RWB-300/400Z

微机综合保护装置

Microcomputer Protection Device

技术说明书

Technical Specification

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目录 catalogue

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一、概述 Overview

本数字式微机保护装置适用于 35kV 及以下小电流/小电阻接地系统，集保护、控制、通信、监视等功能。装置运用元件可编程设计思想减少了维护工作量和备品备件，能灵活地满足多种应用场合需求。本装置可集中组屏，也可以分散安装在开关柜上。通讯方式为 RS485 总线。

The digital microcomputer protection device is suitable for 35kV and below small current/small resistance grounding system, set protection, control, communication, monitoring and other functions.

The device uses the idea of component programmable design to reduce the maintenance workload and spare parts, and can flexibly meet the needs of various applications.

The device can be centrally assembled and dispersed on the switch cabinet. The communication mode is RS485 bus.

1.1 应用范围 Application Range

微机综合保护装置：

- ■ 进(馈)线保护
- ■ 变压器保护
- ■ 电容器保护
- ■ 电动机保护
- ■ 母联分段保护
- ■ 单PT保护

Microcomputer Protection Device

- ■ line protection
- ■ transformer protection
- ■ capacitor protection
- ■ motor protection
- ■ bus tie protection
- ■ Potential Transformer protection

1.2 主要功能配置 Main function configuration

- 三段式相间电流保护元件
  three phase phase current protection component
- 三段式零序电流保护元件(可独立投跳闸或告警)
  three-stage zero-sequence current protection component (independent tripping or alarm)
- 两段式低零序电流保护元件(可独立投跳闸或告警，可作电容器保护的不平衡电流用)
  two-stage low zero sequence current protection component (can be independent tripping or alarm, can be used for unbalanced current protection of capacitors)
- 加速段保护元件(相间电流和零序电流)
  acceleration protection component (phase current and zero sequence current)
- 反时限保护元件(相间电流、高零序电流和低零序电流)
  inverse-time protection component (phase current, high zero sequence current and low zero sequence current)
- 过负荷元件(告警和跳闸，可独立整定)
  overload component (alarm and trip, can be set independently)
- 重合闸元件
  reclosing component
- 低频保护元件
  low frequency protection component
- 低压保护元件
  low voltage protection component

- 过压保护元件
  overvoltage protection component
- 零序过压保护元件
  zero sequence overvoltage protection component
- 失压保护元件
  No voltage protection component
- 电动机启动速断保护元件
  Motor start fast break protection component
- 负序过流元件
  Negative sequence overcurrent component
- 过热保护元件
  overheat protection component
- 堵转保护元件
  locked-rotor protection component
- 长启动保护元件
  Long start protection component
- 非电量保护元件(6 路，可投跳闸或告警，退出时用作普通遥信)
  non-electrical protection component (6 channels, can input trip or alarm, used as ordinary signal when exiting)
- PT 断线判别(可投告警或跳闸)
  PT break detection (alarm or trip possible)
- CT 断线判别(可投告警或跳闸)
  CT break detection (alarm or trip possible)
- 控制回路断线监测
  Control loop disconnection monitoring

1.3 主要特点 Main feature

☆ 装置采用新一代高性能 32 位 CPU，使产品的稳定性和运算速度得到充分保证。
The device adopts a new generation of high-performance 32-bit CPU, so that the stability and computing speed of the product are fully guaranteed.

☆ 采集模块采用 16 位的 A/D 转换器，各项测量计算指标轻松达到要求。
The acquisition module adopts 16-bit A/D converter, and the measurement and calculation indexes can easily meet the requirements.

☆ 配置大容量的存储模块，可记录多达 32 个录波报告，记录的事件数不少于 1000 条，具有掉电保持功能。
A large-capacity storage module can record up to 32 wave recording reports, recording at least 1000 events, and maintaining power failure.

☆ 高精度的时钟芯片，在装置失电时，仍保证时钟的准确性。
The high precision clock chip ensures the accuracy of the clock when the device loses power.

☆ 精心的电气设计，整机无可调节器件，实现了免调试概念设计。
Careful electrical design, the whole machine has no adjustable devices, to realize the concept of debugging.

☆ 高等级、高品质保证的元器件选用。
High-grade, high-quality components selection.

☆ 完善的自诊断功能。
Complete self-diagnosis function.
☆ 防潮、防尘、抗振动的机箱设计。
Case design with moisture, dust and vibration resistance.

二、技术参数 Technical parameter

2.1 环境条件 Environmental condition

正常温度 Normal temperature：-10℃~55℃
极限温度 Limiting temperature：-30℃~70℃
存储温度 Storage temperature：-40℃~85℃

2.2 额定数据 Rated data

装置电源：AC/DC 110/220V 或 DC24V/48V (订货注明)
Device power supply:AC/DC 110/220V or DC24V/48V (Order indication)
状态量电平：装置内部自带24VDC，外接无源开入
State quantity level: The device comes with 24VDC inside and is passively opened outside
操作电源：DC220V，AC220V，DC110V，DC48V (订货注明)
Operating power supply:DC220V，AC220V，DC110V，DC48V (Order indication)
额定交流数据 Rated AC data：

a)	线电压	100 V或380V (订货注明)
	Line voltage	100 V or 380V (Order indication)
b)	交流电流	5A或1A (订货注明)
	Alternating current	5A or 1A (Order indication)
c)	额定频率Rated frequency	50Hz

2.3 功率消耗 Power consumption

a)	直流回路	正常工作时：不大于10W 动作时： 不大于15W
	DC circuit	Normal operation: no more than 10W Action: No more than 15W
b)	交流电压回路	每相不大于0.5VA
	AC voltage loop	Not more than 0.5VA per phase
c)	交流电流回路	额定电流为5A时：每相不大于1VA 额定电流为1A时：每相不大于0.5VA
	AC current loop	The rated current is 5A:Not more than 1VA per phase The rated current is 1A:Not more than 0.5VA per phase

2.4 主要技术性能 Main performance technology

2.4.1 采样回路精确工作范围 Precise working range of sampling loop

电压 voltage：0.005~1.2Un
电流 current：0.08In~20In

2.4.2 各类元件精度 Precision of various components

电流元件 current element： <±2.5%
电压元件 voltage element： <±2.5%
时间元件： 0s~2s时，误差不超过±40ms；2s以上时，误差不超过±3％；
time element: When 0s~2s, the error is not more than ±40ms;
When more than 2s, the error is not more than ±3%;

2.5 过载能力 Overload capacity

交流电流回路	2倍额定电流	连续工作
	10倍额定电流	允许工作10s
	40倍额定电流	允许工作1s
AC current loop	2 times the rated current	continuous operation
	10 times the rated current	allow to work 10s
	40 times the rated current	allow to work 1s
交流电压回路	1.2倍额定电压	连续工作
AC voltage loop	1.2 times the rated current	continuous operation
电源回路	80%~110%额定电压	连续工作
Power supply circuit	80%~110% rated voltage	continuous operation

三、基本操作及使用 Basic operation and use

3.1 面板功能区介绍 Panel Function Area

保护装置面板由三部分组成，1 块彩色点阵液晶、7 个指示灯和 9 个操作按键组成。
The protection device panel is composed of three parts, a color dot matrix LCD, 7 indicators and 9 operating keys.

3.1.1 状态指示灯 Status Indicators

状态指示灯由 7 个指示灯组成，各灯功能如下：
The status indicator consists of seven indicators. Each indicator has the following functions:

序号 No.	指示灯 indicators	功能 function
1	跳闸	线路出现故障保护动作跳闸时点亮
	Trip	The trip indicator light is lit When the fault protection action of the line trips
2	合闸	来电合闸等动作时，合闸指示灯点亮
	Reclose	The closing indicator light is lit when the incoming call is switched on
3	充电	重合闸正在充电时，充电指示灯闪烁； 重合闸充电完成时，充电指示灯常亮
	Charged	When reclosing is charging, the charging indicator flashes; When reclosing charging is complete, the charging indicator is on
4	运行	装置正常工作时，运行指示灯闪烁
	Run	When the device is working normally, the running indicator blinks
5	告警	在出现各种预告信号时，告警灯点亮
	Alarm	When various warning signals appear, the alarm indicator lights up
6	跳位	断路器分位时，指示灯常亮

	Open	When the circuit breaker is open, the indicator is steady on
7	合位	断路器合闸时，指示灯常亮
	Closed	When the circuit breaker is closed, the indicator is steady on

3.1.2 操作键盘 Operating keyboard

键盘由 9 个按键组成，各按键功能如下：

The keyboard consists of 9 keys, and the functions of each key are as follows:

序号 No.	按键 key	主要功能 function
1	＋	用于参数的递加
		Used to append parameters
2	－	用于参数的递减
		Used for decrement of parameters
3	▲	用于向上翻页或上移光标
		Used to turn the page or move the cursor up
4	▼	用于向下翻页或下移光标
		Used to scroll down or move the cursor
5	◀	用于左移光标
		Used to move the cursor left
6	▶	用于右移光标
		Used to move the cursor right
7	确认	用于对参数设定后的保存确认和进入子目录
	ENTER	It is used to confirm the save after parameter setting and enter the subdirectory
8	复归	用于指示灯信号、告警、动作信号的复归
	RESET	Used to restore indicator signals, alarms, and action signals
9	取消	用于对参数设定后的取消和退出子目录
	ESCAPE	It is used to cancel and exit a subdirectory after parameters are set

3.2 装置菜单画面 Device menu screen

主界面 Main interface	一级菜单 menu1	二级菜单 menu2		功能描述 note
		内容	Item	
综合保护 Compre Pro	运行工况 Run Sta	1.保护值	Sam Disp	采样显示 sampling display
		2.二次测量	Seco Mea	测量二次值 secondary measurement
		3.一次测量	Prim Mea	测量一次值 primary measurement
		4.遥信状态	Di Sta	遥信状态 digital input state
	运行设置 Run Set	1.定值显示	Set Disp	定值查看 set display
		2.定值修改	Set Set	定值修改
		3.压板设置	SFC Set	压板设置 soft linking piece set
	报告管理 Report M	1.顺序事件	Seq Eve	顺序事件
		2.动作报告	Trip Eve	事件报告 tripping event
		3.操作报告	Oper Eve	操作事件 operation event
		4.事件清除	Clr Eve	输入密码，清除事件及录波 clear event
	装置设置 Dev Set	1.参数设置	Dev Para	系统设置SYS SET， 内部控制字1 Internal CW1等
		2.网络设置	Net Set	网络设置 Ethernet Set
		3.串口设置	Seri Set	串口设置 RS485
		4.时间设置	Time Set	时间设置
		5.密码设置	Pass Set	密码修改 password set
	装置测试 Dev Test	1.开出测试	Do Test	开出传动 Out Act 开出名称 Out Name， 动作类型(动作/返回)Out Type(Act/Back)
		2.保护上传	Pro Send	保护事件上传 Protection Event Send
		3.告警上传	Ala Send	告警事件上传 Alarm Event Send
		4.开入上传	Di Send	开入上传 Digital Input Send
		5.测量上传	Mea Send	测量上传 Measusrement Send
	出厂设置 Fac Set	1.图形设置	Pic Set	图形显示开关 Pic On/Off， 断路器合位开入 Break Close DI， 手车工作位置 Hand Work Pos， 接地刀闸位置 Gro Switch Pos
		2.语言设置	Lang Set	中文cn/英文en
		3.版本信息	Help	类型Type，版本Ver，校验CRC
		4.电度清零	Ele Clr	输入密码，清除电量。

四、保护功能说明 Protection function

4.1 过电流元件 Overcurrent component

三段过电流保护是指瞬时速断过电流保护、限时速断过电流保护、定时限过电流保护。当任一相电流大于整定值时，经过给定的时限延时后保护跳闸。从故障电流启动到保护动作出口的最短时间不大于 40ms(包括继电器固有动作时间)。为了躲开线路避雷器的放电时间，本装置中 I 段也设置了可以独立整定的延时时间。

装置在执行三段过流判别时，各段判别逻辑一致，其动作条件为：

1) I>Idn：Idn 为 n 段电流定值，I 为任一相电流；

2) T>Tdn：Tdn 为 n 段延时定值；

3) 压板投入；

Three-stage overcurrent protection refers to instantaneous speed overcurrent protection, limited speed overcurrent protection, and fixed time overcurrent protection. When any phase current is greater than the setting value, the protection trip after a given time delay. The minimum time from the fault current start to the protection action outlet is not greater than 40ms(including the natural relay action time). In order to avoid the discharge time of the line arrester, the I section of the device is also set with a delay time that can be adjusted independently.

When the device performs the three-stage overcurrent judgment, the logic of each stage judgment is consistent, and its operating conditions are:

1) I>Idn：Idn is the fixed value of the n segment current, and I is any phase current

2) T>Tdn：Tdn sets the value of the n delay

3) Soft linking piece input；

4.2 零序过电流元件 Zero sequence overcurrent component

当线路/变压器等发生单相接地时，会产生零序电流，零序电流由专用的零序互感器输入装置(或经三相电流合成)。当零序电流大于整定值时，经过时限延时后保护跳闸或告警。该保护针对中性点不接地系统(经消弧线圈接地)。

零序过电流元件分为高侧零序和低侧零序，实现方式基本与过流元件相同。满足以下条件时出口动作(告警或跳闸)：

1) I0>I0n ； I0n 为零序 n 段定值

2) T>T0n ；T0n 为零序 n 段延时定值

3) 压板投入。

注：I0n 为零序 n 段定值。高侧零序电流可选用 I0 通道或自产。

零序过流可投告警或跳闸，且每段都可以单独整定。

When single-phase grounding occurs in the line/transformer, zero-sequence current is generated, and the zero-sequence current is generated by a dedicated zero-sequence transformer input device (or synthesized by three-phase current). When the zero sequence current is greater than the setting value, the protection trip or alarm is generated after a time delay. This protection is for neutral ungrounded systems (grounded via arc suppression coils).

The zero sequence overcurrent component is divided into high side zero sequence and low side zero sequence, and the realization mode is basically the same as that of the overcurrent component. Exit action (alarm or trip) when the following conditions are met:

1) I0>I0n ； I0n is set for the zero sequence n segment

2) T>T0n ；T0n is zero sequence n delay setting

3) Soft linking piece input。

4.2.1 高压侧零序过电流元件 High voltage side zero sequence overcurrent component

检测变压器中性点 CT 或变压器高压侧零序滤过器的零序电流，在变压器负载熔断器拒绝熔断时，作为其后备保护。本装置高压侧零序电流保护有 3 段。

Detect the zero sequence current of the transformer neutral CT or zero-sequence filter on the high-voltage side of the transformer as backup protection when the transformer load fuse refuses to fuse. There are 3 sections of zero sequence current protection on the high voltage side of the device.

4.2.2 低压侧零序过电流元件 Low voltage side zero sequence overcurrent component

检测变压器中性点 CT 或变压器低压侧零序滤过器的零序电流，在变压器负载熔断器拒绝熔断时，作为其后备保护。为了与熔断器熔断地时间特性相配合，中性点或低压侧零序电流保护采用反时限特性曲线如下：

$$t=\tau\times Ied/(Iod- Ire)$$

其中，Ied 为变压器低压侧的额定电流，计算二次值时必须以中性点 CT 变比折算。

Iod 为当前的零序电流。

Ire 为保护所要躲过的低压侧正常运行时的最大不平衡电流。通常取 0.25 倍的低压侧额定电流。

τ 为零序保护动作，与熔断器相配合的时间常数。

本装置低压侧零序电流保护有 2 段。

Detect the zero sequence current of the transformer neutral CT or zero-sequence filter on the low-voltage side of the transformer, and act as backup protection when the transformer load fuse refuses to fuse. In order to match the time characteristic of the fuse breaking point, the inverse time characteristic curve of zero sequence current protection on the neutral or low voltage side is as follows:

$$t=\tau\times Ied/(Iod- Ire)$$

Ied is the rated current on the low voltage side of the transformer, and the secondary value must be converted by the neutral CT ratio.

Iod is the current zero sequence current.

Ire Maximum unbalance current during normal operation of the low voltage side to be avoided. Usually take 0.25 times the rated current of the low voltage side.

τ is the zero sequence protection action and the time constant matched with the fuse.

The zero sequence current protection of the low voltage side of the device has 2 sections.

4.3 加速保护元件 Acceleration protection components

本装置的加速回路包括手合加速及保护加速两种，加速功能设置了独立的投退压板。

The acceleration circuit of the device includes two kinds: hand acceleration and protection acceleration, and the acceleration function is provided with an independent dropout soft linking piece.

4.3.1 手合加速 Hand acceleration

本装置的手合加速回路不需由外部手动合闸把手的触点来启动，此举主要是考虑到目前许多变电站采用综合自动化系统后，已取消了控制屏，在现场不再安装手动操作把手，或仅安装简易的操作把手。本装置的不对应启动重合闸回路也作了同样的考虑，详见后述。

手合加速回路的启动/动作条件为：

1) 断路器在分闸位置的时间超过 30 秒；
2) 断路器由分闸变为合闸，加速允许时间扩展 3 秒。
3) 任一相电流/零序电流大于加速定值。
4) 延时时间到；
5) 压板投入。

The manual/hand acceleration circuit of the device does not need to be started by the contact of the external manual closing handle, which is mainly considering that the control screen has been canceled after the adoption of integrated automation system in many substations at present, and the manual operation handle is no longer installed on the site, or only a simple operation handle is installed. The same considerations are made for the non-corresponding start reclosing circuit of the device, as described below.

The starting/operating conditions of the manual acceleration circuit are:

1) The circuit breaker is in the opening position for more than 30 seconds；

2) The circuit breaker is changed from opening to closing, and the acceleration allowed time is extended by 3 seconds.

3) Any phase current/zero sequence current is greater than the acceleration set value.

4) Delay time reached.

5) Soft linking piece input.

4.3.2 保护加速 Protection acceleration

保护加速分为前加速或重合后加速方式，可由控制字选择其中一种加速方式。

后加速保护适用于保护重合于故障线路时，可加速跳闸，防止故障扩大。后加速保护只在合闸后3s内起作用，3s后加速功能自动退出。若在3s内保护已经启动，则后加速保护将一直延续到保护动作或者保护返回后才能自动退出。

本装置设置了独立的过流及零流加速段电流定值及相应的时间定值，与传统保护相比，此种做法使保护配置更趋灵活。本装置的过流加速段还可选择带低电压闭锁，但所有加速段均不考虑方向闭锁。

Protection acceleration can be divided into pre-acceleration or post-coincidence acceleration, and one of the acceleration modes can be selected by the control word.

The rear acceleration protection is suitable for accelerating tripping when the protection coincides with the fault line to prevent the expansion of the fault. The rear acceleration protection only works within 3s after closing, and the acceleration function automatically exits after 3s. If the protection is enabled within 3s, the post-acceleration protection will continue until the protection action or the protection returns.

The device is equipped with independent current setting and corresponding time setting of the overcurrent and zero current acceleration section, which makes the protection configuration more flexible compared with the traditional protection. The overcurrent acceleration section of the device can also be selected with low voltage lock, but all acceleration sections do not consider the direction lock.

4.4 反时限元件 Inverse time component

反时限保护元件是动作时限与被保护线路中电流大小自然配合的保护元件，通过平移动作曲线，可以非常方便地实现全线的配合。常见的反时限特性解析式大约分为三类，即标准反时限、非常反时限、极端反时限，本装置中反时限特性由整定值中反时限指数整定。各反时限特性公式如下：

The inverse time protection component is a protection component that naturally matches the action time with the current in the protected line, and can be easily matched with the whole line through the translation action curve. The common inverse time characteristic analytical formula can be divided into three types, namely standard inverse time, extraordinary inverse time and extreme inverse time. The inverse time characteristic in the device is adjusted by the inverse time index in the setting value. The inverse time characteristic formula is as follows:

a.一般反时限(整定范围是0.007～0.14) Standard inverse (setting range is 0.007 ~ 0.14)

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

b.非常反时限(整定范围是0.675～13.5) Very inverse (setting range is 0.675 ~ 13.5)

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

c.极端反时限(整定范围是 4～80) Extremely inverse (setting range is 4 ~ 80)

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

其中： tp 为反时限时间系数，范围是(0.05~1)

Ip 为反时限电流基准值，即反时限电流保护启动值，当 I > Ip 时，保护启动

I 为故障电流

t 为跳闸(动作)时间

注意：整定值部分反时限时间为上面表达式中分子的乘积值，单位是秒。

tp is the inverse time time coefficient, the range is (0.05~1)

Ip is the reference value of the inverse time limit current, that is, the start value of the inverse time limit current protection. When I > Ip, the protection starts

I indicates the fault current

t is the trip time

Note: The setting part of the inverse time limit time is the product value of the molecules in the above expression, in seconds.

本装置相间电流、高零序电流及低零序电流均带有反时限保护功能，高零序电流和低零序电流反时限可投跳闸或告警。反时限元件与定时限元件的定值完全独立。

反时限元件的动作条件为：

1) 压板投入；

2) 满足反时限条件；

The interphase current, high zero sequence current and low zero sequence current of the device have inverse time protection function, and the inverse time of high zero sequence current and low zero sequence current can send tripping or alarm. The setting value of the inverse time element is completely independent of that of the fixed time element.

The operating conditions of the inverse time element are:

1) Soft linking piece input.

2) The inverse time condition is satisfied.

4.5 过负荷元件 overload component

过负荷元件监视三相的电流，其动作条件为：

1) 任一相电流大于过负荷定值；

2) 时间延时到；

3) 压板投入；

注：过负荷元件分为过负荷告警和过负荷跳闸，其压板、定值和延时时间，都可以单独整定。

The overload component monitors the current of the three phases, and its operating conditions are:

1) Any phase current is greater than the overload value；

2) Delay time reached；

3) Soft linking piece input；

Note: The overload component is divided into overload alarm and overload trip, and its soft linking piece, setting value and delay time can be adjusted separately.

4.6 重合闸 reclosing component

4.6.1 启动回路 Starting loop

a) 故障电流(相电流或零序电流)保护跳闸启动；

b) 开关位置不对应启动；

其中，b)可在控制字 2 里设置“开关偷跳不启动/启动重合”。

当充电完成后，检测到 a) 或 b) 且未出现闭锁条件，重合闸经过延时后进行重合动作并放电，整个过程重合闸只动作一次。当重合于永久性故障线路时，可选择后加速保护加速跳开。

a) When the fault current (phase current or zero sequence current) protection trip, start the reclosing function；

b) When the switch position does not correspond, start the reclosing function；

Therein, b) can be set in the code 2 "15.No SGACC Reclose/ SGACC Reclose".

4.6.2 闭锁条件 Blocking condition

断路器合位时重合充电时间为 15 秒；充电过程中重合绿灯发闪光，充电满后发常绿光，不再闪烁。本系列的装置设置的重合闸“放电”条件有：

a) 控制回路断线后，重合闸延时 10 秒自动“放电”；

b) 弹簧未储能端子高电位，重合闸延时 2 秒自动“放电”；

c) 闭锁重合闸端子高电位，重合闸立即“放电”。

When the circuit breaker is in position, the reclosing charging time is 15 seconds. During the charging process, the green light will flash, and the green light will glow after full charging, and it will no longer flash. The reclosing "discharge" conditions of this series of devices are:

a) After the control loop is broken, reclosing delay 10 seconds automatic "discharge"；

b) No energy storage terminal high potential, reclosing delay 2 seconds automatic "discharge"；

c) Lock reclosing terminal high potential, reclosing immediately "discharge".

4.7 低周解列元件 Low-frequency trip component

利用这一元件，可以实现分散式的频率控制，当系统频率低于整定频率时，此元件就能自动判定是否切除负荷。

低周解列，即低频减载，低周减载。低频减载功能逻辑中设有一个滑差闭锁元件以区分故障情况、电机反充电和真正的有功缺额。

考虑低频减载功能只在稳态时作用，故取 AB 相间电压进行计算，试验时仍需加三相平衡电压。当此电压(UAB)低于闭锁频率计算电压时，低频减载元件将自动退出。

With this component, distributed frequency control can be realized. When the system frequency is lower than the setting frequency, this component can automatically determine whether to cut the load.

Low cycle decompression, that is, low frequency load shedding, low cycle load shedding. A slip blocking element is included in the low-frequency load shedding function logic to distinguish fault conditions, motor backcharging, and true active power gaps.

Considering that the low-frequency load shedding function only works in steady state, the AB phase voltage is used for calculation, and the three-phase balance voltage is still needed to be added during the test. When this voltage (UAB) is lower than the calculated voltage of the lockout frequency, the low-frequency load shedding component will automatically exit.

综上所述，低频减载元件的判据为：

1) 三相正序平衡电压，且 Uab>Ubs；

2) df/dt < F/T；

3) 频率由正常到不正常的变化(频率小于低频定值，且大于 45Hz)；

4) T>TF；

5) 本线路有载，负荷电流>0.1In；

6) 压板投入。

注：Ubs 为低周闭锁电压定值，F/T 为低周闭锁滑差定值。In 为装置二次额定电流。

In summary, the criteria for low-frequency load shedding component are:

1) Three-phase positive sequence equilibrium voltage, and Uab>Ubs；

2) df/dt < F/T；

3) Change in frequency from normal to abnormal (frequency less than the low frequency fixed value and greater than 45Hz)；

4) T>TF；

5) This line is loaded, the load current is >0.1In；

6) Soft linking piece input.

Note：Ubs is the low frequency locking voltage setting, and F/T is the low cycle locking slip setting. In is the secondary rated current of the device.

4.8 低压元件 Low voltage component

低电压保护，可设置经或不经电流闭锁。

低压元件的动作条件为：

1) 断路器合位；

2) 三个线电压均大于定值 2 秒以上，之后低于低电压定值；

3) 设置经电流闭锁时，三相电流必须小于“低压闭锁电流”定值；

4) 延时时间到；

5) 压板投入。

注：控制字 1 里的“低压电流闭锁”投入时，若任一相电流大于“低压闭锁电流”定值，则会闭锁低压保护元件。

低压保护可投告警或跳闸。

Low voltage protection, can be set with or without current locking.

The operating conditions of the low-voltage component are:

1) The circuit breaker is in position；

2) All three line voltages are above the set value for more than 2 seconds, and then below the low voltage set value；

3) When setting the current lock, the three-phase current must be less than the low voltage lock current setting value；

4) Delay time reached；

5) Soft linking piece input.

Note: When the "low voltage current lock" in code 1 is put in, if any phase current is greater than the "low voltage lock current" set value, the low voltage protection element will be locked.

Low voltage protection can alarm or trip.

4.9 过压元件 Over voltage component

本装置可以反应母线电压的过压保护，过压元件的动作条件为：

1) 断路器合位；

2) 任一个线电压大于过电压定值；

3) 延时时间到；

4) 压板投入；

过压保护可投告警或跳闸。

The device can reflect the over voltage protection of the bus voltage, and the operating conditions of the overvoltage element are:

1) The circuit breaker is in position；

2) Any line voltage is greater than the over voltage value；

3) Delay time reached；

4) Soft linking piece input.

Over voltage protection can alarm or trip.

4.10 零序过压元件 Zero sequence overvoltage component

适用于小电流接地系统的接地保护，本装置的零序电压无需取自三相五柱式电压互感器二次侧开口三角电压，而是取自三相电压的直接合成。

零序过压元件的逻辑为：

1) 断路器合位；

2) 零序电压大于定值；

3) 延时时间到；

4) 压板投入；

零序过压可投告警或跳闸。

The zero sequence overvoltage component is suitable for the grounding protection of the small current grounding system. The zero sequence voltage of the device does not need to be derived from the secondary opening triangle voltage of the three-phase five-column voltage transformer, but from the direct synthesis of the three-phase voltage.

The logic of a zero-sequence overvoltage component is:

1) The circuit breaker is in position；

2) The zero sequence voltage is greater than the fixed value；

3) Delay time reached；

4) Soft linking piece input.

Zero sequence voltage protection can alarm or trip.

4.11 失压元件 No voltage component

当系统电源消失时，经设定的延时时间Tset后，启动失压保护。系统电源消失判据结合了无压无流条件。失压元件的逻辑为：

1) 断路器合位；

2) 三相线电压均大于定值 2 秒以上，再小于定值；

3) 本线路无流(I<5%In 额定电流)；

4) 延时时间到；

5) 压板投入；

失压保护可投告警或跳闸。

When the system power supply disappears, after the set delay time Tset, start the voltage loss protection. System power loss criterion combined with no voltage and no current condition. The logic of the no voltage component is:

1) The circuit breaker is in position；

2) The three-phase line voltage is greater than the fixed value for more than 2 seconds, and then less than the fixed value；

3) No current in this line (I<5%In rated current);

4) Delay time reached；

5) Soft linking piece input.

No voltage protection can alarm or trip.

4.12 电动机启动速断保护 Motor start fast break protection

电动机速断保护通过判断电流的大小来实现的，其整定范围为(3～12)In。速断保护在电动机启动完毕后自动下降一半，这样既可以有效地躲过电动机的巨大启动电流，又可以保证电动机正常启动后提供防备严重的过负荷造成的堵转保护。

动作时间 T1(电流 I 段时间)可整定，对于用断路器控制的电动机整定时间一般较短，而用接触器控制的电动机整定时间一般较长，可选择整定为 0.3 秒。

在电动机启动期间，装置屏蔽电流 I 段，而以速断电流高值为判据。在电动机启动完毕后(大于电动机启动时间)，装置自动屏蔽速断电流高值，而改为以三段式电流为判据(详见过电流元件)。

The motor fast break protection is realized by judging the size of the current, and its setting range is (3 ~ 12)In. The fast-break protection automatically drops by half after the motor is started, which can not only effectively avoid the huge starting current of the motor, but also ensure that the motor provides protection against serious over-load caused by gridlock after normal start.

The operation time T1(current I period) can be adjusted, the setting time of the motor controlled by the circuit breaker is generally shorter, and the setting time of the motor controlled by the contactor is generally longer, and the setting time can be selected as 0.3 seconds.

During the start of the motor, the device shields the current I segment and takes the high value of the fast-break current as the criterion. After the motor is started (greater than the motor start time), the device automatically shields the high value of fast-break current, and changes to the three-stage current as the criterion (see overcurrent element for details).

电动机启动速断保护的逻辑为：

1) 马达启动判别(在控制字 2 里)投入；

2) 在电动机启动时间内，任一相电流大于速断电流高值；

3) 延时时间到(延时时间大于电流 I 段时间)。

4) 电流 I 段保护压板投入。

The logic of motor starting fast break protection is:

1) Motor start identification (in code2) input.

2) During the starting time of the motor, any phase current is greater than the high value of the quick-break current;

3) Delay time reached (The delay time is longer than the current I period)；

4) Soft linking piece (current I period) input.

4.13 负序过流保护元件 Negative sequence overcurrent protection component

负序电流保护主要针对各种非接地性不对称故障，如：电动机发生某相断相时，负序分量的大小因故障前的负荷率而不同，负荷率大于 0.7 时，健全相才能引起过电流，因此常规保护不能有效保护不对称故障。在电动机正常运行时，由于供电电源的不对称，总存在一定的负序电流，该电流不会超过 30%Is，负序保护的整定应能躲过此负序电流，即按 0.3Is 整定。动作时间特性有两种时限特性可

选择，选择定时限和反时限。

Negative sequence current protection is mainly for a variety of ungrounded asymmetric faults, such as: when the motor occurs a phase break, the size of the negative sequence component is different due to the load rate before the fault, when the load rate is greater than 0.7, the sound phase can cause overcurrent, so the conventional protection can not effectively protect the asymmetric fault. In the normal operation of the motor, due to the asymmetry of the power supply, there Is always a certain negative sequence current, the current will not exceed 30%Is, and the setting of the negative sequence protection should be able to avoid this negative sequence current, that is, set according to 0.3Is. There are two kinds of time limit characteristics to choose from: definite time limit and inverse time limit.

极端反时限动作方程为：

The extremely inverse action equation is:

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

其中： tp 为时间系数，范围是(0.05～1)

Ip 为负序电流整定值

I 为故障负序电流

t 为跳闸时间

注意：整定值部分反时限时间为上面表达式中分子的乘积值，单位是秒，整定范围是(0.4～80)。

tp is the time coefficient, the range is (0.05 ~ 1)

Ip is the setting value of negative sequence current

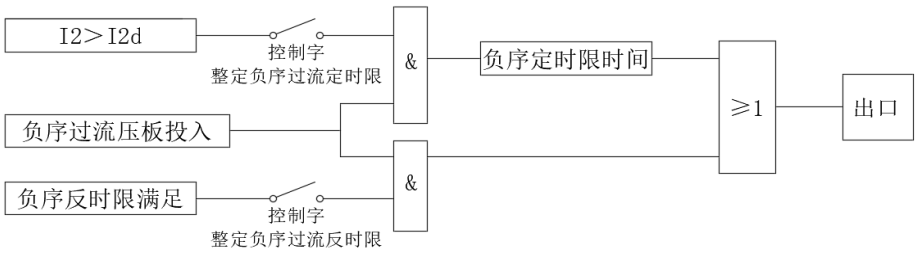
I indicates the fault negative sequence current

t is the trip time

Note: The setting part of the inverse time time is the product value of the molecules in the above expression, in seconds, and the setting range is (0.4 ~ 80).

其动作逻辑如下：

Its action logic is as follows:



注：I2 为负序电流，I2d 为负序电流定值。

可在控制字 2 里整定负序过流投定时限或者反时限。

Note: I2 is the negative sequence current, and I2d is the negative sequence current setting.

The negative sequence overcurrent time limit or inverse time limit can be set in code 2.

4.14 过热保护元件 Overheat protection component

综合考虑了电动机正序、负序电流所产生的热效应，为电动机各种过负荷引起的过热提供保护，也作为电动机短路、启动时间过长、堵转等的后备。

The thermal effect caused by positive and negative sequence current of the motor is comprehensively considered, which provides protection for the overheating caused by various overloads

of the motor, and also acts as a backup for the motor short circuit, too long starting time, and blocked rotation.

用等效电流 Ieq 来模拟电动机的发热效应，即：

The equivalent current Ieq is used to simulate the heating effect of the motor, namely:

$$Ieq=\sqrt{K_1I_1^2+K_2I_2^2}$$

式中：Ieq－等效电流　　Equivalent current

I1－正序电流　　Positive sequence current

I2－负序电流　　Negative sequence current

K1－正序电流发热系数，在电动机启动过程中 K1＝0.5，启动完毕恢复 K1＝1

K1—The heating coefficient of positive sequence current, K1 = 0.5 during the motor starting process, and K1 = 1 after starting

K2－负序电流发热系数，K2=3～10,可取 K2＝6

K2—The heating coefficient of negative sequence current, K2=3～10, usually K2=6

根据电动机的发热模型，电动机的动作时间 t 和等效运行电流 Ieq 之间的特性曲线由下列公式给出：

According to the heating model of the motor, the characteristic curve between the motor's action time t and the equivalent running current Ieq is given by the following formula:

$$t=\tau\times\ln\frac{I_{eq}^2-I_p^2}{I_{eq}^2-I_\infty^2}$$

式中：Ip—过负荷前的负载电流，若过负荷前处于冷态，则 Ip＝0

Ip—The load current before overload. If the load is cold before overload, Ip = 0

I_∞－启动电流，即保护不动作所要求的规定的电流极限值

I_∞－The starting current, that is, the specified current limit value required for protection against action

τ－时间常数，反映电动机的过负荷能力

τ－The time constant, reflects the overload capacity of the motor

这一判据充分考虑了电动机定子的热过程及其过负荷前的热状态。装置用热含量来表示电动机的热过程，热含量与定子电流的平方成正比，通过换算，将其量纲化成反映电动机过负荷能力的时间常数 τ。当热含量值达到 τ 时，装置即跳闸。当热含量达到 Ka×τ，发过热告警信号，其中，Ka 为告警系数，其取值范围为：$\left(\frac{I_{eq}}{I_\infty}\right)^2$<Ka<1。热报警可整定为热积累跳闸的(60～99.9)%，装置提供实时热积累值显示，告警灯光指示和信号接点输出。

This criterion fully considers the thermal process of the motor stator and its thermal state before overload. The heat content is proportional to the square of the stator current. By conversion, the heat content is dimensionalized into the time constant τ which reflects the overload capacity of the motor. When the heat content value reaches τ, the device is tripped. When the heat content reaches Ka×τ, an overheating alarm signal will be generated, where Ka is the alarm coefficient and its value range is: $\left(\frac{I_{eq}}{I_\infty}\right)^2$<Ka<1. The heat alarm can be set to (60 ~ 99.9) % of the heat accumulation trip, and the device provides real-time heat accumulation value display, alarm light indication and signal contact output.

根据电动机可连续启动两次的原则，每次启动其热积累不应大于 50%跳闸值，所以当热积累

值下降到 50%以下时，装置合闸闭锁接点返回。过热保护跳闸后，装置的热记忆功能启动，输出接点一直闭合，直到热积累值下降到 50％以下，过热合闸闭锁接点返回，这时电动机可以重新启动。紧急情况，要求立即启动时，可对装置进行热复归操作。

According to the principle that the motor can be started twice continuously, the heat accumulation should not be greater than 50% of the trip value at each start, so when the heat accumulation value drops below 50%, the device will return to the closing lock contact. After the overheat protection trip, the thermal memory function of the device is activated, and the output contact is closed until the heat accumulation value drops below 50%, and the overheat closing lock contact returns, at which time the motor can be restarted. In case of emergency, when it is required to start immediately, the device can be thermal reset operation.

启动电流 I_∞可按额定电流 Ie 的 1.05～1.15 倍整定。

The starting current I∞ can be set at 1.05 ~ 1.15 times the rated current Ie.

发热时间常数 τ 应由电机厂提供，如果厂家没有提供，可按下述方法之一进行估算：

The heating time constant τ should be provided by the motor manufacturer, if the manufacturer does not provide, it can be estimated according to one of the following methods:

① 如果厂家提供电动机的热限曲线或一组过负荷能力的数据，则按下式计算 τ：

① If the manufacturer provides the heat limit curve of the motor or a set of overload capacity data, τ is calculated as follows:

$$\tau = \frac{t}{\ln \frac{I^2}{I^2 - I_\infty^2}}$$

求出一组 τ 后取较小的值。 We find a set of τ and we take the smaller value.

② 如已知堵转电流 I 和允许堵转时间 t，也可由下式估算 τ：

② If the locking current I and the allowable locking time t are known, τ can also be estimated by the following formula:

$$\tau = \frac{t}{\ln \frac{I^2}{I^2 - I_\infty^2}}$$

③按下式计算 τ： Calculate τ by following formula

$$\tau = \frac{\theta_e \times K^2 \times T_{start}}{\theta_0}$$

式中：θe 为电动机的额定温升，K 为启动电流倍数，θ_0 为电动机启动时的温升，Tstart 为电动机的启动时间。

θe is the rated temperature rise of the motor, K is the multiple of the starting current, θ_0 is the temperature rise when the motor starts, and Tstart is the start time of the motor.

其动作逻辑如下：

1) 任一相电流大于定值；

2) 压板投入；

备注：当任一相电流大于定值时，如控制字 2 里投入过热告警，则装置告警开出；如投入过热闭锁，则过热闭锁出口(备用出口 1，即 X3-5 和 X3-6)动作。

Its action logic is as follows:

1) Any phase current is greater than the fixed value.

2) Soft linking piece input.

Note: When any phase current is greater than the certain value, if the overheat alarm is put into the code 2, the device alarm will be generated; If the overheat lock is put in, the overheat lock outlet (reserve digital output 1, i.e. X3-5 and X3-6) acts.

4.15 堵转元件 Locked-rotor component

堵转保护元件的逻辑为：

1) 堵转开入压板(开入 3)投入；

2) 任一相电流大于堵转电流定值；

3) 延时时间到；

4) 堵转保护软压板投入；

The logic of the locked-rotor protection component is:

1) locked-rotor linking piece (digital input 3) input;

2) Any phase current is greater than the fixed value of the locked-rotor current.

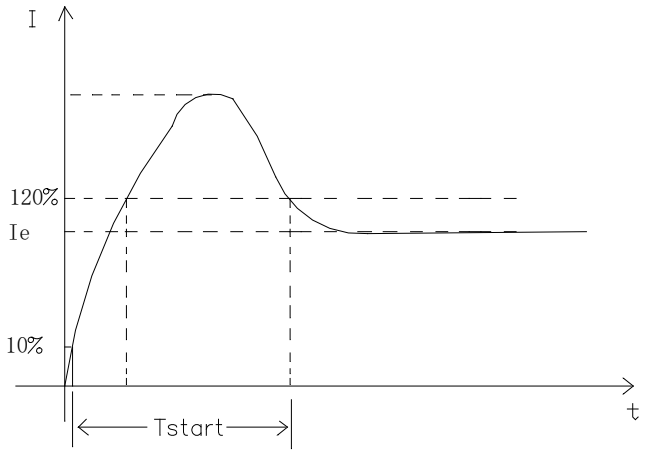
3) Delay time reached;

4) Soft linking piece input.

4.16 长启动时间保护元件 Long startup time protection component

装置测量电动机起动时间 Tstart 的方法：当电动机的最大相电流从零突变动 10%Ie 时开始计时，直到起动电流过峰值后下降到 120%Ie 时为止，之间的历时称为 Tstart。(Ie 为电动机额定电流。)电动机起动时间过长会造成转子过热，当装置实际测量的起动时间超过整定的允许起动时间 Tstart 时，保护动作于跳闸。

The device measures the method of motor starting time Tstart: when the maximum phase current of the motor starts from zero sudden change of 10%Ie, until the starting current drops to 120%Ie after the peak, the duration between is called Tstart. (Ie indicates the rated current of the motor.) Too long motor starting time will cause rotor overheating, when the actual measured starting time of the device exceeds the set allowable starting time Tstart, the protection action is tripping.



长启动保护元件的逻辑为：

1) 马达启动判别投入(在控制字 2 里)；

2) 任一相电流持续大于长启动电流定值；

3) 延时时间到(延时时间大于长启动时间定值，且小于电动机启动时间定值)；

4) 长启动保护软压板投入；

The logic of the long startup protection component is:

1) Motor start identification input (in code2)

2) Any phase current is continuously greater than the long startup current set value.

3) Delay time reached (The delay time is greater than the long starting time and less than the motor starting time)；

4) Soft linking piece input.

4.17 非电量元件 Non-electrical protective component

本装置提供 6 个非电量，定值完全独立。

非电量元件的动作条件为：

1) 非电量开入闭合；

2) 延时时间到；

3) 压板投入；

非电量可投跳闸或告警。非电量压板不投入时，则对应的开入量作普通开入量用。

The device provides 6 non-electrical channels with completely independent values.

The operating conditions of non-electrical components are:

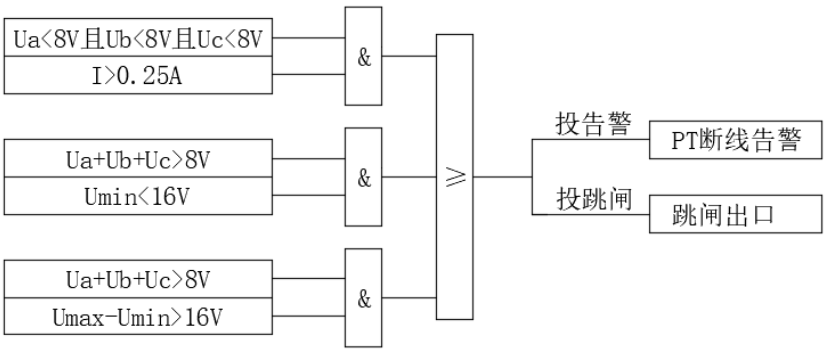
1) Linking piece (digital input) input;

2) Delay time reached.

3) Soft linking piece input.

non-electrical channels, can input trip or alarm, used as ordinary signal when exiting.

4.18 PT 断线检测 PT break detection



在下面三个条件之一得到满足的时候，装置报“PT 断线”信息：

1. 三相电压均小于 8V，某相(A 或 C 相)电流大于 0.25A，判为三相失压。
2. 三相电压之和大于 8V，最小线电压小于 16V，判为两相或单相 PT 断线。
3. 三相电压之和大于 8V，最大线电压与最小线电压差大于 16V，判为两相或单相 PT 断线。

PT 断线检测功能可以通过“TV 断线自检”控制字投退。

PT 断线可投告警或跳闸。

The device reports a "PT break" message when one of the following three conditions is met:

1. The three-phase voltage is less than 8V, and the current of a phase (A or C phase) is greater than 0.25A, which is judged as three-phase voltage loss.
2. If the sum of the three-phase voltage is greater than 8V and the minimum line voltage is less than 16V, it is judged as a two-phase or single-phase PT break.

3. If the sum of the three-phase voltage is greater than 8V, and the difference between the maximum line voltage and the minimum line voltage is greater than 16V, it is judged as a two-phase or single-phase PT break.

The PT break detection function can be returned by the "TV break Self-check" (in code 1).

PT break can input alarm or trip.

4.19 CT 断线检测 CT break detection

Imin 无流(小于 0.05In)，Imax 有流且小于 1.2In，装置报 CT 断线。

CT 断线可投告警或跳闸。

If there is no current in Imin (less than 0.05In), and there is current in Imax (less than 1.2In), the device reports CT break.

CT break can input alarm or trip.

4.20 控制回路断线检测 Control loop break detection

当断路器分位和断路器合位开入量都处于分位时，装置延时报控制回路断线。控制回路断线可设置退出或投入。

When the circuit breaker's opening position and closing position are both in the division signal, the device will delay to report the break of the control circuit. Control loop break can be set to exit or input.

五、装置整定 Device setting

5.1 整定值清单及说明 Setting list and description

序号 No.	定值名称 name	范围 range	单位 units	备注 note
1	控制字 1	0000～FFFF	/	参见控制字 1 说明
	Code 1		/	see Code 1 description
2	控制字 2	0000～FFFF	/	参见控制字 2 说明
	Code 2		/	see Code 2 description
3	速断电流高值	0.2A~100.0A	安	仅作电动机启动速断保护的判据，此时闭锁三段式电流保护。
	IHiFastI		A	It is only used as the criterion for the motor to start fast break protection, and the three-stage over-current protection is locked at this time.
4	电流 I 段定值	0.2A~100.0A	安	
	IOverI1		A	
5	电流 I 段时间	0~5.000s	秒	
	TOverI1		s	
6	电流II段定值	0.2A~100.0A	安	
	IOverI2		A	
7	电流II段时间	0.1~20.00s	秒	
	TOverI2		s	
8	电流III段定值	0.2A~100.0A	安	

序号 No.	定值名称 name	范围 range	单位 units	备注 note
	IOverI3		A	
9	电流III段时间	0.1~20.00s	秒	
	TOverI3		s	
10	高零序 I 段定值	0.1A~20.0A	安	
	IOverI0H1		A	
11	高零序 I 段时间	0~5.000s	秒	
	TOverI0H1		s	
12	高零序 II 段定值	0.1A~20.0A	安	
	IOverI0H2		A	
13	高零序 II 段时间	0.1~20.00s	秒	
	TOverI0H2		s	
14	高零序 III 段定值	0.1A~20.0A	安	
	IOverI0H3		A	
15	高零序 III 段时间	0.1~20.00s	秒	
	TOverI0H3		s	
16	低零序 I 段定值	0.2A~100.0A	安	
	TOverI0H3		A	
17	低零序 I 段时间	0~5.000s	秒	
	TOverI0L1		s	
18	低零序 II 段定值	0.2A~100.0A	安	
	IOverI0L2		A	
19	低零序 II 段时间	0.1~20.00s	秒	
	TOverI0L2		s	
20	电流加速定值	0.2A~100.0A	安	
	IAccelI		A	
21	电流加速时间	0~5.000s	秒	
	TAccelI		s	
22	零序加速定值	0.1~20.00A	安	
	IAccelI0		A	
23	零序加速时间	0~5.000s	秒	
	IAccelI0		s	
24	电流反时基准	0.2A~100.0A	安	
	InvI Base		A	
25	电流反时时间	0.005~127.0s	秒	
	InvI Time		s	
26	高零序反时基准	0.1~20.00A	安	
	InvI0H Base		A	
27	高零序反时时间	0.005~127.0s	秒	
	InvI0H Time		s	
28	低零序反时基准	0.2A~100.0A	安	
	InvI0L Base		A	

序号 No.	定值名称 name	范围 range	单位 units	备注 note
29	低零序反时时间	0.005~127.0s	秒	
	InvI0L Time		s	
30	反时限指数	0.01~10.00	/	置 0.02, 1, 2
	Inv Index		/	set 0.02, 1, 2
31	过负荷告警电流	0.1A~10.00A	安	
	IOverLoadAlm		A	
32	过负荷告警时间	0.1~9000s	秒	
	TAlarmOverL		s	
33	过负荷跳闸电流	0.1A~10.00A	安	
	IOverLoadTrip		A	
34	过负荷跳闸时间	0.1~9000s	秒	
	TTripOverL		s	
35	重合闸时间	0.2～20.0s	秒	
	TReclose		s	
36	低周元件频率	45.0～49.9Hz	赫兹	
	FlowFreq		Hz	
37	低周元件时间	0.1～20.0s	秒	
	TlowFreq		s	
38	低周闭锁电压	10～120V	伏	Uab 线电压为判据
	LowF Ublock		V	The Uab line voltage is used as the criterion
39	低周闭锁滑差	0.5～20.0Hz/s	赫兹每秒	
	Df/dt Block		Hz/s	
40	过电压定值	30~460V	伏	
	UOverU		V	
41	过电压时间	0~100s	秒	
	TOverU		s	
42	零序过压定值	2~460V	伏	
	UOverU0		V	
43	零序过压时间	0~100s	秒	
	TOverU0		s	
44	低电压定值	10~460V	伏	
	ULowU		V	
45	低电压时间	0~100s	秒	
	TLowU		s	
46	低压闭锁电流	0.2A~100.0A	安	
	Block Cur		A	
47	失压定值	10~460V	伏	
	ULostU		V	
48	失压时间	0~100s	秒	
	TLostU		s	

序号 No.	定值名称 name	范围 range	单位 units	备注 note
49	负序过流定值	0.2~100.0A	安	
	INegI		A	
50	负序定时限时间	0.1~20.00s	秒	
	TNegI		s	
51	负序反时限时间	0.4~80.00s	秒	采用极端反时限
	TNegI-Inv		s	extremely inverse
52	过热启动电流	0.2~20A	安	
	Heat StartI		A	
53	发热时间常数 τ	6~3000s	秒	
	Heat const τ		s	
54	负序热效应系数	3~10	/	一般可取为 6
	Heat-Neg Rat		/	The value is usually 6
55	过热报警系数	0.3~1.0	/	一般可取为 70%
	Heat-Alm Rat		/	The value is usually 70%
56	散热时间系数	1～5 倍 τ	/	一般可取为 4.0
	Radiat Ratio		/	The value is usually 4.0
57	堵转电流定值	0.2～100.0A	安	
	Radiat Ratio		A	
58	堵转电流时间	0.1~100.0s	秒	
	Lock Rot T		s	
59	长启动电流	0.2～100.0A	安	
	ILongStartI		A	
60	长启动时间	0.1~100.0s	秒	
	TLongStartI		s	
61	电动机额定电流	0.5～20.0A	安	
	Motor-RatedI		A	
62	电动机启动时间	0~60s	秒	关联长启动保护元件和电动机启动速断保护元件。
	Motor-StartT		s	It is associated with the long start protection component and the motor start quick break protection component.
63	重瓦斯时间	0~100s	秒	
	Heavy Gas T		s	
64	轻瓦斯时间	0~100s	秒	
	Heavy Gas T		s	
65	网门跳闸时间	0~100s	秒	
	Door Open T		s	
66	温度高时间	0~100s	秒	
	Temp Dec T		s	
67	温度超高时间	0~100s	秒	
	Temp High T		s	

序号 No.	定值名称 name	范围 range	单位 units	备注 note
68	温控器故障时间	0~100s	秒	
	Temp High T		s	
69	PT 变比	1~9999	/	比值
	PT Ratio		/	
70	CT 变比	1~9999	/	比值
	CT Ratio		/	

控制字 1 定义： Code1 definition

序号 No.	内容 content	备注 note
1	TV 自检投入/退出	PT 断线自检
	TV Fail On / Off	PT break detect
2	CT 额定电流 5A / 1A	
	CT Rate 5A/1A	
3	选择后/前加速方式	
	Post / Pre-IAcc	
4	低压电流闭锁退出/投入	关联低压保护元件
	Non-UBlock / UBlock LOWU	It is associated with the low-voltage protection component
5	高零序I段投跳闸/告警	
	OverI0H1 Trip / Alm	
6	高零序II段投跳闸/告警	
	OverI0H2 Trip / Alm	
7	高零序III段投跳闸/告警	
	OverI0H3 Trip / Alm	
8	低零序I段投跳闸/告警	
	OverI0L1 Trip / Alm	
9	低零序II段投跳闸/告警	
	OverI0L1 Trip / Alm	
10	高零序反时选告警/跳闸	
	Hi Ze Inv Alm / Trip	
11	低零序反时选告警/跳闸	
	Low Ze Inv Alm / Trip	
12	零序过压投告警/跳闸	
	Zero Vol Alm / Trip	
13	失压投告警/跳闸	
	Lost Vol Alm / Trip	
14	过电压投告警/跳闸	
	Hi Vol For Alm / Trip	
15	高压侧零序用 I0 通道/自产	
	I0H USE CHANAL / SELF	

16	相电流为三/两相式 CT	
	CT For Three / Two Pha	

控制字 2 定义： Code2 definition

序号 No.	内容 content	备注 note
1	过热告警退出/投入	
	Heat Alarm Off / On	
2	过热闭锁退出/投入	
	Heat Block Off / On	
3	负序过流定/反时限	
	Neg-seq Definite / Inverse	
4	马达启动判别投入/退出	马达启动期间，闭锁三段式电流，只判速断电流高值
	Motor Start Off / On	During the start of the motor, the three-stage current is blocked, and only the high value of the quick break current is judged
5	重瓦斯告警/跳闸投入	
	ZWS Alm / Trip On	Heave gas
6	轻瓦斯告警/跳闸投入	
	QWS Alm / Trip On	Light gas
7	网门门开告警/跳闸投入	
	Door Open Alm / Trip On	
8	高温告警/跳闸投入	
	GW Alm / Trip On	Temperature Dec
9	超高温告警/跳闸投入	
	CGW Alm / Trip On	Temperature high
10	温控故障告警/跳闸投入	
	Temp Err Alm / Trip On	
11	PT 电压 100V/380V	
	PT for 100V / 380V	
12	CT 断线判别投入/退出	
	CT Fail Off / On	CT break
13	PTDX 投告警/跳闸	PT 断线
	PT Fail Alm / Trip On	
14	CTDX 投告警/跳闸	CT 断线
	CT Fail Alm / Trip On	
15	开关偷跳不/启动重合	
	No SGACC / SGACC Reclose	Switch slip, initiate reclosing
16	低电压投告警/跳闸	
	Lo Vol For Alarm / Trip	

5.2 保护压板说明 Soft linking piece definition

序号 No.	压板名称 name	对应功能 function
1	电流I段	电流I段功能投退
	Over-Cur I	Off or on
2	电流II段	电流II段功能投退
	Over-Cur II	Off or on
3	电流III段	电流III段功能投退
	Over-Cur II	Off or on
4	高零序I段	高零序I段功能投退
	Hi Zero-Seq I	Off or on
5	高零序II段	高零序II段功能投退
	Hi Zero-Seq II	Off or on
6	高零序III段	高零序III段功能投退
	Hi Zero-Seq III	Off or on
7	低零序I段	低零序I段功能投退
	Lo Zero-Seq I	Off or on
8	低零序II段	低零序II段功能投退
	Lo Zero-Seq II	Off or on
9	电流加速段	电流加速段功能投退
	Cur Accel	Off or on
10	零序加速段	零序加速段功能投退
	Zero Accel	Off or on
11	电流反时限	电流反时限功能投退
	Cur Inverse	Off or on
12	高零序反时限	高零序反时限功能投退
	Hi Zero Inverse	Off or on
13	低零序反时限	低零序反时限功能投退
	Hi Zero Inverse	Off or on
14	过负荷告警	过负荷告警功能投退
	OverLoad Alarm	Off or on
15	过负荷跳闸	过负荷跳闸功能投退
	OverLoad Trip	Off or on
16	重合闸	重合闸功能投退。投入时，开入 3 作闭锁重合闸开入用
	Reclose	When it is put in, the digital input 3 is used for blocking and reclosing opening
17	低周解列	低周解列功能投退
	Low Freq	Off or on
18	低压保护	低压保护功能投退
	Low Voltage	Off or on
19	过压保护	过压保护功能投退
	Over Voltage	Off or on

20	零序过压保护	零序过压保护功能投退
	Over Zero Vol	Off or on
21	失压保护	失压保护功能投退
	Lost Vol	Off or on
22	负序过流	负序过流功能投退
	Negative Seq	Off or on
23	过热	过热功能投退
	Over Heat	Off or on
24	堵转	堵转功能投退，投入时，开入 3 作堵转开入用
	Lock Rotor Cur	When it is put in, the digital input 3 is used for lock rotor
25	长启动	长启动功能投退
	Long Startup	Off or on
26	重瓦斯	可投跳闸或告警，退出时开入 4 为普通开入量
	Heavy Gas	It can alarm or trip. When it exits, the digital input 4 is the normal signal in
27	轻瓦斯	可投跳闸或告警，退出时开入 5 为普通开入量
	Light Gas	It can alarm or trip. When it exits, the digital input 5 is the normal signal in
28	网门跳闸	可投跳闸或告警，退出时开入 6 为普通开入量
	Door Open	It can alarm or trip. When it exits, the digital input 6 is the normal signal in
29	温度高	可投跳闸或告警，退出时开入 7 为普通开入量
	Temp Dec	It can alarm or trip. When it exits, the digital input 7 is the normal signal in
30	温度超高	可投跳闸或告警，退出时开入 8 为普通开入量
	Temp High	It can alarm or trip. When it exits, the digital input 8 is the normal signal in
31	温控器故障	可投跳闸或告警，退出时开入 9 为普通开入量
	Temp Err	It can alarm or trip. When it exits, the digital input 9 is the normal signal in

5.3 内部控制字说明 Internal code definition

序号 No.	内容 content	备注 note
1	控制回路断线投入/退出	
	Contrl-Break On/Off	
2	PT 接线为 YY / VV	VV 接线时，短接电压采样端子 Ub 和 Un
	PT for YY / VV	If the connection mode is VV, short-circuit the voltage sampling terminals Ub and Un
3	开入 1 为远方位置/普通开入	
	DI1 Remote pos / for DI	

4	开入 12 为普通开入/检修压板	
	DI12 for DI / overhaul	
5	启动报文上送/不上送	
	StartUp Send / Not Send	
6	有/无以太网模块	
	Have /No Ethernet	
7	远方位置为常开/常闭	
	Remote Pos Open / Close	
8	开入 13 为普通开入/复归	
	DI13 for DI / FG	FG means reset

六、装置信息一览表 List of device information

6.1 保护事件信息一览表 Protection Event Information List

序号 No.	事件名称	Event name	通信代码 Item No.	备注 note
1	保护启动	Startup	01H	
2	电流I段	Over-Cur I	02H	
3	电流II段	Over-Cur II	03H	
4	电流III段	Over-Cur III	04H	
5	高零I段跳闸	HZe-Seq I Trip	05H	
6	高零II段跳闸	HZe-Seq II Trip	06H	
7	高零III段跳闸	HZe-Seq III Trip	07H	
8	低零I段跳闸	LZe-Seq I Trip	08H	
9	低零II段跳闸	LZe-Seq II Trip	09H	
10	电流加速段	Cur Accel	0AH	
11	零序加速段	Zero Accel	0BH	
12	电流反时限	Cur Inverse	0CH	
13	高零序反时限	Hi Zero Inverse	0DH	
14	低零序反时限	Lo Zero Inverse	0EH	
15	过负荷动作	OverLoad Trip	0FH	
16	重合闸	Reclose	10H	
17	低周	Low Freq	11H	
18	低压	Low Voltage	12H	
19	过压	Over Voltage	13H	
20	零序过压动作	Zer Vol Trip	14H	
21	失压	Lost Voltage	15H	
22	负序过流	Negative Seq	16H	
23	过热保护	Over Heat	17H	
24	堵转保护	Lock Rotor	18H	
25	长启动动作	Long Startup	19H	

26	负序反时限	Inv Neg Seq	1AH	
27	过热闭锁	Heat Block	1BH	
28	重瓦斯动作	Heavy Gas	1CH	
29	轻瓦斯动作	Light Gas	1DH	
30	网门跳闸动作	Door Open Trip	1EH	
31	高温动作	Temp Dec	1FH	
32	超高温动作	Temp High	20H	
33	温控故障动作	Temp Err Trip	21H	
34	CT 断线动作	CT Fail Trip	22H	
35	PT 断线动作	PT Fail Trip	23H	
36	CT 断线告警	CT Fail Alm	24H	
37	PT 断线告警	PT Fail Alm	25H	
38	控制回路断线	Control Fail	26H	
39	跳闸失败	Trip Failure	27H	
40	合闸失败	Close Fail	28H	
41	过负荷告警	OverLoad Alm	29H	
42	零序过压告警	Zer Vol Alm	2AH	
43	失压告警	Lost Vol Alm	2BH	
44	高零 I 段告警	HZe-Seq I Alm	2CH	
45	高零II段告警	HZe-Seq II Alm	2DH	
46	高零III段告警	HZe-Seq III Alm	2EH	
47	低零I段告警	LZe-Seq I Alm	2FH	
48	低零II段告警	LZe-Seq II Alm	30H	
49	高零反时告警	HZero Inv Alm	31H	
50	低零反时告警	LZero Inv Alm	32H	
51	过热告警	Heat Alarm	33H	
52	重瓦斯告警	HeavyGas Alm	34H	
53	轻瓦斯告警	LightGas Alm	35H	
54	网门告警	Door Open Alm	36H	
55	高温告警	Temp Dec Alm	37H	
56	超高温告警	Temp High Alm	38H	
57	温控故障告警	Temp Err Alm	39H	
58	过压告警	Over Vol Alm	3AH	
59	低压告警	Low Vol Alm	3BH	
60	遥控跳闸	Protec Trip	3CH	
61	遥控合闸	Protec Close	3DH	
62	遥控备用出口 1	Protec BACK1	3EH	
63	遥控备用出口 2	Protec BACK2	3FH	
64	定值设置成功	Set Success	40H	
65	定值设置失败	Set Fail	41H	
66	参数设置成功	Para Success	42H	
67	参数设置失败	Para Fail	43H	
68	一次图设置 OK	JXT Success	44H	

69	一次图设置 FA	JXT Fail	45H	
70	未知事件	Unknown Eve	46H	

6.2 告警事件信息一览表 Alarm Event Information List

序号 No.	事件名称	Event name	通信代码 Item No.	备注 note
1	装置上电	Device On	01H	
2	RAM 错误	Ram Err	02H	
3	ROM 错误	Rom Err	03H	
4	AD 错误	AD Err	04H	
5	定值无效	Set Err	05H	
6	参数无效	Para Err	06H	
7	开出异常	Do Err	07H	
8	网络 1 异常	Net1 Err	08H	
9	网络 2 异常	Net2 Err	09H	

6.3 装置遥信量信息一览表 Remote Signal Information List

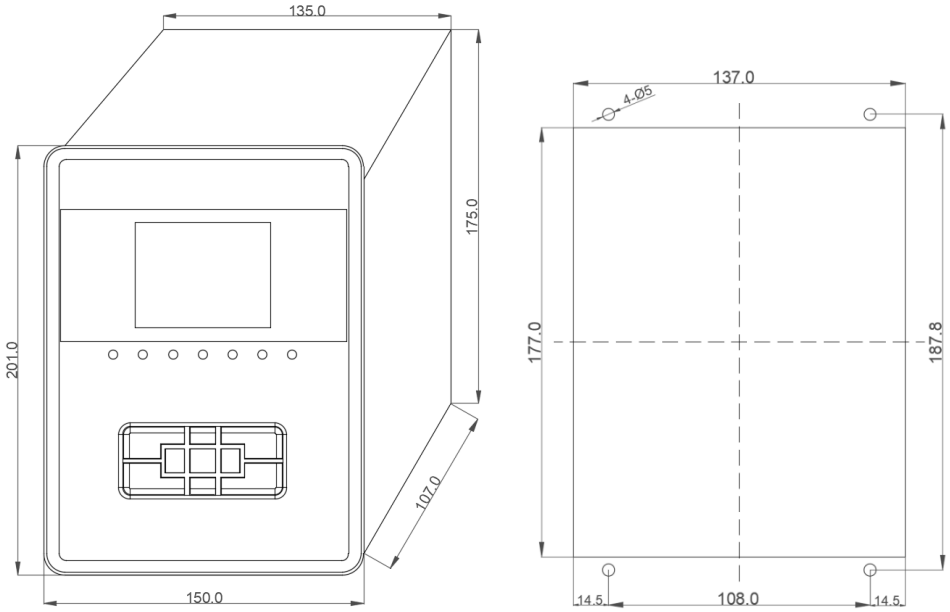
序号 No.	遥信量名称	name	通信代码 Item No.	备注 note
1	遥控允许/开入 1	DI1	01H	
2	弹簧未储能	Spring no energy	02H	
3	闭锁合闸/开入 3	DI3	03H	重合闸投入时,作闭锁重合闸开入用；堵转投入时，作堵转开入用。 When reclosing function is put in, it is used for lock reclosing signal. When plugging function is put in, it is used for plugging signal.
4	重瓦斯/开入 4	DI4	04H	
5	轻瓦斯/开入 5	DI5	05H	
6	网门跳闸/开入 6	DI6	06H	
7	温度高/开入 7	DI7	07H	
8	温度超过/开入 8	DI8	08H	
9	温控故障/开入 9	DI9	09H	
10	断路器合位	HWJ	0AH	
11	断路器跳位	TWJ	0BH	
12	开入 12/检修	DI12	0CH	
13	开入 13/复归	DI13	0DH	
14	事故总	Gerneral Fault	0EH	
15	告警总	Gerneral Alarm	0FH	

6.4 保护遥测量信息一览表 Remote Measurement Information List

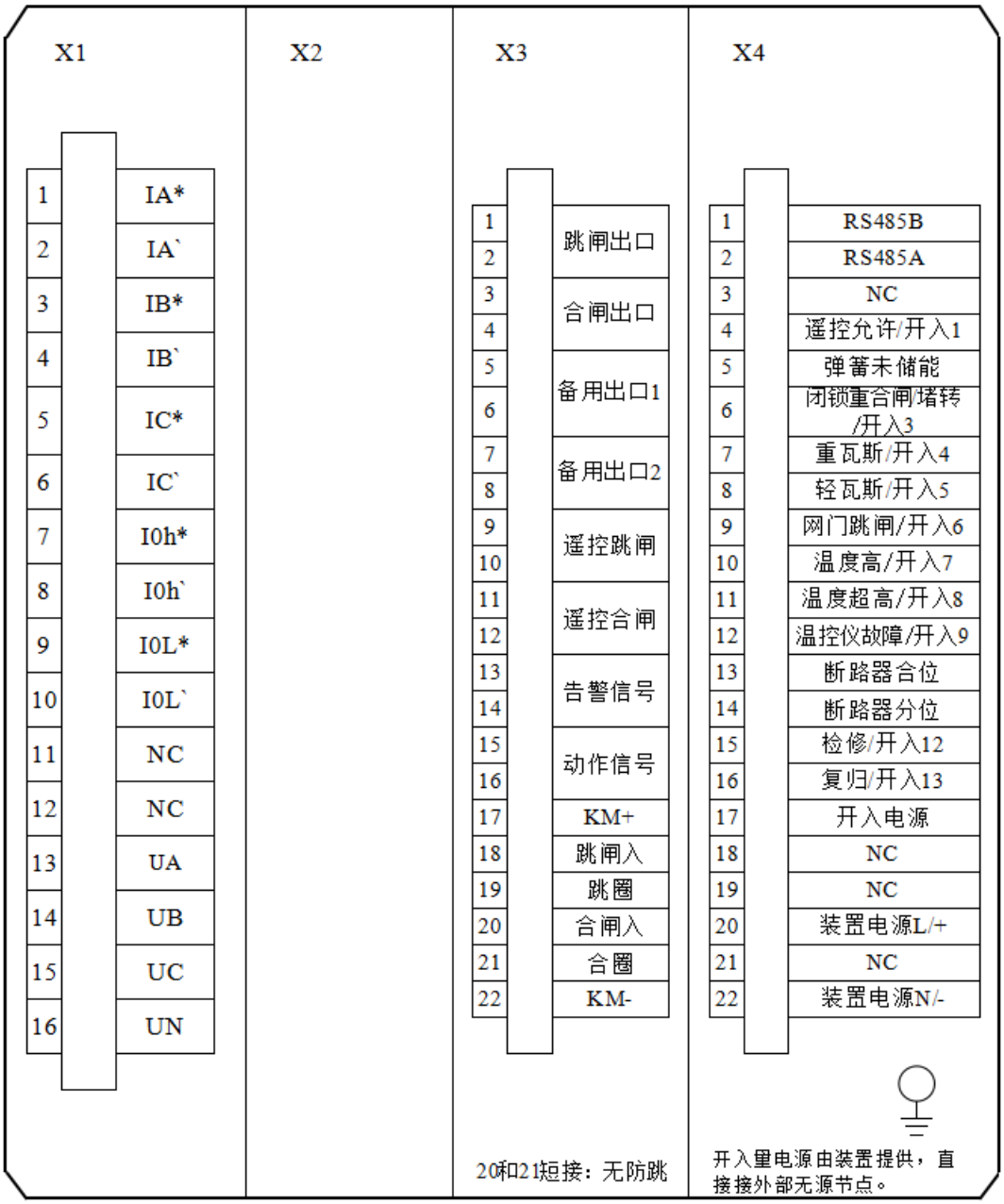
序号 No.	遥测量名称 name	通信代码 Item No.	备注
1	F	01H	

七、装置外观及开孔尺寸图 Device appearance and hole size drawing

产品外观及尺寸：201mm(W)/ 150mm(H)/ 107mm(D) (厚度不含面板，不含接线端子)。
Device appearance and size: 201mm(W)/ 150mm(H)/ 107mm(D)
(Thickness does not include panel, does not include terminal).



八、装置背板端子图 Device backplane terminal definition diagram



说明：

1、短接 X3 板的 20#和 21#端子，可退出防跳。

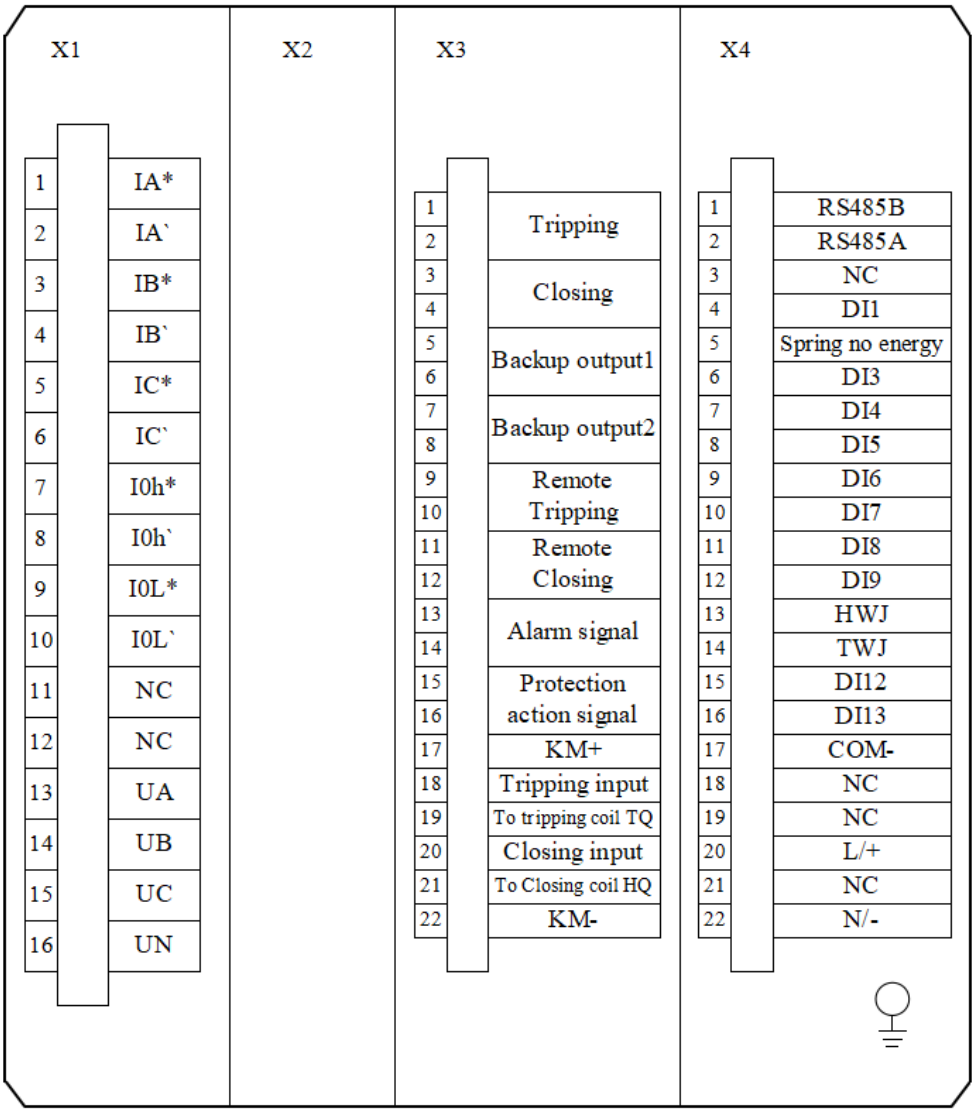
2、VV 接线时，短接 X1 板的 UB 和 UN。

3、X1 板的 IA、IB、IC 为保护电流，带*为输入，带’为输出。

4、开入量电源由装置提供(内部自带 24VDC)，直接接外部无源节点。

5、非电量(开入 4~9)不投入时，对应的开入量作普通开入量用。

6、开入 3 (X4-6)，当重合闸功能投入时，作闭锁重合闸开入用；当堵转功能投入时，作堵转开入用；当重合闸和堵转功能都不投入时，开入 3 作普通开入量用。



Note:

1、Short X3 board 20# and 21# terminals, can exit anti-jump.

2、When connecting VV cables, short-circuit UB and UN of the X1 board.

3、The IA, IB and IC of the X1 board are protection currents, with * as input and ' as output.

4、The digital input power supply is provided by the device (internal 24VDC), directly connected to the external passive node.

5、Non-electrical (digital input 4~9) used as ordinary signal when exiting.

6、Digital input 3 (X4-6), when the reclosing function is put in, for the locking reclosing signal; When the lock-turn function is put into operation, it is used for lock-turn signal. When the reclosing and blocking function are not put into operation, the digital input 3 used as ordinary signal.