KYN61-40.5

铠装移开式金属封闭开关设备

Metal-clad Withdrawable Switchgear

北京北开电气股份有限公司

BEIJING BEIKAI ELECTRIC CO., LTD.

KYN61-40.5 交流铠装移开式开关柜
安装使用维护手册

KYN61-40.5 metal-clad withdrawable switchgear

instruction manual

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1 概述 Summary

1.1 概要 General

- KYN61-40.5 是一种高品质的并已通过型式试验认证的空气绝缘开关柜（以下简称开关柜）。
- Type KYN61-40.5 is a kind of air-insulated switchgear which has high quality and has passed validate（We call it switchgear hereinafter）

1.2 标准和规范 Standards and specfications

- KYN61-40.5 满足 IEC298、GB3906、DL404 等标准的要求。开关柜外壳防护等级：IP4X。
  KYN61-40.5 comply with the standars IEC298，GB3906，DL404。Protection degree is IP4X.

1.3 使用环境条件

Operating conditions

- 海拔高度：不超过 2000 米;

•Height above sea level：≤2000mm;

- 环境温度：上限为 40℃；下限为-10℃;

•Ambient temperature：maximum 40℃；Minmum –10℃；

- 相对湿度：日平均值不大于 95%，月平均不大于 90%;

•Humidity：Highest mean value measured over 24 hours 95%；
Highest mean value measured over 1 month 90%；

- 地震烈度：不超过 8 度;

•Earthquake intensity：≤8 degree;

- 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;

•Working in the place without danger of fire，exploding，acute shaking , chemistry erosion and serious dirtyness.

注：超出上述环境条件时，用户应与制造厂协商;

•Note：If the environment exceed above conditions，customs should consult with the manufacturer.

2 技术参数

Technical data

2.1 电气参数

Electrical data

额定电压	kV	35
最高工作电压	kV	40.5
工频耐受电压	kV	95
雷电冲击耐受电压	kV	185
额定频率	Hz	50/60
断路器，分支母线额定电流	A	…2500
额定峰值耐受电流	kA	…80
额定短路开断电流	kA	…31.5
额定短时耐受电流 4s	kA	…31.5
二次电压	V	DC110, 220; AC110, 220

- 注：外界温度 55℃额定电流 2500A 需强制通风

Rated voltage	kV	35

THE heightest working voltage	kV	40.5
Rated power frequence withstand voltage	kV	95
Rated lighting impluse withstand voltage	kV	185
Rated frequency	Hz	50/60
Rated current	A	…2500
Rated short-circuit making current(peak)	kA	…80
Rated short-circuit breaking currentsymmetrical	kA	…31.5
Rated short-circuit duration 4s	kA	…31.5
The Secondary voltage	V	DC110, 220; AC110, 220

•注： Up to 2500A at 55℃ with forced ventilation.

2.2 外型尺寸和重量

Outline dimension and weight

2.2.1 配 ZN85/VD4-40.5 真空断路器

With the vacuum circuit-breakersof ZN85/VD4-40.5

项目	单位	数据
宽度	mm	1400
深度	mm	2800
高度	mm	2600

item	unit	data
width	mm	1400
depth	mm	2800
height	mm	2600

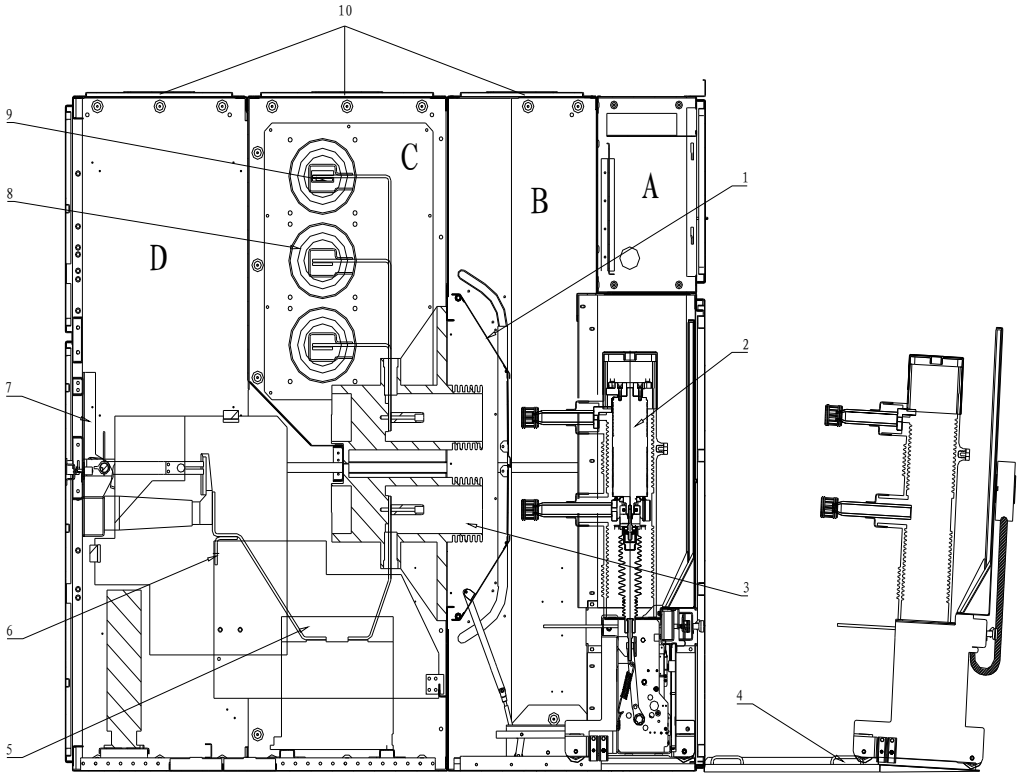

图 1:　KYN61-40.5　1250A 剖视图

1 活门 Shutter　　6 电缆挂接排　cable connetor　　A 低压室 Low-voltage compartment
2 手车 Trolley　　7 接地开关 Ground switch　　B 手车室 Truck compartment
3 触头盒 Case of plug-in contacts　　8 穿墙套管 Wall Bushing　　C 母线室 Busbar compatment
4 运输导轨 rubust sheet steel　　9 主母线 Busbar　　D 电缆室 Cable compatment
5 电流互感器 Current transformer　　10 压力释放装置 Pressure releasese devive

注：图示手车分别位于试验位置(左)和移开位置(右)
Note:The tolley are in the position of the test position(left)and the withdrawble position(right).

3. KYN61-40.5 的结构

Powerbloc KYN61-40.5 structure

3.1 基本结构(图1)

Basic structure (Figures 1)

- 开关柜的主要结构包含手车室、母线室、电缆室、低压室。图 2-图 6 展示了柜体的结构电器设备的安装。

•The basic structure of the Powerbloc comprises the circuit-breaker compartment, which is fixed in position,and the movable withdrawable part with vacuum circuit-breaker. Figures 2/6 show the structure of a panel and the electrical equipment fitted.

3.2 外壳和分隔(图1，图2,图3)

Enclosure and partitions（Figures 1，2，3)

- 开关柜外壳由高质量的 2mm 敷铝锌板组装而成。泻压板安装在高压室的顶部，当发生内部燃弧产生高压时，泻压板被打开。相邻开关柜由侧板隔开。所有门采用粉末喷涂以防腐蚀且可打开近 180。

•The enclosure of the Powerbloc consists of high quality aluminium- zinc coated sheet steel, 2 mm thick. Secured pressure relief plates are located at the top of the high voltage compartment.These open if internal arc faults result in overpressure.The front of the Powerbloc is closed off by flameproof doors which open to an angle of almost 180°

3.3 手车室(图2)

Circuit-breaker compartment（Figures 2）

- 手车室安装了导轨，保证可移开单元可靠的在工作位置和试验/隔离位置之间移动。
- 可移开单元从工作位置退到试验/隔离位置时，活门 13/14 自动关闭,可防止接触到带电体。可移开单元在试验/隔离位置时手车室门仍可完全关闭。此时，断路器分/合指示和储能/未储能指示可通过视察窗观察。
- 断路器的操作时应关好前门。

•The circuit-breaker compartment A fitted with thenecessary guide rails accomodates the withdrawable part with circuit-breaker type VD4, which can be moved between the service position and the test/disconnected position.

•The switching operations of the circuit-breaker are carried out with the doors closed.

3.4 可移开单元(图3)

Withdrawable circuit-breaker part（Figures 3）

- 触臂和梅花触头安装在断路器的电极上，当可移开单元在工作位置时，它们形成与静触头的电气连接。
- 开关柜和断路器之间信号、保护和控制线(以下简称二次线)的连接由安装在断路器二次插头和安装在开关柜上的二次插座共同实现的。

•Contact arms with spring-loaded contactsystems are fitted to the circuit-breaker poles.

•These create the electrical connection to the switchgearpanel when the withdrawable part is inserted into the service position.

•The signalling, protection and control wiring betweenthe switchgear panel and the withdrawable part is coupled by a multiple pin control wiring plugconnector 10.

3.5 机械联锁/防止误操作(图 3,图 6,图 7)

Interlocks/protection against maloperation（Figures 3，6，7）

- 只有断路器在分闸位置时，方可推进或推出可移开单元，可靠防止带负荷推拉断路器。

•The withdrawable part can only be moved from the test/disconnected position into the service Position (and back) with the circuit-breaker open and the earthing switch open (between positions, the circuit-breaker is mechanically interlocked, and also electrically interlocked in the case of circuit-breakers with electrical releases/supplied by the customer).

- 只有处于工作位置、试验/隔离位置时，断路器方可进行分、合闸;

•The circuit-breaker can only be closed when the withdrawable part is precisely in the defined test position or service position (between positions,the circuit-breaker is mechanically interlocked,and also electrically interlocked in the case of circuit-breakers with electrical releases).

- 只有当可移开单元抽出到试验/隔离位置及以外时，接地开关方可合闸;

•The circuit-breaker can only be opened anually in the service or test position when no ontrol voltage is applied, and cannot be closed(electromechanical interlock).

- 只有接地开关处在分闸位置时，手车方可进入工作位置;

•Control wiring plug 10.2 can only be inserted or emoved when the the withdrawable part is in he test/disconnected position.

- 接地开关合闸后，才能打开后门，防止误入带电间隔;

•Earthing switch (if supplied) can only be closed hen the withdrawable part is in the test/disconnented position or the removed position echanical interlock).

- 只有关上后门，才能分接地开关;

•The withdrawable part cannot be moved from the test/disconnencted position into the service position when the earthing switch is closed (chanical interlock).

- 只有可移开单元在试验/隔离位置时，方可插上和解除二次插头;

•Details of any additional interlocks, e.g. in connection with a blocking magnet on the withdrawable part and/or earthing switch operating mechanism, can be found in the order documents for each individual case .

- 可移开单元处于工作位置时，二次插头被锁定，不能拔除。

•The hinged shutters can be secured with padlocks in the closed position of the shutters when the withdrawable circuit-breaker part has been removed.

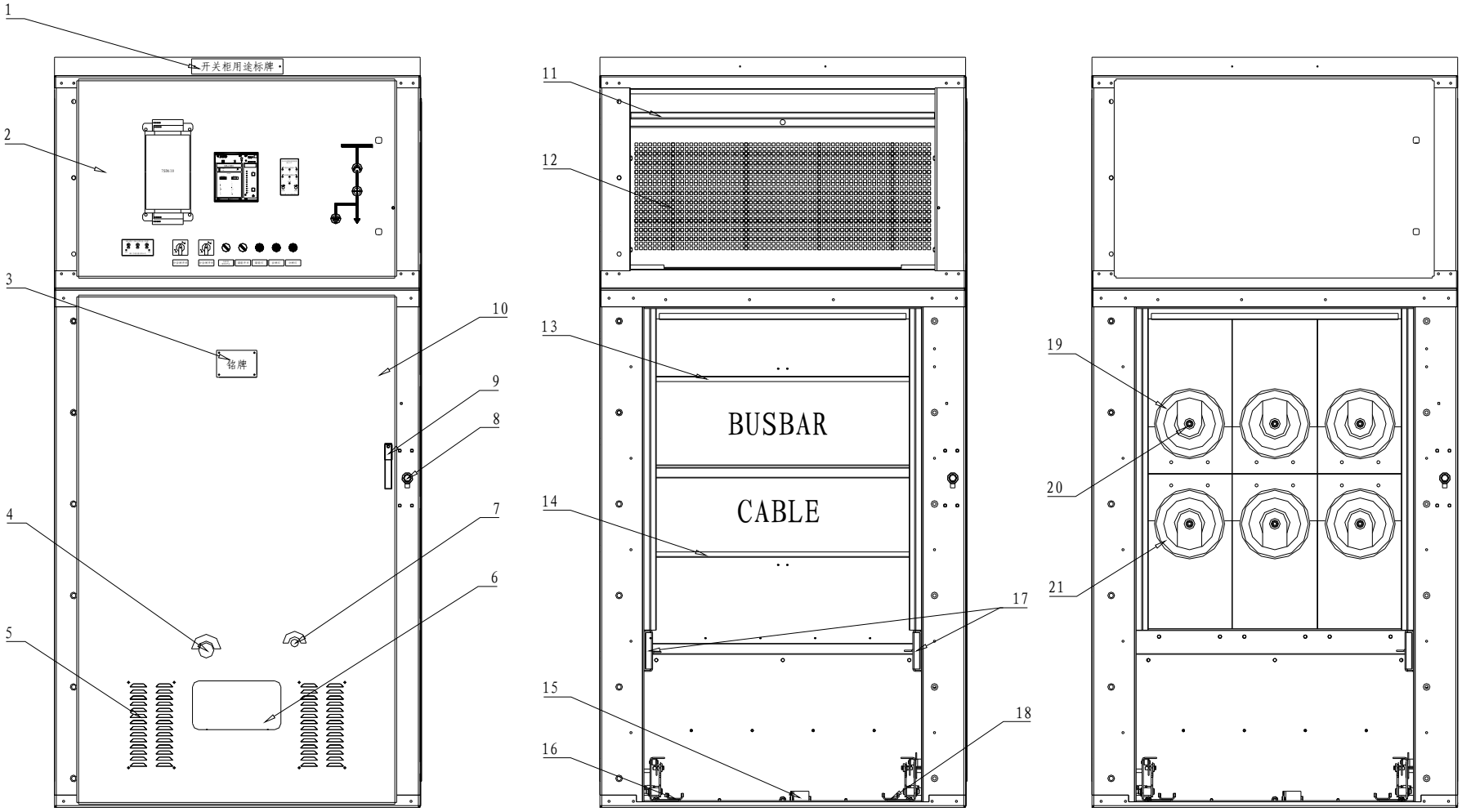

图 2:　KYN61-40.5　开关柜正视图
Figure2:　KYN61-40.5　Front View

1 开关柜用途标牌
Switchgear Scutcheon
2 仪表门
Door of low-voltage compartment
3 铭牌
Nameplate
4 接地开关操作孔
Spindle
5 通风道，下部（2500A 时开通风道）
ventilation grit below（2500A，with ventilation）
6 视察窗
Sight glass
7 断路器分合操作孔（断路器分合指示标牌）
Breaker ON-OFF operating advice（Breaker ON-OFF demonstrative scutcheon）
8 接地开关分合操作孔（接地开关分合指示标牌）
Earthing switch，operation mechanism（Earthing switch ON-OFF demonstrative scutcheon）
9 门锁
Lock
10 手车室门
Door of Vacuum circuit-breaker compartment
11 二次小母线安装板
Control busbar installation board
12 继电器安装板
Relay installation board
13 上活门
Upside valve
14 下活门
Downside valve
15 手车接地排
Trolley earthing busbar
16 手车左导轨
Right guide rail of trolley
17 手车锁定板
Locking board of trolley
18 手车右导轨
Left guide rail of trolley
19 上触头
Upside bush
20 静触头
Contact
21 下触头盒
Downside bush

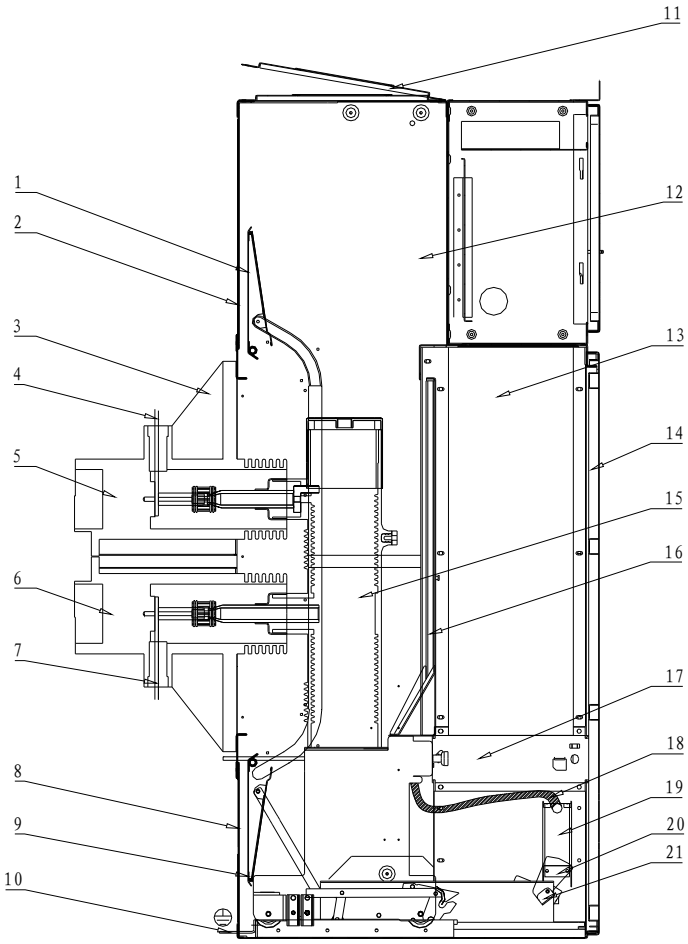

图 3:　KYN61-40.5　前柜基本结构图
Figure 3:　KYN61-40.5 Basic structural diagram

1 上活门
Upside valve
2 上隔板
Upside clapboard
3 触头盒支撑板
Bush uphold board
4 引出排(母线侧)
Derivation busbar (side of busbar)
5 上触头盒
Upside bush
6 下触头盒
Downside bush
7 引出排(电缆侧)
Derivation busbar (side of cable)
8 下隔板
Downside clapboard
9 下隔板
Downside clapboard
10 手车接地排（与主接地排相连）
Trolley earthing busbar（Linking with main earthing busbar）
11 泄压板（2500A 时需强迫风冷，柜顶开通风道）
Pressure relief board（2500A with enforced cooling）
12 外壳
Shell
13 二次线通道
Control busbar passage
14 手车室门
Gate of trolly compartment
15 可移开单元
Locomotive unit
16 手车上面板
Upside panel of trolley
17 手车锁定板
Locking panel of trolley
18 二次插头连接管
Secondary plugs linking
19 二次插头
Secondary plugs
20 二次插座
Secondary socket
21 二次插头连锁挡片
Secondary plugs interlocking baffle
注：图示手车位于工作位置
Remark: The trolly is in service position

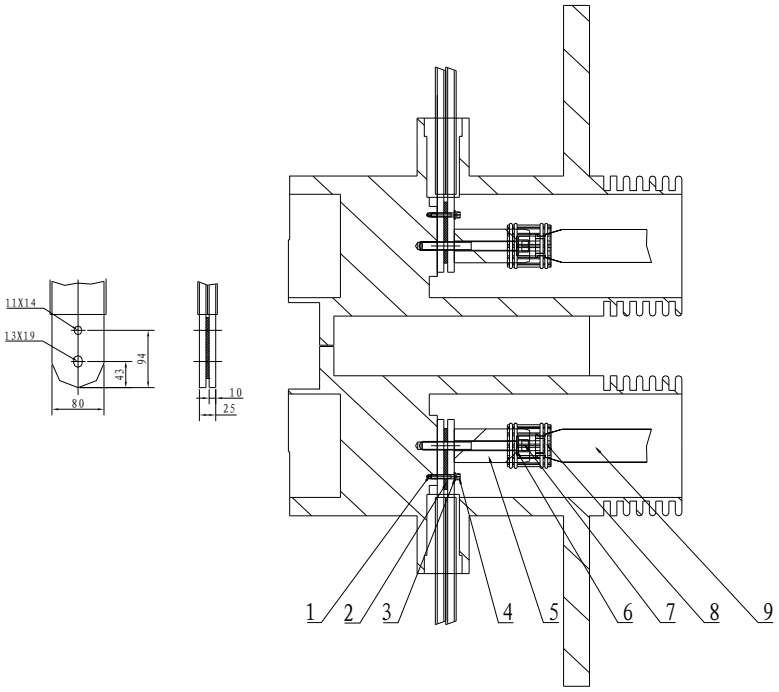

图 4:　触头连接 1600-2500A
Figure 4:　Contact link with 1600-2500A

1 下部连接单元
downside linking unit
2 垫块(5mm)
block (5mm)
3 碗型垫圈(10)
washer (10)
4 螺栓(M10)
bolt (M10)
5 静触头
fixed contact
6 碗型垫圈(20)
washer (20)
7 螺栓(M16/M20)
bolt (M16/M20)
8 梅花触头
contact
9 触臂
contact arm

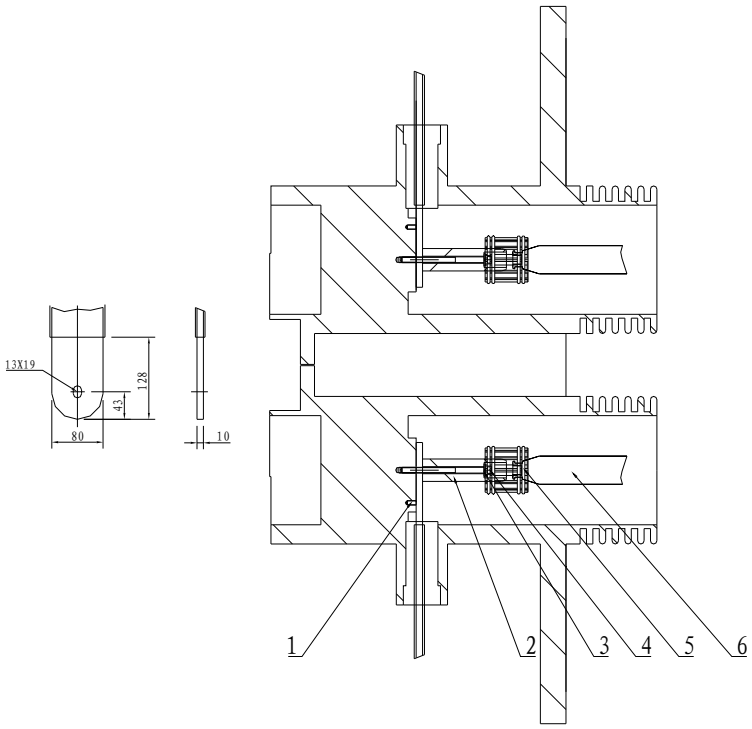

图 5:　触头连接 1250A

Figure5:　contact with 1250A

1 下部连接单元
downside connect unit

2 静触头
fixed contact

3 碗型垫圈(10)
washer (10)

4 螺栓(M10)
bolt (M10)

5 梅花触头
contact

6 静触头
fixed contact

支母排设计
Offset busbar design

1250A 及以下馈线及 PT 柜电缆室支母线规格与电流的关系

The association of the type of outlet switchgear and PT switchgear with 1250A and below 1250A offset busbar in cable compartment with the current.

电流 current	母线规格 Type of busbar	备注 remark
≤2A(PT)	TMY-40x5	触头盒内垫 5mm 的垫块 5mm block in bush
600A and below 600A	TMY-50x6	触头盒内垫 5mm 的垫块 5mm block in bush
800A	TMY-60x6	触头盒内垫 5mm 的垫块 5mm block in bush
1000A	TMY-80x6	触头盒内垫 5mm 的垫块

		5mm block in bush
1200A	TMY-80x8xR4	

1250A 以下馈线及 PT 柜母线室的支排规格为 TMY-8*80*R4

The type of busbar with utlet switchgear and PT switchgear below 1250: TMY-8*80*R4

1250A 以上支母线规格同主母线

The type of offect busbar up 1250A equal to main busbar

主母排设计

Main busbar design

电流 current	母线规格 Type of busbar	备注 remark
< 1000A	TMY-80x8xR4	
1000-1250A	TMY-80x10xR5	
1600A	TMY-80x8xR4x2	
2000-2500A	TMY-80x10xR5x2	

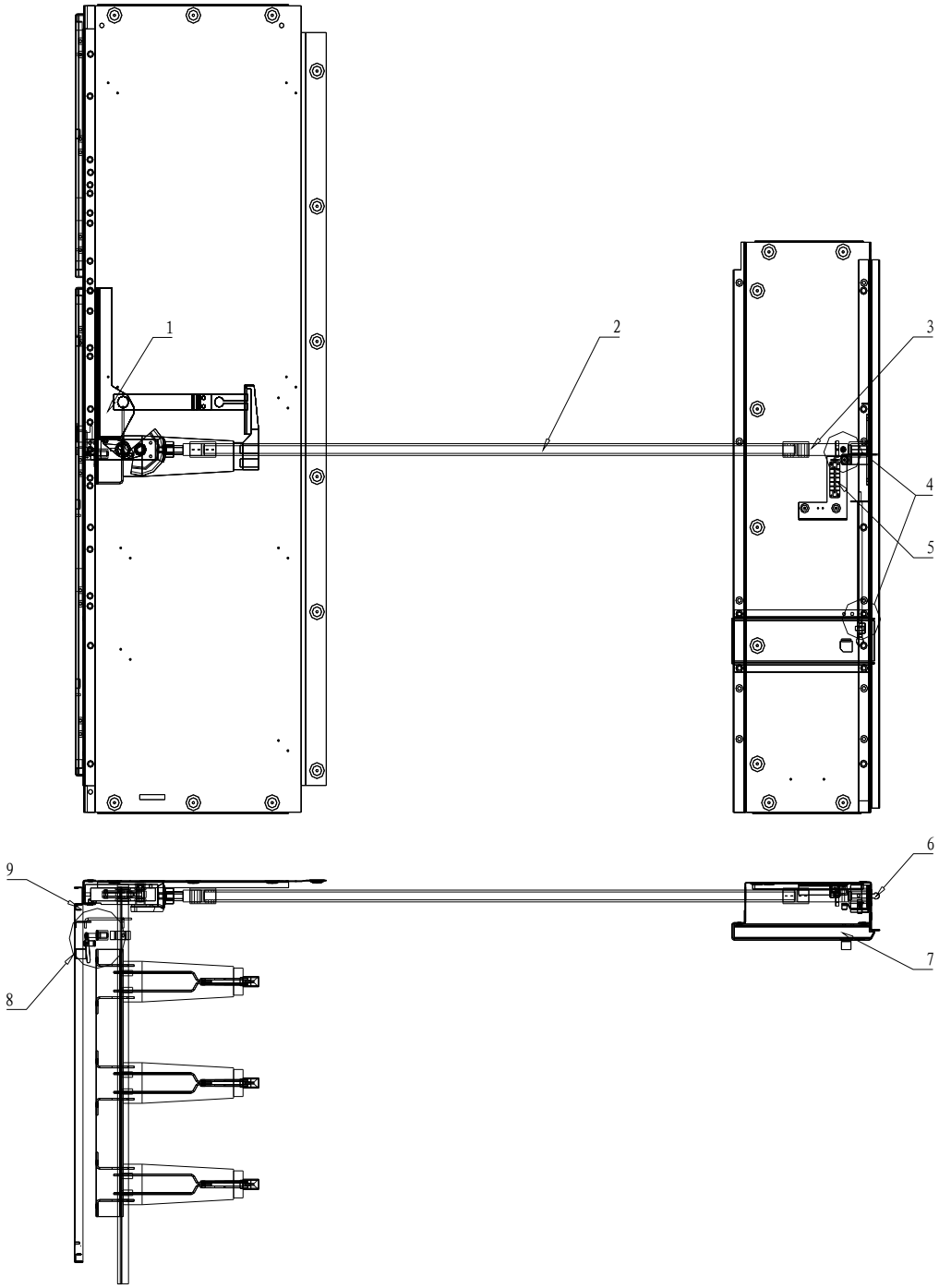

图 6:　接地开关操作机构

Figure 6:　earthing switch manipulation mechanism

1 接地开关

Earthing switch

2 接地开关大轴

Earthing switch shaft

3 前操作轴

Operation shaft

4 接地开关与手车的机械连锁机构

Interlocking device of earthing switch and trolly

5 接地开关辅助接点

Earthing switch accessorial node

6 二次插头连锁挡片

Secondary plug interlocking device

7 手车锁定板

Trolly locking board

8 接地开关与后下门的机械连锁机构

Earthing switch and interlock of rear panel cover, below

9 后下门

Rear panel cover, below

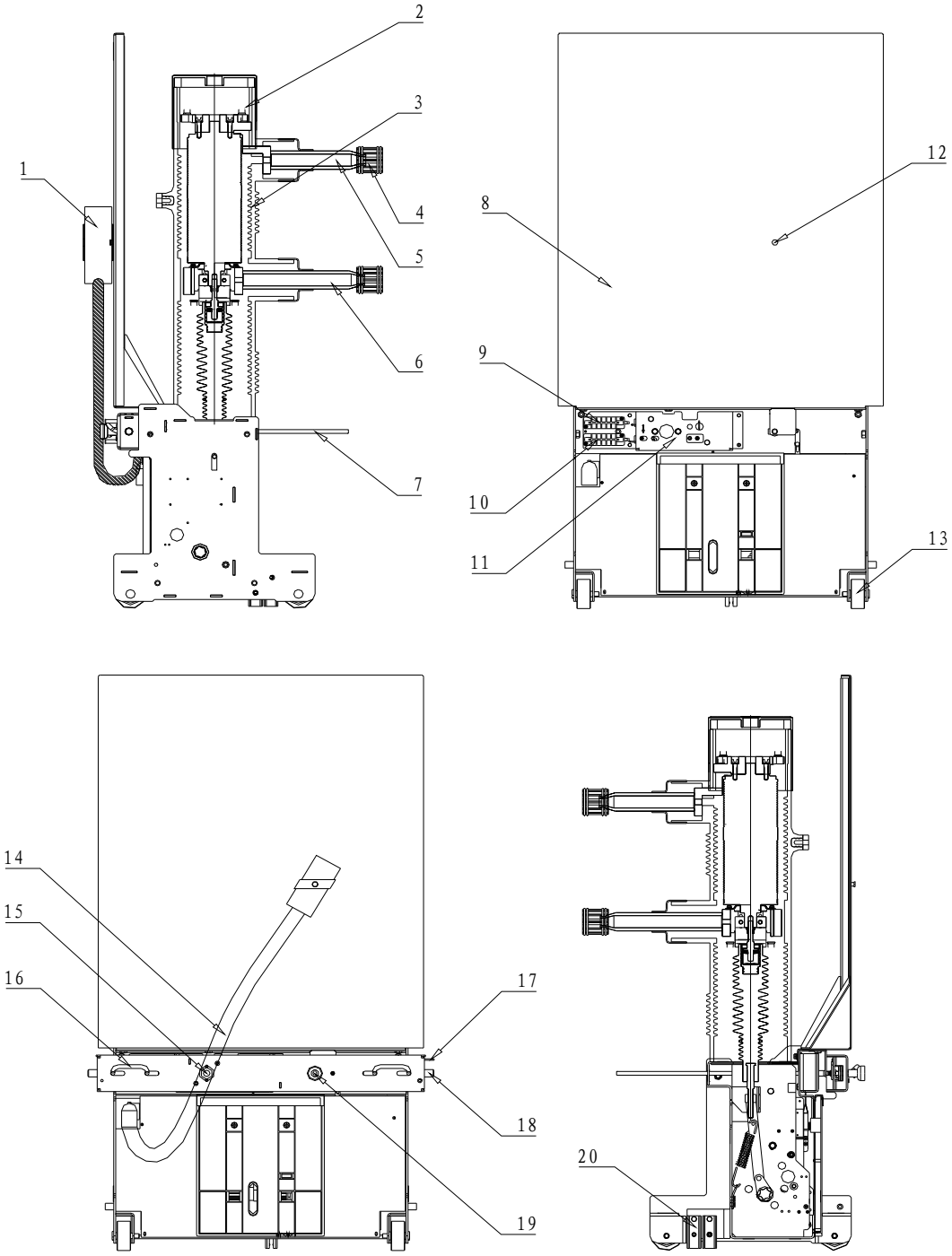

图 7:　断路器结构图

1 二次线插头

Secondary plug

2 绝缘筒盖

Insulated pole tube caps

3 绝缘筒

Insulated pole tube

4 梅花触头

Contact system

5 上触臂

Upper contact arm

6 下触臂

Lower contact arm

7 紧急分合闸连杆

Lever for emergent OFF/ON

8 面板

Front partition plate

9 试验位置辅助开关

Auxiliary switch of test position

10 工作位置辅助开关

Auxiliary switch of service position

11 推进联锁机构

Interlock yoke

12 二次线插头挂接螺栓

Bolt for control wiring plug

13 轮子

Wheel

14 二次线软管

Control wiring tube

15 推进轴

Spindle

16 把手

Hand crank

17 接地开关联锁板

Interlock plate for earthing switch

18 锁定杆

Catch pin

19 紧急分合闸操作轴

ON-OFF operating shaft

20 手车接地排

Earthing contact

4 运输及存放

Dispatch and storage

4.1 出厂条件

Delivery condition

确保所有的工作都完成后，按照相关标准进行例行检查，结构功能符合要求时，方可进行包装或存放。

The factory assembled switchgear panels are checked at the works for completeness in terms of the order and simultaneously subjected to routine testing, and thus tested for correct structure and function.。

包装

Packaging

开关柜的运输必须根据运输条件的不同采取不同的包装方法。个别场合不需包装，而有时需考虑耐航包装。特别是海上运输（甚至在货柜船中），他们需要大量的干燥剂和密封的塑料布防潮。许多场合还需安装湿度指示器，若用铝合金板进行防护，则需在防护板上开一个窗口观察指示器。干燥机有效的时间内，颜色指示剂为蓝色，当它变成粉色时，说明柜内湿度超过了某一定值（比如 40%），这时应该替换干燥剂。干燥剂的使用在相关标准中有详细的说明。

The switchgear panels are dispatched in appropriate packaging for the prevailing conditions, e.g. “seaworthy packaging“, or also without packaging, as required in individual cases. Particularly for overseas transport, even in containers, they are sealed in airtight plastic sheeting with an appropriate quantity of drying agent to protect them from dam-age due to moisture, and in many cases fitted with a separate moisture indicator. When aluminum composite sheeting is used, a window has to be fitted for observation of the moisture indicator. The drying agent is active as long as the colored indicator remains blue. When the color changes to pink, the relative humidity stated on the bag (e.g. 40%) has been exceeded inside the packaging. Suitable action including replacement of the drying agent bags is then necessary if the packaging condition is to be maintained. The instructions for use of the drying agent bags are to be followed carefully.

运输（图 8）

Transport (Figure 8)

开关柜有四个起吊环。它可以用起重机、叉车或手动千斤顶搬卸。注意保护人身安全及可能造成的财产损失，勿倒置。

The transport units are individual panels. The switchgear panels are each fitted with four lifting lugs. Transport switchgear panels upright. Only ever carry out loading operations when it has been ensured that all precautionary measures to protect personnel and materials have been taken and using a cane, fork-lift truck and/or, Manual trolley jack.

起重机起吊:

Loading by crane:

- 选择合适的吊环及吊绳

• Fit lifting ropes of appropriate load capacity with shackles.

- 抽出单元将被单独处理

•Withdrawable unit shall be deal with individually.

交货及中间存储

Delivery and intermediate storage

货到现场后，应进行如下检查:

The responsibilities of the consignee when the switchgear arrives at site include, but are not limited to, the following:

- 检查开关柜是否完好，是否受潮。若是中间存储，还需检查干燥剂，判断是否需要更换干燥剂。

• Checking the consignment for completeness and freedom from damage. In cases of doubt, the packaging must be opened and then properly resealed, fitting new drying agent bags, when in termediate storage is necessary.

- 依照装箱单检查是否缺件或运输损坏，并向发货人或运送者出具证明。

• Precisely documenting any short quantities, defects or transport damage on the consignment note and notifying the shipper or carrier immediately and reporting these to the relevant authorities.

- 最好对损坏部分进行摄影。

• Always take photographs to document any mayor damage.

最适宜的中间存储条件：依照开关柜和元件所要求的最小条件。

Optimum intermediate storage – as far as this would be necessary at all – without detrimental consequences depends on compliance with a number of minimum conditions for the switchgear panels and assembly materials.

只需简单包装或不需包装的场合

Switchgear panels with simple packaging or no packaging

- 干燥并且通风良好的储藏室，空气质量依照相关标准规定。

• A dry and well-ventilated store-room, atmosphere in accordance with correlative standard.

- 室内温度不低于-5℃

• Room temperature which does not fall below -5 C.

- 没有其他有害条件的影响

• No other detrimental environmental influences.

- 竖直摆放开关设备

• Store switchgear panels standing upright.

- 不能堆放开关设备

• Do not stack switchgear panels.

- 柜上的覆盖物不能太多，确保开关柜通气性良好

• Loosely cover unpackaged switchgear panels with plastic film to prevent dirt ingress. Sufficient air circulation must be maintained to prevent corrosion.

- 安装运行前，定期进行必要的检查

• Carry out regular checks for any condensation until erection starts.

适于航海的或相似条件的包装及内部保护

Switchgear panels with seaworthy or similar packaging and internal protective film

- 将开关柜存放于干燥的地方，防止天气和其它有害物的破坏。

• Store the transport units in a dry place, protected from the weather and from damage.

- 在没有有害的环境下检查包装。

• Check the packaging for undamaged condition.

- 每隔一定的时间检查颜色指示剂以确定干燥剂是否有效。

• Check the indicator for correct function of the drying agent on arrival of the consignment and at appropriate intervals.

- 采取措施防止因存储时间大于包装寿命时的包装和反腐蚀措施实效。

• When the maximum storage life after the date of packaging is exceeded, the protective function of the packaging including its anti-corrosion effects will cease to be effective sooner or later, depending on local conditions. If intermediate storage has to be prolonged, suitable action must be taken.

5 现场安装

Assembly of the switchgear at site

开关柜的现场安装需确保正确的安装顺序及高质量标准。包装由熟练工人打开，要求在现场有责任人进行检查指导。同时，应参照产品安装使用说明书。

In the interests of an optimum installation sequence and the assurance of a high quality standard, site installation of the switchgear should only be carried out by specially trained skilled personnel, or at least supervised and monitored by responsible persons.

5.1 现场要求

General site requirements

安装前，需对安装场所检查。安装开关柜的房间必须有照明设备和现场电供应、门锁、房间干燥并有通风设施；准备工作如电缆沟、二次电缆管道等已准备就绪。

On commencement of installation at site, the switch room must be completely finished, provided with lighting and site electricity supply, lockable, dry and with facilities for ventilation. All the necessary preparations such as wall openings, ducts, etc., for laying of the power and control cables up to the switchgear must already be completed.

安装场所应满足相关标准的规定。

Compliance with the conditions for indoor switchgear to correlative standard.

5.2 安装基础形式（图 9）

Foundation frame (Figures 9)

开关柜应在直立的情况下进入室内，它的结构数据可在产品使用说明书中估算。

The switchgear is preferably to be erected on a foundation frame set into the switch room floor. The guideline structural data listed below facilitate a rough calculation of the space required.

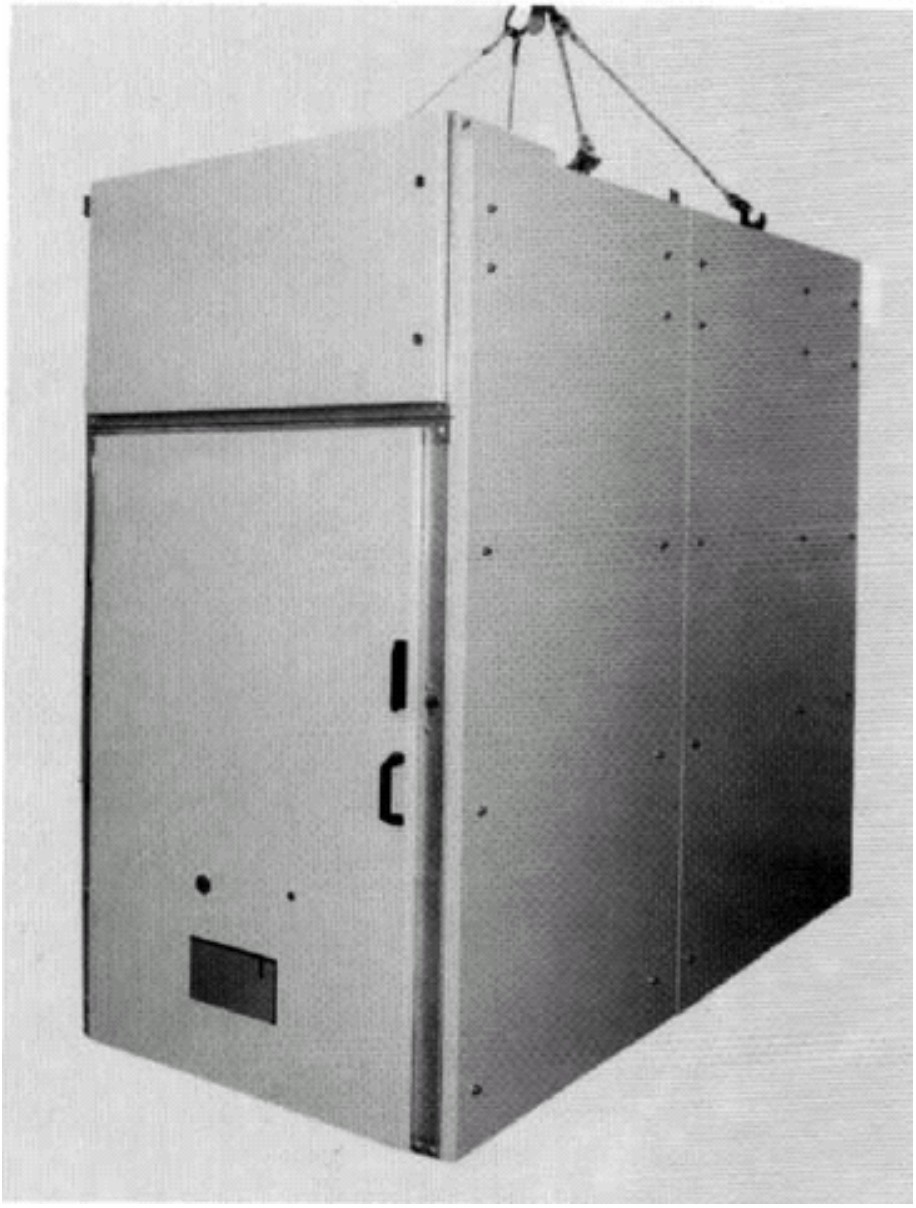

图 8　起吊示意图

Figure.8 lifting drawing

5.2.1 结构参数

Structural data

额定电压	KV	40.5
柜内设备		可移式
柜宽	mm	1200
走道宽(柜前)	mm	2540(单列布置) 3580(双列布置)
走道宽(柜后)	mm	1800
柜重	kg	1000-2000

Rated voltage	KV	40.5
Panel equipment		withdrawable
Panel width	mm	1200
Aisle width (front side of panel)	mm	2540(one row) 3580(two rows)
Aisle width (rear side of panel)	mm	1800
weight	kg	1000-2000

5.3 柜体安装（图 8）

Assembly of the switchgear panels (Figure 8)

用 8.8 级拉力的螺杆。用螺栓连接母排，其所需扭矩值如下表:

Use screws of tensile class 8.8. The tightening torques for the busbar screw connections are as follows:

螺纹	推荐扭矩 1) Nm	
	润滑情况 2)	
	无润滑	油或油脂
M6	10.5	4.5
M8	26	10
M10	50	20
M12	86	40
M16	200	80

Thread	Recommended tightening torque 1) Nm	
	Lubricant 2)	
	Without	Oil or grease
M6	10.5	4.5
M8	26	10
M10	50	20
M12	86	40
M16	200	80

1) 无润滑连接的额定扭矩取决于螺纹摩擦系数 0.14（其实际数值不可避免在一定范围内波动）

1) The rated tightening torques for fasteners without lubrication are based on a coefficient of friction for the thread of 0.14 (the actual values are subject to an unavoidable, partly not inconsiderable, spread).

2) 螺纹和接触表面润滑。

2) Thread and head contact surface lubricated.

- 对一些偏离一般规则的扭矩值（比如接触系统和转换终端）需查阅详细的技术文件。

Consult the detailed technical documentation for any tightening torques which deviate from the general table (e.g. for contact systems or switch terminals).

安装步骤如下:

The individual installation stages are as follows:

- 按指定的起吊环起吊开关柜。

• Transport the switchgear panels to the prepared installation point in the sequence shown on the switchgear plan.

- 拆除吊索。

• Dismantle lifting lugs.

- 将可移开部分从开关柜中移开并加以有效的保护。

• Remove withdrawable parts from the switchgear panels and store them with suitable protection.

- 将端封板移开。

• Release and remove floor cover.

- 将开关柜在基础上正确的位置排成一行（垂直方向安装不平度不得超过 2mm，尤其在前面）并用螺栓连接在 一起 。当柜子超过 10 台时应考虑从中间部位开始安装。

• Align the switchgear panels on the foundation one after another for correct position and vertical alignment (deviations of the panel edges from the vertical must not exceed 2 mm, particularly at the front) and bolt the panels together. It is advised able to start from the centre when assembling switchgears with more than ten panels.

- 当开关柜完全装配好时，可用螺钉或焊接将其和基础框架连接在一起。

• When the switchgear has been properly assembled, fasten the panels to the foundation frame by welding or by using adequate bolts.

5.4 接地（图 2 和图 3）

Earthing the switchgear (Figure 2 and Figure 3)

手车接地排已经在手车室底部安装并且须和开关柜的主接地排连接在一起。

框架主接地排与配电室主接地系统用截面不小于 16mm^2 的黄绿线连接，对 10 台以上的长排列的开关柜，连接节点不少于两个。

• Connect the main earthling bar of the switchgear with the prepared connection links panel by panel.

• Connect the earthing conductor coming from the ground electrode – preferably via a metering point with the green-yellow wire (not less than 16 mm^2) – to the main earthing bar of the switchgear. When the number of the switchgear is more than 10, the metering point is not less than 2.

5.5 安装后的检查

Concluding installation work

- 检查油漆有无损伤并在必要时补漆

• Check the paintwork of the switchgear for any damage, and touch up where necessary.

- 检查螺栓有无松动，尤其是母排和接地系统中的，必要时拧紧。

• Check bolted connections; especially all those made during on-site assembly in the busbar and earthing system, and tighten where necessary.

- 仔细清洁开关柜

• Carefully clean the switchgear.

- 清除柜内所有杂物。

• Remove all foreign bodies from the switchgear panels.

- 彻底整修在安装和连接中移动过的封板。

• Properly refit all covers etc. removed during installation and connection.

- 封闭因特殊需要在外壳保留的但已不再需要的孔。

• Close off any openings remaining in the enclosure as a result of the particular design, but which are no longer required.

- 将可移开单元推进开关柜。

• Insert the withdrawable parts into the switchgear panels.

- 检查触头系统和联锁机构运动是否灵活，必要时加以润滑。

• Check the isolating contacts and interlock mechanisms for smooth function, and relubricate with Isoflex

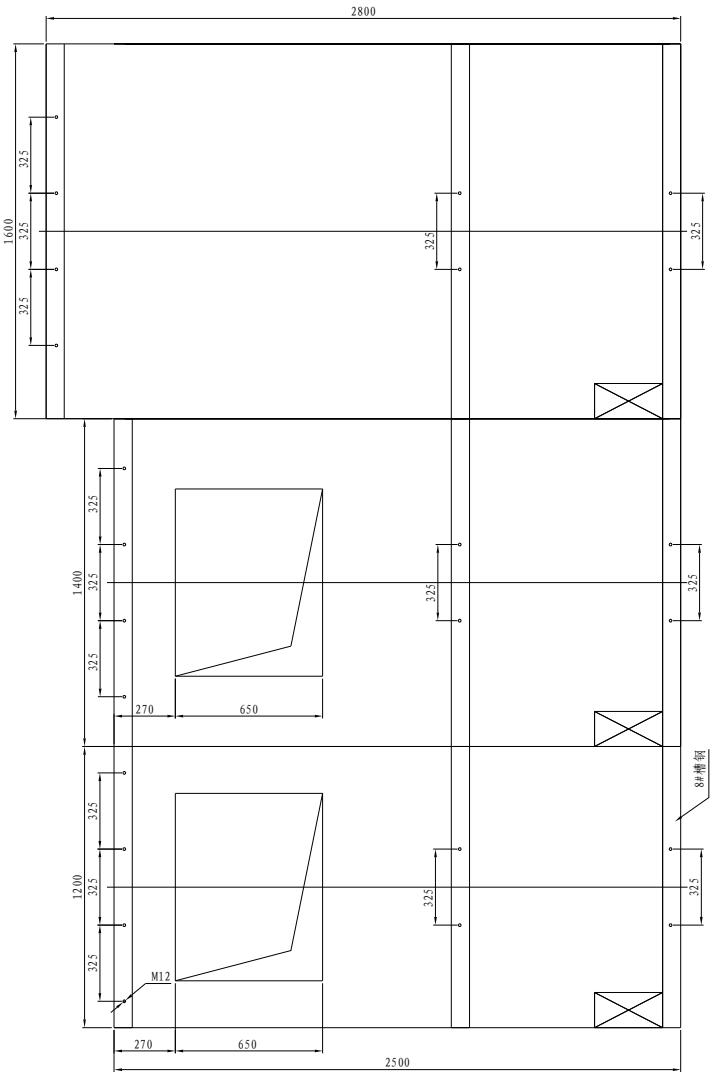

图 9　开关柜地基图(宽度分别为 1200/1400/1600mm)

6　KYN61-40.5 的操作

The operation of KYN61-40.5

- 注意：开关柜的操作和相关工作，应该由经过培训和有经验的人员进行。要注意相关安全规则的规定。

• The relevant work and operating procedures are to be carried out carefully by trained specialists familiar with the installation, taking into account all the relevant safety regulations.

注意：不要在开关柜泻压顶板上行走

• Do not walk on the top surfaces of the Powerbloc panels, rupture points for pressure relief.

6.1　投入使用

Commissioning

6.1.1 **准备工作**（图 1，图 2，图 3，图 4，图 7）

Preparatory work(Figures 1，2，3，4，7)

- 在和高压一次电源连接前，应该先做下列工作:

• In preparation for commissioning, the following work should be carried out prior to connection with the high-voltage power supply:

- 应认真核对开关柜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;

• Check the general condition of the switchgear for detrimental circumstances of all kinds.

- 检查元件如断路器、可移开单元、绝缘件等;

• Perform a visual examination of the switching devices, withdrawable parts, isolating contacts, insulating parts, etc.

- 检查主接地排和接地排是否可靠连接;

• Check the connection of the main earthing bar to the earthing rail of the Powerbloc.

- 检查开关柜的粉末喷涂件的涂层是否有损伤并采取必要的措施;

• Check the paintwork for damage and touch up the panel in where necessary.

- 清除所有开关柜内的异物，如工具，剩余材料等;

• Clean all the foreign matter,such as tools,leaving materials

- 清洁开关柜，用干净、柔软、干燥的布檫去绝缘件上的油脂或灰尘;

• Clean the switchgear, rubbing down insulating parts with a clean, soft, non-fraying and dry cloth. Remove greasy or adhesive dirt.

- 重新安装所有安装或调试过程中被移走的封板、电缆盖等;

• Remove all material residues, foreign bodies and tools from the switchgear.

- 必须取掉断路器的运输防尘盖;

• Properly refit all covers etc. removed during assembly and testing processes.

- 一次回路试送电，在此过程中，要特别注意电压互感器，电缆等的情况;

• When performing AC voltage testing on the main circuits，pay special attention during this procedure to voltage transformers, cables, etc.

- 接通二次电源;

• Turn the auxiliary and control voltage on.

- 进行开关柜操作的调试，注意观察相关的位置指示;

• Carry out test operations of switching devices manually or by electrical control, and simultaneously observe the relevant position indicators.

- 检查机械和电器联锁;

• Check mechanical and electrical interlocks

- 设置开关柜的控制保护元件至所需数值，检查其功能;

• Set the protective devices in the switchgear to the required values and check their function with test equipment.

- 培训当地的操作人员，使其了解开关柜正常操作的基本细节;

• Instruct the local operators in the fundamental details of regular handling of the switchgear.

- 检查以上准备工作是否完成。

• Check the readiness for operation and switching status of electrical systems upstream and downstream from the switchgear.

- 根据职责分配，检查下列开关柜附近设备也是必要的:

• Depending on the allocation of responsibilities, it may also be necessary to check the following

equipment in areas adjacent to the switchgear:

- 一次电缆
- power cables
- 二次电缆
- auxiliary cables
- 二次电源
- auxiliary power source
- 远方遥控系统
- remote control system
- 接地系统
- complete earthing system,
- 配电室设备
- switch-room equipment
- 配电室环境
- switch-room condition

6.1.2 启动

- Start-up
- 遵守相关安全规程;
- Comply with all relevant safety regulations.
- 确认系统中断路器处于分闸位置;
- Ensure that the circuit-breakers in the system are in the OFF position.
- 移走任何现有的接地线和短接线;
- Remove any existing earthing and shortcircuiting conncetions in the critical switching area.
- 给电缆送电;
- Energize the feeder cables.
- 测量并检查所有接通高压电应产生的作用;
- Carry out all measurements and check all functions dependent on the high-voltage power supply being connected.
- 留意观察任何不正常现象;
- Watch out for irregularities of any kind.

6.2 操作开关

- Switching operations
- 操作开关时应关好前门。
- Carry out switching operations with the front doors closed.

6.2.1 可移开单元用 VD4/VG1-40.5 断路器（图 1，图 2，图 3，图 7）

- Withdrawable part with circuit-breaker, type VD4 /VG1-40.5(Figures1，2，3，7)
- 从试验/隔离位置进入工作位置:
- Insertion from the test/disconnected position to the service position.
- 插好二次插头;
- Connect control wiring plug
- 关上前门;
- Close the front door.
- 确认断路器处于分闸位置;

• Ensure that the circuit-breaker is in the OFF position.

- 用手车推进摇把顺时针摇动丝杠大概 45 圈，直到丝杠到达被限制转动位置，此时可移开单元处于工作位置;

• Turn the crank clockwise through approx. 45 turns until the stop is reached and the withdrawable part is in the service position.

- 观察手车位置指示;

• Observe the position indicator.

- 移走手车推进摇把;

• Remove hand crank

- 从工作位置退到试验/隔离位置:

• Manual withdrawal from the service position into the test/disconnected position:

- 确认断路器处于分闸状态;

• Ensure that the circuit-breaker is in the OFF position.

- 按上述进入工作位置相反过程操作;

• Reverse the procedure described above for insertion into the service position.

- 将断路器单元拉出柜外;

• Withdrawal of the circuit-breaker unit out of the panel:

- 打开手车室门;

• Open the door of the circuit-breaker compartment.

- 从插座上取下二次插头并固定在断路器上面板上;

• Release control wiring plug and engage it in the storage position of the withdrawable part.
if the earthing switch is in the closed position.

- 拉动断路器手车把手，使手车锁定销解锁;

• Move sliding handles inwards against the springs to release withdrawable part.

- 将断路器单元拉出开关柜外;

• Move the withdrawable part out of the panel;

- 关上手车室门;

• Close panel door

- 将断路器单元送入试验/隔离位置:

I• nsertion into the test/disconnected position:

- 按上述过程操作，改变相应的操作顺序;

• Carry out the procedure as described above for withdrawal, changing the order accordingly.

6.2.2 断路器（图 7）

• Circuit-breaker（Figure 7）

- 断路器的操作详见断路器样本。

• For operation refer to the stylebook of VCB

6.2.3 接地开关（图 6）

• Earthing switch（Figure 6）

- 手动分/合

• Manual opening and closing:

- 将滑板压至接地开关操作孔底部。(如果接地开关处于合闸位置，它已处于此位置)

• Press slide on the operating lever recess socket down. (When the earthing switch is closed, it is already in position!)

- 插入接地开关操作杆

• Fit operating lever which is now released for operation.

- 合闸时，顺时针转动操作杆大概 270°至操作杆无法转动；分闸时，逆时针转动操作杆大概 270°至操作杆无法转动；

• Turn the lever clockwise through approx. 270 ° until the stop is reached to close the earthing switch, or anti-clockwise until the stop is reached to open the earthing switch.

- 观察接地开关机械/电气位置指示；

• Observe the mechanical/electrical switch position indicator.

- 拿开接地开关操作杆，如果接地开关已合上，滑板处于接地开关操作孔底部不上弹；

• Remove operating lever. Slide remains open if the earthing switch is in the closed position.

7 维护

Maintenance

7.1 目的

aim

- 维护工作用来维持开关设备的无故障运行并可获得最长的使用寿命。维修工作由以下几个紧密有关的部分组成：

• Maintenance serves to preserve trouble-free operation and achieve the longest possible working life of the switchgear, it comprises the following closely related activities:

- 检查 —取决于实际情况

• Inspection--determination of the actual condition

- 维护 —用于保持设备具体工作状况的措施

• Servicing--Measures to preserve the specified condition

- 检修 —用于恢复设备具体工作状况的措施

• Repair--Measures to restore the specified condition

⚠注意：维修工作只能是由经过培训，熟悉本开关设备的人员担任，并且应符合 GB 和电力部门颁发的各种安全规程的要求。建议维护和检修的工作聘请长江电器的对外服务人员来担任。

• Maintenance work may only be performed in a careful manner by trained personnel familiar with the characteristics of the individual switchgear, in accordance with all relevant safety regulations to GB/IEC and of other technical authorities, and with other overriding instructions. With regards to the Powerbloc it is recommended that CJEC service personnel will be called in to perform servicing and repair work

7.2 一般要求

General requires

- 维护工作与设备或零部件（如易磨损件）和老化情况有关。所需进行的维修工作的时间间隔取决与开关操作的频率、运行时间、断路器的短路开断次数，另一方面，还取决于不同的操作模式或个别原因，误操作或环境因素（空气中的水汽及粉尘）。

• The inspection and servicing intervals for some of the equipment/components (e.g. parts subject to wear) are determined by fixed criteria such as switching frequency, length of service and number of short-circuit breaking operations. For other parts, on the other hand, the length of the intervals may depend, for example, on the different modes of operation in individual cases, the degree of loading, and also enviromental influences (including pollution and aggressive air).

- 由于 KYN61-40.5 交流铠装移开式开关柜具有结构简单和耐用的特点，因此具有很长的

使用寿命。

- 真空断路器的使用与维护请参阅相关的断路器样本。

• If necessary, further details can be taken from the stylebook of VCB

7.3 检查与维护

Inspection and servicing

7.3.1 检查

• Inspection

- 每 1-2 年需对开关柜进行检查，具体根据当地的环境和操作的情况。

• Inspection of the Powerbloc (switchgear) should be carried out approximately every 1 to 2 years, depending on the operating conditions and local environment


注意：在进行维修工作时，所有的辅助电源均必须断开且没有再送电的危险。

Isolate the area where work is to be performed in accordance with the relevant safety regulations to GB/IEC, and secure it against reconnection.

- 检查工作应包括下列内容但不应局限于下列内容:

The inspection should include but not be limited to the following:

- 检查安装时产品是否有任何部位的变形，产品的清洁程度和周围环境的情况

• Check the installation for abnormalities of any kind，dirt and the effects of other environmental influences.

- 检查开关的操作机构和控制机构，联锁、保护、报警和其它的装置

• Check the function of the switching devices and the controls, interlocks, protection, annunciation and other devices.

- 检查隔离触头系统的表面（在可移开部件拉出开关柜的情况下目测），当触头表面的镀银层损坏或露铜，当触头表面腐蚀严重或显示其它损坏或过热（触头表面变色），需更换触头部件。

• Check the surface condition of the isolating contact system (for visual examination of the contact pins with the withdrawable part removed).When the galvanic silver coating on the contact parts is worn to such an extent that the copper conductor material below becomes visible, or when their surfaces are heavily corroded or show signs of other damage or overheating (discoloured surface), replace the contact parts.

- 检查所有的开关柜的附件和辅助的设备。

• Check all switchgear accessories and the auxiliary equipment.

- 在正常电压下操作，设备不出现异常情况，如：异常的声音、异味或在黑暗的情况下的弧光。

• No external discharge may occur on the surfaces of equipment at operating voltage. This can, for example, be detected by characteristic noises, a clearly perceptible smell of ozone, or visible glowing in the dark.

7.3.2 维护

Servicing

- 基本的维护工作和在检查是发现必须维护的工作包括以下几个方面:

Basic servicing activities, and those which may be found necessary during inspections, include the following:

- 仔细清洁开关柜特别是绝缘件的表面，当发现其由于受到盐雾的污染，发霉时，需用软布清除污染物，如果产品表面含有油污，可用在软布上掺少许家庭用碱性清洁剂擦拭，再用干布擦干。

• Carefully clean the unit, and in particular the insulating material surfaces, when they are found to be dirty (contamination may also be caused by salt, mould formations, insects or conductive materials in conjunction with frequent condensation when the switchgear is operated in a tropical climate). Remove dry dust deposits which do not adhere strongly using a soft dry cloth. Remove more strongly adhering, e.g. sticky/greasy dirt, with a cloth soaked in a slightly alkaline household cleaner. Wipe off with clear water and dry carefully.

- 检查回路连接和接地连接的螺钉是否紧固。

• Check that the bolt connections at the connectionblock and the earth connections are tight, and that the isolating contact system functions correctly.

- 对接触的点和抽出部件，联锁的传动部分加涂润滑脂。

• Regrease the contact points and mechanism of the withdrawable part insertion system as necessary, or, when lubrication is inadequate or missing,

7.3.3 维修

Repair

⚠ 注意：当开关柜的缺陷被发现时应立即进行维修。

• Carry out repair work immediately after a defect has been discovered.

7.4 测试(图 1，图 2，图 6)

Test(Figure 1，2，6)

7.4.1 测试断路器抽出式单元

Tests on withdrawable parts with circuit-breakers,

- 当对抽出式单元进行维修时需对下列情况进行检测

• When functional tests are carried out on withdrawable parts, compliance with the conditions listed below should also be checked.

- 检测抽出单元辅助开关的安装，按照联锁的设计要求保证手车在试验/隔离位置、工作位置辅助开关处于断开状态;

• Checking the auxiliary switch settings on withdrawable parts compliance with the interlock conditions in the areas of the test/disconnected position and the service position is ensured by position signalling switches located on the withdrawable

- 通过检查和试验操作，通过手柄摇动手车应轻便灵活;

• In the inspection and test operation, the withdrawable part is to be moved with the crank fitted.

7.4.1.1 将手车设定在试验/隔离位置

Settings in the area of the test/disconnected position

- 摇动手柄几圈使手车离开试验/隔离位置向工作位置移动;

• Move the withdrawable part out of the test/disconnected position towards the service position with a few turns of the crank.

- 慢慢使手车向回移动，直到停止在手柄转动到停止位置前的 60°时，辅助开关应开始切换;

• Slowly move the withdrawable part back to the stop.Auxiliary switch(S8) must then operate when the hand crank still has ﹒60 ﹒of turn to reach the stop.

- 慢慢使手车从试验/隔离位置向工作位置移动直到试验位置辅助开关刚切换;

• Slowly insert the withdrawable part from the test/disconnected position towards the service position until auxiliary switch (S8) just operates.

- 在这个位置，需保证仍可以操作手车上的 ON-OFF 铵钮，进行这个操作时，断路器上闭锁电磁铁的功能应手动解除。

• In this position, it must still just be possible to move the ON-OFF operating shaft. For this test, the function of the blocking magnet must be deactivated manually.

7.4.1.2 将手车设定在工作位置

• Settings in the area of the service position(manually)

- 摇动手柄几圈使手车离开工作位置向试验/隔离位置移动

• Move the withdrawable part out of the limit position towards the test/diconnected position with a few turns of the crank.

- 慢慢使手车向前移动，直到停止

• Slowly move the withdrawable part forwards again up to the stop.

- 在手柄转动到停止位置前的 60°时，辅助开关应开始切换

• Auxiliary switch (S9) must then operate when the hand crank has a remaining angle of ﹒60 ﹒to turn up to the stop.

- **测试联锁功能**

• Testing of interlock conditions

7.4.2.1 必须保证断路器和接地开关在分闸状态下手车才能从试验/隔离位置向工作位置移动

此时需检查下列功能:

• The withdrawable part must only be movable from the test/disconnected into the service position when the circuit-breaker is open and the earthing switch is open.
Check the following conditions individually:

- 如果断路器处于合闸状态，手车向工作位置的操作必须被机械联锁锁定

• With the circuit-breaker closed, insertion of the withdrawable part towards the service position must be blocked after only half a turn of the crank in the clockwise direction.

- 如果接地开关处于合闸状态，手车向工作位置的操作必须被机械联锁锁定。

• With the earthing switch closed, insertion of the withdrawable part towards the service position must be blocked after only two clockwise turns of the crank.

7.4.2.2 必须保证断路器在分闸状态下手车才能从工作位置向试验/隔离位置移动

• The withdrawable part must only be movable from the service position into the test/disconnected position with the circuit-breaker open.

此时需检查下列功能:

Check the condition as follows:

- 如果断路器处于合闸状态，手车向工作位置的操作必须被机械联锁锁定。

• With the circuit-breaker closed, withdrawal movement of the withdrawable part must be blocked after only half a turn of the crank in the anti-clockwise direction.

7.4.2.3 只有手车在试验/隔离位置或工作位置时断路器才能合闸。

• Closing of the circuit-breaker must only be possible when the withdrawable part is in the defined test/disconnected position or service position.


注意：此时控制二次插头必须预先插好。

• The control wiring plug must previously have been inserted.

- 此时需检查下列功能：

• Check this condition as follows:

- 手车在试验/隔离位置和工作位置之间的任何位置断路器不能合闸

• It must not be possible to close the circuitbreaker with the withdrawable part in any position between the test/disconnected position and the service position.

7.4.2.4 在控制电压失去的情况下，必须保证手车在试验/隔离位置或工作位置时，断路器只能分闸

• It must only be possible to open the circuitbreaker (manually) when the withdrawable part is in the service position or test/disconnected position and the control voltage has failed.

7.4.2.5 如果手车安装有 Y0 的闭锁，在没有控制电压时手车将被锁定，此时不能用强制力移动手车

• The withdrawable part with blocking magnet Y0 (if ordered) may not be moved if the control voltage fails or is not available. Do not use force to move the blocked withdrawable part.

7.4.2.6 手车在工作位置时，二次控制插头必须被锁定

• The second plug must be locked when the withdrawable part is in the service position

7.4.2.7 保证手车在试验/隔离位置或移开位置时才能操作接地开关

• With the withdrawable part in the test/disconnected position, the earthing switch can then be operated.

7.4.2.8 接地开关电器联锁与指示

• Electrical interlock and indication of earthing switch

- 检查与接地开关对应的辅助开关的安装位置

• Inspect the installation of earthing switch auxiliary switch

- 辅助开关的切换应对应与接地开关的分/合闸位置

• The conversion of auxiliary switch must be according to the open/close position of earthing switch

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