KYJ1 铠装中压配电板
Armoured medium voltage switchboard

概述
Overview

随着船舶的大型化，其电力系统容量越来越大，传统的低压供电方式已不能满足要求，突出表现在：电力系统损耗大，电缆用量大、敷设困难，系统短路电流大、断路器选型困难，采用中压供电方案能较好地解决以上问题。KYJ1型船用铠装中压配电板适用于系统额定电压3.6~12kV、主母线电流≤4000A、额定频率50Hz或60Hz的海洋工程船、石油平台等船舶的中压电力系统，为发电机、电动机、变压器、电缆等提供全面的控制和保护；具有在线远程智能控制、检测、诊断配电板运行及健康情况的功能，产品满足CCS、LR、DNV、ABS、BV、NK等中外船级社规范。

KYJ1柜型（自主研发）
KYJ1 type (self-developed)

NXAirS LP柜型（西门子授权）
NXAirS LP type (Siemens authorized)

With the enlargement of ships, the capacity of their power system is becoming larger and larger, and the traditional low-voltage power supply mode can not meet the requirements, the prominent performance is: the power system loss is large, the cable consumption is large, and the laying is difficult; The system short circuit current is large and the circuit breaker selection is difficult. The medium voltage power supply scheme can solve the above problems. KYJ1-type armored medium voltage switchboard is mainly used in the medium voltage electrical power system of the ship, with rated voltage of 3 to 11kV, the main busbar current being no more than 4000A and the rated frequency of 50Hz or 60Hz, to provide comprehensive control and protection for the generators, motors, transformers, cables, etc. The remote intelligent control, monitoring and diagnosis of the running state could be realized and the products are in line with the specifications of CCS, LR, DNV, ABS, BV, NK and other domestic and foreign classification societies.

产品特点
Product features

■ 多元化

拥有自主研发的KYJ1柜型和西门子授权的NXAirS LP柜型，可为客户提供多元化的解决方案；

Diversification: With self-developed KYJ1 and Siemens authorized NXAirS LP cabinet type, can provide customers with diversified solutions;

■ 小型化

配电板单屏最小外形尺寸为：宽650mm×深1450mm×高2200mm；

Miniaturization: The minimum outline dimension of switchboard single panel is 650mm W x 1450mm D x 2200mm H;

■ 标准化

配电板能安装ABB、SIEMENS、GE、Schneider、厦门华电、南瑞等中外断路器及综合保护装置；

Standardization: The circuit breakers and integrated protection devices of ABB, SIEMENS, GE, Schneider, VEP, NARI and other brands at home or abroad are available to be installed on the switchboard;

■ 抗振性

配电板关键部位减振设计、满足船用振动环境；

Vibration resistance: Vibration reduction is designed for key parts of the switchboard, and the main components are custom made, to meet marine vibration environment;

■ 安全性

设置有五防机械联锁、电气联锁、弧光保护等；

Safety:install five prevention mechanical interlock, electrical interlock, arc protection, etc;

■ 耐燃弧

电缆室、断路器室、母线室抗燃弧设计，高压室有独立的泄压通道，内部电弧耐受：IAC-AFLR 50kA 1s；

Resistance to arcing: The cable room, circuit breaker compartment and busbar room for each panel of the switchboard are designed with anti-arcing,and the high voltage compartment has a separate pressure relief channel, IAC-AFLR 50kA 1s；

■ 易检修

二次控制室、二次电缆进出位置在配电板前面，方便维修，配电板电缆室、母线室、断路器室完全独立，检修时互不影响；

Easy maintenance：secondary cable in and out positions are in the front of the switchboard, easy for maintenance, Switchboard cable room, busbar room and circuit breaker room are totally independent, and have no mutual effect during maintenance；

■ 易操作

停电后合母线室或电缆室接地开关，对地放电后可检修母线、发电机、电缆等设备；

Easy to operate: after the power failure, the bus room or cable room grounding switch can be closed. After discharging to the ground, the bus, generator, cable and equipment can be inspected；

■ 智能化

配电板温度、断路器特性参数等实时监控；检修操作流程的可编程自动化控制。

Intellectualization: Real time monitoring of distribution board temperature and circuit breaker characteristic parameters, programmable automatic control of maintenance operation process.

产品组成

Product composition

■ 发电机屏
Generator panel

■ 母联屏
Bus-tie panel

■ 负载屏
Feeder panel

■ 预励磁屏
Pre-excitation panel

产品功能

Product functions

■ 系统功能
System functions

功率管理系统可实现如下功能：

Power management system can achieve the following functions:

○ 汇流排失电自动恢复供电
BLACKOUT AUTOMATIC RECOVERY POWER SUPPLY

○ 过载增机
LOAD DEPENDENT START

○ 轻载减机
LOAD DEPENDENT STOP

○ 自动调频调载
AUTOMATIC LOAD SHARING AND FREQUENCY ADJUST

○ 发电机故障换机
FAULT CAUSED EXCHANGE GENERATOR

○ 优先脱扣
PRIORITY TRIP

○ 重载问询
HEAVY LOAD REQUEST

○ 功率限制
POWER LIMIT

○ 发电机保护
GENERATOR PROTECTION

■ 发电机屏主要功能
Generator panel function

○ 保护功能

接地故障、漏电、过载和短路、差动保护、过压、欠压、欠频、欠磁、逆功率保护等；

Ground fault, leakage, overload and short circuit, differential protection over voltage, under voltage, under frequency, under magnetic, reverse power protection, etc;

○ 测量和显示功能

可测量发电机的功率、功率因数、三相电流、三相电压、频率。断路器、手车、接地开关状态以及单线图等的显示；

Measurement and display function: measure generator power, power factor, three-phase current, three-phase voltage, frequency. In addition, it also has circuit breaker, hand car, grounding switch status and single line diagram simulation display;

○ 控制功能

具有并车、解列、发电机充磁、调速、调压和发电机防冷凝加热等功能。

Control function:has parallel, disconnecting, generator magnetization, speed regulation, voltage regulation and generator anti-condensing heating, etc.

■ 负载屏功能
Feeder panel function

○ 保护功能

负载屏综合保护装置具有接地故障、漏电、过载和短路、缺相保护（接触器柜）等功能；

Protection function: the comprehensive protection device of load screen has earth fault, leakage, overload and short circuit, phase loss protection (contactor cabinet), etc;

○ 测量和显示功能

负载屏仪表能测量和显示负载电流，具有断路器或接触器手车、接地开关状态以及单线图等模拟显示功能；

Measurement and display function: load screen instrument can measure and display the load current, with circuit breaker or contactor handcart, grounding switch status and single line diagram simulation display;

○ 控制功能

根据需要，负载屏可设重载询问、变压器预励磁联锁及电动机、变压器停用防冷凝加热等功能。

Control function: according to the need, the load panel can be set heavy-duty inquiry, transformer pre-excitation interlock and motor, transformer shutdown anti-condensation heating, etc.

■ 预励磁屏功能
Pre-excitation panel function

○ 保护功能

预励磁屏具有短路、缺相保护等保护功能；

Protection function: the pre-excitation panel has the protection function of short circuit and phase loss, etc;

○ 控制功能

预励磁屏同对应的变压器屏完成变压器预充磁联锁功能；

Control function: pre-excitation panel and corresponding transformer panel complete transformer pre-magnetization interlocking function;

○ 测量和显示功能

预励磁屏能测量和显示接触器、手车、接地开关状态以及单线图等模拟显示功能。

Measurement and display function: the pre-excitation panel can measure and display the contactor, hand car, grounding switch status and single line diagram and other analog display functions.

■ 母联屏功能
Bus-tie panel function

○ 保护功能

母联屏综合保护装置具有接地故障、漏电、过载和短路保护等保护功能；

Protection function: The integrated protection device of busbar screen has the protection functions of earth fault, leakage, overload and short circuit, etc;

○ 测量和显示功能

预励磁屏能测量和显示接触器、手车、接地开关状态以及单线图等模拟显示功能；

Measurement and display function: the pre-excitation panel can measure and display the contactor, hand car, grounding switch status and single line diagram and other analog display functions；

○ 控制功能

预励磁屏同对应的变压器屏完成变压器预充磁联锁功能。

Control function: pre-excitation panel and corresponding transformer panel complete transformer pre-magnetization interlocking function.

■ 智能化操控自诊断功能
Intelligent control self-diagnosis function

采用智能化断路器及智能模块等可实现以下功能：

The following functions can be realized by using intelligent circuit breaker and intelligent module:

○ 检修操作流程的可编程自动化控制

Editable automatic control of maintenance operation flow

※通过可编程模块，预先设置好检修操作流程，一键完成

Through the programmable module,the maintenance operation process is set up in advance and completed with one key

○ 配电板具有温度智能监测和诊断系统

The switchboard has an intelligent temperature monitoring and diagnosis system

※断路器触头的温度监测

Temperature monitoring of circuit breaker contacts

※母线搭接处的温度监测

Temperature monitoring of Bus bar connection

※电缆头搭接处的温度监测

Temperature monitoring of cable connection

※低压室环境温度监测

Monitoring of ambient temperature in low voltage chamber

※基于实时运行电流的温升诊断

Temperature rise diagnosis based on real-time running current

○ 断路器具有特性参数实时智能监测和诊断系统

The circuit breaker has a real-time intelligent monitoring and diagnosis system for characteristic parameters

※储能电机及合分闸线圈等监测

Energy storage motor and closing and splitting coil monitoring

※储能电机的储能时间

Storage time of energy storage motor

※储能电机的储能电流（平均值）

Energy storage current of energy storage motor (average)

※合分闸线圈的动作电流（平均值）

Operating current of split gate coil (average)

※分闸线圈的动作电流（平均值）

Operating current of the opening coil (average)

※机械特性参数监测

Monitoring of mechanical characteristic parameters

※合/分闸时间

Closing/opening time

※合/分闸速度

Closing/opening speed

※触头开距

Contact opening distance

※超行程

Over travel

※分闸反弹幅值

Rebound amplitude of split brake

技术指标
Technical index

名称 Name		断路器柜 Circuit breaker cabinet					接触器柜 Contactor cabinet	
型号 Type		KYJ1-□/D					KYJ1-□/J	
额定电压（kV） Rated voltage (kV)		7.2		12			7.2	12
工频耐压（kV、min） Power frequency withstand voltage (kV/min)		32		42			32	42
雷电冲击耐压峰值(kV) Peak value of lightning impulse withstand voltage (kV)		60		80			60	80
主母线最大额定电流(A) Maximum rated current of main busbar (A)		4000					4000	
框架标准外形尺寸 Standard outline sizes （mm）	宽 Width	650	800	1000	800	1000	650	
	深 Depth	1450、1650、1800					1450、1650、1800	
	高 Height	2200					2200	
额定电流(A) Rated current (A)		630 1250	630 1250 1600 2000	1600 2000 2500 3150 4000	1250 1600 2000	1600 2000 2500 3150 4000	25、31.5、40、50、63、80、 100、125、160、200、224、250、315	
额定开断电流（kA） Rated breaking current (kA)		25、31.5	25、31.5、40		50		50	
短时耐受电流（kA、4s） Short-time withstand current(kA,4s)		31.5	40		50		50	
柜体内部电弧耐受等级 Arc resistance level in the cabinet IAC-AFLR（kA、1s）		31.5	40		50		50	
防护等级 Protection class		IP43					IP43	

型号命名
Model naming

KYJ1型铠装中压配电板按一次回路元件（手车）分为：KYJ1-□/D真空断路器柜（简称：断路器柜）、KYJ1-□/J真空接触器柜（简称：接触器柜），型号命名如下：

KYJ1 type armoured medium voltage switchboard is divided into KYJ1-□/D vacuum circuit breaker cabinet (circuit breaker cabinet for short) and KYJ1-□/J vacuum contactor cabinet (contactor cabinet for short) according to primary circuit elements (handcar):

铠装移出式 Armoured shift-out type	KY J	1	-□	/□	□	□
设计序号 Designnumber						
额定电压（kV）： 7.2、12 Rated voltage (kV): 7.2、12						
D：真空断路器柜 J：真空接触器柜 D: vacuum breaker cabinet J: vacuum contactor cabinet						
真空断路器柜额定电流（A） 630、1250、1600、2000、2500、3150、4000 Vacuum circuit breaker cabinet rated current(A): 630,1250, 1600, 2000, 2500, 3150, 4000						
真空接触器柜额定电压12kV时额定电流（A） 25、31.5、40、50、63、80、100、125、160 Vacuum contactor cabinet fuse rated currentat rated voltage of 12kV(A): 25, 31.5, 40, 50, 63, 80, 100, 125, 160						
真空接触器柜额定电压7.2kV时额定电流（A） 25、31.5、40、50、63、80、100、125、160、200、224、250、315 Vacuum contactor cabinet fuse rated current at rated voltage of 7.2kV (A): 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 224, 250, 315						
真空断路器柜额定开断电流(kA)：25、31.5、40、50 Vacuum circuit breaker cabinet rated breaking current(kA): 25, 31.5, 40, 50						
真空接触器柜额定开断电流(kA)：50 Vacuum contactor cabinetrated breaking current(kA): 50						

选型说明
Selection description

KYJ1-7.2/D 1250A 31.5kA: 铠装移出式真空断路器柜、额定电压7.2kV、额定电流1250A、额定开断电流31.5kA。

Ex. :KYJ1-7.2/D 1250A 31.5kA: Armoured removable vacuum circuit breaker cabinet, rated voltage 7.2kV, rated current 1250A, rated breaking current 31.5kA.

安装注意事项
Installation Notes

○ 底架安装的基础槽钢要求水平
The base channel steel for chassis installation is required to be level

○ 配电间的地坪同柜体底架在同一水平
The floor of the distribution room should be at the same level as the chassis of the cabinet body

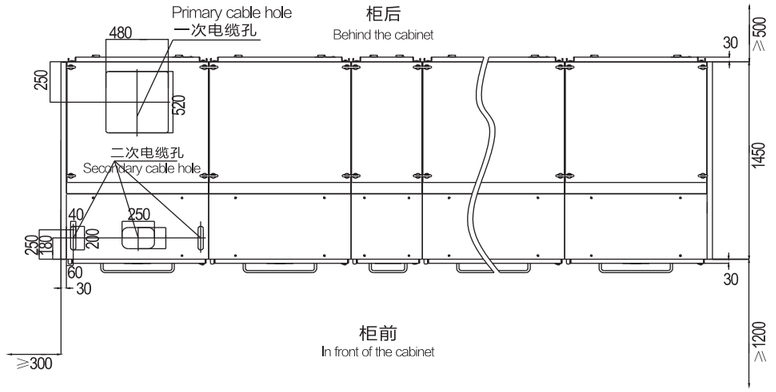
○ 安装过程要保护真空灭弧室，严禁遗留任何物料及工具在高压柜内
Protect the vacuum arcing chamber during installation, and do not leave any materials and tools in the high pressure cabinet

○ 主母排连接必须在拼柜螺栓紧固后施工
The connection of the main bus bar must be constructed after the fastening of the assembly bolt

○ 二次外部连接电缆应充分避开柜体活动部件，以免受损
The secondary external connecting cables should be fully avoided from the moving parts of the cabinet to avoid damage

○ 安装完毕必需进行交接试验方可投入运行
The installation must be completed before the handover test can be put into operation

○ 安装空间要求见下图
Installation space requirements are shown in the following figure



注 Note：

1. 图中方框内是KYJ1铠装中压配电板安装周围最小尺寸，一次电缆和二次电缆位置可根据客户要求调整开孔位置。
2. 如客户要求柜体靠墙安装需特别说明。

1.The box in the figure is the minimum size around the installation of KYJ1 armoured medium voltage switchboard. The position of primary and secondary cables can be adjusted according to customer requirements.
2.If the customer requires the cabinet to be installed against the wall, special instructions should be given.

附件
Attachment


环境试验
检 测 报 告
（共3页）

温湿度污秽环境试验报告
Temperature and humidity pollution environment test report


检 验 报 告

振动试验报告
Prototype vibration test report


电磁兼容性测试
检 测 报 告
（共28页）

电磁兼容试验报告
Electromagnetic compatibility test report


内部故障试验报告
Internal fault test report


XIHARI
检 验 报 告
西安高压电器研究院有限责任公司实验认证中心
国 家 高 压 电 器 质 量 监 督 检 验 中 心

机械特性试验报告
Mechanical characteristic test report


检 测 报 告
KYJ1-12型中压配电板力学环境试验检测

冲击试验报告
Impact test report