP	
11	Over Voltage Protection	Value Delay Enable	5～160V 0～500S EXIT/ALM/TRP	Voltage setting is line voltage
12	Zero Sequence Voltage Protection	Value Delay Enable	5～160V 0～500S EXIT/ALM/TRP	
13	Negative Sequence Voltage Protection	Value Delay Enable	5～160V 0～500S EXIT/ALM/TRP	
14	Loss Voltage Protection	Value Delay Enable	5～160V 0～500S EXIT/ALM/TRP	Voltage setting is line voltage
15	Automatic Transfer Switch [Automatic backup power supply]	High Voltage Loss Voltage Delay ATS Mode Enable	5～160V 5～160V 0～30S MOD1/MOD2 EXIT/ACT	MOD1：switch to backup power line MOD2: resume to main power line
16	Long Startup Time Protection	Current Startup Time Enable	0～100A 0～500S EXIT/ALM/TRP	
17	Post Acceleration Protection	Value Delay Enable	0～100A 0～100S EXIT/ALM/TRP	
18	Reclose Protection	Delay Enable	0～300S EXIT/ACT	
19	Non-electricity 1	INPUT Delay Enable	D-IN01～D-IN08 0～100S EXIT/ALM/TRP	
20	Non-electricity 2	INPUT Delay Enable	D-IN01～D-IN08 0～100S EXIT/ALM/TRP	
21	Non-electricity 3	INPUT Delay Enable	D-IN01～D-IN08 0～100S EXIT/ALM/TRP	
22	Non-electricity 4	INPUT Delay Enable	D-IN01～D-IN08 0～100S EXIT/ALM/TRP	
23	PT Breaking	Enable	EXIT/ALM	
24	CT&PT Set	CT Ratio PT Ratio CT Num	1～10000 1～10000 3CT/2CT	

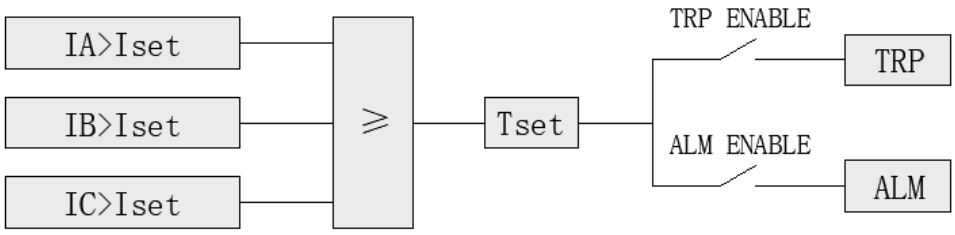
4.2 Protection Logic Diagram

4.2.1 Three-stage overcurrent protection

【Protection Function】

Three-stage overcurrent protection refers to over-current I protection, over-current II protection, and over-current III protection. When any phase current is greater than the set value, the trip or alarm is output to protect after a given delay time. The shortest time from the fault current occur to the protection action lasted is no more than 40ms (including the relay's inherent action time). In order to avoid the discharge time of the line arrester, the over-current I protection also can set the delay time .

【Logic Block Diagram】

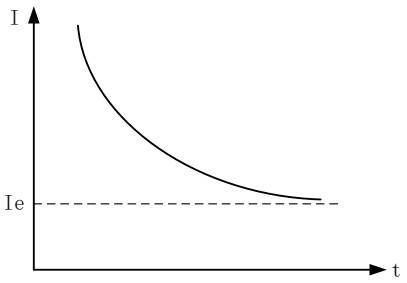


4.2.2 Time Inverse Current Protection

【Protection Function】

This protection is mainly used for transformers and motors .When any phase current is greater than the rated operating current , the protection starts after the delay time Tfs.

where the Tfs for the standard inverse time curve, the formula is:



$$t=0.14\tau/[(I/Ie)^{0.02}-1]$$

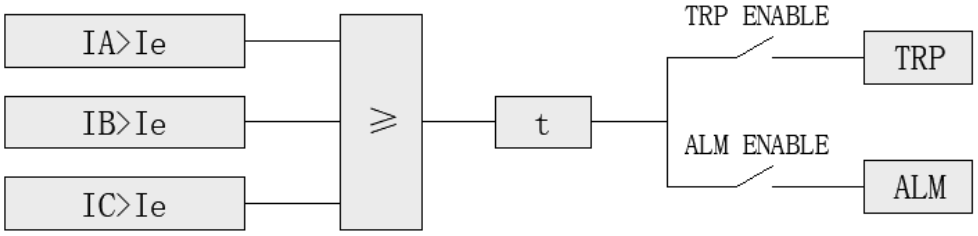
t: protection action time.

τ: time inverse constant.

Ie: rated operating current, in order to make the motor or transformer have a certain overload capacity, the Ie value can be appropriately increased, for example, set to 1.05 times the rated current.

I: Actual circuit current value.

【Logic Block Diagram】

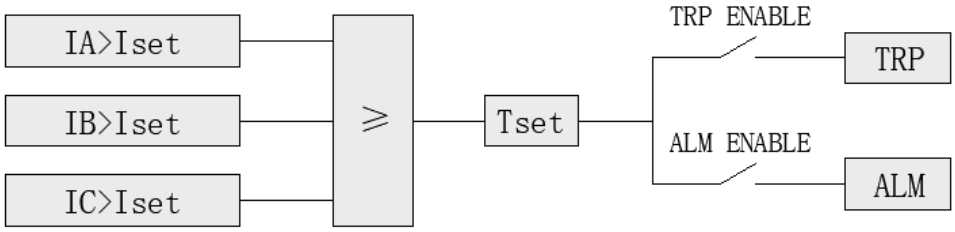


4.2.3 Overload Protection

【Protection Function】

When any phase current is greater than the set value, the trip or alarm is protected after a given time delay.

【】

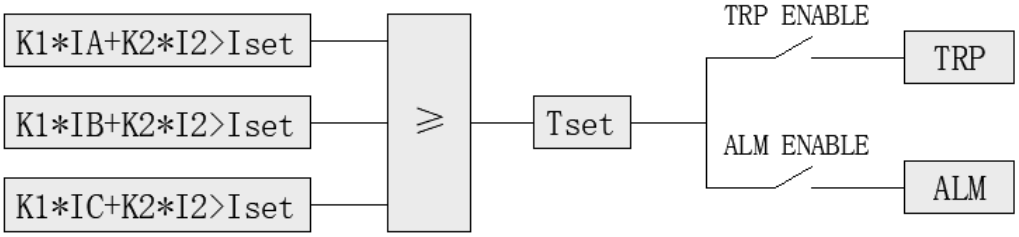


4.2.4 Negative Sequence Current Protection

【Protection Function】

This protection is mainly used for motor protection. When the motor current is asymmetrical, a large negative sequence current will appear, and the negative sequence current will generate two times the power frequency current in the rotor, which will greatly increase the rotor heat and endanger the safety of the motor. When the protection is enable, when the three-phase current of the motor is largely asymmetrical, and the negative sequence current is higher than the set negative sequence current and exceeds the time limit, the protection output will act. The time-delayed negative sequence overcurrent protection with proportional adjustment can be used for the main protection of the short-circuit, reverse-phase and loss of phase, and can also be used as a backup for the asymmetric short circuit.

【Logic Block Diagram】



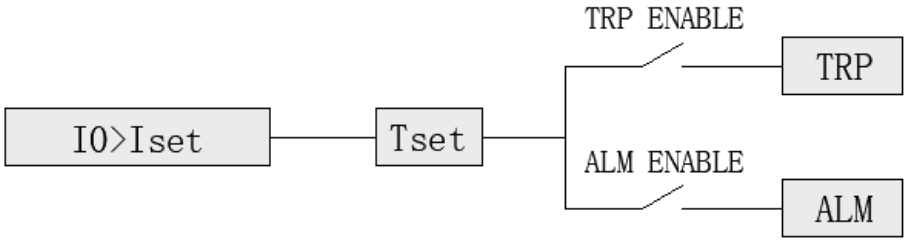
Note: K1 is the fundamental current factor, K2 is the negative sequence current factor, Iset is the action current value, T is the action time limit.

4.2.5 Zero Sequence Current Protection

【Protection Function】

The protection is used for a neutral point ungrounded system (grounded by an arc suppression coil), and the zero sequence current loop is rated at 1A;

【Logic Block Diagram】

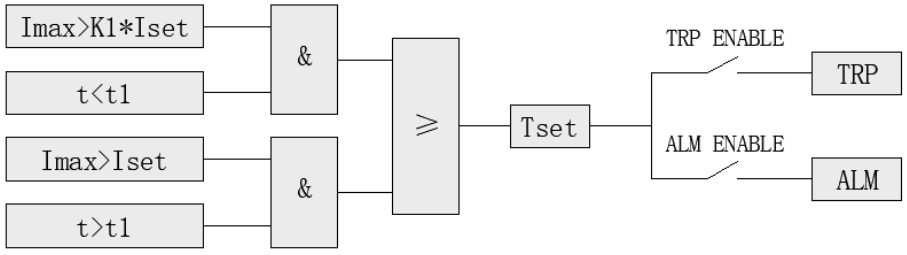


4.2.6 Motor Startup Current Protection

【Protection Function】

When the motor startup, there is a large startup current. In order to protect the motor works more reliably, the parameter t1 (startup time) and the parameter K1 (Current Multiple factor) are used to escape the normal startup current of the motor. When the motor starts, parameter t1 (startup time) timing starts, the protection current in the startup time is equal to the setting current value multiplied by the parameter K1 (Current Multiple factor), and automatically returns to the value of overcurrent protection (I > Iset) after the startup time; thus, It can effectively prevent the malfunction caused by excessive starting current during the startup process, and at the same time ensure the high sensitivity of the protection during normal operation. When the motor startup after the startup time, the current of any phase does not exceed the setting current value is a normal startup process.

【Logic Block Diagram】

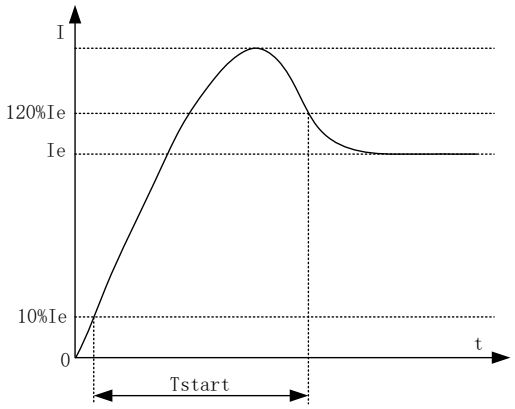


Note: Iset is the current action value, Imax is the maximum value of three-phase current, t1 is the motor startup time, K1 is the motor startup Current Multiple factor.

4.2.7 Motor Long Startup Time Protection

【Protection Function】

How the device measures Tstart(the motor startup time) value: when the maximum phase current of the motor is abruptly changed from zero to 10% Ie (Ie is the motor rated current), the time is reached until the start current exceeds the peak value and then drops to 120% Ie. This period of time is called Tstart. Since the motor starts to take too long to cause overheating of the rotor, the protection action is performed when the actual measured Tstart of the device exceeds the set allowable start time Tset (the set time of motor startup time).



I: actual running current

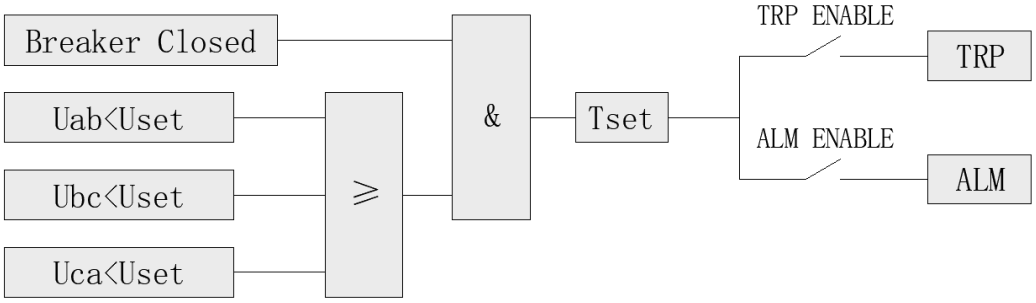
Ie: rated current, can set in the submenu of Long Startup Time Protection

4.2.8 Low Voltage Protection

【Protection Function】

When any one of the three-phase voltages is lower than the set value (Uset), and the circuit breaker is in the closing position, then delay Tset time the output will action trip or alarm.

【Logic Block Diagram】

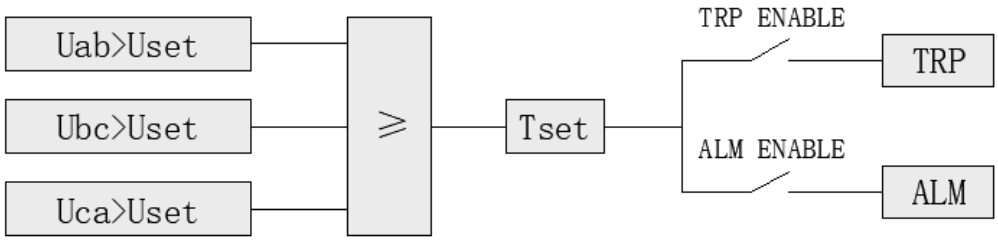


4.2.9 Over Voltage Protection

【Protection Function】

When any one of the three-phase voltages exceeds the set value (Uset), then delay Tset time the output will action trip or alarm.

【Logic Block Diagram】

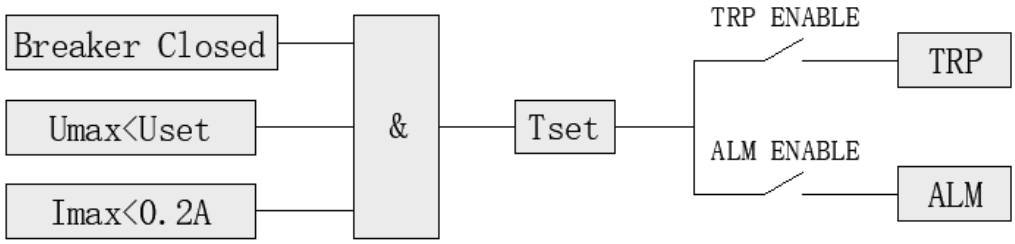


4.2.10 Loss Voltage Protection

【Protection Function】

When the voltage of system is losing, the protection action is performed after the set delay time. The loss voltage protection logic combines the no-voltage and no-current conditions.

【Logic Block Diagram】



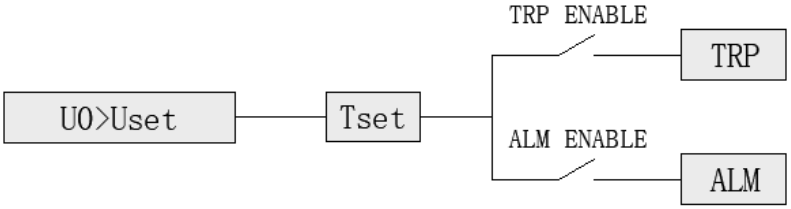
Note: Umax is the maximum value of line voltage, Imax is the maximum value of the three-phase current.

4.2.11 Zero Sequence Voltage Protection

【Protection Function】

It is suitable for the grounding protection of the small current grounding system. The zero sequence voltage is taken from the triangular voltage of the secondary side of the three-phase five-column voltage transformer.

【Logic Block Diagram】

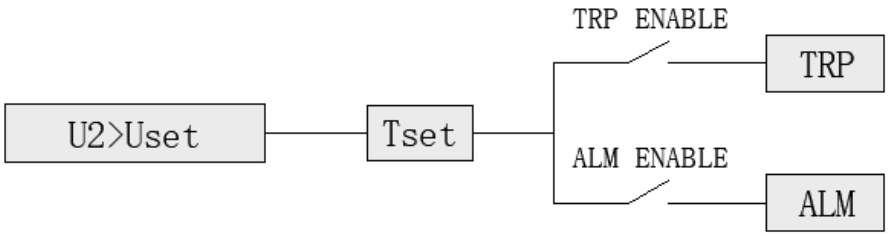


4.2.12 Negative Voltage Protection

【Protection Function】

When the negative sequence voltage is greater than the voltage setting value Uset, then delay Tset time the output will action trip or alarm.

【Logic Block Diagram】



4.2.13 Motor Overheating Protection

【Protection Function】

The motor overheating protection comprehensively considers of the thermal effect generated by the positive sequence current and negative sequence current of the motor, and provides protection for the overheating of the motor. The protection can also be used as backup protection for long startup time, stalling, and short circuit between motors.

The calculation formula for overheating protection is as follows:

$$t=\tau/[K1\ (I1/Ie)^2+K2\ (I2/Ie)^2-1.05^2]$$

t: protection action delay time;

τ : the heating time constant of the motor, corresponding to the overheating (overload) bearing capacity of the motor;

I1: motor positive sequence current;

I2: motor negative sequence current;

Ie: motor rated current (secondary value) ;

K1: motor positive sequence current heating factor, automatically set to 0.5 when cold start, automatically set to 1 after normal start;

K2: motor negative sequence current heating factor , it is recommended to set to 6。

According to the above formula, when the motor is in an abnormal state, the device starts to calculate the heat accumulation value of the motor:

$$H=\Sigma[K1\ (I1/Ie)^2+K2\ (I2/Ie)^2-1.05^2]\times\triangle t$$

When the heat accumulation value reaches the set tripping time constant, the device trips. When the heat accumulation value is above 50% of the trip value, the alarm signal can be set, the motor returns to normal, and the heat accumulation value falls below the alarm set value, the alarm signal is reset.

4.2.14 Reclose Protection

【Protection Function】

The reclosing function adopts the protection starting mode, and the reclosing function is activated only after the three-stage overcurrent protection action trips. When the charging is completed, three-stage overcurrent protection action is detected and no disable condition occurs. After the delay time, the reclosing operation is performed and discharged, and the reclosing operation only takes once. When it recloses with a permanent faulty line, the post-acceleration protection can be selected to accelerate the trip action.

◆ Reclosing protection charging condition

(1) Reclosing protection is activity;

(2) The circuit breaker is in closing position。

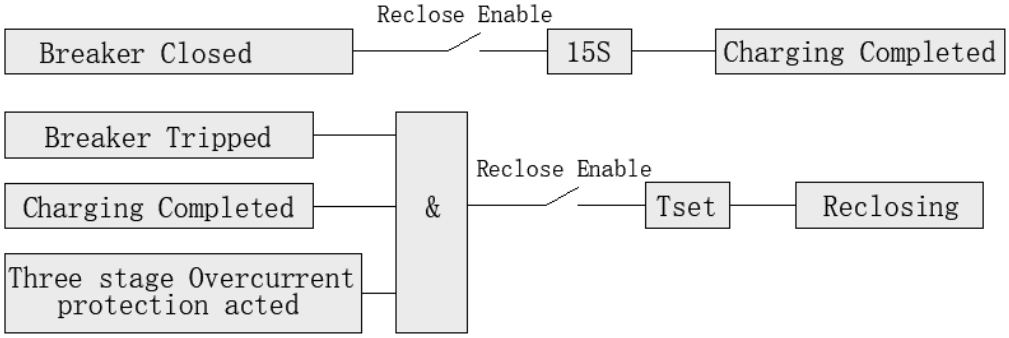
◆ Reclosing protection disable condition

(1) When manually tripping, directly disable the reclose protection and discharge;

(2) When the trip protection is not tripped by three-stage overcurrent protection, then disable the reclose protection and discharge;

(3) The reclose locked digital input is ON(A11=1).

【Logic Block Diagram】

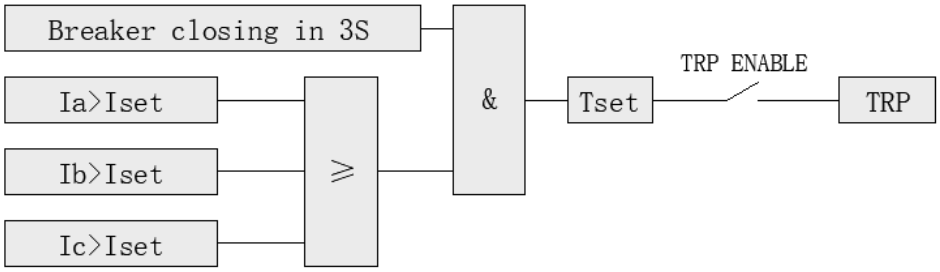


4.2.15 Post Acceleration Protection

【Protection Function】

The post-acceleration protection is suitable for speeding up the trip and preventing the fault from expanding when the hand-over or protection coincides with the faulty line. The post-acceleration protection only works within 3S after closing, and the acceleration function automatically exits after 3S. If the protection has been activated within 3S, the post-acceleration protection will continue until the protection action or protection returns before it can automatically exit. When any phase current is greater than the value of the post-acceleration protection current, the action can be protected by a settable delay time. This protection can be used as the charging protection of the busbar. It is only necessary to put the rear acceleration platen into the setting and set the acceleration current and time.

【Logic Block Diagram】



4.2.16 Automatic Transfer Switch [Automatic backup power supply]

For dual power supply systems, this protection can be used to achieve automatic and fast mutual investment of two power supplies. It is typically applied to the incoming line for Automatic backup power supply or parent-slave Automatic backup power supply. If dual power supply backup for eachother, we need set the ATS mode to MOD1, else if dual power supply divided into the main power and the backup power, then the main power side set the ATS mode to MOD1, and the backup power side set the ATS mode to MOD2.

Method 1: (Used for incoming line or self-injection, the protection applied to the incoming line cabinet is applicable to this method)

If dual power supply backup for eachother, we need set the ATS mode to MOD1, else if dual power supply divided into the main power and the backup power, then the main power side set the ATS mode to MOD1, and the backup power side set the ATS mode to MOD2.

ATS MOD1 action process: After the charging is completed, when the system is detected to be de-energized, the backup side incoming line is have right voltage, and ATS MOD1 protection start-up trip beside switch is confirmed, and then close the backup[opposite] side power switch after the beside switch is tripped.

◆ Charging condition

(1) The beside circuit breaker[switch] is in the closing position (A04=1);

(2) The backup[opposite] side circuit breaker[switch] is in the tripping position (A09=1);

(3) The beside line voltage is greater than the setting value Uon[High Vol];

(4) The backup[opposite] side line voltage Ux is greater than the value Uon[High Vol];

With the above conditions, after 20s delay time the charging is completed

◆ Discharge condition

(1) The digital input of ATS Locked signal is ON(A10=1);

(2) The beside and the backup[opposite] side lose power at the same time (no voltage, no current).

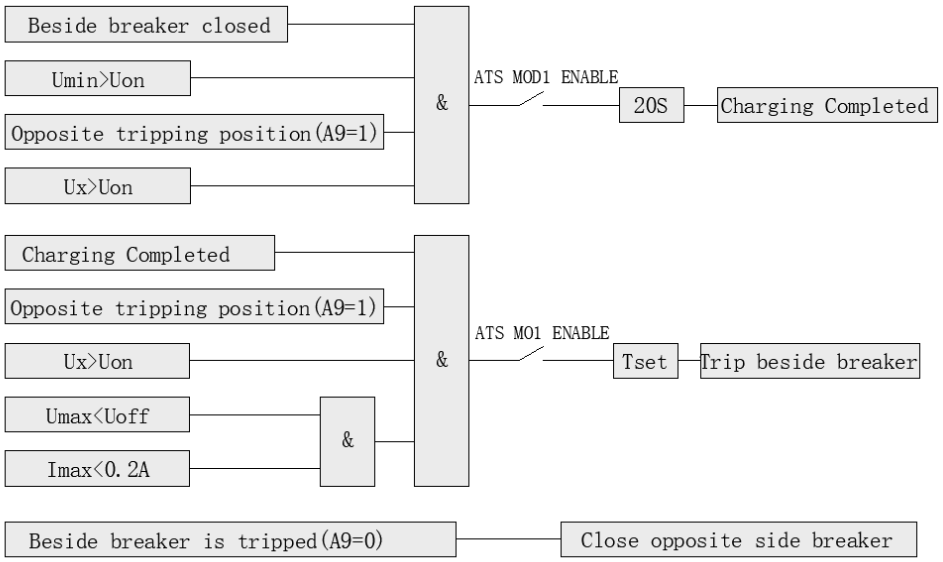
◆ ATS MOD1 action condition

(1) ATS MOD1 Charging is completed;

(2) The beside lose power (no voltage, no current).

(3) The backup[opposite] side line voltage (Ux) is greater than the set value Uon[High Vol].

【Logic Block Diagram】



Note: Umin is the line voltage minimum, Umax is the line voltage maximum, Imax is the three-phase current minimum

Method 2: (To achieve the main power self-recovery function, the protection installed in the backup line cabinet is applicable to this method)

If dual power supply divided into the main power and the backup power, then the main power side set the ATS mode to MOD1,and the backup power side set the ATS mode to MOD2.

ATS MOD2 action process : After the charging is completed, when it is detected that the opposite side incoming line is have voltage, the ATS MOD2 protection first trip beside breaker[switch], and after the beside breaker[switch] is tripped, then close the main power[opposite] side breaker[switch].

◆ Charging condition

(1) The backup [beside] circuit breaker[switch] is in the closing position (A04=1);

(2) The main[opposite] side circuit breaker[switch] is in the tripping position (A09=1);

(3) The backup [beside] line voltage is greater than the setting value Uon[High Vol];

(4) The main[opposite] side line voltage Ux is less than the setting value Uoff[Loss Vol];

With the above conditions, after 20s delay time the charging is completed.

◆ Discharge condition

(1) The digital input of ATS Locked signal is ON(A10=1);

(2) The beside and the backup[opposite] side lose power at the same time (no voltage, no current).

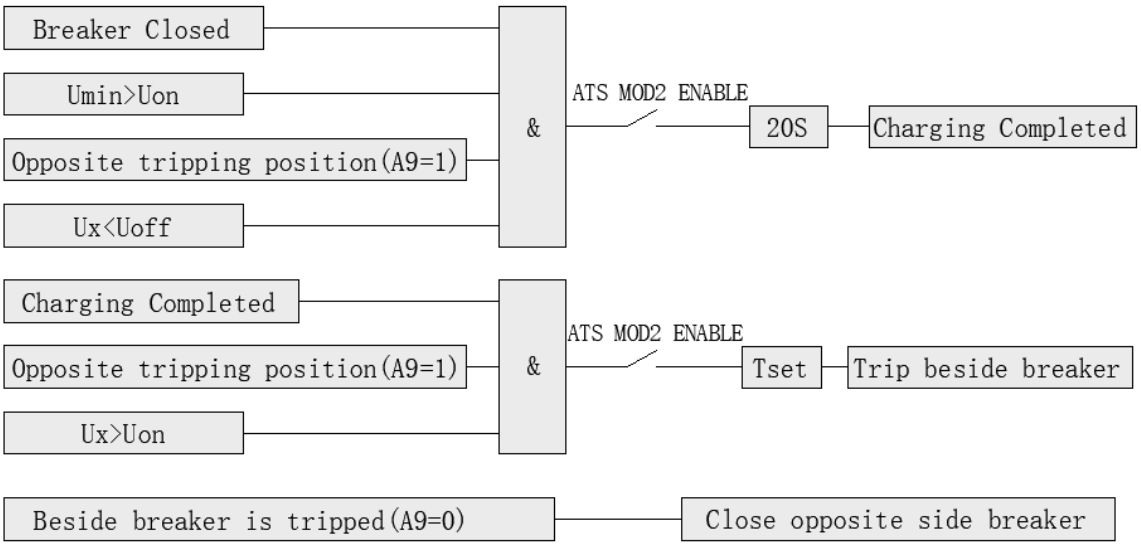
◆ ATS MOD2 action condition

(1) ATS MOD2 Charging is completed;

(2) The main[opposite] side line voltage (Ux) is greater than the set value Uon[High Vol];

(3) The delay time exceeds the set time setting Tset.

【Logic Block Diagram】



Note: Umin is the line voltage minimum

4.2.17 Non-electricity Protection

【Protection Function】

Non-electricity Protection Generally used for gas, temperature, cooling disappearance and chain trip protection, up to 4 channels non-electricity protection can be defined. After the protection is acted, as the default A8 is the light gas signal, the A9 is the heavy gas signal, the A10 is the high temperature signal, and the A11 is the over temperature signal.

◆ action condition

（1）Non-electricity X protection is acted;

（2）the corresponding digital input is ON.

FIVE、NOTICE

5.1 Check before power on

1) Check whether the working voltage, control power, AC current, voltage rating and other parameters on the product nameplate on the back of the protection device are consistent with the order form. If not, please contact us.
2) The grounding wire of the device must be reliably connected to the grounding wire of the switchgear. It is not allowed to connect the connecting plate of the front panel of the switchgear cabinet to the cabinet as a grounding connection, and the grounding wire must meet the low impedance requirement (less than 1 ohm).

5.2 Commissioning inspection and explanation

1) Check whether the cables and rear terminals of the device are connected and fixed reliably.
2) The LCD and indicator lights are normal after power-on.
3) Input quantity input check: Enter the “Switch quantity status” menu, perform the displacement test one by one according to the design drawing, and check whether the screen display is consistent with the actual status.
4) Execution quantity and analog input check: Add the rated value from the AC current (5A) and voltage (57.7V) input terminals of the switchgear (PK screen), and enter the “Switch status” menu in “Secondary electric quantity”. According to the design drawings, the actual amount of switching is tested one by one, and the screen display is consistent with the actual status.
6) When the product is first run, the relevant setting must be adjusted to ensure the normal operation of the protection device.
7) The protection value is set according to the power dispatching value setting notice. After all the protection values of the fixed value list are set, the verification is completed and archived. (Unrequired protection items are set to exit).
8) The switching time of the microcomputer output control signal is 1.5 seconds. If the circuit breaker coil cannot be divided/closed for 1.5 seconds, the switch is considered to be rejected and the event is recorded.

5.3 Common problem solving

Question 1: The circuit breaker has been closed and the microcomputer panel still displays the position.

Answer: The microcomputer's split indicator light is related to the opening amount 1 (A4).

1. Confirm that one end of the auxiliary open contact of the circuit breaker is connected to A-4, and the other end is connected to the common end.

2. When the circuit breaker is in position, measure A4 and A12 with a multimeter, and the normal condition is connected.

3. Short-circuit directly on A-4 and A-12, and the microcomputer indicator shows the position.

Question 2: How to check when the protection device trips or alarms.

A: You can query the fault or alarm information in the "Event Record" screen, 64 event records, the first one is the latest record, the 64th is the oldest, and each record records the time, fault type and fault value in detail.

Question 3: When the protection device trips or the alarm occurs, pressing the reset button cannot be successfully reset.

A: When the fault persists, the device cannot be reset. Only after the cause of the fault is removed can it be returned normally.

Question 4: What is the factory password for the protection device?

Answer: The factory password of the protection device is “0000”. If the user modifies the password of the protection device, it should be kept safely to avoid forgetting.