The controller

Installation Manual

1 Start preparation

1.1 Important steps

To ensure trouble-free operation for many years, please read the following sections carefully to help and guide you during the entire installation of the new relay.

Before attempting to install or use the relay, it is necessary to carefully concern all warnings and cautions in this manual to avoid personal injury, equipment damage or downtime.

1.1.1 Note

Note: The controller operator should know that if the device is used out of the conditions specified in this manual, it may result in property damage, personal injury or even death, and must comply with the relevant regulations and instructions in the manual.

The following icons included in this manual represent safety-related status or other important information:

 Electrical warning icon: Indicates the risk of electric shock may occur.

 Warning icon: Indicates that it may result in property damage, personal injury or even death.

 Information icon: to remind readers about the facts and conditions.

Early warning and warning may result in property damage, personal injury or even death, and must be clear; therefore, all warning and warning instructions must be strictly observed.

 Early warning: The backside terminals of the controller intelligent protection monitoring and control system may have dangerous voltage, even after disconnecting the auxiliary power within a few seconds it may also exist. When used, the grounding bolts on the backplane enclosure of the controller intelligent protection and control system must be well grounded.

WARNING: The controller intelligent protection and monitoring device contains static-sensitive devices. When opening the case, wear a good ESD-preventive wrist strap and avoid unnecessary contact with the device.

WARNING: To prevent electric shock, it must disconnect the device from the power input before opening the enclosure.

WARNING: The controller is not allowed to lay in the places where there has water vapor access, large temperature change, long time heavy vibration, or full of dust powder, flammable, explosive or corrosive gases.

Information: If the seal is broken, the warranty will be expired immediately, we can't ensure this device can work normally again, Volcano Electrical reserves the right of final interpretation.

1.2 Open the packing and chek

Open the The controller unit's box and check if it is actually damaged or missing items.

Check the label on the side of the controller and see if the model of the relay is consistent with the order model.

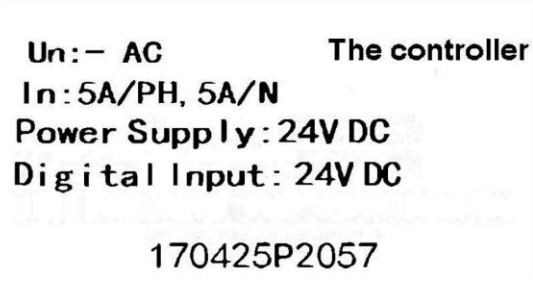


Figure 1-1. Identify the label

Please confirm receipt of the following items issued by the controller:

- Four studs and nuts that used to fix the controller unit into the panel.
- Factory test report

The information provided here does not include all the details of the changes described in the equipment, nor is it where the installation, operation and maintenance may be taken into account.

1.3 Safety instructions

The controller with shell grounding bolt shown in Figure 1-2 must be properly grounded.

Figure 1-2 The position of the grounding bolt

Before using the front USB port to communicate with the controller, make sure that the computer is grounded.

If you are using a laptop, do not connect it to the power supply. The reason is that the cable used for the power supply or connector may not be properly grounded.

The reason for this is: not only to protect the staff, but also to avoid the existence of the voltage difference between the relay serial port and the computer port. Because the voltage difference may cause the computer or the relay to be permanently damaged.

In the event of failure to comply with safety regulations,

1.4 Description

1.4.1 Introduction of system

With the increasing capacity of the power system, the scope of more and more wide, only the system components of the relay protection device, far from the full power system to prevent long-term large-scale power outage serious accident. In this regard, it is necessary to proceed from the overall situation of the power system to study the failure of the corresponding components after the action of the relay protection device, the system will show what conditions, the system will lose stability when what features, how to resume normal operation as soon as possible.

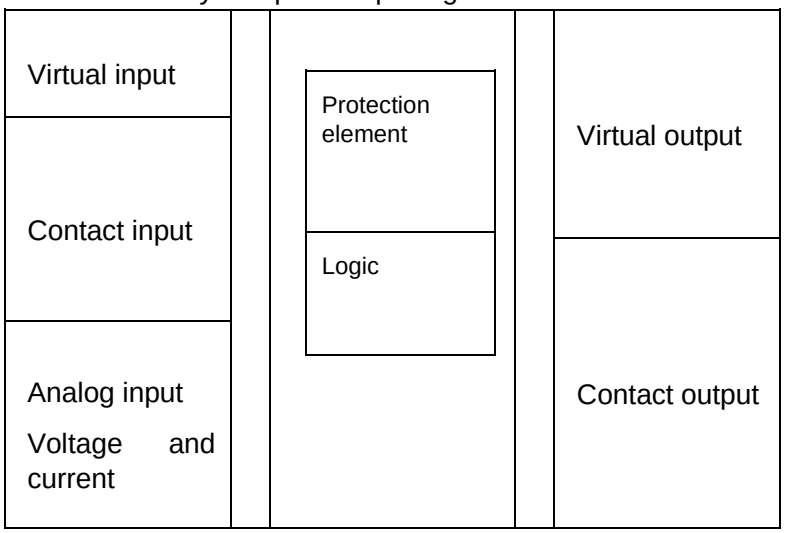
The task of system protection is when the normal operation of large power system is destroyed, as far as possible to limit the scope of its impact to a minimum, load power outage to a minimum.

The protection, control and measurement functions are initially performed by electromechanical components, then done by static components, finally by digital equipment. The digital device integrates all of these functions into a single device, known as an intelligent electronic device (IED). These IEDs must not only perform all the functions related to protection and control, but also communicate quickly, share information with each other, and send this information to the control dispatch center, which can lessen the usage of components and wiring by up to 70 %.

The controller is just one of these new generation devices and can be easily used with substation automation systems.

1.4.2 Hardwares

The controller performs protection and control functions with a series of interconnect modules. First, it includes a set of AC transformers to detect current and voltage. These amplitudes are digitized and sent to a digital signal processor (DSP). The controller is a digital rela, its CPU can control a variety of input / output signals.



Theory illustration of The controller

Contact input / output: the signal of from actual input / output contacts of relay

Analog input: input signal come from the current and voltage transformer, used to monitor the power system signal.

Logic: logic controller. It is a control module that performs a unit configuration (input / output value) and implements a logic circuit.

Protection components: Relay protection components, such as overcurrent, overvoltage, undercurrent, undervoltage, low frequency, over frequency protection.

1.4.3 Software

The controller through the BP-PLP software can monitor data in real time, display phase angle vector illustration, display status, display SOE events and fault wave, user-friendly at the factory or in the field device settings, debugging and modification work.

The communication interface (USB, RS485, Ethernet) in the front of the panel and backside can be used to communicate with the BP-PLP software.

1.4.4 Communication

The processor performs detection, protection, control and communication functions. It uses a dedicated serial port to communicate with the HMI. Serial connection has a strong resistance to electromagnetic interference. Thus enhancing the security of the system.

The controller has a USB serial port in front of panel, followed by another two communication modules.

A module provides asynchronous serial communication function, using the RS485 physical media. An RS485 physical channel can be connected up to 32 nodes, each node of the RS485-connected in the same line, RS485 + even in the twisted with another line, SHIELD for the common reference grounding, the same bus on the The SHIELD of the unit must be connected and grounded well.

Another module for Ethernet communication, using 10base-T physical layer standard, RJ45 connector. You can select the dual Ethernet simultaneous operating mode, see order number.

The controller is equipped with a standard interface: this USB interface located on the front panel,

One or two Ethernet interfaces on the backplane is optional, one RS-485 interface on the backplane.

Communication protocol: IEC60870-5-103, Modbus RTU, Modbus TCP / IP protocol, different communication port can be set to different specifications, you can run at the same time.

1.5 BP-PLP software

1.5.1 System requirements

The BP-PLP software interface is the preferred means of editing settings and viewing actual values. Because the PC monitor can display more contents by a simple, compressible format.

To operate the PC correctly, the following minimum requirements for the BP-PLP software must be met:

- Pentium® or higher processor (Pentium® II 300 MHz or higher)
- Windows® NT 4.0 (Service Pack 3 or higher), Windows® 2000, Windows® XP
- Internet Explorer® 5.0 or higher
- 64 MB of RAM (128 MB recommended)

- 40MB of available system drive space and 40MB of available installation drive space
- USB serial and Ethernet ports for communication with the controller.
- Install the USB driver software (CH341SER.EXE)
- GPS time card (option)
- 1024 * 768 and above resolution displays

1.5.2 Installation

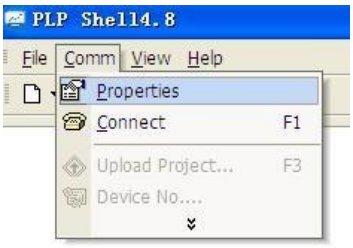
Copy the folder with the BP-PLP package to your computer.

1.5.3 Configure the USB connection

Before starting, make sure that the USB serial cable is properly connected to the USB port on the front panel of the controller unit.

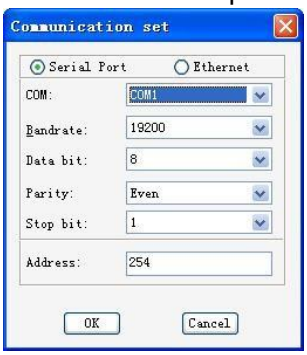
① open the package "PLP" package and start "PLP.exe"

② Click the "Communication" option in the toolbar and select "Settings" to bring up the "Communication Settings" dialog box.



③ The controller device and "PLP" software communication in two ways, one for the front panel USB serial communication, one for the back of the Ethernet port communication.

Click the "Use Serial Port" option and set the relevant parameters.

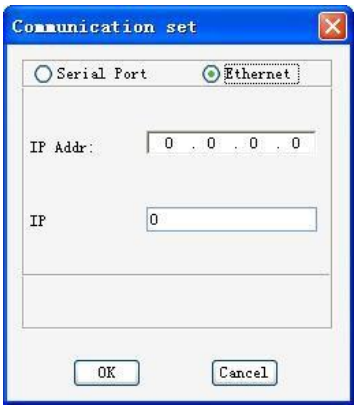


"Serial number" is selected according to the computer, "19200", "data bits" select "8", "parity" select "even parity", "stop bit" select " 1 "," Device Address "fill in" 254 ", set the parameters and click" OK ".

④ Click the "Connect" icon ☎ to complete the connection between the controller SETUP software and the controller device. 1.5.4 Configure the connection of Ethernet

Before starting, make sure that the Ethernet cable is properly connected to the Ethernet port on the back of the device.

The connection between the Ethernet and the device has same procedure as the connection between the USB and the device, click the "Use Ethernet" option when communicating. And set the relevant parameters, and then click the connection icon to finish the connection.



1.6 Order code

	BC5	X	*	X	X	*	*	H	1	*	*	*	*	
Name	BC5													The controller Automatic reclosing controller
Application		61												Protect feeder
Phase														
									1					
		1A	CT current											
									5					5A CT
Earthing current								S						0.2A CT
								1						1A CT
								5						5A CT
Power								H						110/220V DC or 220V AC or DC24V
Communication										D				RS485 : Modbus RTU, IEC60870-5-101 ,DNP3.0
										E				10/100M RJ45 : Modbus TCP IEC60870-5-104 DNP3.0
Language														E English interface C Chinese interface

2 product description

2.1 Summary

The controller intelligent protection and control system integrates protection, control, monitoring, measurement and recording. It adopts large capacity, resource redundancy design and plug-in plug-in structure. It is suitable for protection, control, measurement and monitoring of various voltage level power systems, Can be configured for a variety of distribution reclose, Section controller and other special protection. Users can choose according to the needs of the scene, apply different models, applied to different objects. They can be used for different main wiring methods, such as single bus, double bus and multi-bus wiring. The protection function also supports different types of power grids, such as a neutral point ungrounded system, an arc suppression coil grounding system and a small resistance grounding system. In addition, The controller can store four sets of protection settings, group switching function to quickly and easily adapt to a variety of operating methods. Time synchronization, event reporting, waveform capture, reduced troubleshooting time, and reduced maintenance costs. The controller supports RS485 bus and Ethernet communication network form, to meet the different users, different industrial sites, different network environments, different sizes of systems on the communication and network structure requirements. And support dual-network mode, parallel or hot standby mode. Thereby further improving the reliability of the communication. You can use ModbusRTU, ModbusTCP, DNP3.0, IEC60870-5-101/104 protocol to achieve communication with the upper equipment.

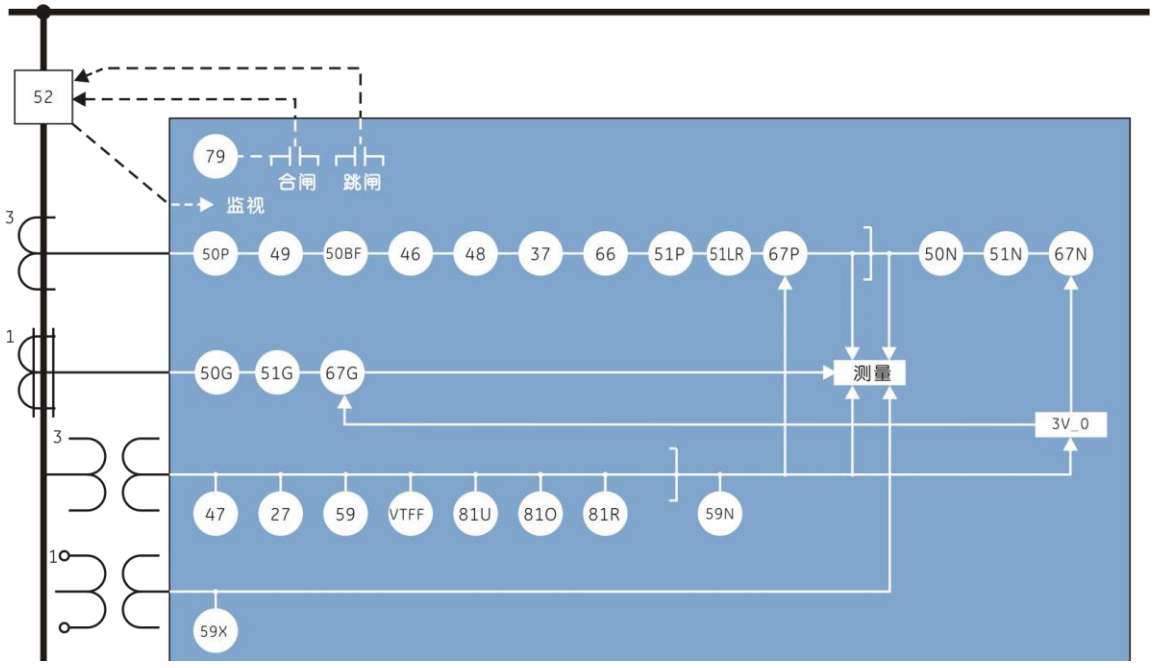


Figure 2.1 The controller Functional block diagram

2.2 The controller function at a glance

2.2.1 ANSI code and protection functions

ANSI code	Features
27	Phase undervoltage
27X	Auxiliary circuit undervoltage
37	Undercurrent
46	Negative sequence overcurrent
47	Negative sequence overvoltage
48	Start too long
49	Thermal overload
50P1	Definite time overcurrent I stage
50P2	Definite time overcurrent II stage
50P3	Definite time overcurrent
50N	Zero sequence overcurrent
50G	Grounding overcurrent
50BF	Circuit breaker failure
51P	Inverse time limit overcurrent
51N	Zero sequence Inverse time limit overcurrent
51G	Grounding reverse time limit overcurrent

ANSI code	Features	
59N	Zero sequence overvoltage	
59X	Auxiliary circuit overvoltage	
66	Maximum number of starts	
67P	Phase direction overcurrent	
67N	Zero sequence direction overcurrent	
67G	Grounding direction overcurrent	
79	Three-phase reclosing	
81U	Low frequency	
81O	over frequency	
81R	Frequency change rate (slip)	
VTFF	VT line disconnected	
	Trip loop monitoring	
	Rewound overcurrent	
	Circuit breaker remote control division	
	Non-power protection	Light gas warning
		Heavy gas tripping

51LR	Stall protection			Pressure release
59	Phase overvoltage			Temperature protection

The controller (Recloser) function：

ANSI code	Features
27	Phase undervoltage
46	Negative sequence overcurrent
50P1	Definite time overcurrent I stage
50P2	Definite time overcurrent II stage
50P3	Definite time overcurrent III stage
50N	Zero sequence overcurrent
50G	Grounding overcurrent
50BF	Circuit breaker failure
51P	Inverse time limit overcurrent

ANSI code	Features
51N	Zero sequence Inverse time limit overcurrent
51G	Grounding reverse time overcurrent
59X	Auxiliary circuit overvoltage
81U	Low frequency
79	Three-phase reclosing
	Trip loop monitoring
VTFF	VT line disconnected
	Sensitive Grounding overcurrent
	Reclosing conditions

The controller-II (LBS controller) function：

ANSI code	功 Features
27	Phase undervoltage
81U	Low frequency
50N	Zero sequence overcurrent
50G	Grounding overcurrent

ANSI code	Features
51N	Zero sequence Inverse time limit overcurrent
51G	Grounding reverse time overcurrent
59X	Auxiliary circuit overvoltage
	Trip loop monitoring

50BF	Circuit breaker failure		VTFF	VT line disconnected
51P	Inverse time limit overcurrent			Sensitive Grounding overcurrent
	SF6 LOW/ALARM			
	Manual lock			

2.2.2 Other functions

Input / output: 8 loops AC current, 4 loops AC voltage input; up to 16 contact inputs, 8 contact outputs (one of which is device fault signal).

Measurement: including three-phase (line) voltage, zero sequence voltage, voltage average, three-phase current, zero sequence current, current average, three-phase power factor, average power factor, frequency, two-way active power, and reactive power;

Communication: front panel USB interface, backside RS485 interface, back Ethernet interface, a variety of communication protocols: Modbus TCP / IP, Modbus RTU, IEC60870-5-103,DNP3.0;

Monitoring: event recording 100 events; high-resolution recording, can sample 28 cycles of data / bar, sampling rate of 32 / week; 8 LED lights; can be configured value, the parameters of the human-machine interface; LCD liquid crystal display.

Other: clock synchronization; BP-PLP software; multi-rating group (4 sets of settings).

2.3 Technical specifications

2.3.1 Protection elements

protection

2.3.1.1 Phase undervoltage（**27**）

Voltage: Phase-to-phase voltage of the fundamental phase (no harmonics)

Start value: 10 ~ 120V, step 0.1V

Reset value: 102% ~ 103% start value

Accuracy: ± 3% of reading value

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35mS (take a large value)

2.3.1.2 Auxiliary circuit undervoltage（**27X**）

Start value: 10 ~ 120V, step 0.1V

Reset value: 102% ~ 103% start value

Accuracy: ± 3% of reading value

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35mS (take a large value)

2.3.1.3 Undercurrent（**37**）

Current: fundamental phase (no harmonics)

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 102% ~ 103% start value

Accuracy: ± 3% of reading value ± 10mA from 0.1 to 0.5CT and ± 3% of reading value at 0.5CT

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35mS (take a large value)

2.3.1.4 Negative sequence overcurrent（**46**）

Current: fundamental phase (no harmonics)

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 97% ~ 98% start value

Accuracy: ± 3% of reading value ± 10mA from 0.1 to 0.5CT and ± 3% of reading value at 0.5CT

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35mS (take a large value)

2.3.1.5 Negative sequence overvoltage（**47**）

Start value: 10 ~ 120V, step 0.1V

Reset value: 97% ~ 98% start value

Accuracy: ± 3% of reading value

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35mS (take a large value)

2.3.1.6 Definite time limit overcurrent I/II/III stage（**50P1/50P2/50P3**）

Current: fundamental phase (no harmonics)

Direction: positive / reverse direction optional

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 97% ~ 98% start value

Accuracy: ± 3% of reading value ± 10mA from 0.1 to 0.5CT and ± 3% of reading value at 0.5CT

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35mS (take a large value)

2.3.1.7 Zero sequence overcurrent（**50N**）

Current: fundamental phase (no harmonics)

Direction: positive / reverse direction optional

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 97% ~ 98% start value

Accuracy: ± 3% of reading value ± 10mA from 0.1 to 0.5CT and ± 3% of reading value at 0.5CT

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35mS (take a large value)

2.3.1.8 Grounding overcurrent（**50G**）

Current: fundamental phasor (no harmonics)

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 97% to 98% start value

Accuracy: ± 3% of reading value ± 10mA from 0.1 to 0.5CT and ± 3% of reading value at 0.5CT

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% of the action time or ± 35mS (take a large value)

2.3.1.9 Inverse time limit overcurrent (51P)

Current: fundamental phasor (no harmonics)

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 97% to 98% start value

Action curve: general / strong / super / long reverse time limit

Inverse time limit constant: 0 ~ 1, step 0.01

Accuracy: ± 5% of the action time or ± 40ms (take a large value)

2.3.1.10 Zero sequence Inverse time limit overcurrent (51N)

Current: fundamental phasor (no harmonics)

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 97% to 98% start value

Action curve: general / strong / super / long anti-time limit

Inverse time: 0 ~ 99s, the difference between 0.01s

Accuracy: ± 5% of the action time or ± 40mS (take a large value)

2.3.1.11 Grounding Reverse Time Overcurrent (51G)

Current: fundamental phasor (no harmonics)

Start value: 0.1 ~ 19CT, step 0.01CT

Reset value: 97% to 98% start value

Action curve: general / strong / super / long anti-time limit

Inverse time: 0 ~ 99s, the difference between 0.01s

Accuracy: ± 5% of the action time or ± 40mS (take a large value)

2.3.1.12 Phase overvoltage (59)

Voltage: phase-to-phase voltage of the fundamental phase (no harmonics)

Start value: 10 ~ 120V, step 0.1V

Reset value: 97% to 98% start value

Accuracy: ± 3% of reading value

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% of the action time or ± 35mS (take a large value)

2.3.1.13 Zero sequence overvoltage (59N)

Start value: 10 ~ 120V, step 0.1V

Reset value: 97% to 98% start value

Accuracy: ± 3% of reading value

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% of the action time or ± 35mS (take a large value)

2.3.1.14 Phase direction overcurrent (67P)

ABC phase sequence: phase A (VBC), phase B (VCA), phase C (VAB)

ACB phase sequence: phase A (VCB), phase B (VAC), phase C (VBA)

Polarization Current: Three Phase Line Current

Polarization voltage threshold: 10 ~ 120V, step 0.1V

Characteristic angle: -45 ° ~ 135 °

Directionality: forward and reverse can be selected by setting

Angle accuracy: ± 1 ° when I> 0.5A, V> 20Vac

Response time: <30ms

2.3.1.15 Zero sequence direction overcurrent (67N)

Polarization: voltage (zero sequence), current (zero sequence)

Polarization voltage threshold: 10 ~ 120V, step 0.1V

Characteristic angle: -135 ° ~ 45 °

Directionality: forward and reverse can be selected by setting

Angle accuracy: ± 1 ° when I> 0.5A, V> 20Vac

Response time: <30ms

2.3.1.16 Grounding Direction Overcurrent (67G)

Polarization: voltage (Uch4), current (I01)

Polarization voltage threshold: 10 ~ 120V, step 0.1V

Characteristic angle: 0 ° ~ 180 °

Directionality: forward and reverse can be selected by setting

Angle accuracy: ± 1 ° when I> 0.5A, V> 20Vac

Response time: <30ms

2.3.1.17 Over frequency (81O)

Start value: 45.5 ~ 55Hz, step difference 0.01Hz

Reset value: ± 0.1Hz for start value

Accuracy: ± 0.01Hz

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% action time or ± 35ms (take a large value)

2.3.1.18 Frequency change rate (low frequency) (81R / 81U)

Slip lock start value: 1Hz / s ~ 10Hz / s, step 0.1Hz / s

Low frequency start value: 45.5 ~ 55Hz, step 0.01Hz

Reset value: ± 0.1Hz for start value

Accuracy: ± 0.01Hz

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 5% action time or ± 50ms (take a large value)

2.3.1.19 Circuit Breaker Failure (50BF)

Current: fundamental phasor (no harmonics)

Monitoring start value: 0.1 ~ 19CT, step 0.01A

Reset value: 97% to 98% start value

Accuracy: ± 3% for ± 0.1% for 0.1 to 0.5 CT and ± 3% for> 0.5CT

Delay accuracy: ± 3% of the action time or ± 35mS (take a large value)

2.3.1.20 Three-phase reclosing (79)

Program: three-phase trip program

Closing times: 1 reclosing can be made before locking

The whole group reset time: 0 ~ 99s, grade difference 0.01s

Charging time: 0 ~ 99s, grade difference 0.01s

Allowed condition: Optional by setting

Action time: 0 ~ 99s, step 0.01s

Delay accuracy: ± 3% of the action time or ± 35mS (take a large value)

2.3.1.21 VT line disconnection (VTFF)

The algorithm is based on negative sequence voltage and low voltage determination or with current, without voltage

2.3.2 Measurement and measurement accuracy

Protection current: ± 1%

Measuring current: ± 0.5%

Voltage: ± 0.5%

Phase angle: ± 1 °

Power factor: ± 0.5%

Frequency: ± 0.01Hz

Power: ± 0.5%

Active power: ± 0.5%

Reactive power: ± 0.5%

2.3.3 Monitor

2.3.3.1 Transient events

Capacity: 100 scrolling events

Resolution: 1ms

Trigger: Digital input input state change, protection element trigger, device power on, self-test status change, value change Save: Save in nonvolatile memory

2.3.3.2 Recording waves

Record: 8 records

Sampling: 32 points / week

Record length: 28 weeks / bar

Data: 5 current channels, 4 voltage channels, 112 status bits

Storage: Save in nonvolatile memory

Format: COMTRADE format

2.3.4 input

2.3.4.1 Current input

Measuring range: 0 ~ 99A

Power consumption: rated 5A, each phase is not greater than 0.5VA Rated 1A, each phase is not greater than 0.2VA Rated at 0.2A, not more than 0.1VA per phase Overload capacity: 3 times the rated current, continuous work 20 times the rated current for 4s 50 times the rated current for 1s

2.3.4.2 contact input input

Voltage threshold: 18 ~ 36VDC

Impedance:> 100KΩ

Debounce time: 1 ~ 99ms, step 1ms

2.3.4.3 Voltage input

Measuring range: 0 ~ 120V

Power consumption: rated at 100V when each phase is not greater than 0.3VA Overload capacity: 1.4 times the rated value, continuous work

2.3.5 Output

DO1-4

Contact Type: FormA

Continuous bearing: 5A

Breaking capacity: DC, inductive load, L / R = 40ms, 220V / 0.5A

DO5-8

Contact Type: FormA

Continued carrying: 3A

Breaking capacity: DC, inductive load, L / R = 40ms, 220V / 0.15A **ALARM**

Contact Type: FormB

Continued carrying: 3A

Breaking capacity: DC, inductive load, L / R = 40ms, 220V / 0.15A

2.3.6 Control power supply

Rating: 220VDC / AC or 110 VDC / AC

Range: 176-256 VDC, 160-240 VAC @ 50 Hz

Power consumption: normal work less than 10W, action is not greater than 15W

Loss of pressure to maintain time: 220VAC / DC 100ms, no device reset

2.3.7 communication

2.3.7.1 USB port

Version: 2.0

Agreement: manufacturer agreement

2.3.7.2 RS485

Rate: 1200-38400bps

Default rate: 9600bps

Protocol: Modbus RTU, IEC60870-5-101,DNP3.0

2.3.7.3 Ethernet port

Mode: 10 / 100M (adaptive)

Interface: RJ45

Protocol: Modbus TCP / IP,DNP3.0 IEC60870-5-104

2.3.8 Type test

Dielectric strength: GB / T14598.3-2006: 2000VAC

Insulation resistance: GB / T14598.3-2006:> 100MΩ

Impulse voltage: GB / T14598.3-2006: 5KV

Vibration test: GB / T11287-2000: Level 1

Impact and Collision: GB / T14537-1993: Level 1

Oscillation wave immunity: GB / T14598.13-2008: Level 3, 1MHz, 2.5KV / 1KV

Electrostatic discharge: GB / T14598.14-1998: 4, ± 8KV contact / ± 15kv air

Radiation Electromagnetic Field: GB / T14598.9-2002: Level 3, 10V / m

Fast transient: GB / T14598.10-2007: Class A, ± 4KV / 2.5KHz and 5KHz

Surge immunity: GB / T 14598.18-2007: Level 3, ± 2KV / ± 1KV, 1 time / min

Radio frequency immunity: GB / T 14598.17-2005: Class 3, 10V

Radiation emission limit: GB / T 14598.16-2002: range 30MHz ~ 1000MHz, ranging 3m, step 5KHz, 1ms, bandwidth 120KHz

Conducted emission limits: GB / T 14598.16-2002: range 150KHz ~ 30MHz, step 5KHz, 20ms, IF bandwidth 9KHz

2.3.9 Mechanical properties

Enclosure: metal shell,
262 × 317 × 51mm (width × height × depth),

Weight: net weight of about 6.0KGs, transport weight of about 7.5KGs

2.3.10 Environmental conditions

Operating temperature: -20 ℃ ~ +60 ℃

Storage temperature: -40 ℃ ~ +80 ℃

Humidity: 90% non-condensing

Type test report may be provided if required by the customer.

3 The controller installation

3.1 Mechanical installation

3.1.1 The controller product size

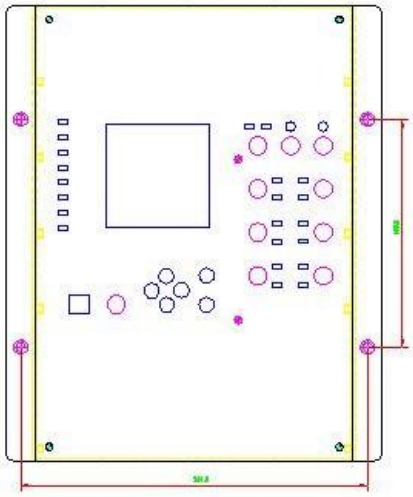
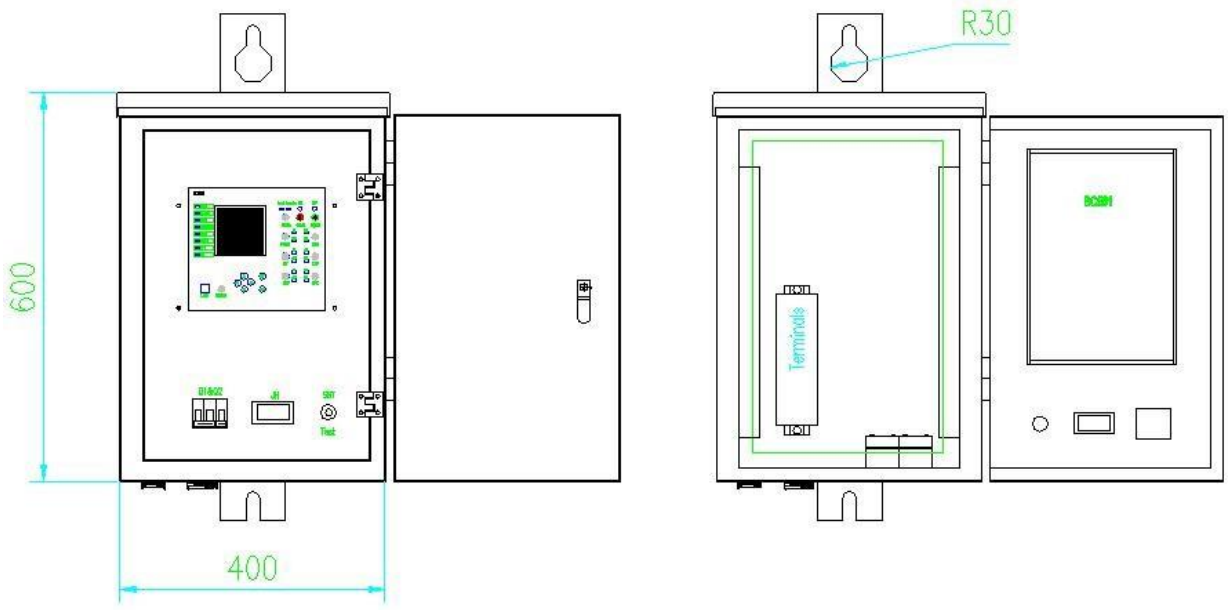


Figure 3.1 The controller outline structure



The controller in the controlbox

3.1.2 installation method

First, according to the hole shown in Figure 3.1, in the cabinet panel cut the shadow part of the hole.

Step 1: The controller device is introduced from the front into the open hole,

Step 2: Open the flip tab at both ends of the device and insert the four mounting screws that are carried in the mounting hole.

Step three: tighten the attached mounting nut, the intensity can be appropriate. Installed the controller around to leave some space in order to facilitate heat, handling, wiring and operation.

3.2 Front panel

Figure 3.2 The controller (Recloser) device front panel

The controller-II (LBS controller) device front panel The controller front panel totally including:

- 7 keys,9 quick keys
- 1 USB interface,
- 8 LED indicators,
- A 128 × 128 LCD monitor.

The controller settings in the panel, the user through the operation of the button on the device settings, parameters and other data settings, the device can be through the liquid crystal display and LED lights to observe. Can also be used with the data cable connected with the computer, through the matching BP-PLP software can monitor data in real time, display phase angle vector, display status, display SOE events and fault wave recorder, user-friendly device in the field settings, debugging and modify the work.

3.2.1 LCD display

The controller uses a liquid crystal display, which uses 128 * 128 dot matrix, you can display a lot of information, such as:

- One-line diagram, including switch and span, real-time position;
- Measure current, voltage, power and other real-time values, current, voltage real-time waveform;
- Device version, serial number, self-test, and so on
- Event Reporting (SOE)
- Various device parameters
- Various setting parameters
- Time

3.2.2 LED indication

The controller device has eight LED indicators that can be used to indicate the operating status of the device, protection action information, device alarms, communication status, and associated various BOOL variables.

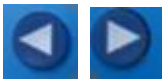
Indicator light	Colour	annotation
LED1～LED8	red light	Instructions for device protection actions or alarms

Table 3.1 The controller indicator definition

Information: The indicators listed in Table 3.1 are defined as the initial definition at the factory. The actual indicator light will be slightly different from the device model. Please use it as a physical object and can also be customized according to the user's requirements.

3.2.3 button

There are 7 buttons on the controller panel, and their functions are shown in the table below (Table 3.2).

key	icon	description
"Up" / "Down" key		Move the cursor up or down or increase or decrease the value
"Left" / "right" key		Left and right to move the cursor or switch between the main screen
Enter		Go to the next level menu or follow the screen prompts

"Return", "cancel" key	ESC	Return to the previous menu or follow the screen prompts
Reset key	RESET	Reset signal indicatorKeep property relays and signal relays

Figure 3.2 The controller front panel key definition table

MODE：remote/local key

CLOSE：closing key

OPEN：opening key

PROT ： all protection allow EF ：

Ground protect allow

SEF：Sensitive ground allow

ARC：allow reclose control

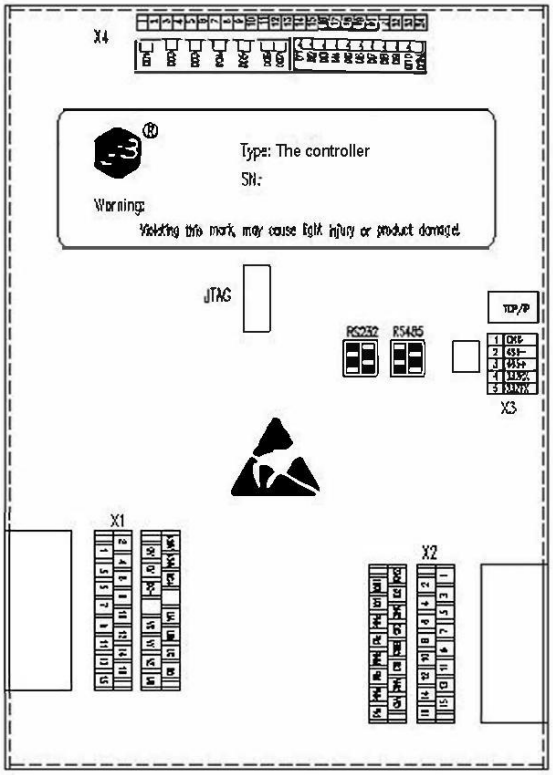
CLP：cold load protect

HLT：hot line tag

3.3 Backplane terminal description

The backside terminal block of the controller is defined as shown below

With Ethernet, RS485



Terminal definition:

Terminal group X1 is analog AC voltage input terminal, the power supply terminal;

Terminal group X2 is analog AC current;

Terminal group X3 is RS-485 interface;

Terminal group X4 for the connection input and output terminal;

1 Ethernet port, 1 RS-485 communication,

3.4 Electrical wiring

3.4.1 AC current, voltage wiring

The double row terminal x1 of the controller backside is used for AC connection terminal that allows cable with a maximum diameter of 6 mm². total 8 pairs terminals connected with CT, connected to the PT, no common terminal, to facilitate the external wiring.

Information: The protection grounding connected to the controller backplane communication terminal X1 should be grounded at the installation of the controller unit, rather than grounding at the installation of the CT or PT. Also, the controller installation must have a good grounding system.

Warning: The PCB parts inside the controller are mostly static-sensitive devices, open the enclosure must wear a good grounding anti-static bracelet.

The controller can support five basic AC wire connections, as shown in Table 3.3. Among them: the way 1, 4 for the incoming line, feeder, distribution transformer, motor, transformer backup protection and control,

Mode 2 and Mode 3 are suitable for the protection of capacitors, Mode 5 applies to the bus section of the standby power supply.

Ia, Ib, Ic for the protection phase current,

IA, IB, IC for the measurement phase current, can be connected A, B, C three-phase, but also only A, C two-phase.

I01 in the Mode 1 to 4 can be connected to the zero sequence current, unbalanced current, etc., in the Mode 5 access line into the measured current IL1 as the line with or without current criteria.

Us is the opposite side of the line voltage (reclosing check pressure, check the same period), can be taken from Ua or Uab, the secondary rating of 100V or 100 / V. 3U0 for the zero sequence voltage, the Mode 1, 2, 3U0 obtained by calculation, Ud for the capacitor group differential pressure.

Uch1 and Uch2 are connected to the voltage Uab and Ubc, respectively, through the calculation can be Uca, U1, U2, but not zero sequence voltage 3U0, Ua, Ub, Uc. Therefore, the calculation of the power element in this mode using two component method.

The controller support five kinds of AC voltage wiring:

Wiring	Voltage connection	**Uch1—Uch3** aisle	**Uch4** aisle	Applicable circuit
the Mode1	Y type wiring	Ua、Ub、Uc	3U0	Line / feeder and so on
the Mode2	Y type wiring	Ua、Ub、Uc	Ud	Capacitor
the Mode3	Open triangular	Uch1 then Usb line voltage, Uch2 then Ubc line voltage, Uch3 then 3Uo (zero sequence voltage)	Ud	Capacitor
the Mode4	Open triangular	Uch1 then Usb line voltage, Uch2 then Ubc line voltage, Uch3 then 3Uo (zero sequence voltage)	Us	Line / feeder and so on
the Mode5	Split 2 bus voltage	UabUch1 then Uab, Uch2 then section of the Ubc, Uch3 then section of the Uab	Ubc Uch4 access Part II of Ubc	Mother of self-cast
Us: for the reference voltage, can be connected to the line side voltage, or on the line Ua or Uab (reclosing check pressure, check the same period), or other AC voltage input input.				
Ud: is the differential pressure of the capacitor (unbalanced voltage).				

Figure 3.3 The controller device wiring method introduction table

The controller has 7 current input input, divided into 3-way protection current input input, 3-way measurement current input input and an additional 1 AC current input input.

Ia, Ib, Ic for the protection of current input input, IA, IB, IC for the measurement of current input input.□ protection current and measurement current input input are Y-type wiring, 3CT way wiring

A, B, C three-phase, 2CT way only A, C two-phase.□

■ I01 can access zero sequence current, unbalanced current and so on. For standby mode, I01 can be connected to the two incoming line of the measured current as a line to determine whether the current.

Channel number	Channel name	the way1	the way2	the way3	the way4	the way5
1	Ia	Ia	Ia	Ia	Ia	Ia
2	Ib	Ib	Ib	Ib	Ib	Ib
3	Ic	Ic	Ic	Ic	Ic	Ic
4	I01	IN1	IN1	IN1	IN1	IL1
5	IA	IA	IA	IA	IA	IA
6	IB	IB	IB	IB	IB	IB
7	IC	IC	IC	IC	IC	IC
8	Uch1	Ua	Ua	Uab	Uab	Uab1
9	Uch2	Ub	Ub	Ubc	Ubc	Ubc1
10	Uch3	Uc	Uc	UN	UN	Uab2
11	Uch4	US	Ud	Ud	Us	Ubc2

Figure 3.4 The controller device terminal group A wiring mode correspondence table

The polarity of the exchange affects the correctness of the direction protection, power components, sequence components, and simultaneous operation. Therefore, the field wiring must ensure that the polarity is correct. The angle of each AC (relative to Uch1 and Uch1 is required to be greater than 13V) can be observed in the debug man-machine interface of the controller to verify the polarity of the wiring. For access to the zero sequence / unbalanced current or voltage, because the usual value is small, the angle is uncertain, can not directly estimate the angle, so take more phase verification. For example, the A phase to get rid of, then into the B phase and C phase vector sum, it is easy to verify the polarity of the wiring. Therefore, you can use the controller test, verify the field wiring phase sequence and polarity.

AC connection, protection current and measurement current are used in several components, Us selection, and CT and PT ratio, the secondary side of the ratings are set in the system parameters. The controller in accordance with the different settings, automatically select the appropriate algorithm for compensation calibration.

When the two currents are used for the protection current, the zero sequence current IN can not be calculated by the calculation. The positive sequence current I1 and the negative

sequence current I2 are calculated assuming that IN is equal to 0. Similarly, the power element is assumed to be equal to 0 under the premise of the.

When measuring current using two components, the calculation of P and Q is also based on the assumption that IN is equal to zero.

Uch1 and Uch2 are connected to the voltage Uab and Ubc, respectively, through the calculation can be Uca, U1, U2, but not zero sequence voltage 3U0, Ua, Ub, Uc. Therefore, the calculation of the power element in this mode using two component method.

3.4.2 Power input wiring

The controller backplane terminal block x1 for the power supply terminals, x1.1 and x1.2 for access to auxiliary power, non-polar, AC and DC can be, to the internal switching power supply. Built-in 3AT / 250V fuse and power filter. lead to the enclosure grounding bolts, but must ensure reliable grounding.

3.4.3 Contact **input**

The terminal strip x4 of the controller backplane is the terminal block of switching input, allowing the use of cable connections with a maximum wire diameter of 1.5 mm². As shown in the back terminal diagram, there are 16 input inputs on terminal strip D. All of the switching input of the controller is non-polar, allowing access to 85VDC ~ 265VDC, with the same group must have the same polarity, because they have one end connected to the same common, the polarity of each common can be different.

Each group has its own "recording time" parameter, the range is 0 ~ 999ms, the user can modify the scene.

The controller for all the switching input of the changes are time sequence records (SOE), "recording time" for the start of anti-shake and anti-jamming, to prevent false hair SOE, and even lead to logical confusion, "recording time" Confirm the time of telepresence. When the change (unstable) time is less than the "recording time", the change process the controller is not processed, and the state of the change is 5 times for 5 consecutive times after the "recording time" Only to be recognized. The recorded start-up displacement time is still the initial moment at which the displacement occurs, and the "recording time" is not added. Therefore, each group into the "recording time" must be set to the same group into the maximum possible jitter time, and leave a certain margin, such as 20 %. "Recording wave time" set a large number will not affect the record of the stability of the time, on the contrary set the small down will miss the record of the real displacement time. However, the "recording time" setting of the General Assembly on the delivery of SOE and logic processing to produce a corresponding delay.

3.4.4 Contact output

The controller on the back of the x4 terminal strip has 7 control output, DO1 ~ DO7, where the first 7 output for the device self-test outlet ALARM. The controller factory "ALARM" for the normally closed contact output, for the device fault signal relay.

The controller has three kinds of switching output methods: pulse, level and synchronization. Three ways to apply to different control objects and peripheral circuits, or different purposes. When the "pulse" type output is selected, the corresponding pulse width (0.01 ~ 2.55S) is also set. Each output has output mode and pulse width parameters, can only be set and view with BP-PLP, when the output register status is 1, the pulse output will drive the corresponding relay and maintain a certain time (pulse width), and then release the relay And clear the status of the output register. "Voltage Level/Potential" switching output is simple, at any time according to the status of the output register to drive (1) or release (when 0) the corresponding relay. The "sync" is similar to the "voltage level" output, except that only after the signal is reset or the device is reset, then it can clear the output register.

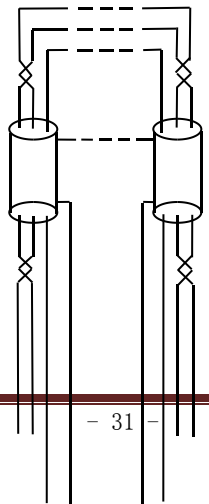
3.4.5 Communication wiring

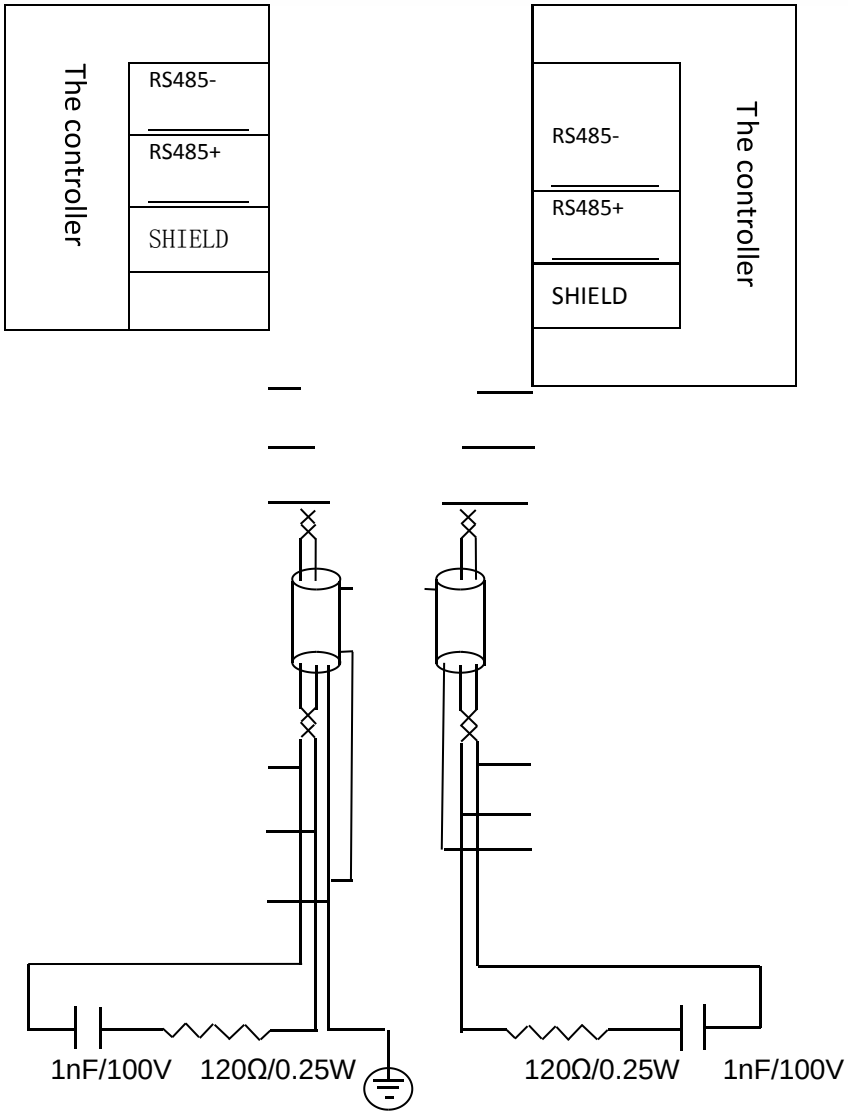
3.4.5.1 USB wiring

Below the controller front panel is a square receptacle that is a standard USB square receptacle. Use the supplied USB cable to connect to the computer and connect to the device through the supplied "BP-PLP" software. Please refer to Section 1.5.3 for connection settings

3.4.5.2 RS485

There are two sets of RS485 communication channels, terminal numbers x3-2 and x3-3 are RS485- (1), RS485 + (1), terminal number B-1 is "SHIELD" common reference To ground. Use a shielded twisted pair for RS485 communication cable and connect the wires of RS485and RS485 + to each other. The "SHIELD" terminal is connected to another pair of twisted pairs. So, you can use at least 2 pairs of wires, each wire is 0.25, 0.34 or 0.5 mm² shielded twisted pair wiring. To prevent the grounding current from forming the circuit, the connected shield and "SHIELD" must be grounded only at one end, usually at the master station. Be careful to ensure a good connection to the shield at each communication node.





RS485 + and - signals can also be called B and A, SHIELD can also be called GND. An RS485 physical channel can hold up to 32 nodes. Each node's RS485- or A is connected to the same line. RS485 + or B is connected to another line with which the SHIELD or GND is connected. See Figure 3.6.

To reduce the traveling wave reflection, when the total length of an RS485 physical channel is greater than 100 meters, the communication rate is greater than 9600bits / s, we recommend adding a terminal matching circuit at both ends of the channel. The longer the length or the higher the communication rate, the more necessary. For the general shielded twisted pair, the terminal matching circuit can be a 120Ω / 0.25W resistor, it can be RC circuit, as shown in Figure 3.6. The latter effect is better, it is recommended to use. In addition, the wiring should pay attention to reduce the RS485 physical channel on the length of the branch line, it is recommended not more than 2 meters, as far as possible to the end of the connection, and all the wiring head to be welded firmly.

Information: Although the RS485 communication distance of up to 1km or more, but the actual situation is often fragile, especially through the outdoor communication line, long-term use is dangerous. Power failure caused by the potential difference or lightning, etc. can easily damage the equipment. So we do not recommend using more than 300 meters and through the outdoor RS485 channel. If necessary, it is recommended to use fiber converter to do relay. The controller device RS485 port communication parameters are communication address, rate.

The communication address is shared by all the communication ports of the device backplane. It can be used for the communication protocol to address the device. It can be set from 1 to 254. RS485 port rate can be set to a range of 1200 ~ 38400bits / s. The controller device RS485 port support communication protocol IEC60870-5-101 and Modbus RTU, can be installed in the device panel man-machine interface or through the matching "BP-PLP" software settings.

3.4.5.3 Ethernet wiring

The controller backplane Ethernet for the Ethernet interface, using 10base-T physical layer standard, RJ45 connector. The controller RJ45 using 10base-T standard definition shown in Figure 3.7.

PIN	SIGNAL
1	Tx+
2	Tx3 Rx+
6	Rx-

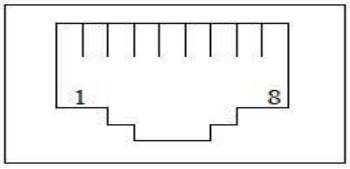


Figure 3.7Ethernet RJ45 pin definition

According to the IEEE 802.3i standard, 10base-T Ethernet can be wired with Category 3 and above unshielded twisted pair, ie UTP cable. It has 4 pairs of twisted pair, the first butt RJ45 1 and 2 pins, the second butt 3 and 6 pins. 10base-T site between the maximum distance of 100 meters or less, even the relay, 10base-T LAN maximum diameter of not more than 500 meters. Above refers to the maximum wiring distance in the office environment, in the interference of serious industrial site, in order to ensure smooth communication, UTP cable should be shortened to the wiring distance.

If Ethernet is selected according to the order number, its corresponding IP address can be defined by the user through the matching "BP-PLP" software or the key operation on the front panel of the device. The controller Ethernet port adopts the Modbus TCP / IP protocol.

3.4.6 Shield terminal

The SHIELD terminal is the common reference for the B terminal strip, which is the common reference grounding for RS485 and RS232. In RS485 and RS232 integrated wiring system, to ensure that each controller SHIELD terminal a good grounding, that is, each controller SHIELD terminal only one way to the grounding grid. And, all the wiring is RS485 or RS232 bus connected

together the controller, the SHIELD terminal must also be connected. In addition, the equipment connected to the RS485 or RS232 bus of the controller must be on the same grounding grid.

The terminal bar X3 is defined as follows:

X3 Terminal	definition
1	SHIELD
2	RX
3	TX
4	RS485-
5	RS485+

Figure 3.5 Terminal X3 defines the table

3.4.7 Grounding wiring

The controller backplane has a housing grounding bolt, identified as.

Must be a good grounding of the bolt, and the use of stainless steel joints, grounding wire cross-section to be greater than 2.5mm ², close to the ground bus. **4** Interface operation

4.1 Text menu navigation

The controller all types of protection devices have a text menu, which is through the man-machine interface to achieve value, measurement, change settings such as a visual menu. Press the "Left" or "Right" key in the main menu interface to switch between the monitor screen and the running screen. Press "ENTER" key to enter the next submenu or perform the related action, press "ESC" key to return to the previous menu. Do not move to the other lower level menu and move it in the top menu, press the "Up" and "Down" keys to move. The following figure is an example of a the controller menu navigation chart.

4.2 Text menu hierarchical structure

The following options are displayed in the main menu:

name	description	operating
Measurement information	信息 Including the sampling value, angle value, electrical measurement, the clock and the temperature on the motherboard and the internal detection point measurement voltage and other information	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu
switching input/output	Including the amount of input, output information	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu

Protection settings	Used to set the current setting group and the setting of the modification device	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu
Information record	The event occurred in the recording device, including the protection action, the switching input change, the device power, the device power down, the device reset, the signal reset, the remote operation, the local operation, the value change, the device self-test error,	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu
parameter settings	The setting of the basic parameters of the device	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu
Device testing	Used for test of switching output, serial data observation and analog channel waveform display	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu
Self-check information	Including the control word calibration, calibration check, logic check, picture data, set value settings, ferroelectric memory FLASH memory, clock detection, RAM memory, logical length, logic data detection	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu
Device information	Browse the machine information	Press "ENTER" key to enter the lower submenu, press "ESC" key to return to the previous menu

Figure 4.1 Device menu description table

4.3 Boot

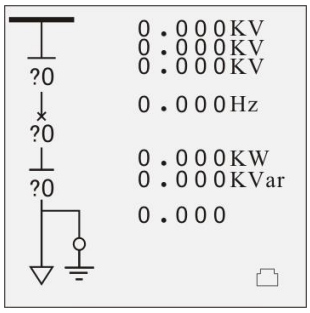
When the device is powered up, the LCD screen will appear blank screen; followed by all LED lights are lit at the same time, "RUN" running light is green, "REMOTE" remote indicator light is green, "LOCAL" local indicator Green, "ALARM" standby indicator is yellow, the remaining indicators (LED1 ~ LED8) is red, the user can observe whether the lights are correct. The controller in the boot at the same time, also in the clock, set value, logic data, power supply voltage, flash memory, machine temperature and other content self-test. If all the self-test items are correct, The controller abnormal alarm relay start, issued a "pop" sound, normally closed contact open. After the successful operation, the screen will enter the event recording screen (shown in Figure 4.2), generate the "device power" event recording screen, and immediately open the protection logic module; if the self-test project error, The controller abnormal alarm relay will

not start, Normally closed contact output alarm signal, the screen will produce "self-test error" event recording screen, and turn off the protection logic module.

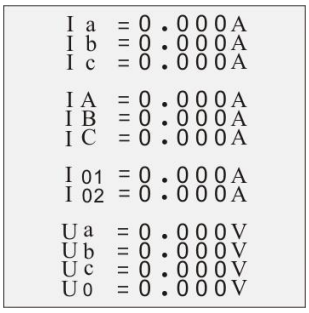
Press the "ESC" key three times, exit the event log menu, or after 60S without any operation, the screen will automatically switch to the "main screen" in the "running screen."

4.4 The main screen

The main screen a total of two, respectively, "running screen" and "monitoring screen", the screen can be between the "left", "right" key to switch. (The operation screen and the monitor screen are slightly different depending on the device model, subject to the actual screen).



4.3 Run the screen



4.4 Monitor the screen

4.5 Manual closing operation

Manual opening, closing operation refers to the relay outlet opening, closing operation.

Proceed as follows:

The local operation indicator "LOCAL" is illuminated when the device receives a signal that can be operated manually (The controller is factory-set logic with DI16 for local operation of the input signal and DI15 for remote operation). If the device is in the password protection state, will not be able to manually perform operation, the user first "login" operating system. After logging in, press "ESC" to exit the main menu and enter the "Run Screen", then select the circuit breaker through the "Up" and "Down" keys, and the selected circuit breaker will be displayed. After the operation object is selected, you can press the "hand Open" button or "hand close" button to start the object associated with the sub-relay, this time, the device produce a "pop" crisp sound (device internal relay action), while the screen into "Event record" screen, resulting in "local operation" SOE record (shown in Figure 4.5). At this point, the manual closing operation is successful. Do not do any operation, after 60S time screen will automatically switch to the "main screen" in the "running screen", or press the three "return" key, the screen will be switched to "main screen" in the "running screen."

4.6 User login

The controller uses a password protection program, the user is not logged on, only observe the screen, and can not modify any parameters of the device. If you want to modify the parameters

of the device, you must first log in to the user, enter the correct password to enter, only after the login is successful, the device can modify the appropriate setting parameters. The user login steps are as follows:

In the main screen, press "ENTER" to enter the main menu, select "User Login" by "Up" and "Down" (Figure 4.6), press "ENTER" to enter the menu, "User Login" has two submenus, "login" and "logout".

In the "User Login" menu, press "ENTER" to enter the login menu by selecting "Login" from "Up" and "Down". "Down", "down" key to modify the number, "left", "right" key to move the cursor, enter the correct input password, then press "ENTER" key, the screen switch to Figure 4.8. Select "Yes", press "ENTER" key to confirm the login, select "No", then press "ENTER" key will cancel the login, the screen to the main menu. The user can determine whether the login is successful by observing the lock icon in the upper right corner of the screen. The icon indicates that the device is not unlocked and the user login fails. The icon indicates unlock and the user logs in successfully. When the password input input error, the screen displays "password wrong! Please return" the words, press "ESC" key to switch to the "main menu" screen. Or do not do any operation, wait 60 seconds, the screen automatically switch to the running screen. Information: The controller password decryption, if no 60 seconds without any password protection will take effect again. The factory initial password is: 000000

4.7 Download data

The controller device parameters, settings and other data can be set by two means, one is through the matching BP-PLP software the controller device parameters, settings and other data settings, a button on the panel through the operation of its Set up. Regardless of whether the controller is in any menu screen, the controller can be used to transfer parameters such as parameters, settings and other data after connecting the computer and the controller.

4.8 main menu

Press "ENTER" key in any main screen to enter the main menu, as shown in Figure 4.10. The main menu screen consists of nine submenus. You can use the up and down keys to move the cursor to select the submenu, and the selected object will be displayed. After selecting the menu, press "ENTER" to enter the submenu. Press "Esc" to return to the previous menu.

Serial number	Submenu	annotation
1	Measurement information	Including the sampling value, angle value, electrical measurement, the clock and the temperature measurement on the motherboard and
		other information

2	Switching input/output	Including the amount of input input, output information
3	Protection settings	Used to set the current setting group and the setting of the modification device
4	Information record	The event occurred in the recording device, including the protection action, the input change, the device power on, the device power off, the device reset, the signal reset, the remote operation, the local operation, the value change, the device self-test error,
5	parameter settings	The setting of the basic parameters of the device
6	Device testing	Used to for the test of switching output, serial data observation and analog channel waveform display
7	Self-check information	Including the control word calibration, calibration check, logic check, picture data, set value settings, ferroelectric memory FLASH memory, clock detection, RAM memory, logical length, logic data detection
8	Device information	Browse the machine information

4.3 Main menu list

4.8.1 Measurement information

In the main menu, select the "Measure Information" submenu and press "ENTER" to enter the submenu. The measurement information includes information such as sampling value, angle value, electrical measurement, other clock, and so on. From these measurement information, you can intuitively and clearly understand the current device to collect the data information. All the values in the measurement information can only be viewed, and the device collects the relevant data collected in real time. Press "ESC" to return to the previous menu.

Measurement information	
Submenu	Measurement data
Sample value	Protection channel, zero sequence channel, measuring channel current voltage value
Angle value	Protection, zero sequence, measurement of the current channel, the voltage angle value
Electrical measure	Electricity value
other	conversion value, the enclosure temperature and so on
clock	time

4.4 Measurement information table

4.8.2 Switching input/switching output

In the main menu, select "open out" submenu, press "ENTER" key to enter the submenu. The menu contains the "switch input input" and "switch output" submenu options, the cursor position will be displayed at the end, then press "ENTER" key, the screen will jump to the next sub-menu of the selected item, the All the contents of the menu can only be viewed and can not be modified. Through the window can be directly observed the current device into the switching output/input state, intuitive response to the current device working conditions.

Switching Input/output		
Menu item	**contect**	status
Switch input	DI01 ～ DI16 real-time status	0 or 1 (0 for no signal input, 1 for signal input)
Switch output	DO01 ~ DO7 real-time status	0 or 1 (0 for no signal output, 1 for signal output)

4.5 Switching Input/output status list

4.8.3 Protection settings

In the main menu, select the "protection settings" option, press the "ENTER" key to enter the sub-menu, The controller device can set a total of four different sets of protection settings, the user can replace the "current valuation area" Value group, convenient and quick. The rating group and all settings are password protected. If you want to modify the settings, you must log in to the user before decrypting them.

4.8.3.1 The setting of the current setting group

After the user logs in successfully, select the "Protect Settings" menu in the main menu and press "ENTER" to enter the submenu. Press the "Up" and "Down" keys to move the cursor to the "Current setting area" and press "ENTER" to enter. At this time, press "ENTER" key to confirm the current setting group, and then use the "up" and "down" key to select the desired value group option, select the set value group, press "ENTER" key to exit the modification (the cursor black backlight area is enlarged to indicate that the modification has been made). At this time, press "ESC" key again, the screen will switch to the saved screen as shown in Figure 4.15, select the next step by "left" and "right", then press "ENTER" to confirm whether to save, The screen will jump to the previous menu; select "Cancel", the device will cancel the changes made just, the screen back to the "current rating area" screen.

4.8.3.2 Set value

After the user logs in successfully, select the "Protect Settings" menu in the main menu and press "ENTER" to enter the submenu. Press "ENTER" and "Down" to select the setting group to be set. Press "ENTER" to enter the set value. And then through the "up", "down" key to select the need to modify the value of the selected items will be displayed in reverse, and then press the "ENTER" key to enter the submenu of the selected item.

To "composite voltage" as an example, its parameters to modify. After entering the "Composite Voltage" menu, select the setting value item to be set by "Up" and "Down" key, then press "ENTER" to confirm the setting and change the cursor to "=". If the value of the control word type parameters, only "0" and "1" two states, you can use the up and down keys to modify; set value if the current, voltage, time and other types of parameters, for bitwise modification, can be used Move the cursor to the "Left", "Right" key, and then press "ENTER" to return to the value name. After all the parameters in the menu have been modified, press "ESC" to exit the modification and the screen will switch to the "Confirm" screen. Select "Yes" from the "Left" and "Right" keys to select "Next", press "ENTER" to confirm the save and the screen will switch to the "Set Group" menu screen (Figure 4.16) The setting is successful (can be viewed in the event log menu). Select "No", then press "ENTER" key, the screen will not save to the previous menu. Select "Cancel", then press "ENTER" key, the device will cancel the parameters just modified, the screen back to the selected value of the menu screen. If you do not do any operation under the "Confirm" menu, the device will not save and automatically cancel all the operations that have just been performed for 60 seconds. The screen will switch to the "Run Screen" in the main screen and be automatically locked.

4.8.4 Information record

Select "Info" in the main menu and press "ENTER" to enter the menu. The information recording menu consists of two submenus, "event log" and "set / reset" menus. "Up", "Down" key to move the cursor, then press "ENTER" key to enter the lower menu, press "ESC" key to return to the previous menu.

4.8.4.1 Event Log

The "Event Log" menu is used to record all the event information that occurred on the device. A total of 100 pieces of information can be recorded,

According to the principle of first-in first-out record, that is, Article 101 covers the first, circular storage. The contents of the event log are displayed: event record number, total number of event records, event name, post-displacement status, SOE code, event occurrence time (in

- 40 -

milliseconds), event recording if the protection action is generated, Moment action element action value.

4.8.4.2 Set / reset

In the information record, select "Set / Reset", press "ENTER" key to enter, the screen shown in Figure 4.18. The module acts to clear the event, as follows:
After successfully registering the device, press "ENTER" button in the picture of Fig. 4.18, the screen will switch to the screen as shown in Figure 4.19, "left" and "right" key, then press "ENTER" to confirm whether the event is cleared, Return to the previous menu. Then enter the "event log" menu, the screen shown in Figure 4.20, the event record has been cleared successfully.

4.8.5 parameter settings

In the main menu, select "parameter settings", press "ENTER" key to enter the parameter setting menu. The menu is a total of eight submenus, namely, "system parameters", "mode into the configuration", "switching input configuration", "language settings", "communication settings", "time setting", "power settings", "password settings "And so on, including the basic parameters of the controller device settings. The user can move the cursor through the "Up" and "Down" keys, then press the "ENTER" key to enter the selected submenu to modify the parameters. Parameters need to check the password, modify the password protection, the user must log on to be successful before the change. There are two ways to modify the parameters: one for the bitwise modification, through the "left", "right" key to move the cursor, "up", "down" key to modify the cursor to achieve the value; the other for the whole The parameters are incremented by the minimum step size.

4.8.5.1 System parameters

The controller "system parameters" include CT, PT, zero sequence channel CT ratio setting, analog definition selection, measurement power algorithm selection, protection of current component selection, the same period voltage wiring options and so on.
The procedure for setting system parameters is as follows:
Press "ENTER" to enter the "System parameter" option, then press "ENTER" key to enter the menu, then press "ENTER" key, the cursor moves to the parameter after the equal sign , And then through the "up", "down" to be modified. After the modification is complete, press "ENTER" again, the cursor will move to the parameter name, then press "ESC" to exit, the screen will

switch to "OK" screen. Press "ENTER" to select "Yes", press "ENTER" to save the previous modification and exit to the "Parameter Setting" screen. If you select "No", the device will not wiring of the site, otherwise you will get some wrong results. Changing the AC connection The wiring parameters must be carried out under all protection and the device can be re-energized for protection.

4.8.5.2 Mode configuration

"Mold into the configuration" for the device AC channel analog coefficient configuration, the factory has been debugging well, it is recommended not to adjust the scene,

4.8.5.3 Switching input configuration

Switching input configuration is the setting for DI1 filtration time, The controller has total 5 groups, DI01 ~ DI02 for the first group, DI03 ~ DI04 for the second group, DI05 ~ DI10 for the third group, DI11 ~ DI16 for the fourth group, DI01 ~ DI02 for the first group, DI03 ~ DI04 for the second group, DI05 ~ DI10 for the third group, DI11 ~ DI16 for the fourth Group, DI17 to DI26 are the fifth group. Refer to Section 4.8.5.1 for the procedure.

Switching input configuration			
content	**range**	Step length	Factory default
DI01_02 Filter time	0~999ms	1	20ms
DI03_04 Filter time	0~999ms	1	20ms
DI05_10 Filter time	0~999ms	1	20ms
DI11_16 Filter time	0~999ms	1	20ms

4.8 the configuration table of Switching input

4.8.5.4 language settings

The controller screen display there are two, one for the Chinese, one for the English. Refer to Section

language settings	**name**	**range**	Factory default
	language selection	Chinese,English	Chinese

4.9 Language setting table

4.8.5.5 Communication settings

Communication settings

Submenu	name	range
mailing address	Local communication address	1～254
Serial port 1	Communication rate	1200、2400、4800、9600、19200、38400
	Communication protocol	MODBUS、IEC-103,DN3.0

The "Communication Settings" menu contains the basic parameters of The controller communication, including "communication address", "serial port 1", "serial port 2" three submenu, the operation of the steps please refer to Section 4.8.5.1. The "DOWNLOAD" protocol is an internal protocol for the connection of the BP-PLP software to the device.

4.8.5.6 time setting

The time setting of the device can be set by pressing the buttons on the panel, or by supporting the BP-PLP software. For manual operation, refer to section 5.7.5.1, using the left and right keys to move the cursor, up and down keys to modify the number. After editing, press "ENTER" to save the current setting, press "ESC" key to return to the previous menu.

4.8.5.7 Electricity setting

The user can set the electrical measurement of the device by setting the electrical power, including the active power and the reactive power measurement. After editing, press "ENTER" to save the current setting, press "ESC" key to return to the previous menu.

4.8.5.8 password setting

The user can set the login password of the device through the "Password Setting" menu. Refer to Section 4.8.5.1 for the operation procedure. The initial password of the device is "000000".

4.8.6 Device testing

Users can use the "device test" menu, perform test of switching output on the device, communication data observation, and analog channel waveform to observe. If the user needs to switching output of the device channel and LED test, you must first exit the protection. In order to ensure safety, users in the case of successful login, you need to enter the "test enable" menu, and then through the "up", "down" key to select "Enable" option, then press "ENTER" key to determine, Enter the test state, then press the "ESC" key to return to the "device test" menu, and

then through the "up", "down" key to select the need to test the options, press "ENTER" to enter through "up" Key to test the device. " the test of switching output " menu can be performed on 24 loops, "LED test" menu on the panel can be 12 lights on the test, the user can check the device through the operation of the swithing output channel and the light Whether it is normal. In the "Waveform Display" menu, the user can select the channel number to observe the real-time waveforms, current values, and phase angles collected by each channel in the "waveform display" menu. And other information.

4.8.7 self-check information

The "self-check information" menu includes items such as control word verification, calibration check, logic check, picture data, setting, ferroelectric memory, FLASH memory, clock detection, RAM memory, logic length, logic data The When the device item self-check message is correct, the "OK" character is displayed in the status bar. In the self-check information menu, the user can "up", "down" key to move the cursor to view.

4.8.8 Device information

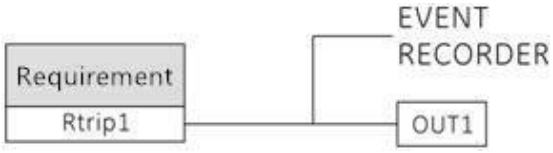
In the main menu, select the "device information" option, the menu display content: the machine model, version number, serial number, The controller serial number serial number of a total of 11 digits or letters, the device for authentication. **5** Protection and control functions

5.1 Running instructions

When the device is powered on, the self-test is correct, the normal start condition is met and the run indicator is activated. The logic diagram is as follows:

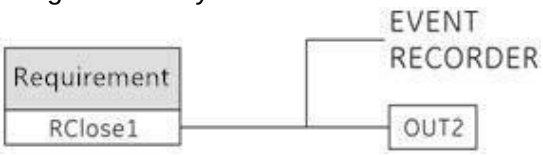
5.2 Remote opening

Logic for controlling the opening of the relay



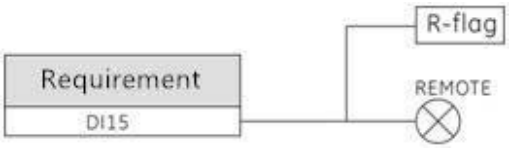
5.3 Remote closing

Logic for controlling the closing of the relay:



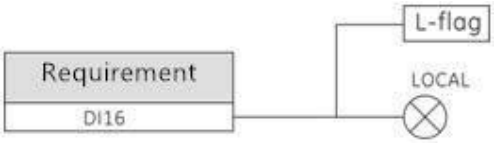
5.4 Distant location

The logic of the switching input signal for remote operation:



5.5 Local place

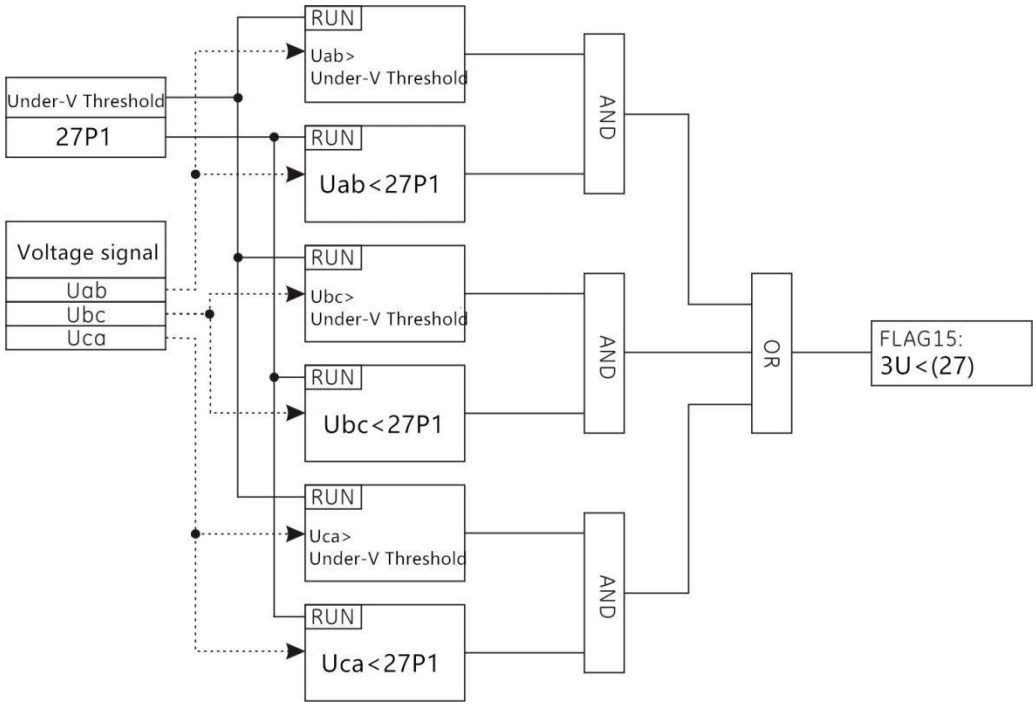
The logic of the switching input signal for in-place operation:



5.6 The low-voltage detection

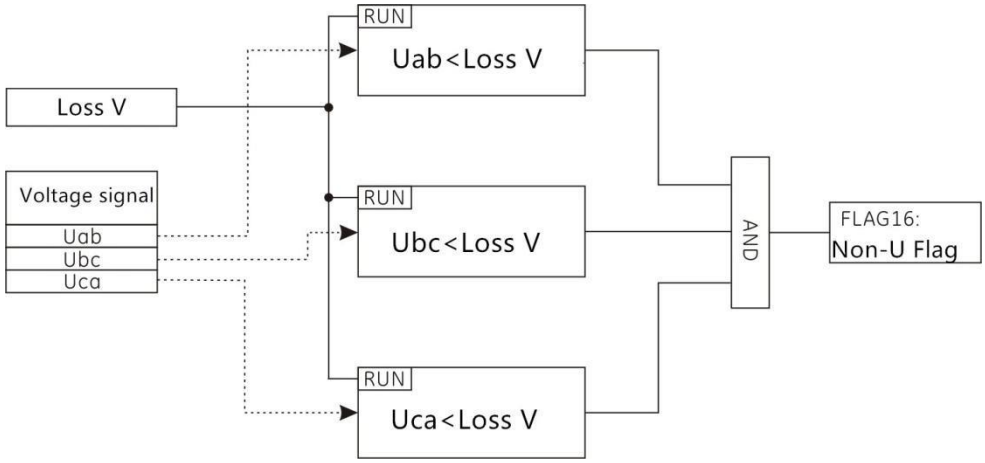
The low-voltage detection element is used as an intermediate variable and can also be used as a logic condition (FLAG15 low-voltage start flag). By detecting the input input A / B / C three-

phase line voltage or phase voltage, the set value You can start low-voltage detection components. The logic diagram is as follows:



5.7 he voltage-free detection

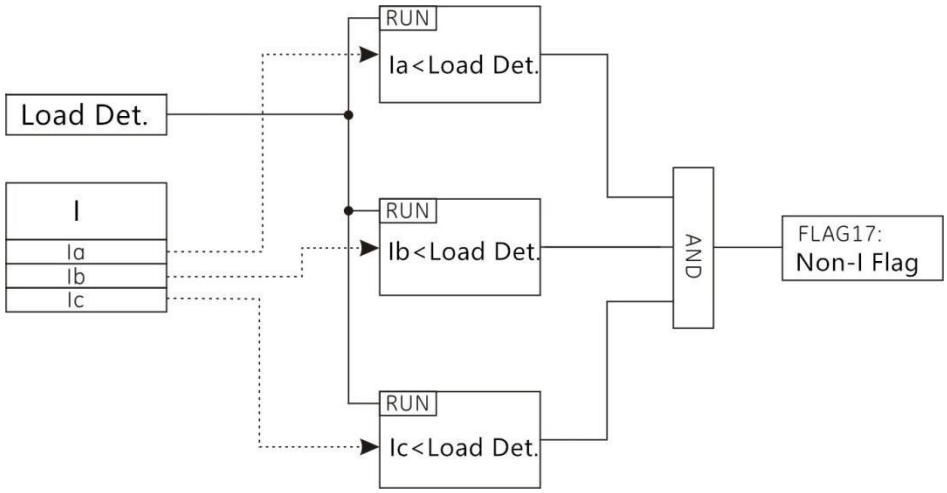
The voltage-free detection element is used as an intermediate variable and can also be used as a logic condition (FLAG16 without voltage flag). By detecting the input input A / B / C three-phase line voltage or phase voltage, the set value Condition to start the pressureless detection element. The logic diagram is as follows:



5.8 The non-current detection

The non-current detection element is used as an intermediate variable and can also be used as a logic condition (FLAG17 without flag of non-current). By detecting the input input A / B / C three

phase phase current, the set value can be set Start the non-current detection element. The logic diagram is as follows:

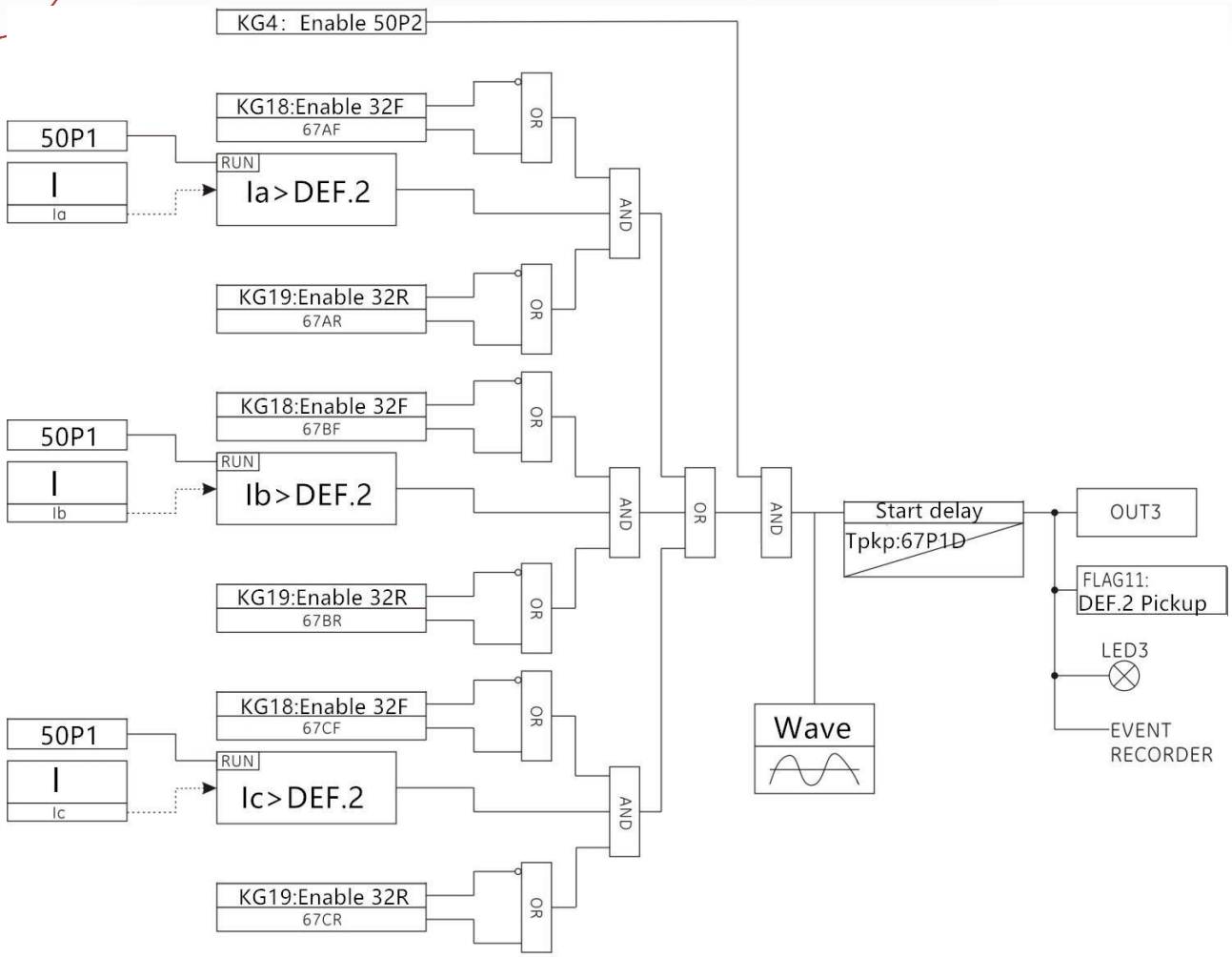


5.9 Re-voltage lockout

The re-latching element is used as an intermediate variable and can also be used as a logic condition (FLAG26 composite voltage flag). By detecting the negative sequence voltage U2 of the input input, the composite voltage blocking element can be activated by satisfying the set value The The logic diagram is as follows:

5.10 Fixed-time over-current section (with directional components, re-pressure lockout)

In order to overcome the overcurrent protection in the vicinity of the power supply protection device operating time is long, the use of increased setting value to limit the scope of action, so there is no need to increase the time limit can be instantaneous action (delay component time setting is set to "0") or set A very short time, the action is to avoid the maximum operating mode under the short circuit current to consider, the definite time overcurrent part of the current protection transient transcendence, the shorter the action time, the use of high-value short-circuit protection, the typical protection The range should be less than 80% of the total length of the line at maximum operation. It can be combined with the setting of the positive / negative component latching function and the reset function. The protection logic diagram is as follows.

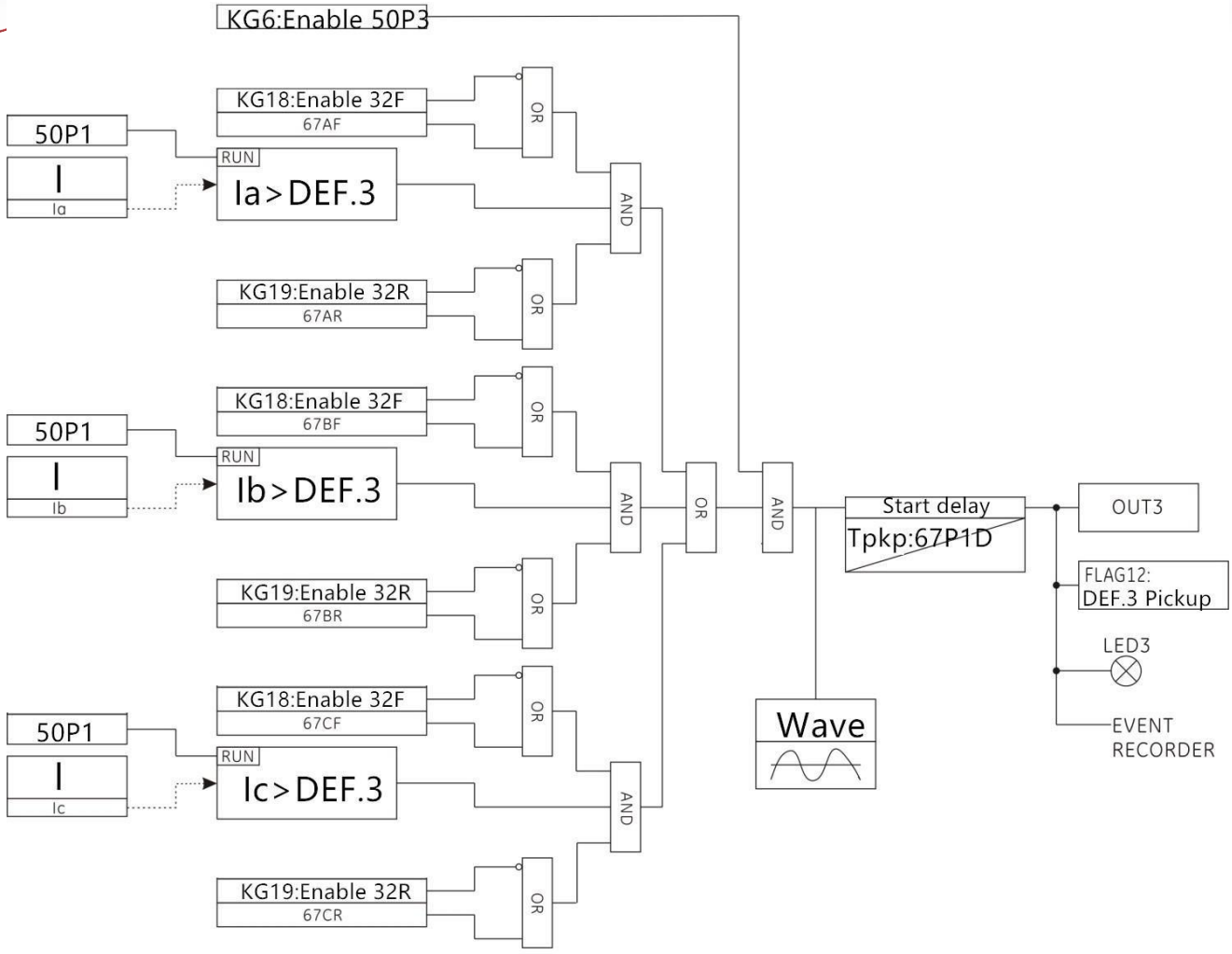


5.11 Fixed time overcurrent two (with directional components, re-pressure lockout)

The protection principle of the two-stage overcurrent two-stage protection is the same as the protection principle of the period-over-current section. The protection logic diagram of the positive / negative direction element locking function and the reset voltage lock function are as follows.

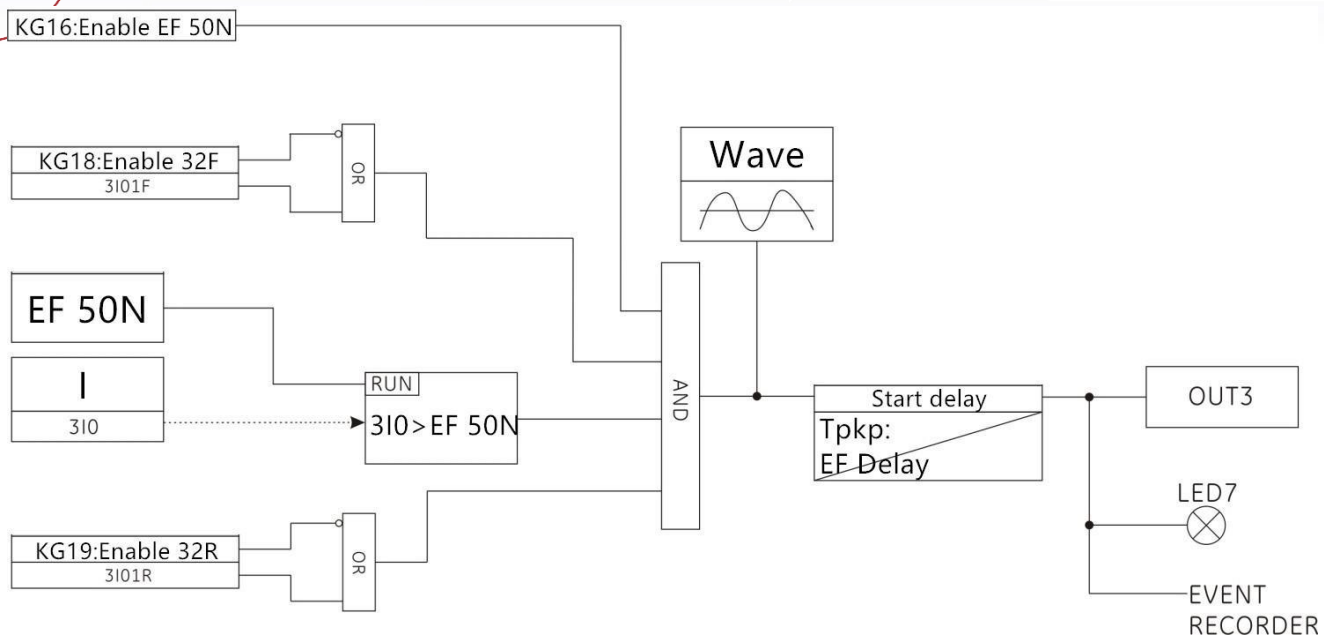
5.12 Fixed-time overcurrent three sections (with directional components, re-pressure lockout)

The protection principle of the three-stage overcurrent overcurrent is the same as the protection principle of the two-stage overcurrent, and the protection logic is as follows.



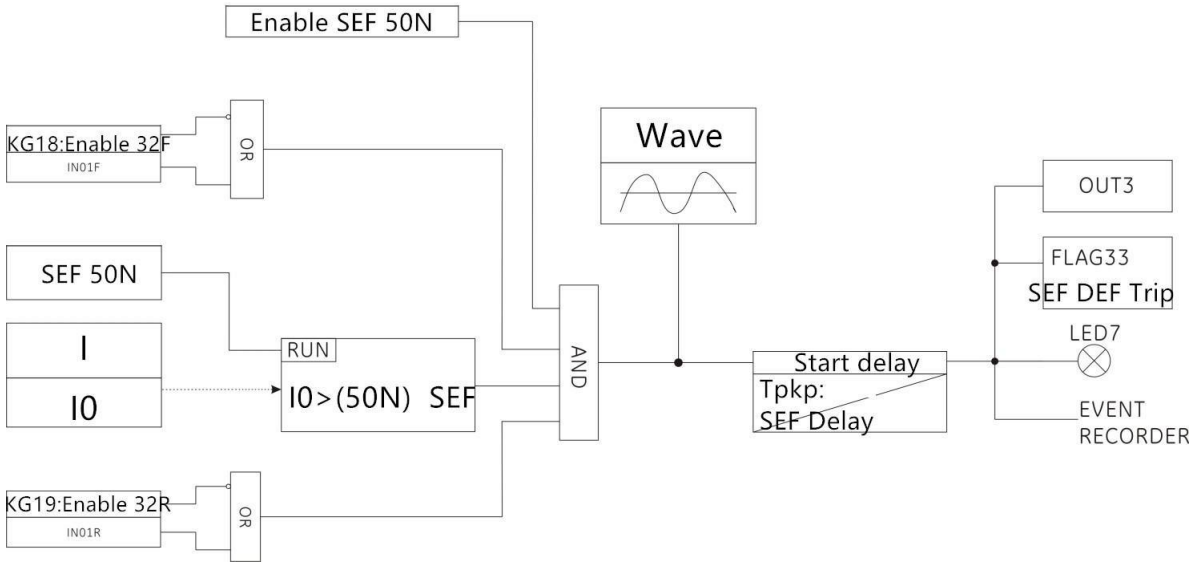
5.13 Zero sequence overcurrent (with directional components)

The zero-sequence overcurrent protection current is taken to the zero sequence current of the zero sequence channel IN, and the positive / reverse direction overcurrent function is selected. When the detected IN current value is greater than the set IN overcurrent setting, the IN overcurrent Component start, the time delay, send a signal. The protection logic diagram is as follows:



5.14 Grounding overcurrent (with directional element)

Ground I / O protection As with the zero sequence overcurrent protection principle, the analog I01 and IO2 channels on the controller are grounded channels, where the I02 channel is the sensitive ground channel, the I01 Grounding overcurrent element can be oriented, the I02 sensitive grounding is a non-directional over- current element. When the detected current is greater than the set grounding current setting, the overcurrent overcurrent protection element is activated, after the start delay, send a signal. The grounded overcurrent element can also be used as an intermediate variable, and FLAG33: Grounding overcurrent action flag. The protection logic diagram is as follows:



5.15 Inverse time limit overcurrent

Anti-time components reflect four international standards of time / current curve, respectively, the general inverse time, strong anti-time limit, super inverse time, long inverse time. The Inverse time limit component consists of the current input amount, the set current value, the characteristic curve setting value, the times of Inverse time limit time, and the binary output amount.

The relationship between time and current is according to IEC-255 and BS-142, which can be expressed as follows: $t = K.\alpha$

$$t_{(s)} = \frac{I^{\beta} - 1}{\alpha}$$

$\alpha = Ie$

Where t (s): action time

K: Inverse time limit constant

I: current input amount

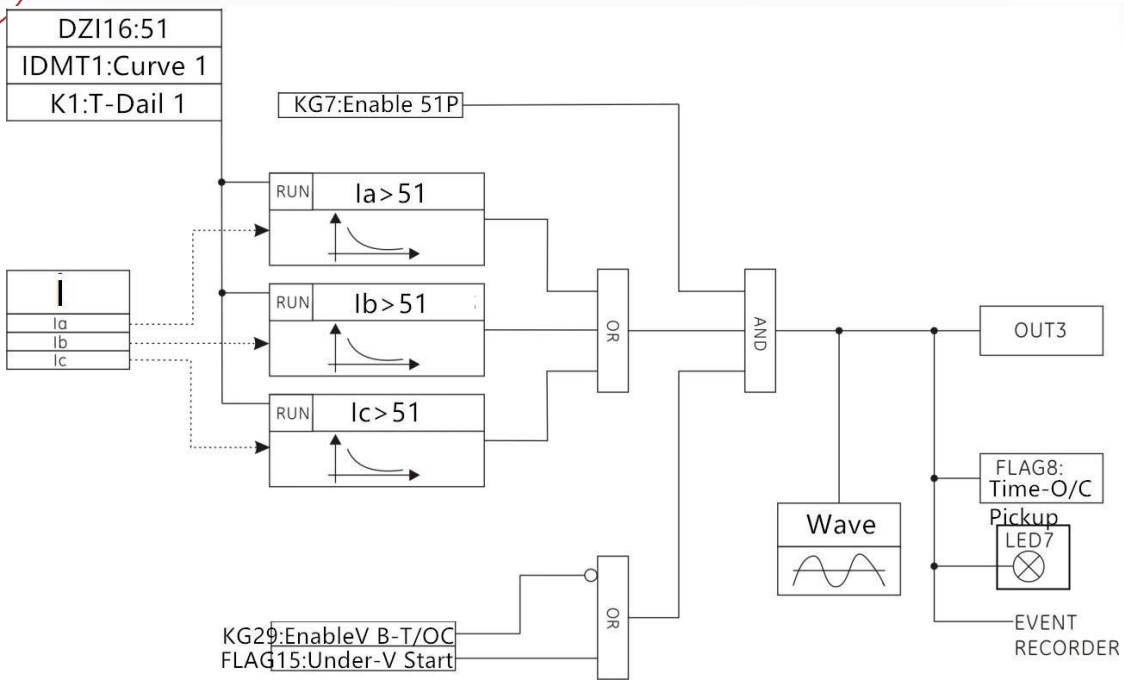
Ie: reverse time rated current

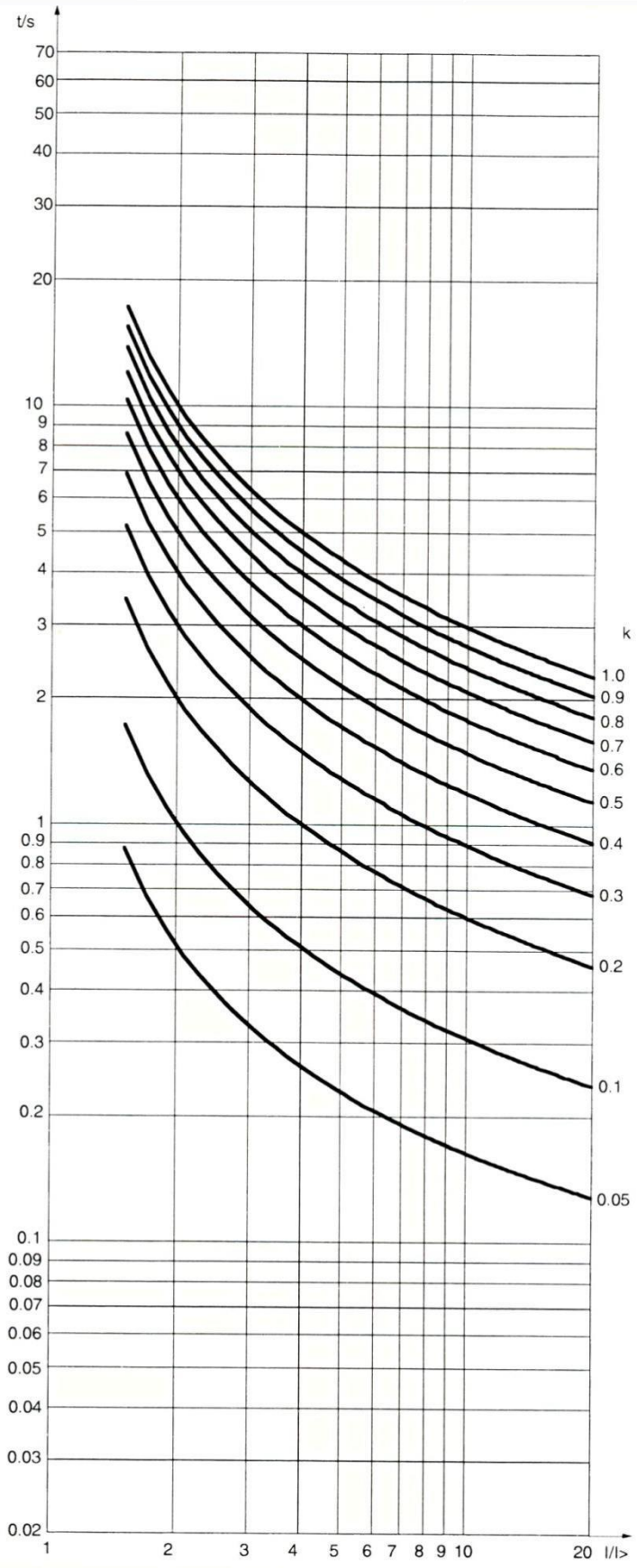
The values of the constant α, β are as follows:

Curve	Time / current curve group	α	β
IEC Curve A	General inverse time limit	0.02	0.14
IEC Curve B	Strong anti-time limit	1.0	13.5
IEC Curve C	Super inverse time limit	2.0	80.0
IEC Long Inverse	Long inverse time limit	1.0	120.0

5.1 Inverse time limit parameter value

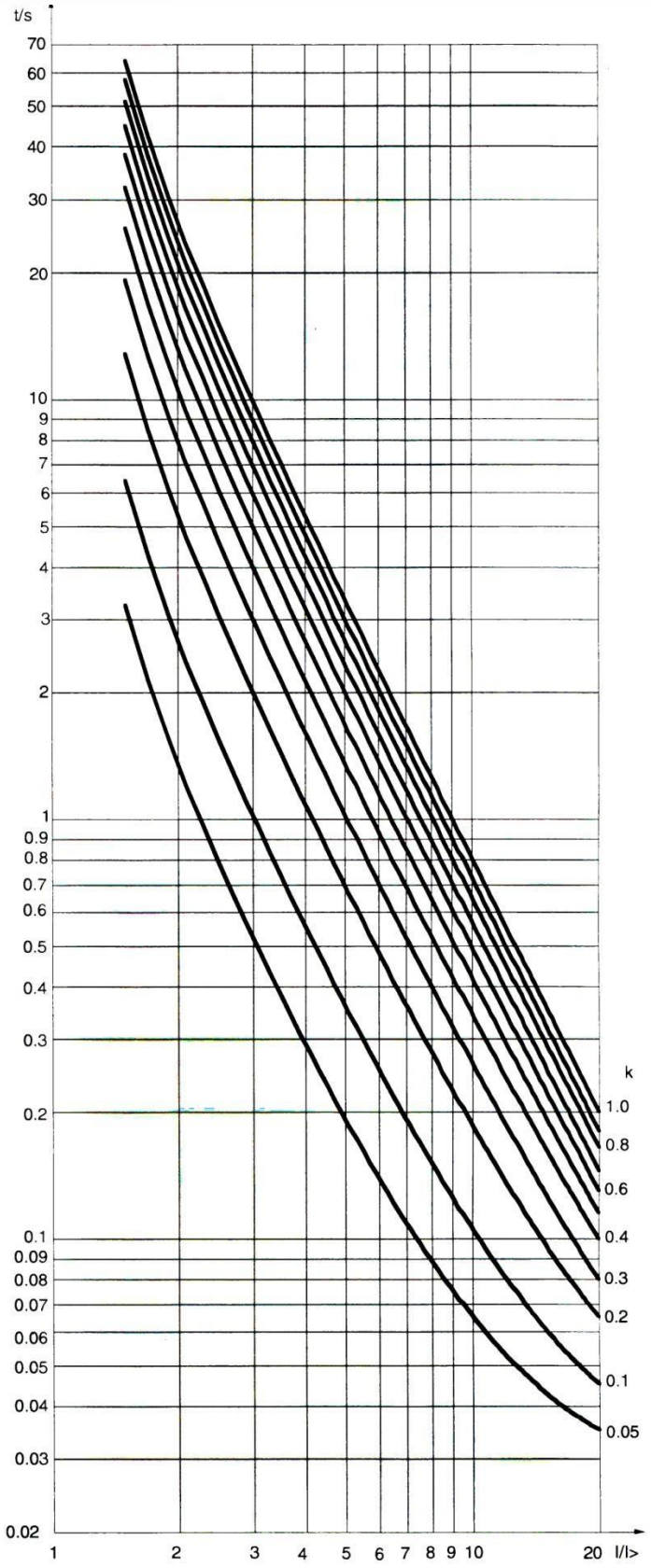
Standard BS-142.1966 limit the normal current range of 2 to 20 times the set value, in addition, the components for the general inverse time, strong Inverse time limit or super inverse time limit, when the current exceeds the set value of 1.3 times must start; Time limit, when the current exceeds the set value of 1.1 times will start. The protection logic diagram is as follows:


DZI16:51
IDMT1:Curve 1
K1:T-Dail 1
KG7:Enable 51P
RUN
Ia>51
RUN
Ib>51
RUN
Ic>51
I
Ia
Ib
Ic
OR
AND
OUT3
FLAG8:
Time-O/C
Pickup
LED7
Wave
EVENT
RECORDER
OR
KG29:EnableV B-T/OC
FLAG15:Under-V Start


t/s
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
k
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.05
1
2
3
4
5
6
7
8
9
10
20
I/I>

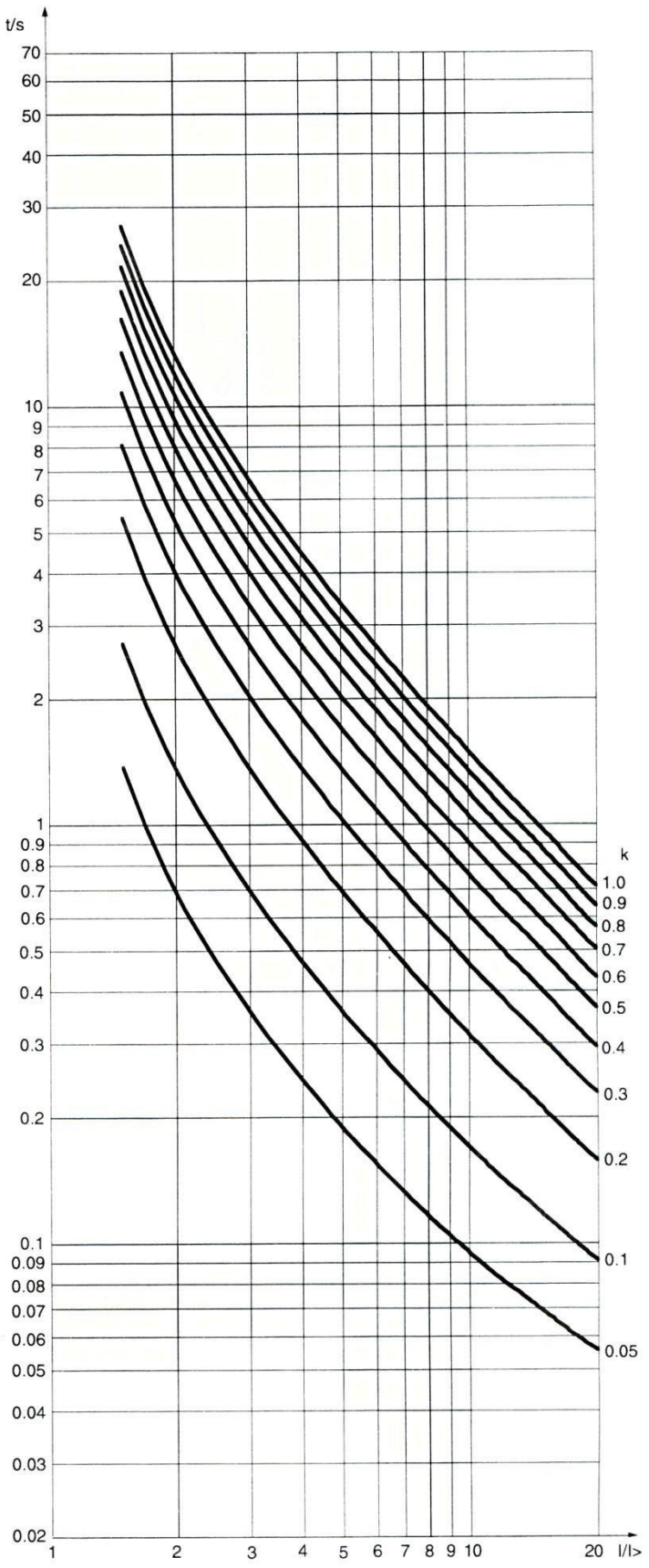
α=0.02 β=0.14

General Inverse time limit curve



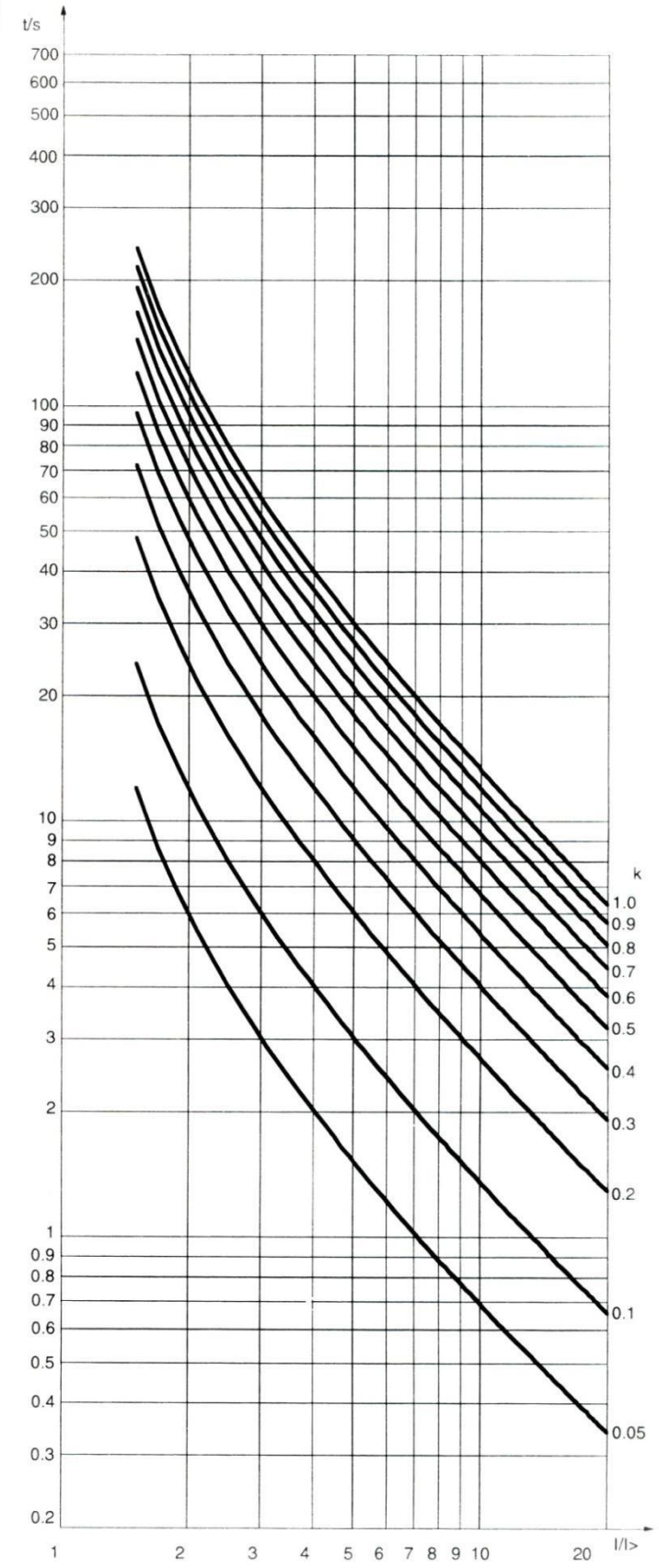
α=2 β=80

Strong Inverse time limit curve



α=1.0 β=13.5

Super Inverse time limit curve



α=1.0 β=120

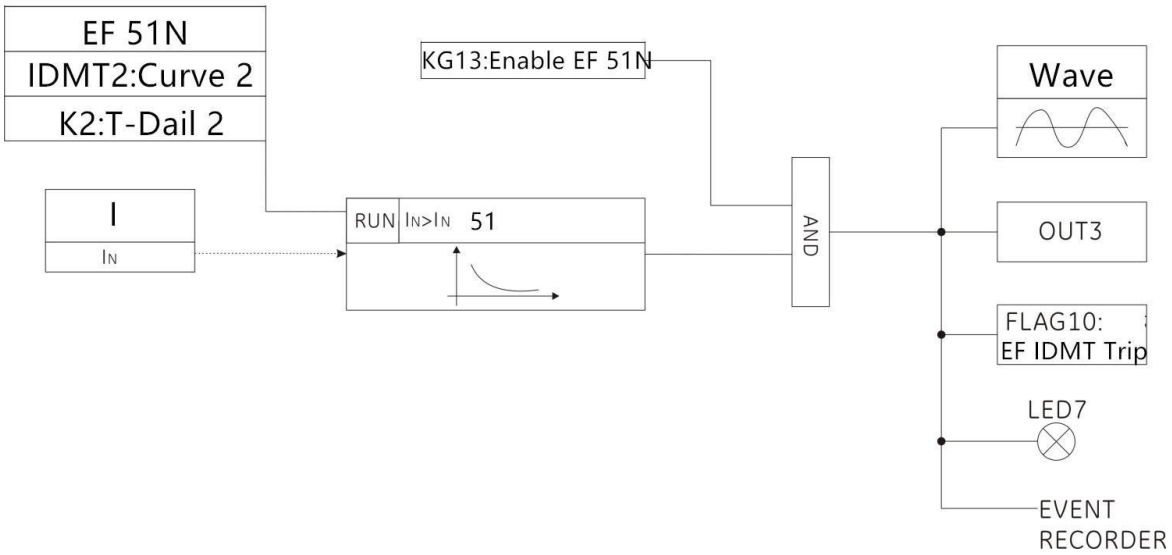
Long Inverse time limit curve

5.16 Zero sequence Inverse time limit overcurrent

Zero sequence Inverse time limit overcurrent protection principle and anti-time overcurrent protection principle, when the calculated IN current is greater than the set value, through the Inverse time limit component, the signal, the protection logic as follows:

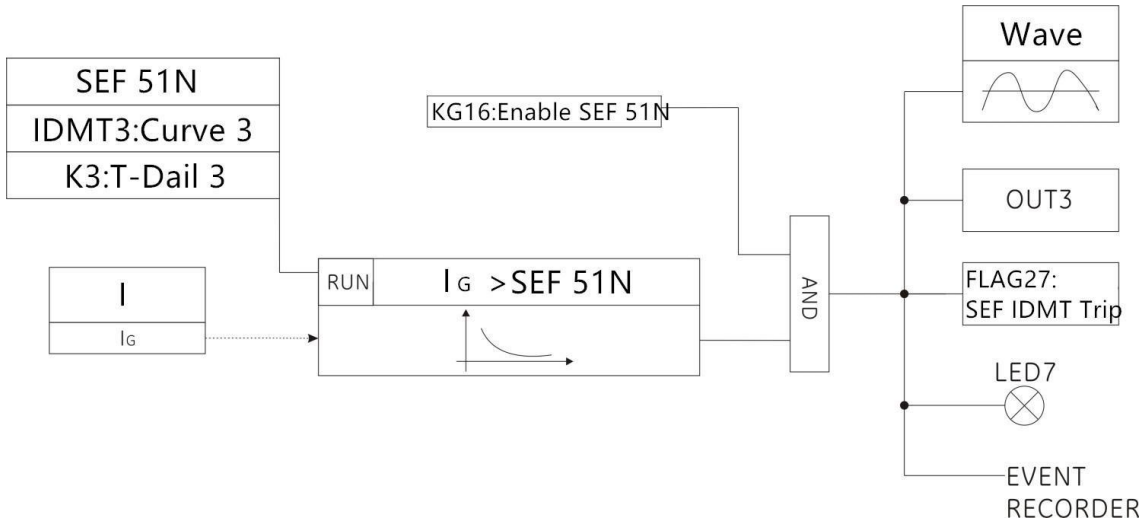
$$I_N = i_A + i_B + i_C$$

i_A、i_B、i_C: For the sine power frequency current sampling value (obtained after filtering)



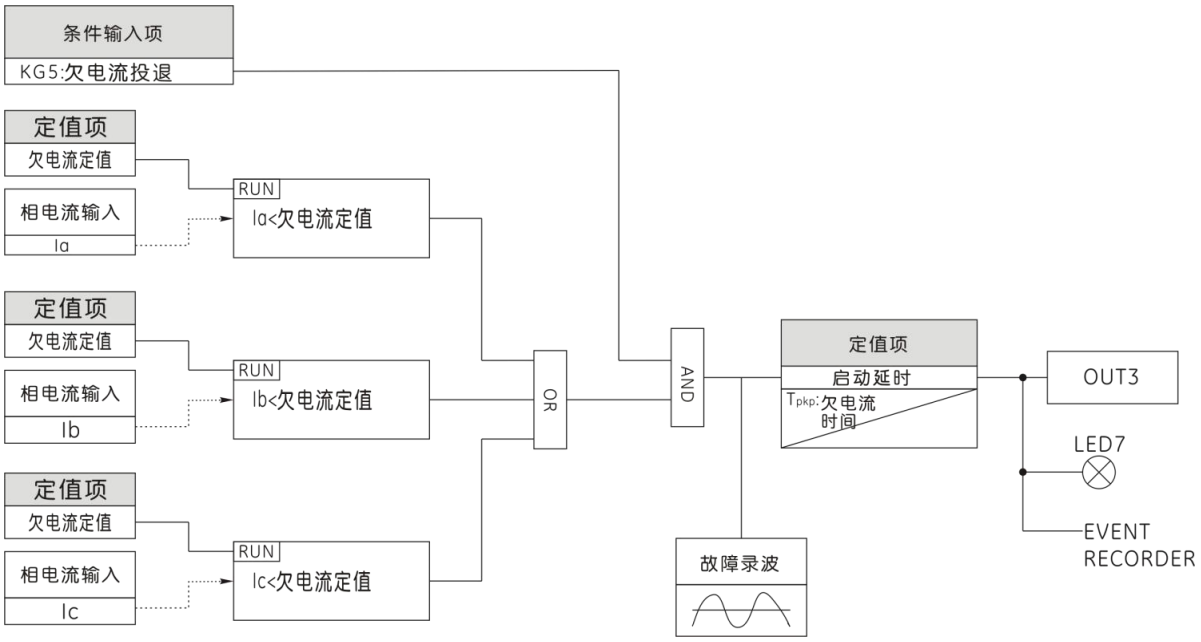
5.17 Grounded reverse time limit overcurrent

The principle of grounding Inverse time limit overcurrent protection is the same as the zero sequence Inverse time limit overcurrent protection principle. When the grounding current IG of the grounding channel is detected to be greater than the set grounding reverse time limit, the Inverse time limit component sends a signal whose protection logic As shown below:



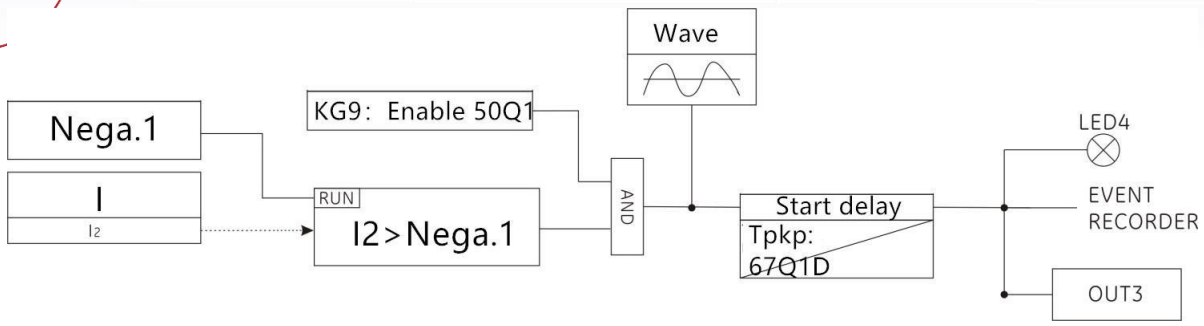
5.18 Undercurrent

When the current value detected by the device is less than the set under-current setting, the undercurrent protection element is activated and the signal is issued after the start delay. The protection logic diagram is as follows:



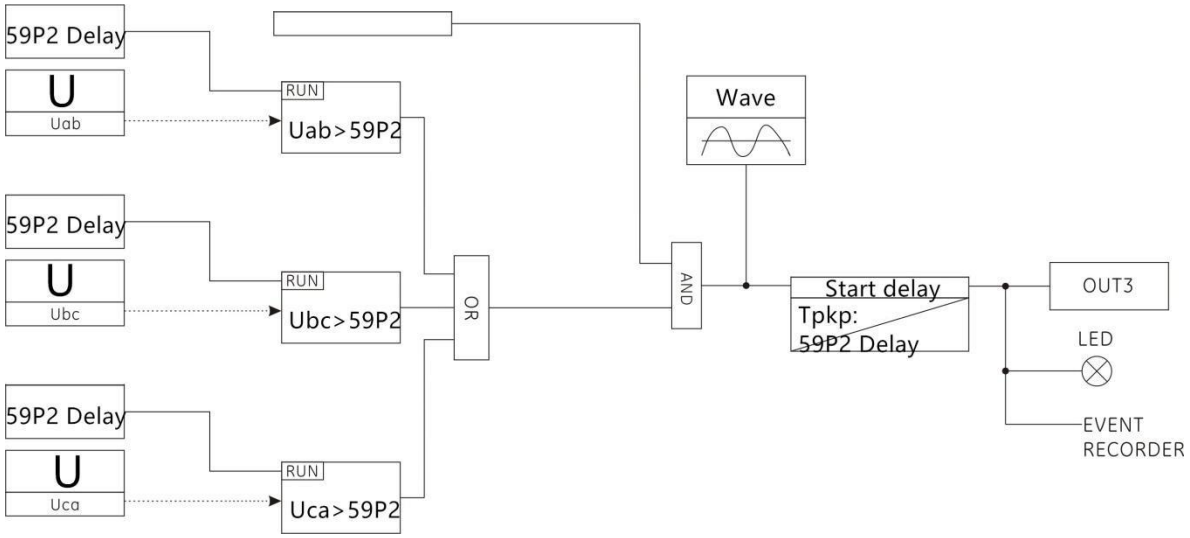
5.19 Negative sequence overcurrent

For the ideal power system, because the three-phase symmetry, so the value of negative sequence components are zero (that is, we often say that the normal state only positive sequence component of the reasons). When the system fails, the three phases become asymmetric, then you can break down the amplitude of the negative sequence components. The same positive sequence current and negative sequence current in the motor generated by the heat is not the same, negative sequence current generated by the double frequency excitation current for the rotor thermal effect is very significant. For the small negative current caused by mild unbalanced supply voltage, overheat protection has been provided for protection, but for severe unbalance, such as stator windings are disconnected or phase sequence reversed, special fast protection must be provided , Otherwise the sharp increase in the negative sequence current will make the motor burned due to overheating. The negative sequence overcurrent protection of the device is mainly for the motor phase, reverse phase, turn short circuit and more serious asymmetrical fault. When the device detects the negative sequence current is greater than the set negative sequence overcurrent value, you can start the negative sequence overcurrent components, and then after the start delay, send a signal. Its protection logic as shown below:



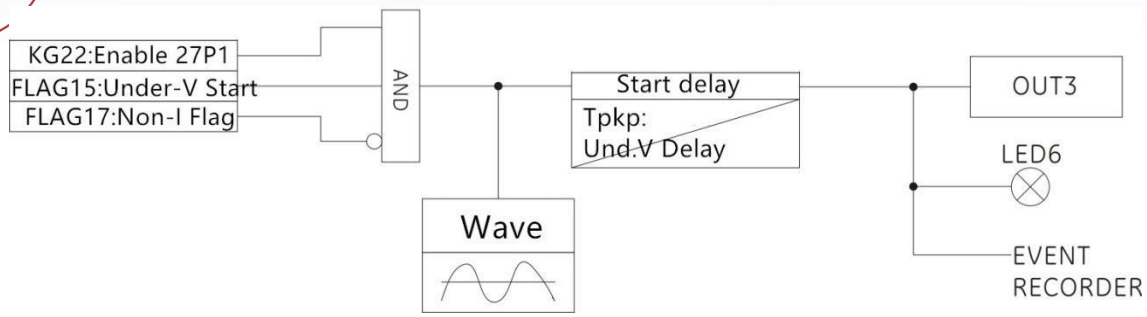
5.20 phase overvoltage

Power system voltage is too high a great harm, may burn out electrical equipment and even paralyzed the system. In order to avoid the high voltage caused by the harm, the use of phase over voltage protection components. When the device detects that any phase voltage is greater than the set over-voltage setting, the phase overvoltage protection element is activated and the signal is issued after the start-up delay. The protection logic diagram is as follows:



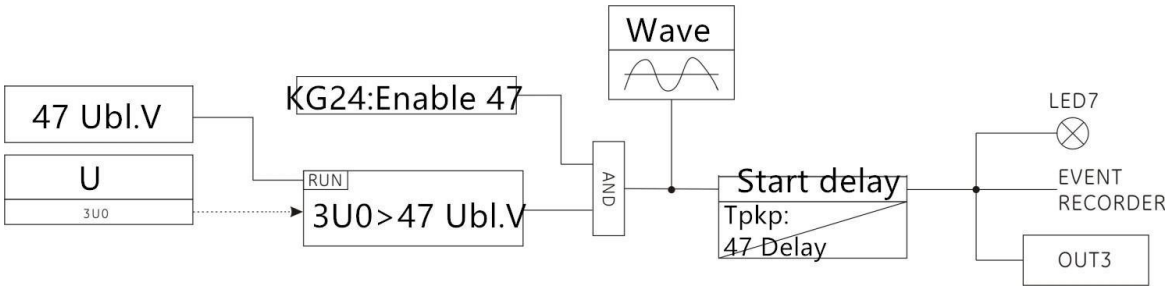
5.21 Phase undervoltage

In the event of a power system failure or abnormality, a low voltage may be generated. This protection can be used to disconnect the circuit breaker in the event of a power system power failure to prepare for system recovery or long backup protection as a primary protection. Its protection logic as shown below:



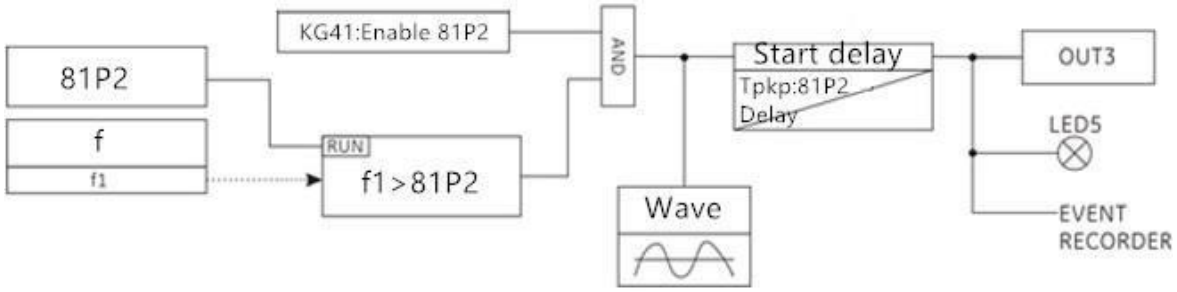
5.22 Zero sequence overvoltage

Zero sequence over-voltage protection principle and phase over-voltage protection principle, to calculate the 3U0 zero sequence voltage as a criterion. When the device detects that the zero sequence voltage is greater than the set zero sequence overvoltage setting, the zero sequence overvoltage protection element is activated and the signal is issued after the start delay. The protection logic diagram is as follows:



5.23 Over frequency protection

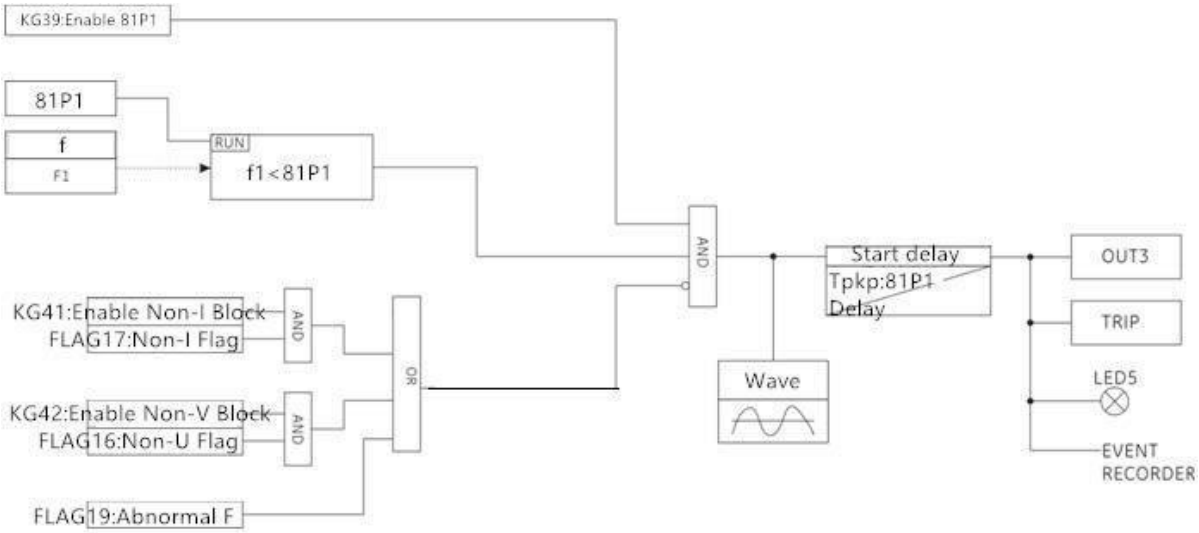
When the device detects the frequency is higher than the set over frequency setting, the over-frequency protection device starts, after the start delay, send a signal. The protection logic diagram is as follows:



5.24 Frequency change rate (low frequency)

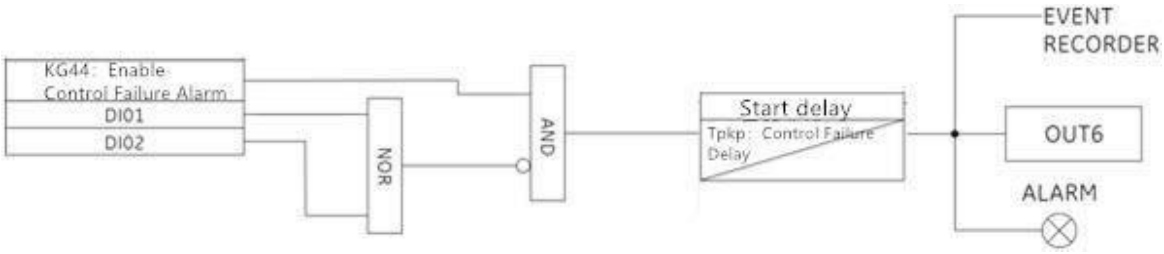
Frequency change rate protection element is a special monitoring system frequency protection components, when the voltage is greater than the set value, the current is greater than the set value, the system load is too heavy, the frequency down. Decrease the speed (slip) is less than the set value, when the frequency dropped to the set value when the export action, cast a low cycle to protect the pressure switch outlet switch will be jumped, get rid of part of the system load to ensure the normal operation of the system. Frequency change rate protection element can

choose slip lock / no current lock / no pressure lock function, the protection logic diagram as shown below:



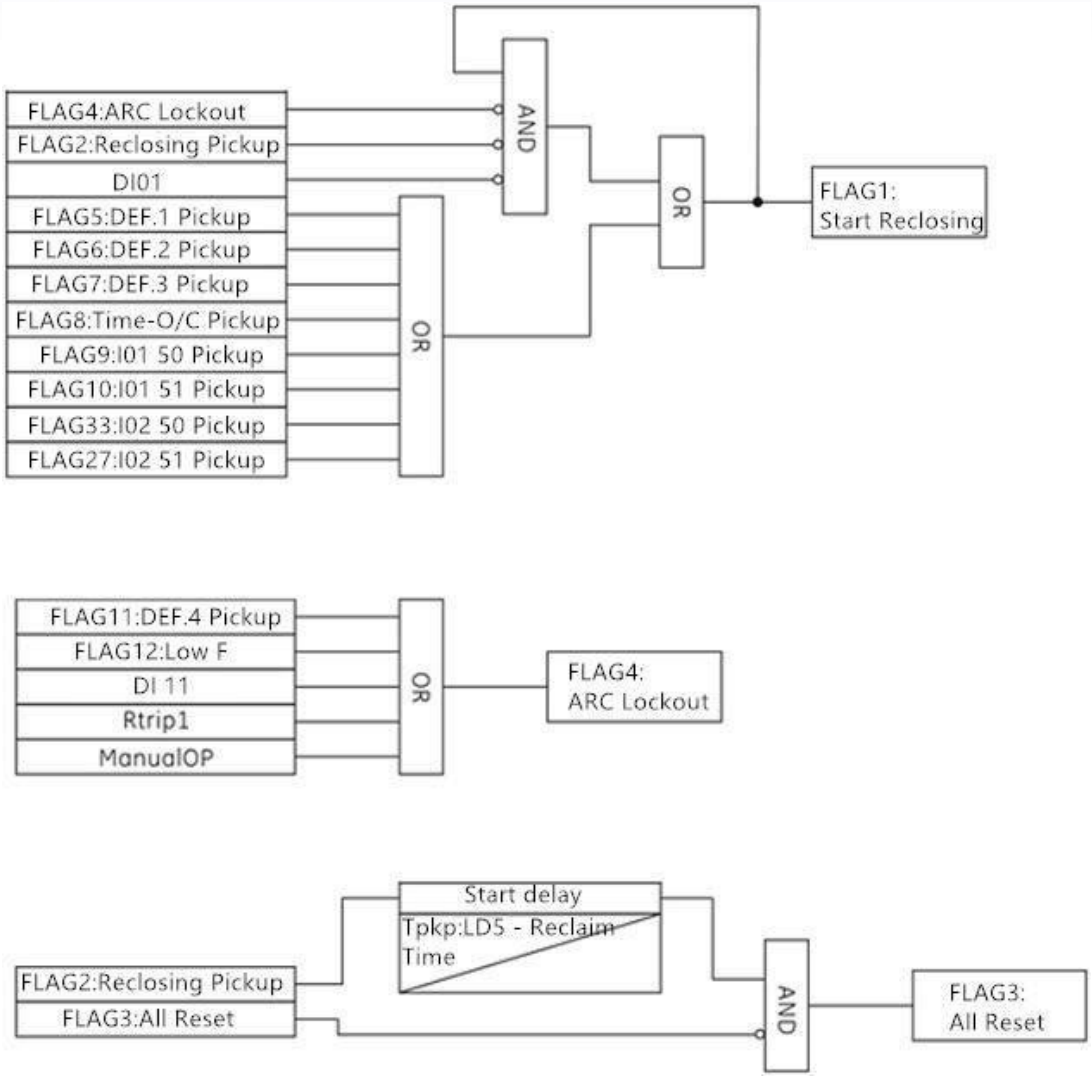
5.25 Trip loop monitoring

Trip circuit monitoring constant components to DI01 and DI02 as input input signal as a criterion, when the two input input only one signal, it is determined that the loop abnormal situation, the control loop abnormal components start, after the start delay issued Signal; when the input input side at the same time have a signal or no signal input input, then determine the loop did not happen abnormal situation.



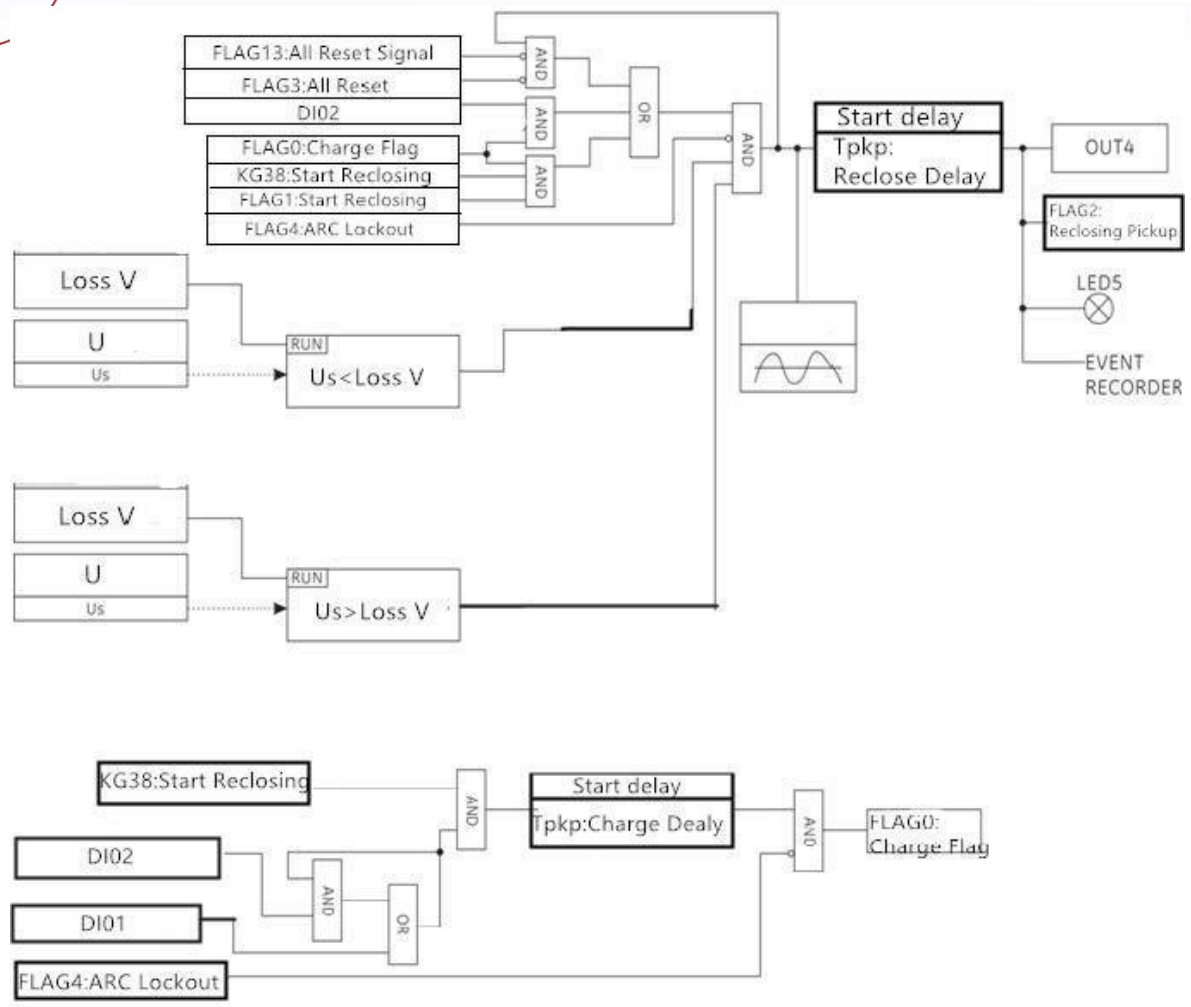
5.26 Reclosing conditions

The reclosing conditional element is used for reclosing protection, including the FLAG1 start reclosing flag, the FLAG4 latching reclosing flag, and the FLAG3 complete return sign. The logic is as follows:



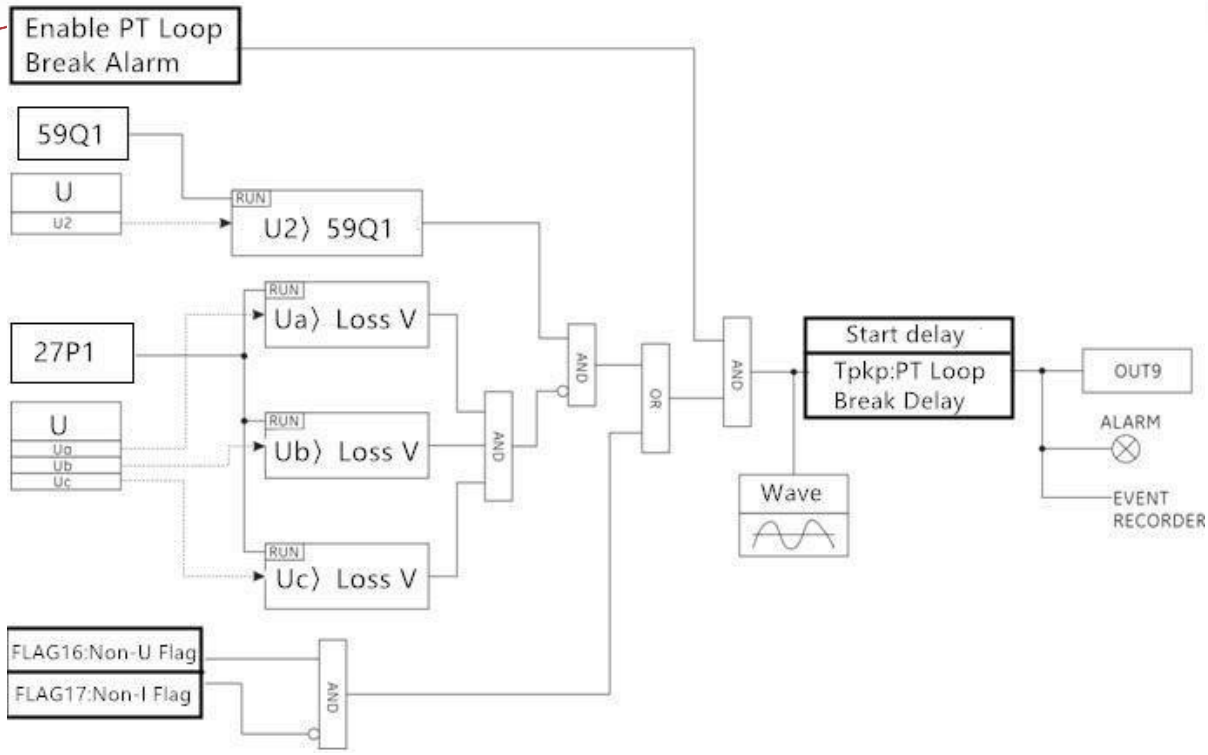
5.27 Three-phase reclosing

The reclosing element is used for reclosing control and can be set to not correspond to reclosing and to protect the reclosing. Automatic reclosing can be set repeatedly reclosing, the factory set up for the three-phase reclosing, can provide a single circuit breaker or multi-circuit breaker fast / slow reclosing. The following figure shows a three-phase reclosing logic diagram:



5.28 VT line disconnected

VT substation accident occurred in the substation, is a common fault. Once the VT disconnection is lost, the amount of voltage in the protection device is deviated, and the correct acquisition of the voltage is a prerequisite for distance protection, directional blocking, and overcurrent protection with low-voltage start-up components. The criterion is that when the device detects the current without pressure, and can start the VT broken element; or when the detection of VT broken line negative sequence voltage is greater than the set value, while detecting any phase voltage is lower than the low voltage When setting, you can also start VT broken components, the protection logic as shown below:



6 Debugging test

6.1 Visual inspection

Make sure that the controller is not damaged during transport and that all screws are properly fastened and that all relay terminals are in good condition.

Make sure that the information displayed on the relay panel matches the data displayed on the display and conforms to the required relay model.

6.2 General considerations for power networks

All devices that use AC current are affected by frequency. Since a non-sinusoidal waveform consists of a fundamental wave plus a series of harmonics from this fundamental, it can be concluded that the device using AC current is affected by the waveform used. To correctly test the use of alternating current relays, it is important to use a current and / or voltage sine waveform. Can not clearly represent the sine wave (no harmonic) purity of a particular relay. However, any relays that contain the sintonized loop [R-L) and R-C (resistance-capacitance) circuits will be affected by non-sine waves, as is the case with the controller. For most AC current and voltage tables, these relays respond in different ways to voltage waveforms. If the power supply network used for the test contains a wide range of harmonics, the voltmeter and relay response will be different. The relay has been calibrated at the factory with a network with the least harmonic

component 50 or 60 Hz. When testing a relay, you must use a power supply network with no harmonics in its waveform. The ammeter and timer for testing relay operating and operating times must be verified and their accuracy is higher than the accuracy of the relay. The test power supply must remain stable, mainly because the value of the power supply is close to the operating threshold. It is important to note that the accuracy of the test depends on the grid and instrument used. Performing functional tests with inappropriate power networks and meters is useful for checking if the relay is working properly. Thus, the operating characteristics of the relay can be confirmed in an approximate manner. However, if these conditions are used to verify the relay, the operating characteristics will exceed the allowable range. The following sections demonstrate in detail the test of confirming the full functionality of the relay.

6.3 Power on self test

6.3.1 LED inspection

After the device is powered on, the LED can be lit automatically, the color is correct (with green, red and yellow). After the self test is finished, if the device is working normally, the running indicator (RUN) works with the pulse attribute. Or through the device panel operation, in the "device test" menu, you can press the key operation to test the LED lights are good or bad.

6.3.2 LCD

After power on the LCD will be bright screen display, check whether there is a blind spot, the display of data, images, text, etc. is complete.

6.3.3 Device abnormal self-test relay (ALARM)

Device is also starting the clock, set value, logic data, power supply voltage, flash memory, machine temperature and other content self-test. If all the self-test items are correct, The controller alarm relay start, issued a "pop" sound, normally closed contact open. If the device self-test error, the relay will not turn on the electric shock, latch all fault output.

6.4 Key detection

After the device is powered on, each button can be flexible and reliable operation, and can make the right response, please refer to Section 3.2.3.

6.5 Screen display and switch detection

6.5.1 Screen display

The contents of each screen and the menu name should correspond to each other, no typos, each parameter and its description can correspond, and no spelling mistakes. Icons, single-line charts, etc. to be true.

6.5.2 Screen switch

Each screen can be switched through the up and down left and right keys, through the "ENTER" key to enter the next level menu, through the "ESC" key to return to the previous menu; the same screen parameters can be selected by the up and down keys;

6.5.3 Switch in English and Chinese

By setting the parameters to switch between Chinese and English display, before and after switching the various screens and their menus, parameters, description are correct.

6.6 Parameter setting and save detection

Press the controller parameter to modify the steps to modify the parameters, save the data into effect. After the saved data should remain after power-down; set value group can switch, switch after the four sets of values can be independent and save, but only the current investment group can work.

6.7 Clock detection

After the device is powered on, it can set the time manually by pressing the key on the panel or after the connection with the software. The clock travel time should be correct and the saved time can be saved.

6.8 SOE detection

The change of the switching input status, the change of the setting value, the generation of the protection action and the operation of the device, power failure, panel reset and other operations should produce the corresponding SOE, and should have the correct time scale, SOE code, SOE name, code And the name should be corresponding to protect the fault of the SOE should also have the corresponding fault action value; SOE is always the first preservation of the latest, recorded over 100 followed by the last one.

6.9 Communication detection

Verify that the available communication ports allow the device to communicate.
The ports to check are as follows:
Front: USB port
Back: RS485, RJ45 - Ethernet.
You must use a computer with a controller PLP Setup software and an appropriate connector.

6.10 Measurement detection

The controller related parameters are set as follows:

Serial number	Parameter Name	Set the value	range
1	Analog ACConfig	1	1～5
2	Power config	2 / 3	2 / 3
3	Current config	2 / 3	2 / 3
4	Vs config	1	1～3
5	CT ratio	100	0～9999
6	VT ratio	100	0～2200
7	CT rating	1	1 / 5
8	I01 ran	100	0～9999
9	I02 ran	100	0～9999

Information: The part of the parameter is not the same as the model of the selection device. The configuration is different. The parameters are slightly different. Please refer to the actual parameters.

6.11 Contact input and Output detection

6.11.1 Contact input test

In the binary input input port threshold voltage of 85VDC power supply, the switching input should change from 0 to 1, and produce the corresponding SOE, remove the voltage, will produce 1 to 0 state changes, and produce Corresponding SOE.

DI test				
DI channel	input voltage	The initial state of the channel	Channel status	SOE record
1～26	0 VDC	1	From "1" to "0"	Have
	85 VDC	0	From "0" to "1"	Have
	200VDC	0	From "1" to "0"	Have

6.11.2 Output test

After successful login, enter the "Test of switching output " menu, select the related switching output channel, and in the switching output loop connected with a small light or multimeter, press the "ENTER" key to test the operation, the specific test steps please refer to 4.8.6 The status of

the channel from 0 to 1, the small light is lit up or the multimeter is tweeted, then press the "ENTER" key, the channel status is from 1 to 0, the small light is off or the multimeter stops the call; the "ALARM" exit is the device abnormal relay Node, the device is powered off, the outlet node is closed, the device is started successfully, the node is disconnected.

6.12 Fault recorder detection

Protection of the fault should occur after the corresponding fault recording, the contents should have the correct time scale, the first 4 after the 24 cycles of the current or voltage waveform, value and the switch state, fault record can save a total of 8, Record the last one after the eight in order to cover the last one. You must use a computer with the controller's BP-PLP software and an appropriate connector.

6.13 Power detection

Apply the minimum and maximum voltage to the controller. For each voltage value, to verify that there is a voltage, the alarm relay is energized and exits when it is lost. The device ensures a "device power" event record after each power-up.

Control power rating: 24V DC/AC

Range: 18~36V DC/AC

7 Frequently Asked Questions and Handling

If there is a problem finding the equipment, we strongly recommend that you follow the recommendations below before sending the equipment back to the factory. Although it can not solve all the problems, at least they will make you as soon as possible to determine the problem in order to repair as soon as possible.

If you need to return the equipment to the factory for repair, please use the appropriate Return Material Authorisation procedure and follow the shipping instructions provided by our service department, especially when international shipping. This can solve the problem quickly and effectively.

classification	problem	possible reason	Processing recommendations
protection	The relay does not trip	This feature is disabled Not put in Conditional lockout	Check that the self-check information is correct Put the corresponding protection control word Check if the latching condition is met
general	After the the controller is powered up, the panel indicator is not lit.	The supply voltage is not enough Fuse tube fuse Not equipped with insurance tube Wrong wiring	Check the supply voltage Replace the new T 3A fuse Fitted with T 3A fuse Check the auxiliary power supply terminal number
general	After supplying the the controller, the display clock is very different from the actual one	Time operation is set incorrectly Invalid battery in the device	Reset the time Replace the new 3V button battery
Communication	BP-PLP and the controller panel USB port can not communicate	Wrong communication cable The communication cable is damaged the controller or PC is not grounded	With the manufacturers to provide special cables Replace the new communication cable To ensure that the two reliable grounding (portable PC

		PC's USB port is damaged	battery power without grounding) Make sure the USB port of the PC is good
Communication	The controller backplane RS485 port can not communicate	PC communication parameters are set incorrectly Wiring polarity is wrong the controller or master is not grounded Communication parameters or protocols are inconsistent	Check the PC's communication parameter settings Swap +, - wiring To ensure that the two reliable grounding Check the communication parameters and communication protocol settings
Communication	The controller backplane Ethernet port can not communicate	PC communication parameters are set incorrectly The cable is damaged the controller or master is not grounded Communication parameters or protocols are inconsistent	Check the PC's communication parameter settings Replace the new cable To ensure that the two reliable grounding Check the communication parameters and communication protocol settings

8 Equipment maintenance

The equipment is maintenance-free for the specified period of time when the controller unit is used in the "Technical data" section and the conditions specified in this manual. The controller device electronic circuit does not have any components that are subject to abnormal physical or electrical wear.

If the environmental conditions are different from those specified in the "Technical Data" section (eg temperature and humidity), or if the atmosphere surrounding the unit contains chemically active gases or dust, the equipment should be visually inspected in conjunction with a secondary test. The following points:

- mechanical damage to the enclosure and terminals,
- equipment panel or enclosure dust,

- equipment wiring terminals, enclosure or internal corrosion traces,

If the protection terminal is not operating correctly, or if the action value is significantly different from the protection terminal characteristics of the protected equipment, the protection terminal needs to be repaired. Please contact our company or related agents for more information on inspection, overhaul or re-establishment of protective terminals. Due to not work, to the controller equipment to return to my company for maintenance, please contact with my company. In the maintenance of the transport device on the way, must be carefully packaged to prevent further damage to the equipment.