

配电自动化馈线终端 FTU

Distribution automation feeder terminal

FYF630 Series

Technical specifications

珠海菲森电力科技有限公司

Zhuhai Fusion Power Technology Co., Ltd.

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1. Summary

1.1 Scope of application

FYF630 series distribution network intelligent controller (hereinafter referred to as the device) adopts advanced digital signal processing technology, high-speed industrial network communication technology, embedded industrial chipset and multi task real-time operating system, with strong stability, high reliability, good real-time performance, wide environment and powerful functions. With the cooperation of load switch, it can be combined into voltage time type and voltage current time type distribution functions to realize the local distribution automation function. The device can cooperate with outgoing circuit breaker, sectional circuit breaker, branch circuit breaker, boundary switch, etc. to realize fault removal and fault recovery of distribution lines. It is a new generation of microprocessor-based remote terminal device for distribution automation, which integrates telemetry, remote signaling, remote control, protection and communication functions.

1.2 Design code

The product design follows the following standards:

| | |
|---------------|--|
| GB/T13720 | General specification for data acquisition and monitoring system of regional power grid |
| GB/T13729 | Telecontrol terminal equipment |
| GB/T13730 | Dispatching automation system of regional power grid |
| GB/T14285 | Technical specification for relay protection and automatic safety device |
| GB/T15153.1 | Standard for Telecontrol equipment and power supply and electromagnetic compatibility |
| GB/T17626 | EMC test and measurement technology |
| DL451 | Circular telecontrol protocol |
| DL516 | Operation management regulation of power dispatching automation system |
| DL/T550 | Functional specification for dispatching automation of regional power grid |
| DL/T599 | Technical guidelines for transformation of urban medium and low voltage distribution network |
| DL/T630 | Technical conditions of AC sampling telecontrol terminal |
| DL/T634.5-101 | Subset of standard transmission protocols for telecontrol equipment and systems Part 101 |
| DL/T634.5-104 | Subset of standard transmission protocols for telecontrol equipment and systems Part 104 |
| DL/T667 | Supporting standard for information interface of relay protection equipment |
| DL/T721 | Remote terminal of distribution automation system |
| DL/T790 | Distribution automation with distribution line carrier |

| | |
|-----------|--|
| DL/T814 | Functional specification of distribution automation system |
| DL/T890 | Energy management system application program interface |
| DL/T1080 | System interface of integrated distribution management in electric power enterprises |
| DL/T5003 | Technical code for design of power system dispatching automation |
| DL/T5404 | Engineering design and technical specification of synchronous digital series optical cable communication in power system |
| Q/GDW156 | Guidelines for planning and design of urban power network |
| Q/GDW212 | Technical principle of reactive power compensation configuration in power system |
| Q/GDW370 | Technical guidelines for urban distribution network |
| Q/GDW382 | Technical guidelines for distribution automation |
| GB/T 4208 | Enclosure protection class (IP code) |
| GB3047.1 | Basic size series of panels, racks and cabinets |
| JB 616 | General specification for secondary circuit panel (set) of power system |
| GB191 | Packaging, storage and transportation pictorial mark |

1.3 Device model description

1.4 Device features

■ Powerful software and hardware platform

The device adopts integrated design, with strong universality of circuit design, good interchangeability, good maintainability and convenient technology upgrading. The software platform adopts the patented cold fire real-time Linux system, and a main control board realizes the "algorithm" + "communication" function. The system architecture is simple and reliable.

■ Various anti-interference measures

The device adopts multi-level isolation and good shielding measures. Various anti-interference measures are fully considered in the design from case to printed board and the selection of components. The application of mature surface mounting technology and the production process strictly follow the requirements of ISO9

000:2000 program, which makes the whole machine have excellent electromagnetic compatibility performance and high reliability of field operation. No external anti drying is required for screen assembly. Disturbance measures simplify the design and operation maintenance.

■ Flexible functions

The device maintenance tool software provides three configuration functions: device channel configuration, constant value parameter setting and forwarding point table configuration. Through the three configuration functions, all kinds of engineering applications can be completed through configuration, without modifying the program, greatly improving the reliability of the device.

■ Good maintainability

The device maintenance tool software is divided into four parts: utility, engineering, production and development, which provides comprehensive maintenance functions for different roles of personnel. Among them, public use includes: telemetry data, line remote signaling, board card remote signaling, sampling zero drift, device log, device information, device maintenance module; engineering includes: device channel configuration, constant value parameter modification, forwarding point table configuration, GPRS setting, engineering backup, engineering recovery, telecontrol test, message monitoring module; production includes: device upgrade, single board test, complete machine test module The development includes: device board configuration, device type configuration, protocol test, recording data analysis, file transmission, protocol analysis, amplitude adjustment and other modules.

■ Perfect fault recording function

The device can simultaneously record all waveforms of 8 analog channels at a time, and the maximum length of manual recording is 1000 cycles, 20 seconds. During fault recording, 4 cycles before fault and 8 cycles after fault are recorded. Using the device maintenance tool software, you can make a detailed analysis of the recording files, with all the details at a glance.

■ High resolution human-computer interface (optional)

The 160 × 160 graph form is full of Chinese display interface, friendly human-machine interface and rich display content.

2. Basic function

2.1 Three remote function

| Three remote function | FYF630 |
|---|--------|
| Single line is supported. Including 9 channels of AC telemetry, 2 channels of DC telemetry, 15 channels of remote signal and 2 channels of remote control | √ |
| Each telemetry, remote signaling and remote control can be configured on any corresponding hardware channel through maintenance tools | √ |
| Voltage, current, active, reactive, power factor, battery voltage, device temperature, frequency, etc | √ |

2.2 Protection function

| Protection function | FYF630 |
|------------------------|--------|
| Quick break protection | √ |

| Protection function | FYF630 |
|--|--------|
| Over current protection | √ |
| Zero sequence current protection | √ |
| Ground fault alarm function | √ |
| Three phase multiple reclose (optional times, up to 3 times) | √ |
| Acceleration protection after phase over current or zero sequence over current | √ |
| Manual closing and remote closing acceleration tripping | √ |
| High current lockout open | √ |
| Over limit alarm of voltage and current | √ |

2.3 Distribution network function

| Distribution network function | FYF630 |
|--|--------|
| Segment s function: delay forward / reverse delivery | √ |
| Contact l function: delay closing of ring outlets | √ |
| Loss voltage opening | √ |
| Zero sequence voltage opening | √ |
| Closing loop | √ |

2.4 Data transmission function

| Data transmission function | FYF630 |
|--|--------|
| Be able to communicate with the superior station, send the collection and processing information up and accept the control command of the superior station | √ |
| Time calibration with superior station | √ |
| With local maintenance communication interface | √ |
| Short message service interface | √ |

| Data transmission function | FYF630 |
|--|--------|
| Communication interface: RS-232 / 485, industrial Ethernet | √ |
| Communication channel: it can support optical fiber, carrier, wireless spread spectrum, wireless data transmission radio, CDMA, GPRS, ADSL and other communication forms, which can be selected by users | √ |

2.5 Maintenance function

| Maintenance function | FYF630 |
|--|--------|
| Local setting parameter setting | √ |
| Remote setting parameter setting | √ |
| Program remote update | √ |
| With local maintenance communication interface | √ |
| remote diagnosis | √ |
| Equipment self diagnosis | √ |
| Program self recovery | √ |

2.6 Other functions

| Other functions | FYF630 |
|---|-------------------------|
| Wireless remote control function: 50m (local operation) | Selective configuration |
| Event sequence recording function | √ |
| Power loss data saving function | √ |
| GPS geographic information and timing function | Selective configuration |
| Handheld PDA monitoring | Selective configuration |

3. Technical parameter

3.1 Environment condition

■ Normal working atmospheric conditions

The terminal equipment of the station shall work normally in the following environment:

- a) Ambient temperature range: $-40^{\circ}\text{C} \sim +75^{\circ}\text{C}$;
- b) Maximum change rate of ambient temperature: $1.0^{\circ}\text{C} / \text{min}$;
- c) Humidity: 5% - 100%;
- d) Maximum absolute humidity: $35\text{g} / \text{m}^3$;
- e) Atmospheric pressure: 70-106kpa.

■ Environmental requirements

- a) There is no explosion hazard, corrosive gas, conductive dust, serious mould and violent vibration shock source. The site safety requirements shall comply with the provisions of GB / T 9361.
- b) The grounding resistance shall be less than 4Ω .

■ Storage and transportation limit ambient temperature

The storage and transportation limit ambient temperature of the equipment is $-40^{\circ}\text{C} \sim +75^{\circ}\text{C}$, without any abnormality.

3.2 Power requirements

DC power supply: 24V, allowable deviation: $\pm 20\%$

Input voltage of switching value and state value: DC24V, starting voltage (60% - 75%) U_e

3.3 Main technical performance indexes

■ Three section low voltage lockout directional overcurrent protection

- a) Setting value range
Current: $0.1I_n \sim 20I_n$
Low voltage: $20\text{V} \sim 100\text{V}$
Time range of overcurrent section I: $0\text{s} \sim 10\text{s}$
Time range of overcurrent II and III: $0.1\text{s} \sim 10\text{s}$
- b) Interphase power directional element
Action area: 120°

Maximum sensitive angle: $-30^{\circ} \pm 2^{\circ}$

- c) Allowable error of setting value

Current: $\pm 3\%$ 或 $\pm 0.02I_n$

Low voltage: $\pm 3\%$

Note: I_n is the secondary rated current of TA, the same as below

- d) Time error: not more than $\pm 40\text{ms}$ or $\pm 1\%$ when the current is 1.2 times the setting value

■ Overcurrent acceleration protection

- a) Setting value range

current: $0.02I_n \sim 20.0I_n$

Time range: $0\text{s} \sim 10\text{s}$

- b) Allowable error of setting value

Current: $\pm 3\%$ 或 $\pm 0.02I_n$

- c) Time error: not more than $\pm 40\text{ms}$ or $\pm 1\%$ when the current is 1.2 times the setting value

■ Zero sequence overcurrent protection of section II

- a) Setting value range

current: $0.0\text{A} \sim 100.0\text{A}$

Time range: $0.1\text{s} \sim 1800\text{s}$

- b) Allowable error of setting value

current: $\pm 3\%$ 或 $\pm 0.01\text{A}$

- c) Time error: not more than $\pm 40\text{ms}$ or $\pm 1\%$ when the current is 1.2 times the setting value

■ Zero sequence accelerated protection

- a) Setting value range

current: $0.01\text{A} \sim 10.0\text{A}$

Time range: $0\text{s} \sim 10\text{s}$

- b) Allowable error of setting value

current: $\pm 3\%$ or $\pm 0.01\text{A}$

- c) Time error: not more than $\pm 40\text{ms}$ or $\pm 1\%$ when the current is 1.2 times the setting value

■ Reclosing

- a) Setting value range

Reclosing charging time is 15s

First reclosing time: $0.3\text{s} \sim 300\text{s}$

Second reclosing time: $0.3\text{s} \sim 300\text{s}$

Third reclosing time: $0.3\text{s} \sim 300\text{s}$

Reclosing locking time: 0.0s ~ 300s

Reclosing confirmation time: 0.3s ~ 999s

- b) Allowable error of setting value
- c) Time: reclosing action time, no more than $\pm 1\%$ or $\pm 60\text{ms}$

■ Functional performance index of voltage distribution network

Voltage detection: $\geq 80\% U_n$

Power failure detection time (Z time): $\leq 3.5\text{s} \pm 0.5\text{s}$

X time error: $\pm 1\%$ or $\pm 60\text{ms}$

Y time error: $\pm 1\%$ or $\pm 60\text{ms}$

3.4 Measurement accuracy

Measuring current and voltage: class 0.2

Power and power factor: class 0.5

Event resolution: $\leq 2\text{ms}$

Frequency: 0.01Hz

3.5 Output contact capacity

24VDC: it is allowed to pass current 16A for a long time and cut off current 3A.

3.6 Power consumption

AC voltage: $< 0.5\text{VA/phase}$

AC current: $< 0.5\text{VA/phase}$

DC: $\leq 20\text{VA}$

3.7 Overload capacity

Current circuit: 2 times of rated current, continuous operation

20 times of rated current, 1 s allowed

Voltage circuit: $1.2U_n$, continuous operation

3.8 Insulation property

■ Insulation resistance

The insulation resistance of each live conducting circuit of the device to the ground (i.e. shell or exposed non live metal parts) and between each live conducting circuit which has no electrical connection in the product shall not be less than $100\text{m}\ \Omega$ measured by a test instrument with an open circuit voltage of

500V.

■ Dielectric strength

Each live conducting circuit of the device to the ground (i.e. shell or exposed non live metal parts) and each live conducting circuit which has no electrical connection in the product shall be able to withstand 2.5KV (rated insulation voltage $> 63\text{v}$), 500V (rated insulation voltage $\leq 63\text{v}$) (effective value) and 50Hz AC test voltage for 1min without breakdown or flashover.

■ Impulse voltage

Between each live conducting circuit of the device to the ground (i.e. shell or exposed non live metal parts), and between each live conducting circuit which has no electrical connection in the product, it shall be able to withstand the test voltage with impulse voltage waveform of standard lightning wave, peak value of 1KV (rated insulation voltage $\leq 63\text{v}$) or 5kV (rated insulation voltage $> 63\text{v}$), and no insulation damage thereafter.

■ Heat and humidity resistance

The device shall be able to withstand the damp heat test specified in GB / T 2423.9. The test temperature is $+ 40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, relative humidity is $(93 \pm 3)\%$, and the test time is 48h. Within 2H before the end of the test, according to the requirements of 2.4.1, the insulation resistance of the exposed conductive metal part of each conductive circuit, the insulation resistance between the shells and the circuits that are not electrically connected shall be no less than $1.5\text{m } \Omega$, and the dielectric withstand voltage strength shall be no less than 75% of the dielectric strength test voltage amplitude specified in 2.4.2.

3.9 Mechanical properties

The equipment shall be able to withstand vibration with frequency f of 2~9hz, amplitude of 0.3mm, F of 9hz ~500hz and acceleration of $1\text{m} / \text{S}^2$. After vibration, the equipment shall not be damaged and parts shall not fall off due to vibration.

3.10 Electromagnetic compatibility

The adaptability of voltage dips and interruptions shall be in accordance with the relevant provisions of GB / t15153.1.

The ability to resist high-frequency interference shall be in accordance with the relevant provisions of GB / t15153.1.

The anti-interference ability of fast transient pulse group shall be in accordance with the relevant provisions of GB / t17626.4.

The anti surge interference ability shall be in accordance with the relevant provisions of GB / t15153.1.

The anti-static discharge capacity shall be in accordance with the relevant provisions of GB / t15153.1.

The anti-interference ability of power frequency magnetic field and damping oscillating magnetic field shall be in accordance with the relevant provisions of GB / t15153.1.

The ability to resist radiated electromagnetic field interference shall be in accordance with the relevant provisions of GB / t17626.3.

3.11 Communication interface

- a) Two RS-232 communication interfaces, the communication rate can be adjusted.
- b) Two RS-485 communication interfaces, the communication rate can be adjusted.
- c) Two standard 10m / 100M Ethernet interfaces (optional RJ45 or optical Ethernet interface).
- d) It supports DL / T 634.5101-2002 (IEC60870-5-101), DL / t634.5104-2002 (IEC60870-5-104), MODBUS and other communication protocols, and can be expanded as required.

4. Device structure hardware

4.1 Device structure

The device adopts stainless steel case, waterproof design and air plug outlet. See Figure 4-1 for the overall dimension and installation dimension of the device.

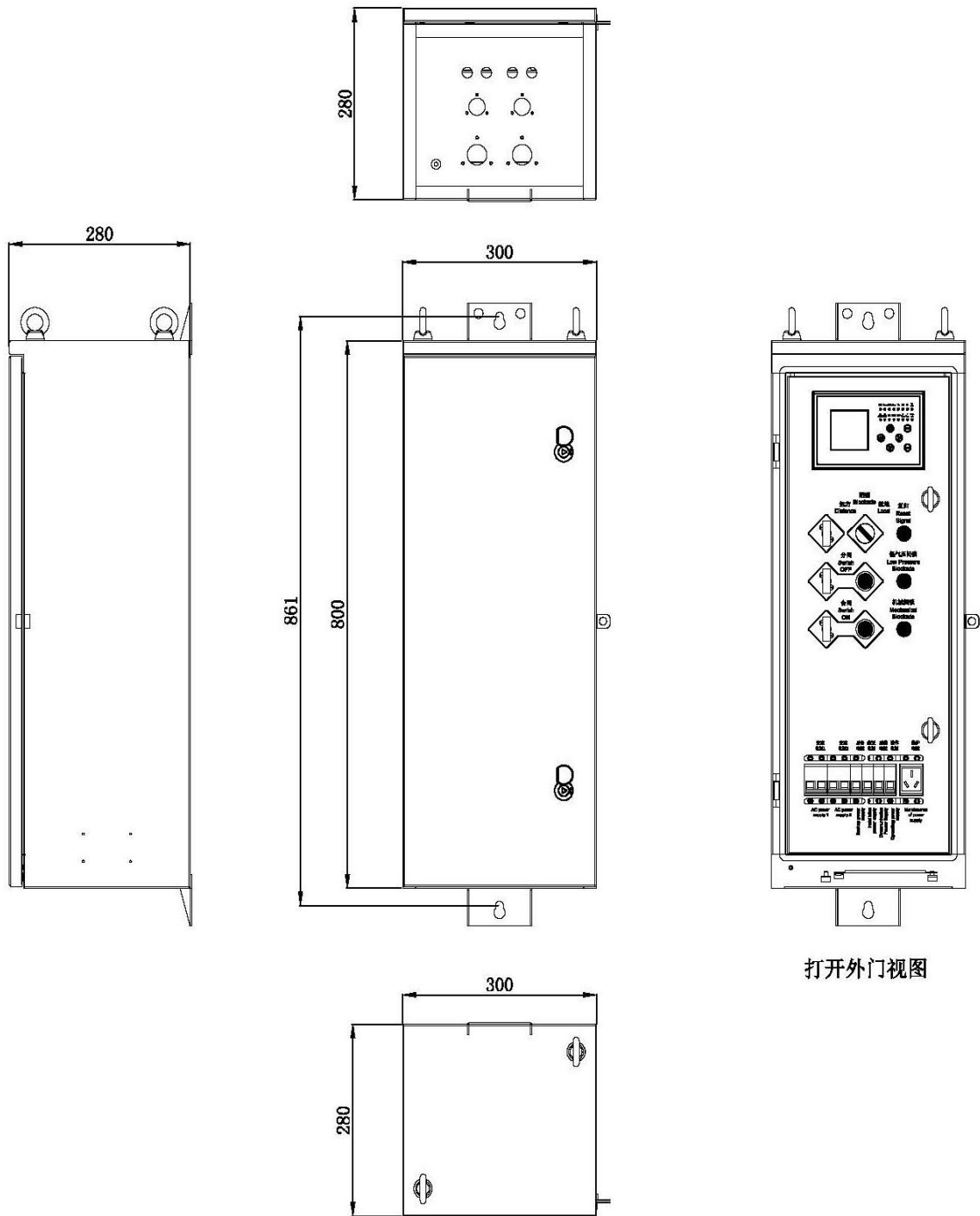


Figure 4-1 Overall dimension of device

5. Device function introduction

5.1 Protection function

■ Three section low voltage lockout directional overcurrent protection

The device is equipped with three-phase overcurrent protection. Each section of section I, II and III of overcurrent protection can be independently set with or without direction and locked by voltage or without voltage; when low-voltage locking and direction locking exit, each section with direction or low-voltage locking exit voltage element becomes pure overcurrent protection; when low-voltage locking or direction locking is put into operation, each section with direction or low-voltage locking is locked.

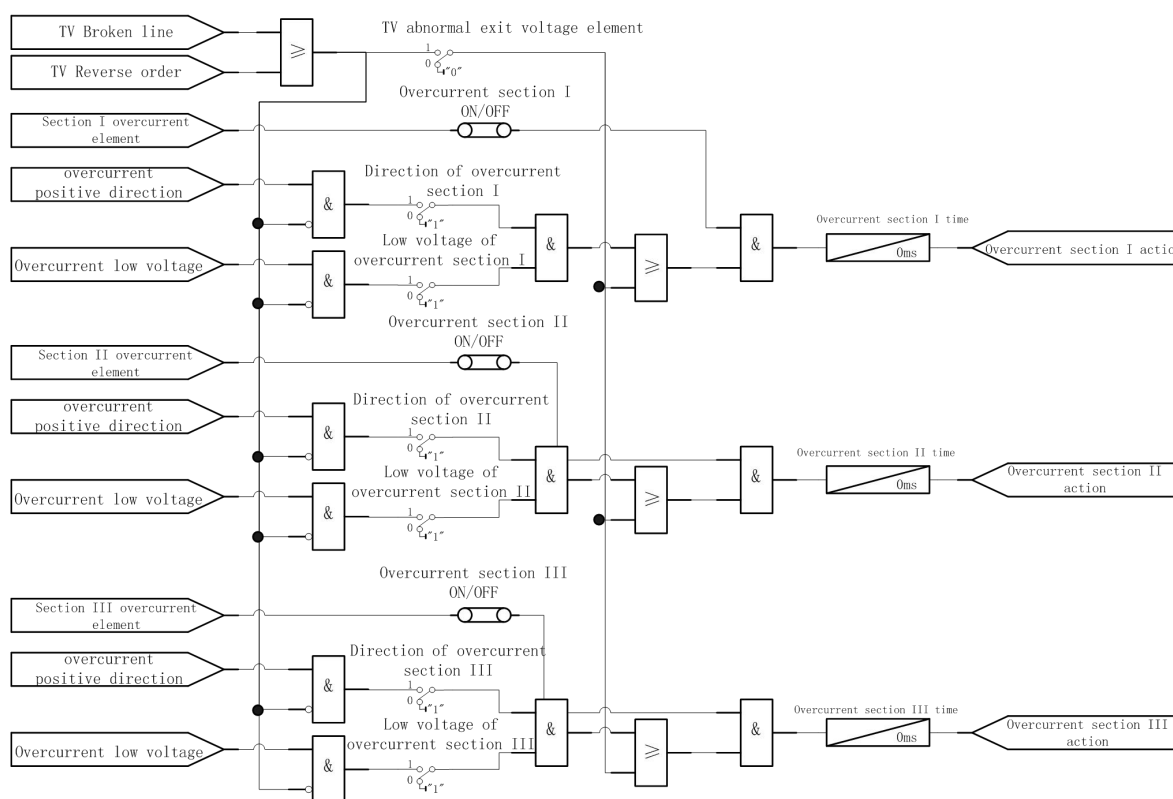


Figure 5-1 quick break protection logic diagram

■ Two section zero sequence directional overcurrent protection

The device is equipped with two sections of zero sequence overcurrent protection, which can choose whether to block through zero sequence voltage or not, and can independently choose whether to block through zero sequence direction. When zero sequence low-voltage locking and zero sequence direction locking exit, the exit voltage element of zero sequence protection with direction or zero sequence voltage locking becomes pure zero sequence overcurrent protection; when low-voltage locking and direction locking are put into operation, the zero sequence protection of each section with direction or zero sequence voltage locking is locked.

Zero sequence protection can select tripping or alarm. When "zero sequence tripping" is selected, the outlet tripping can be realized by setting delay; when "zero sequence alarm" is selected, the alarm signal can be sent by setting delay.

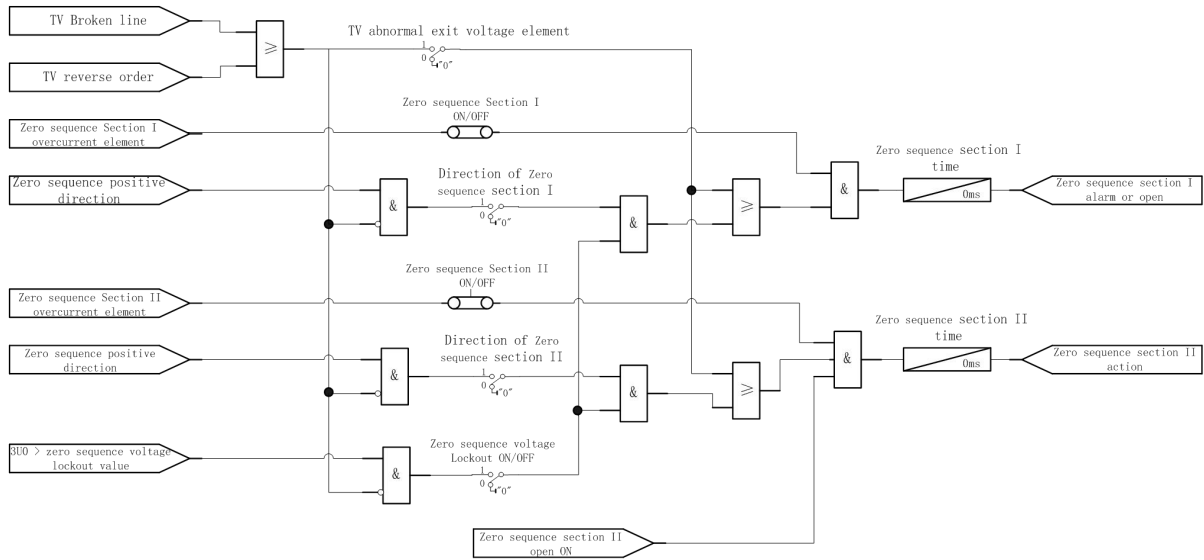


Figure 5-2 zero sequence protection logic diagram

■ Acceleration after overcurrent

The device is equipped with independent acceleration section protection, which can choose to use overcurrent acceleration and zero sequence current post acceleration protection.

The manual acceleration loop of the device does not need to be started by the contact of the external manual closing handle.

The current setting and time setting of overcurrent acceleration protection and zero sequence overcurrent acceleration protection can be set independently. The post acceleration opening time is 200ms.

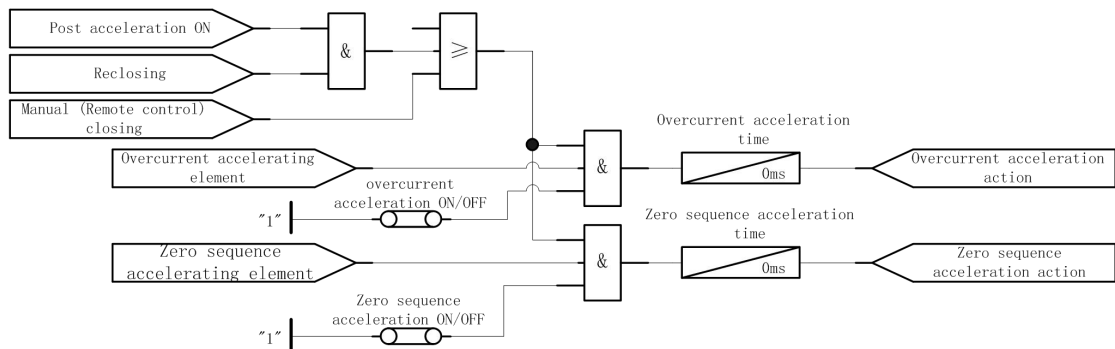


Figure 5-3 logic diagram of acceleration protection

■ Reclosing

The device can select three-phase multiple reclosing through the control word, and supports three reclosing at most.

There are two starting modes of reclosing: non corresponding starting and protection starting.

The reclosing is put into operation after charging, the line is in normal operation state (breaker trip = 0 or current), the protection is not started, and the reclosing discharge conditions are not satisfied, and the charging is completed after 15s. After charging, the "□" of the charging mark in the mark item under the working condition menu changes to "■".

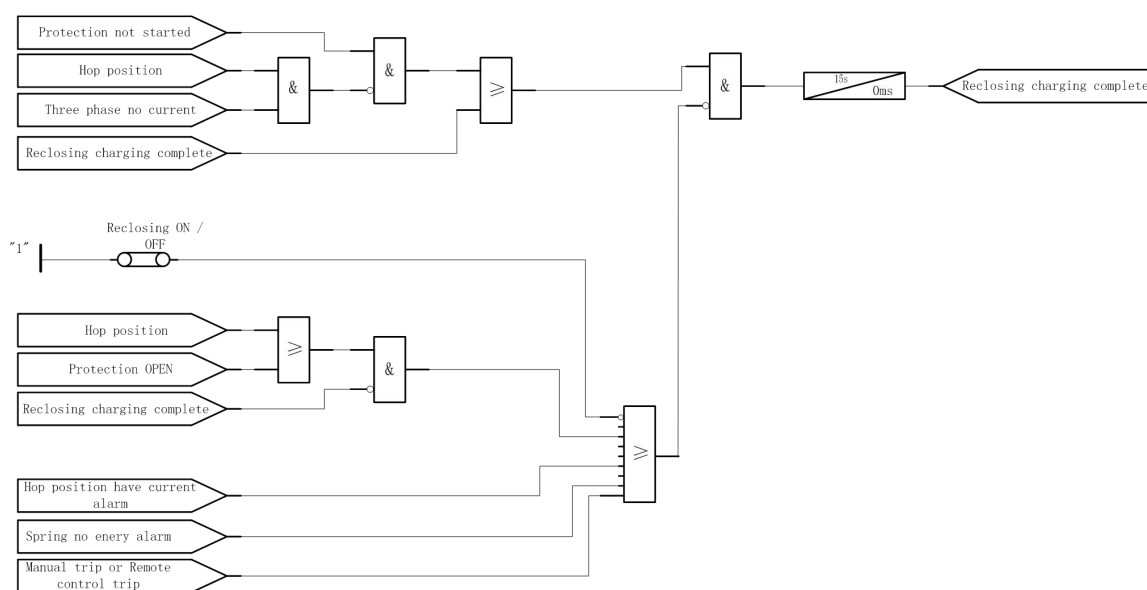


Figure 5-4 logic diagram of reclosing charge and discharge

The conditions for reclosing and discharging are as follows:

- (1) Reclosing on / off not on;
- (2) When reclosing charging is not completed, there is tripping in or protection tripping;
- (3) Tripping current alarm;
- (4) Spring energy not stored alarm;
- (5) Hand trip or remote trip.

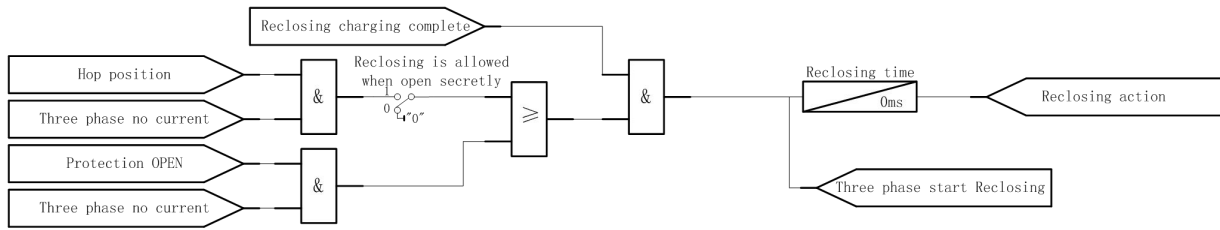


Figure 5-5 reclosing action logic diagram

When the second and third reclosures are put into operation, the number of reclosures is not reached after reclosing: if the switch is tripped again within the locking time limit, it will reclose and discharge; if the reclosure occurs beyond the successful time limit, it will be judged as another reclosure, and the sequence diagram of three-phase multiple reclosures is shown in Figure 5-7.

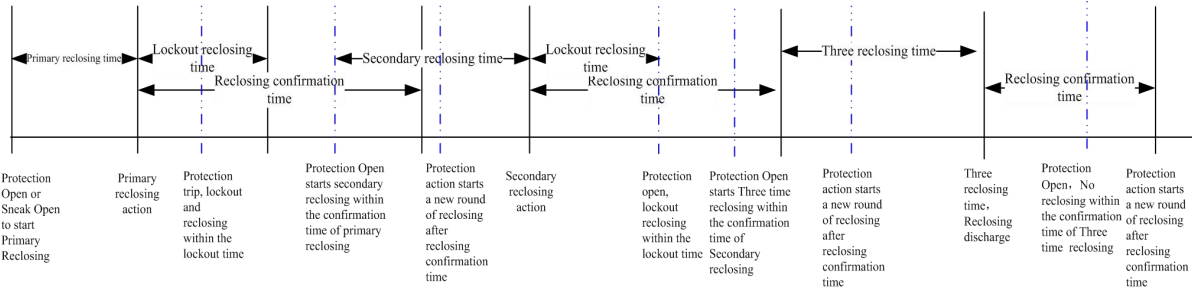


Figure 5-6 sequence diagram of three-phase three times reclosing action

5.2 Distribution automation function

■ Loss of voltage opening

After the voltage on both sides of the device is lower than the set value, the device will open after the setting time. When applied to the voltage type subsection s function, if there is no overcurrent within the fault confirmation time (w time) after the switch is closed, the voltage loss opening function will be blocked, and the lockout will reset after 5 minutes.

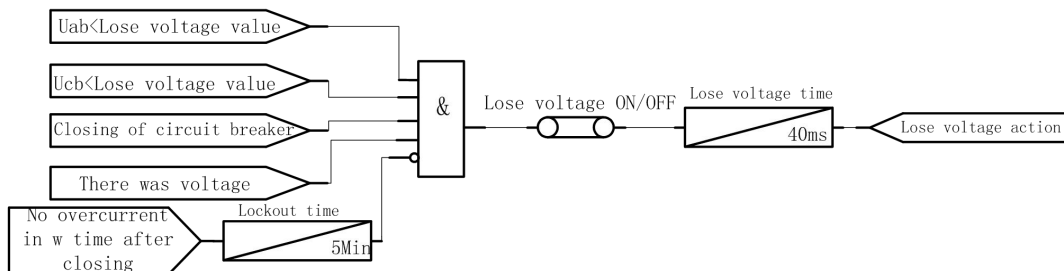


Figure 5-7 Logic diagram of voltage loss

■ Segment s function: delay forward / reverse delivery function

1) Power on delay closing

When power is cut off at both sides of a and B and the device is not in the locked state, power is supplied from one side, the device will start XT time timing to confirm the accident, and the switch will be closed after XT timing.

In case of power failure within Z time ($3.5s \pm 0.5s$) during x timing, X timing will continue to accumulate after the device is powered on again.

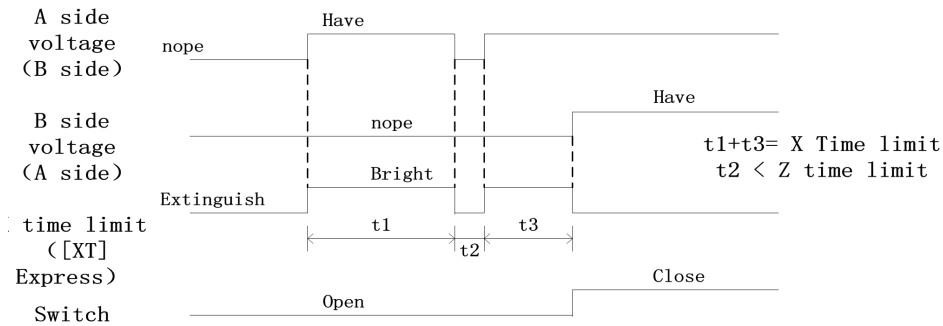


Figure 5-8 power on delay closing logic diagram

2) X time lockout

In x time, when the power supply side is cut off for more than Z time, the device starts the [x time lockout] function, and the [lock] light is on. When the power is transmitted from the load side, the switch is not closed.

Unlocking conditions:

- (1) Through the operation handle or remote control, execute the [Close] operation and release the locking;
- (2) When the power supply side is powered on, the locking will be released after X timing.

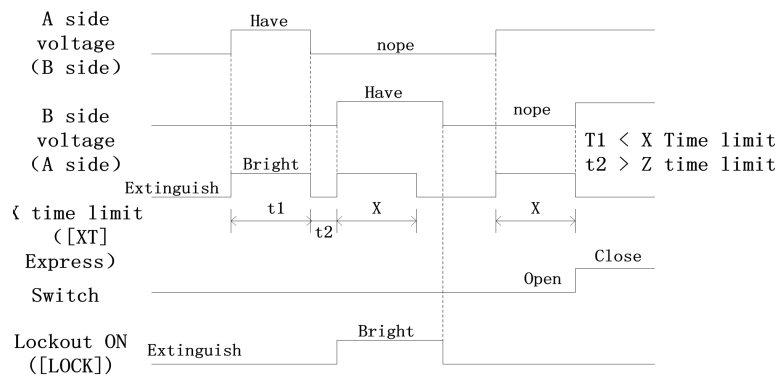


Figure 5-9 XT time lockout logic diagram

3) Voltage lockout on both sides

In X timing, if there is voltage on both sides, the device starts the [voltage locking on both sides] function, and the [lock] light is on. After X timing, the switch does not close.

Unlocking conditions:

- (1) through the operation handle or remote control, execute the [Close] operation and release the locking;
- (2) if the power is cut off for more than Z time on both sides at the same time, the locking is released.

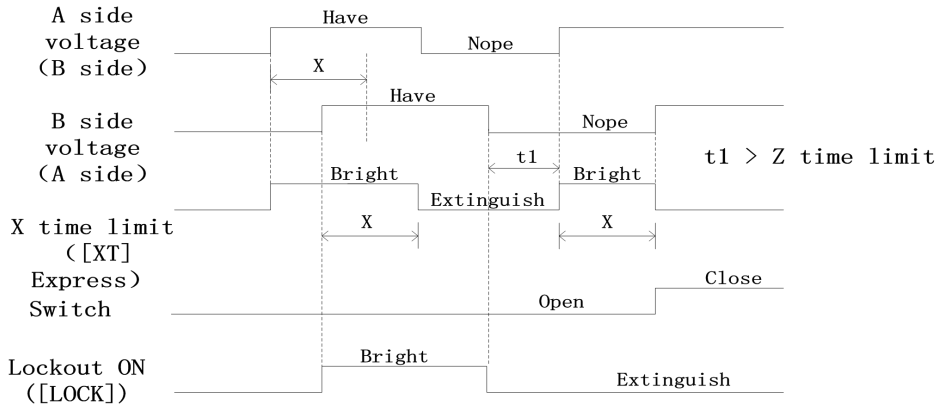


Figure 5-10 logic diagram of voltage lockout on both sides

4) Instantaneous pressure lockout

In the X timing, the instantaneous voltage is detected at the load side, the device starts the [instantaneous pressure locking] function, and the [lock] light is on. After X timing, the switch does not close.

Unlocking conditions:

- (1) through the operation handle or remote control, execute the [Close] operation and release the locking;
- (2) when there is a power supply at the instantaneous pressurization side, the locking will be released after X timing.

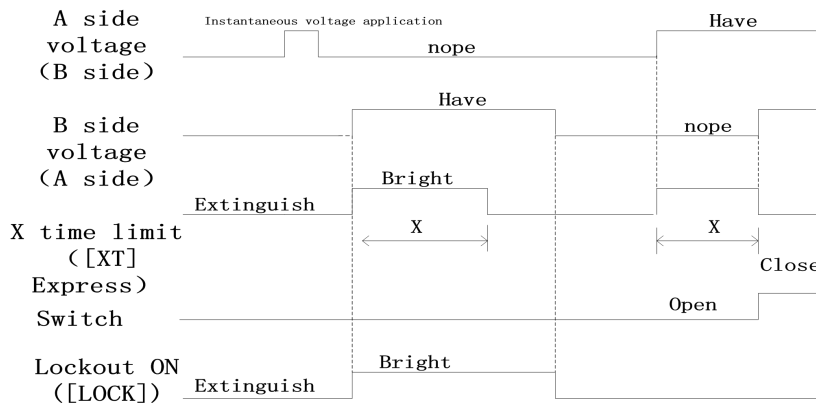


Figure 5-11 logic diagram of instantaneous voltage lockout

5) Closing confirmation

After the switch is closed, in order to confirm whether there is an accident, the device starts y time timing. In the Y timing, if there is a power failure less than Z time, the switch will start and close immediately without x timing after power supply is restored, and the Y timing will continue to accumulate.

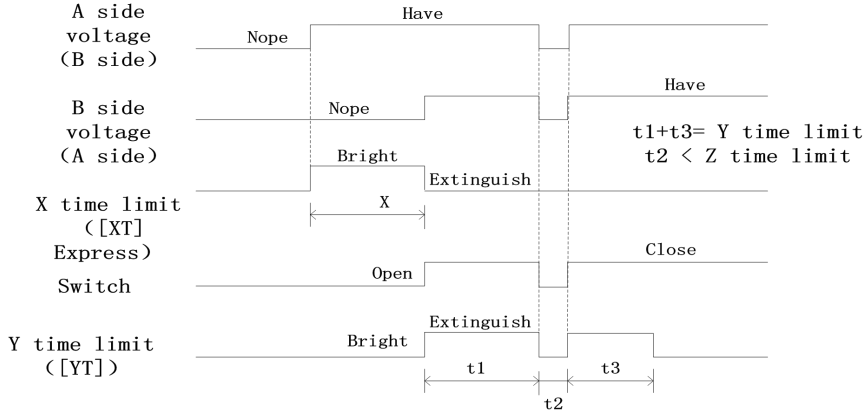


Figure 5-12 closing confirmation logic diagram

6) Y time lockout

During y-timing, in case of power failure greater than z-time, the device starts the [YT time locking] function, and the [lock] light is on. When the power is transmitted from the power supply side, the switch will not be closed after X timing.

Unlocking conditions:

- (1) through the operation handle or remote control, execute the [Close] operation and release the locking;
- (2) when there is an incoming call at the load side, the locking will be released after X timing.

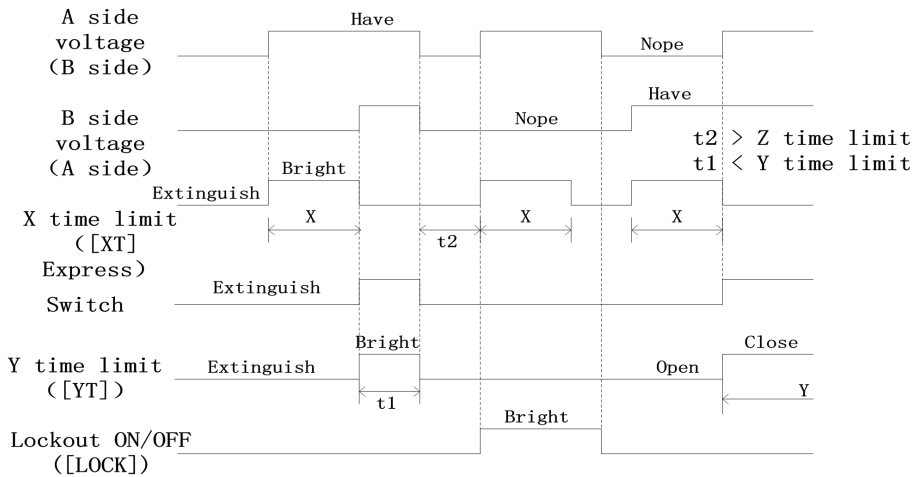


Figure 5-13 time blocking logic diagram

7) Zero sequence overvoltage after closing

Within the fault confirmation time (w time) after closing, the device detects the zero sequence voltage signal, immediately opens the switch and cuts off the ground fault.

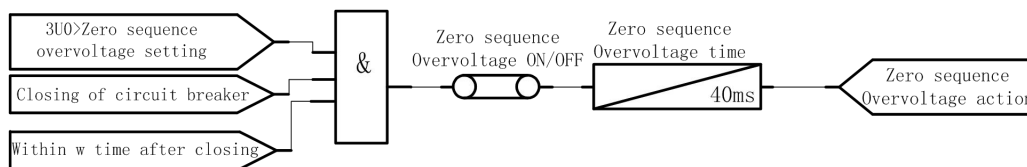


Figure 5-14 logic diagram of zero sequence overvoltage after closing

■ **Contact L function: delay closing of ring outlets**

1) **Power confirmation**

When one side is powered on, start the YL time locking function, and the lock light is on. When there is an incoming call from both sides, the unit starts YL timing to confirm that there is no fault. After YL timing is completed, the [YL time locking] is released.

In the process of YL timing, in case of power failure within Z time, YL timing continues to accumulate.

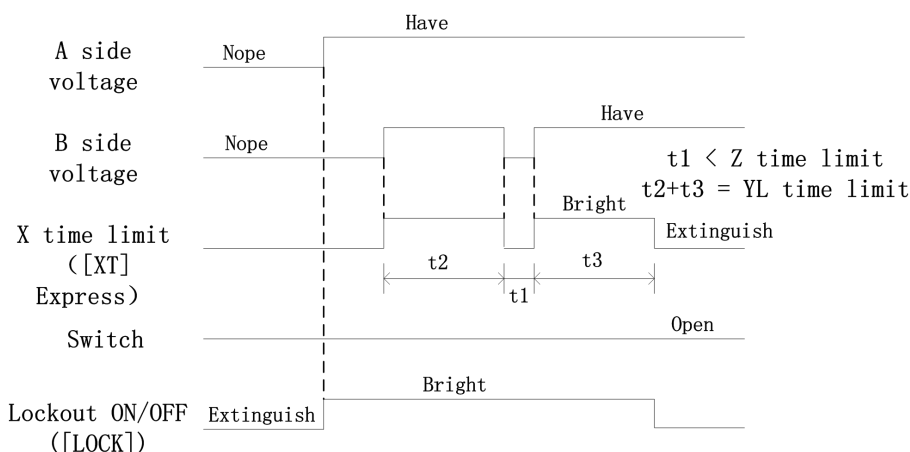


Figure 5-15 power confirmation logic diagram

2) **Delayed input**

After YL timing is completed and [YL locking] is unlocked, if one side is powered off, the device will start XL timing for reclosing confirmation. After XL timing, the switch is closed.

If the power supply is restored at the power failure side within Z time, XL timing is reset and the device remains in the state before power failure.

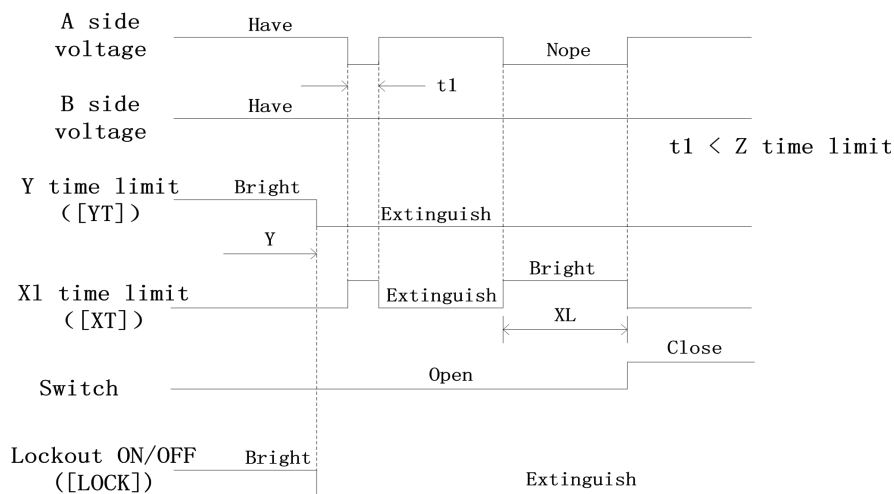


Figure 5-16 logic diagram of delay input

3) Voltage blocking on both sides

In the process of XL timing, there is voltage on both sides, the XL timing of the device is reset, the [YL time locking] function is started, the YL timing is confirmed, and the [lock] light is on.

Unlocking conditions:

- (1) through the operation handle or remote control, execute the [Close] operation and release the locking;
- (2) YL timing is completed and locking is released.

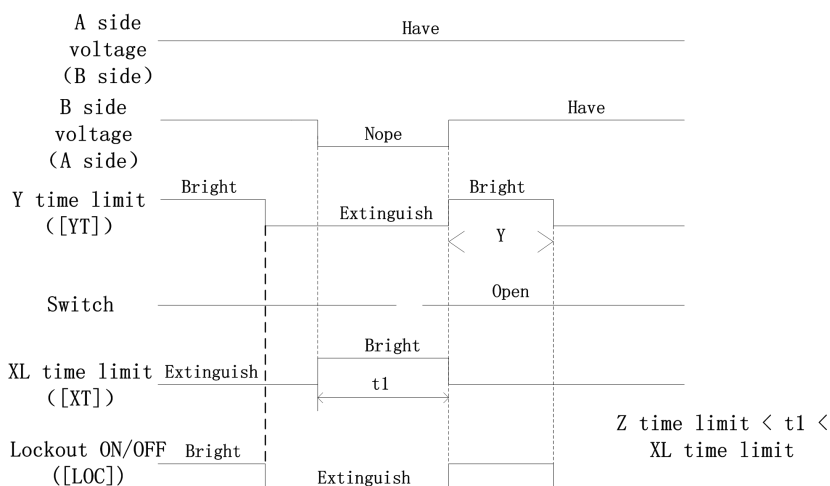


Figure 5-17 logic diagram of voltage blocking on both sides

4) Instantaneous voltage lockout

In the process of XL timing: within the power-off time Z time, instantaneous voltage is found at the power-off side, and XL timing continues to accumulate; outside the power-off time Z time, instantaneous voltage is found at the power-off side, XL timing is reset, the [instantaneous pressure locking] function is

started, and the [lock] light is on.

Unlocking conditions:

- (1) through the operation handle or remote control, execute the [Close] operation and release the locking;
- (2) YL timing is completed and locking is released.

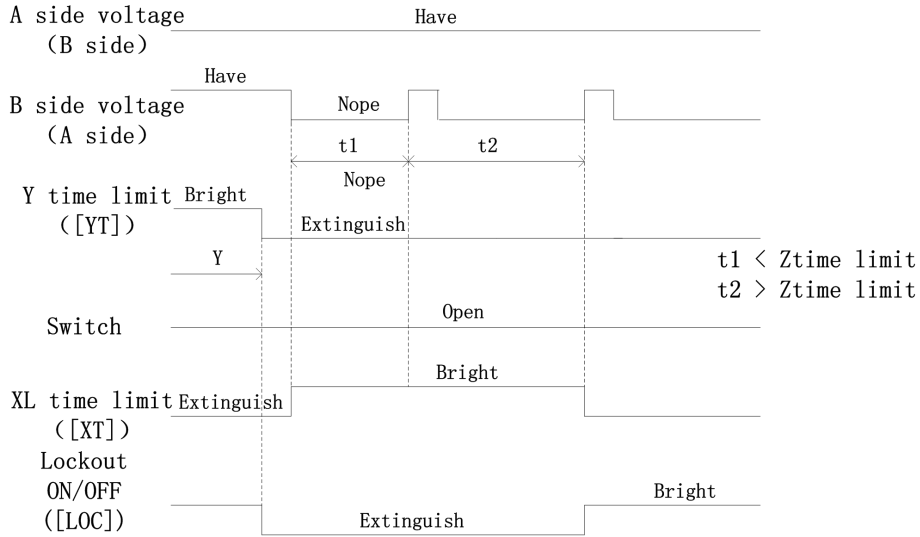


Figure 5-18 logic diagram of instantaneous voltage lockout

■ Closing loop

1) Closed loop lockout

When the manual closing or remote control is closed, the closing ring is locked. If the power supply 1 is greater than the power on voltage of pT1, and the power supply 2 is greater than the power on voltage of pT2, the closing ring is locked. On the contrary, close the outlet.

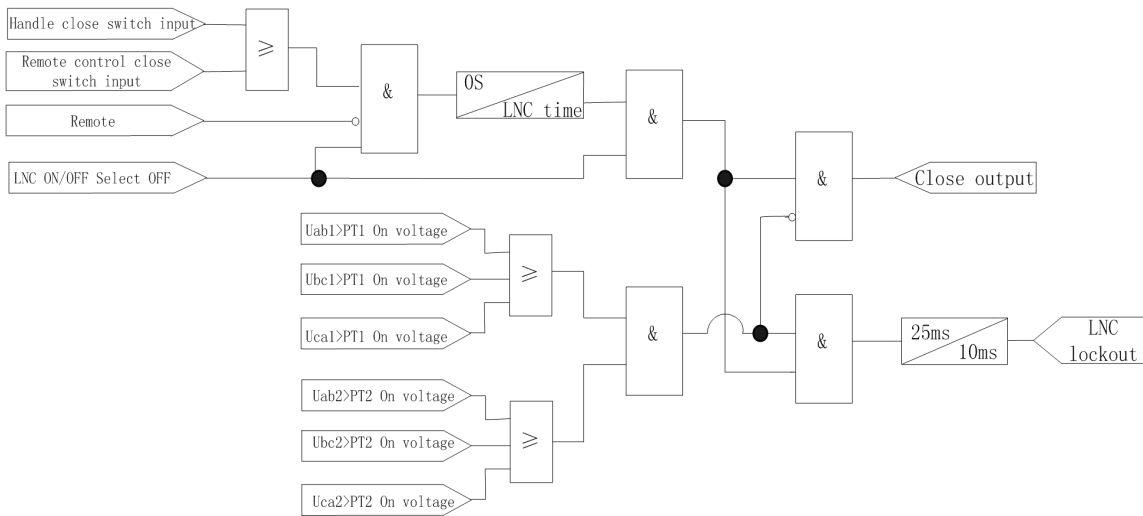


Figure 5-19 closed loop lockout logic diagram

2) Closing loop cclose

When the manual closing or remote control is closed, the on / off selection of the closing ring is on. If the voltage difference between the two sides is less than that of the closing ring, the closing ring will be closed after the closing ring time.

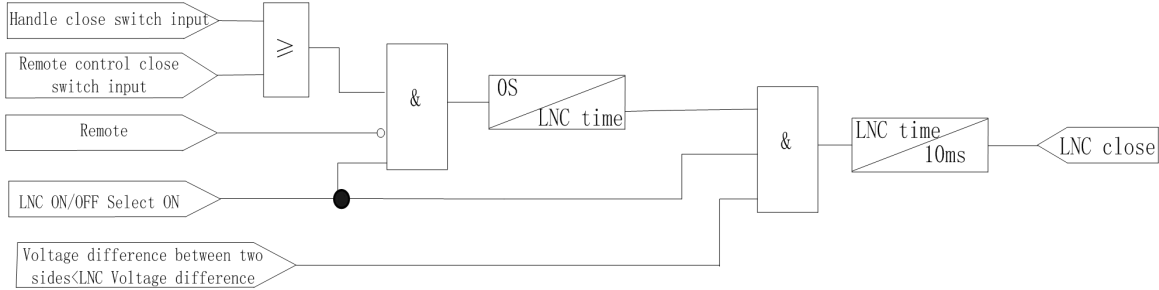


Figure 5-20 closing logic diagram

5.3 Over limit alarm function

■ Current over upper limit

The current over upper and lower limit function is mainly used by the master station. SOE will be recorded and external abnormal light will be lit after the event.

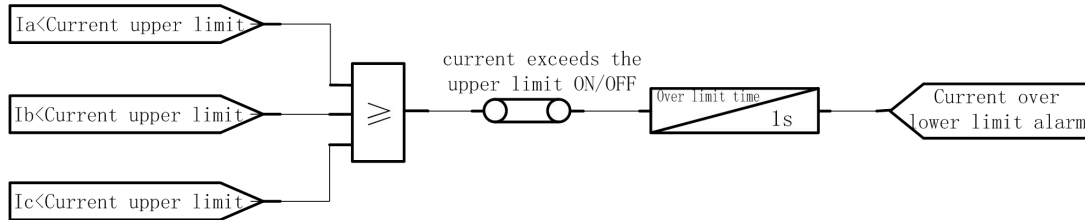


Figure 5-21 logic diagram of current exceeding upper limit

■ Current over lower limit

The current over upper and lower limit function is mainly used by the master station. SOE will be recorded and external abnormal light will be lit after the event.

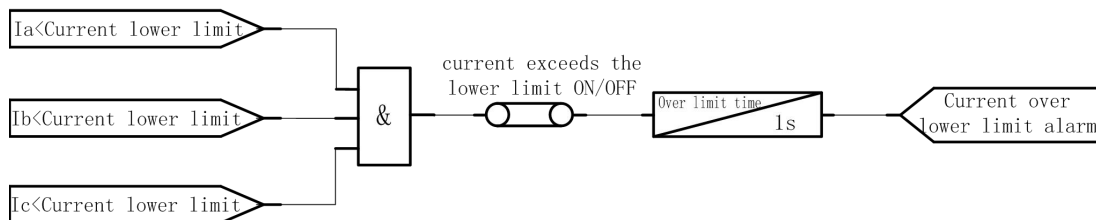


Figure 5-22 logic diagram of current exceeding lower limit

■ Voltage over upper limit

The function of voltage exceeding upper and lower limit is mainly used by the master station. SOE will be recorded after the event and external abnormal light will be lit. Note that there are two voltage groups.

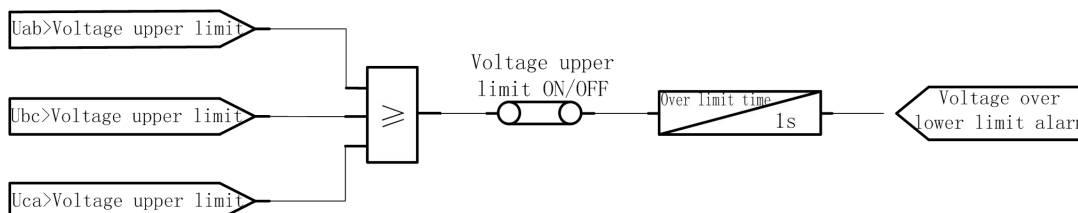


Figure 5-23 logic diagram of voltage exceeding upper limit

■ Voltage over lower limit

The function of voltage exceeding upper and lower limit is mainly used by the master station. SOE will be recorded after the event and external abnormal light will be lit. Note that there are two voltage groups.

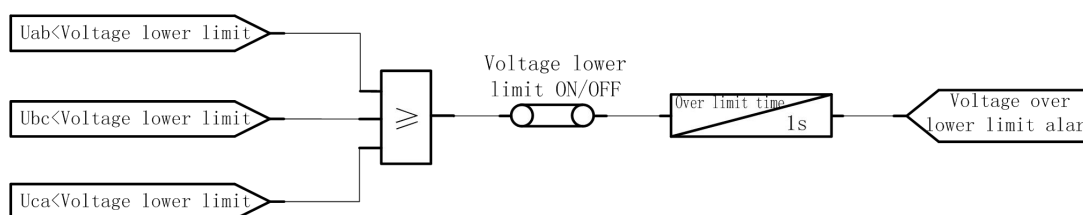


Figure 5-24 logic diagram of voltage exceeding lower limit

6. Setting instructions

The device setting is divided into two parts: device parameters and protection settings.

6.1 Device parameter

| Parameter name | Setting range | Unit | Initial value | Explain |
|---------------------------------|--|------|------------------|----------|
| Protocol parameter | | | | |
| Device address | 1~65535 | | 1 | Integer |
| Telesignaling message type | Single point, double poin | | Single point | Picklist |
| Telemetry message type | Normalized value, scaled value, floating point value | | Normalized value | Picklist |
| Telemetry transmission interval | 0~3600 | s | 0 | Integer |
| Telemetry automatic delivery | on、 off | | on | Picklist |

| Parameter name | Setting range | Unit | Initial value | Explain |
|----------------------------------|--|------|---------------|----------|
| COS automatic up delivery | on、 off | | on | Picklist |
| Event record cannot be delivered | on、 off | | on | Picklist |
| Event parameter upload | on、 off | | on | Picklist |
| Remote control timeout | 10~3600 | s | 300 | Integer |
| 101 protocol link address | Single byte, double byte | | Single byte | Picklist |
| 101 protocol application address | Single byte, double byte | | Single byte | Picklist |
| 101 protocol transmission reason | Single byte, double byte | | Single byte | Picklist |
| 104 protocol mode | Server, client | | Server | Picklist |
| 104 protocol port | 0~65535 | | 2404 | Integer |
| 104 confirmation timeout | 1~65535 | | 30 | |
| 104 test timeout | 1~65535 | | 30 | |
| 104 K value | 0~48 | | 12 | |
| 104 W value | 0~48 | | 8 | |
| 104 master station 1 IP | --- | | 0.0.0.0 | IP type |
| 104 master station 2 IP | --- | | 0.0.0.0 | IP type |
| 104 master station 3 IP | --- | | 0.0.0.0 | IP type |
| 104 master station 4 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station communication | | | | |
| 104 Sub station 1 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station 2 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station 3 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station 4 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station 5 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station 6 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station 7 IP | --- | | 0.0.0.0 | IP type |
| 104 Sub station 8 IP | --- | | 0.0.0.0 | IP type |
| Serial port channel | | | | |
| Serial port 1 protocol | Unbalanced 101, balanced 101, IEC104, state board, panel | | balanced 101 | Picklist |
| Serial port 1 band rate | 4800 , 9600 , 19200 , 38400, 57600 | | 57600 | Picklist |
| Serial port 1 check method | None check, Odd check, Even check | | None check | Picklist |
| Serial port 2 protocol | Unbalanced 101, balanced 101, IEC104, state board, panel | | balanced 101 | Picklist |
| Serial port 2 band rate | 4800 , 9600 , 19200 , 38400, 57600 | | 57600 | Picklist |

| Parameter name | Setting range | Unit | Initial value | Explain |
|----------------------------|--|------|----------------|----------|
| Serial port 2 check method | None check, Odd check, Even check | | None check | Picklist |
| Serial port 3 protocol | Unbalanced 101, balanced 101, IEC104, state board, panel | | panel | Picklist |
| Serial port 3band rate | 4800 , 9600 , 19200 , 38400, 57600 | | 57600 | Picklist |
| Serial port 3 check method | None check, Odd check, Even check | | None check | Picklist |
| 485 port 1 band rate | Unbalanced 101, balanced 101, IEC104, state board, panel | | Unbalanced 101 | Picklist |
| 485 port 1 band rate | 4800 , 9600 , 19200 , 38400, 57600 | | 57600 | Picklist |
| 485 port 1 check method | None check, Odd check, Even check | | None check | Picklist |
| 485 port 2 band rate | Unbalanced 101, balanced 101, IEC104, state board, panel | | Unbalanced 101 | Picklist |
| 485 port 2 band rate | 4800 , 9600 , 19200 , 38400, 57600 | | 57600 | Picklist |
| 485 port 2 check method | None check, Odd check, Even check | | None check | Picklist |
| 485 port 3 band rate | Unbalanced 101, balanced 101, IEC104, state board, panel | | Unbalanced 101 | Picklist |
| 485 port 3 band rate | 4800 , 9600 , 19200 , 38400, 57600 | | 57600 | Picklist |
| 485 port 3 check method | None check, Odd check, Even check | | None check | Picklist |
| Built-in GPRS band rate | Unbalanced 101, balanced 101, IEC104, state board, panel | | balanced 101 | Picklist |
| Ethernet channel | | | | |
| 1#_network | network port 1、network port 2 | | network port 1 | Picklist |
| 1# IP Address | --- | | 192.168.1.100 | IP type |
| 1# Subnet mask | --- | | 255.255.255.0 | IP type |
| 1# Target network | --- | | 0.0.0.0 | IP type |
| 1# Target mask | --- | | 0.0.0.0 | IP type |
| 1# Gateway | --- | | 0.0.0.0 | IP type |

| Parameter name | Setting range | Unit | Initial value | Explain |
|---------------------------------|--|------|----------------|-------------------------|
| 2#_network | network port 1、network port 2 | | network port 2 | Picklist |
| 2# IP Address | ---- | | 192.168.2.100 | IP type |
| 2# Subnet mask | ---- | | 255.255.255.0 | IP type |
| 2# Target network | ---- | | 0.0.0.0 | IP type |
| 2# Target mask | ---- | | 0.0.0.0 | IP type |
| 2# Gateway | ---- | | 0.0.0.0 | IP type |
| 3#_network | network port 1、network port 2 | | network port 1 | Picklist |
| 3# IP Address | ---- | | 192.168.64.240 | IP type |
| 3# Subnet mask | ---- | | 255.255.255.0 | IP type |
| 3# Target network | ---- | | 0.0.0.0 | IP type |
| 3# Target mask | ---- | | 0.0.0.0 | IP type |
| 3# Gateway | ---- | | 0.0.0.0 | IP type |
| Default gateway | ---- | | 192.168.64.254 | IP type |
| Timing | | | | |
| Timing mode | Network time synchronization, B code time synchronization, B code time synchronization (with year), second pulse time synchronization, 1588 time synchronization | | Network timing | Picklist |
| SNTP server IP address | ---- | | 0.0.0.0 | IP type |
| SNTP synchronous clock interval | 10~1024 | s | 64 | Integer |
| Battery activation | | | | |
| Activation start date | ---- | | 1970-01-01 | Year month day type |
| Activation start time | ---- | | 00: 00: 00 | Hour minute second type |
| Battery activation interval | 500 | day | 0 | Integer |
| Battery alarm threshold | 1.0~100.0 | hour | 6.0 | |
| Telecontrol parameters | | | | |
| Current deadband | 0.0~0.3 | | 0.01 | |
| AC voltage deadband | 0.0~0.3 | | 0.01 | |
| DC voltage deadband | 0.0~0.3 | | 0.01 | |
| Power deadband | 0.0~0.3 | | 0.01 | |
| Frequency deadband | 0.0~0.3 | | 0.05 | |
| Power factor deadband | 0.0~0.3 | | 0.01 | |
| Remote signal anti shake time | 0.0~60000.0 | ms | 20.0 | |

| Parameter name | Setting range | Unit | Initial value | Explain |
|----------------------------------|---------------|------|---------------|---------|
| Opening pulse | 0.0~50000.0 | ms | 200.0 | |
| Closing pulse | 0.0~50000.0 | ms | 200.0 | |
| Voltage zero drift | 0.0~20.0 | | 0.001 | |
| Current zero drift | 0.0~1.0 | | 0.001 | |
| Other | | | | |
| On / off of signal auto reset | 0~65535 | s | 0 | Integer |
| Signal auto reset time | 0~50000 | s | 0 | |
| Fault remote signal holding time | 0~300 | s | 0 | |
| LCD backlight time | 0~65535 | s | 180 | Integer |

Note:

- a) All the parameters marked as list type can be selected through the interface list.
- b) The telemetry automatic transmission parameter is only valid when the balance is 101 band rate. If it exists, the telemetry data will be transmitted only when the total call.
- c) The telemetry transmission interval parameter is only effective for balancing 101 band rate. If telemetry is automatically put into operation, the telemetry value, telemetry transmission interval and telemetry dead zone can cooperate with each other to effectively control the communication data flow.
- d) When the battery activation time, alarm reset time and LCD backlight time are set to 0, the corresponding function exits.
- e) The IP address of different Ethernet cards must be set to different network segments.
- f) Setting the gateway address to 0.0.0.0 means using the system default gateway.
- g) The automatic activation time is composed of "activation start time" + "activation start time" into year, month, day, hour, minute and second activation time.

6.2 Protection setting value

| set value name | Setting range | Unit | Initial value | Description |
|-----------------------------------|---|------|---------------|-------------|
| Total function | | | | |
| Total function on / off | on、 off | | off | Picklist |
| Device operation mode | Section, liaison, boundary and protection | | protection | Picklist |
| Over current | | | | |
| Overcurrent outage open | ON、 OFF | | off | Picklist |
| ON / OFF of overcurrent section I | ON、 OFF | | OFF | Picklist |

| set value name | Setting range | Unit | Initial value | Description |
|---|---|------|-----------------------|-------------|
| value of overcurrent section I | 0.0~100.0 | A | 50.0 | |
| Overcurrent section I time | 0.0~100.0 | s | 100.0 | |
| Overcurrent section I direction ON/OFF | ON、OFF | | OFF | Picklist |
| Overcurrent section I low voltage lockout | ON、OFF | | OFF | Picklist |
| ON / OFF of overcurrent section II | ON、OFF | | OFF | Picklist |
| value of overcurrent section II | 0.0~100.0 | A | 50.0 | |
| Overcurrent section II time | 0.0~100.0 | s | 100.0 | |
| Overcurrent section II direction ON/OFF | ON、OFF | | OFF | Picklist |
| Overcurrent section II low voltage lockout | ON、OFF | | OFF | Picklist |
| ON / OFF of overcurrent section III | ON、OFF | | OFF | Picklist |
| value of overcurrent section III | 0.0~100.0 | A | 50.0 | |
| Overcurrent section III time | 0.0~100.0 | s | 100.0 | |
| Overcurrent section III direction ON/OFF | ON、OFF | | OFF | Picklist |
| Overcurrent section III low voltage lockout | ON、OFF | | OFF | Picklist |
| OC lockout ON/OFF | ON、OFF | | OFF | Picklist |
| Switch interruption current | 0.0~100.0 | A | 100.0 | |
| Zero sequence | | | | |
| Low current grounding alarm | ON、OFF | | OFF | Picklist |
| Low current grounding ON/OFF | ON、OFF | | OFF | Picklist |
| Low current start type | Zero sequence voltage 、 Zero sequence current | | Zero sequence current | Picklist |
| Low current transient current | 0.0~100.0 | A | 100.0 | |
| Ground fault angle α_0 | 0.0~360 | | 0 | |
| Zero sequence section I ON/OFF | ON、OFF | | OFF | Picklist |
| Zero sequence section I current | 0.0~100.0 | A | 100.0 | |
| Zero sequence section I time | 0.0~1800.0 | s | 1800.0 | |
| Zero sequence section I direction ON/OFF | ON、OFF | | OFF | Picklist |
| Zero sequence section II ON/OFF Io(AR) | ON、OFF | | OFF | Picklist |
| Zero sequence section II current | 0.0~100.0 | A | 100.0 | |

| set value name | Setting range | Unit | Initial value | Description |
|--|---------------|------|---------------|-------------|
| Io(AR) | | | | |
| Zero sequence section II time Io(AR) | 0.0~1800.0 | s | 1800.0 | |
| Zero sequence section II direction ON/OFF Io(AR) | ON、OFF | | OFF | Picklist |
| Post acceleration | | | | |
| Overcurrent acceleration ON/OFF | ON、OFF | | OFF | Picklist |
| Overcurrent acceleration value | 0.1~100.0 | A | 100.0 | Floating |
| Overcurrent acceleration time | 0.0~10.0 | s | 10.0 | Floating |
| Zero sequence acceleration ON/OFF | ON、OFF | | OFF | List |
| Zero sequence acceleration value | 0.00~10.0 | A | 10.0 | Floating |
| Zero sequence acceleration time | 0.0~10.0 | s | 10.0 | Floating |
| Reclosing | | | | |
| Reclosing ON/OFF | ON、OFF | | OFF | List |
| Multiple reclosing ON/OFF | ON、OFF | | OFF | List |
| Reclosing check synchronization | ON、OFF | | OFF | List |
| Reclosing check no voltage | ON、OFF | | OFF | List |
| Non primary coincidence time | 0.0~100.0 | s | 3.0 | |
| One time reclosing time | 0.0~600.0 | s | 3.0 | Floating |
| Secondary reclosing time | 0.0~600.0 | s | 3.0 | Floating |
| Triple reclosing time | 0.3~600.0 | s | 3.0 | Floating |
| Reclosing lockout time | 0~300.0 | s | 0 | Floating |
| Reclosing confirmation time | 0.3~999.0 | s | 30.0 | Floating |
| Reclosing times | 1~3 | | 1 | List |
| Sneak open Start Reclosing | ON、OFF | | OFF | List |
| Large current lockout Reinvestment | ON、OFF | | OFF | List |
| Large current Reset setting value | 0.0~100.0 | | 100.0 | List |
| Frequency splitting | | | | |
| High frequency splitting ON/OFF | ON、OFF | | OFF | List |
| High frequency splitting setting value | 50.0~55.0 | Hz | 51.0 | Float type |
| High frequency splitting time | 0.0~999.0 | s | 2.0 | Float type |
| Low frequency splitting ON/OFF | ON、OFF | | OFF | List |
| Low frequency splitting setting value | 45.0~50.0 | Hz | 47.6 | Float type |
| Low frequency splitting time | 0.0~999.0 | s | 2.0 | Float type |
| Local feeder automation | | | | |
| Local FA ON/OFF | ON、OFF | | OFF | List |

| set value name | Setting range | Unit | Initial value | Description |
|---|---|------|---|-------------|
| Local FA Type | Automatic adaptation Comprehensive type 、 voltage time type 、 voltage current time type | | Automatic adaptation Comprehensive type | |
| LNC switch action | Close、 Alarm | | | |
| Line head FTU | ON、 OFF | | OFF | List |
| Automatic adaptation Shot-current treatment | ON、 OFF | | OFF | List |
| Automatic adaptation Grounding treatment | ON、 OFF | | OFF | List |
| W time ON/OFF | ON、 OFF | | OFF | List |
| X Time | 1.0~1000.0 | s | 7.0 | |
| Y Time | 1.0~1000.0 | s | 5.0 | |
| C Time | 1.0~1000.0 | s | 30.0 | |
| W Time | 1.0~1000.0 | s | 50.0 | |
| Route selection open time | 0.0~100.0 | s | 5.0 | |
| Route selection reclosing time | 0.0~100.0 | s | 3.0 | |
| Fault overcurrent setting | 0.0~100.0, | A | 5~ | |
| Fault overcurrent time | 0.0~100.0 | s | 0.1 | |
| Loss voltage open ON/OFF | ON、 OFF | | OFF | List |
| Loss voltage open setting | 0.0~100.0 | V | 30.0 | |
| Loss voltage open time | 0.1~10.0 | s | 10.0 | |
| Loss voltage times | 1~3 | | 1 | |
| After closing Zero sequence voltage ON/OFF | ON、 OFF | | OFF | List |
| After closing Zero sequence voltage time | 0.0~100.0 | V | 100.0 | |
| Over voltage protection | | | | |
| Over voltage protection ON/OFF | ON、 OFF | | OFF | List |
| Over voltage protection value | 0.8~1.5 | Un | 1.1 | |
| Over voltage protection time | 0.0~100.0 | s | 100.0 | |
| Closing loop | | | | |
| Closing loop ON/OFF | ON、 OFF | | OFF | List |
| Closing loop time | 0.1~100.0 | s | 3.0 | |
| Voltage difference | 0.0~220.0 | V | 10.0 | |
| Angle difference | 0.0~30.0 | ° | 5.0 | |
| Frequency difference | 0.0~10.0 | Hz | 0.0 | |
| Continuous open lockout | | | | |
| Continuous open lockout ON /OFF | ON、 OFF | | OFF | List |
| Continuous open times | 1~100 | | 3 | |

| set value name | Setting range | Unit | Initial value | Description |
|--|---|------|---------------|-------------|
| Continuous open time | 0.1~65536.0 | s | 600.0 | |
| Current over limit | | | | |
| Current heavy load ON / OFF | ON、OFF | | OFF | List |
| Current heavy load setting value | 0.1~10.0 | 5.0 | 5.0 | |
| Current heavy load time | 0.0~10000.0 | s | 3600 | |
| Current overload ON / OFF | ON、OFF | | OFF | List |
| Current overload setting value | 0.1~10.0 | 5.0 | 5.0 | |
| Current overload time | 0.0~10000.0 | s | 3600 | |
| Current over limit ON / OFF | ON、OFF | | OFF | List |
| Current over limit setting value | 0.0~100.0 | 5.0 | 5.0 | |
| Current over limit time | 0.0~10000.0 | s | 3600 | |
| Zero sequence current over limit ON / OFF | ON、OFF | | OFF | List |
| Zero sequence current over limit setting value | 0.1~10.0 | 5.0 | 5.0 | |
| Zero sequence current over limit time | 0.0~10000.0 | s | 3600 | |
| CT ratio | | | | |
| Phase CT primary rating | 1.0~2000.0 | A | 600.0 | |
| Phase CT secondary rating | 1.0~10.0 | A | 5.0 | |
| Zero sequence CT primary rating | 1.0~500.0 | A | 20.0 | |
| Zero sequence CT secondary rating | 1.0~10.0 | A | 5.0 | |
| Auxiliary setting value | | | | |
| On / off of current reversal | | | | |
| On / off of voltage group 2 | ON、OFF | | OFF | List |
| Spring uncharge alarm | ON、OFF | | OFF | List |
| Control circuit inspection | ON、OFF | | OFF | List |
| Air pressure low lock on / off | ON、OFF | | OFF | List |
| Release the soft pressing plate | ON、OFF | | OFF | List |
| Power side voltage selection | Uab1、Ubc1、Uca1、Uab2、Ubc2、Uca2、Us1、Us2、U01、U02 | | Uab1 | List |
| EVT voltage selection | Uab1、Ubc1、Uca1、Uab2、Ubc2、Uca2、Us1、Us2、U01、U02 | | Ubc2 | List |
| Zero sequence voltage selection | Uab1、Ubc1、Uca1、Uab2、Ubc2、Uca2、Us1、Us2、U01、U02 | | U01 | List |

Note:

- a) Current setting of overcurrent acceleration section: set as per avoiding the maximum load of the line.
- b) Setting value of zero sequence acceleration section: the minimum zero sequence current of the terminal earth fault of the line under the minimum operation mode, and setting with certain margin considered.
- c) Zero sequence acceleration period time: it is set according to the closing time when avoiding the maximum difference of the circuit breaker, so as to avoid the zero sequence current caused by the different closing of the circuit breaker to make the acceleration element misoperate. Usually it can be set to 0.1 second.
- d) Primary, secondary and tertiary reclosing time: three-phase reclosing time.
- e) Reclosing locking time: it refers to the previous reclosing action of multiple reclosing. When the protection is closed in the first zone, the protection action will be accelerated and reclosing will be locked.
- f) Reclosure success time: it is the time when multiple reclosures complete one round of reclosure. If the protection does not act within the reclosure success time, a new round of reclosure will be started.
- g) The blocking current is mainly for the breaker and load switch with insufficient breaking capacity. When the protection trips, if the fault current is greater than the setting value of the blocking opening current, the device will block the opening of the switch to prevent the switch from breaking the current above its breaking capacity.

7. Device menu operating instructions

7.1 Menu description

FYD830CF measurement and control unit adopts 160 × 160 lattice liquid crystal display screen, which can display 10 lines of standard Chinese characters. LCD application simple menu display mode, with the key into different menu interface operation. The specific menu layout is shown in Figure 7.1.1.

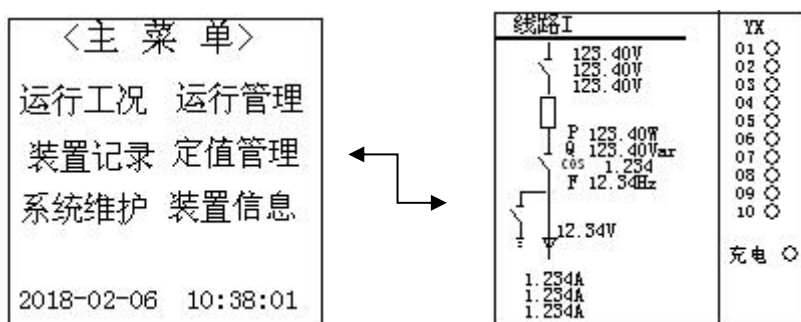


Figure 7.1.1 menu layout

When there is no key, the device will time out to enter the default main display interface in any screen menu item.

7.2 Keynote description

The device adopts 7 key keyboard, which is easy and reliable to operate. In terms of function, five keys can be divided into three types: direction key, function key and edit key. The direction key is used to select the current focus menu. Function keys include "confirm", "Cancel" and "reset" for specific function selection.

Basic principles of menu operation: direction key to shift focus, confirm key to enter or off editing status, up and down key to modify, select data, confirm key to perform operation or enter the next level menu, left key to return to the previous level menu.

During data editing, the left and right keys and the up and down keys are mainly used to complete:

- Press left and right to move the edit bit,
- When the edit bit is a number, the up key number plus one and the down key number minus one
- The edit digit is the decimal point. The up key moves the decimal point one place to the right, and the down key moves the decimal point one place to the left
- The edit bit is a symbol bit. The up key sets the data to a positive value and the down key sets the data to a negative value

Note: the above mentioned data editing is applicable to the menu with data input, such as password input, constant value modification, parameter modification, etc.

The functions of each key are as follows:

| Key name | Function |
|---------------------|---|
| Direction key: up | Function 1: move menu focus up |
| | Function 2: turn up the screen |
| | Function 3: in data editing state, add 1 to the value or cycle picklist value |
| Direction key: Down | Function 1: move menu focus down |

| | |
|-------------------------|--|
| | Function 2: turn down the screen |
| | Function 3: in the data editing state, the value minus 1 or the value of circular picklist |
| Direction key: Left | Function 1: move menu focus item left or up |
| | Function 2:OFF |
| | Function 3: move edit bit left in data editing status |
| Direction key: Right | Function 1: move menu focus item right or down |
| | Function 2: turn down the screen |
| | Function 3: move edit bit right in data editing status |
| Direction key: Enter | Function 1: confirmation of menu focus item |
| | Function 2: enter or exit data editing status |
| Direction key: ESC | Go back to the previous menu |
| Function key, reset key | Function 1: signal and indicator light reset |

7.3 LED indicator light

A total of 12 LED lights are set in the terminal to indicate different states of terminal operation. The function of indicator light is shown in the following table:

List 3-1

| Serial number | Name | Colour | Indicator light run state description |
|---------------|---------|--------|---|
| 1 | Power | Green | External AC power supply, normally on; no power supply, normally off; backup power supply, power supply voltage greater than the alarm value, slow flash; backup power supply, power supply voltage less than the alarm value, fast flash |
| 2 | Run | Red | Normal working state and normal communication with the main board, slow flashing; normal panel, but abnormal communication with the main board, constant flashing; panel does not start working, off; panel starts working, but abnormal, fast flashing |
| 3 | Communi | Green | Blink when the communication is normal, no communication or abnormal communication is often off |

| | | | |
|----|----------------|-------|--|
| | tion | | |
| 4 | Unnormal | Red | Terminal internal abnormality (hardware abnormality or software abnormality), normally on; terminal external abnormality, slow flashing; normally off if there is no abnormality |
| 5 | Action | Red | When the protection acts, it flashes quickly, and when there is a blocking signal, it is always on |
| 6 | Over current | Red | There is over-current fault, and then the fault disappears, which is normally on; there is over-current fault, which is always on, which is flash; when there is no over-current fault, it is normally off. If there is overcurrent fault and the fault disappears, press the "reset" key to reset |
| 7 | Ground | Red | There is a ground fault, and then the fault disappears, normally on; there is a ground fault, and the fault always exists, flash; there is no ground fault, normally off. If there is a ground fault and the fault disappears, press the "reset" key to reset |
| 8 | W Time | Red | Reclosing waiting time |
| 9 | Close position | Red | When the switch is closed, it is normally on; others are normally off |
| 10 | Open Position | Green | When the switch is open, it is normally on; others are normally off |
| 11 | Remote | Green | When in a distant position, it is always on; others are always off |
| 12 | Charge | Green | Recloser is always on when charging and off when discharging |
| 13 | Liaison | Red | Contact mode is always on; others are always off |
| 14 | XT | Red | XT is always on, others are always off |
| 15 | YT | Red | YT is always on, others are always off |
| 16 | Lockout | Red | It is always on when closing and blocking, and off when there is no locking |