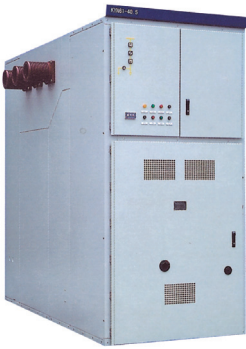


KYN61-40.5

型铠装移开式交流金属封闭开关设备



概述

KYN61-40.5 铠装移开式交流金属封闭开关设备（以下简称开关柜）适用于三相交流 50Hz、40.5kV 单母线及单母线分段电力系统，主要应用于发电厂、变电所及工矿企业、高层建筑的变配电站中作为接受和分配电能之用，并对电路实行控制、保护和监测，满足 IEC60298、GB3906、DL404 等标准的要求，并具备完善的“五防”功能。

Brief Introduction

KYN61-40.5 Armoured movable AC metal enclosed switchgear (hereinafter referred to as switch cabinet) is applicable to 3-phase AC 50Hz and 40.5kV single bus and single-bus staged power system. It is mainly used as the reception and distribution of electrical energy transformation and distribution in the power transformation and distribution power plant, substation and industrial and mining establishment as well as high-rise. It controls and protects as well as monitors the circuit. It meets the requirement of IEC60298, GB3906 and DL404 standards and so on. It has the perfect “5 protections” function.

使用环境条件

海拔高度：不超过 2000 米；
环境温度：上限为+40℃，下限为-15℃；
相对湿度：日平均值不大于 95%，月平均值不大于 90%；
地震烈度：不超过 8 度；
没有火灾爆炸危险，没有剧烈震动及化学腐蚀等严重污秽的场所。

Service Environmental Condition

Altitude: No higher than 2000m;
Ambient temperature: the upper limit is +40℃ and the lower limit is -15℃;
Relative humidity: The daily average value is not more than 95% and the monthly mean value is not more than 90%;
Earthquake intensity: Not more than 8 degrees;
The location without severe dirtiness such as fire explosion hazard and strenuous vibration as well as chemical corrosion and so on.

特点

采用热缩绝缘材料及环氧涂覆绝缘工艺，优化电极形状，柜体结构紧凑，缩小占地面积；
开关柜柜体选用优质冷轧钢板经数控钣金加工成形后，通过高强度螺栓螺母和铆螺母连接而成，构件表面采用喷塑或镀锌工艺；
可配用国产 ZN85-40.5(3AV3) 真空断路器和法国施耐德 SF1、SF2 型及阿尔斯通 FP 系列六氟化硫断路器，以满足不同用户的需求；
开关柜各功能小室均采用金属隔板封隔，并设有独立的压力释放通道；
断路器、接地开关等操作均可在开关柜门关闭情况下进行，即可实现关门操作；
开关柜的结构适应性强，主结线方案可以达到 198 种以上，能满足不同用户的需要；
手车，断路器，接地开关和后柜门之间设有防止误操作的机械联锁装置，“五防”功能齐全，安全可靠。

feature

The thermal shrinkage insulating material and epoxy-coated insulating process is used. The electrode shape is optimized. The structure of cabinet body is compact and the floor area is reduced. For the switch cabinet body, the high-grade cold rolled steel plate is formed by the NC sheet-metal processing and then it is connected by the high-strength bolt and nut as well as riveting nut. For the surface of structural member, the plastic-spraying or galvanizing process is adopted.

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It can be equipped with the homemade ZN85-40.5 (3AV3) vacuum circuit breaker and French Schneider SF1 and SF2 model as well as Alston FP series of sulfur hexafluoride circuit breaker to meet the demands of different clients.

The metal partition is used to separate among every function chamber in the switch cabinet. The individual pressure relief channel is installed.

Operations of circuit breaker and grounding switch and so on can be performed under the situation that the door of switch cabinet is closed. The door-close operation can be realized.

The structure adaptability of switch cabinet is strong. The main wiring scheme can be up to above 198 types. Therefore, demands from different clients can be met.

The mechanical interlocking device preventing misoperation is installed among trolley, circuit breaker, grounding switch and rear cabinet door. "5 protections" function is complete and safe as well as reliable.

技术参数 Technical parameter

开关柜技术参数 Technical parameter of switch cabinet

序号 Serial number	项目 Item	单位 Unit	参数 Parameter
1	额定电压 Rated voltage	kV	40.5
2	额定频率 Rated frequency	Hz	50
3	主母线额定电流 Rated current of main bus-bar	A	1250, 1600, 2000
4	分支母线额定电流 Rated current of branch bus-bar	A	630, 1250, 1600
5	额定绝缘水平 Rated insulating level	1min 工频耐受电压 (有效值) 1min Power-Frequency withstand voltage (Valid value) 雷电冲击耐受电压 (峰值) Rated lightning impulse withstand voltage (peak value)	相间、相对地 Interphase & phase to ground
			一次隔离断口 Primary separation fracture
			95
	辅助控制回路 1min 工频耐受电压 1min Power-Frequency withstand voltage in the auxiliary control circuit	V	2000
6	额定短路开断电流 Rated short circuit breaking current.	kA	25, 31.5
7	额定短路关合电流 (峰值) Rated short-circuit making current (peak value)	kA	63, 80
8	额定短时耐受电流 (4s) Rated short-time withstand Current (4s)	kA	25, 31.5
9	额定峰值耐受电流 Rated impulse Withstand Current	kA	63, 80
10	辅助控制回路额定电压 Rated voltage of auxiliary control circuit	V	-110, -220, -220
11	防护等级 Protection degree		外壳 IP4X Housing IP4X 隔室间, 断路器室门打开时 IP2X Among compartments and when the door of circuit breaker room is opened: IP2X
12	外形尺寸 (宽 × 深 × 高) Physical dimension (W × D × H)	mm	1400×2800(3000)×2800* (*括号内数字为SF6手车方案) (*the number in the parenthesis is scheme of SF6 trolley)
13	重量 Weight	kg	约2300 bout 2300

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ZN85-40.5(3AV3) 真空断路器技术参数 Technical parameter of ZN85-40.5(3AV3) vacuum circuit breaker

序号 Serial number	项目 Item	单位 Unit	参数 Parameter
1	额定电压 Rated voltage	kV	40.5
2	额定频率 Rated frequency	Hz	50
3	额定绝缘水平 Rated insulating level	工频耐受电压 (有效值) Power-Frequency withstand voltage (Valid value)	kV 95
		雷电冲击耐受电压 (峰值) Rated lightning impulse withstand voltage (peak value)	kV 185
4	额定电流 Rated current	A	630, 1250, 1600, 2000
5	额定短路开断电流 Rated short-circuit breaking current.	kA	25, 31.5
6	额定短路关合电流 (峰值) Rated short-circuit making current (peak value)	kA	63, 80
7	额定短时耐受电流 (4s) Rated short-time withstand Current (4s)	kA	25, 31.5
8	额定峰值耐受电流 Rated peak-value withstand current	kA	63, 80
9	额定电容器组开断电流 Rated drop-out current of capacitor bank	A	630
10	额定短路开断电流开断次数 Total breaking times of rated short circuit breaking current	次 Times	20
11	额定操作顺序 Rated operation sequence		0-0.3s-CO-180s-CO
12	分闸时间 Switching-off time	ms	35-60
13	合闸时间 Switching-on time	ms	45-100
14	机械寿命 Mechanical life	次 Times	10000
15	触头开距 Open distance of contact	mm	20 ± 2
16	超行程 Over stroke	mm	6 ± 2
17	触头允许磨损累积厚度 Allowable wearing accumulation thickness of contact	mm	3
18	平均合闸速度 Average switching-on speed	m/s	0.5-0.8
19	平均分闸速度 (刚分 10mm) Average switching-off speed (10mm)	m/s	1.6-2.0

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序号 Serial number	项目 Item	单位 Unit	参数 Parameter
20	触头合闸弹跳时间 Rebound time of contact switching on	ms	≤ 2
21	三相触头分闸不同期 Asynchronous switching off of 3-phase contact	ms	≤ 2
22	三相触头合闸不同期 Asynchronous switching on of 3-phase contact	ms	≤ 2
23	每相回路直流电阻 DC resistance of circuit for every phase	$\mu \Omega$	≤ 50
24	合闸状态额定触头弹簧压力 Rated spring pressure of contact under the switching-on state	N	3100 ± 200
25	相间中心距 Interphase center distance	mm	300

FP40 系列六氟化硫断路器技术参数

Technical parameter of FP40 series of sulfur hexafluoride circuit breaker

最高工 作电压 kV Maximum operating voltage kV	绝缘水平 Insulating level		开断 电流 kA Drop-out current kA	工作电流 A Operating current A								
	冲击 耐压 kVp Impact withstand kVP	工频耐压 50Hz Power- frequency withstand voltage 50Hz kV1min		400	630	800	1250	1600	2000	2500	3150	
40.5	185	95	12.5	FP4012A	FP4012B	FP4012C	FP4012D					
			16		FP4016B	FP4016C	FP4016D	FP4016E				
			20			FP4020C	FP4020D	FP4020E	FP4020F	FP4020G	FP4020H	
			25			FP4025C	FP4025D	FP4025E	FP4025F	FP4025G	FP4025H	
			31.5									

成套设备选型

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SF 型六氟化硫断路器技术参数
Technical parameter of Schneider SF-type sulfur hexafluoride circuit breaker

序号 Serial number	项目 Item		单位 Unit	参数 Parameter
1	额定电压 Rated voltage		kV	40.5
2	额定绝 缘水平 Rated insulating level	工频耐受电压 Power-frequency withstand voltage	kV	95
		雷电冲击耐受电压(峰值) Rated lightning impulse withstand voltage (peak value)	kV	185
3	额定电流 Rated current		A	630, 1250, 2000
4	额定短路开断电流 Rated short-circuit breaking current		kA	25, 31.5
5	额定短路关合电流 Rated short-circuit making current		kA	63.80
6	额定短时耐受电流(3s) Rated short-time withstand Current (3s)		kA	25, 31.5
7	额定峰值耐受电流 Rated peak-value withstand current		kA	63, 80
8	额定电容器组开断电流 Rated drop-out current of capacitor bank		A	440, 875, 1750
9	额定短路开断电流开断次数 Total breaking times of rated short circuit breaking current		次 Times	20
10	额定操作顺序 Rated operation sequence			0-0.3s-CO-180s-CO
11	分闸时间 Switching-off time		ms	45 ± 4
12	合闸时间 Switching-on time		ms	68 ± 4
13	机械寿命 Mechanical life		次 Times	10000

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LZZB9-35 型电流互感器技术参数

Technical parameter of LZZB9-35 Current transformer

额定一次 电流 (A) Rated primary current (A)	准确级 组合 Combination of accuracy class	相应准确级下的额定输出 (VA) Rated output under the corresponding accuracy class (VA)					额定短时耐受电流 (1s 有效值)(kA) Rated short-time withstand Current (1S valid value) (kA)	额定峰值耐受电流 (峰值)(kA) Rated peak-value withstand Current (peak value) (kA)
		0.2	0.5	10P10	10P15	10P20		
30-100	0.2/10P10	15	30	50	30	20	150lin	375lin
150	0.2/10P15	15	30	50	30	20	31.5	80
200	0.2/10P20	15	30	50	30	20	44.5	80
300-500	0.5/10P10	15	30	50	30	20	54.5	80
600-800	0.5/10P15	30	50	50	40	30	63	80
1000-2000	0.5/10P20	40	50	50	50	30	80	100

LDBJ8-40.5 型环氧树脂浇注全封闭触头

盒式电流互感器技术参数主要技术参数：

额定绝缘水平：95/185kV

表面爬距：830mm

额定二次电流：5A(或 2A, 1A)

局部放电量：≤ 20PC

准确级次：0.2S,0.2,0.5,10P10,10P15, 10P20

Technical parameter of LDBJ8-40.5 box current transformer for fully-enclosed contact box poured with epoxy resin

Main technical parameter:

Rated insulating level: 95/185kV

830mm Surface creeping distance: 830mm

Rated secondary current: 5A(or 2A, 1A)

Amount of partial discharge: ≤ 20PC

Accuracy class: 0.2S,0.2,0.5,10P10,10P15, 10P20

额定一次 电流 (A) Rated primary current (A)	准确级组合与相应的额定输出 (VA) Combination of accuracy class & corresponding rated output (VA)				额定短时耐受电流 (1s 有效值)(kA) Rated short-time withstand Current (1S valid value) (kA)	额定峰值耐受电流 (峰值)(kA) Rated peak-value withstand Current (peak value) (kA)
	0.2/10P10	0.5/10P10	0.2/0.5	10P10/10P10		
5-300	10/30	20/30	10/20	20/20	150lin	375lin
400-500	10/40	15/40	10/15	25/25	63	130
600-800	20/50	30/50	20/30	30/30	63	130
1000-1600	30/50	50/50	30/50	40/40	80	180
2000-3150	40/50	50/50	40/50	50/50	100	180

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JN22-40.5/31.5 型接地开关技术参数
Technical parameter of JN22-40.5/31.5 grounding switch

序号 Serial number	项目 Item		单位 Unit	参数 Parameter
1	额定电压 Rated voltage		kV	40.5
2	额定绝 缘水平	工频耐受电压 Power-Frequency withstand voltage	kV	95
	Rated insulating level	雷电冲击耐受电压 (峰值) Rated lightning impulse withstand voltage (peak value)	kV	85
3	额定短时耐受电流 (4s) Rated short-time withstand Current (4s)		kA	31.5
4	额定峰值耐受电流 (峰值) Rated peak-value Withstand Current (Peak value)		kA	80
5	额定短路关合电流 (峰值) Rated short-circuit making current (Peak value)		kA	80

结构 Structure

结构

KYN61-40.5 型金属封闭开关设备主要由柜体和断路器手车等两大部分组成。柜体分为断路器室 (也称手车室)、母线室、电缆室和继电器仪表室等四个单独隔室。外壳防护等级为 IP4X, 断路器门打开时防护等级为 IP2X。产品具有电缆进出线、架室进出线、联络、计量、隔离及其它功能方案。

Structure

KYN61-40.5 metal enclosed switchgear mainly consists of two parts, namely, cabinet body and trolley. The cabinet body is divided into 4 individual compartments, namely, circuit breaker compartment (it is also called trolley compartment), bus-bar compartment, cable compartment and relay instrument compartment. The protection degree of casing is IP4X. The protection degree is IP2X when the door of circuit breaker is opened. The trolley of circuit breaker consists of two parts, namely, circuit breaker and chassis trolley. It has leading in and outlet of cable, leading-in and outlet of rack chamber, contact, counting and isolation and other function schemes.

柜体

柜体是选用优质冷轧钢板或敷铝锌板经过数控钣金设备加工折弯成形, 通过高强度螺栓、螺母 (8.8 级) 或拉铆螺母组装而成。柜体各构件采用喷塑或表面镀锌工艺, 这样使柜体不仅具有很高的精度, 而且与同类设备相比具有重量轻、机械强度高、外形美观的特点。同时由于采用了组装式结构使零部件通用性强、加工周期短、生产占地面积小, 可以根据订货情况便捷地组织生产。

Cabinet body

The cabinet body is made from the high-grade cold-cooled steel plate or aluminized zinc plate. It is assembled through the high-strength bolt and nut (grade 8.8) or riveted nut after the plate is machined and bent as well as formed by the NC sheet metal equipment. For every structural member of cabinet body, the plastic-spraying or surface galvanizing process is used. Therefore, the cabinet body not only has the very high height but also it can have such features as lightweight and high mechanical strength as well as beautiful appearance comparing with the similar equipment. At same time, there are such features as strong versatility, short machining period, small floor area for production of component because the assembly-type structure is adopted. The production can be organized conveniently depending on the ordering condition.

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手车

1. 手车骨架由优质钢板折弯焊接而成。根据用途手车可分为断路器手车、隔离手车、电压互感器手车和避雷器手车等。同规格手车可以互换。

2. 手车之推进装置采用丝杠螺母推进机构，与超越离合器和联锁机构等组成。丝杠螺母推进机构可轻便地使手车在试验位置和工作位置之间移动。借助丝杠螺母自锁性可使手车可靠地锁定在工作位置，而防止因电力作用引发事故。超越离合器在手车移动退至试验位置和进至工作位置时使操作轴与丝杠自动脱离而空转，可防止超限操作损坏推进机构。

Trolley

1. The framework of trolley is bent and welded by the high-grade sheet steel. The trolley can be divided into the trolley of circuit breaker, separation trolley, trolley of voltage transformer and trolley of lightning arrester and so on according to the purpose. Trolley of same specification can be interchangeable.

2. The pushing device of trolley consists of leading screw nut pushing mechanism, overrunning clutch and interlocking mechanism and so on. The leading screw nut pushing mechanism can operate easily to make the trolley move between the testing position and working position. The self-locking property of leading screw nut can be utilized to lock the trolley at the working position reliably and prevent the accident from play of trolley due to action of electrical force. The overrunning clutch will enable the operating shaft to separate from the lead screw automatically and the operating shaft runs idly when the trolley moves back to the testing position and advances to the working position, and thus avoid damage to the construction.

隔室

KYN61-40.5型金属封闭开关设备设有独立的隔室，即断路器室，母线室，电缆室和继电器仪表室。而
且
断
路器室，母线室和电缆室都设有泄压通道。

1. 断路器室

断路器室底部装有导轨，对手车在试验位置和工作位置间平稳运动起正确导向作用。触头盒前装有活门，上下活门在手车从试验位置移动到工作位置过程中自动打开，当手车反方向移动时自动关闭并形成有效的隔离。上下活门联动，检修时可锁定，以保证检修人员不会触及带电体。柜门关闭时手车可以操作，门面开有紧急分闸操作孔，供手动分闸操作。通过门上的观察窗可以观察到手车所处位置、断路器分合位置指示器及合闸弹簧储能状态。

2. 母线室

主母线、分断母线，通过分支母线和触头盒固定，不需要其它绝缘子支撑。主母线、分支母线及联络母线均为紫铜母线。相邻柜间用穿墙套管隔开，能有效防止事故蔓延，同时对主母线起到辅助支撑作用。母线室的主绝缘采用复合绝缘技术，确保绝缘的可靠性。

3. 电缆室

每相可并接1-3根电缆，最多并接6根单芯电缆。手车移开后，安装维修人员可从正面进入电缆室，对其电流互感器、电压互感器、接地开关、避雷器等元件进行维护安装。柜底配置开缝的可拆卸式封板，方便电缆的施工。

4. 继电器仪表室

继电器仪表室供安装继电保护控制元件、仪表以及特殊要求的二次设备。小母线室位于继电器仪表室内的顶部，供敷设控制小母线用。

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Compartment

The individual compartment, namely, compartment of circuit breaker, bus compartment, cable compartment and compartment of relay instrument, is installed in the KYN61-40.5 metal enclosed switchgear. The pressure-relief channel is installed in the compartment of circuit breaker and bus compartment as well as cable compartment.

1. compartment of circuit breaker

The guide rail is installed at the bottom of circuit breaker compartment to function as the correct guidance for the smooth operation of trolley between the testing position and working position. The valve is installed in front of the contact box. The upper and lower valve opens automatically during the process that the trolley moves to the working position from the testing position. When the trolley moves oppositely, the valve closes automatically to form the effective separation. The upper and lower valve can be locked while overhauling so that it can ensure that the maintainer will not contact the charged body. The trolley can be operated when the cabinet door is closed. The emergency switching-off operating hole is installed at the door face for manual switching off. The position where the trolley is located at and on/off position indicator of circuit breaker as well as energy-storage state of switching-on spring can be observed through the observation window on the door.

2. Bus compartment

The main bus and staged bus is fixed through the branch bus and contact box and the support from the other insulator is not necessary. The main bus and connecting bus as well as branch bus is the red copper bus. The wall sleeve is separated between adjacent cabinets so that it can prevent the accident from spreading effectively. At same time, it functions as the auxiliary support for main bus. The compound insulation technique is used for main insulation in the bus compartment to ensure the insulation reliability.

3. Cable compartment

1-3 cables can be connected in parallel in every phase. Maximum 6 single-core cables can be connected in parallel. After the trolley is moved away, the installer and maintainer can enter into the cabinet from the front side to repair and install such elements as current transformer, voltage transformer, grounding switch and lightning arrester and so on. It is equipped with the slotted dismountable sealing plate for easy cable construction.

4. Compartment of relay instrument

The relay protection and control element and instrument as well as secondary equipment with special requirement can be installed in the compartment of relay instrument. The small bus is located at the top of compartment of relay instrument for laying and control of small bus.

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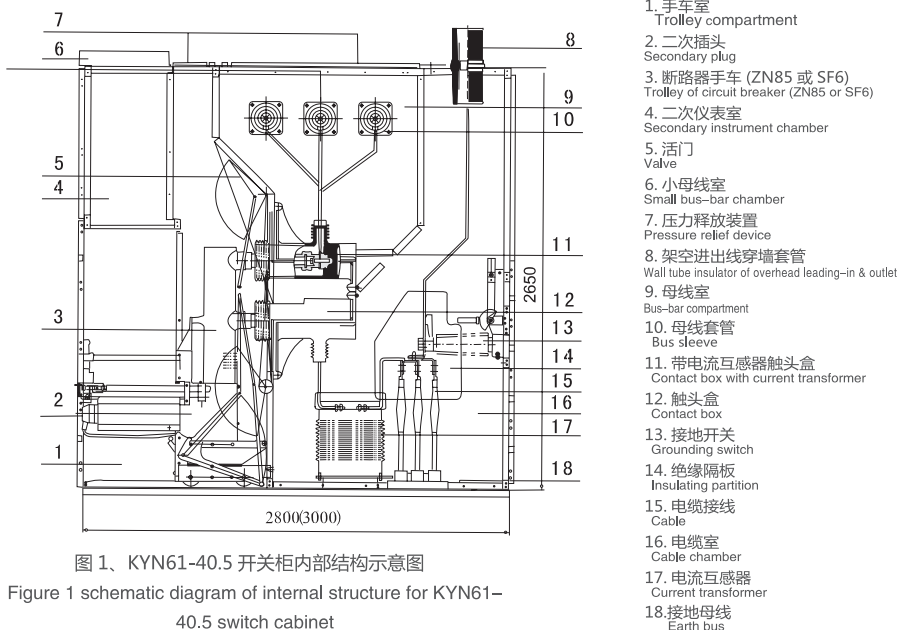


图 1、KYN61-40.5 开关柜内部结构示意图

Figure 1 schematic diagram of internal structure for KYN61-40.5 switch cabinet

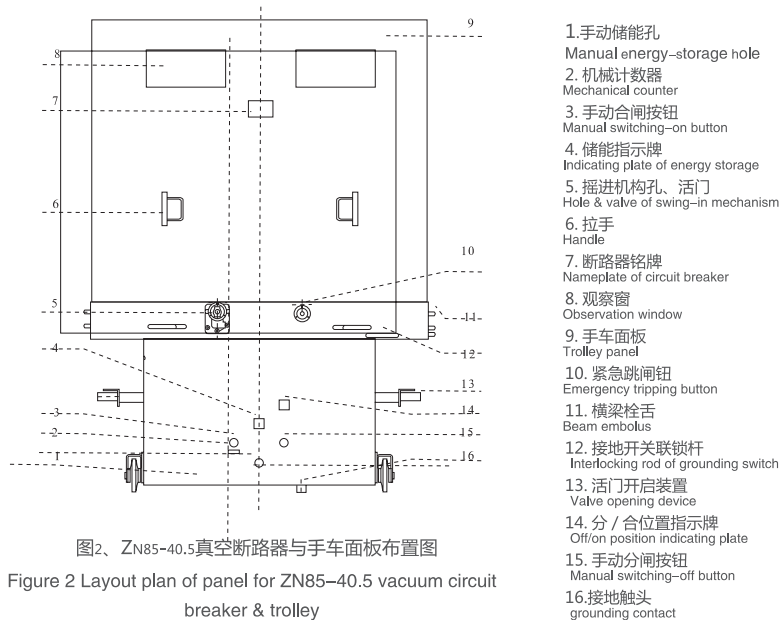


图2、ZN85-40.5真空断路器与手车面板布置图

Figure 2 Layout plan of panel for ZN85-40.5 vacuum circuit breaker & trolley

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防止误操作联锁装置

KYN61-40.5 型金属封闭开关设备装有可靠的防误联锁装置,可满足“五防”要求。

1. 继电器仪表室门上有明显提示标志的操作按钮或 KK 转换开关,以及与用户之模拟图板上提示标志(如红绿翻牌)相配合以防误合、误分断路器。
2. 断路器手车只有处在试验或工作位置时断路器才能进行分合闸操作;而且断路器只有处在分闸位置时手车才能从试验位置推向工作位置,或者从工作位置退到试验位置,从而防止带负荷分合隔离触头。
3. 手车只有在试验位置接地开关才能进行合闸操作,防止带电合接地开关。
4. 接地开关处于合闸状态,手车不能进到工作位置,防止带接地开关合闸。
5. 接地开关不关合则开关柜后门不能打开,反之,后门不关,则接地开关不能分闸,从而防止误入带电间隔。
6. 无接地开关的断路器柜、母线分段柜和母线联络柜等由相应的电磁锁(或程序锁)配合完成全部防误功能。
7. 手车二次插件只有在试验位置才能插入或拔出,在工作位被锁定不能拔出。

Interlocking device preventing false operation

KYN61-40.5 metal enclosed switchgear is equipped with reliable interlocking device preventing false operation so that it can meet the “5-pretection requirement” .

1. There are operating button with obvious prompting sign or KK changeover switch and prompting sign on the analog drawing board from the client (e.g. red/green drawing) on the door of relay instrument compartment. They are cooperated to prevent the circuit breaker from wrong switching on and off.
2. The switching-on/off operation of circuit breaker can be done only when the trolley of circuit breaker is located at the testing position or working position. Moreover, the trolley can be pushed to the working position from the testing position or returned back to the testing position from the working position only when the circuit breaker is located at the switching-off position. Thus, it prevents switching on and off isolating contact with charge.
3. The switching-on operation of grounding switch can be done only when the trolley is located at the testing position to prevent switching on the grounding switch with charge.
4. When the grounding switch is located at the switching-on state, the trolley cannot be entered into the working position to prevent switching on the grounding switch.
5. The rear door of switch cabinet cannot be opened if the grounding switch does not switch on. On the other hand, the grounding switch cannot switch off if the rear door is not closed. Thus, it can be prevented that the charged compartment is entered wrongly.
6. For the circuit breaker cabinet and subsection cabinet of bus as well as bus contact cabinet and so on without installation of grounding switch, the corresponding electromagnetic lock (or program lock) is needed to cooperate and finish all mistake-prevention functions.
7. The secondary plug-in unit can be inserted in or plugged out only when the trolley is located at the testing position. The secondary plug-in unit is locked at the working position and it cannot be plugged out if the trolley is located at the working position.

接地装置

1. 手车与柜体间有可靠的接地装置。
2. 电缆室内单独设有 $5 \times 40(\text{mm}^2)$ 接地铜排,此铜排能贯穿整个排列与柜体接触良好,供直接接地元件使用,从而使整个柜都外于良好的接地状态之中。

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Earthing device

1. There is a reliable earthing device between the trolley and cabinet body.
2. The $5 \times 40(\text{mm}^2)$ copper grounding bar is installed in the cable compartment individually. This copper bar can be through the whole arrangement and contacts with the cabinet body well. It is provided to the direct grounding element for its use. Thus, the whole cabinet is located at the good grounding state.

泄压装置

断路器室、母线室和电缆室均设有泄压通道,各泄压室盖板的一端用金属螺栓固定,另一端用塑料螺栓固定,当故障时,内部高压气体能容易地将泄压盖板冲开释放压力,以确保操作人员和开关设备安全。

① Switching-on operation of grounding switch: At first, it is confirmed that the trolley has been located at the testing position and the indicating lamp of voltage display device has extinguished entirely. Afterwards, the locking between the trolley and operating shaft of grounding switch is unlocked. The operating handle of grounding switch is inserted to rotate by 270° in the clockwise direction. The grounding switch is switched on.

② Switching-off operation of grounding switch: At first, it is confirmed that the trolley has been located at the testing position and the front and rear door is closed. Afterwards, the locking between the trolley and operating shaft of grounding switch is unlocked. The operating handle of grounding switch is inserted to rotate by 270° in the counter-clockwise direction. The grounding switch is switched off.

3. Operation of isolation cabinet: The isolation trolley has not the capacity connecting and breaking the load current. Therefore, the isolation trolley accesses into the working position from the testing position and return back to the testing position from the working position in the cabinet, the operation correctness can be ensured through the electrical interlock between the isolation trolley and self-contained circuit breaker. It means that the isolation cabinet door can be opened only the circuit breaker is in the switching-off position. The other detailed operating procedure is the same as the circuit breaker trolley.

安 装

1. 安装准备:

- a. 首先检查开关柜之型号、规格、数量等是否与合同相符,无问题后方可开箱。
- b. 按厂家提供的装箱单清点所收到的物品是否与装箱单一致,若有出入请及时与厂家电传联系。
- c. 检查柜体及断路器元件等有无损坏,如发现损坏应速与厂家联络。
- d. 清除脏污,尤其绝缘表面,应清扫干净。
- e. 手动使断路器分闸,同时手动储能进行合分闸,确认正常后进行开关柜安装。
- f. 产品在开箱、起吊、转运等过程中注意用力适中,轻起轻落,轻拿轻放,以保护产品不致受到不应有的损伤或损坏。

2. 安装:

- a. 首先检查基础是否符合设计以及本产品之基础(见图 18.1)要求,合格方可安装。
- b. 开关柜安装次序,先将中间柜子搬运到基础上,尔后将两则开关柜依次排列好并对齐,再紧固柜间螺栓,最后紧固好柜体与基础间螺栓。
- c. 分别清理主母线和分支母线搭接面,将主母线与分支母线连接好,并用 0.05mm 插尺插入各搭接处,其插入深度不大于 5mm 。

注:各种断路器(包括操动机构)之安装前检查应按各断路器要求进行。

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Installation

1. Preparation for installation: a. At first, check the model and size and quantity of switch cabinet is conformed to the contract. It can be unpacked if there is no problem. b. Please check if the received goods are in accordance with the packing list as per the packing list provided by the manufacturer. If there is a conflict, please contact with the manufacturer by telephone or fax in time. c. Check the cabinet body and element of circuit breaker and so on for damage. The manufacturer shall be contacted quickly in case of any damage. d. Remove the dirt especially insulating surface shall be cleaned up. e. Manual switch off the circuit breaker and manual store the energy to switch on and off at same time. The switch cabinet is installed after it is in good condition. f. Note that the proper force is applied and the product is lifted up and down slightly during the process of unpacking and handling as well as transportation to protect the product against the undesirable loss or damage.

2. Installation: a. At first, check if the foundation meets the design requirement and foundation requirement of this product (see the figure 18.1). The installation can be proceeded after it is acceptable. b. For the installation of switch cabinet, the intermediate cabinet shall be conveyed on the foundation at first. Afterwards, the both sides of switch cabinet are well arranged and aligned. The bolt among cabinets is tightened. Afterwards, the bolt between the cabinet body and foundation is fixed. c. Clean up the lapped face of main bus and branch bus respectively. Check if connection of every bus and branch end bus is tightened. The 0.05mm ruler shall be used. The insertion is not more than 5mm. Note: The inspection shall be carried out according to the requirement of every circuit breaker before various circuit breakers (including the actuator) is installed.

检测

1. 检验手车进出柜是否顺利；
 2. 检验活门动作是否良好可靠；
 3. 检验同类型手车互换性是否良好；
 4. 检验“五防”功能是否良好可靠；
 - a. 检验断路器手车在工作或试验位置的锁定状态下，应能合闸、分闸，在工作或试验位置之间，应合不上闸。
 - b. 检验接地开关处于合闸状态，手车推不到工作位置，手车在工作位置时接地开关不能合闸。
 - c. 检验接地开关不合闸后门不能打开，后门不关则接地开关分不了。
 - d. 检验手车在工作位置二次插头应拔不下。
 5. 检查各行程开关动作是否良好；
 6. 检测隔离插头插入深度，符合要求；
 7. 测试回路电阻；
 - a. 主回路（断路器）
 - b. 每相总回路（包括断路器和出入口隔离触头，不含电流互感器）阻值不大于 $400\mu\Omega$
 8. 工频而耐压试验；
 - a. 主回路：相间、对地（手车应在工作位置进行）
 - b. 断路器断口、隔离断口
 - c. 二次控制回路对地 2000V.1min
- 注：断路器之检测项目按各类断路器（包括操动机构）要求进行。

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Inspection

1. Check if the trolley enters into and exits the cabinet smoothly.
2. Check if the action of valve is good and reliable.
3. Check if the interchangeability of same type of trolley is good.
4. Check if the "5-protection" function is good and reliable.
 - a. Check that the circuit breaker shall switch on and off when the trolley of circuit breaker is at the locking state of working position or testing position and the circuit breaker shall not switch off when the trolley of circuit breaker is located between the working and testing position.
 - b. Check that the trolley is not pushed to the working position when the grounding switch is at the switching-on state and the grounding switch shall not switch on when the trolley is located at the working position.
 - c. Check that the rear door cannot be opened when the grounding switch does not switch on and the grounding switch does not switch off when the rear door is not closed.
 - d. Check that the secondary plug shall not be plugged out when the trolley is located at the working position.
5. Check if the action of every stroke switch is good.
6. Check the insertion strength of isolation plug and it meets the requirement or not.
7. Testing of circuit resistance
 - a. Main circuit (circuit breaker)
 - b. The resistance value of total circuit of every phase (it includes the circuit breaker and isolating contact at the entrance and exit and does not contain the current transformer) is not more than $400 \mu \Omega$.
8. Power-frequency withstand voltage test
 - a. Main circuit & interphase and phase to ground (the trolley shall be at the working position)
 - b. Circuit breaker fracture & isolation fracture
 - c. Secondary control circuit for ground 2000V, 1min

Note: The inspection item for circuit breaker is carried out according to the requirements of various circuit breakers (including the actuator)

操作试验

当上述检测良好后进行下列操作试验：

1. 手车处于试验位置将二次插头插好，合上控制电源，检查仪表盘上的信号是否正常，如用弹簧机构手动储能其储能信号灯是否正常。
2. 按动仪表盘上合闸按钮进行合闸，良好后分闸，尔后合分闸，各进行 5 次，动作和信号应表示正常。
3. 手车推至工作位置，检查控制室内控制盘上之信号是否正常，然后进行合分闸操作，无问题各合分 5 次，来检验动作，报警和信号是否正常。
4. 断路器合闸后模拟继电保护动作进行重合闸动作试验，共 2 次，检验其动作，报警和信号是否正常，同时也验证出继电保护，断路器和二次控制回路接线是否正确。
5. 将断路器合闸，于现场手动分闸，重合闸继电器动作合闸后，立即手动合闸，这时断路器不能立即合闸，(持续时间不超过 10 秒) 检验其动作和信号及报警是否正确及不成功重合闸时间设定是否正确。

Operation test

The next operation test shall be done after the foregoing inspection is proved good:

1. The secondary plug-in unit is inserted after the trolley is located at the testing position. The control power supply is switched on. Check if the signal on the instrument board is regular. For example, the energy-storage signal lamp is regular or not if the spring mechanism stores the energy manually.

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2.The switching-on button on the instrument panel is pressed to switch on. After it is in good condition, the switching off is executed. Afterwards, switching on and off is executed. The switching and off action shall be performed for 5 times respectively. The signal indicates it is good.

3.The trolley is pushed to the working position to check if the signal on the control board in the control room is regular. Afterwards, the switching on and off operation is carried out for 5 times if there is no problem to check if the action and alarm as well as signal are good.

4.After the circuit breaker is switched on, the analog relay protection action switches on again for action test for totally twice to check if the action and alarm as well as signal are good. At the same time, check if the relay protection, circuit breaker and wiring of secondary control circuit are correct.

5.The circuit breaker is switched on and off manually on site. After the re-switching on relay acts to switch on, the manual switching on is carried out immediately. At this time, the circuit breaker cannot be switched on immediately (duration is not more than 10s). Check if the action and alarm as well as signal are correct and unsuccessful re-switching-on time is set correctly.

日常维护

1. 应按电力部门规定的状态维护制度进行，在进行小修时应进行预防性试验，并对断路器断口进行工频耐压试验。

2. 对 SF6 断路器应每年进行水份含量试验，不大于 300PPm

3. 根据开关柜工作情况进行停电维修（包括小修项目）

a. 对开关柜内外进行清扫；

b. 检查导体连接部位紧固是否良好，否则应紧固；

c. 检查隔离触头是否有过热变色情况，否则修正或更换；必要时测试隔离触头插入深度和接触电阻；

d. 必要时检验“五防”联锁是否良好；

e. 检查二次线接线端接触是否良好（包括端子排），否则应紧固；

f. 应按各类断路器之检修项目进行（包括操动机构）；

g. 频繁操作（电容器组）达 1000 次应进行临检；

h. 根据电力部门规定 6-12 年进行大修一次，按规定的大修项目进行。

Routine maintenance

1. The state maintenance system specified by the electrical power department shall be followed. The preventive test shall be performed when carry out the minor overhaul. The power-frequency withstand voltage test is performed at the circuit breaker fracture.

2. The moisture content test shall be performed for circuit breaker every year: not more than 300PPm.

3. Power failure maintenance (including the minor overhaul item) is carried out depending on the working condition of switch cabinet.

a. Clean the internal and external part of switch cabinet

b. Check if the connecting position of conductor is well tightened.

c. Check if the isolation contact overheats and the color is changed. Otherwise, it is amended or replaced. If necessary, the insertion depth of isolation contact and contact resistance is tested.

d. Check if the “5-protection” interlocking is good if necessary

e. Check if the terminal of secondary line contacts well (including the terminal block). Otherwise, it shall be tightened.

f. It shall be carried out according to the overhauling item of various circuit breakers (including the actuator)

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g. The temporary inspection shall be carried out when the frequent operation (capacitor bank) is up to 1000 times.

h. The major overhaul is carried out once every 6-12 year according to the regulation from the power department. It is carried out according to the specified item of major overhaul.

包装运输与贮藏

1. 手车与柜体分开包装。断路器处于合闸位置，弹簧机构的分、合闸弹簧处于释放状态，包装箱的外部注明开关柜型号、到货地点、订货单位及其它有关标志。

2. 在运输及吊卸过程中应避免强烈震动、颠簸、碰撞和倒置，不得受潮和腐蚀，装卸和放置时应按包装箱上标志要求进行。

3. 产品放在通风干燥的室内，不得遭受潮湿和有害物质侵蚀，周围不得有易燃和易爆物品。

Packing & transportation and storage

1. The trolley and cabinet body is packed separately. the trolley of circuit breaker is located at the switching-on position. The spring mechanism is located at the releasing state. For the packing & transportation and storage, the special packing unit is used. It is packed according to the single cabinet. The model of switch cabinet and delivery place as well as ordering unit and other related signs are indicated outside.

2. During the transportation and handling process, the severe vibration, jolt, impact and inversion shall be avoided. The damping and corrosion is not allowed. The handling and placement shall be carried out according to the requirements in the sign on the packing box.

3. The product is placed in the well-ventilated and dry room. The damping and harmful corrosion is not allowed. It is not allowed that there is the combustible and explosive substance around the product.

随机文件及清单

“产品合格证书”；

《产品样本》或《产品安装使用说明书》（包括断路器）；

装箱清单；

“产品出厂检验报告”；

二次结线图；

备品备件、易损件及专用工具。

Attached document & list

Conformity certificate of product;

<<Product catalog>> or <<Installation & operating instruction of product>> (including the circuit breaker

Packing list

“factory inspection report of product”

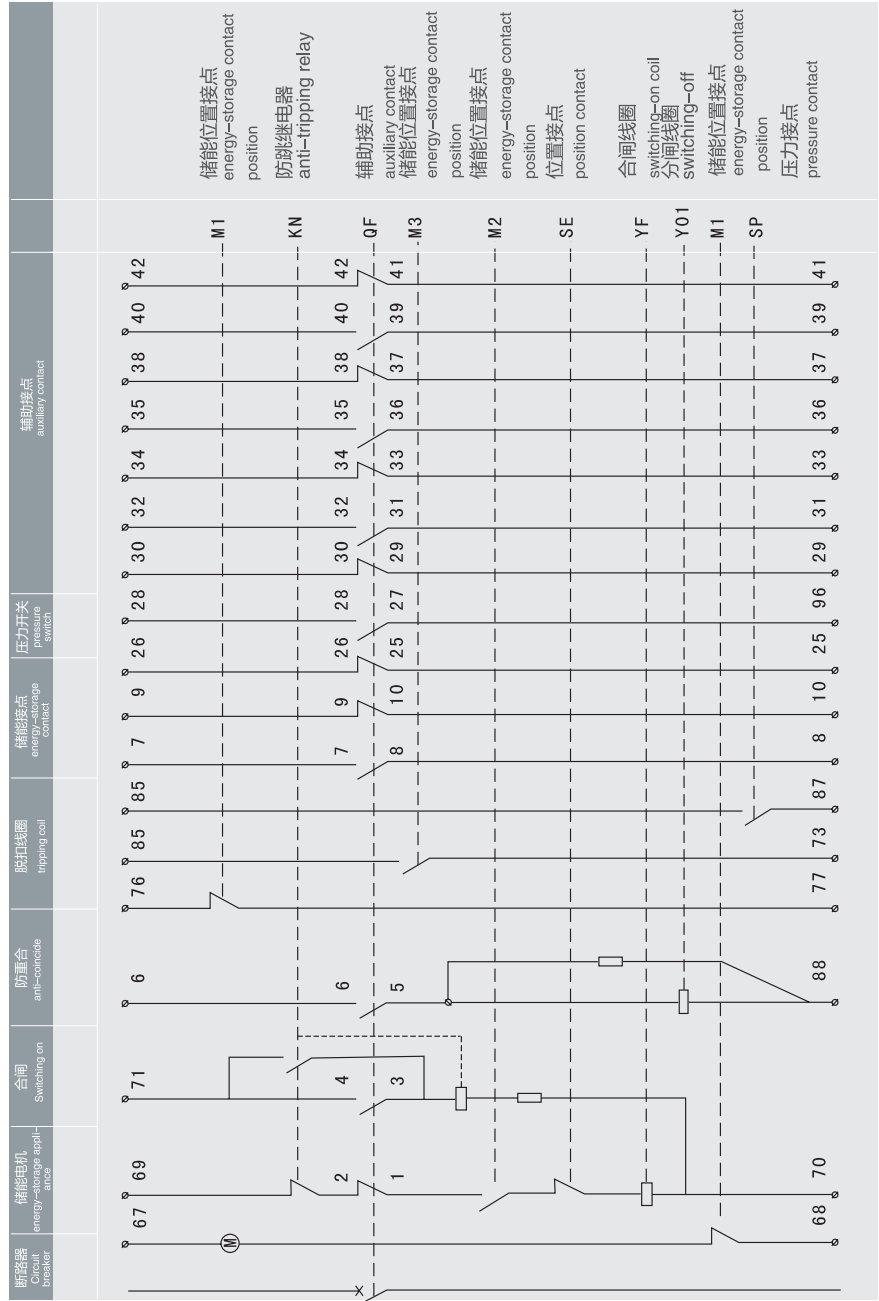
Secondary wiring diagram

Spare part & wearing part and special tool

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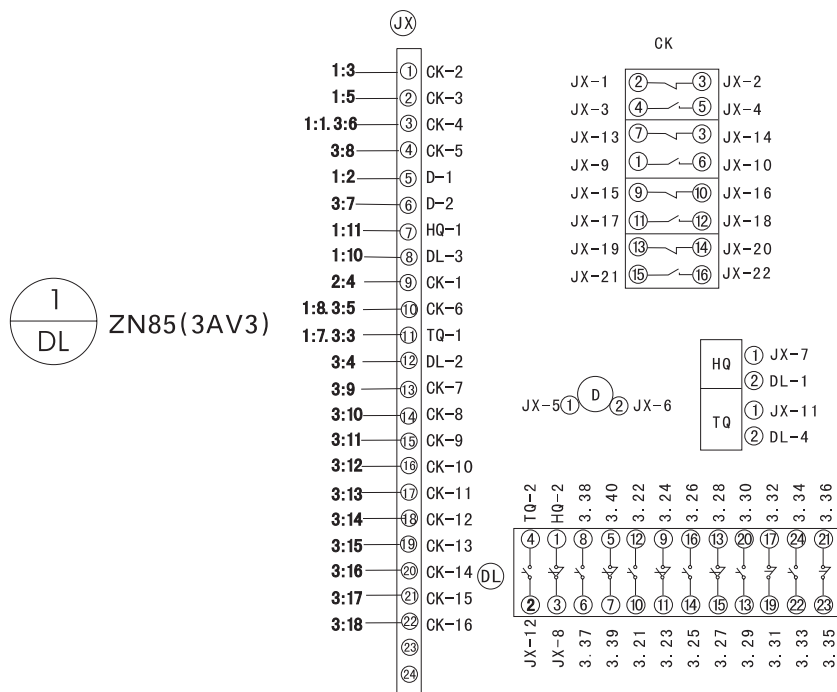
Schematic diagram of SF2 sulfur hexafluoride circuit breaker SF 型六氟化硫断路器控制原理图



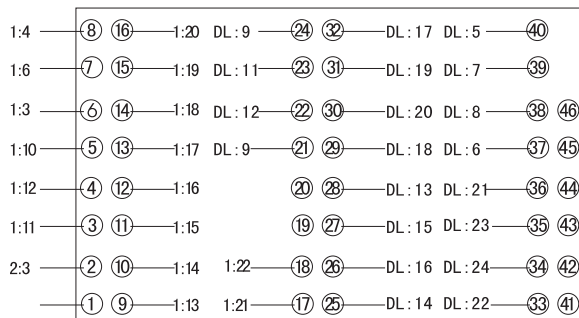
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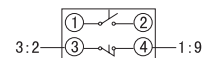
真空断路器机构接线图 Wiring diagram of vacuum circuit breaker



3 CZ-46



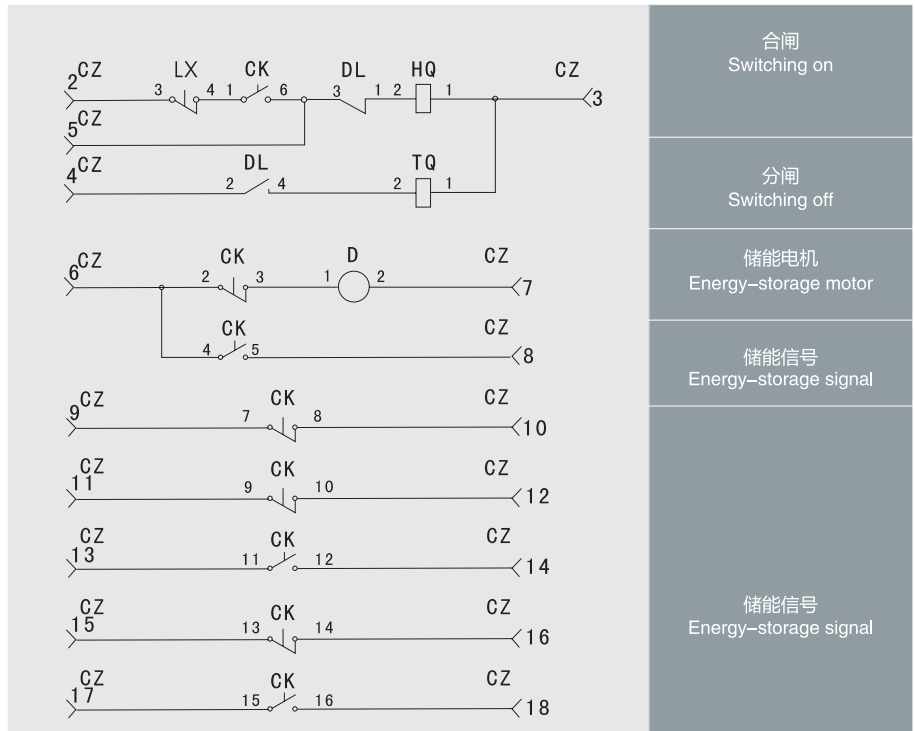
2 LXW20-11



成套设备选型

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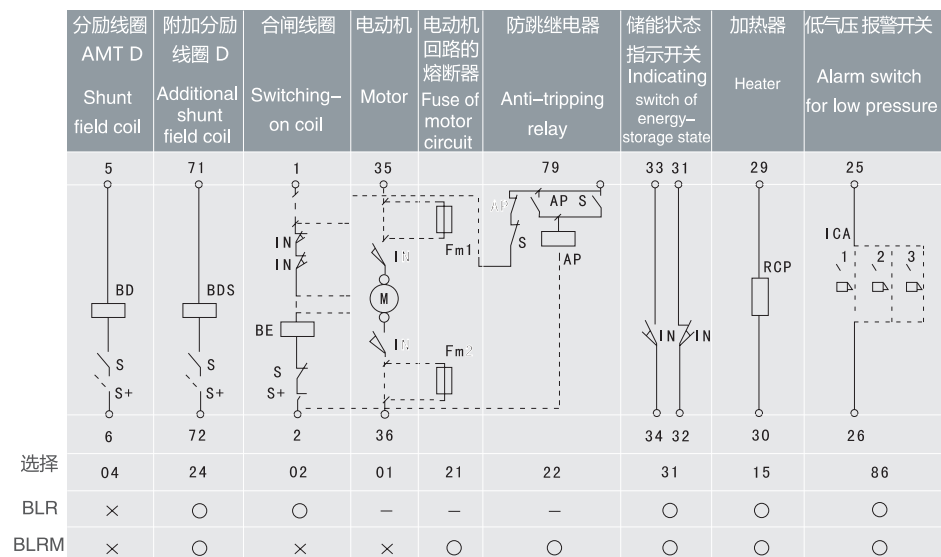


序号 Serial number	标号 Label	名称 Name	型号规格 Model & specification	数量 Quantity	备注 Remarks
1	LX	微动开关 Micro switch	LXW20-11	1	
2	CZ	二次插头 Secondary plug	CZ-46	1	
3	DL	辅助开关 Auxiliary switch	弹簧操动机构内附件 Accessories in the spring actuator	1	
4	CK	行程开关 Stroke switch	弹簧操动机构内附件 Accessories in the spring actuator	4	
5	HQ	合闸线圈 Switching-on coil	弹簧操动机构内附件 Accessories in the spring actuator	1	
6	TQ	分闸线圈 Switching-off coil	弹簧操动机构内附件 Accessories in the spring actuator	1	
7	D	储能电机 Energy-storage motor	弹簧操动机构内附件 Accessories in the spring actuator	1	
8	JX	接线端子 Terminal	弹簧操动机构内附件 Accessories in the spring actuator	24	

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FP 控制原理图 FP schematic diagram



图例：
Legend

基本设备
Basic

供用户选择
equipment for client selection

不可选择
non-selection

选某些选拔项 (如 04、24、02、22) 必须配用辅助开关。这些辅助开关与选拔项用相同的颜色加以表示。若选项没有被选用, 则该项涂色的辅助开关仍可选用, 端子排仍保留。接入防跳时, 合闸回路接 79, 监视信号回路接 1。

If some options are selected (e.g. 04, 24, 02 and 22), it must be equipped with the auxiliary switch. For these auxiliary switch and option, the same color is used to indicate.

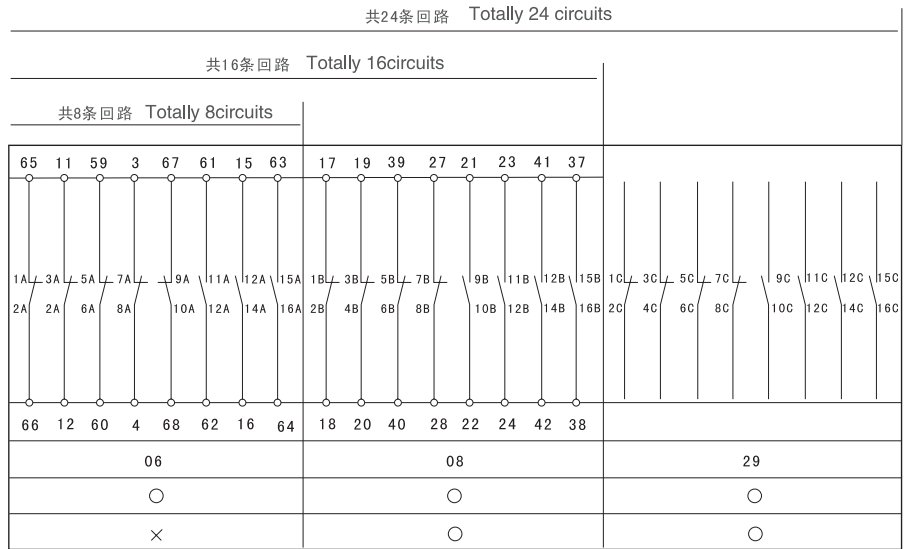
If the option is not selected, this color-coated auxiliary switch still can be selected. The terminal block is still maintained. When connecting in the anti tripping, the switching-on circuit is connected to 79 and the monitoring signal circuit is connected to 1.

端子排列图 Terminal arrangement diagram

接线座号 Number of wire holder	9	13	25	26	1	2	3	4	5	6	11	12	15	16	17	18	19	20	21	22	23	24	27	28	29	30	31	32	33	34
选择号 Option number	01	86	02	06	04	06														08					15			31		

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接线座号 Number of wire holder	35	36	37	38	39	40	41	42	59	60	61	62	63	64	65	66	67	68	71	72	79
选择号 Option number	01		08						06						24		22				

注意：

单台断路器接至端子的辅助接点最多为 6NO，6NC。

由于端子排空间有限，提供给用户使用的辅助接点引至端子的数量需根据用户选用的项目而定。我们将根据用户要求提供相应的原理图及端子排图。

对于未能引至端子排的辅助接点（如选项 29 均不引线），用户可使用我们提供的接线头 (SQA-5N) 直接由辅助开关接出。

Note

The maximum auxiliary contact connected to the terminal with the single circuit breaker is 6NO and 6NC.

The quantity that auxiliary contact is connected to the terminal provided to the client for use is determined depending on the item selected by the client because there is limited space in the terminal block. We will provide the corresponding the schematic diagram and terminal block diagram according to the requirement from client.

For the auxiliary contact which cannot be led to the terminal block, (e.g. for option 29, the wire is not led.), the client can use the connector lug provided by us to and the connector lug is connected from the auxiliary contact.

KYN61-40.5

type outdoor AC armoured movable
type metal sealed switchgear

安装基础图 Installation foundation drawing

