REJ-600 微机保护装置

REJ-600MicrocomputerProtectionDevice

技术说明书

Technical Specification

V1.6

目录contents

1、概述 Overview

1.1、装置简介 Device introduction

微机保护装置是集监控、保护、人机界面和通讯接口等多种功能于一体，以电压、电流保护为基本配置的数字化保护单元，适用于我国 35kV 及以下电压等级的电力系统、工矿企业、民用建筑配电的小电流接地系统，作为各类电气设备和线路的主保护和后备保护。

Microcomputer protection device is a digital protection unit which integrates monitoring, protection, man-machine interface and communication interface, and takes voltage and current protection as the basic configuration,It is suitable for small current grounding system of power system, industrial and mining enterprises and civil buildings of 35kV and below in China, and serves as the main protection and backup protection for all kinds of electrical equipment and lines.

装置采用 32 位微处理器，运用数字处理技术，实现各种保护，以替代传统电磁继电器，实现保护的数字化、智能化。

The device uses a 32-bit microprocessor and digital processing technology to realize various protections, replacing traditional electromagnetic relays and realizing digitalization and intelligence of protection.

1.2、测控单元配置表 Unit configuration table

配置名称 Configuration name	配置功能 Configuration function
保护功能 Defencive function	过流Ⅰ段保护、过流Ⅱ段保护、过流Ⅲ段保护、反时限过流保护、过流加速保护、过负荷保护、零序Ⅰ段保护、零序Ⅱ段保护、反时限零序过流保护、零序加速保护、低电压保护、过电压保护、一次重合闸、二次重合闸、三次重合闸、重合闸闭锁、重瓦斯保护、轻瓦斯保护、超温保护、过温保护、网门打开 overcurrent Ⅰ section protection, overcurrent Ⅱ section protection, overcurrentⅢsection protection, inverse time overcurrent protection, overcurrent acceleration protection, overload protection, zero sequence Ⅰ section protection, zero sequence Ⅱ section protection, zero sequence acceleration protection, under-voltage protection, overvoltage protection, primary reclosing, secondary reclosing, tertiary reclosing, reclosing locking, heavy gas protection, light gas protection, overtemperature protection, overtemperature protection, open the net door
测控功能 Measurement and control function	Uab、Ubc、IA、IB、IC、Ia、Ib、Ic、3I0、f、P、Q、COS
	遥信 6 路 6 digit inputs
	断路器遥控分闸、遥控合闸 Remote opening and closing of circuit breaker
硬件资源 Hardware resources	6 路开关量输入 6 digit inputs
	4 路开关量输出：告警、事故、跳闸、合闸 4-channel switch output: alarm, accident, trip, and closing

配置名称 Configuration name	配置功能 Configuration function
	模拟量输入：Uab、Ubc、Ia、Ib、Ic、IA、IB、IC、3I0 Analog input: Uab、Ubc、Ia、Ib、Ic、IA、IB、IC、3I0
	1 路 RS485 通信 1 RS485 communication

1.3、产品特点 Product characteristics

★采用 32 位 MCU 微控制器芯片，内置大容量的 RAM 和 Flash，数据运算、逻辑处理和信息存储能力强，可靠性高，运行速度快，确保了装置在恶劣环境下工作稳定。

★ It adopts 32-bit MCU microcontroller chip with built-in RAM and Flash with large capacity, which has strong data operation, logic processing and information storage capabilities, high reliability and fast running speed, ensuring the stable operation of the device in harsh environment.

★采用高精度采样，数据采集每周波 32 点，高度保证了采样精度和保护计算精度的准确性。

* High-precision sampling is adopted, and data is collected at 32 points per week, which highly ensures the accuracy of sampling precision and protection calculation precision.

★采用 LCD 液晶显示屏，中文友好显示界面；可实时显示各种数据及运行状态，使用、调试方便。

* LCD screen and Chinese friendly display interface are adopted; It can display various data and running status in realtime, and is convenient to use and debug.

★结构设计支持竖直安装及横向安装，硬件板卡采用插入式安装，支持现场快速、便捷的更换及维护。

* The structural design supports vertical and horizontal installation, and plug-in installation is adopted for hardware boards, which supports quick and convenient replacement and maintenance on site.

★通信规约 IEC101、MODBUS 规约可选，设有RS-485、组网经济、方便，可直接与微机监控或通讯管理机联网通信。

* communication protocols IEC101 and MODBUS protocol are optional, with RS- 485,networking is economical and convenient, and it can directly communicate with microcomputer monitoring or communication management machine.

★保护功能配置齐全，各保护功能均可灵活投退，出口配置灵活方便。

★ The protection functions are fully configured, each protection function can be switched on and off flexibly, and the export configuration is flexible and convenient.

★模拟量输入、开关量输入、电源输入及通信接口部分，采用了变压器隔离、光电隔离、TVS 保护的抗干扰措施，使得装置的抗干扰能力更强。

★ Anti-interference measures such as transformer isolation, photoelectric isolation and TVS protection are adopted in analog input, switch input, power input and communication interface, which makes the anti-interference ability of the device stronger.

★高可靠的电磁兼容设计，电路板采用表面贴装技术以及多层板工艺，选用快速瞬变电压抑制器件，使装置具有很强的电磁兼容能力。

★ Highly reliable electromagnetic compatibility design, the circuit board adopts surface mounting technology and multilayer board technology, and selects fast transient voltage suppression devices, so that the device has strong electromagnetic compatibility.

2、技术性能指标 Technical performance indicators

2.1、技术环境条件 Technical and environmental conditions

2.1.1、技术参数 Technical parameters

★电源（订货时提供）： AC220(110)V，±20%。
DC220(110)V，±20%。
DC48V，±20%。
DC24V，±20%。

★额定频率：50Hz（-5%～+5%）。
★额定电流：5A。
★额定电压：100V（线电压）100/$\sqrt{3}$（相电压）。

* Power supply (provided when ordering): AC220(110)V, ±20%。
DC220(110)V, ±20%。
DC48V, ±20%。
DC24V, ±20%。

★ Rated frequency: 50hz (-5% ~+5%).

★ Rated current: 5A.

* Rated voltage: 100V (line voltage) 100V(phase voltage)

2.1.2、环境温度 Ambient temperature

★工作温度：-25℃~+55℃。
★储存温度：-25℃~+70℃。

★ Working temperature:-25℃ ~+55℃.
★ Storage temperature:-25℃ ~+70℃.

2.1.3、相对湿度 Relative humidity

★相对湿度：5%～95%。

★ Relative humidity: 5% ~ 95%.

2.1.4、大气压力 Atmospheric pressure

★80kPa～110kPa（≤2000m）。

2.2、装置功耗 Device power consumption

★交流电流回路：额定电流为 5A，每相不大于 1VA。
★交流电压回路：Un＝100V，每相不大于 1.0VA。
Un=100/$\sqrt{3}$,每相不大于 0.5VA。
★直流电源回路：正常工作时不大于 3W。
★零序电流回路：不大于 0.5VA。
★保护电源回路：正常工作,不大于 12W。
保护动作,不大于 15W。

★ AC current loop: the rated current is 5A, and each phase is not more than 1VA.

★ AC voltage loop: un = 100v, no more than 1.0VA per phase.
Un=100/√3, Each phase is not greater than 0.5VA。
★ DC power circuit: not more than 3W in normal operation.
★ Zero sequence current loop: not more than 0.5VA
★ Protection power circuit: normal operation, no more than 12W. Protection action, not more than 15W.

2.3、定值整定范围及误差 Fixed value setting range and error

2.3.1、定值整定范围 Fixed value setting range

★交流电流：0.1A～100A。
★零序电流：0.1A～10A。
★交流电压：30～160V。

★ AC current: 0.1A～100A.
★ Zero sequence current: 0.1A～10A.
★ AC voltage: 30 ~ 160V.

2.3.2、定值误差 Fixed value accuracy

★电流元件：≤±3%或±0.1A。
★电压元件：≤±3%。
★零序电流：≤±3%或±0.1A。
★时间元件：≤±1%整定值或±40ms。

★ Current element: ≤ 3% or ±0.1A
★ Voltage components: ≤ 3%.
★ Zero sequence current: ≤ 3% or ±0.1A
★ Time element: ≤ 1% setting value or ±40ms.

2.3.3、测量精度 Measurement accuracy

★各模拟量的测量误差不超过额定值的±0.5%。
★开关量输入为无源输入，分辨率不大于 2ms。

★ the measurement error of each analog quantity shall not exceed 0.5% of the rated value.
★ the switch input is passive, and the resolution is not more than 2ms.

2.3.4、时间精度 Time accuracy

★24h 误差不大于±1s。

★24h error is not more than 1s.

2.4、电气性能参数 Electrical performance parameters

2.4.1、绝缘性能 Insulation performance

★绝缘电阻：在试验的标准大气条件下，产品的各带电的导电电路对地（即外壳或外露的非带电金属零件）之间，以及产品中电气上无联系的各带电的导电电路之间，用开路电压为 500V 的测试仪器测定其绝缘电阻应不小于 500MΩ。

★ Insulation resistance: under the standard atmospheric conditions of the test, the insulation resistance between each live conductive circuit of the product and the ground (i.e., the shell or exposed non-live metal parts), and between each live conductive circuit that is not electrically connected in the product, shall be measured by a test instrument with an open circuit voltage of 500V, and shall be no less than 500MΩ.

★介质强度：装置通信回路和 24V 等弱电输入输出端子对地能承受 50Hz、500V(有效值)的交流电压,历时 1min 的检验无击穿或闪络现象；其余各带电的导电电路分别对地(即外壳或外露的

非带电金属零件)之间，交流回路和直流回路之间,交流电流回路和交流电压回路之间，能承受50Hz、2kV(有效值)的交流电压,历时 1min 的检验无击穿或闪络现象。

★ Dielectric strength: the communication circuit and weak current input/output terminals such as 24V of the device can withstand AC voltage of 50Hz and 500V (effective value) to the ground, and there is no breakdown or flashover phenomenon after inspection for 1min; Other live conductive circuits can withstand 50Hz, 2kV (effective value) AC voltage between ground (i.e., shell or exposed non-live metal parts), between AC circuit and DC circuit, and between AC current circuit and AC voltage circuit, and there is no breakdown or flashover after 1min inspection.

★冲击电压：装置通信回路和 24V 等弱电输入输出端子对地,能承受 1kV(峰值)的标准雷电波冲击检验；其各带电的导电端子分别对地,交流回路和直流回路之间，交流电流回路和交流电压回路之间，能承受 5kV(峰值)的标准雷电波冲击检验。

★ Impulse voltage: the communication circuit and weak current input and output terminals such as 24V of the device are grounded, and can withstand 1kV (peak value) standard lightning wave impulse test; The live conductive terminals are connected to the ground, between the AC circuit and the DC circuit, and between the AC current circuit and the AC voltage circuit, and can withstand the standard lightning wave impact test of 5kV (peak value).

2.4.2、机械性能 Mechanical properties

★振动响应：装置能承受GB/T 11287-2000 中 4.2.1 规定的严酷等级为 I 级振动响应检验。

★ Vibration response: the device can withstand the severity level I vibration response test specified in 4.2.1 of GB/T 11287-2000.

★冲击响应：装置能承受GB/T 14537-1993 中 4.2.1 规定的严酷等级为 I 级冲击响应检验。

★ Impact response: the device can withstand the severity test specified in 4.2.1 of GB/T 14537-1993 as grade I impact response test.

★碰撞：装置能承受GB/T 14537-1993 中 4.3 规定的严酷等级为 I 级碰撞检验。

★ Collision: the device can withstand the severity level specified in 4.3 of GB/T 14537- 1993 as class I collision test.

2.4.3、抗电磁干扰性能

★静放电抗扰度试验，符合GB/T 14598.14-1998 规定的严酷等级 IV 级。

★ Static discharge immunity test, meeting the severity level IV specified in GB/T 14598.14-1998.

★辐射电磁场抗扰度试验，符合GB/T 14598.9－2002 规定的严酷等级 III 级。

★ Immunity test of radiated electromagnetic field meets the severity level III specified in GB/T 14598.9-2002.

★电快速瞬变脉冲群抗扰度试验，符合GB/T 14598.10－2007 规定的严酷等级 A 级。

★ Electrical fast transient immunity test, which meets the severity level A specified in GB/T 14598.10-2007.

★浪涌（冲击）抗扰度试验，符合GB/T 14598.18-2007 规定的严酷等级Ⅳ级。

★ Surge (impact) immunity test, meeting the severity level IV specified in GB/T 14598.18- 2007.

★射频场感应的传导骚扰抗扰度试验，符合GB/T 14598.17-2005 规定的严酷等级 III 级。

★ The conducted disturbance immunity test induced by RF field meets the severity level III specified in GB/T 14598.17-2005.

★工频抗扰度试验，符合GB/T 14598.19-2007 规定的严酷等级为 A 级。

★ According to the power frequency immunity test, the severity level specified in GB/T 14598.19-2007 is grade A.

★射频传导发射限值试验，符合GB/T14598.16-2002 规定的传导发射限值。

★ The radio frequency conducted emission limit test meets the conducted emission limit specified in GB/T14598.16-2002.

★电磁辐射发射限值试验，符合GB/T14598.16-2002 规定的辐射发射限值要求。

★ The electromagnetic radiation emission limit test meets the radiation emission limit requirements specified in GB/T14598.16-2002.

3、主要功能简介 Brief introduction of main functions

3.1、保护功能描述 Description of protection function

针对不同保护的功能类型，以下按保护的功能类型进行详述。

According to different protected function types, the following detailed description is made according to the protected function types.

☆过流保护

★三段式过流保护
★反时限保护
★加速保护
★过负荷保护

☆ Overcurrent protection

★ Overcurrent section Ⅰ protection
★ Overcurrent section Ⅱ protection
★ Overcurrent section Ⅲ protection
★ Inverse time overcurrent protection
★ Overcurrent acceleration protection
★ Overload protection

☆零序保护

★零序Ⅰ段保护
★零序Ⅱ段保护
★零序加速保护

☆ Zero sequence protection

★ Zero sequence Ⅰ section protection
★ Zero sequence Ⅱ section protection
★ Zero sequence acceleration protection

☆低电压保护

☆ Under-voltage protection

☆过电压保护

☆ Overvoltage protection

☆重合闸保护

★重合闸
★重合闸闭锁

☆ Reclosing protection

★ Primary reclosing
★ Reclosing lockout

☆非电量保护

★重瓦斯保护
★轻瓦斯保护
★超温保护
★过温保护
★网门打开

☆ Non-electricity protection

★ Heavy gas protection
★ Light gas protection
★ Overtemperature protection

★ Over-temperature protection
★ Open the net door

3.2、保护功能配置表 Protection function configuration table

保护功能 Defencive function	说明 Explain	整定范围及步长 Setting range and step size
过流Ⅰ段保护 Over-current Ⅰ section protection	过流Ⅰ段保护投退 Over-current Ⅰ section protection switching back	投入/退出 Enter/exit
	过流Ⅰ段保护电流值整定 Setting of protection current value in overcurrent section Ⅰ	范围：0.1A~100A Range: 0.1A~100A
	过流Ⅰ段保护时间值整定 Setting of protection time value of overcurrent section Ⅰ	范围：0.0s~100s Range: 0.0s~100s
过流Ⅱ段保护 Over-current Ⅱ section protection	过流Ⅱ段保护投退 Over-current Ⅱ section protection switching back	投入/退出 Enter/exit
	过流Ⅱ段保护电流值整定 Setting of protection current value in overcurrent section Ⅱ	范围：0.1A~100A Range: 0.1A~100A
	过流Ⅱ段保护时间值整定 Setting of protection time value of overcurrent section Ⅱ	范围：0.1s~100s Range: 0.1s~100s
过流Ⅲ段保护 Over-current Ⅲ section protection	过流Ⅲ段保护投退 Over-current Ⅲ section protection switching back	投入/退出 Enter/exit
	过流Ⅲ段保护电流值整定 Setting of protection current value in overcurrent section Ⅲ	范围：0.1A~100A Range: 0.1A~100A
	过流Ⅲ段保护时间值整定 Setting of protection time value of overcurrent section Ⅲ	范围：0.1s~100s Range: 0.1s~100s
反时限过流保护 Inverse time overcurrent protection	反时限曲线选择 Selection of inverse time curve	退出/极端反时限/非常反时限/一般反时限 Exit/extreme inverse time/extraordinary inverse time/general inverse time
	反时限电流基准值 Inverse timecurrent reference value	范围：0.3A~10A Range: 0.3A~10A
	反时限时间常数 Inverse time constant	范围：0.005s~120s Range: 0.005s~120s
零序Ⅰ段保护 Zero sequence Ⅰ	零序Ⅰ段保护投退 Zero-sequence Ⅰ section	投入/退出 Enter/exit

section protection	protection is switched back	
	零序Ⅰ段保护电流值整定 Setting of zero sequence Ⅰ section protection current value	范围：0.1A~10A Range: 0.1A~10A
	零序Ⅰ段保护时间值整定 Setting of zero sequence Ⅰ section protection time value	范围：0.0s~100s Range: 0.0s~100s
零序Ⅱ段保护 Zero sequence Ⅱ section protection	零序Ⅱ段保护投退 Zero-sequence Ⅱ section protection switching-back	投入/退出 Enter/exit
	零序Ⅱ段保护电流值整定 Setting of protection current value of zero sequence Ⅱ section	范围：0.1A~10A Range: 0.1A~10A
	零序Ⅱ段保护时间值整定 Setting of protection time value of zero sequence Ⅱ section	范围：0.0s~999.9s Range: 0.0s~999.9s
	零序Ⅱ段保护跳闸 Zero sequence Ⅱ section protection tripping	投入/退出 Enter/exit
反时限零序保护 Inverse time overcurrent protection	反时限曲线选择 Selection of inverse time curve	退出/极端反时限/非常反时限/一般反时限 Exit/extreme inverse time/extraordinary inverse time/general inverse time
	反时限电流基准值 Inverse timecurrent reference value	范围：0.3A~10A Range: 0.3A~10A
	反时限时间常数 Inverse time constant	范围：0.005s~120s Range: 0.005s~120s
过流加速保护 Overcurrent acceleration protection	过流加速保护投退 Over-current acceleration protection switching-on and switching-off	投入/退出 Enter/exit
	过流加速保护电流定值 Current setting value of overcurrent acceleration protection	范围：0.1A~100A Range: 0.1A~100A
	过流加速保护时间定值 Setting value of overcurrent acceleration protection time	范围：0.0s~10s Range: 0.0s~10s
零序加速保护 Zero sequence acceleration protection	零序加速保护投退 Switching on and off of zero sequence acceleration protection	投入/退出 Enter/exit
	零序加速保护电流定值	范围：0.1A~10A

	Current setting value of zero sequence acceleration protection	Range: 0.1A~10A
	零序加速保护时间定值 Time setting value of zero sequence acceleration protection	范围：0.0s~10s Range: 0.0s~10s
过负荷保护 Overload protection	过负荷保护投退 Overload protection throw back	投入/退出
	过负荷保护跳闸投退 Overload protection tripping throw back	投入/退出 Enter/exit
	过负荷保护电流定值 Overload protection current setting value	范围：0.1A~100A Range: 0.1A~100A
	过负荷保护告警时间定值 Overload protection alarm time settingvalue	范围：0.1s~999.9s Range: 0.1s~999.9s
	过负荷跳闸时间整定 Overload trip time setting	范围：0.1s~999.9s Range: 0.1s~999.9s
低电压保护 Low voltage protection	低电压保护投退 Low voltage protection voted back	投入/退出 Enter/exit
	低电压电压定值 Low voltage voltage setting value	范围：30V~160V Range: 30V~160V
	低电压保护时间定值 Low voltage protection time setting	范围：0.1s~999s Range: 0.1s~999s
过电压保护 Overvoltage protection	过电压保护投退 On / off of overvoltage protection	投入/退出 Enter/exit
	过电压电压定值 Over voltage voltage setting	范围：30V~160V Range: 30V~160V
	过电压保护时间定值 Overvoltage protection time setting	范围：0.1s~999s Range: 0.1s~999s
重合闸保护 Reclosing protection	一次重合闸时间 Primary reclosing time	0.3s~10s
	二次重合闸时间 Secondary reclosing time	0.3s~999s
	三次重合闸时间 Three reclosing time	0.3s~999s
	重合闸闭锁时间 Reclosing blocking time	0.0s~300s
	重合闸确认时间 Reclosing confirmation time	0.3s~999s

	重合闸次数 Reclosing times	一次重合闸/二次重合闸/三次重合闸 Primary reclosing / secondary reclosing/ tertiary Reclosing
非电量保护 Non electric quantity protection	重瓦斯时间 Heavy gas time	0.1s~999s
	轻瓦斯时间 Light gas time	0.1s~999s
	超温时间 Overtemperature time	0.1s~999s
	过温时间 Over temperature time	0.1s~999s
	网门打开时间 Opening time of net door	0.1s~999s

3.3、参数功能配置表 Parameter function configuration table

参数 Parameter	名称 name	整定范围及步长 Setting range and step size
装置参数 Set parameter	装置地址 Device address	范围：1~254 Range：1~254
	串口规约 Serial port protocol	MODBUS/平衡 101/非平衡 101 Single byte / double byte
	101 规约地址 IEC101 transmission reason	单字节/双字节 Single byte / double byte
	101 传送原因 Communicatio n baud rate	单字节/双字节 Single byte / double byte
	通信波特率 Calibration mode	4800/9600/19200/38400/57600
	校验方式 Telesignaling type	无校验/奇校验/偶校验 No parity / odd / even parity
	遥信类型 Telemetry type	单点/双点 Single point / double point
	遥测类型 Telemetry dead zone	规一化值/浮点数值/标度化值 Normalized value / floating point value / scaled value
	遥测死区 Telemetry dead zone	范围：0.002~50.00 Range：0.002~50.00
	遥测发送间隔 Telemetry transmission interval	范围：0.000s~3600s Range：0.000s~3600s
	遥测主动上送 Telemetry active upload	投入/退出 Enter/exit
	遥信确认时间 Telesignaling	范围：0.005s~60.00s Range：0.005s~60.00s

	confirmation time	
	遥控超时时间 Remote control timeout	范围：10.00s~3600s Range：10.00s~3600s
	跳闸脉冲宽度 Trip pulse width	范围：0.100s~5.000s Range：0.100s~5.000s
	合闸脉冲宽度 Closing pulse width	范围：0.100s~5.000s Range：0.100s~5.000s
	串口调试 Access Port	投入/退出 Enter/exit
	显示一次值	投入/退出
	TV 变比	范围：1.000~1100
	测量 TA 变比	范围：1.000~9999
遥信口定义 DI name	遥信 1~6 定义 Definition of telesignaling 1	开关合位/开关分位/刀闸合位/刀闸分位/接地合位/接地分位/未储能/远方/重瓦斯/轻瓦斯/超温/过温/网门打开/闭锁重合/手合信号/手分信号/遥信 1/遥信 2/遥信 3/遥信 4/遥信 5/遥信 6 Switch closing / switch opening / knife switch closing/ knife switch opening / grounding closing / grounding opening / non energy storage / remote / heavy gas / light gas / over temperature / over temperature / network door opening / locking reclosing / manual closing signal / manual opening signal / remote signaling 1 / remote signaling 2 / remote signaling 3 / remote signaling 4 / remote signaling 5 / remote signaling 6

4、人机操作界面 Man-machine operation interface

4.1、按键简介 4.1Introduction to Keys

标识 Identification	名称 Name
	向上按键 Up key
	向下按键 Down key
	向右按键 Right key
	向左按键 Left key
	确认键 Confirm key
	复位键 Reset button
	退出键 Exit key

4.2、操作界面 Operating interface

4.2.1、菜单简介 Introduction to the menu

菜单界面包含“工况”、“设置”、“记录”、“定值”、“维护”、“信息”。如下图 4.2.1-1 所示。
The menu interface includes "working condition", "setting", "recording", "setting value", "maintenance" and "information". As shown in Figure 4.2.1-1 below.

图 4.2.1-1

其中“工况”、“设置”、“记录”、“定值”、“维护”、“信息”含子菜单具体说明如下表所示：
Among them, the submenus of "working condition", "setting", "recording", "setting value","maintenance" and "information" are specified in the following table:

一级菜单 Primary	二级菜单 Secondary	三级菜单 Three level menu	说明 Explain
工况 Working condition	测量 Measure	IA、IB、IC、Ia、Ib、Ic、Uab、Ubc、3I0、f、P、Q、COS	实时数据 Real-time data
	遥信 DI	开关合位、开关分位、手分信号、未储能、远方、接地合位 Switch closing position, switch opening position, manual signal splitting, no energy storage, remote, grounding closing position	实时位置信号 Real-time position signal

	时间 Time	装置时间 Installation time	实际时间 Actual time
	标志 FLAG	重合闸充电、控制回路断线 Reclose power supply、control circuit disconnection of reclosing	

表 4.2.1-1

一级菜单 Primary	二级菜单 Second	三级菜单 Three level	四级菜单 Four level menu	说明 Explain
设置 SET	密码 0000 Passwd 0000	参数 Para	装置地址、串口规约、规约地址、规约传送、波特率、校验方式、遥信类型、遥测类型、遥测死区、遥测发送间隔、遥测主动上送、遥信时间、遥控超时时间、跳闸脉冲宽度、合闸脉冲宽度、串口调试、显示一次值、TV 变比、测量 TA 变比、遥信 1~6 定义。 Device address, serial port protocol, protocol address, protocol transmission, baud rate, calibration mode, remote signaling type, telemetry type, telemetry dead zone, telemetry transmission interval, telemetry active upload, remote signaling time, remote control timeout time, trip pulse width, closing pulse width, serial port debugging, YX1 ~ 6 Definitions.	可根据自身需求设置 Defined according to user requirements
		时间 Time	时间设置 Time Set	可以设置时间

表 4.2.1-2

一级菜单 Primary menu	二级菜单 Secondary menu	说明 Explain
记录 Record	事件记录查询 Event record query	可以储存 99 条事件记录 It can store 99 event records.
	操作记录查询 Operation record query	可以储存 99 条事件记录 It can store 99 event records.

表 4.2.1-3

一级菜单 Primary menu	二级菜单 Secondary menu	三级菜单 Three level	说明 Explain
定值 Fixed value	定值查看 View	包含此台保护所有保护功能整定值的查看。 View values of all protection functions	
	定值管理 Management	包含此台保护所有保护功能整定值的设置 Setting values of all protection functions	密码：0000 Passwd:0000

表 4.2.1-4

一级菜单 Primary menu	二级菜单 Secondary menu	三级菜单 Three level	说明 Explain
维护 Debug	测试 Test	开入、开出、模入、零漂、远动、LED、自测试。 Input, output, analog input, zero	“维护”功能使用时请联系厂家。 Please contact the manufacturer when using the Debug

		drift, remote control, led, self-test.	function.
	校通道 Channel Adjust	精度手校、精度自校 Automatic 、Manual	
	改密码 ChangePassword	/	
	清事件 Clear event	事件删除 Delete event	
	下载 Download	软件下载 Software upgrade	

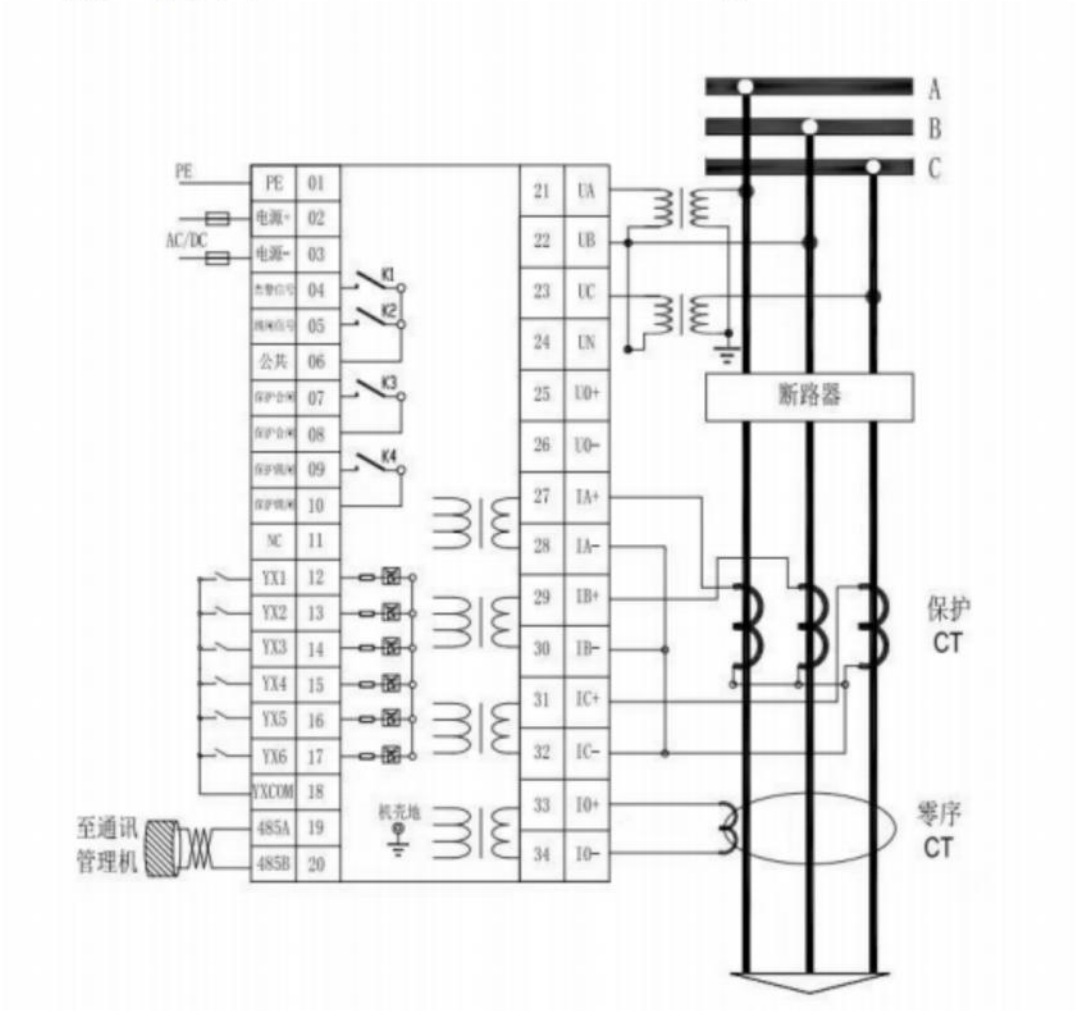
表 4.2.1-5

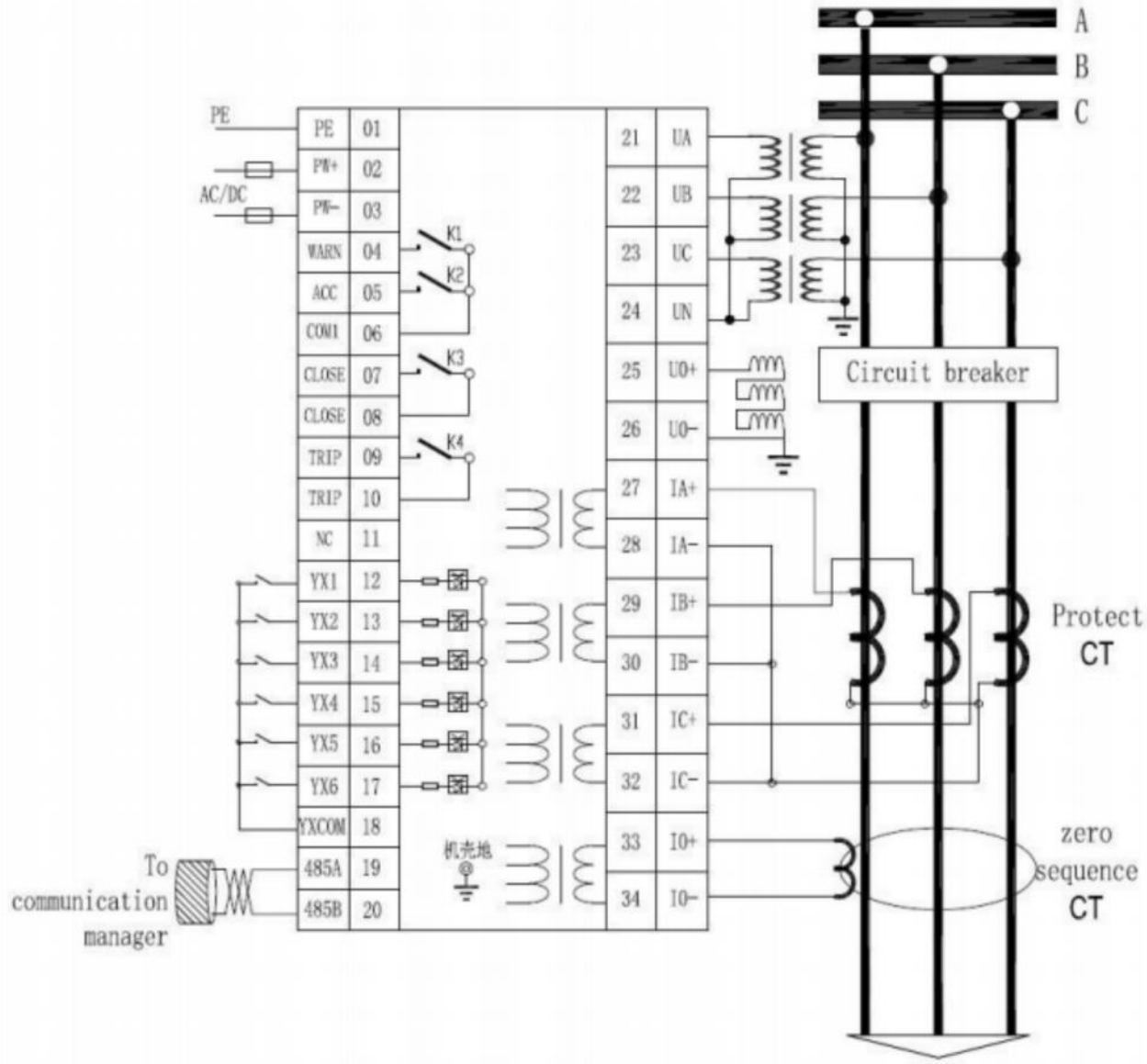
一级菜单 Primary menu	二级菜单 Secondary menu	说明 Explain
信息 Information	版本号：1.00.09 Version：1.00.09	/
	校验码：BC1DH Check code：BC1DH	/

表 4.2.1-6

5、保护原理 Protection principle

5.1、保护端子图 Protection terminal diagram





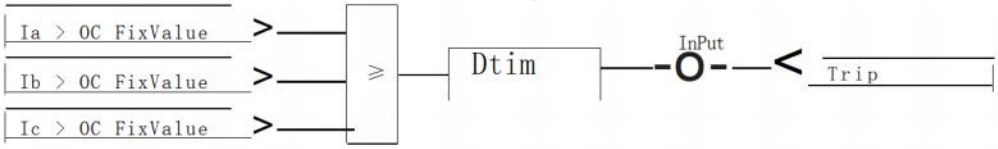
5.2、保护原理简介 Protection principle

5.2.1、过流保护 Over-current protection

装置设有速断、限时速断、过流保护功能，保护动作于跳闸出口继电器，用户可通过设置保护功能投/退选择。原理框图如图 5.2.1 所示。

The device is equipped with quick-break, limited-speed-break and overcurrent protection functions, and the protection acts on the trip outlet relay, and the user can select whether to switch on/off by setting the protection function. The principle block diagram is shown in Figure 5.2.1.

图 5.2.1 过流保护原理框图



Fig,5.2.1 block diagram of overcurrent protection principle

5.2.2、零序过流保护 Zero sequence overcurrent protection

装置设有零序过流保护，通过设置保护压板控制投退。在不接地或小电流接地系统中发生接地故障时，其接地故障点零序电流基本为电容电流，且幅值很小，用零序过流保护来检测接地故障，在经小电阻接地系统中，接地零序电流相对较大，故采用直接跳闸方法，本装置中设一段零序过流保护（可整定为报警或跳闸）。

The device is equipped with zero-sequence overcurrent protection, which is controlled by setting protection clamp. When a grounding fault occurs in anungrounded or low-current grounding system, the zero-sequence current at the grounding fault point is basically capacitive current, and its amplitude is very small, so zero-sequence overcurrent protection is used to detect the grounding fault,In the grounding system with low resistance, the grounding zero-sequence current is relatively large, so the direct tripping method is adopted,A section of zero-sequence overcurrent protection (which can be set as alarm or trip) is set in this device.

在某些不接地系统中，电缆出线较多，电容电流较大，也可采用零序过流保护直接跳闸方式。原理框图如图 5.2.2-1 所示。

In some ungrounded systems, there are many outgoing cables and large capacitance current, so zero sequence overcurrent protection can also be used to trip directly. The principle block diagram is shown in Figure 5.2.2.

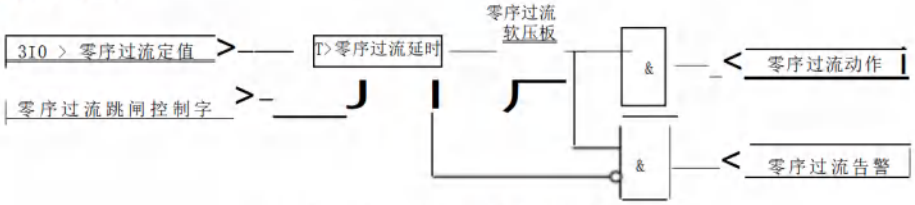
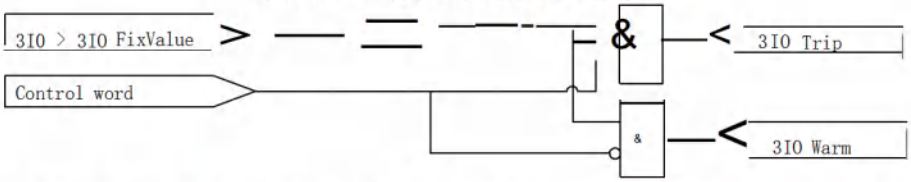


图 5.2.2 零序过流保护原理框图



Fig,5.2.2 Block diagram of zero sequence overcurrent protection principle

5.2.3、过流加速保护 Over-current acceleration protection

装置设置了独立的加速保护段，可通过控制字选择合闸前加速或合闸后加速。前加速是在保护安装的下一级任何一条线路发生故障时无选择性快速切除故障，重合闸动作后再有选择性地切除故障。后加速是当重合于故障或者手合于故障时，保护加速动作跳闸切除故障。

The device is provided with an independent acceleration protection section, which can select acceleration before closing or acceleration after closing through the control word. Pre-acceleration refers to the non-selective quick removal of faults when any line in the next stage of protection installation fails, and then selective removal of faults after reclosing. Post-acceleration refers to the protection acceleration action tripping to cut off the fault when it coincides with the fault or when it is manually closed to the fault.

在同一个保护中，前加速与后加速只可选其中一个，前加速一般应用在发电厂或重要变电所引出的直配线路上，后加速一般用在对重要负荷供电的送电线路上。

In the same protection, only one of the front acceleration and the rear acceleration can be selected,The front acceleration is generally applied to the direct distribution lines leading out from powerplants or important substations, and the rear acceleration is generally used on the transmission lines supplying power to important loads.

装置的手合加速回路不需由外部手动合闸把手的触点来起动，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。

The manual acceleration circuit of the device does not need to be started by the contact of the external manual closing handle, which is mainly due to the fact that the control panel has been cancelled after the integrated automation system is adopted in many substations at present, and the manual operating handle is no longer installed on site, or only the simple operating handle is installed.

装置设置了独立的过流加速段电流定值及相应的时间定值，与传统的保护相比，使保护的

配置更加灵活。原理框图如图 5.2.3-1 所示。

The device is set with independent current setting value and corresponding time setting value of overcurrent acceleration section, which makes the configuration of protection more flexible compared with traditional protection. The principle block diagram is shown in Figure 5.2.3-1.

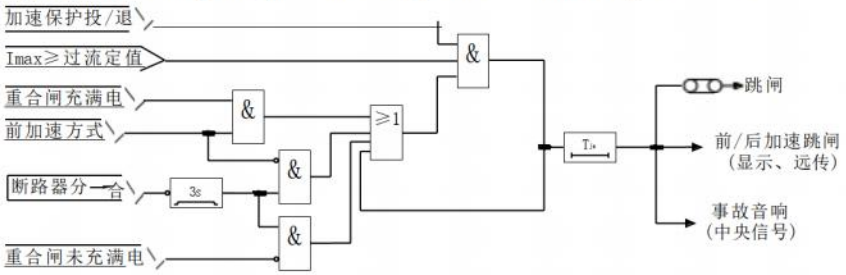
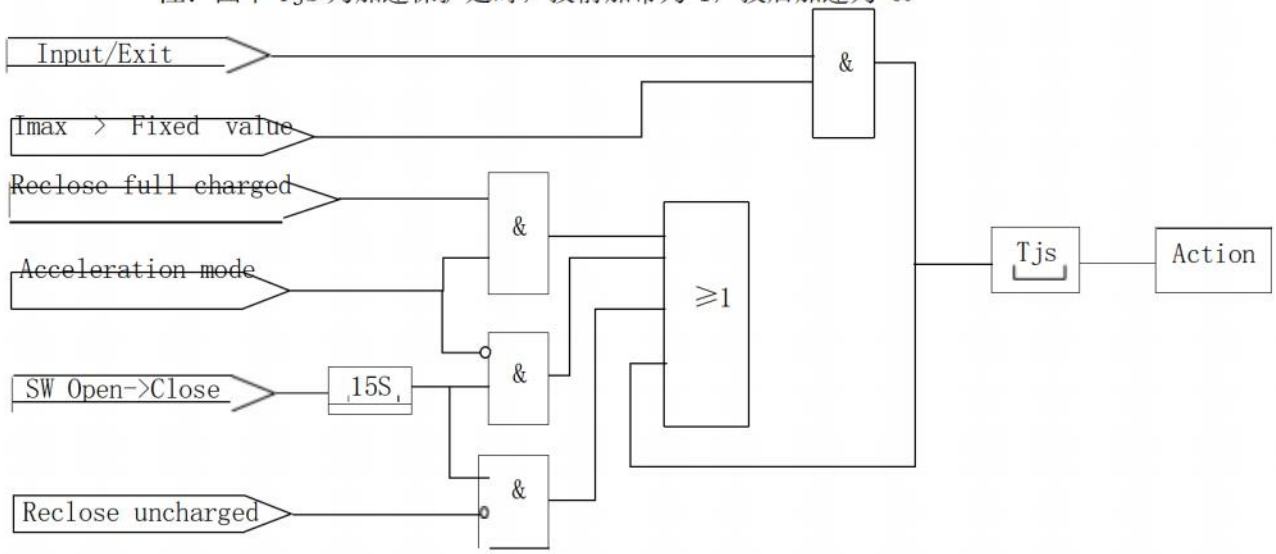


图 5.2.3-1 过流加速保护原理框图

注：图中 Tjs 为加速保护延时，投前加带为 1，投后加速为 0。



Fig,5.2.3-1 block diagram of overcurrent acceleration protection principle Note: Tjs in the figure refers to the acceleration protection delay, which is 1 before putting into operation and 0 after putting into operation.

5.2.4、过负荷保护 Overload protection

装置设有过负荷保护功能。过负荷可通过控制字定值选择动作于跳闸或告警。投跳闸时，跳闸后闭锁重合闸。投告警功能时，过负荷返回系数不小于 0.95。原理框如图 5.2.4-1 所示。

The device is equipped with overload protection function. Overload can be selected by setting value of control word to trip or alarm. When tripping, lock andreclose after tripping. When the alarm function is switched on, the overload return coefficient is not less than 0.95. The schematic diagram is shown in figure 5.2.4-1。

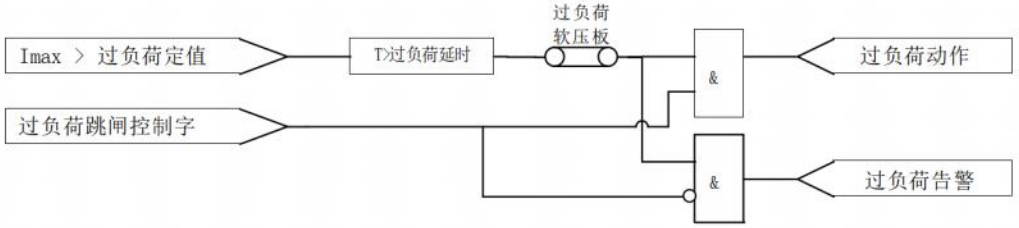
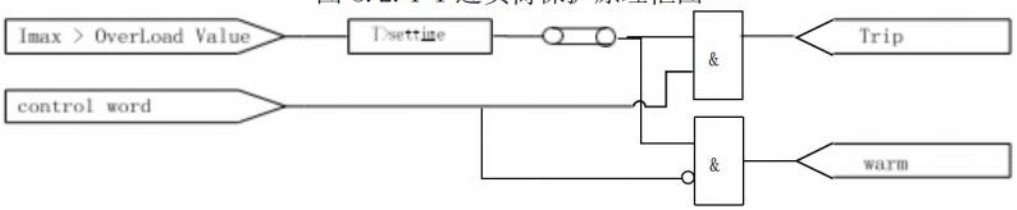


图 5.2.4-1 过负荷保护原理框图



Fig,5.2.4-1 block diagram of overload protection principle

5.2.5、低压保护 Low voltage protection

在系统故障时电压降低，可配置低电压保护来甩掉部分负荷。原理框图如图 5.2.5-1 所示。

In case of system failure, the voltage decreases, and under-voltage protection can be configured to get rid of part of the load. The principle block diagram is shown in Figure 5.2.5-1.

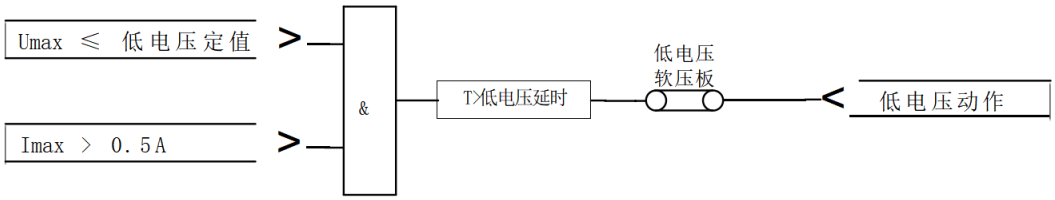
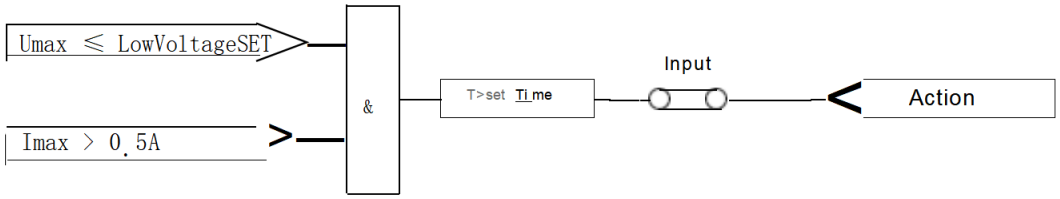


图 5.2.5-1 低电压保护原理框图



Fig,5.2.5-1 under-voltage protection principle block diagram

5.2.6、过压保护 Overvoltage protection

装置设有过电压保护功能，当电压最大值大于整定值时，延时动作与跳闸或信号，用户可通过设置保护功能投/退选择。原理框图如图 5.2.6-1 所示。

The device is equipped with overvoltage protection function,When the maximum voltage is greater than the set value, it will delay the action and trip or signal, and the user can select whether to switch on/off by setting the protection function. The principle block diagram is shown in Figure 5.2.6-1.

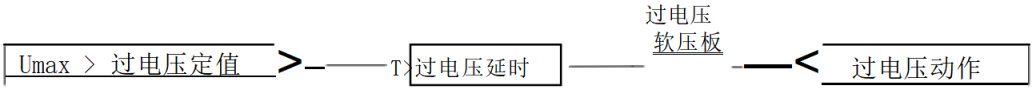
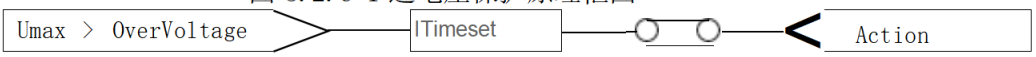


图 5.2.6-1 过电压保护原理框图



Fig,5.2.6-1 block diagram of overvoltage protection principle

5.2.7、重合闸保护

装置设有三相一次重合闸功能，通过设置重合闸压板控制投退。重合闸当开关位于合位，且无外部闭锁时充电，充电时间为 15 秒。当开关由合位变为跳位（且充满电）时重合闸启动。启动后，若 10 秒内不满足重合闸条件（含有流：任一相电流超过 0.2A）则放电。重合闸设有四种重合方式：0－无检定；1－检无压，有压不重合；2－检同期；3－检无压，有压转检同期。双侧电源的线路，除采用解列重合闸的单回线路外，均应有一侧检同期重合闸，以防止非同期重合闸对设备的损害，另外一侧投检无压。重合闸充电完成时，液晶显示屏中央显示重合闸充电完成标志。重合闸充放电原理框图如图 4-10 所示。重合闸动作框图如图 5.2.7-1 所示。1 重合闸的启动：由断路器位置由合位变跳位同时充电标志为 1 且三相无流时启动。

The device is equipped with three-phase primary reclosing function, and the switch-on and switch-off is controlled by setting the reclosing platen. Reclosing When the switch is in the closed position and there is no external locking, the charging time is 15 seconds. When the switch changes from closed position to tripped position (and is fully charged), the reclosing starts. After start-up, if the reclosing condition is not met within 10 seconds (including current: any phase current exceeds 0.2A), it will be discharged. There are four reclosing modes: 0-no verification; 1-check no pressure, pressure does not coincide; 2-check the same period; 3-Check without pressure, and check with pressure in the same period. In addition to the single-circuit lines with split-line reclosing, the lines with double-side power supply shall have synchronous reclosing on one

side to prevent the equipment from being damaged by non-synchronous reclosing, and the other side shall have no voltage. When reclosing charging is completed, the center of the LCD screen displays the reclosing charging completion sign. The principle block diagram of reclosing charging and discharging is shown in Figure 4-10. Reclosing action block diagram is shown in Fig. 5.2.7-1。The action block diagram of reclosing is shown in figure 5.2.7-1. Start when bit simultaneous charging flag is 1 and there is no current in three phases。

★重合闸的闭锁条件：
★闭锁重合闸开入
★过负荷跳闸
★低电压保护动作
★遥控跳闸
★线路电压异常
★弹簧未储能
★手跳（将手跳信号接至闭锁重合闸）
★失压跳闸
★零序过流跳闸

★ Locking conditions of reclosing:
★ Locking reclosing into
★ overload trip
★ under-voltage protection action
★ Remote trip
★ abnormal line voltage
★ the spring has no energy storage
★ hand jump (connect the hand jump signal to locking reclosing)
★ trip due to pressure loss
★ Zero sequence overcurrent trip

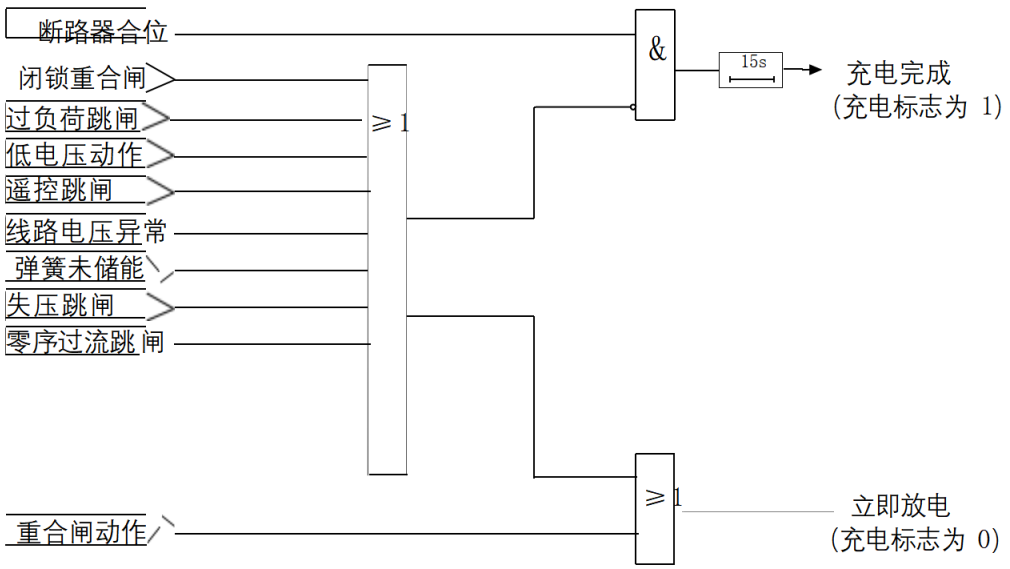
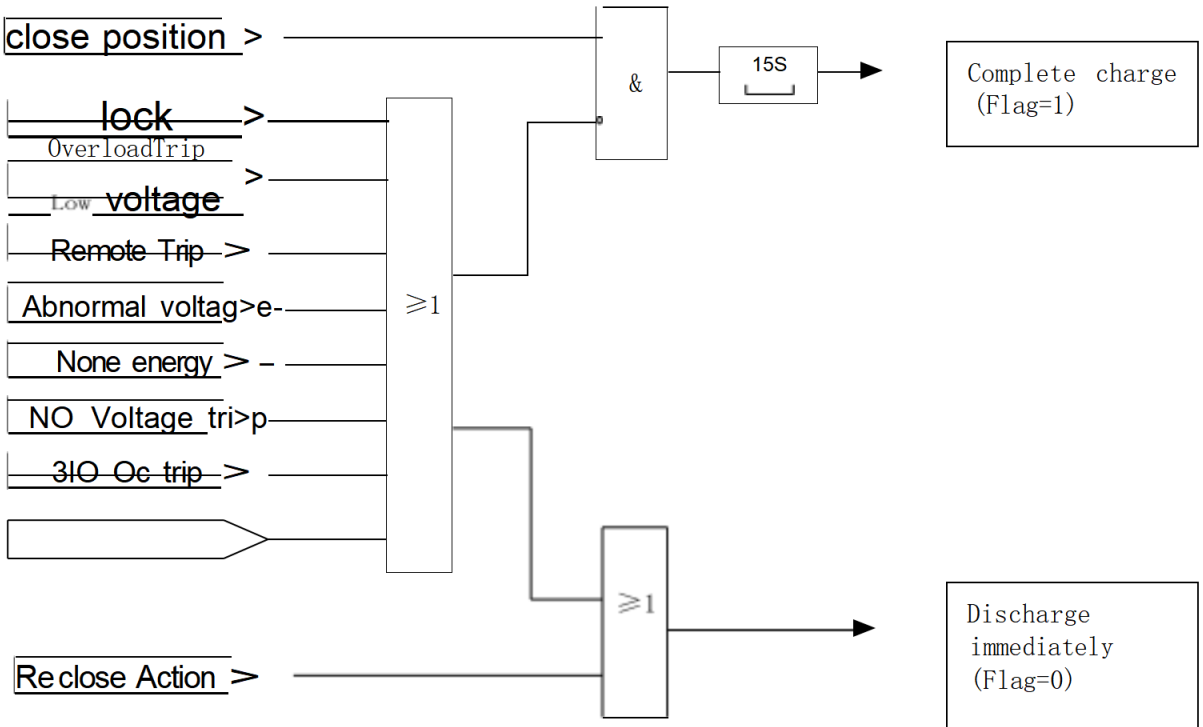


图 5.2.7-1 重合闸充放电原理框图



Fig,5.2.7-1 block diagram of reclosing charging and discharging principle

5.2.8、瓦斯保护 Gas Protection

装置中设有瓦斯保护，通过设置瓦斯保护控制字的投退。装置经开关量输入接口接收瓦斯继电器的信号，经逻辑判断后通过开出继电器输出。重瓦斯保护运作于跳闸，轻瓦斯保护运作于告警。原理框图如图 5.2.8-1 所示。

Gas protection is set in the device, and the switching of the word is controlled by setting the gas protection. The device receives the signal of the gas relay through the switch input interface, and outputs it through the opening relay after logical judgment. Heavy gas protection operates in trip, while light gas protection operates in alarm. The principle block diagram is shown in Figure 5.2.8-1.

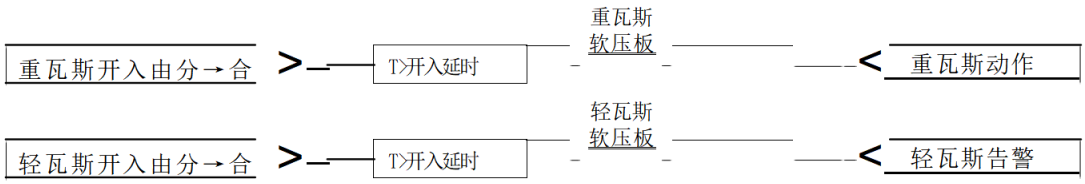
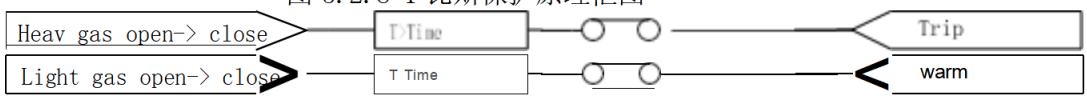


图 5.2.8-1 瓦斯保护原理框图



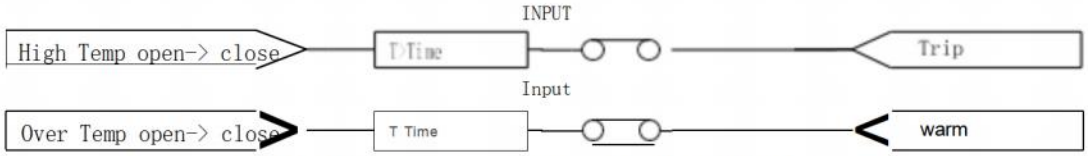
Fig,5.2.8-1 block diagram of gas protection principle

5.2.9、温度保护 Temperature protection

装置中温度保护，通过设置温度保护控制字的投退。装置经开关量输入接口接收温度控制器的信号，经逻辑判断后通过开出继电器输出。超温运作于跳闸，过温运作于告警。原理框图如图 5.2.9-1 所示。

Temperature protection in the device, by setting the temperature protection control word. The device receives the signal of the temperature controller through the switch input interface, and outputs it through the opening relay after logical judgment. Overtemperature operates in trip and overtemperature operates in alarm. The principle block diagram is shown in Figure 5.2.9-1.

图 5.2.9-1 温度保护原理框图



Fig,5.2.9-1 block diagram of temperature protection principle

5.3.10、反时限过流保护 Inverse time overcurrent protection

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。反时限过电流保护的动作时限与被保护线路故障电流的大小有关，故障电流越大，动作时限越短，若故障电流越小，动作时限越长。电流倍数超过 20 倍时，按 20 倍计算动作时间。

Inverse time protection element is a protection element whose action time is naturally matched with the current in the protected line,By translating the action curve, the whole line can be conveniently matched. The action time limit of inverse time overcurrent protection is related to the fault current of the protected line,The larger the fault current, the shorter the action time limit; if the fault current is smaller, the longer the action time limit. When the current multiple exceeds 20 times, the action time shall be calculated as 20 times.

根据国际电工委员会 IEC 有关反时限继电器的标准，本装置采用下列三个标准反时限特性方程，反时限特性方程如下：

According to IEC standard of International Electrotechnical Commission on inverse time relay, this device adopts the following three standard inverse time characteristic equations, which are as follows:

一般反时限/ Generalinverse: $t = \dfrac{0.14}{(I/I_p)^{0.02}-1} \times T_p(s)$

(1)

非常反时限/ Very inverse: $t = \dfrac{13.5}{(I/I_p)-1} \times T_p(s)$

(2)

极端反时限/ Extreme inverse: $t = \dfrac{80}{(I/I_p)^2-1} \times T_p(s)$

(3)

式中：Ip 为动作电流整定值；Tp 为时间常数定值；t 为跳闸时间；I 为故障电流。

In which: Ip is the setting value of operating current; Tp is the fixed value of time constant; T is trip time; I is the fault current.

其中反时限特性可由控制字“曲线”选择为：

★（1）为一般反时限
★（2）为非常反时限
★（3）为极端反时限

The inverse time characteristic can be selected by the control word "curve" as follows:

★(1) is the general inverse time limit

★(2) is very inverse time limit

★(3) is the extreme inverse time limit

原理框图见图 5.3.0-1 所示，一般反时限与过流第 3 段保护选择其一投入。

The principle block diagram is shown in Figure 5.3.0-1,Generally, one of inverse time limit and overcurrent protection in the third stage is selected.

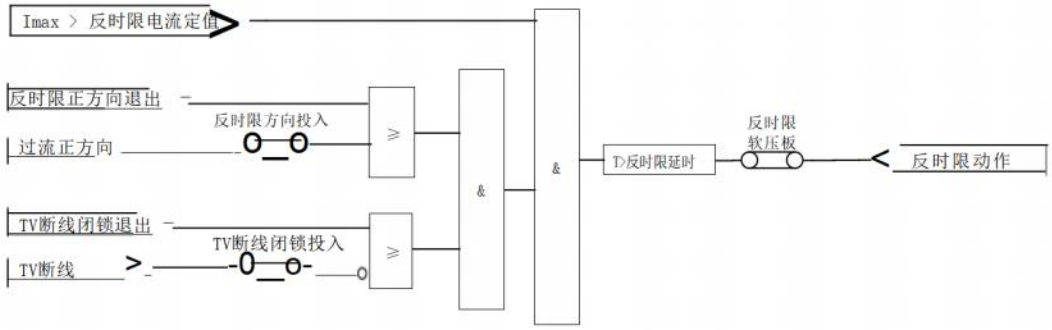
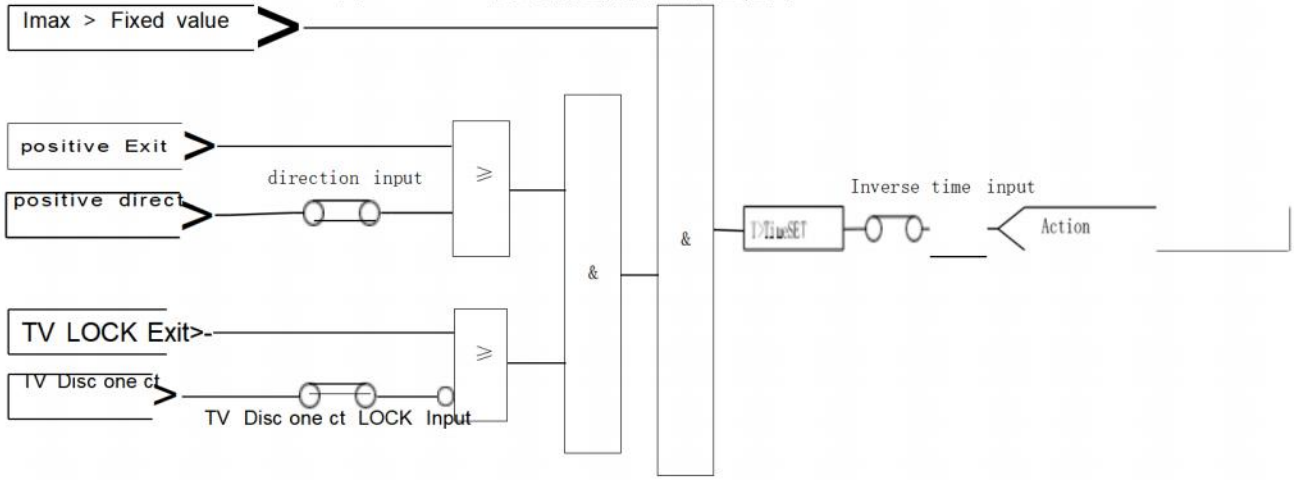


图 5.3.10-1 反时限过流保护原理框图



Fig,5.3.10-1 block diagram of inverse time overcurrent protection principle

5.3.11、反时限零序过电流保护 Inverse time zero sequence protection

反时限零序过电流保护其原理是通过检测电流零序分量的变化，以判断是否存在故障。当系统出现故障时，电流的零序分量会显著增加，超过设定值时，保护装置便会动作。同时，通过设置反时限功能，可以限制保护装置在瞬时故障或临时性故障时的动作。

The principle of inverse time zero sequence overcurrent protection is to detect changes in the zero sequence component of the current to determine whether there is a fault. When the system malfunctions, the zero sequence component of the current will significantly increase. When it exceeds the set value, the protection device will act. Meanwhile, by setting the inverse time limit function, the action of the protection device can be restricted in the event of instantaneous or temporary faults.

根据国际电工委员会 IEC 有关反时限继电器的标准，本装置采用下列三个标准反时限特性方程，反时限特性方程如下：

According to IEC standard of International Electrotechnical Commission on inverse time relay, this device adopts the following three standard inverse time characteristic equations, which are as follows:

一般反时限/ Generalinverse: $t = \dfrac{0.14}{(I/I_p)^{0.02}-1} \times T_p(s)$

(1)

非常反时限/ Very inverse: $t = \dfrac{13.5}{(I/I_p)-1} \times T_p(s)$

(2)

极端反时限/ Extreme inverse: $t = \dfrac{80}{(I/I_p)^2 - 1} \times T_p(s)$

(3)

式中：Ip 为动作电流整定值；Tp 为时间常数定值；t 为跳闸时间；I 为故障电流。

In which: Ip is the setting value of operating current; Tp is the fixed value of time constant; T is trip time; I is the fault current.

其中反时限特性可由控制字“曲线”选择为：

★（1）为一般反时限

★（2）为非常反时限

★（3）为极端反时限

The inverse time characteristic can be selected by the control word "curve" as follows:

★(1) is the general inverse time limit

★(2) is very inverse time limit

★(3) is the extreme inverse time limit

原理框图见图 5.3.11-1 所示。

The principle block diagram is shown in Figure 5.3.11-1,Generally.

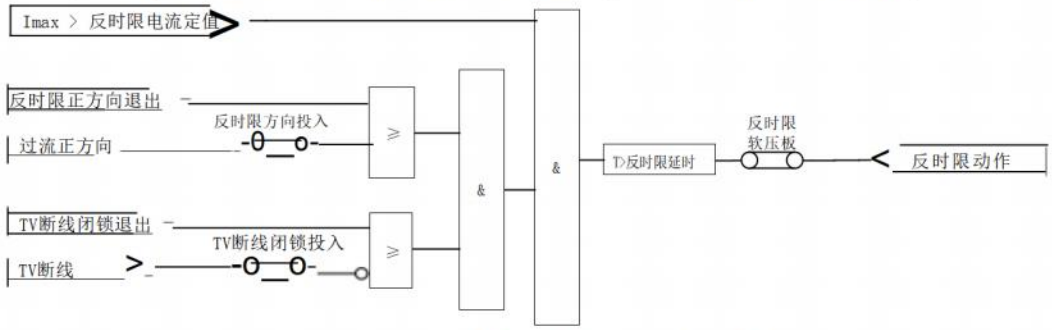
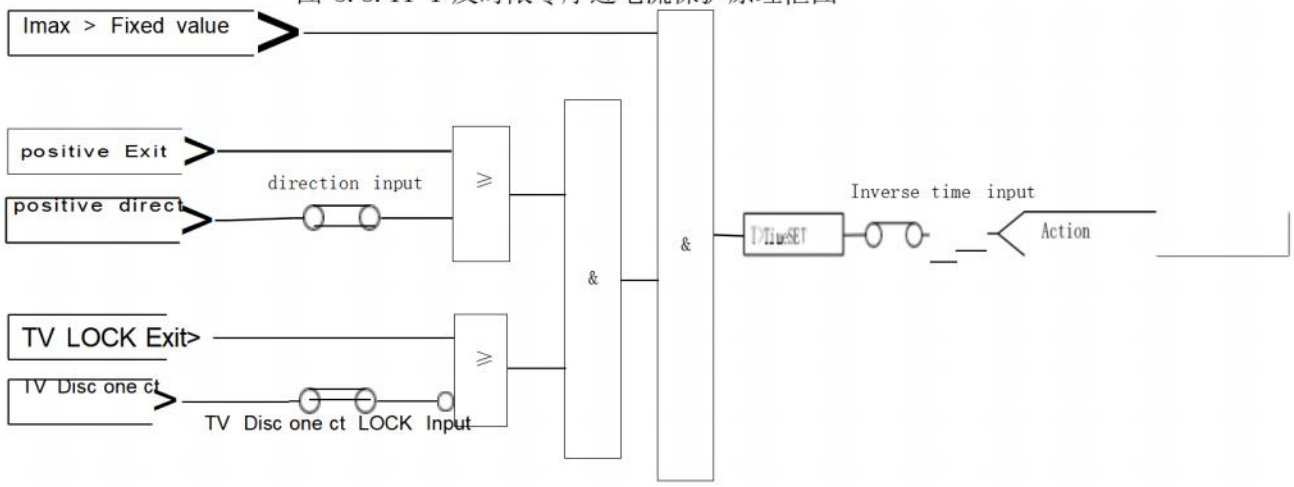
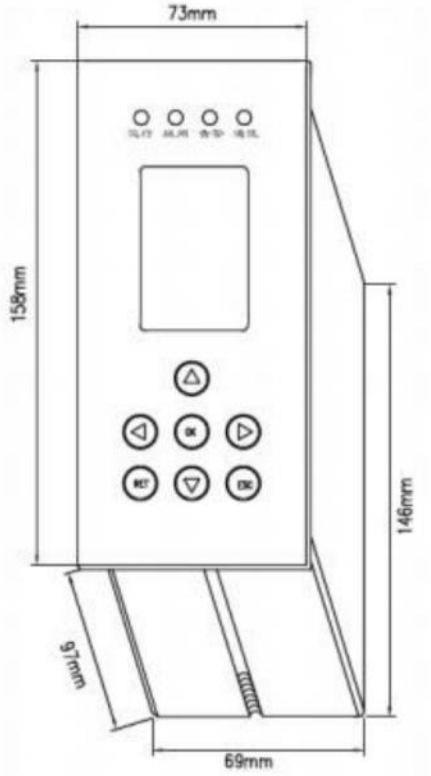


图 5.3.11-1 反时限零序过电流保护原理框图



Fig,5.3.11-1 block diagram of inverse time overcurrent protection principle

6、结构尺寸图



安装开孔尺寸图（垂直安装）

附中英文对照表、

初始菜单中英对照：

中文	English	说明
工况	STATE	
设置	PARA	密码：0000
记录	RECORD	
定值	FIXVAL	密码：0000
维护	DEBUG	
信息	INFO	

工况菜单中英对照：

中文	English	说明
测量	MEA	
遥信	DI	
时间	TIME	
标志	FLAG	

设置菜单中英对照（参数）：

中文	English	说明
装置地址	DEV Addr	
串口规约	UART-Prt	Modbus/PTC101P平衡 101/PTC101非平衡101
101 规约地址	101Addr	WORD单字节/BYTE双字节
101 传送原因	101SentReason	WORD单字节/BYTE双字节
通信波特率	BaudRate	
校验方式	PARITY	NONE无校验/ODD奇校验/EVEN 偶校验
遥信类型	DI-Type	S-DOt单点/D-DOt双点
遥测类型	MEA-Type	Normval规一化值/Floatval 浮点数值/Scalval标度化值
遥测死区	DeadZone	
遥测发送间隔	DataSentInterval	
遥测主动上送	DataSent	Input投入/Exit退出
遥信确认时间	DI CMF TIME	
遥控超时时间	DO TimeOUT	
跳闸脉冲宽度	Trip Pulse Time	
合闸脉冲宽度	Close Pulse Time	
串口调试	UartDBG	Input投入/Exit退出
显示一次值	ShowPriVAL	
TV 变比	TV Ratio	
测量TA 变比	TA Ratio	
零序TA 变比	TA0 Ratio	
遥信1 定义	DI1 Def	遥信自定义下拉列表： 开关合位：SW-CLOSE 开关分位：SW-TRIP 刀闸合位：KG-CLOSE
遥信2 定义	DI2 Def	
遥信3 定义	DI3 Def	
遥信4 定义	DI4 Def	

遥信5 定义	DI5 Def	刀闸分位：KG-TRIP 接地合位：GD-CLOSE 接地分位：GD-TRIP 未储能： NO ENG 远方： Remote 重瓦斯： H-Gas 轻瓦斯： L-Gas 超温： H-Temp 过温： O-Temp 网门打开：DoorOpen 闭锁重合：LockRC 手合信号：ManClose 手分信号：ManTrip 遥信1： DI1 遥信2： DI2 遥信3： DI3 遥信4： DI4 遥信5： DI5 遥信6： DI6
遥信6 定义	DI6 Def	

定值菜单中英文对照：

中文	English	说明
过流 Ⅰ段保护	OC Zn I Trip	退 出: Exit 告警: Warm 跳闸: Trip 投 入: Input 其它保护投退都一致
过流 Ⅰ段电流	OC Zn I A	
过流 Ⅰ段时间	OC Zn IT	
过流Ⅱ段保护	OC Zn II Trip	
过流Ⅱ段电流	OC Zn II A	
过流Ⅱ段时间	OC Zn IIT	
过流Ⅲ段保护	OC Zn III Trip	
过流Ⅲ段电流	OC Zn III A	
过流Ⅲ段时间	OC Zn IIIT	
过负荷保护	OverLoad	
过负荷电流	OverLoad A	
过负荷时间	OverLoad T	
反时限曲线选择	Curve Selectio	退出： Exit 一般反时限： RVS_STD 非常反时限： RVS_VERY 极端反时限： RVS_EXT
反时限电流基准值	Inv Time Ref	
反时限时间常数	Inv Time Time	
零序 Ⅰ段保护	3IO Zn I	
零序 Ⅰ段电流"	3IO Zn I A	
零序 Ⅰ段时间	3IO Zn IT	

零序Ⅱ段保护	3IO Zn II	
零序Ⅱ段电流"	3IO Zn II A	
零序Ⅱ段时间	3IO Zn IIT	
零序反时限曲线选择	3I0 Curve Selectio	退出： Exit 一般反时限： RVS_STD 非常反时限： RVS_VERY 极端反时限： RVS_EXT
零序反时限电流基准值	Inv Time Ref	
零序反时限时间常数	Inv Time Time	
过流加速保护	OC ACC	
过流加速电流	OC ACC A	
过流加速时间	OC ACC T	
零序加速保护	Zero ACC	
零序加速电流	Zero ACC A	
零序加速时间	Zero ACC T	
低压保护	Low-Volt	
低压电压	Low-Volt U	
低压时间"	Low-Votl T	
过压保护	Over-Votl	
过压电压	Over-Volt U	
过压时间	Over-Volt T	
重合闸投退	Reclose	
重合闸时间	Teree Re T	
非电量投退	Non-Ele IN	
重瓦斯时间	H-Gas Time	
轻瓦斯时间	L-Gas Time	
超温时间	H-Tmp Time	
过温时间	O-Tmp Time	
网门打开时间	Door Time	

维护菜单中英文对照：

中文	English	说明
测试	TEST	非必要不使用装置维护功能 Unnecessary device maintenance function
校通道	Adjust	
改密码	PSWORD	
清事件	CLR SOE	
下载	Download	

信息菜单中英文对照：

中文	**English**	说明
装置信息	Dev Info	
录波	Rcd Wave	

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Website: https://www.hzgcth.com/