KYN10-40.5
Metal Armoured Movable type Switchgear

概述

KYN10-40.5型金属铠装移开式开关设备(以下简称开关柜),是我公司研制的适合国情的产品。广泛适用于三相交流50Hz,额定电压40.5kV的单母线及母线分段的电力系统,作为发电厂、变电所及工矿企业的配电室接受分配电能之用。并对电路具有控制、保护和监测等功能。开关柜除广泛用于一般电力系统外,还可使用于具有频繁操作的电力线路中。

柜架按金属封闭铠装式结构而设计,其柜体采用优质钢板焊接而成,外壳防护等级为IP3X;开关柜为单面不靠墙安装。柜内配有性能优良的SF_6或真空断路器,大大减少停电检修时间和次数。主回路采用热缩套管绝缘母线,相间及连接头配有用阻燃材料注塑而成的绝缘套,进线及柜间隔板装有环氧树脂绝缘套管,触头盒与电流互感器合为一体,保证开关柜具有良好的绝缘特性和缩小体积 手车具有轻便的推进机构及可靠的导向定位装置,确保同类手车具有良好的互换性; 柜内设有可靠的"五防"机械联锁装置,确保设备操作运行安全可靠。开关柜除符合GB3906国标外,还满足IEC-298国际标准的要求。

General

KYN10-40.5 Metal Armoured Movable type Switchgear (here in after called switchgear) researched and produced by our company, is a kind of all regime product which complies with national conditions. It is widely used for receiving and distributing electric energy in distributing cabinet of power stations, transform substations and industrial and mining enterprises with single bus bar and sectioned bus bar electric system three phase AC 50Hz rated voltage 40.5kV. It also has functions of controlling, protecting and monitoring the electric circuit. Except for being widely used in electric system, it can also be used in frequently operated electric circuits.

Main characteristics: Its frame is designed according to metal sealed armoured type and its case body has common plate and Aluminum and Zinc applied plate. The safety class of outer frame is IP3X. The switchgear adopts single side not against wall installation. Inside the cabinet there is SF_6 or vacuum circuit breaker of good performance, which decreases time and number of times to stop power supply to check the circuit. The main circuit has thermal shrinkage adapter pipe insulated bus bar. There is insulating covering cast by fire resistant material between phase to phase and union joint; there's installed epoxide resin insulating sleeve between input wire and clapboard among cabinets; contact box is integrated with current transformer; which ensures the switch cabinet has good characteristics of insulation and small volume. The handcart has light and convenient propelling plant and dependable oriented locating device, which ensures the similar type handcart has good interchangeability. There is reliable five-proof mechanical interlocking device inside the cabinet to ensure its equipment to work safely. The switch gear complies with GB 3906 national standard and IEC-298 international standard as well.

设备运行环境条件

2.1正常使用环境条件:

海拔高度不超过:1000m;

地震烈度不超过:8度;

环境温度:上限温度:+40℃;

下限温度:-25℃;

相对湿度:日平均相对湿度95%以下;

月平均相对湿度90%以下;

开关设备安装在户内没有火灾、爆炸危险,没有严重污秽、化学腐蚀及剧烈振动的场所。

2.2特殊使用环境条件:

当开关柜安装在海拔高度大于1000m的地区时,必须与厂家商定制造技术。当环境温度升高超过规定时,必须在柜内进行强迫通风,以提高母线的载流量。当开关柜运行于有凝露危险的环境中时,必须安装加热器。

Running ambient conditions for switchgear

2.1Normal using environmental conditions:

Sea level: not over 1000m.

Earthquake intensity: not over 8 degree.

Ambient temperature: upper limit : +40℃.

Lower limit: -25℃.

Relative humidity: daily average humidity 95% or below.

Monthly average humidity 90% or below.

The switchgear should be installed in places where there調no danger of fire and explosion and no dirtiness, chemical corrosion and strenuous vibration.

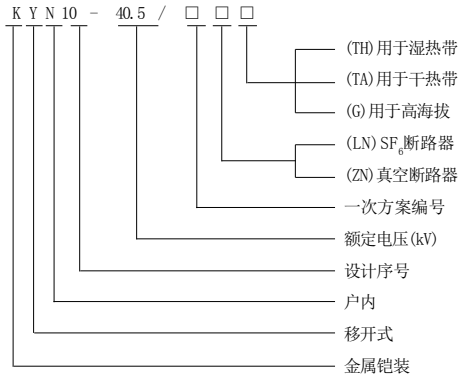
2.2Special using conditions;

When switch gear is installed above 1000m sea level, the user should contact its manufacturer for its technology. When ambient temperature rises surpassing the setting value, forced ventilation must be acted so as to improve the load quantity of its busbar. When switch gear is used in places with dew, heater be installed.

KYN10-40.5

金属铠装移开式开关设备

型号说明



技术参数 Technical parameter

4.1KYN10-40.5开关柜主要技术参数

Main Technical parameter of KYN10-40.5 Switchgear

序号	项目	技术参数
1	额定电压（kV）	40.5
2	额定频率（Hz）	50
3	主母线额定电流（A）	1600
4	分支母线电流（A）	630 1000 1250 1600
5	热稳定电流（kA）/ 持续时间（S）	20/4 25/4 31.5/4
6	动稳定电流（kA）	50 63 80
7	外形尺寸（宽×深×高）mm	1400×2260×2600
8	重量（kg）	1800
9	操动机构	电磁或弹簧
10	防护等级	IP3X

4.2真空断路器主要参数

Main technical parameter of vacuum circuit breaker

项 目		单位	技术参数
额定电压		kV	40.5
绝缘水平	1min工频耐压	kV	95
	雷电冲击电压(全波)	kV	185
额定频率		Hz	50
额定电流		A	1600
额定短路开断电流		kA	25
额定短路关合电流		kA	63
动稳定电流		kA	63
热稳定电流		kA	25
机械寿命		次	10000
储能电机额定电压		V	交、直流:110、220
储能电机额定功率		W	150～200
合分闸线圈额定电压		V	交、直流:110、220
合分闸线圈额定电流		A	5.6(4.07)、4.5(2.03)
过电流脱扣额定电流		A	5
合闸时间		ms	30～75(电磁≤200)
分闸时间		ms	15～60

4.3熔断器主要技术参数
Main technical parameter for fuse

型号	额定电压(kV)	额定电流(A)	三相断流容量(MVA)	最大开断电流有效值(kA)	当开断极限短路电流时，最大电流峰值(kA)
RN1-40.5	40.5	7.5 10 20 30 40	200	3.5	1.5 1.6 2.8 3.6 4.2
RN2-40.5	40.5	0.5	1000	17	7.0

4.4避雷器主要技术参数 Main technical parameter for lightning arrester

项 目		技术参数
避雷器型号		HY5WZ1-51/134
避雷器额定电压有效值（kV）		42
系统额定电压有效值（kV）		40.5
避雷器持续运行电压效值（kV）		23.4
直流参考电压UimA不小于（kV）		73
残压8/20us5 kA不大于峰值(kV)		134(105)
方波通流容量2ms18次 不小于（A）		300
冲击波通流容量4/10ms2次不小于(kA)		40
0.75产UimA下泄露电流不大于（ A）		50
泄露比距不小于（mm/kV）		30
外型	安装高度H(mm)	620,676
	裙数(个）	9
重量(Kg)		15

注：1.括号内的数据是操作冲击电流（30/60ms)500A时的残压。2.可根据用户要求提供方波通流容量大于300A时的产品。
Note: 1. The data in bracket is residual voltage when operating impulse current(30/60ms) is 500A. 2. Product whose square wave flowing capacity is more than A can be provided according to users requirements.

4.5电流互感器主要技术参数 Main technical parameter for current transformer

型 号	额定电流比	准确级组合	相应准确级组合下额定二次输出(伏安)cos=0.8(滞后)			热稳定电流(kA)	动稳定电流(kA)
			0.2级	0.5级	10P级		
LDJ1-40.5	5-300/5	0.2/0.2 0.2/0.5 0.2/10P 0.5/0.5 0.5/10P 10P/10P	10	10	15	100(额定一次电流倍数)	250(额定一次电流倍数)
	400-500/5		10	10	20	20	50
	600-800/5		10	15	25	31.5	80
	1200-2000/5		15	20	30	40	100

4.6电压互感器技术参数 Technical parameter for voltage transformer

型 号	额定输出(VA)				额定电压(V)			极限负荷(VA)
	0.2级	0.5级	1级	3级	一次线圈	二次线圈	辅助线圈	
JDZ9-40.5	60	180	360	1000	3500	100		1800
JDZX9-40.5	30	90	180	500	$3500/\sqrt{3}$	$100/\sqrt{3}$	100/3	600

4.7 干式变压器技术参数 Technical parameter for dry type transformer

型 号	额定容量 (kVA)	额定电压(kA)		损耗 W		短路压降	空载电流	联结方式	温度极限	最高温度	冷却方式
		初级	次级	空载	负载 (75℃)						
SC8-50/40.5	50	40.5	0.4	410	1614	6 %	3 %	Y.Yn0	155℃	100℃	AN

4.8 接地开关技术参数 Technical parameter for earthing switch

型 号	额定电压(kV)	4s热稳定电流(kA)	动稳定电流(kA)	短路关合电流(kA)
JN11-40.5	40.5	20	50	50
		25	63	63
		31.5	80	80

4.9 一次接线方案,见11页附表 Primary wiring plan see attached table in page 11.

结构特征

开关柜结构图,见图1 开关柜结构按其组成分为仪表箱、前柜和后柜三部分,相互用紧固螺钉连成一整体。除仪表箱用薄钢板弯制焊成外,其余各部分用角钢焊接成形,外敷钢板以加强柜架刚度同时改善外观质量。按功能特征可分仪表箱、手车室、电缆室和母线室四部分,各部分以接地的金属隔板分隔,其外壳防护等级为IP3X.断路器手车可配装SF_6或真空断路器,此外还设计有 隔离手车、计量手车、互感器手车、避雷器、互感器手车, 所用变手车和检修车等。

各种手车均设有轻便的的推拉机构2,灵活可靠的定位机构19(具有工作、试验、移出三种位置)和准确的导向装置(见图1项1)。定位机构(项19)与二次插头(项7)之间设有可靠的机械联锁装置(保证手车外于工作位置时,二次插头不能拉出,手车从试验位置若拉到移出位置时必须先拉下二次插头,手车才能移出)。断路器(项5)和一次隔离触头(项21)、接地开关(项11)、手车(项3)与活门(项20)以及柜上、下门之间均设有可靠的机械联锁装置(项15)和(项19)。

手车面板即是柜门,可通过其上的观察窗观察断路器(项5)的状态指示,一次隔离触头及有关联锁机构的工作是否正常。

手车室与电缆室顶部设有泄压活门(项12),以便释放柜内不正常的压力和蒸气。

主母线可按用户要求装设于后柜上部,亦可设于下部,可从柜顶架空进出线,亦可从下电缆进出线。

Structure feature

The structure drawing of switchgear is shown in table 1.

Switchgear is composed of meter box, front cabinet and back cabinet. These three parts is integrated by tightened screw. The meter box is curvedly welded by sheet steel, but other parts are all shaped by angle steel. The external applied steel sheet can strengthen the cabinet frame's harness and better its outer appearance as well. Switchgear is divided into meter box, handcart cabinet, cable cabinet and busbar cabinet according to its functions. The four parts are separated by metallic clapboard and its outer frame protective class is IP3X.

Handcart of circuit breaker can equipped with SF_6 or vacuum circuit breaker, separated handcart, measuring handcart, transformer handcart, lightning-transformer handcart and inspecting handcart and so on.

Each kind of handcart has light push-and-pull mechanism 2, flexible positioning mechanism 19 (has three positions of working, testing and moving out) and accurate guiding device (see 1st item of table 1). There's dependable interlocking device between positioning mechanism (19th item) and secondary plug (7th item) (ensures the secondary plug can't be put out when the handcart is in the position of working and the handcart can only be put out when the handcart is moved from testing position to moving out position.)

There's also dependable mechanical interlocking device (15th item and 19th item) between circuit breaker (5th item) and primary insulating contactor (21st item), grounding switch (11th item), handcart (3rd item) and movable door (20th item), upper door of the switch gear, lower door of the switch gear.

The handcart board is the door of the switchgear and through the observing window on the handcart board can see pressure of the circuit.

There's pressure relief movable door between handcart and cable cabinet, which can relieve abnormal pressure and water vapor in the cabinet.

Main busbar can be installed on the upper part of the back cabinet according to users' requirements and on the lower part of the back cabinet as well.

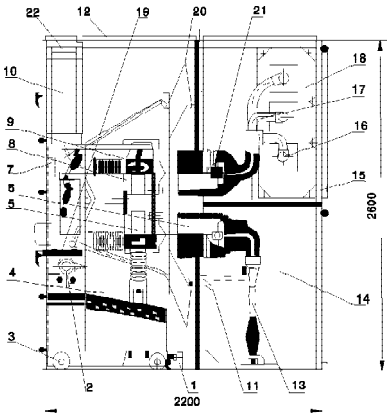


图1开关柜结构图
Table1 structure drawing for switch gear

1. 手车导向装置	1. guiding device of handcart
2. 手车推拉机构	2. push-and pull mechanism of handcart
3. 断路器手车	3. handcart of circuit breaker
4. 手车室	4. handcart cabinet
5. 断路器	5. circuit breaker appliances
6. 电流互感器	6. current transformer
7. 二次插头	7. secondary plug
8. 相间隔板	8. separated board
9. 触头盒	9. contactor box
10. 继电器室	10. relay cabinet
11. 接地开关	11 earthing switch
12. 泄压活门	12. pressure relief movable door
13. 进（出）电缆	13. in-and-out cable
14. 电缆室	14. cable cabinet
15. 后盖板联锁	15. back covering board interlocking
16. 主母线及套管	16. main busbar and sleeve
17. 支母线	17 sub-busbar
18. 绝缘板	18. insulating board
19. 手车定位及联锁	19. hardcart positioning and interlocking
20. 活 门	20. movable door
21. 一次隔离触头	21. primary insulating contact
22. 控制电缆通道	22. controlling cable chunnel

开关柜的安装

6.1 母线桥安装尺寸参考图2，最好选用硬母线架空进出，采用品字形布置，其裸露带电部分之间的电气绝缘距离应大于315mm，复合绝缘部分之间的距离不得小于220mm。

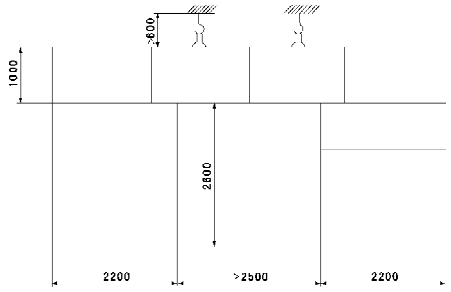


图2 母线桥安装图

6.2 开关柜安装基础,参考图3(选用电缆进出线时)
前柜右侧下部基础挖一条150×600mm的沟槽,以便从电缆沟引入控制电源。柜后离墙>1200mm,以便检修CT、接地开关及主母线。
6.3 开关柜的调整
开关柜出厂时对其各功能单元均已严格调整,但设备在运输和安装过程中,难免使某些紧固件松脱或使柜架产生微小变形，都会影响其性能，故开关柜在基础安装后，必须对各功能单元进行必要的调整。
6.3.1一次隔离触头
a、一次隔离触头行程、超程和接触深度要求如图4。

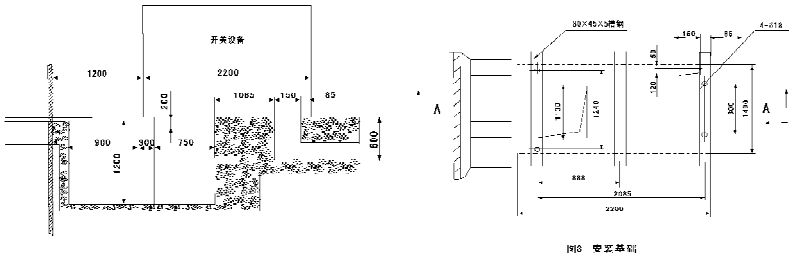


图3 安装草图

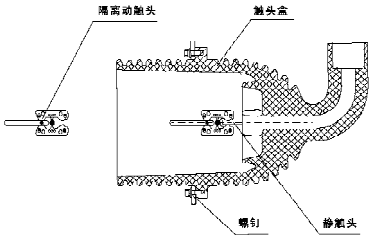


图4 一次隔离触头检触示意图

当手车推入试验位置后一次隔离动触头和静触头之间的绝缘距离为200mm，推入工作位置后动触头超程应有2-3mm，动静触头接触深度为≥12mm.

b.按图4检查一次隔离动静触头同轴度要求

当手车处于工作位置时，为了保证一次隔离动静触头接触良好，应尽可能调整其同轴度。首先应调整相距360±0.5，如仍达不到要求时要调整螺栓。同轴度是否满意，建议在静触头外表面涂黄油或白粉，观看接触后的印记是否均匀对称来判断。

c.一次隔离动静触头接触前后，要求其弹簧片不得有明显的变形和松脱，如有异常及时更换。

6.3.2 手车推动机构的调整要求如图5

当手车处于工作位置后，轴销5不得脱离导轨2，手车推进时轴销5应在导轨2长槽内自由滑动，可调整导轨2与拐臂4之间的配合间隙。

6.3.3 活门的调整要求如图6

当手车从移出位置推入试验位置之前要求活门4完

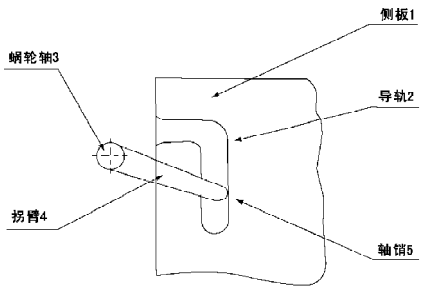


图5 手车推动机构示意图

全打开，当手车从工作位置退到试验位置后约100mm要求活门4完全关闭。为此，可调整拐臂2与导轨1之间的夹角Q来达到要求。

6.3.4 手车锁定机械的调整要求见图7

当手车处于工作、试验位置时，要求锁杆伸出手车侧板84mm，移出位置为34mm。

上述要求可通过调节锁杆上的双头螺杆来调整。

6.3.5 断路器与操作机构配合参数的调整

调节断路器与操作机构之间的拉杆长度,以满足断路的行程和超行程要求。

6.3.6 通过附供的专用手柄，进行慢分、慢合操作，以排除断路器与机械的卡阻现象。

6.3.7 按照断路器及操作机构各自产品使用说明书的要求及调试方法调好断路器分合闸速度及有关参数。

6.3.8 手车与接地开关的联锁要求

当手车处于工作位置时,接地开头应安全打开,其动静触头之间的绝缘距离应大于315mm,此时接地开关不能进行合闸操作,当手车拉到移出位置之后,接地开关应能可靠合闸,此时手车不能被推入柜内。

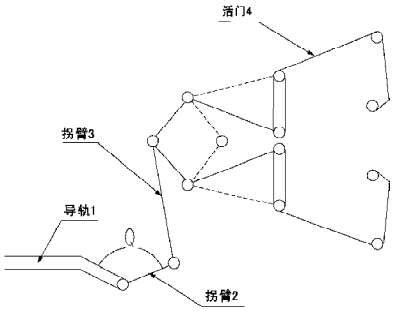


图6 活门结构示意图

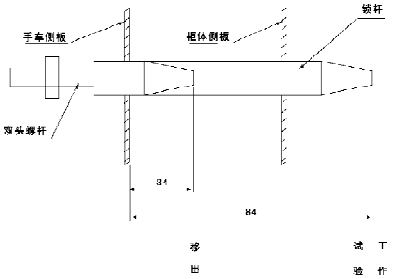


图7 手车锁定机械调整示意图

Installation of switchgear

6.1 The installing dimension of busbar bridge can be referred in table 2. It is best to select toughened busbar overhead in-and-out. The electric insulating distance of naked part should be more than 315mm and the distance of compound insulating part shouldnt be less than 220mm.

Table 2 installing drawing of busbar bridge

6.2 the basic installing drawing of switch gear can be referred in table 3.

A. 150×600mm groove should be dug in the lower right part of front cabinet so as to lead in controlling power supply from cable groove. The distance between wall and back cabinet should more than 1200mm in order to make the inspection and maintenance of CT, grounding switch and main busbar more easier.

6.3 Adjustment of switchgear

All functioning units of the switchgear have been severely adjusted when the switchgear leaves factory. But during the time of transportation and installation, loose of some tightened unit or some small distortion will be incidentally occur, which will affect its performance. So the adjustment to each functioning unit is necessary after the basic installation of switchgear.

6.3.1 Primary insulating contact

a. The requirements for traveling, over-traveling and contacting depth of primary insulating contact is shown in drawing

Drawing 4 contacting sketch map for primary insulating contact

The insulating distance between primary insulating moving con tact and static contact is 200mm when the hardcart is put in testing location. The over-travel distance of moving contact should be 2~3mm after put in working position and the contacting depth between moving contact and static contact should more than 12mm.

b. Check same bearing angle requirements of primary insulating moving and static contact according to drawing 4. When handcart is in working position, the same bearing angle of primary insulating moving and static contact shall be adjusted so as to ensure good contact of primary insulating moving and static contact. The angle shall be firstly adjusted to 360±0.5 difference. Bolt shall be adjusted if adjustment of same bearing angle can't meet requirements. It's suggested to daub butter or white powder on the surface of static contact to get the best result of same bearing angle. Judging method is to see whether the mark after contacting is balanced or not.

c. Spring plate of primary insulating moving and static contact mustn't have remarkable distortion and loose before and after it gets contacted. If any abnormity occurs, it should be replaced timely.

6.3.2 Adjustment requirement of pushing mechanism of handcart is shown in drawing 5.

Axle pin 5 mustn't break away from guide rail 2 after handcart stands on working position. Axle pin 5 should freely slide within the long groove of guide rail 2 when the handcart puts in and can adjust clearance between guide rail 2 and regulating lever.

6.3.3 Adjustment requirement of movable door is shown in drawing 6.

Movable door 4 shall be completely open when the handcart moves from moving-out position to testing position and close completely when the handcart returns 100mm or so from working position to testing position. So this requirement can get through adjusting the angle Q between regulating lever 2 and guide rail 1.

6.3.4 adjustment requirement of locking mechanism of handcart is shown in drawing 7.

Drawing 7 adjustment of locking mechanism of handcart

The locking level shall exceed 84mm of side bar of the handcart when the handcart stands on working and testing position. And the moving out distance shall be 34mm.

The above requirement can get through adjusting double threaded screw of the locking level.

6.3.5 adjustment of proportion between circuit breaker and operating mechanism

Adjust the level length between the circuit breaker and operating mechanism to meet the requirements of traveling and over-traveling of the circuit breaker.

6.3.6 Slowly make and break through attached special handle to remove clip between the circuit and the mechanism.

6.3.7 Adjust switching in and out speed of the circuit breaker and relevant reference according to the requirements of using direction and adjusting method of circuit breaker and operating mechanism.

6.3.8 Interlocking requirement of the handcart and grounding switch.

When the handcart stands on working position the grouding switch should be completely open and the insulating distance between the moving and static contact should be more than 315mm. At this moment the grounding switch can be switched in. When the handcart is moved to moving-out position the grounding switch should dependably switch in and at this moment the handcart can't be put into the cabinet.

开关柜的使用与维护

7.1开关柜在投入运行前,应认真核对铭牌所标技术数据与运行电力线路所要求的技术数据是否一致。

7.2 彻底清扫开关柜的灰尘和异物,对所有绝缘件的内外表面用工业酒精或丙酮仔细擦试干净,对有裂纹或破损的绝缘件应及时更换。

7.3 对设备所有紧固件进行认真的检查,以排除松脱现象,对传动及接触连接部位用工业黄油涂敷润滑,检查泄压活门盖板, 开启是否灵活, 不得有卡阻现象, 检查断路器压力或工作指标是否正常。

7.4 将手车从移出位置→试验位置→工作位置抽拉2-3次,操作应轻便、灵活。

7.5 完成上述调整及准备工作后,通过机构对断路器进行储能、合闸、分闸试操作,如正常即可通电运行。

7.6 开关柜在正常运行时,应对运行情况如实记录,并按断路器及机构的各自使用说明书的要求做好定期的维护保养。如发现气压下降,绝缘件表面凝露或局部放电,柜内温度明显偏高及闻到强烈异常气味等,应及时找出原因加以排除,并通知制造厂汇同处理。

Usage and maintenance of the switchgear

7.1 Check whether the nominal technical data on the name plate is the same as the technical data of actual running power circuit before the swichgear is put into use.

7.2 Clear out the dust and extraneous substance on the switchgear completely. Wipe the inner and outer surface of insulating device with industrial alcohol or acetone. Replace insulating device with crack.

7.3 Check the tightened device carefully to prevent them from loosing.

7.4 Push the handcart 2~3 times from moving-out position→testing position→working position. The operation should be flexible.

7.5 After finishing the above jobs, get a dry run to the switchgear such as storing energy, switching in and so on. If everything goes well, it can be electrified.
7.6 when the cabinet is running normally, get a record of it and maintain and inspect it according to the using direction.

开关柜的运输与保管

8.1 开关柜的包装符合GB11022及产品包装规范的要求，出国产品的包装应满足出国产品包装技术条件的要求。
8.2 产品在运输、装卸、安装过程中，不许倒置、碰撞和剧烈震动。
8.3 产品不用时，应储存在干燥、通风良好、没有腐蚀性气体的室内。
8.4 产品开箱后，应按产品装箱单核对有关技术文件及配件数量是否完整、齐全。

Transportation and keeping of the switchgear

8.1 Its package is compliance with GB 11022. The package of exported products should meet the requirements of relevant package of exported products.
8.2 The products can not be place upside down, collided and excessive vibration, during the transporting, loading and unloading, installing.
8.3 The products have to stored in dry, well ventilation, without corrosive gas in house, when it is unused.
8.4 It have to check the relative technical documents and quantity of parts accord to the packing list, to make sure it is completed or not, after opening the box.

订货须知

9.1 用户根据需要，按附表选择主接线方案编号
9.2 注明断路器、接地开关等主要元件的规格、数量
9.3 注明操作机构型号、分、合闸电压
9.4 备品配件的名称、数量
9.5 单线系统图、设备型号（容量）、排列图及平面布置图。
9.6 二次回路功能图，端子排列图（如用户未提供要求，制造厂按标准提供）。
9.7 开关柜使用在特殊环境条件时应在订货时提出。

Ordering notice of switchgear

9.1 User can choose the main connection project No. accord to the attached list as their demands.
9.2 Mark the specification, quantity of main elements of circuit breaker, earth switch;
9.3 Mark the type, breaking and making voltage of operation machine;
9.4 Name and quantity of Spare parts;
9.5 Single system drawing, device type (capacitor), pareto diagram and layout chart;
9.6 Function drawing of secondary feedback circuit, terminal pareto diagram (If user do not supply other requirement, manufacturer supplied accord to standard);
9.7 If the switchgear is used under special surrounding condition, it must be confirmed during ordering.