



电力工程直流电源设备 DC Power Supply Equipment Of Power Projects

GZDW

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公司简介 Introduction

宁波天仑电气有限公司(以下简称公司)成立于2001年1月。

公司坐落于浙江宁波,毗邻“东方大港”北仑港。拥有10000平方米的研发生产基地,年产值超亿元,目前有80多名年轻朝气的员工,其中60%为本科学历。公司是集研发、生产、销售、服务于一体的高新技术企业,致力于打造高品质的智能化、节能型、定制模式的输变电设备产品。

公司目前有符合国际及国内标准3大类18种产品,包括24kV中置式开关柜及环网柜,12kV中置式开关柜及环网柜,440V固定式分隔柜,抽屉式开关柜,预装式变电站,低压母线槽(合作生产),10kV变压器(合作生产)等等,同时部分为ABB、Schneider的授权产品。公司立足于浙江,为很多大型的制造企业、房产开发、学校、港口等用户提供了许多高质量的产品和服务,同时也出口到东非、北非及东南亚国家,获得了客户的一致满意。

公司严格执行ISO9001质量保证体系,标准化体系,安全生产标准体系,国家CCC认证体系。坚持持续提升产品质量,追求零缺陷产品,全心全意服务用户的质量方针,坚持以人为本,鼓励创新,精细化的管理理念,坚持以感恩在心为核心价值观,为我们的用户提供最好的产品和服务。

Ningbo TIANLUN Electric Co., Ltd was established in year 2001, January. It is located in Ningbo, near Beilun port, which is called "oriental grand port". TIANLUN has 10000-square-meter researching and developing workshop and annual output value exceeds 100 million. TIANLUN has a professional team composed of 80 innovative staff, most of them have bachelor's degrees. TIANLUN is a company that integrates researching, developing, selling and service. Our purpose is to create high quality electric equipment product which is intelligentized, energy-saving and customized.

TIANLUN mainly have 18 types of products which belong to 3 majors as follow: 24 kV Intermediate switchgear and Ring Main Unit Switchgear, 12kV Intermediate Switchgear and Ring Main Unit Switchgear, 440V Fixed Isolated Switchgear, Preparatory Transformer Substation, Low Voltage Bus Duct (coproduction) and 10kV transformer (coproduction). Some products are Licensed by ABB and Schneider. TIANLUN have been providing high quality products to large manufacture enterprise, real estate, school and port constructions. At the mean time, our product are exported to Africa and southeastern countries and win satisfaction from the overseas customers.

TIANLUN strictly stick to ISO9001 standard system, standardization system, safety standard system and CCC authentication system. Our quality policy is producing good and zero defect product, having customers well served. Our management policy is people orientation, creation encouragement and high-effective system. TIANLUN always hold a thankful heart and provide top-level product with best service.

产品概述

Overview

该系统适用于500kV及以下的发电厂、变电站、工矿企业、高层建筑、通讯、铁路等系统直流操作、继电保护、控制信号和事故照明等方面的不间断直流供电控制。该系统控制下,整个直流成套系统严格按照蓄电池充电曲线进行强充电、均充电、避免过充和欠充现象,延长电池的使用寿命。设定在控制系统出现故障时,直流屏自动转换为手动并报警,以确保整个系统的安全和可靠。这是一套理想的直流屏智能控制系统,它可按部颁标准实现所有的需求。

The system supplies 500kV or lower-voltage power plants, substations, industrial and mining enterprises, tall buildings, communication systems, and railway systems with uninterrupted DC power for DC operation, relay protection, signal control, and lighting. Controlled by this system, the entire DC complete system performs forced charging and equalized charging in strict accordance with the charging curve of the battery to avoid overcharging and undercharging and extend the service life of the battery. In case of fault on the control system, the DC cabinet switches to manual operation mode and gives an alarm to ensure safety and reliability of the entire system. This ideal DC cabinet smart control system can implement all requirements of the power industry.

技术数据

Technical Data:

系统配置

System Configuration:

充电机: 高频开关整流模块或进口电力模块

备份方式: 1、电池容量在200Ah以上的系统:按(N1+1)+(N2+1)备份
2、电池容量在200Ah以下的系统:按N1+(N2+1);N+1备份

中央控制系统: 液晶屏界面控制、触摸屏+各检测分模块、触摸屏+PLC组件

数据采集: 综合参数控制器

降压装置: 电压调整器、DC/DC

人机界面: 液晶屏、触摸屏

电池检测: 触摸屏画面、专用电池检测装置、PLC监控

温度补偿: 温度补偿装置

断路器: 西门子等

Charging module: High-frequency switch rectifier module or imported power module

Standby method: 1. For system with battery capacity larger than 200 Ah, (N1+1) + (N2+1)
2. For system with battery capacity smaller than 200 Ah, N1 + (N2+1); N+1

Central control system: LCD interface control, touchscreen + detection submodules, touchscreen + PLC components

Data collection: general parameter controller

Step-down device: voltage adjustor; DC/DC

MMI: LCD, touchscreen

Battery monitor: touchscreen interface, special-purpose battery detection device, PLC monitor

Temperature compensation: temperature compensation device

Circuit breaker: Siemens, etc



ISO9001-2000



CCC 认证



WSC 北京世标认证中心



配置原则

Configuration Rules:

充电/浮充电装置采用多个智能高频开关电源模块并联, N+1 热备份工作。智能高频开关电源模块数量可按如下公式选择(即确定 N 的数值): $N \times \text{模块额定电流} \geq \text{最大经常性负荷} + \text{满足蓄电池要求的均充电流}$

例如: 直流系统电压等级为 220VDC, 蓄电池容量为 300Ah, 经常性负载为 5A, 则充电电流 $(0.1 \times 300\text{Ah}) + \text{经常性负荷}(5\text{A}) = 35\text{A}$ 。若选用整流模块 4 台即可满足符合要求 (N=4), 再加一个备用模块共 5 个电源模块并联可构成所需系统。

可选功能:

- (1) 输出支路绝缘监测
- (2) 输出支路开关状态监测
- (3) 输出支路跳闸监测
- (4) 单体蓄电池端电压监测
- (5) 电池容量监测

The charging / float charging device adopts multiple smart high-frequency switch mode power modules which are paralleled and work in N+1 hot standby mode. The number of smart high-frequency switch mode power modules can be determined in accordance with the following formula (that is to determine the value N):

$N \times \text{rated current of module} \geq \text{maximum general load} + \text{equalized charging current (meeting battery requirement)}$

For example, a DC system with voltage 220 VDC, battery capacity 300 Ah, and general load 5 A, the charging current is $(0.1 \times 300 \text{ Ah}) + \text{General load}(5\text{A}) = 35\text{A}$. If four rectifier modules (N = 4) can meet requirements, add a standby module. A total of five power modules are connected in parallel mode to form a required system.

Optional functions:

1. Monitoring insulation of output branch
2. Monitoring ON/OFF state of output branch
3. Monitoring trip state of output branch
4. Monitoring end voltage of single battery
5. Monitoring battery capacity



名称 Name	单位 Unit
输入电压 /Input voltage	380V±15% (三相 three-phase)
电网频率 /Grid frequency	50Hz±10%
输入过压 /Input overvoltage	437V±5V
输入欠压 /Input undervoltage	320V±5V
额定输出直流电压范围 /Rated output DC voltage range	48V、110V、220V 等 (180V-320 连续可调, 90V-160V) 48V, 110V, 220V, etc (180V ~ 320V consecutive and adjustable, 90V ~ 160V)
输出欠压 /Output undervoltage	196V±2V, 98V±2V
过压保护 /Overvoltage protection	325V±5V, 162V±2V
蓄电池额定容量 /Battery rated capacity	5-3000Ah
事故后供电时间 /Post-accident power supply time	1h
常规负荷母线额定电流 (A) /Rated current of conventional load bus (A)	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 100, 160, 180, 200, 250, 315, 400, 630, 800, 1000, 1250, 1600, 2000
直流设备中各电路的额定绝缘电压 Rated insulating voltage of various circuits in DC device	直流 63V 及以上 (48V 系统) DC 63V and above (48V system) 直流 200V 及以上 (110V 系统) DC 200V and above (110V system) 直流 300V 及以上 (220V 系统) DC 300V and above (220V system)
绝缘电阻 /Insulating resistance	≥10MΩ
稳压精度 /Voltage stabilization precision	≤±0.5%
稳流精度 /Current stabilization precision	≤±1%
纹波系数 /Ripple factor	≤0.5%
合闸时动力母线电压 /Bus voltage at closing status	≥200V
外壳防护等级 /Degree of protection	不低于 IP30 Not lower than IP30
效率 /Efficiency	η ≥90%
效率因数 /Power factor	cosΦ ≥0.95
均流不平衡度 /Equalized current unbalance	充电模块间电流不平衡度不大于 ±5% Current unbalance between charging modules ≤5%
相对湿度 /Relative humidity	≤ 90% (20 ± 5℃)
环境温度 /Ambient temperature	-5℃ ~ +45℃
可闻噪音 /Noise	≤ 45dB
绝缘强度: 输出对地、输入对低、输入对输出施加 2kVAC, 1min 无飞弧无闪络 Insulation strength: apply 2 kV AC to output-to-ground, input-to-ground, and input-to-output; 1min is free of arcing and flashover	
尺寸 /Dimensions: 2260mm×800mm×600mm 2360mm×800mm×600mm	

功能及特点

Functions and features:

通过微机通讯接口实现远程计算机监控。备份模块正常时与整流模块群并机运行, 当充电模块出现故障时, 备份模块自动与充电模块并机。当中央控制系统故障退出时, 充电及整流模块群能正常工作。当出现一块以上模块故障时, 充电电流及控制母线电流由剩余的模块共同提供。提供环境温度及时调整充电电压, 使电池保持最佳充电状态。独立监控器操作, 汉字显示, 操作直观便捷。通过画面转换 (可达 256 幅), 在控制屏上采用按钮, 指示灯、文字、数据、仪表、方块图、条形图、状态图、曲线等多种形态显示系统动态过程和静态资料。

1. 采用模块化设计, N+1 热备份, 可平滑扩容。
2. 模块采用国际最新软开关电源技术, 95% 以上的元器件采用高质量的知名品牌器件。采用硬件低差自主均流技术, 模块间输出电流最大不平衡度小于 5%。
3. 模块可带电插拔, 更换安全方便。
4. 系统可选择两路交流自动切换输入, 主从备份, 可靠性高。
5. 监控功能完善, 高智能化, 采用大屏幕触摸屏汉字显示, 声光告警。
6. 监控系统配有标准 RS232 接口, 采用电力部标准通信规约, 方便接入综合化系统或单独组网, 实现“四遥”及无人值守。
7. 可实现供电一体化方案, 将通信电源, 逆变器等均纳入监控系统进行监控。
8. 除可以管理单电池组系统以外, 还可以管理双电池组系统 (只一套系统控制管理两组分别独立进行均 / 浮充, 两组之间互不干扰), 可带两组电池巡检仪。
9. 可满足母线分段要求, 包括微机绝缘监测仪也可满足母线分段的要求。
10. 具有先进的电池温度补偿功能。

Implement remote PC monitor over the microcomputer COM interface. In normal case, the standby module works with the rectifier module group in parallel; in case of fault on the charging module, the standby module automatically parallels with the charging module. If the central control system becomes faulty and exits, the charging module and rectifier module group can work normally. If more than one module becomes faulty, the remaining normal modules will jointly supply charging current and bus current. The charging voltage is adjusted in a timely manner in accordance with ambient temperature to keep the battery in optimal charging state. A monitor allows independent operation, provides Chinese interface, and facilitates operation. By screen conversion (up to 256 pictures), dynamic processes and static information can be viewed using buttons and indicators through various kinds of information such as text, data, meters, block diagrams, bar charts, status diagram, and curves.

1. Modular design; N+1 hot standby; capability of smooth capacity expansion.
2. Modules are designed using latest soft switch mode power supply technologies with more than 95% elements being high-quality well-known parts. Hardware is designed using low-difference independent equalized current techniques with the maximum unbalance of inter-modular output current less than 5%.
3. Modules are hot swappable, facilitating replacement and ensuring safety.
4. Two channels of AC work in active / standby mode which can automatically switch over to guarantee high reliability.
5. Highly smart perfect monitor; touchscreen with Chinese interface and audio / visual alarm.
6. RS-232 interface which complies with standard telecommunication prescription of the power ministry and facilitates wiring into general system or independent networking and helps implement telemetry, remote control, remote communication, and remote adjustment and unattended running.
7. All-in-one power supply solution which allows telecommunication power supplies, inverters, and other devices to be incorporated into the list of the monitor system.
8. In addition to single-battery group system, dual-battery group system can be managed as well (this means that a set of system manages two group of batteries to implement separate equalized charging or float charging); two groups of battery detectors can be equipped.
9. Capability of meeting bus sectioning requirement (the microcomputer insulating detector can meet this requirement as well).
10. Advanced battery temperature compensation function.

使用环境要求

Functions and features:

海拔高度: ≤ 2000 米

环境温度: -5°C ~ +45°C

相对湿度: ≤ 90%(20±5°C)

交流电网电压幅值持续波动范围: 不超过额定电压 ± 15%

交流电网频率波动范围: 不超过 ± 10%

运行地点无剧烈振动和冲击, 无强电磁场干扰, 垂直倾斜不超过 5°

机房无腐蚀金属和破坏绝缘的有害气体, 无导电尘埃和引发火灾及爆炸的危险介质

Altitude: ≤ 2000m

Ambient temperature: -5°C ~ +45°C

Relative humidity: ≤ 90% (20±5°C)

Voltage fluctuation range of AC grid: ≤ ±15% of rated voltage

Frequency fluctuation range of AC grid: ≤ ±10%

The operation place will not cause violent vibration or impact, and is free of interference of electromagnetic field;

vertical tilt shall not exceed 5°.

The room without harmful gas of corrosion and damage to the insulation, no conductive dust and fire and explosion

dangerous medium

系统正常使用条件

Operation conditions:

1. 室内使用, 且通风良好;
2. 运行地点无导电微粒或爆炸危险介质, 无腐蚀金属和破坏绝缘的气体或蒸汽, 无强电磁场干扰;
3. 交流电网电压波形为正弦波, 电网电压幅值的持续波动范围不超过额定值的 20%;
4. 交流电网频率波动范围不超过 5%;
5. 使用环境温度不高于 45°C, 在设备停用期间, 环境温度允许范围;
6. 使用环境的最大相对湿度不超过 90%RH (25±5°C时), 且无凝露现象;
7. 安装地基无振动或冲击, 垂直倾斜度不超过 5°;
8. 海拔不超过 2000m。

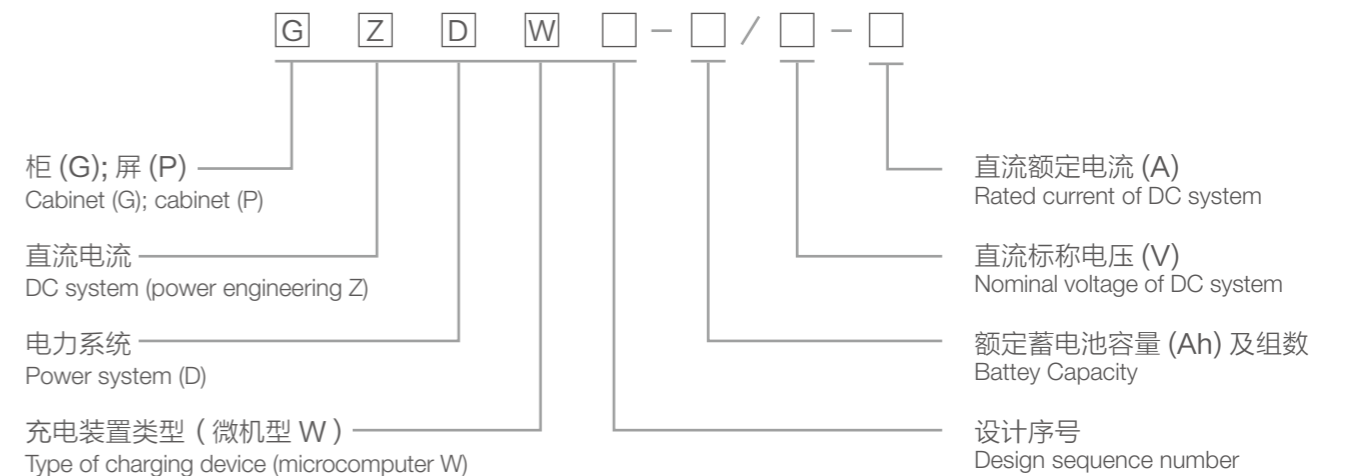
*注: 使用条件与上述条件不相符时, 请与制造商协商解决!

1. Indoor environment with good ventilation;
2. Installation place is free of conductive particles, medium posing risk of explosion, corrosive metals, gases or vapors that do damage to insulation, and interference of electromagnetic field;
3. Voltage waveform of the AC grid is a sine wave and voltage fluctuation range does not exceed 20% of the rated voltage;
4. Frequency fluctuation range of AC grid does not exceed 5%;
5. Ambient temperature range: -5°C ~ +45°C; during system downtime, permissible ambient temperature range: -25°C ~ +50°C;
6. Maximum relative humidity (RH) ≤ 90% (temperature: 25±5°C), without condensing;
7. The installation foundation does not cause the system to vibrate or be impacted; with vertical tilt degree not exceeding 5%;
8. Altitude: ≤ 2000m.

Note: If actual operation conditions do not comply with the preceding requirements, contact the manufacturer.

型号含义

Model Description



系统工作原理

Working Principle of the System

直流电源系统主要由交流配电单元、充电模块、监控模块、配电监控、降压硅链(降压单元)、直流馈电单元(包括合闸分路、控制分路)、绝缘监测等几大部分。不同的接线方式有不同的输出馈电,但基本原理是一致的,原理框图如图 1-3-1 所示:

DC power supply system is mainly composed of AC power distribution unit, charging module, monitor module, power distribution monitor, step-down silicon chain (step-down unit), DC feeder unit (including ON branch and control branch), and insulating monitor. The output feeders vary with the wiring method but share similar principle. Figure 1-3-1 shows the schematic:

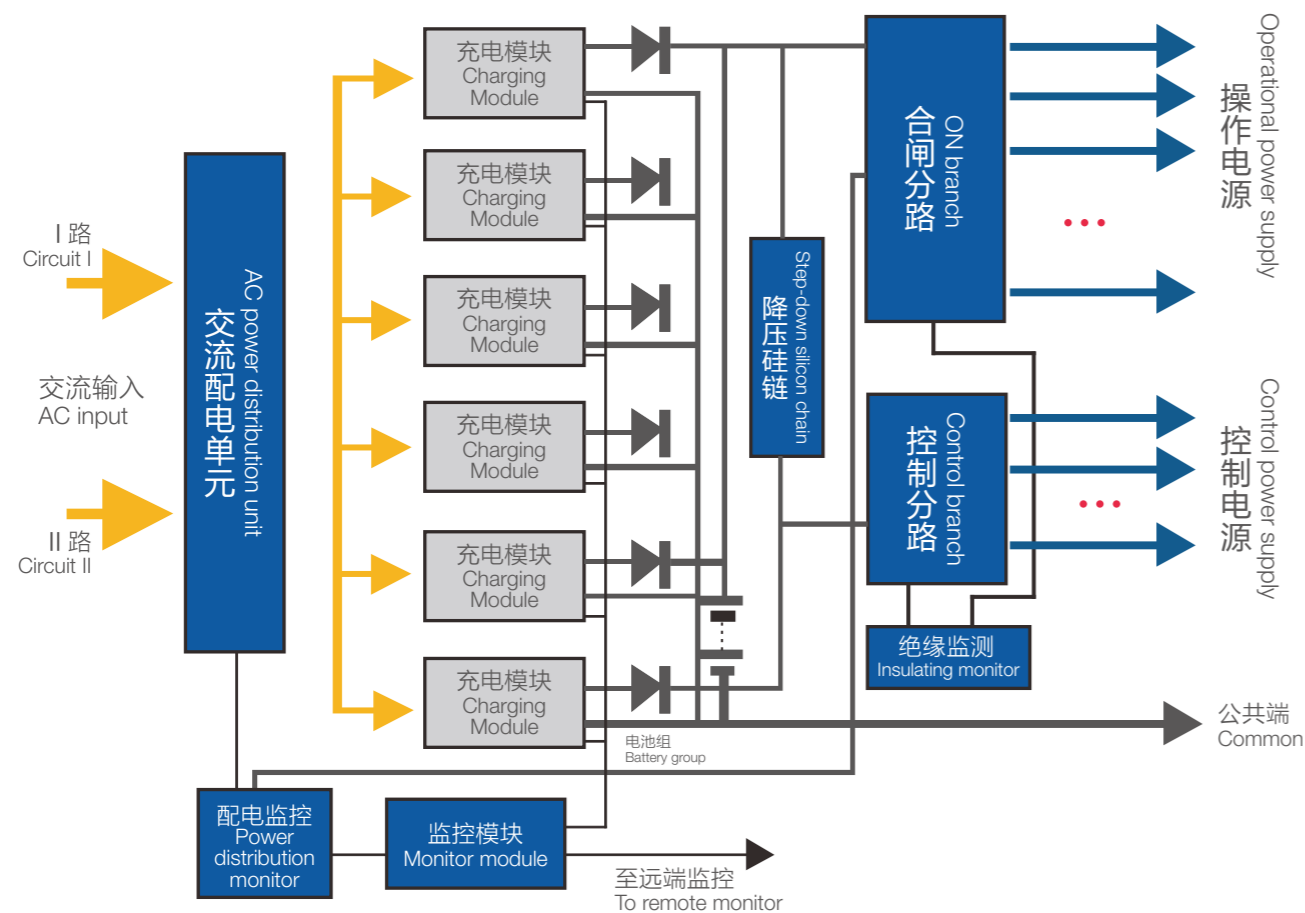


图 1-3-1 工作原理图

Figure 1-3-1 Working Principle of the System

系统的基本工作原理如下

Basic working principle of the system is as follows:

1、交流输入正常时

系统交流输入正常时,两路交流输入经交流切换控制电路的选择其中一路输入并通过交流配电单元给各个充电模块供电。充电模块将三相交流电转换为 220V 或 110V 的直流,经隔离二极管隔离后输出,一方面给电池充电,另一方面给负载提供正常工作电流。

监控部分采用集散方式对系统进行监测和控制,充电柜和馈电柜的运行参数、充电模块运行参数,分别由配电监控电路和模块监控电路采集处理,然后通过串行通讯口把处理后的信息上报给监控模块,由监控模块统一处理后显示在液晶屏上同时可通过人机交互操作方式对系统进行设置和控制,若有需要还可接入远程监控,监控模块还能对每个充电模块进行均/浮充控制、限流控制等以保证电池的正常充电,延长电池寿命。

1.In normal AC input case

In case of normal AC input, one of the two channels of AC input transmits along the switchover control circuit to each charging module via the AC power distribution unit. The charging module converts the three-phase AC current into 220V or 110V DC current which will be isolated by the diode and then transmitted to the battery for charging and to the load for supplying power.

System monitor and control is implemented using centralized and decentralized methods. Running parameters of the charging cabinet and feeder cabinet, and running parameters of the charging module are collected and processed by the power distribution monitor circuit and the module monitor circuit respectively and then reported to the monitor module via the serial COM port for further processing and displayed on the LCD display. The system can be set and controlled through the MMI interface. Where necessary, add a remote control module to implement control on the equalized / floating charging of the charging modules and current limitation in order to ensure normal charging of the battery and extend service life.

2、交流输入停电或异常时

交流输入停电或异常时,充电模块停止工作,由电池给负载供电。监控模块监测电池电压、放电时间,当电池放电到设置的欠压点时,监控模块告警。交流输入恢复正常以后充电模块对电池充电。

2.AC input shutdown or anomaly

In case of AC input shutdown or anomaly, the charging module stops work and the battery supplies load with power. The monitor module monitors battery voltage and discharge time. When battery discharge reaches the preset undervoltage point, the monitor module reports an alarm. The charging module will charge the battery after AC input is restored to normal. Figure 1-3-2 shows.

系统工作时的能量流如同 1-3-2 所示

the energy conversion flowchart during system operation:

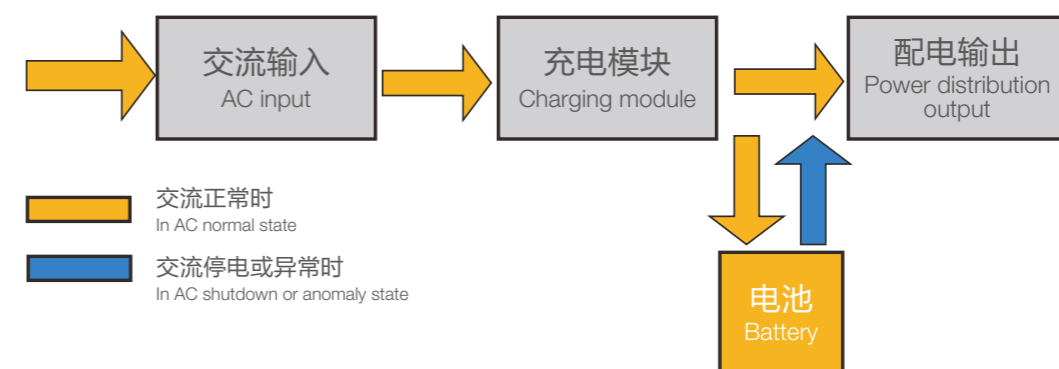


图 1-3-2 系统能量流动图

Figure 1-3-2 System energy flowchart

蓄电池管理与维护

Battery Management and Maintenance

电池管理的基本思想是：

- 以电池组剩余容量、电池充电电流为依据，控制电池由浮充转入均充；
- 以充电电流、充电时间为依据控制电池由均充转入浮充；
- 如果系统配有温度传感器，电池组均 / 浮充电压可根据温度作适当补偿（一般情况下温度每升高 3℃，电池组充电电压下降 1V）；
- 保证负载电流基本不变，以电池电流和总负载电流作为主要参考依据，通过调节模块输出电压及限流点，稳定负载电流，控制电池电流及电压，防止电池充电过流从而延长电池使用寿命；电池管理曲线图如图 1-3-3 所示，监控模块设置在“自动”工作状态，可以实施对电池的全自动管理。

Basic thoughts of battery management:

- Control the battery to change from float charging state to equalized charging state based on the remaining capacity of the battery and battery charging current;
- Control the battery to change from equalized charging state to float charging state based on the charging current and charging time;
- If the system is configured with a temperature sensor, the battery charging (equalized or float charging) voltage can be compensated in accordance with the temperature (in general case, the charging voltage of the battery drops 1V if the temperature rises by 3°C);
- When maintaining load current unchanged, adjust the output voltage and limit current of modules to stabilize the load current, control battery current & voltage, avoid battery overcurrent, and extend service life of the battery. The following figure shows battery management curve, where, the monitor module is set to "auto" work state to implement automatic management of the battery.

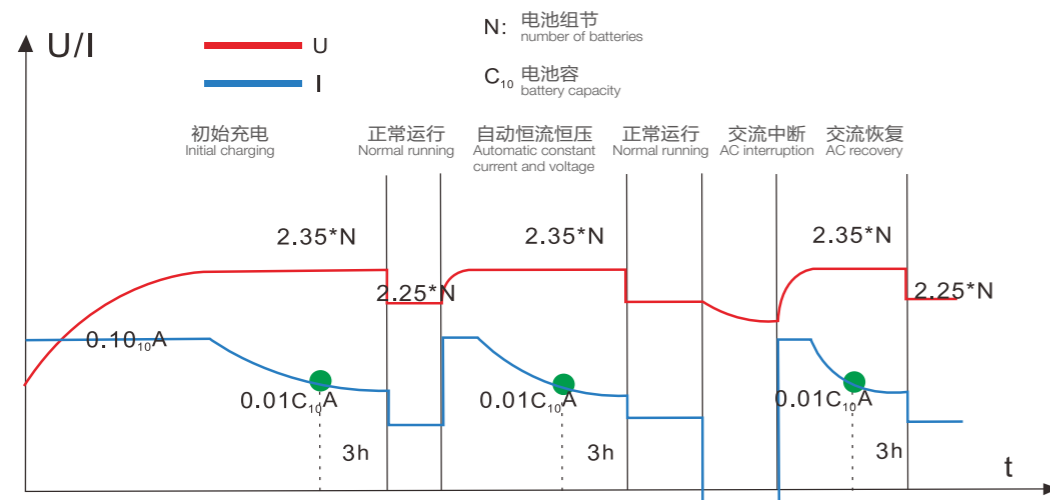


图 1-3-3 阀控蓄电池在运行中电压偏差及放电终止电压规定值
Figure 1-3-3 Management curve of valve-regulated lead-acid battery

技术指标

Technical indicators:

阀控蓄电池技术指标执行 DL/T724 标准，见表。

The technical indicators of the valve-regulated lead-acid battery comply with DL/T724 standards, as shown in the following table.

表 阀控蓄电池在运行中电压偏差及放电终止电压规定值

Table Prescriptions on voltage difference and discharge termination voltage of valve-regulated lead-acid battery

阀控式密封铅酸蓄电池 Valve-regulated lead-acid battery	标称电压 V Nominal voltage V		
	2	6	12
运行中的电压偏差值 Voltage difference during running	±0.05	±0.15	±0.3
开路电压最大最小电压差值 Max. and min. difference of open-circuit voltage	0.03	0.04	0.06
放电终止电压值 Discharge termination voltage	1.80	5.40 (1.80×3)	10.80(1.80×6)

阀控蓄电池组的运行及维护

Running and maintenance of valve-regulated lead-acid battery group

① 阀控蓄电池的运行方式及监视

阀控蓄电池组在正常运行中以浮充电方式运行，浮充电值宜控制为 $(2.23\sim 2.28) V \times N$ 、均衡充电电压值宜控制为 $(2.30\sim 2.35) V \times N$ ，在运行中主要监视蓄电池组的端电压值，浮充电流值、每只蓄电池的电压值、蓄电池组及直流母线的对地电阻值和绝缘状态。

② 阀控蓄电池的充放电制度

恒流限压充电

采用 I_{10} 电流进行恒流充电，当蓄电池组端电压上升到 $(2.30\sim 2.35) V \times N$ 限值时，自动或手动转为恒压充电。

恒压充电在 $(2.30\sim 2.35) V \times N$ 的恒压充电下， I_{10} 充电电流逐渐减小，当充电电流减小至 $0.1I_{10}$ 电流时，充电装置的倒计时开始启动，当整定的倒计时结束时，充电装置将自动或手动地转为正常的浮充电运行，浮充电电压值宜控制为 $(2.30\sim 2.35) V \times N$ 。

补充充电

为了弥补运行中因浮充电流调整不当造成了欠充，补偿不了阀控蓄电池自放电和爬电漏电所造成蓄电池容量的亏损，根据需要设定时间（一般为 3 个月）充电装置将自动地或手动进行一次恒流限压充电→恒压充电→浮充电过程，使蓄电池组随时具有满容量，确保运行安全可靠。

Running mode and monitor of the valve-regulated lead-acid battery

In normal state, the valve-regulated lead-acid battery group runs in float charging mode, with float charging voltage within $(2.23 \sim 2.28) V \times N$ and equalized charging voltage within $(2.30 \sim 2.35) V \times N$. During running, monitor end voltage of the battery group, float charging current, voltage of each battery, and resistance to ground and insulation state of the battery group and DC bus.

Charging and discharging mechanism of the valve-regulated lead-acid battery

Constant current & voltage limit charging

Adopt I_{10} current to implement constant current charging. When the end voltage of the battery rises to $(2.30 \sim 2.35) V \times N$, automatically or manually switch over to constant voltage charging.

Constant voltage charging

Under $(2.30 \sim 2.35) V \times N$ constant voltage charging mode, the charging current I_{10} gradually decreases. When the charging current decreases to $0.1I_{10}$ current, the charging device starts to count down. If the countdown time is up, the charging device will automatically or manually convert to normal float charging mode, with the float charging voltage within $(2.30 \sim 2.35) V \times N$.

Compensatory charging

In order to compensate the undercharging in case of improper adjustment of the float charging current, set an interval (generally, three months) to allow the charging device to automatically or manually perform the process: constant current voltage limit charging > constant voltage charging > float charging if battery capacity loss that is caused by the self-discharging and creepage leakage of the valve-regulated lead-acid battery cannot be compensated. The compensation enables the battery group to bear full capacity all time and ensures running safety and reliability.

组屏与系统接线方案

Panel Combination and System Wiring Solution

组屏按监控装置的不同分为简易型、普通型、完全型三种，根据配置功能和直流输出回路的多少及应配蓄电池容量的安时不同，确定屏面数。

Panel combination is categorized into simple pattern, general pattern, and complete pattern according to the type of monitor device. Determine the number of required panels according to the functions to be configured, number of DC output circuits, battery capacity, and different Ah.

第一种组屏和接线方案 (简易型)

First Type of Panel Combination and Wiring Solution (Simple Pattern)

特点:

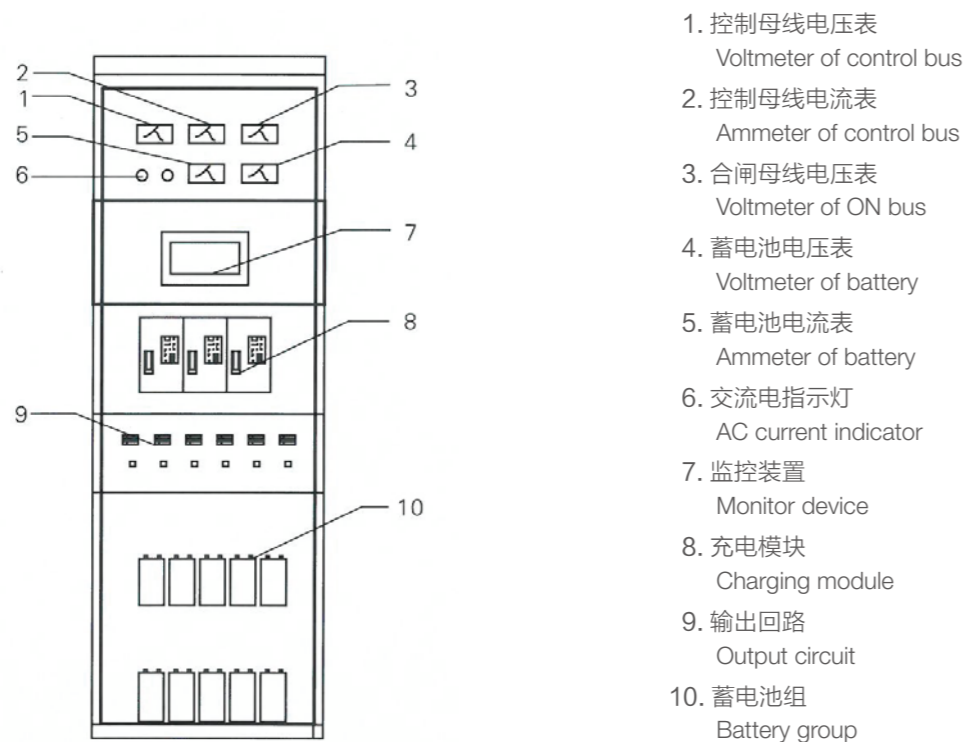
1. 充电、馈电及蓄电池组共用，最少用一只屏体。
2. 充电模块：根据直流系统电压等级可选 110V、220V；充电模块数量可选范围 2~4 只，（典型选 2 只）。
3. 馈电装置：直流回路输出数量最多为 8 路（控制回路 + 合闸回路）典型选 6 路。若无合闸回路，控制回路输出数量最多为 10 路。控制回路实现自动或手动调压。
4. 蓄电池：220V 系统 电池规格 ≤ 65Ah 数量 18 只 典型选 12V/50Ah。110V 系统 电池规格 ≤ 100Ah 数量 9 只 典型选 12V/65Ah。
5. 监控：采用液晶屏监控装置。具有均，浮充控制功能。
6. 用户选配：≤ 2kVA 逆变电源（ups）；500VA 通讯电源；交流双回路输入。

Features:

1. Charging: the feeder and battery group share one panel at least.
2. Charging module: select 110V or 220V voltage, depending on the actual DC system; number of permissible charging modules: 2~4 (2 charging modules generally).
3. Feeder device: Maximum number of DC circuit outputs (control circuit + ON circuit) 8; typical value: 6 circuits If there is no ON circuit, maximum number of control circuit outputs is 10. Control circuits implement automatic or manual voltage adjustment.
4. Battery: For 220V system, battery specification ≤ 65 Ah, Quantity: 18; typical, specification: 12V/50Ah
For 110V system, battery specification ≤ 100 Ah, Quantity: 9; typical on: 12V/65Ah
5. Monitor: adopt LCD to implement monitor; the LCD comes out with equalized / float charging control function.
6. Optional functions: ≤ 2 kVA power supply for inverter (UPS); 500 VA power supply for communication; AC dual-circuit input.

屏前示意图

Diagram of frontal side of panel



第二种组屏和接线方案 (普通型)

Second Type of Panel Combination and Wiring Solution (General Pattern)

特点:

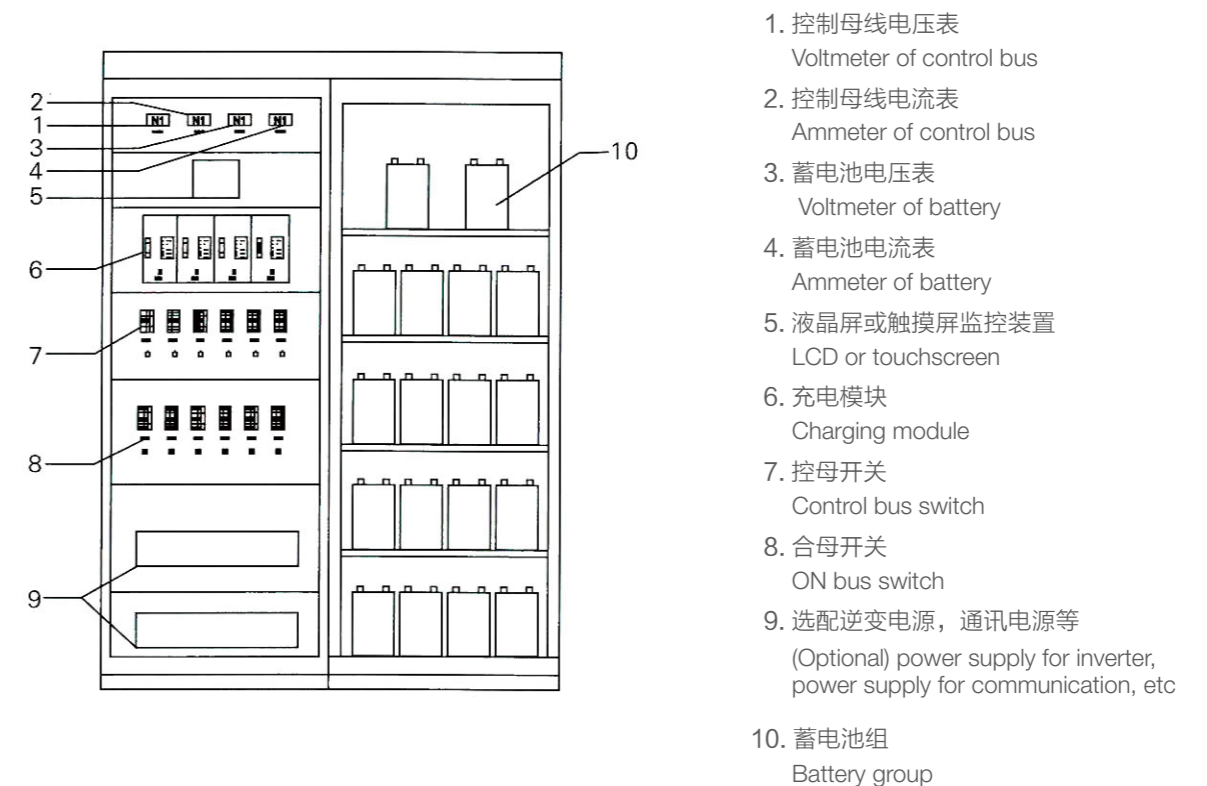
1. 充电、馈电共用一只屏，蓄电池组按使用的容量情况另外组屏或用电池；
2. 充电机：根据直流系统电压等级可选 110V、220V；充电模块数量可选范围 2~8 只，（典型选 3 只）；
3. 馈电装置：直流回路输出数量最多为 16 路（控制回路 + 合闸回路）典型选 12 路。若无合闸回路，控制回路输出数量最多为 20 路。控制回路实现自动调压；
4. 蓄电池：电池规格 ≤ 500Ah；监控：采用液晶屏或触摸屏监控装置；
5. 用户选配：≤ 2kVA 逆变电源（ups）；500VA 通讯电源 × 2。

Features:

1. Charging: feeders share one panel. For battery groups, use combined panel or batteries, depending on required capacity.
2. Charging module: select 110V or 220V voltage, depending on the actual DC system; number of permissible charging modules: 2~8 (3 charging modules generally).
3. Feeder device: Maximum number of DC circuit outputs (control circuit + ON circuit) 16; typical value: 12 circuits If there is no ON circuit, maximum number of control circuit outputs is 20. Control circuits implement automatic voltage adjustment.
4. Battery: Battery specification ≤ 500 Ah
Monitor: adopt LCD or touchscreen to implement monitor.
5. Optional functions: ≤ 2 kVA power supply for inverter (UPS); 500 VA power supply for communication × 2.

屏前示意图

Diagram of frontal side of panel



第三种组屏和接线方案（完全型）

Third Type of Panel Combination and Wiring Solution (Complete Pattern)

特点:

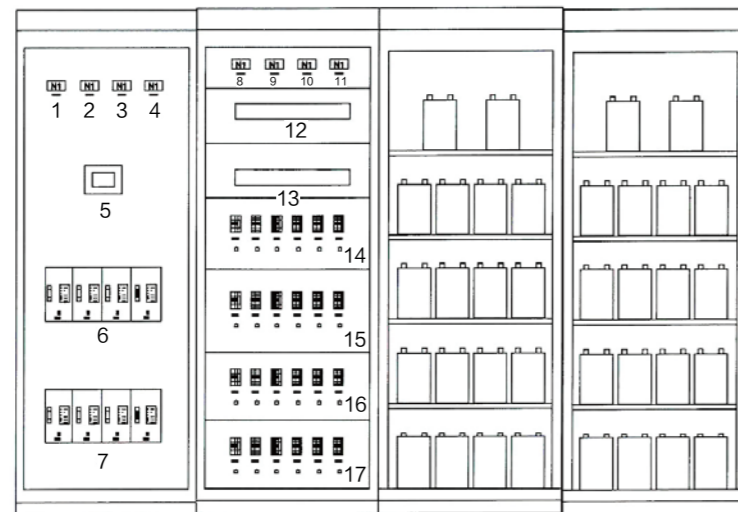
1. 充电、馈电、蓄电池分别组屏;
2. 充电模块数量可选范围 2~12 只;
3. 馈电装置: 直接回路输出数量最多为 32 路;
4. 蓄电池: (按电池容量及电压系统等级组屏);
5. 监控: 采用触摸屏监控装置;
6. 用户选配: 2kVA 以上逆变电源将另外组屏。

Features:

1. Charging: the feeder and battery group use independent panels.
2. Charging module: number of permissible charging modules: 2 ~ 12.
3. Feeder device: Maximum number of DC circuit outputs: 32.
4. Battery: panels are combined in accordance with battery capacity and voltage level.
5. Monitor: adopt touchscreen to implement monitor.
6. Optional functions: for the power supply of 2 kVA+ inverters, configure them with independent combined panels.

屏前示意图

Diagram of frontal side of panel



充电柜 Charging Cabinet

1. 控母电压表
Voltmeter of control bus
2. 控母电流表
Ammeter of control bus
3. 蓄电池电压表
Voltmeter of battery
4. 蓄电池电流表
Ammeter of battery
5. 触摸屏监控系统
Touchscreen

馈电柜 Charging Cabinet

6. 充电模块
Charging module
7. 充电模块
Charging module
8. I 输出回路电压
Voltage of output circuit I
9. I 输出回路电流
Current of output circuit I
10. II 输出回路电压
Voltage of output circuit II

蓄电池柜 Battery Cabinet

11. II 输出回路电流
Current of output circuit II
12. 通讯电源 (选配)
Power supply for communication (optional)
13. 逆变器 (选配)
Inverter (optional)
- 14-17. 输出回路开关
Switch of output circuit

包装、运输及保管

Packaging, Transportation, and Storage

包装:

包装材料选用防潮、防尘、不受机械损伤的全封闭包装箱, 电池应单节包装;

运输:

产品在运输中不应有剧烈的振动、撞击或倒置;

保管:

设备购入后, 如果不能立即投入运行, 需要短期或长期保管时, 请注意以下几点;

1. 设备存放在通风的干燥环境, 避开高温、尘埃或金属粉末多的场所, 存放场所应有防雨、防潮、防晒措施;
2. 蓄电池应存放在干燥、通风、环境室温不超过 25°C, 湿度不超过 70% 的室内环境中;
3. 准备长期存放的蓄电池, 应每半年进行一次正常的充、放电, 在放电状态下将蓄电池表面清理干净后, 在电池极柱、螺母、金属垫、跨接板上均匀涂上一层凡士林, 放在通风、干燥、温度在 25 ± 10°C 的室内保存。

Packaging:

Use moisture-proof and dustproof hermetic cases that will not suffer mechanical damage to package the devices. Batteries shall be packaged cell by cell.

Transportation:

Avoid violent vibration, knock, or upside down placement during transportation.

Storage:

If the devices will not put into operation immediately, make sure to adopt the following precautionary measures to ensure short-time or longtime storage:

1. Store the devices in dry and well-ventilated environment, avoid high-temperature and dusty place that is filled with a great amount of metal powder. The storage place shall be equipped with proper measures to avoid rainfall, moisture, and sun exposure.
2. Store the battery in dry and well-ventilated environment with indoor temperature within the range 25°C ~ 70°C.
3. If the battery will be stored for a long period of time, charge and discharge the battery on a semi-year basis. During discharging, clean the surface of the battery and apply Vaseline onto the battery polarities, nuts, metal cushion, and connection board. Store the battery in well-ventilated and dry indoor environment with temperature within the range 25°C ± 10°C.