

[技术手册]

Technical Manual

为了安全使用本生产，请阅读该技术手册。

For safe use of this product, please read through this technical manual.

增强型有源电力滤波器

Enhanced Active Power Harmonic Filter



关于手册

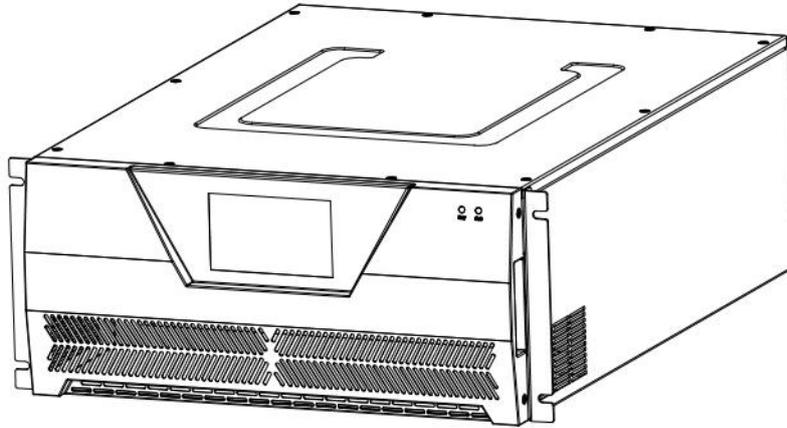
About the manual

购买产品时此手册与机器同箱包装，使用前请仔细阅读本手册。

This manual is attached to the equipment in package. Please read this manual carefully before using it.

手册编码:1801000061

Manual No.:1801000061



安全须知

Safety instructions

产品介绍

Product introduction

产品运输、存储及安装

Transport, storage and installation

通电试运行

Commissioning

整柜抽屉式有源滤波器基本操作流程图

Basic operation flow chart of drawer type active power filter

集中与远程监控式系统操作说明

Centralized and remote monitoring system operating instructions

常见故障及处理

Common faults and handling

维护

Maintenance

目录 Contents

目录 Contents	1
第 1 章 安全须知	3
Section 1 Safety Instructions	3
1.1 前言 Introduction	3
1.2 使用注意事项 Precautions for use	5
1.3 安装条件说明 instructions of installation conditions	6
第 2 章 产品介绍	7
Section 2 Production Introduction	7
2.1 使用前确认信息 Confirm information before use	7
2.1.1 型号说明 Type explanation	7
2.1.2 铭牌说明 Nameplate explanation	8
2.2 产品性能参数说明	8
2.2 Description of performance parameters	8
2.3 使用领域 Application	9
第 3 章 产品运输、储存及安装	10
Section 3 Transport, Storage and Installation	10
3.1 运输、储存注意事项 Precautions for transport and storage	10
3.2 机械安装 Mechanical installation	11
3.3 电气安装 Electrical installation	13
3.3.1 系统接线 System wiring	13
3.3.2 电流互感器选择及安装 Selection and installation of current transformer	15
第 5 章 通电试运行	20
Section 5 Power-on Commissioning	20
5.1 安装检查 Installation inspection	20
5.2 相序检查 Phase sequence inspection	20
5.3 互感器检查 Current transformer inspection	20
5.4 启动设备 Start the equipment	21
5.5 关闭设备 Shut down the equipment	21
第 6 章 集中与远程监控式系统操作说明	22
Section 6 Centralized and Remote Monitoring System Operating Instructions	22
6.1 集中监控式通讯接口说明 Description of centralized monitoring communication interface	22
6.2 集中监控式通讯接线说明 Description of centralized monitoring communication wiring	22
6.3 集中监控式地址设置 Centrally monitored address strings	24
6.4 集中监控式系统参数设置 Centralized monitoring system parameter setting	25
6.4.1 监控画面 Monitoring picture	25
6.4.2 实时数据界面 Real-time data interface	27
6.4.3 参数设定界面 Parameter setting interface	28
6.4.4 故障报警 Fault alarm	31
6.4.5 实时波形 Real-time waveform	33
6.4.6 用户手册 User manual	34
6.5 远程监控式系统说明 Description of remote monitoring system	34
第 7 章 整柜抽屉式设备基本操作流程	35
Section 7 Basic Operation Flow Chart of Drawer-type Equipment	35

第 8 章 常见故障及处理	37
Section 8 Common Faults and Troubleshooting	37
第 9 章 维护	39
Section 9 Maintenance	39
售后服务	40
After-sale Service	40

第 1 章 安全须知

Section 1 Safety Instructions

1.1 前言 Introduction

本手册关于设备的安装及使用，安装前请仔细阅读本手册！请严格遵守以下操作规程进行安装使用，若不按规定操作，造成的人身伤害及财产损失，本公司概不承担责任。

This manual is about the installation and use of equipment. Please read this manual carefully before installation!

Please strictly abide by the following operating procedures for installation and use. The company shall not be liable for any personal injury or property loss caused for failure to follow the operating instructions.

⚠ 危险

⚠ DANGER

√ 严禁带电对设备进行安装、接线、操作、维护等动作！

Installation, wiring, operation, maintenance and others are strictly prohibited when the equipment is electrified.

√ 电击可能致命，禁止接触带电的部件！

Electric shock can be fatal. Do not touch live parts!

√ 接入电源前，请务必确认设备有效接地。

Before connecting to the power supply, please make sure that the equipment is effectively grounded.

√ 关闭电源后，设备的部分电路仍带电，应等待至少 15min，确认设备电压降至人体安全电压后，再对设备进行操作。

After the power is cut off, part of the circuit of the equipment is still electrified. Please wait for at least 15 minutes to confirm that the equipment voltage drops to safety voltage before operating the equipment.

⚠ 警告

WARNING

√ 所有的电气安装或日常维护必须由经过培训合格的工程师依据“电工法则”进行, 严禁其他人员违规进行安装操作。

All electrical installation or routine maintenance must be carried out by trained engineers in accordance with the "Electrical code", and it is strictly forbidden for other personnel to perform installation operations in violation of operating regulations.

√ 电弧火花可能伤害眼睛、灼伤皮肤、损坏设备以及引燃易爆物体, 因此请做好相关安全防护。

Arc sparks may injure eyes, burn skin, damage equipment, and ignite explosive objects, so please take relevant safety protections.

√ 操作电流互感器时, 需保证互感器的次级是短接的。

When operating a current transformer, please ensure that the secondary of the transformer is short-circuited.

√ 在潮湿情况下, 人体电阻会下降, 此时可能有危险的大电流通过人体, 因此不要在潮湿的地方检修设备。

In damp conditions, the resistance of the human body will decrease. At this time, dangerous high current may pass through the human body. Therefore, do not inspect and repair the equipment in a humid place.

√ 当无法避免在该条件下工作时, 可以站在一块干燥的橡皮垫或干木板上, 并使用绝缘手套, 保持衣服干燥, 不要单独工作。

When it is unavoidable to work under this condition, you can stand on a dry rubber mat or dry wooden board and use insulated gloves and keep your clothes dry. Do not work alone.

√ 操作时请使用合适的安全服及测试工具, 遵守安全操作规范。

Please wear appropriate safety clothing and use test tools during operation, and comply with safety operation regulations.

注意 CAUTION

√ 请勿运行已经损坏的设备。

Do not operate damaged equipment.

√ 保险丝熔断或接线断路器跳闸时, 请勿立即接通电源或进行设备操作。检查电缆接线以及外围设备的选型是否正确, 找出原因。若无法确定原因, 请及时联系本公司, 切勿擅自接通电源或操作设备。

Do not switch on the power or operate the equipment immediately when the fuse is blown or the circuit breaker is tripped. Check whether the cable connection and the selection of peripheral equipment are correct, and find out the reason. If you cannot determine the cause, please contact us in time and do not switch on the power or operate the equipment without authorization.

危险 标记为危险的信息对于避免安全事故至关重要。

DANGER Information marked as DANGER is critical to avoiding security incidents.

警告 标记为警告的信息对于避免损坏产品或其他设备有所必需。

WARNING Information marked as WARNING is necessary to avoid damage to the product or other equipment.

注意 标记为注意的信息有助于确保正确的产品操作。

CAUTION Information marked as CAUTION helps ensure correct product operation.

1.2 使用注意事项 Precautions for use

1. 接线检查 Wiring check

在接通电源之前，请仔细检查 A、B、C 三相接线顺序是否正确（A、B、C 三相分别对应线色为黄、绿、红）。请仔细确认 A、B、C、N、PE 各线路之间是否有短路现象，否则会导致产品损坏或误动作。

Before switching on the power, please carefully check whether the wiring sequence of three phases A, B and C is correct (the three phases A, B and C correspond to yellow, green and red respectively). Please carefully confirm whether there is short circuit between A, B, C, N and PE, otherwise the product will be damaged or misoperated.

2. 电流互感器安装检查 Installation and inspection of current transformer

电流互感器在安装时，需特别注意安装方向，互感器 P1 指向电源，P2 指向负载。每只互感器的 S1、S2 必须与相应标号的端子对应（S1->A，S2->AN），严禁二次开路。如违反本条可能会引起互感器烧毁。

When installing the current transformer, special attention should be paid to the direction of installation. The current transformer P1 points to the power supply and P2 points to the load. The S1 and S2 of each current transformer must correspond to the terminal of corresponding label (S1->A, S2->AN), and the secondary open circuit is strictly forbidden. Violation of this point may cause the current transformer to burn.

3. 电磁接触器的安装 Installation

为了确实切断电源与设备之间的连接，建议安装电磁接触器(MC)。安装 MC 时，请设计通过设备的故障接点输出使 MC 断开的回路。在电源侧设置 MC 时，请勿使该 MC 频繁进行起动及停止。否则将导致设备的故障。通过 MC 切换 ON/OFF 时的频度，请设为最高 30 分钟 1 次。

In order to cut off the connection between the power supply and the device, it is recommended to install an electromagnetic contactor (MC). When installing the MC, please design a circuit that disconnects the MC through the fault contact output of the equipment. When installing MC on the power supply side, do not make the MC start and stop frequently. Otherwise it will cause equipment to fail. Please set the frequency of switching ON/OFF by MC to the maximum once every 30 minutes.

4. 维护与检查 Maintenance and inspection

即使切断设备的电源，内置电容器也需要一定的放电时间。因此，进行检查时，请先切断电源，等待至少 15min 后，测量电源电压降至人体安全电压后再开始作业，否则电容器上有残余电压，可能会导致触电。

Even if the power supply of the device is cut off, the built-in capacitor needs a certain discharge time. Therefore, during the inspection, please cut off the power supply, wait at least 15 minutes, and measure the power supply voltage to ensure it drops to the safety voltage before starting work, otherwise there will be residual voltage on the capacitor, which may cause electric shock.

5. 产品搬运、安装 Product handling and installation

√ 请勿进行熏蒸处理。

Do not perform fumigation treatment.

√ 无论在运输或安装的任何情况下，均不得使设备暴露在有卤素（氟、氯、溴、碘等）或 DOP 气体（邻苯二甲酸酯）的环境中。

In any case of transportation or installation, the equipment must not be exposed to halogen (fluorine, chlorine, bromine, iodine, etc.) or DOP gas (phthalate).

√ 在海拔高度超过 1000m 的地区，由于空气稀薄造成设备的散热效果变差，有必要降额使用。此情况请向本公司技术人员垂询。

In areas with an altitude of more than 1000m, the heat dissipation effect of the equipment deteriorates due to the thin air, so it is necessary to derate the equipment for use. In this case, please consult our company's technicians.

√ 对于雷电频发处的客户请在设备前加防雷保护装置。

For the place where lightning is frequent, please install lightning protection devices in front of the equipment.

1.3 安装条件说明 instructions of installation conditions

为保证设备的正常及安全使用，延长使用寿命，产品应安装在以下环境：

To ensure the normal and safe use of the equipment and extend its service life, the product shall be installed in the following environments:

√ 接线方便，有足够的操作空间。

Convenient connection and enough operating space.

√ 通风良好，满足散热要求，周围无腐蚀性气体。

Good ventilation, meeting the heat dissipation requirements, and no corrosive gas around.

装置背面距离墙体距离不得小于 100mm，装置顶部与屋顶空间距离不得小于 200mm，装置正面距离墙体不得小于 800mm。

The distance between the back of the device and the wall should not be less than 100mm, the distance between the top of the device and the roof should not be less than 200mm, and the front of the device should not be less than 800mm from the wall.

√ 空气湿度适当，无高温源。

The air has proper humidity and no high temperature source.

√ 空气湿度过大，会导致设备金属板表面形成冷凝水，存在导电风险，对设备及操作人员造成伤害。

Excessive air humidity will cause condensed water to form on the surface of the metal plate of the equipment, which may cause electrical conduction risks and cause damage to the equipment and operators.

√ 环境中应避免有强磁场，核辐射和来自通讯设备的大功率射频干扰。

Strong magnetic fields, nuclear radiation and high power RF interference from communications equipment should be avoided in the environment.

√ 符合消防要求。

Meeting the fire protection requirements.

第 2 章 产品介绍

Section 2 Production Introduction

2.1 使用前确认信息 Confirm information before use

在产品到货时:

Upon the arrival of the product:

1、 务必确认本机铭牌所标注额定值与您的订货要求一致;

1. Be sure to confirm that the ratings marked on the nameplate of the machine are consistent with your order requirements;

2、 若发现产品有不良情况, 请及时联系本公司代理商。

2. If you find that the product is in a bad condition, please contact our agent in time.

2.1.1 型号说明 Type explanation

-设计代码 Design code

安装方式 Installation type

RI: 抽屉式带屏幕 RL Drawer-type with screen RL

Rn: 抽屉式不带屏幕 RN Drawer-type without screen RN

HI: 壁挂式带屏幕 HL Wall-mounting type with screen HL

Hn: 壁挂式不带屏幕 HN Wall-mounting type without screen HN

CI: 柱上式带屏幕 CL Pole-mounting type with screen CL

Cn: 柱上式不带屏幕 Pole-mounting type without screen CN

电压等级 Voltage class

-产品容量 Capacity

150: 滤波电流为 150A 150 Filter current 150A 150

100: 滤波电流为 100A 100 Filter current 100A 100

075: 滤波电流为 75A 075 Filter current 75A 075

050: 滤波电流为 50A 050 Filter current 50A 050

030: 滤波电流为 30A 030 Filter current 30A 030

-连线方式 Wiring type

4L: 三相四线制 4L Three-phase four-wire system 4L

-产品类型 Product type

增强型有源滤波器 E-APF Enhanced active power filter

-电能质量 Electric power quality

-西驰电气 Spread Electric

图 2-1.1 型号说明

Fig. 2-1.1 Type explanation

2.1.2 铭牌说明 Nameplate explanation



图 2-2 铭牌说明

Fig. 2-2 Nameplate explanation

2.2 产品性能参数说明

2.2 Description of performance parameters

产品系列 Product series	XPQ-				
电压等级 (kV) Voltage class (kV)	0.4				
单机滤波能力 (A) Single unit's filter capability	30	50	75	100	150
相/线 Phase/wire	三相四线 Three-phase four-wire system				
工作频率 Working frequency	50 (1±2%) Hz				
滤除谐波次数	2~50 次 (可消除全部或选定次数谐波) 2~50 times (All or selected harmonic frequencies can be eliminated)				
中性线滤波能力	三倍相线 RMS 电流 Three times of phase wire RMS current				
滤波能力	≥97%				
CT 需求	3 个 CT,精度 0.5 级以上, 二次电流为 5A Three current transformers with precision above 0.5 grade and secondary current 5A				
补偿方式	谐波补偿、无功补偿或同时补偿 Harmonic, reactive or simultaneous compensation				
瞬间响应时间 Instantaneous response time	40us				
全响应时间 Full response time	10ms				
IGBT 开关频率 IGBT switch frequency	20kHz				
模块扩展能力	最多可扩展 10 个功能模块 Up to 10 functional modules can be extended				
保护功能	过流、电网过压、欠压、过热、母线过压、欠压、短路、风机故障、电源故障及限流保护等 Overcurrent, overvoltage, undervoltage, overheat, overvoltage, undervoltage, short circuit, fan fault, power fault and current-limiting protection, etc				

界面显示信息	<p>1、各相电压电流、功率因数、THD 等参数 Voltage current, power factor, THD and other parameters of each phase</p> <p>2、电网、负载电流波形、三相电压波形 Grid, load current waveform, three-phase voltage waveform</p> <p>3、三相 IGBT 温度显示 Three-phase IGBT temperature display</p> <p>4、运行方式设定、参数设置 Operation mode setting, parameter setting</p>
过载保护	<p>可参数设置限流能力 Set current limiting capability with parameters</p>
通讯 Communication	RS485&RS232
冷却方式	<p>强制风冷 Air cooling</p>
防护等级	<p>IP20,更高防护等级可定制 IP 20, higher protection class can be customized</p>
颜色	<p>亚光黑, 可根据客户要求提供其它颜色 Matte black, other colors are available upon request</p>
安装环境	<p>温度: -10°C ~+45°C 湿度: 最大 95%RH (无凝露) Temperature: -10°C ~+45°C Humidity: max 95% RH (no condensation)</p>
海拔高度	<p>建议安装海拔高度不超过 1000 米, 更高海拔可降额使用。 It is recommended that the altitude of installation should not exceed 1000 meters, and it can be derated for use at higher altitude.</p>
设备尺寸	<p>30~100A 模块: 484*200*640 30~100A module: 484*200*640</p> <p>150A 模块: 544*250*646 150A module</p> <p>整柜: 800*800*2200 (宽*长*高) Entire cabinet: 800*800*2200 (W*L*H)</p>
模块重量 Module weight	<p>34kg (50A) 34kg (100A) 47kg (150A)</p>
适用范围 Range of application	<p>适用于带中性线的电网系统, 可同时滤除相线和中性线谐波, 补偿无功。 It is suitable for the grid system with neutral lines. It can filter the phase line and neutral line harmonics at the same time and compensate the reactive power.</p>

2.3 使用领域 Application

适用于带有中性线三相平衡的工业现场的电网系统, 可滤除非零序谐波, 补偿无功。具体场合如下:
该设备的应用领域包括化工, 汽车, 食品, 制药, 光伏, 烟草, 电力, 冶金, 纺织, 轨道交通, 军工, 现代建筑, 医院, 石油, 影院, 电动汽车充电站等。

It is suitable for the power grid system of the industrial site with neutral three-phase balance, which can filter non-zero sequence harmonics and compensate reactive power. The specific occasions are as follows: the application areas of the equipment include chemicals, automobiles, food, pharmaceuticals, photovoltaics, tobacco, electricity, metallurgy, textiles, rail transit, military industry, modern buildings, hospitals, petroleum, theaters, electric vehicle charging stations, etc.

第 3 章 产品运输、储存及安装

Section 3 Transport, Storage and Installation

3.1 运输、储存注意事项 Precautions for transport and storage



警告 WARNING

√ 每套设备均是通过木箱包装后运输的，在运输过程中必须小心轻放，严禁雨淋、暴晒，不能倒置或斜放，这样能够保证设备在运输过程中不被损坏。

Each set of equipment is packed in wooden boxes and transported. It must be handled with care during transportation. Rain and exposure to the sun are strictly prohibited, and it cannot be placed upside down or diagonally. This will ensure that the equipment will not be damaged during transportation.

√ 如果设备不是立即安装使用，请把设备放置于干燥、通风和无腐蚀性物质的仓库内，仓库内应无强烈的机械振动和磁场作用。

If the equipment is not immediately installed and used, please place the equipment in a dry, ventilated and non-corrosive warehouse without strong mechanical vibration and magnetic field effect.

√ 如果有设备存储时间超过一年，应该对直流侧电容重新充电一次。如果没有重新充电，直流侧电容可能发生损坏使设备不能正常工作。

If the equipment has been stored for more than a year, the DC side capacitor should be recharged. If not recharged, damage to the DC capacitor may occur and the equipment may not function properly.

注意：CAUTION

√ 运输温度应在 $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$ 范围内。

Transportation temperature shall be within the range of $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$.

√ 该设备的包装可以在室内存放 6 个月（自发货之日起），如果需要存放更长时间的话，订货时可以向本公司提出制作存放时间更长的包装。

The packaging of the equipment can be stored indoors for 6 months (from the date of shipment). If you need to store it for a longer period of time, you can ask our company to make a package with a longer storage time when ordering.

√ 存储极限温度 $-40^{\circ}\text{C} \sim +55^{\circ}\text{C}$ ；空气相对湿度 15% ~ 90% (20 $^{\circ}\text{C}$ 以下时)。

Storage limit temperature $-40^{\circ}\text{C} \sim +55^{\circ}\text{C}$; air relative humidity ranges from 15% to 90% (below 20 $^{\circ}\text{C}$).

该设备在出厂前已经过全面测试和检查，并根据安全运输的要求进行运输准备，但在长途运输过程中，设备上固定零件仍有可能由于振动颠簸等原因而松动，因此收到该设备后，请进行如下检查：

The equipment has been fully tested and inspected before leaving the factory, and prepared for transportation according to the requirements of safe transportation. However, during long-distance transportation, the fixed parts on the equipment may still be loose due to vibration. Therefore, after receiving the equipment, please check as follows:

1. 检查运输的包装箱有无损坏。如果发现任何损坏，则要求运输代理检查运输情况并在运输接收单上记录损坏情况；

Check the shipping box for damage. If any damage is found, the forwarding agent is required to check the transportation and record the damage on the transportation receipt;

2. 拆卸包装箱时，应尽量小心。如果使用杠、锤等工具来拆除包装箱，请小心操作以避免损坏设备；

Care should be taken when removing the packing case. If a bar, hammer or other tools are used to remove the packing case, please handle with care to avoid damaging the equipment;

3. 检查设备上有无外部损坏，如面板擦伤、掉漆、凹陷等。检查有无松动的元器件和接线等。如运输有损伤应要求索赔，在索赔过程中需要协助时，请联系本公司。

Check the equipment for external damage, such as scratches, paint drops, dents, etc. Check for loose components and wiring. If there is any damage in transportation, please contact us if you need assistance in the process of claim.

3.2 机械安装 Mechanical installation

使用环境 Working conditions

1. 环境温度：Ambient temperature

设备运行时的环境温度范围：-10°C~+45°C;

Ambient temperature range during operation: -10°C~+45°C;

2. 空气相对湿度：Relative humidity

设备运行时的湿度范围：15%~90% (20 以下时)；

Humidity range of equipment during operation: 15% ~ 90% (below 20);

3. 海拔高度：Altitude

设备安装运行的海拔高度不超过 1000m;

The altitude of equipment installation and operation shall not exceed 1000m;

安装地点无剧烈振动及颠簸，安装倾斜度不大于 5%;

There is no severe vibration and turbulence at the installation site, and the installation inclination is not more than 5%;

设备的安装 Equipment installation

设备模块单元安装时要避免倒置或倾斜，安装时请保证水平安装（抽屉式）或垂直安装（壁挂式），设备应尽量安装在补偿点附近。

When installing the equipment module unit, please avoid inversion or tilting. Please ensure that it is mounted horizontally (drawer-type) or vertically (wall-mounted). The equipment should be mounted near the compensation point as far as possible.

互感器的安装 Installation of current transformer

安装互感器时主要是互感器的安装方向需要注意，互感器 P1 指向电源，P2 指向负载。

Attention should be paid to the installation direction of the transformer. The transformer P1 points to the power supply and P2 points to the load.

抽屉式

Drawer type

XPQ-EA-4L-口 XPQ-EA-4L-port	外形尺寸 (mm) Dimension (mm)							固定螺钉 Set screw	净重 (kg) Net weight
	W	H	D	w	h	d			
30A	484	200	640	465	158	610	M6	34	
50A									
75A									
100A									
150A	544	250	646	525	180	610	M6	47	

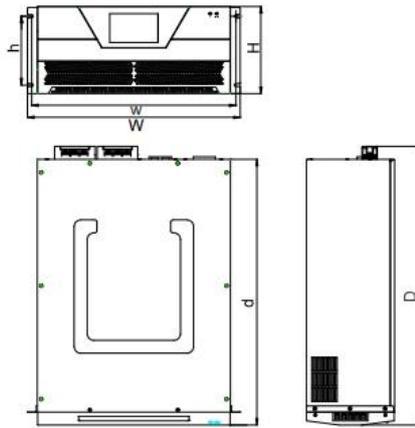


图 3-1 抽屉式外观尺寸

Fig. 3-1 Drawer-type dimension

壁挂式

Wall-mounted type

XPQ-EA-4L-口 XPQ-EA-4L-type	外形尺寸 (mm) Dimension							固定螺钉 Set screw	净重 (kg) Net weight
	W	H	D	w	h	d			
30A	440	657	212	375	633	/	M8	35	
50A									
75A									
100A									
150A	500		262			/		48	

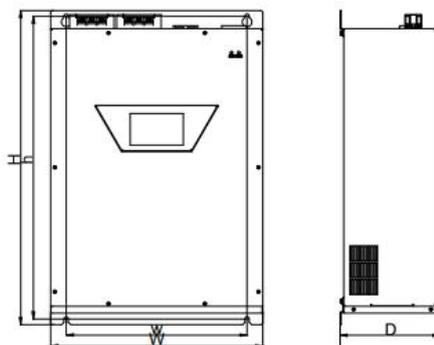


图 3-2 壁挂式外观尺寸

Fig. 3-2 Wall-mounted type dimension

3.3 电气安装 Electrical installation

本手册中所提及的设备是并联型设备，它和补偿对象是并联关系。

The equipment referred to in this manual is a parallel equipment, and it is in parallel with the compensation object.

安装要求 Installation requirements

1. 频率 Frequency

频率变化范围不大于 $\pm 10\%$

频率变化速率不大于 $\pm 10\%$

The frequency range is no more than $\pm 10\%$

The rate of frequency change shall not be greater than $\pm 10\%$

2. 电压波动 Voltage fluctuation

稳态时电压波动范围不超过 $-15\% \sim +15\%$

瞬态时电压波动范围不超过 20%

Voltage fluctuation range in steady state does not exceed $-15\% \sim +15\%$

Voltage fluctuation range in transient state does not exceed 20%

3. 电压不对称度 Voltage asymmetry

稳态时允许的电压不对称度为 5%

瞬态时允许的电压不对称度为 8%

Allowable voltage asymmetry in steady state is 5%

Allowable voltage asymmetry in transient state is 8%

4. 交流电压波形 AC voltage waveform

交流电压波形应为正弦波

Ac voltage waveform should be sine wave

稳态时谐波畸变率不超过 10%，奇次谐波畸变率不超过 5%，偶次谐波畸变率不超过 2%

In steady state, the harmonic distortion rate does not exceed 10%, the odd harmonic distortion rate does not exceed 5%, and the even harmonic distortion rate does not exceed 2%

3.3.1 系统接线 System wiring

主回路接线及互感器接线，以 EA 柜机抽屉式系列为例：

For main circuit wiring and transformer wiring, take EA cabinet drawer-type series as an example:

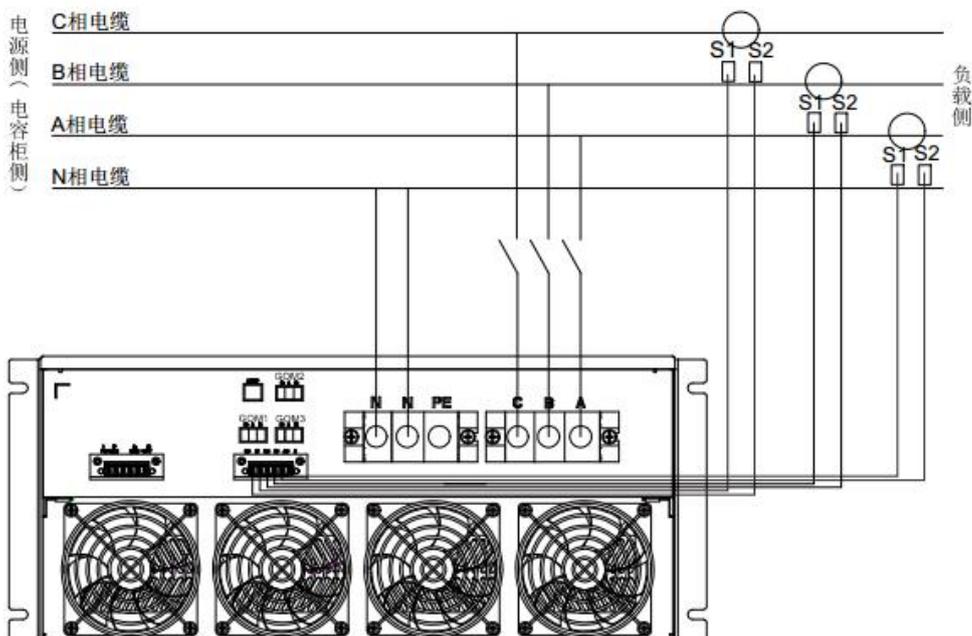


图 3-3 回路接线方式一

Fig. 3-3 Circuit wiring mode 1

电源侧（电容柜侧） Power source side (capacitor cabinet side)

C 相电缆 Phase C cable

B 相电缆 Phase B cable

A 相电缆 Phase A cable

N 相电缆 Phase N cable

负载侧 Load side

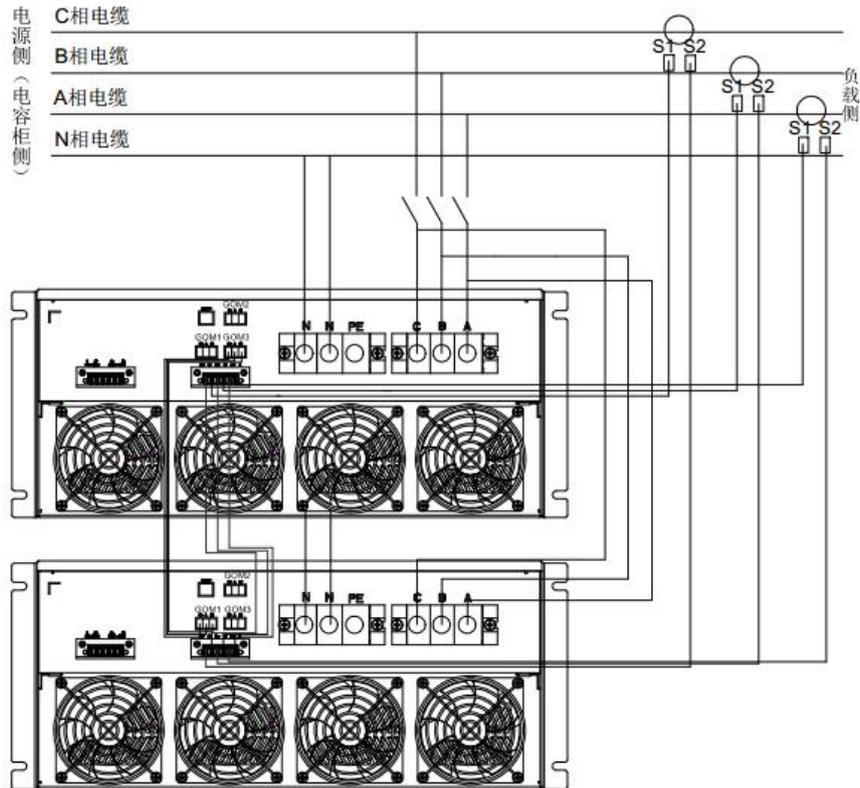


图 3-4 回路接线方式二

Fig. 3-4 Circuit wiring mode 2

注意：CAUTION:

1. 接线方式：使用电缆连接至模块输出端子，柜内多个模块并联时使用汇流铜排作为模块的汇流点。
2. 主回路接线应保证电网相序与设备相序一致，否则有产品可能不能正常启动。
3. 互感器 P1 面必须指向电源。
4. 每只互感器的 S1、S2 必须与相应标号的端子对应，严禁二次开路。如违反本条可能会引起互感器烧毁。

1. Wiring mode: Use cables to connect to the output terminals of the module. When multiple modules in the cabinet are connected in parallel, use the busbar as the junction point of the modules.
2. The main circuit wiring should ensure that the grid phase sequence is consistent with the equipment phase sequence, otherwise the equipment may not start normally.
3. Current transformer P1 must point to the power supply.
4. The S1 and S2 of each current transformer must correspond to the terminal of corresponding label, and the secondary open circuit is strictly forbidden. Violation of this point may cause the current transformer to burn.

3.3.2 电流互感器选择及安装 Selection and installation of current transformer

为了提高设备的补偿效果，互感器检测到的负载电流信号必须准确，这样就需要选择合适的互感器。

In order to improve the compensation effect of the equipment, the load current signal detected by the transformer must be accurate, so it is necessary to select the appropriate transformer.

选择互感器时，首先需要知道所测电流的最大值，这就需要详细了解所需补偿的负载电流，测出负载电流后，在留有一定余量的情况下选择互感器。

When selecting a transformer, you first need to know the maximum value of the measured current. This requires a detailed understanding of the load current to be compensated. After the load current is measured, the transformer should be selected with a certain margin.

互感器与系统的接线方式如下表：

The wiring modes of the transformer and the system are as follows:

互感器接线端		端子	备注 Remark
A 相 Phase A	S1	A	注意互感器的安装方向为 P1 指向电网，P2 指向负载 Please be noted that the installation direction of the transformer is P1 points to the grid and P2 pointsto the load
	S2	AN	
B 相 Phase B	S1	B	
	S2	BN	
C 相 Phase C	S1	C	
	S2	CN	

电流互感器作为选配件，可以选择开口和闭口的方式，其中开口 CT 的安装较为方便，闭口 CT 的安装则必须在客户端停电的情况下进行安装。

As an option, the current transformer can be selected in open and closed modes. The installation of open current transformer is more convenient, and the installation of closed current transformer must be installed when the client side is powered off.

1) CT 安装在负载侧，CT 安装方式如图 3-5 所示，（以某一相为例，其余两相连接方式相同）

Current transformer is installed on the load side, and the installation mode of current transformer is shown in Fig. 3-5 (take a certain phase as an example, the other two phases are connected in the same way).

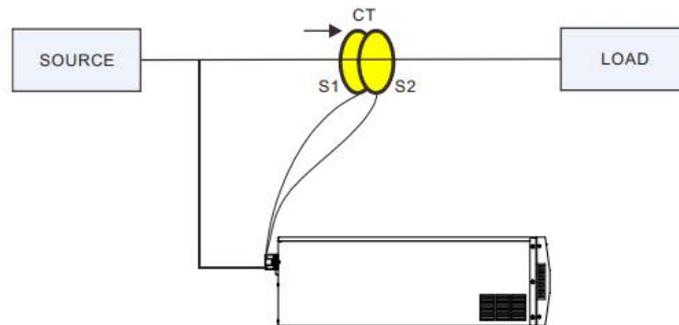


图 3-5 CT 装于负载侧示意图

Fig. 3-5 Schematic diagram of CT installed on the load side

2) 负载侧有大电容的情况下，可选择以下三种安装方式。

When there is a large capacitor on the load side, the following three installation methods can be selected.

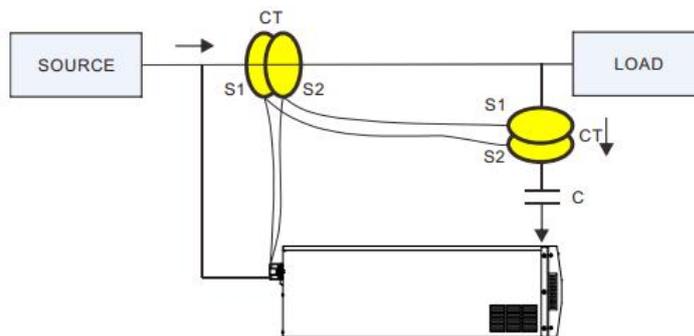


图 3-6 方式一

Fig. 3-6 Mode 1

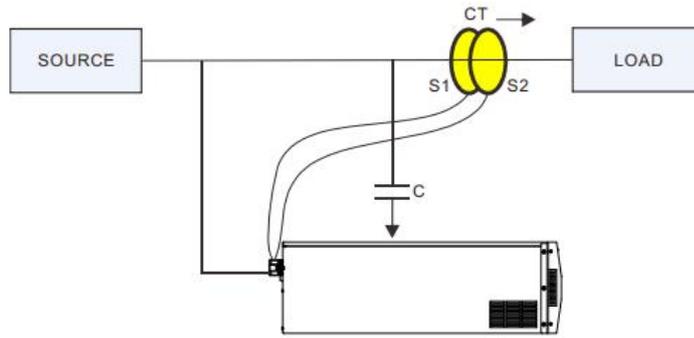


图 3-7 方式二
Fig. 3-7 Mode 2

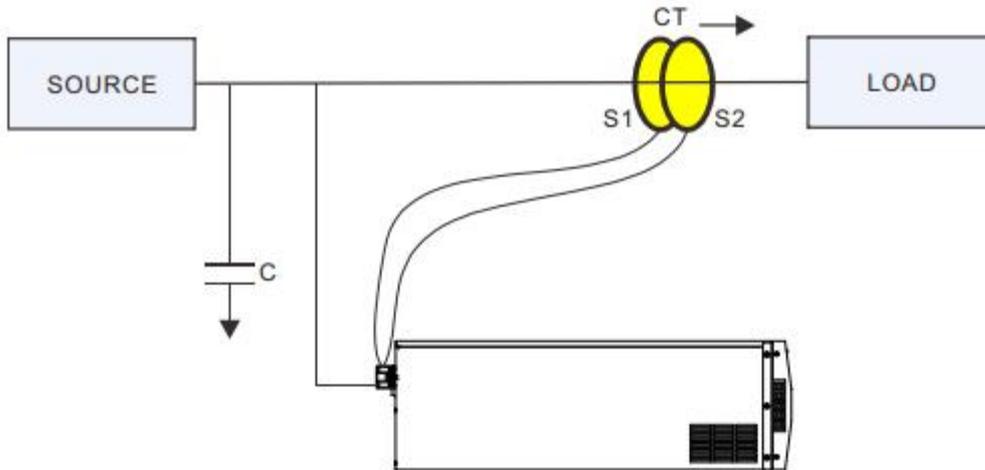


图 3-8 方式三
Fig. 3-8 Mode 3

- 3) 若用户端不方便将 CT 装于负载侧，则可按以下方式装于电源侧。（箭头方向为 CT 的正方向，此箭头方向要与 CT 本身壳体外的箭头方向一致）

If it is not convenient for the user to install the CT on the load side, it can be installed on the power source side as follows. (The direction of the arrow is the positive direction of the CT, and the direction of the arrow should be consistent with the direction of the arrow outside the CT itself)

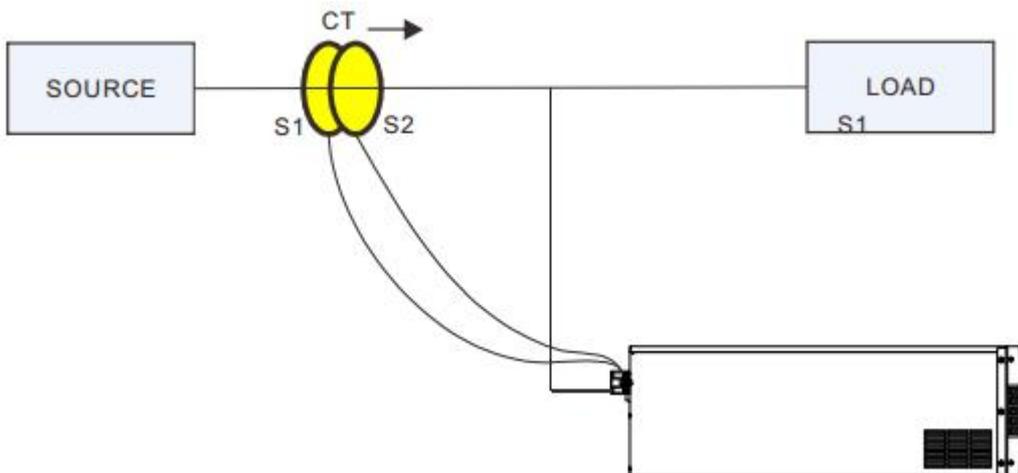


图 3-9 CT 装于源侧示意图

Fig. 3-9 Schematic diagram of CT installed on the power source side

- 4) 电源侧有大电容时，可按以下两种方式进行接线。

When there is a large capacitor on the power source side, wiring can be done in the following two ways.

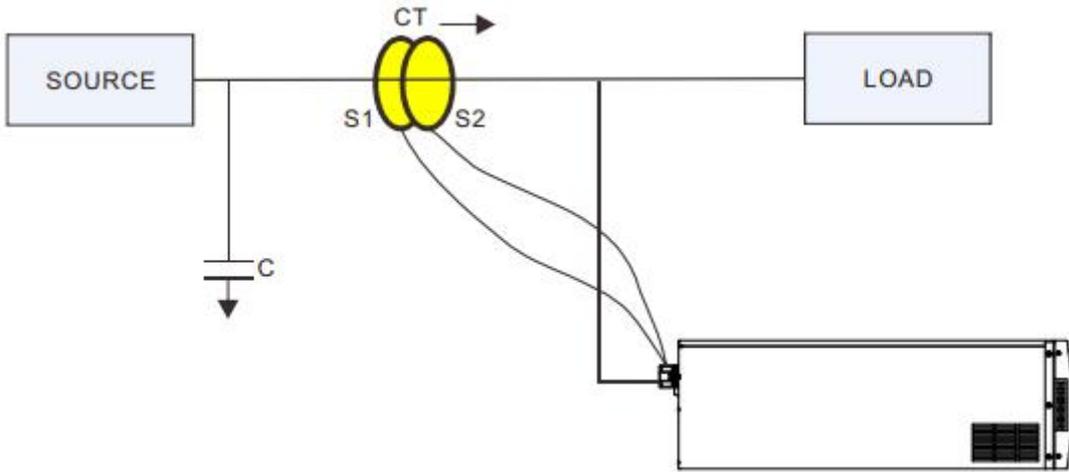


图 3-10 方式一
Fig. 3-10 Mode

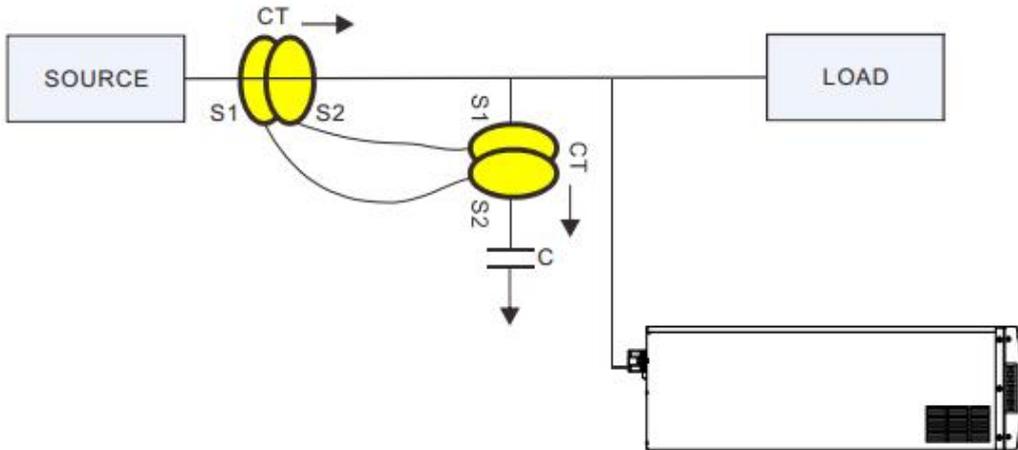


图 3-11 方式二
Fig. 3-11 Mode 2

5) CT 安装于电源侧，负载侧有大电容的安装方式如图 3-12。

The CT is installed on the power source side, and the installation method with large capacitors on the load side is shown in Fig. 3-12.

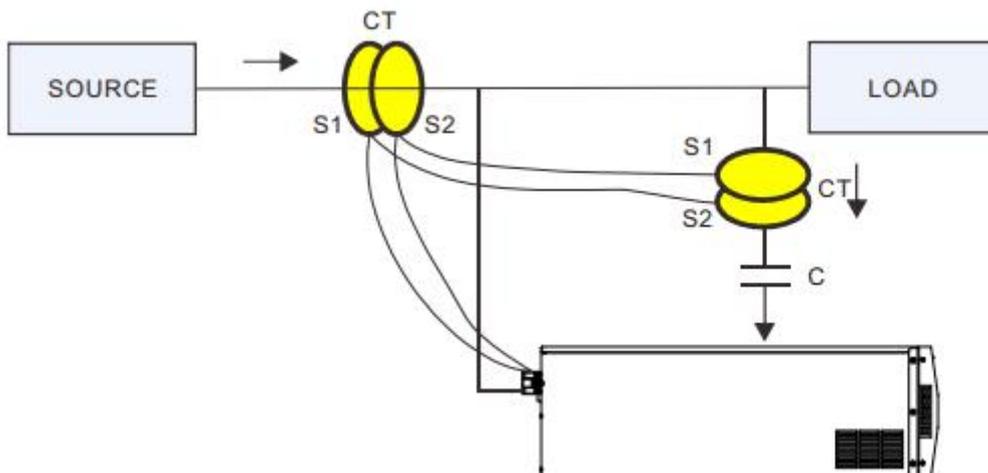


图 3-12 CT 安装于源测，负载侧有大电容

Fig. 3-12 CT installed on power source side and there is a large capacitor on the load side

6) 两个电流互感器二次侧连接方式，如图 3-13。

The secondary side connection mode of two current transformers is shown in Fig. 3-13.

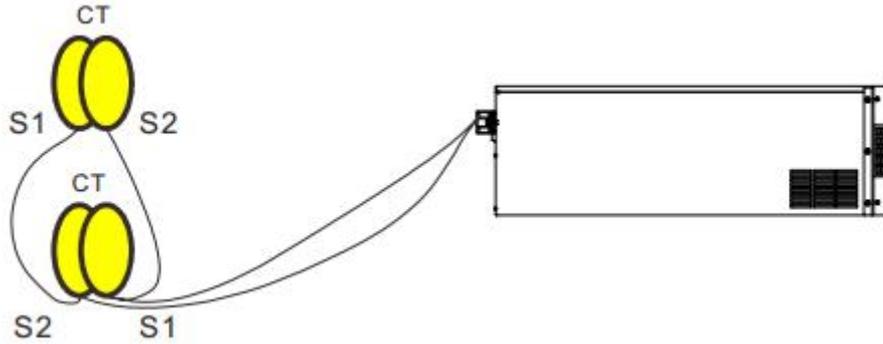


图 3-13 两个 CT 二次侧互连方式

Fig. 3-13 Secondary side interconnection mode of two current transformers

- 7) 并机系统中，如果电流互感器无法安装在模块化设备和负载之间，则允许安装两套变比一致的电流互感器，其中一套电流互感器安装在电源侧，另一套电流互感器安装在并机系统的输出端。同一相的两个 CT 的输出端再并联在一起。（注意：信号电缆 AB 的长度与 AC 的长度要等长），具体连接方式如图 3-14。

In the parallel system, if the current transformer cannot be installed between the modular equipment and the load, it is allowed to install two sets of current transformers with the same transformation ratio. One set of current transformers is installed on the power source side and the other set of current transformers is installed at the output end of the parallel system. The output terminals of the two current transformers of the same phase are then connected in parallel. (Note: The length of signal cable AB and AC must be the same length), the specific connection method is shown in Fig. 3-14.

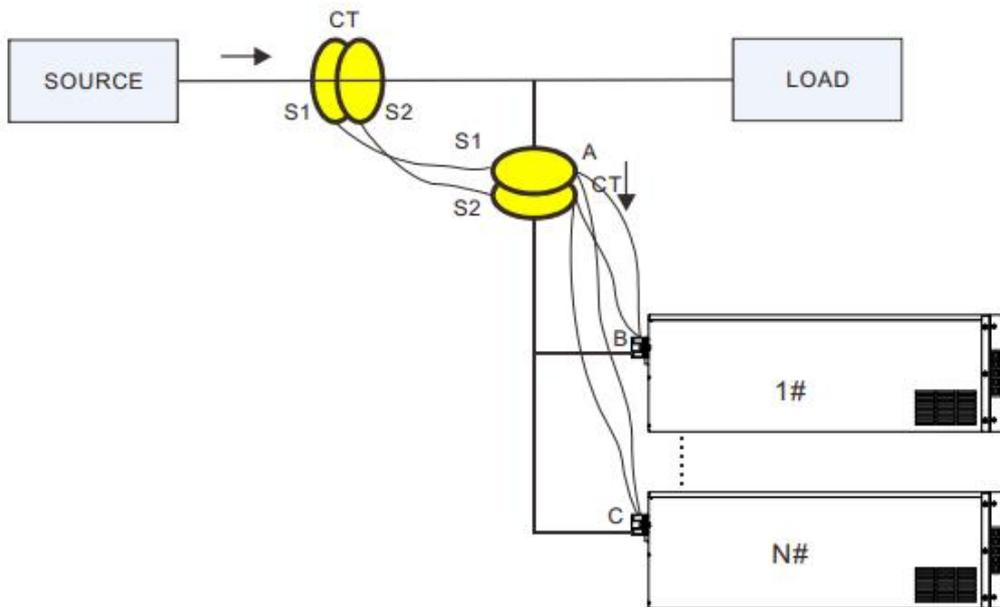


图 3-14 N 台并联设备源侧接 CT 接线示意图

Fig. 3-14 Schematic diagram of CT wiring connection of N# parallel equipment source side

第 5 章 通电试运行

Section 5 Power-on Commissioning

设备通电试运行必须按照如下操作进行！

The power-on commissioning of the equipment must be carried out as follows!

 **警告 WARNING**

✓试运行之前，必须保证您已经仔细阅读并熟知该设备的操作过程（本手册第 5 章内容），并且一定要注意直流侧电压！

Before commissioning, you must ensure that you have read and know the equipment operation process (chapter 5 of this manual) in detail, and must pay attention to the DC side voltage!

试运行过程包括如下步骤：

The commissioning process includes the following steps:

安装检查→电源相序检查→电流互感器检查→启动滤波器→数据监控→关闭滤波器

Installation inspection → power phase sequence inspection → current transformer inspection → start filter → data monitoring → close filter

5.1 安装检查 Installation inspection

- a. 检查设备模块是否安装平稳；
 - b. 检查设备的主回路电缆及电流互感器的电流采样线是否牢固；
 - c. 检查机柜及电流互感器的接地线是否牢固；
 - d. 检查输入接线端子 A、B、C、N、PE 是否牢固；
 - e. 检查触摸屏显示盒是否有连接线脱落；
 - f. 检查完毕后进入相序检查阶段。
- a. Check whether the equipment module is installed smoothly;
 - b. Check whether the main loop cable of the equipment and the current sampling line of the current transformer are firm;
 - c. Check whether the grounding wires of the cabinet and current transformer are firm;
 - d. Check whether the input terminals A, B, C, N and PE are firm;
 - e. Check whether the connecting wires of the touch screen display box have come off;
 - f. Enter the phase sequence inspection stage after completion of the inspection.

5.2 相序检查 Phase sequence inspection

输入电压必是正相序(A—B—C—N)连接，错相会造成设备不能正常运行！ 检查相序办法：

The input voltage must be in the positive phase sequence (A-B-C-N) connection, the wrong phase will cause the equipment to not operate normally! The method of checking the phase sequence is as follows:

1. 查线：确保设备的相序与电网相序一致；
 2. 用相序表检查。
1. Check the line: ensure that the phase sequence of the equipment is consistent with the phase sequence of the grid;
 2. Check with phase sequence table.

相序检查正确后进入互感器检查阶段。

After the phase sequence is checked, start the current transformer inspection.

5.3 互感器检查 Current transformer inspection

错误的互感器连接是造成设备不能正常运行的最主要原因！

Wrong transformer connection is the most important reason for the equipment not to operate normally!

请按图 3-4 或图 3-5 检查互感器接线，互感器接线检查无误后方可进入启动滤波器阶段。

Please check the wiring of the transformer according to Fig. 3-4 or Fig. 3-5. After the transformer wiring is checked, the filter can be started.

5.4 启动设备 Start the equipment

1.启动前确认 Confirm before start

上述检查无误后，闭合主电源与设备之间的隔离开关。液晶显示屏启动并进入监控界面，同时绿色指示灯以 1s 的间隔闪烁。通过监控界面查看三相输入电压值是否正常（230V 左右）；通过翻页命令进入第 2 页查看电网频率是否正常（50Hz）直流母线电压是否正常（630V 左右）。

2.启停机 Start/stop operation

上述参数确认无误后，按照 4.4 章节的描述进行启停机操作。

After the above parameters are confirmed to be correct, start and stop operation shall be carried out according to the description in Section 4.4.

5.5 关闭设备 Shut down the equipment

一种方法是进入监控画面，点击“停止”按钮，模块将停止运行；此种关闭模式只关闭了系统中功率器件的运行，使模块处于待机状态，但是模块仍带电。

One method is to enter the monitoring screen and click the "Stop" button, the module will stop running; this shutdown mode only shuts down the operation of the power devices in the system, making the module in a standby state, but the module is still powered.

另一种方法是直接断开模块与电源间的隔离开关，这种方式断电后模块将不带电。

Another method is to directly disconnect the isolating switch between the module and the power supply. In this way, the module will not be powered.

客户可根据实际情况选择关闭设备的方式。

The client can choose the way to shut down the equipment according to the actual situation.

第 6 章 集中与远程监控式系统操作说明

Section 6 Centralized and Remote Monitoring System Operating

Instructions

西驰电气研发的该设备具备集中与远程监控功能。

The device, developed by Spread Electric, has both centralized and remote monitoring capabilities.

在集中监控式系统中，各单机模块的液晶触摸屏将不再起作用；系统通过集中式触摸监控屏 (MCGS) 来完成各参数的设置和数据显示。

In the centralized monitoring system, the LCD touch screen of each single module will no longer function. The system completes the parameter setting and data display through the centralized touch monitor screen (MCGS).

远程监控式除了配备 MCGS 触摸屏外，还可通过与上位机的通讯完成参数设置及数据监控。

In addition to the MCGS touch screen, the remote monitoring system can also complete parameter setting and data monitoring through communication with the upper computer.

6.1 集中监控式通讯接口说明 Description of centralized monitoring communication interface

该设备为集中监控式触摸屏专门配备了 RS485 通讯接口板，集中监控通讯格式默认为 RS485，若需使用 RS232 通讯，则可通过通讯接口板进行 RS485 - RS232 转换。通过 RS485 通讯接口板实现大屏与整柜抽屉式内各个模块间的通讯。

The device is specially equipped with RS485 communication interface board for the centralized monitoring touch screen. The communication format of the centralized monitoring is RS485 by default. If RS232 is needed for communication, RS485 - RS232 conversion can be carried out through the communication interface board. Through RS485 communication interface board, the communication between the large screen and each module in the drawer can be realized.

RS485 通讯板如图示 6-1 所示，其中，RS485 的端口 A (7)和 B (8)的接线需与单元模块后端的 A 和 B 逐一对应。

RS485 communication board is shown in Figure 6-1, where the wiring of ports A (7) and B (8) of RS485 should correspond to A and B one by one at the back end of the unit module.



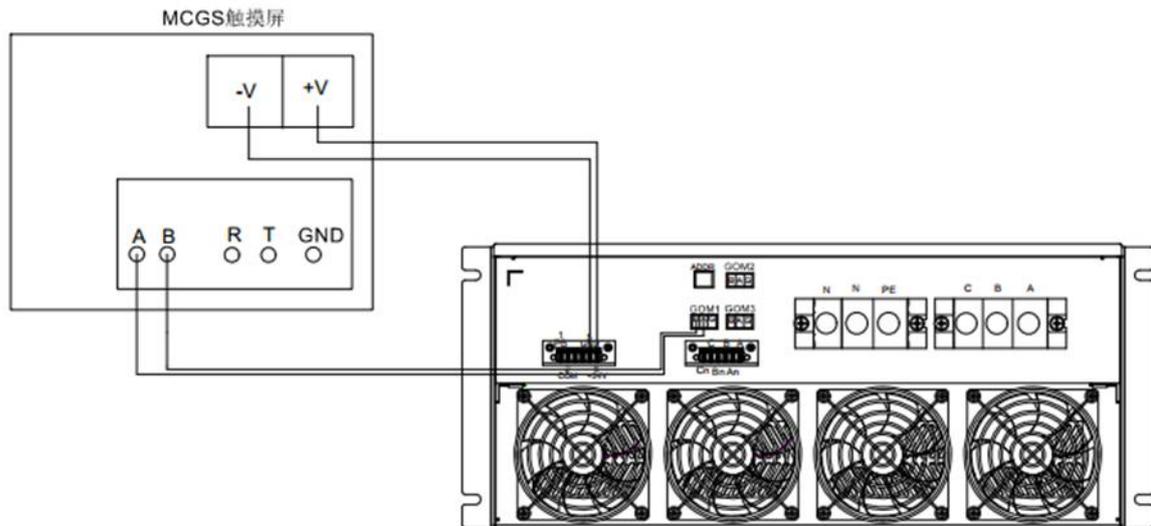
图 6-1 RS485 通讯接口板

Fig. 6-1 RS485 Communication interface board

6.2 集中监控式通讯接线说明 Description of centralized monitoring communication wiring

柜机抽屉式单台模块通讯接线如下图 6-2 所示：

The communication wiring of the drawer type single module of the cabinet is shown in Figure



6-2:

图 6-2 单台模块通讯接线方式

Fig. 6-2 Communication wiring mode of single module

触摸屏 Touch screen

完成接线后，技术人员需做以下检查：

After wiring is completed, the technician shall make the following inspection:

1. MCGS 触摸屏供电电源的正负极性是否正确连接
2. 通讯接口的 RS485 中的 A (7)和 B (8)与通讯模块是否一一对应;
1. Whether the positive and negative polarities of the MCGS touch screen's power supply are connected correctly
2. Whether A (7) and B (8) in RS485 of communication interface are one-to-one correspondence with communication module.

按照柜机中放置模块数量进行拨码调节，每台必须设置不同的地址码，具体参数设置见表 6-1。

柜机抽屉式多模块（2 台及以上）通讯接线方式如图 6-3,各模块之间接线采用串联方式。

Dial code is adjusted according to the number of modules placed in the cabinet. Different address codes must be set for each machine. See Table 6-1 for specific parameter setting.

The communication wiring of the drawer type multi-module (2 and above) of the cabinet is shown in Figure 6-3, and the wiring between the modules is connected in series.

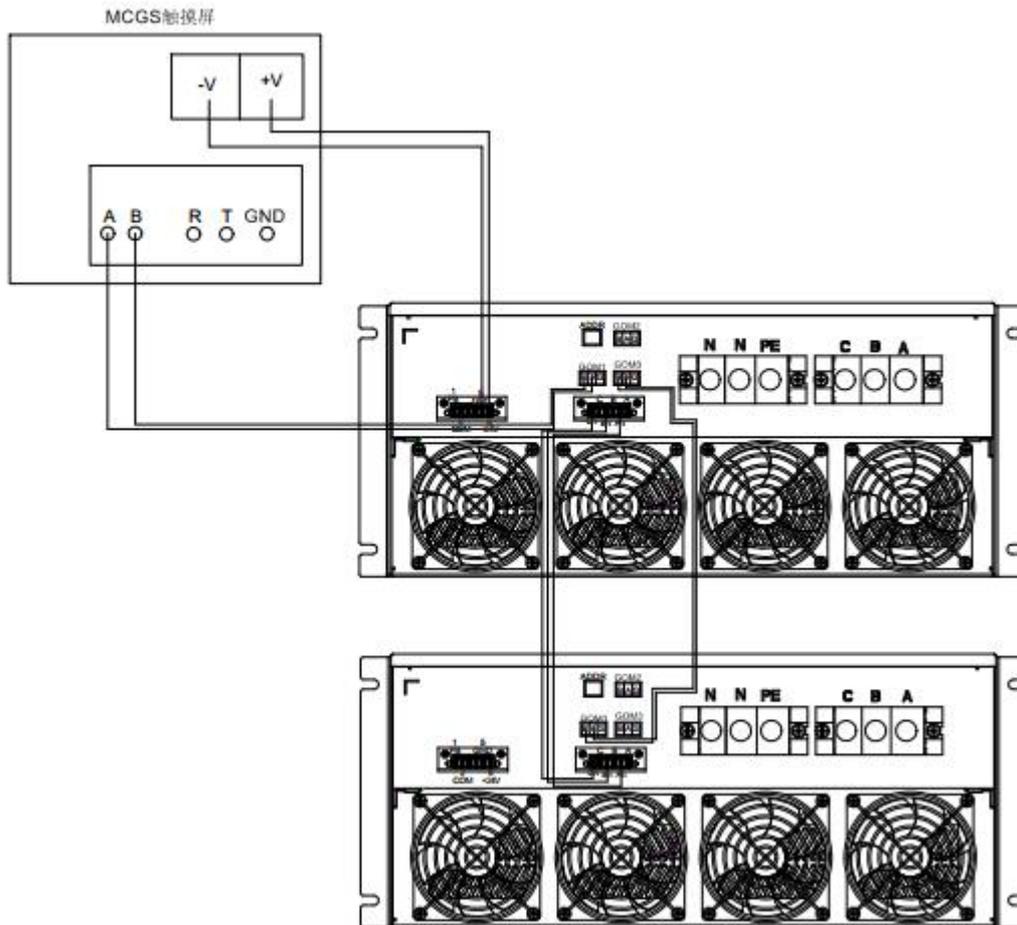


图 6-3 多模块通讯接线方式

Fig. 6-3 Communication wiring mode of multi-module

6.3 集中监控式地址设置 Centrally monitored address settings

针对柜机抽屉式多模块（2 台及以上）集中监控地址设置，其每台必须设置不同的地址码。地址码可通过模块背面的拨码开关来设置，拨码开关从左往右计数，拨码拨上为地址 1,拨下为地址 0。

For the centralized monitoring address setting of the drawer type multi-module (2 and above) of the cabinet, each of them must be set with a different address code. The address code can be set by the DIP switch on the back of the module. The DIP switch counts from left to right. Dial up is address 1 and dial down is address 0.

柜机内部模块数量与拨码地址对应关系如下表 6-1 所示：

The corresponding relationship between the number of internal modules of the cabinet and the dialing address is shown in Table 6-1:

表 6-1 柜机模块数量与拨码地址对表

Table 6-1 Table for comparison between the number of cabinet modules and dial code address

柜机模块数量 Number of cabinet module	地址	具体拨码位置（从右至左） Specific dial position (from right to left)
第一台 First	0001	下下下上 Down down down up
第二台 Second	0010	下下上下 Down down up down
第三台 Third	0011	下下上上 Down down up up
第四台 Forth	0100	下上下下 Down up down down
第五台 Fifth	0101	下上下上 Down up down up
第六台 Sisth	0110	下上上下 Down up up down

6.4 集中监控式系统参数设置 Centralized monitoring system parameter setting

对于配有 MCGS 触摸屏的整柜抽屉式设备，其参数介绍及具体设置如下。

For full cabinet drawer-type equipment equipped with MCGS touch screen, its parameters and specific settings are as follows.

6.4.1 监控画面 Monitoring picture

闭合隔离开关，完成系统上电。待触摸屏数据加载完成后，点击“有源电力滤波器”选项，进入状态监控主界面，如下图 6-4 所示：

Close the isolation switch to power the system. After the data is loaded on the touch screen, click "Active Power Filter" to enter the main interface of status monitoring, as shown in Figure 6-4 below:

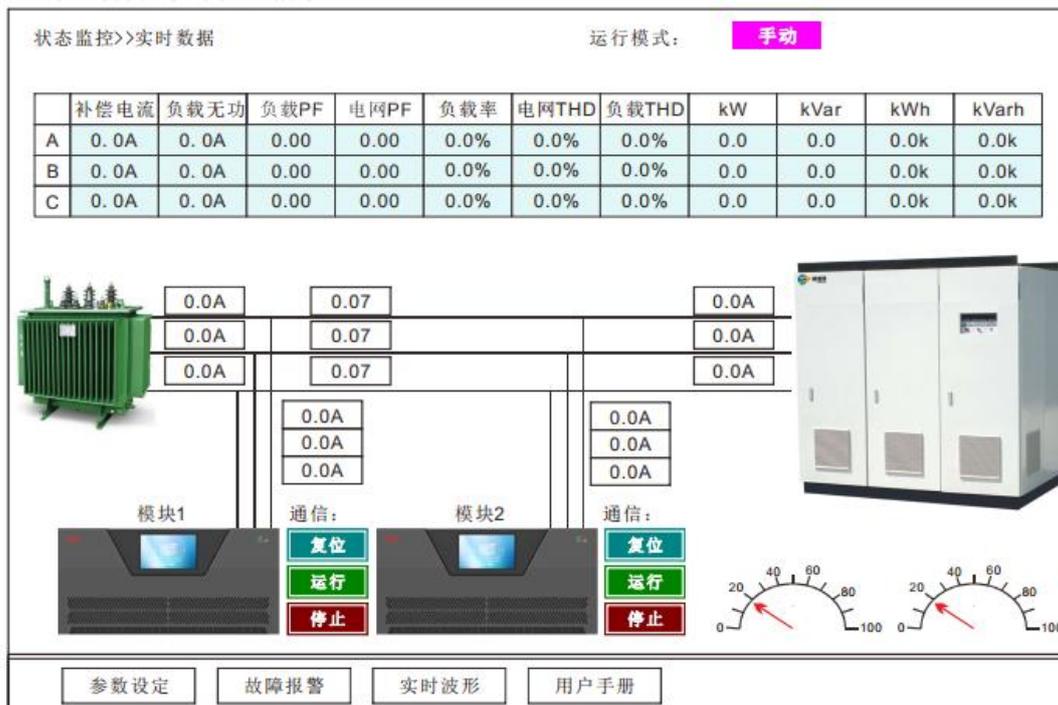


图 6-4 状态监控界面

Fig 6-4 Status monitoring interface

状态监控	Status monitor	负载 THD	Load THD	复位 Reset
实时数据	Real-time data	模块 1	Module 1	运行 Run
运行模式	Running mode	通讯	Communication	停止 Stop
补偿电流	Compensation current	参数设置	Parameter setting	
负载无功	Load reactive power	故障报警	Fault alarm	
负载 PF	Load PF	实时波形	Real-time waveform	
负载率	Load rate	用户手册	User's manual	
电网 THD	Power grid THD			

1) 系统信息 System information

提供了系统在运行时的实时数据，包含补偿电流、负载无功、负载 PF、电网 PF、负载率、电网 THD、负载 THD、有功功率、无功功率、有功电量、无功电量等。

Real-time data of the system during operation is provided, including compensation current, load reactive power, load PF, power grid PF, load rate, power grid THD, load THD, active power, reactive power, active power, and reactive power.

2) 系统菜单 System menu

可实现“状态监控主界面”和“实时数据”的切换，方便用户进行参数监控；

It can realize the switch between "main interface of status monitoring" and "real-time data", which is convenient for users to monitor parameters;

运行模式默认上电为“手动”，可点击切换为“自动”，与之相关的参数在“实时数据”的投切上限、投切下限、检测周期、轮换周期进行设置，详细介绍见“实时数据界面”说明。

The default running mode is "Manual" when powered on, and you can click to switch to "Auto". The related parameters are set in the upper limit of switching, lower limit of switching, detection period, and rotation period of "Real-time data". For details, see description of "Real-time" data interface".

右上角为系统中英文切换键。

The upper right corner is the system Chinese and English switch key.

3) 数据信息 Data information

a、显示各模块在电网系统中的主回路接线、通讯状态、模块启停复位键、各单个模块的最高温度、电网电流、电网电压、负载电流及补偿电流等信息。

Display the main circuit connection, communication status, start-stop and reset key of each module, maximum temperature of each single module, power grid current, power grid voltage, load current and compensation current of each module in the power grid system.

b、当系统上电未启动，相应的模块通道处于开启状态时，其通信代码显示 0，电网相电压应在 220V-250V 之间。若通信代码显示 1 或 2 时，电网电压显示 0V 或其他不正常的电压值，则证明通讯不正常，请检查通讯连接及地址码。

When the system is powered on but not started, and the corresponding module channel is in the open state, its communication code shows 0, and the grid phase voltage should be between 220V-250V. If the communication code shows 1 or 2, the grid voltage shows 0V or other abnormal voltage value, which proves that the communication is abnormal. Please check the communication connection and address code.

c、点击“模块 1、模块 2.....”的“绿色运行”键，各个对应模块运行，系统开始抑制谐波、补偿无功，点击“红色停止”键，相应模块退出运行，停止待机；“复位”键可在系统出现可以恢复的故障时点击有效。

Click "Module 1, Module 2..." the system begins to suppress harmonics and compensate reactive power. Click the "red stop" button, and the corresponding module exits the operation and enters the standby. The "Reset" key is available in the event of a recoverable failure of the system.

4) 系统菜单 System menu

点击可进入参数设定、故障报警、实时波形、用户手册界面，用户可进行参数设置和数据查看。

Click to enter the interface of parameter setting, fault alarm, real-time waveform and user manual. Users can set parameters and view data.

6.4.2 实时数据界面 Real-time data interface

用户点击进入“实时数据”界面，可查看系统当前运行的数据。如下图 6-5 所示：

Users can click "Real-time data" to enter its interface to view the data currently running in the system.

As shown in Figure 6-5 below:

状态监控>>实时数据		本机地址：0x0B								A相	B相	C相
A相谐波	0	0	0	0	0	0	0	0	0	0	0	
OFF	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	
OFF	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	
OFF	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	
OFF	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	
OFF	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	
OFF	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	
	直流电压	直流波动	中点电压	中点波动	温度A	温度B	温度C	--	电网频率	互感器		
OFF	0.0V	00.0V	0.0V	0.0V	0.0℃	0.0℃	0.0℃		0.0Hz	0.5		
OFF	0.0V	0.0V	0.0V	0.0V	0.0℃	0.0℃	0.0℃			0.5		
OFF	0.0V	0.0V	0.0V	0.0V	0.0℃	0.0℃	0.0℃	投切上限	0%	0.5		
OFF	0.0V	0.0V	0.0V	0.0V	0.0℃	0.0℃	0.0℃	投切下限	0%	0.5		
OFF	0.0V	0.0V	0.0V	0.0V	0.0℃	0.0℃	0.0℃	检测周期	0s	0.5		
OFF	0.0V	0.0V	0.0V	0.0V	0.0℃	0.0℃	0.0℃	轮换周期	0h	0.5		
<div style="display: flex; justify-content: space-around;"> 参数设定 故障报警 实时波形 用户手册 </div>												

图 6-5 实时数据界面

Fig. 6-5 Real-time data interface

状态监控	Status monitor	温度 A	Temperature
实时数据	Real-time data	电网频率	Power grid frequency
本机地址	Local address	互感器	Transformer
A 相谐波	Phase A harmonics	参数设置	Parameter setting
直流电压	DC voltage	故障报警	Fault alarm
直流波动	DC fluctuation	实时波形	Real-time waveform
中点电压	Mid-point voltage	用户手册	User's manual
中点波动	Mid-point fluctuation		

- a、上侧菜单栏可查看本机地址并进行 A 相、B 相、C 相谐波数据监控切换；

In the upper menu bar, the address of the machine can be viewed and the harmonics data of phases A, B and C can be monitored and switched.

- b、中间部分为当前设备运行补偿后负载侧各次谐波和当前系统直流电压、直流波动、中点电压、中点波动、温度 A、温度 B、温度 C 的实时数据，用户可进行数据监控。

The middle part is the real-time data of the current system's DC voltage, DC fluctuation, mid-point voltage, mid-point fluctuation, temperature A, temperature B and temperature C after the current equipment operation is compensated, which can be monitored by the user.

- c、界面右下角为“运行模式”的设置参数，一般设置为投切上限——75%，投切下限——25%，检测周期——120s，轮换周期——240h，用来表示当多个模块开启运行时，系统程序在120s周期内检测，若负载率高于额定75%、低于额定25%时，在运行240h之后，系统将自动退出之前第一台开启的模块，从而切换至另一台模块运行，以保证系统整体的可靠运行。

The lower right corner is the setting parameter of "Running Mode", generally set as the upper limit of switching-75%, the lower limit of switching-25%, detection cycle-120s, rotation cycle-240h, used to indicate when multiple modules are turned on, the system program will detect in a 120s period. If the load rate is higher than 75% of the rated value and lower than 25% of the rated value, after 240 hours of operation, the system will automatically exit the first opened module before switching to another one so as to ensure the reliable operation of the system as a whole.

- d、查看“电网频率”是否为50Hz，若频率为-50Hz，则证明输入相序有反相现象，需对输入相序线进行倒相，对互感器二次侧输出S1、S2同样进行反相。

Check whether the "grid frequency" is 50Hz. If the frequency is -50Hz, it proves that the input phase sequence is reversed. The input phase sequence line needs to be reversed, and the transformer secondary side outputs S1 and S2 are also reversed.

注意：互感器二次侧不能开路，倒相时需要将配电箱内的主电源完全切断；

Note: The secondary side of the transformer cannot be opened, and the main power supply in the distribution box needs to be completely cut off during phase inversion.

- e、设置“互感器”变比。与工程技术人员确认互感器变比，输入互感器一次侧数据，例如：互感器变比为3000:5，则输入3000；

Set the "transformer" ratio. Confirm the transformation ratio of the transformer with the engineering and technical personnel, and enter the primary side data of the transformer. For example, if the transformation ratio of the transformer is 3000:5, then enter 3000;

6.4.3 参数设定界面 Parameter setting interface

点击进入“参数设定”界面，输入密码“XCDQ”确定后，进入参数设置界面。

Click "Parameter setting" to enter its interface. After entering the password "XCDQ", enter the parameter setting interface.

注意：该部分为厂家参数，内部参数除了设备1、设备2.....的通讯开启，其他一般不建议用户自行修改。如下图6-6、图6-7所示：

Note: This part is the manufacturer's parameters. The internal parameters are generally not recommended to be modified by the user, except that the communication of device 1, device 2... is turned on. As shown in Figure 6-6 and Figure 6-7:

		谐波次数	3	5	7	9	11	13	15	17	19	21
设备1	ON	相位	0	0	0	0	0	0	0	0	0	0
0V	0V	幅值	0	0	0	0	0	0	0	0	0	0
容量	0A	限幅	0	0	0	0	0	0	0	0	0	0
设备2	ON	相位	0	0	0	0	0	0	0	0	0	0
0V	0V	幅值	0	0	0	0	0	0	0	0	0	0
容量	0A	限幅	0	0	0	0	0	0	0	0	0	0
设备3	OFF	相位	0	0	0	0	0	0	0	0	0	0
0V	0V	幅值	0	0	0	0	0	0	0	0	0	0
容量	0A	限幅	0	0	0	0	0	0	0	0	0	0

说明：点击设备1、设备2.....来启动或关闭对应的模块，点击后稍等几秒生效。 << 1/4 >>

图 6-6 参数设置界面

Fig. 6-6 Parameters setting interface

状态监控	Status monitor
实时数据	Real-time data
谐波次数	Harmonic number
设备 1	Unit 1
容量	Capacity
相位	Phase
限幅	Amplitude limit
说明：点击..... Remark: click the equipment 1, 2, etc. to start or stop the corresponding module. After clicking, it will take effect in several seconds.	

状态监控>>实时数据

		谐波次数	3	5	7	9	11	13	15	17	19	21
设备4	OFF	相位	0	0	0	0	0	0	0	0	0	0
	0V	幅值	0	0	0	0	0	0	0	0	0	0
	容量	限幅	0A	0	0	0	0	0	0	0	0	0
设备5	OFF	相位	0	0	0	0	0	0	0	0	0	0
	0V	幅值	0	0	0	0	0	0	0	0	0	0
	容量	限幅	0A	0	0	0	0	0	0	0	0	0
设备6	OFF	相位	0	0	0	0	0	0	0	0	0	0
	0V	幅值	0	0	0	0	0	0	0	0	0	0
	容量	限幅	0A	0	0	0	0	0	0	0	0	0

说明：点击设备1、设备2.....来启动或关闭对应的模块，点击后稍等几秒生效。 << 2/4 >>

图 6-7 参数设置界面

Fig. 6-7 Parameters setting interface

a、“参数设置”的第一页和第二页可对于柜机抽屉式内部模块进行通讯开启和谐波相关参数的相应设置。用户可以依照柜机内部的模块总数来开启对应的设备数呈，点击左侧设备的“OFF”键，当显示由“OFF”切换为“ON”时，表示已完成与大屏的通讯连接。设备下方数值表示当前母线电压值，当模块未启动时显示电压 540V-600V 左右，启动后显示电压 740V；“OFF”下方数值农示中点电压波动值，一般显示 0；容量数值为系统通讯得到的模块容量值。

The first and second pages of "Parameter Setting" can enable the communication of the drawer-type internal modules of the cabinet and the corresponding setting of harmonic related parameters. The user can turn on the corresponding number of devices according to the total number of modules inside the cabinet. Click the "OFF" button on the left, when the display switches from "OFF" to "ON", it means that the communication connection with the large screen has been completed. The value below indicates the current bus voltage value. When the module is not started, the display voltage is about 540V-600V, and after startup, the voltage is 740V. The value below "OFF" shows the midpoint voltage fluctuation value, generally showing 0. The capacity value is the module capacity value obtained by system communication.

b、屏幕右侧数据为谐波相位、幅值和限幅的设置，此处出厂已做设定，用户一般无须进行修改。

The data on the right of the screen are settings of harmonic phase, amplitude and amplitude limit. The settings have been set by the factory, and users generally do not need to modify them.

点击右下角“>>”进行翻页，进入参数设置第 3 页，如下图 6-8 所示：

Click "»" in the lower right corner to turn the page and enter page 3 of parameter settings, as shown in Figure 6-8 below:

状态监控>>实时数据										
	设备1	设备2	OFF	OFF	OFF	OFF		互感器	总容量	总限流
过流阈值	0	0	0	0	0	0	设备 1	0	0	0%
过压阈值	0	0	0	0	0	0	设备 2	0	0	0%
欠压阈值	0	0	0	0	0	0	OFF	0	0	0%
稳压目标	0	0	0	0	0	0	OFF	0	0	0%
温度阈值 1	0	0	0	0	0	0	OFF	0	0	0%
温度阈值 2	0	0	0	0	0	0	OFF	0	0	0%
功率因数	0	0	0	0	0	0				
中点阈值	0	0	0	0	0	0				
保护预留	0	0	0	0	0	0				
工作模式	0	0	0	0	0	0				
							并机数量		1	

图 6-8 参数设置界面

Fig. 6-8 Parameters setting interface

状态监控	Status monitor	中点阈值	Midpoint threshold
实时数据	Real-time data	保护预留	Protection reserve
设备 1	Unit 1	工作模式	Working mode
过流阈值	Overcurrent threshold	互感器	Transformer
欠压阈值	Undervoltage threshold	总容量	Total capacity
稳压目标	Voltage regulation target	总限流	Total current limit
温度阈值 1	Temperature threshold 1	并机数量	No. of parallel units
功率因数	Power factor		

- a、 屏幕左侧项目分别为设备部分保护参数的设定。按照已打开的设备 1 至设备 6，对于 50A 和 100A 模块，分别查看其过流阈值（1300）、 过压阈值（3600）、 欠压阈值（2500）、 稳压目标（740）、 温度阈值 1（85）、 温度阈值 2（600）、 功率因数（0）、 中点阈值（200）、 保护预留（1700）、 工作模式（0）是否正确。此处参数出厂已做相应设置，用户只需进行检查确认，无须更改；

The left of the screen are the setting of protection parameters of the equipment. According to the started units 1 to 6, for 50A and 100A modules, check whether the overcurrent threshold (1300), overvoltage threshold (3600), undervoltage threshold (2500), voltage regulation target (740), and temperature threshold 1 (85), temperature threshold 2 (600), power factor (0), midpoint threshold (200), protection reserve (1700), and working mode (0) are correct. The parameters here have been set accordingly at the factory, and the user only needs to check and confirm, without changing;

备注：30A 模块的过流阈值为 800，保护预留为 1000

Note: The overcurrent threshold of 30A module is 800, and the protection is reserved for 1000.

- b、 屏幕右侧“互感器”参数为其变比一次侧数据，总容量显示为各个设备的容量值，总限流出厂值为 100%；

The "Transformer" parameter on the right side of the screen is its transformation ratio primary side data, the total capacity is displayed as the capacity value of each unit, and the total current limit factory value is 100%;

- c、 右下角为“并机数量”，表示几台柜机的并机数量，并不代表单台柜机抽屉式内部的模块数量。

Click the button  in the upper right corner to enter the main interface, click "Fault Alarm" to enter the real-time alarm interface, as shown in Figure 6-10:

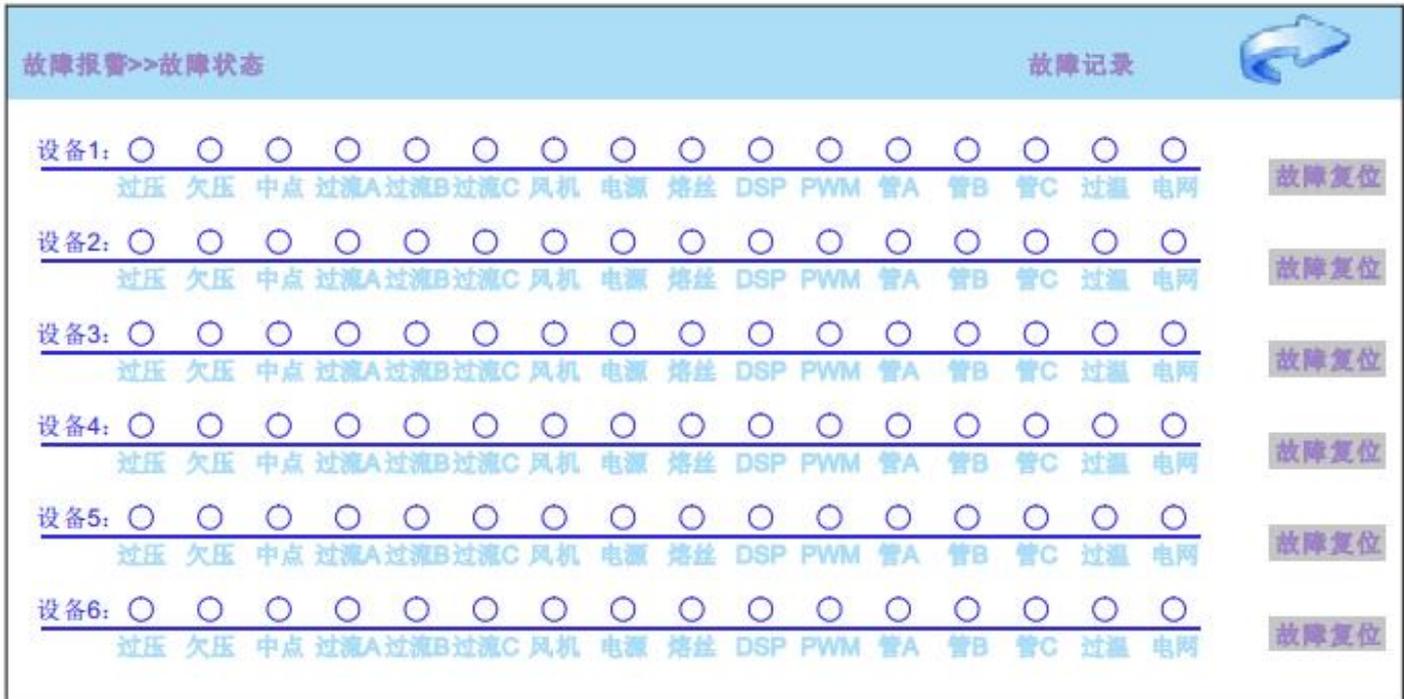


图 6-10 报警界面

Fig. 6-10 Alarm interface

状态监控	Status monitor	故障记录	Fault history
实时数据	Real-time data	故障复位	Fault reset
设备 1	Unit 1	电源	Power source
过压	Overvoltage	熔丝	Fuse
欠压	Undervoltage	管 A	Pipe A
中点	Midpoint	过温	Over-temperature
过流 A	Overcurrent A	电网	Power grid
风机	Fan		

当系统出现故障时，点击进入故障报警界面，对应故障灯将会变亮；右侧为故障复位，右上角为历史故障。点击进入查看历史故障报警查询，如下图 6-11 所示。具体故障解决方法请参阅第 8 章内容。

When the system fails, click "Fault alarm" to enter the fault alarm interface, and the corresponding fault light will turn on; the right side is fault reset, and the upper right corner is the historical fault. Click it to enter and view historical alarm query, as shown in Figure 6-11. Please refer to Section 8 for specific troubleshooting methods.

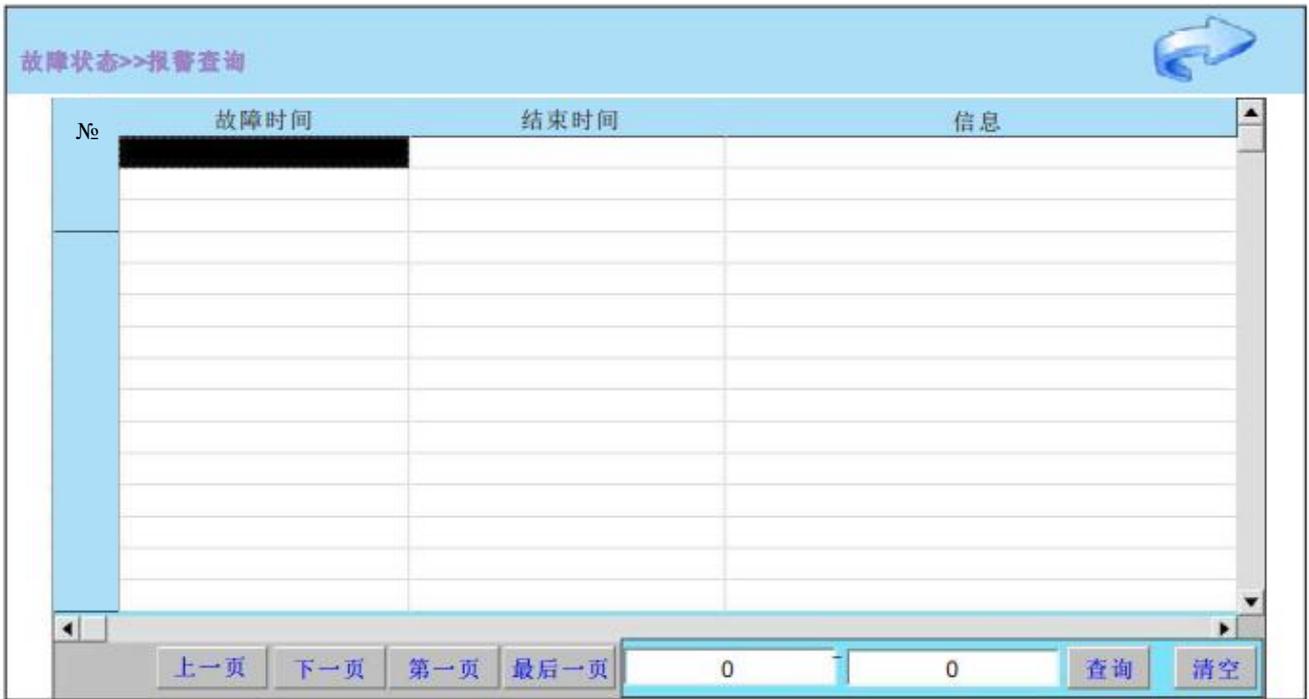


图 6-11 报警查询界面

Fig. 6-11 Alarm query interface

故障时间 Fault time 结束时间 End time 信息 Information
 上一页 Previous 下一页 Next 第一页 First 最后一页 Last
 查询 Query 清空 Clear

6.4.5 实时波形 Real-time waveform

点击主界面“实时波形”进入“曲线显示”如下图 6-12 和 6-13 所示：

Click "Real-time Waveform" on the main interface to enter the "Curve Display" as shown in Figure 6-12 and 6-13 below:



图 6-12 曲线显示界面

Fig. 6-12 Curve display interface

A 相补偿 Phase A compensation 补偿前电流 Pre-compensation current
 补偿电流 Compensation current 补偿后电流 Post-compensation current
 电流曲线 Current curve 时域分析 Time domain analysis 频域分析 Freq. domain analysis

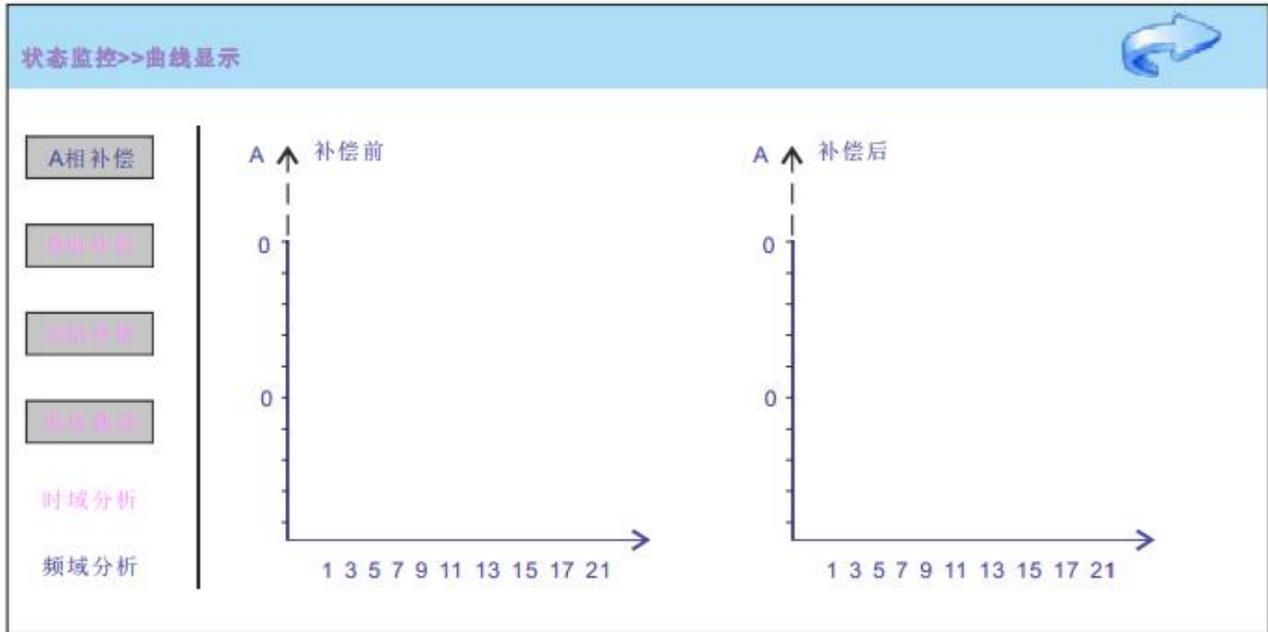


图 6-13 曲线显示界面

Fig. 6-13 Curve display interface

补偿前 Before compensation

补偿后 After compensation

界面系统可通过时域分析在线监控 A 相、B 相、C 相的补偿前电流、补偿电流和补偿后电流；也可点击频域分析柱状图进行查看。

The interface system can monitor the pre-compensation current, compensation current and post-compensation current of phases A, B and C online through time domain analysis. You can also click on the frequency domain analysis bar chart to view.

6.4.6 用户手册 User manual

点击返回主界面进入“用户手册”可查看设备模块单元使用说明书。

Click back to the main interface and enter the "User manual" to view the operating instructions of the equipment module unit.

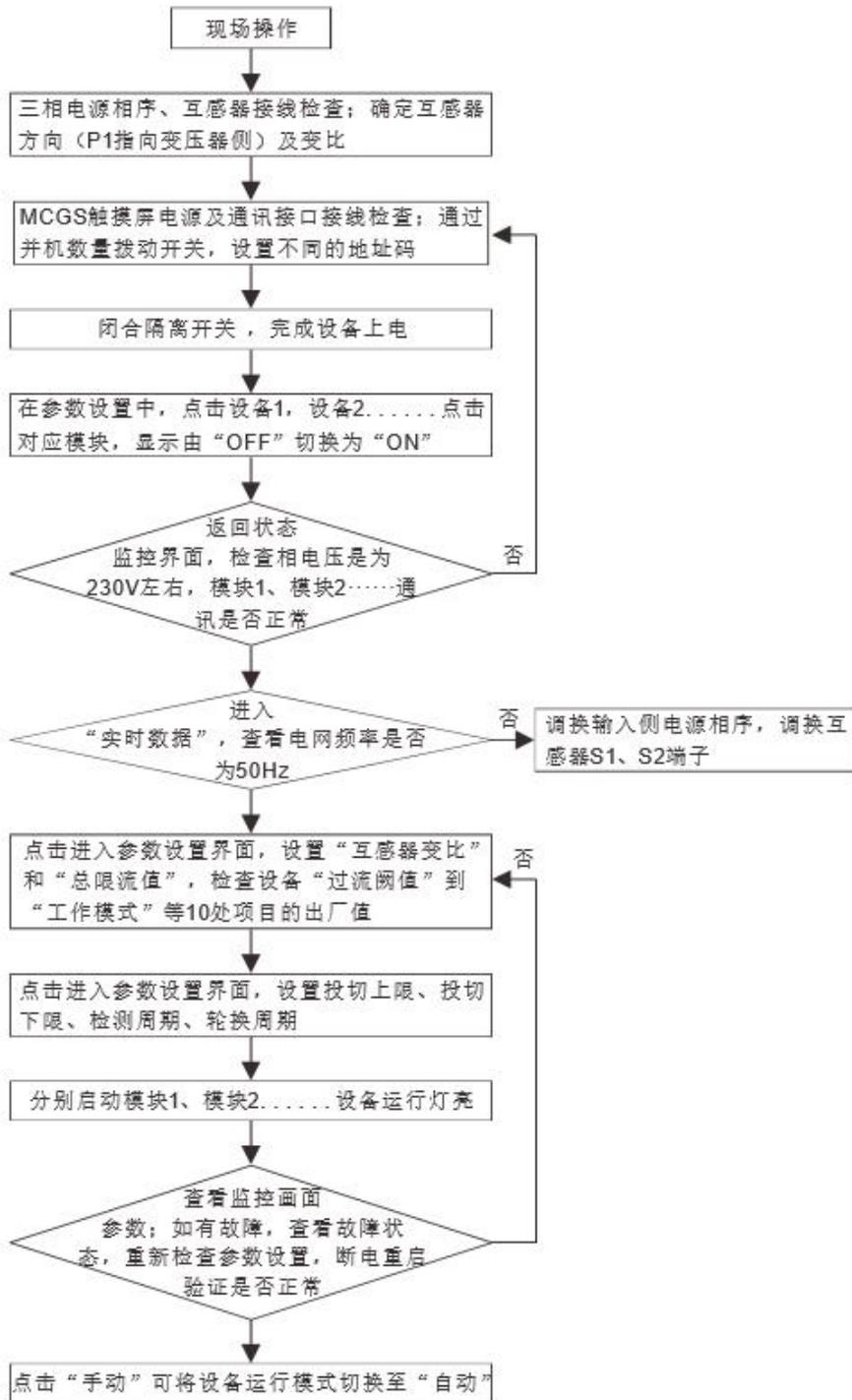
6.5 远程监控式系统说明 Description of remote monitoring system

该设备可通过上位机完成远程监控，远程监控方式目前采用厂家提供的内部协议，如需提供，可与本公司联系。

The equipment can be remotely monitored through the upper computer. The remote monitoring mode currently adopts the internal agreement provided by the manufacturer. If you need it, you can contact the company.

第 7 章 整柜抽屉式设备基本操作流程图

Section 7 Basic Operation Flow Chart of Drawer-type Equipment



现场操作 Site operation

三相电源相序、互感器接线检查；确定互感器方向（P1 指向变压器侧）及变比

Three-phase power source phase sequence and transformer connection inspection. Determine the direction of the transformer (P1 points to the transformer side) and the transformer ratio

MCGS 触摸屏电源及通讯接口接线检查；通过并机数量拨动开关，设置不同的地址码

MCGS touch screen power and communication interface wiring inspection. Set different address code by the parallel machine toggle switch,

闭合隔离开关，完成设备上电

Close the isolation switch to energize the equipment

在参数设置中，点击设备 1，设备 2.....点击对应模块，显示由“OFF”切换为“ON”

In parameter settings, click unit 1, unit 2..., click the corresponding module, and the display will change from "OFF" to "ON"

返回状态监控界面，检查相电压是为 230V 左右，模块 1、模块 2.....通讯是否正常

Return to the status monitoring interface and check whether the phase voltage is about 230V and whether the communication between module 1 and 2 is normal

进入“实时数据”，查看电网频率是否为 50Hz

Enter "Real-time data" to see if the grid frequency is 50Hz

否 No

调换输入侧电源相序，调换互感器 S1、S2 端子

Replace the phase sequence of the power source on the input side and the terminals S1 and S2 of the transformer

点击进入参数设置界面，设置“互感器变比”和“总限流值”，检查设备“过流阈值”到“工作模式”等 10 处项目的出厂值

Click to enter the parameter setting interface, set "Transformer transformer ratio" and "Total current limit value", and check the factory value of 10 items from "overcurrent threshold" to "working mode"

点击进入参数设置界面，设置投切上限、投切下限、检测周期、轮换周期

Click to enter the parameter setting interface, set the upper limit of switching, lower limit of switching, detection period, and rotation period

分别启动模块 1、模块 2.....设备运行灯亮

Start module 1 and module 2 respectively... The equipment running light is on

查看监控画面参数；如有故障，查看故障状，重新检查参数设置，断电重验证是否正常

View the parameters of the monitoring screen. If there is a fault, check the fault status, re-check the parameter settings, and power off to verify whether it is normal

点击“手动”可将设备运行模式切换至“自动”

Click "Manual" to switch the operating mode of the device to "Automatic"

第 8 章 常见故障及处理

Section 8 Common Faults and Troubleshooting

该设备拥有完善的保护功能，涵盖了电压、电流、温度等一系列电参数。当电网或者设备发生异常时，一方面能够快速停机，避免设备本身或者网侧器件的损坏；另一方面将故障信息上传至人机界面，方便工作人员进行故障排查。

The equipment has complete protection functions, covering a series of electrical parameters such as voltage, current, and temperature. When an abnormality occurs in the power grid or equipment, on the one hand, it can quickly shut down to avoid damage to the equipment itself or grid-side components; on the other hand, the fault information can be uploaded to the human-machine interface to facilitate troubleshooting by the staff.

常见故障信息及排除方法如下表所示：

Common fault information and troubleshooting methods are shown in the following table:

序号 No.	故障信息 Fault	故障原因 Cause	排除方法 Troubleshooting
1	参数设置错误 Parameter setting error	设置的参数超出了规定范围 The parameter set exceeds the range	1、在规定范围内设置参数 Set parameters within the range
2	过温故障 Over-temperature fault	IGBT 的 NTC 温度超过保护值 The NTC temperature of IGBT exceeds the protection value	1、环境温度是否超过设备最高允许温度； 2、模块运行过程中风机运转是否正常； 3、模块进风、出风口是否有灰尘等异物堵塞。 1. Whether the ambient temperature exceeds the maximum allowable temperature of the equipment; 2. Whether the fan operates normally during the module operation; 3. Whether the air inlet and outlet of the module are clogged with dust and other foreign matter.
3	A 相、B 相或 C 相 过流 Overcurrent of phase A, B and C	逆变器或控制单元出现故障导致主回路电流超过保护值 The main circuit current exceeds the protection value due to the failure of the inverter or control unit	1、控制板及排线连接是否正常； 2、逆变单元是否有异常现象。 1. Whether the connection between the control board and the wiring is normal; 2. Whether there are abnormal phenomena in the inverter unit.
4	过、欠压故障 Over and under voltage fault	直流母线电压高于或者低于保护值 The voltage of dc bus is above or below the protection value	1、电网电压是否正常； 2、母线电压保护值的设置是否正常； 3、模块待机时母线电压显示值是否正常。 1. Whether the grid voltage is normal; 2. Whether the bus voltage protection value is set normally; 3. Whether the bus voltage display value is normal when the module is standby.
5	电网故障 Power grid fault	输入缺相、电网电压过高或过低 Input phase failure, grid voltage too	1、输入端接线是否正常； 2、电网电压是否正常；

		high or too low	<p>3、模块待机时电网电压显示值是否正常。</p> <p>1. Whether the input terminal is connected normally;</p> <p>2. Whether the grid voltage is normal;</p> <p>3. Whether the display value of grid voltage is normal when the module is standby.</p>
6	中点故障 Midpoint fault	中点电压超过保护值 Midpoint voltage exceeds the protection value	<p>1、电网电压是否有较大波动；</p> <p>2、母线电压是否有较大波动；</p> <p>3、控制板程序版本是否正确。</p> <p>1. Whether there is a big fluctuation in grid voltage;</p> <p>2. Whether the bus voltage fluctuates greatly;</p> <p>3. Whether the control board program version is correct.</p>
7	IGBT 故障 IGBT fault	控制板或者逆变器异常导致输出电流峰值超过保护值 Abnormal control panel or inverter results in peak output current exceeding the protection value	<p>1、控制板及排线连接是否正常；</p> <p>2、逆变单元是否有异常现象。</p> <p>1. Whether the connection between the control board and the wiring is normal;</p> <p>2. Whether there are abnormal phenomena in the inverter unit.</p>
8	风机故障 Fan fault	风机或者风机控制回路异常 Abnormal fan or fan control circuit	<p>1、每个风机的供电线路是否有磨损；</p> <p>2、每个风机的供电端子连接是否正常；</p> <p>3、模块启动时每个风机的运转是否正常。</p> <p>1. Whether the power supply lines of each fan are worn;</p> <p>2. Whether the power supply terminals of each fan are connected normally;</p> <p>3. Whether the operation of each fan is normal when the module is started.</p>
9	三相电流严重不平衡 The three - phase current is severely unbalanced	输出电流信号跟踪异常 Abnormal tracking of output current signal	<p>1、检查输入电流信号检测线路和互感器接线是否正常。</p> <p>Check the input current signal to test whether the wiring of the detection line and the transformer is normal.</p>

如果按照上述操作未能解决问题，请与供应商联系。

If the problem cannot be resolved as described above, please contact the supplier.

第 9 章 维护

Section 9 Maintenance

该设备可靠性高，现场运行时一般无需维护。根据现场应用环境的不同，仍建议客户定期进行全面维护。维护的内容主要包括现场确认、设备的清洁以及关键器件的检查等工作。为确保操作安全，维护时应严格按照下列步骤进行：

The equipment is highly reliable and generally does not require maintenance during on-site operation. According to different on-site application environments, it is still recommended that customers conduct comprehensive maintenance regularly. The maintenance mainly includes the confirmation of the on-site environment, the cleaning of equipment and the inspection of key components. To ensure safe operation, the following steps should be strictly followed during maintenance:

- a) 断开设备的进线断路器；
 - b) 电源断开 10 分钟后再开盖，确保直流侧支撑电容的电压低于 36V；
 - c) 确认现场环境状况：对温度及湿度进行测量，判断是否满足设备运行条件；
 - d) 灰尘及异物清理：清理风扇网罩的积尘、模块表面和内部的积尘；
 - e) 检查所有电气和机械连接：主回路连接端子是否松动、控制排线是否松动、CT 及风机接线端子是否松动、并机通讯线是否松动；
 - f) 检查所有导线有无各种原因引起的损伤现象；
 - g) 检查印制电路板上器件有无异常；
 - h) 维护过程中有异常问题应及时处理，或者跟我公司技术人员反馈；
 - i) 维护完毕，恢复所有连接；
 - j) 闭合进线断路器；
 - k) 通电正常后按照操作说明启动设备；
 - l) 确认设备正常运行后方可离开。
- a) Disconnect the incoming circuit breaker of the equipment;
 - b) Open the cover after disconnecting the power supply for 10 minutes to ensure that the voltage of the DC side supporting capacitor is lower than 36V;
 - c) Confirm on-site environmental conditions: measure temperature and humidity to determine whether the equipment operating conditions are met;
 - d) Clean dust and foreign matter: clean up the dust accumulation on the surface and inside of the fan guard;
 - e) Check all electrical and mechanical connections to ensure the connection terminals of the main loop, the control wiring, the CT and fan wiring terminals and the parallel communication cables are not loose;
 - f) Check all wires for any damage caused by any cause;
 - g) Check whether the components on the printed circuit board are abnormal;
 - h) If there are any abnormal problems in the maintenance process, please deal with them in time, or give feedback to our technicians;
 - i) After maintenance, restore all connections;
 - j) Close the incoming circuit breaker;
 - k) Start the equipment according to the operation instructions after normal power on;
 - l) Verify that the equipment is in normal operation before leaving.

售后服务

After-sale Service

本公司产品保修一年，保修期从产品售出之日算起。若保修期内产品出现故障或零件损坏，经本公司技术人员鉴定属于正常使用下所发生的，本公司将提供免费维修。

Our products are guaranteed for one year from the date of sale. In case of product failure or part damage within the warranty period, the company will provide free maintenance after technical personnel of the company identify it as occurred under normal use.

如有下列情形，将收取材料成本及维修工时费用：

The cost of materials and maintenance hours will be charged if:

- (1) 未按使用手册中的规定使用所导致的损坏状况；
- (2) 擅自拆焊零件或修改而导致的损坏状况；
- (3) 运行超过“三包”期限。

- (1) Damage caused by failure to use in accordance with the provisions in the user's manual;
- (2) Damage caused by unauthorized removal of welding parts or modification;
- (3) Operation beyond the warranty period.

本着优质服务的宗旨，未尽事宜，本公司将与用户协商解决；当双方无法协商解决时，则共同以《中华人民共和国消费者保护法》作为解决问题的依据。

In line with the purpose of quality service, the company will negotiate with users to solve the issues not covered herein; If the two parties are unable to solve the problem through negotiation, they shall take the "Consumer Protection Law of the People's Republic of China" as the basis for solving the problem.

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西安西驰电气股份公司
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若产品尺寸及参数变化以最新产品为准

If the size and parameters of the products change, the latest products shall prevail