

TECHNICAL DATA

KYH1-40.5 Model Removable AC Metal-clad Switchgear

ISO9001 International Quality System Certified Enterprise

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National Exemption from Inspection Products



GENERAL AND APPLICATION

KYH1-40.5 model Metalclad Centered Metal-enclosed Switchgear (hereinafter referred to as switchgear) is a new product independently designed and developed by HEAG group after absorbing international advanced technology. The product has the outstanding advantages as follows:

1.1 The enclosure is completely formed by Al-Zn coated steel plate after multiple bending processed by CNC machine, then is assembled with the bolts, which has strong mechanical strength and effectively ensure the neatness and good appearance. The door is painted by the plastic powder and has strong anti-impact and corrosion proof ability. The protection grade of enclosure is IP4X.

1.2 The main circuit breaker is VHY1-40.5 model Solid-sealed Vacuum Circuit Breaker, which is independently designed and developed by HEAG group. It has the unique advantages of long life, high reliability, less maintenance and small volume, furthermore, it has perfect and reliable anti-misoperation function. Of course, the switchgear can be equipped with other similar circuit breakers.

1.3 The circuit breaker handcart is centred structure, which inherits the advantage of KYN28 model switchgear. This structure avoids the adverse effects for the installation foundation against the movable/fixed contacts, and is convenient for maintenance and overhaul.

The switchgear applies to three phase power system of rated voltage 24 ~ 40.5kV AC 50Hz(or 60Hz) for receiving and distributing power energy, and also for circuit control, monitor and protection. It can be used in single-busbar system and single-busbar section system.

It accords with the standards as follows:

IEC 62271-200	<Alternative-current Metal-enclosed Switchgear and Control Equipments of rated voltage 3.6 ~ 40.5kV>;
IEC 62271-1	<High-voltage switchgear and controlgear - Part 1: Common specifications>;
GB 3906	<Alternative-current Metal-enclosed Switchgear and Control Equipments of rated voltage 3.6 ~ 40.5kV>;
GB/T 11022	<General Technology Requirements of High-voltage Switchgear and Control Equipments>;
GB/T 1984	<High-voltage Alternating-current Circuit Breaker>;
GB/T 1985	<High-voltage Alternating-current Circuit Breaker and Earth Switch>;
DL/T 404	<Alternative-current Metal-enclosed Switchgear and Control Equipments of rated voltage 1 ~ 52kV>;
DL/T 593	<General Technology Requirements of High-voltage Switchgear and Control Equipments>.

NORMAL SERVICE CONDITIONS

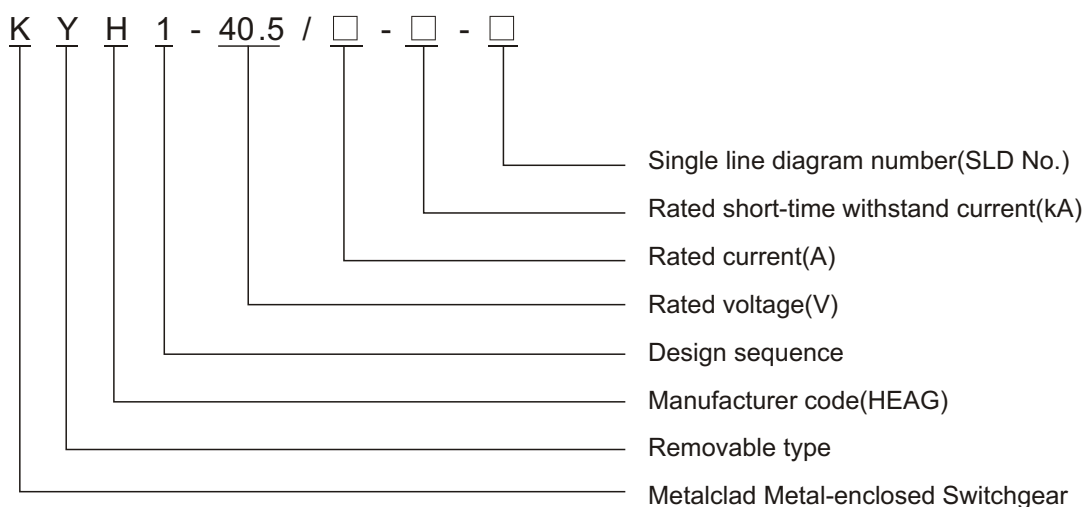
- ◆ Environmental ambient temperature: +40°C ~ -15°C, daily average not exceed 35°C;
- ◆ Altitude above sea level: not exceed 1000m;
- ◆ Relative humidity: daily average less than 95%, monthly average less than 90%;
- ◆ Saturated vapor pressure: daily average less than 2.2×10^{-3} MPa, monthly average less than 1.8×10^{-3} MPa ;
- ◆ Earthquake intensity: not exceed 8 grade;
- ◆ The environmental air without flammable, explosive and corrosive material;
- ◆ Site without frequent vibration.

If the service conditions exceed the above mentioned range, the user shall consult the manufacturer.

The switchgear shall be equipped with a heater to avoid the condensation. The heater shall operate all day when the switchgear is in the steady or operating state.

For the special locations of bad operation conditions, e.g. the underground substation, the unmanned substation and son on, the constant temperature & humidity-reduced equipment shall be added indoor to improve the operating condition and ensure the safe and reliable operation of the switchgear.

MODEL AND MEANING



MAIN TECHNICAL PARAMETERS

4.1 Main technical parameters of switchgear

table 1

Item	Unit	Data
Rated voltage	kV	40.5
Rated insulation level	1 min P.F. withstand voltage	kV Interphase, phase to ground 95; between gaps 118
	Lightning impulse withstand voltage	kV Interphase, phase to ground 185; between gaps 215
Rated frequency	Hz	50 (or 60)
Rated current	A	630, 1250, 1600, 2000, 2500
Rated short-time withstand current(4s)	kA	25, 31.5
Rated peak withstand current※	kA	63, 80
IAC grade		BFLR
Kind of operation continuity		LSC2B-PM
Protection grade		IP4X(enclosure), IP2X(compartment)
Outline dimension (W×D×H)	mm	1200×2600×2400※※
Weight	kg	< 1600

※: The short-circuit capacity of CT shall be separately considered;

※※: If installed with Lightning Arrester or the aerial busbar outgoing/incoming, the cubicle depth shall be 2800mm.

4.2 Main technical parameters of VHY1-40.5 model indoor vacuum circuit breaker

table 2

Item	Unit	Data
Rated voltage	kV	40.5
Rated insulation level	1 min P.F. withstand voltage	kV Interphase and phase to ground 95
	Lightning impulse withstand voltage	kV Interphase and phase to ground 185

table2 continued

Item	Unit	Data
Rated frequency	Hz	50 (or 60)
Rated current	A	630, 1250, 1600, 2000, 2500
Rated symmetrical short-circuit breaking current	kA	25, 31.5
Rated peak withstand current	kA	63, 80
Rated short-time withstand current(4s)	kA	25, 31.5
Rated operating sequence		O-0.3s-CO-180s-CO
Opening time	ms	20~50
Mechanical life	time	20000
Electrical life	grade	E2
Rated out of phase earth fault breaking current	kA	27.3
Rated cable charging breaking current	A	50
Rated voltage/current of opening operation	V/A	DC(AC)220/1.5, DC(AC)110/3
Rated voltage/current of closing operation		DC(AC)220 /1.5, DC(AC)110/3
Rated instantaneous over-current tripping current	A	5
Rated voltage of secondary circuit	V	DC(AC)220, DC(AC)110
Rated voltage of motor for energy storage		DC(AC)220, DC(AC)110
Rated output power of motor for energy storage	W	70
Time of energy storage	s	≤12

4.3 Main technical parameters of JN□ model earth switch

table 3

Item	Unit	Data
Rated voltage	kV	40.5
Rated P.F. withstand voltage(1 min)		95
Rated lightning impulse withstand voltage(peak value)		185
Interphase centre distance	mm	280
Rated short-time withstand current(4s)	kA	31.5
Rated short-circuit making current		80
Rated peak withstand current		80

STRUCTURE FEATURES

- 5.1 Integrative three-dimensional structural design and good appearance;
- 5.2 The enclosure is made of imported Al-Zn coated plate after double bending and assembled with the bolts. It has the features of high accuracy, good rigidity and good corrosion-proof function;
- 5.3 Adopt a new-style APG contact box with the interphase insulation baffle plate inside the cubicle;
- 5.4 Adopt electric field grading voltage and shielding design, which is of reliable insulation and can satisfy full-working condition requirements.
- 5.5 Be provided with a mature and reliable five-prevention locking device to completely realize the closed-door operation

In front of the cubicle.

5.6 Be provided with the reliable VHY1 model solid-sealed centred vacuum circuit breaker and JN□ model earth switch with short-circuit making ability and a quick closing mechanism. Meanwhile, the location of the handcart is obviously up, and the coordination between the guide rail and the bottom board machine adopts multi-point(up down left right) positioning mode, which can effectively decrease the electric power torque arm between the movable contact and the fixed contact, greatly enhance the ability of anti active thermal stable current.

5.7 The circuit breaker handcart is centred structure, which inherits the advantage of KYN28 model switchgear. This structure avoids the adverse effects for the installation foundation against the movable/fixed contacts, and is convenient for maintenance and overhaul.

5.8 Be equipped with normal relay protection device or integrated micro-computer protection relay.

5.9 The fixed contact box and through bushings are of inner grading voltage & outer shielding structure, which can avoid the partial point discharge, effectively restrain the thermal breakdown and the electric thermal breakdown of the solid insulation under AC electric field, so as to improve the actual effect of insulation life and insulation aging protection.

PRODUCT STRUCTURE

The product structure shown as Fig. 1.

The switchgear consists of a fixed body and the withdrawable parts. According to the function, the fixed body can be divided into four function units of busbar compartment, CB compartment, cable compartment and LV compartment. The mounting screws for side mounting is of special design, which will make the cubicles without the exposed fastening pieces at the side, and is convenient to put them together. If the faults occur, the cubicles can be quickly pulled out from the cubicle arrangement so as to recover power supply in time.

The withdrawable parts includes the circuit breaker, the lightning arrester, the fuse, the disconnecter and potential transformer.

The power indicator is mounted in the cubicle for inspecting the operating condition of primary circuit and is user-selectable which consists of a HV sensor and a display. The sensor is mounted at the side of busbar or feeder, and the display is mounted on the name plate of the L.V. Compartment.

6.1 Enclosure, baffle plate and pressure releasing device

The enclosure and the baffle plates are made of Al-Zn coated steel plate after processed by CNC machine and double-bending, then are assembled with the bolts of high strength, and three pieces of double-layer double-bending pillars(8mm thick) are in the middle of both side of cubicle, so as to ensure its uniformity in size and high mechanical strength. The cubicle will not be out of shape during loading & unloading, transportation, installation and operation.

The protection grade of enclosure is IP4X and that of the compartment is IP2X, so that, the three H.V. compartments are of full metal isolation and independently connect ground between each other and with the L.V. compartment, to ensure the safety of equipments and the personnel safety.

There is a metal shielding passage for the secondary cables crossing, to ensure that the high electric field inside the cubicle will not interfere with the working of the secondary control circuit.

The cubicle door is coated by plastic powder, so that the surface is anti-impact and corrosion-proof, and ensure a beautiful appearance.

Perfect internal anti arcing fault design. The pressure-releasing devices are respectively mounted on the top of handcart compartment, busbar compartment and cable compartment. When the internal fault arc occurs, the pressure releasing plate will be automatically opened to release the gas and pressure, so as to protect the near compartment from suffering and ensure the safety of operators in front of the cubicle.

6.2 CB compartment

A special guide rail, which is II model of high strength, is installed in CB compartment for the handcart to move inside the compartment. The II model guide rail improves the reliability of the movable electricity joints between the CB handcart and the cubicle through the four-direct positioning against the circuit breaker. It is processed by the advanced laser cutting machine and its positioning is accuracy. The handcart can move between the isolating/testing position and the working

position. The movable baffle plate is made of good metal sheet is installed on the back wall of the handcart compartment. When the handcart moves from the isolating/testing position to the working position, the baffle plate will automatically open, contrarily, it will automatically close, thereby to protect the operators from touching the electricity.

All the normal operations of the switchgear including the opening/closing operation, the movement of the handcart between the isolating/testing position and the working position, and the operation of the earth switch, are done only if the cubicle door is closed. The closing/opening state of the CB handcart, the position of the CB handcart and the closing/opening state, are all equipped with the obvious and reliable mechanical indicators or the electronic analog indicators according to the requirement, so as to effectively ensure the personnel safety.

The coupling between the secondary circuit of the switchgear and that of the handcart is realized through the manual secondary aerial plug. Only when the handcart is in the isolating/test position, the secondary plug can be plugged into or unplugged. When the handcart is in the working position, the secondary plug will be locked and can not be unplugged due to the effect of the mechanical interlocking device.

6.3 Handcart

The frame of the handcart is made of the steel plate after bending and is welded together. According to its usage, the handcart can be sorted into CB handcart, PT handcart, disconnecter handcart and so on. The height and depth of different kinds are same, so those of same specification are interchangeable. The handcart has the isolating/testing position and the working position in the cubicle. Each position is equipped with a positioning device to ensure that the handcart only can be correspondingly operated in the specified position. Unlock the position lock before move the handcart, the circuit breaker must be in opening state before move the CB handcart.

6.4 Hydraulic lift type service truck

The service truck is lift type, which can easily lift the handcart or put it on the ground or the desk. There are the reliable locking devices: Only when the service truck reliably connect the cubicle, the handcart can be pushed into the cubicle or pulled out from the cubicle; When the handcart is pulled onto the service truck, it will be conveniently locked and the height will be suitably lower during transportation to avoid the accident of overturning.

6.5 Busbar compartment

The main busbar is supported by the insulator of high strength, the busbar between the cubicles is separated from each other through the busbar bushings, so as to limit the spread of internal fault arc. The busbar bushing is the new-style shielding one, which can effectively improve the electric field at the side sealing plate.

6.6 Cable compartment

In the cable compartment, there are current transformer, earth switch(with manual operating mechanism), over-voltage protector(The depth of the cubicle shall be 2800mm when the arrester is installed inside.), and several pieces of cables.

JN□ model earth switch has the short-circuit making ability, and has a quick closing mechanism, whose operation is independent of the main shaft, and the making speed of the switch and the produced torque are not controlled by the operating mechanism.

6.7 Mal-operation protection

The cubicle has reliable mal-operation protection function.

◆ Only when the circuit breaker is in opening position, the handcart can be pushed from the isolating/testing position to the working position, contrarily, it is same.

◆ Only when the CB handcart completely reaches the testing position or the working position, the circuit breaker will close.

◆ Only when the CB handcart completely reaches the testing/isolating position or the moving-out position, the earth switch will close.

◆ When the earth switch is in the closing position, the handcart can't be pushed from the isolating/testing position to the working position.

◆ Only when the earth switch is in the closing state, the door of the cable compartment can be opened.

◆ When the handcart is in the working position, the secondary plug shall be locked and can't be pulled out.

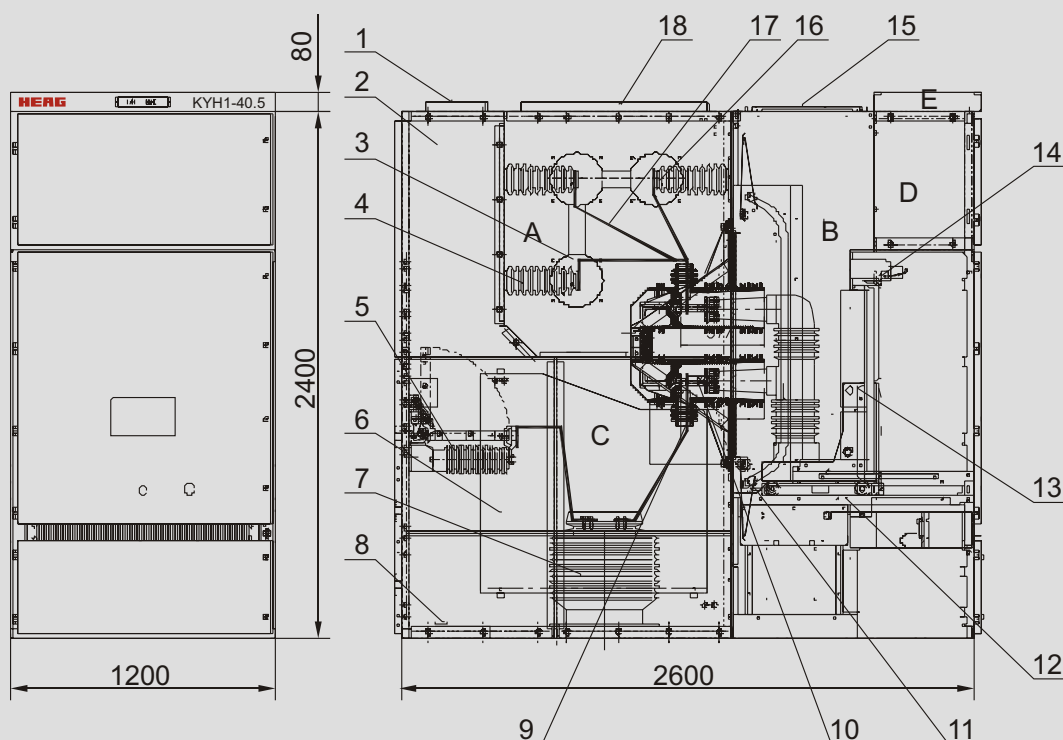


Fig.1 Section Drawing of Feeder Cubicle

- | | | |
|-----------------------------|-----------------------------|--|
| A. Busbar compartment | B. CB compartment | C. Cable compartment |
| D. Instrument compartment | E. Small busbar compartment | |
| 1. Pressure releasing plate | 2. Cubicle body | 3. Busbar bushing |
| 4. Insulator | 5. Earth switch | 6. Interphase insulation plate |
| 7. Current transformer | 8. Earth bar | 9. Contact box |
| 10. Fixed contact arm | 11. Shutter mechanism | 12. Guide rail |
| 13. Circuit breaker | 14. Secondary plug | 15. Pressure releasing plate of CB compartment |
| 16. Main busbar | 17. Branch busbar | 18. Pressure releasing plate of busbar compartment |

FOUNDATION REFERENCE

All the construction of the cubicle's installation foundation should accords with related provisions of "Technical Specifications for Power Construction and Acceptance".

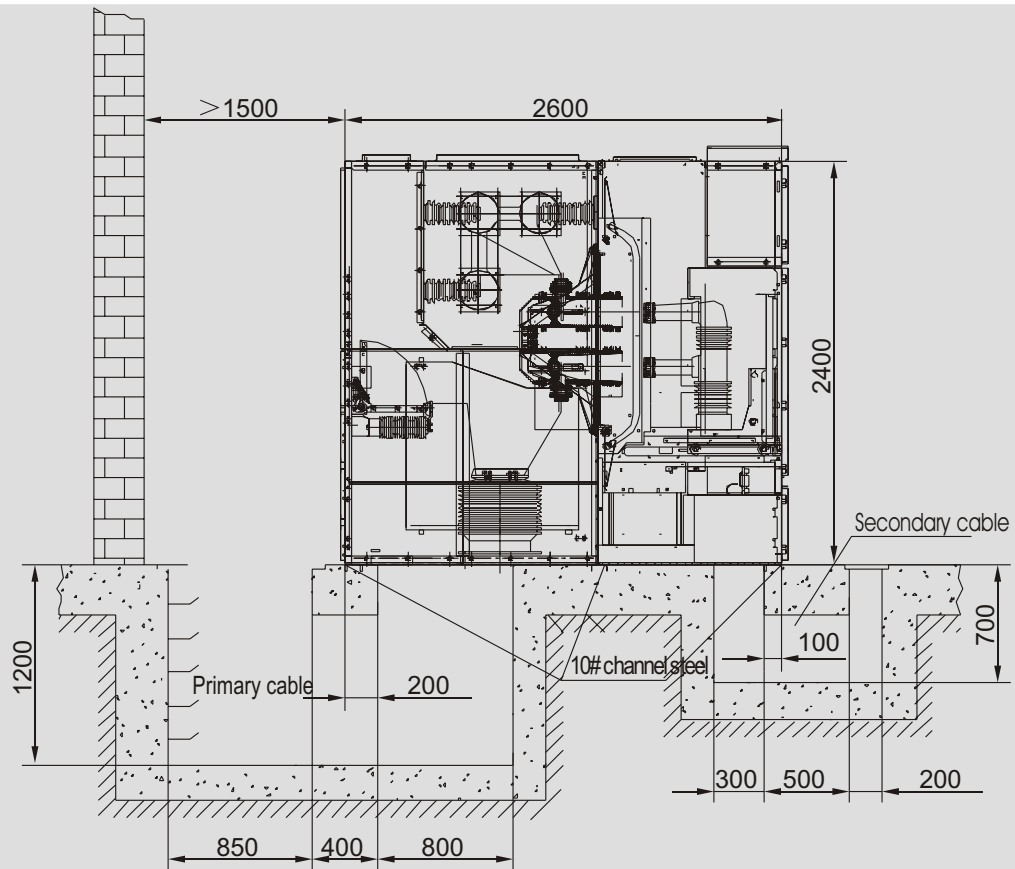
Fig. 2 is the typical layout figure of KYH1-40.5 model switchgear for the designers reference. The detail dimensions shall be adjusted according to the different cubicle style.

The width of the operating passage shall be over 2500mm for single row layout, the distance between the two rows shall be over 3000mm for double row layout face to face.

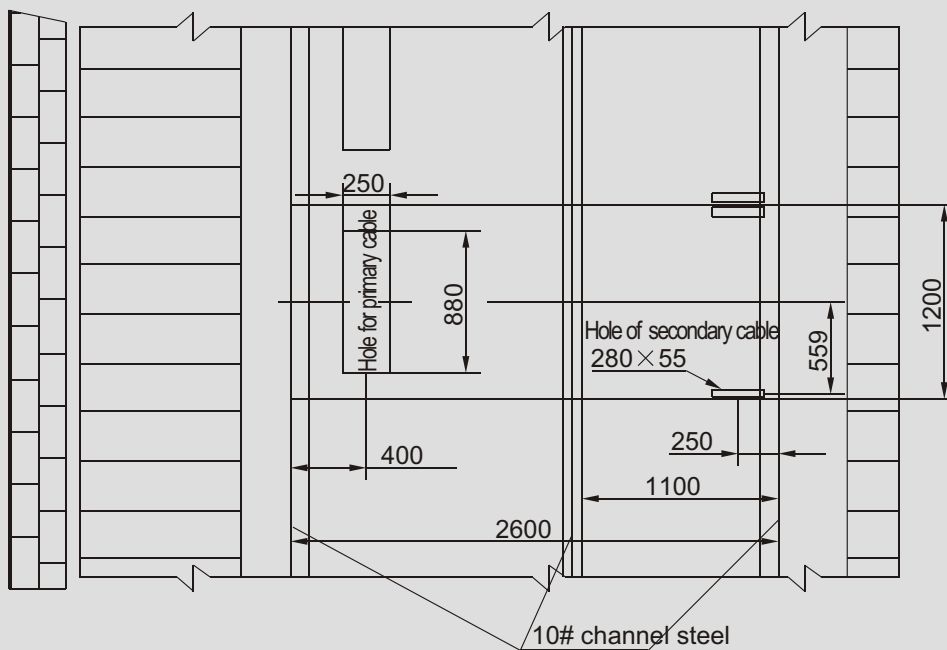
The embedding of the foundation frame commonly adopts the double grouting method, and will be done by the electrical installation unit after the construction.

The height of the channel steel shall be preserved with a wide margin together with the standard height of the foundation while the construction design, and the anchoring steel plate shall be embedded on the foundation every a space of 1~1.5mm along the frame.

The level of the frame shall be calibrated when it is embedded, the required level error and flatness shall accord with clause 2.0.1 of GB 50171 standard, in other words, the non-straightness per meter shall be less than 1mm and the total length shall be less than 5mm, the levelness per meter shall be less than 1mm and the total length shall be less than 5mm,



Remarks: This sketch is for the standard incoming/outgoing cubicle(1200×2600×2400), other scheme can be adjusted according to this sketch, or consult the manufacturer.



Remarks: This sketch is for the standard incoming/outgoing cubicle(1200×2600×2400), other scheme can be adjusted according to this sketch, or consult the manufacturer.

Fig.2 Sketch of Installation Foundation

the total length of the position error and non-parallelism shall be less than 5mm. Furthermore, The top height of foundation frame shall be less 3~5mm than the ground level of the distribution room.

ORDERING INSTRUCTIONS

The user shall provide the following technical documents as placing an order:

8.1 Primary single line diagram and circuit usage, rated voltage, rated current, rated short-circuit breaking current, the distribution room plan and cubicle arrangement diagram.

8.2 Model, specification and quantity of the main components in the cubicle. For example, if the cubicles shall be connected through the busbar bridge, the user shall provide the details data, such as rated current-carrying capacity of the busbar bridge, the span of the busbar bridge, height from the ground, phase sequence of incoming/outgoing and son on.

8.3 Measurement, control and protection functions of the cubicle, other requirements of lock-up and automation devices.

8.4 The specifications of incoming/outgoing cables.

8.5 Special service conditions shall be pointed out as ordering;

8.6 Other special requirements.

ATTACHED DOCUMENTS, ACCESSORIES AND SPARE PARTS

9.1 The attached documents includes:

- ◆ Qualification certificate and factory test report;
- ◆ Product Instruction;
- ◆ Secondary connection diagram;
- ◆ Packing list (including accessories, spare parts).

9.2 Accessories and spare parts:

- ◆ Forward handle for the CB handcart;
- ◆ Manual energy storage handle for the circuit breaker;
- ◆ Operating handle for the earth switch.

SPECIAL ATTENTIONS

The switchgear will be of high condensation danger if it operates in the site where it is of high humidity, big difference in temperature between the day and the night, and big variation of the temperature. So the heater must operate all day if the switchgear in the steady or operating state. However, the heater need not operate when the switchgear operates under the load current up to 1250A.

SINGLE LINE DIAGRAM(SLD)

Please find hereunder attached single line diagrams(SLD).

11.1 The models of the primary components listed in the sheet are for design selection, please consult the manufacturer if the user need other models.

11.2 For the single line diagram not listed in the sheet, please consult the manufacturer.

SLD NO.		001	002	003	004	005
Main Circuit Scheme						
Usage		Incoming/outgoing				
Outer dimension(W×D×H)		1200×2600×2400		1200×2800×2400		
Rated current(A)		630~2500				
Main Components	VCB of VHY1-40.5	1	1	1	1	1
	CT of LZZBJ18-35Q	3	3	3	6	3
	Combination over-voltage protection device	1	1	1	1	1
	PT of JDZ9-35Q or JDZX9-35Q					
	Fuse of XRNP-40.5/0.5					
	Earth switch of JN□-40.5		1			
Remarks		The power display is optional, the cubicle with the arrester shall be 2800mm deep.				
SLD NO.		006	007	008	009	010
Main Circuit Scheme						
Usage		Incoming/outgoing				
Outer dimension(W×D×H)		1200×2800×2400	1200×2600×2400			
Rated current(A)		630~2500				
Main Components	VCB of VHY1-40.5	1	1	1	1	1
	CT of LZZBJ18-35Q	6	3	3	3	3
	Combination over-voltage protection device	1	1	1	1	1
	PT of JDZ9-35Q or JDZX9-35Q					
	Fuse of XRNP-40.5/0.5					
	Earth switch of JN□-40.5			1		1
Remarks		The power display is optional, the cubicle with the arrester shall be 2800mm deep.				

SLD NO.		011	012	013	014	015
Main Circuit Scheme						
Usage		Incoming/outgoing				Busbarsection cubicle
Outer dimension(W×D×H)		1200×2600×2400				
Rated current(A)		630~2500				
Main Components	VCB of VHY1-40.5	1	1	1	1	1
	CT of LZZBJ18-35Q	3	3	3	3	3
	Combination over-voltage protection device			1	1	Optional
	PT of JDZ9-35Q or JDZX9-35Q					
	Fuse of XRNP-40.5/0.5					
Earth switch of JN□-40.5				1		
Remarks		The power display is optional, the cubicle with the arrester shall be 2800mm deep.				
SLD NO.		016	017	018	019	020
Main Circuit Scheme						
Usage		Isolation				
Outer dimension(W×D×H)		1200×2800×2400				1200×2600×2400
Rated current(A)		630~2500				
Main Components	VCB of VHY1-40.5					
	CT of LZZBJ18-35Q	3	6	3	6	
	Combination over-voltage protection device	Optional	Optional	Optional	Optional	Optional
	PT of JDZ9-35Q or JDZX9-35Q					
	Fuse of XRNP-40.5/0.5					
Earth switch of JN□-40.5						
Remarks		The power display is optional, the cubicle with the arrester shall be 2800mm deep.				

SLD NO.		021	022	023	024	025
Main Circuit Scheme						
Usage		Isolation	Lightning Arrester		Busbar uprise	
Outer dimension(W×D×H)		1200×2600×2400				
Rated current(A)		630~2500				
Main Components	VCB of VHY1-40.5					
	CT of LZBJ18-35Q					3
	Combination over-voltage protection device	1	HY5WZ 3	HY5WZ 3	1	Optional
	PT of JDZ9-35Q or JDZX9-35Q					
	Fuse of XRNP-40.5/0.5					
	Earth switch of JN□-40.5					
Remarks		The power display is optional, the cubicle with the arrester shall be 2800mm deep.				
SLD NO.		026	027	028	029	030
Main Circuit Scheme						
Usage		Busbar uprise	Measurement		PT	
Outer dimension(W×D×H)		1200×2600×2400				
Rated current(A)		630~2500				
Main Components	VCB of VHY1-40.5					
	CT of LZBJ18-35Q		3	3		
	Combination over-voltage protection device					HY5WZ 3
	PT of JDZ9-35Q or JDZX9-35Q		3	JDZX11-35R 3	JDZX11-35R 3	JDZX11-35R 3
	Fuse of XRNP-40.5/0.5		3	3	3	3
	Earth switch of JN□-40.5					
Remarks		The power display is optional, the cubicle with the arrester shall be 2800mm deep.				

SLD NO.		031	032	033	034	035
Main Circuit Scheme						
Usage		PT		PT+incoming/outgoing		Earth switch
Outer dimension(W×D×H)		1200 × 2600 × 2400				
Rated current(A)		630 ~ 2500				
Main Components	VCB of VHY1-40.5					
	CT of LZZBJ18-35Q				3	
	Combination over-voltage protection device					
	PT of JDZ9-35Q or JDZX9-35Q	3	3	JDZX11-35R 3	JDZX11-35R 3	
	Fuse of XRNP-40.5/0.5	3	3	3	3	
	Earth switch of JN□-40.5					Earth switch 1
Remarks		The power display is optional, the cubicle with the arrester shall be 2800mm deep.				
SLD NO.		036	037	038	039	040
Main Circuit Scheme						
Usage		PT + Busbar uprise		Transformer		
Outer dimension(W×D×H)		1200 × 2600 × 2400				
Rated current(A)		630 ~ 2500		50 ~ 80kVA		
Main Components	VCB of VHY1-40.5					
	CT of LZZBJ18-35Q					
	Combination over-voltage protection device					
	PT of JDZ9-35Q or JDZX9-35Q	JDZX11-35R 3	3			
	Fuse of XRNP-40.5/0.5	3	3	3		
	Earth switch of JN□-40.5					
Remarks		The power display is optional, the transformer cubicle shall be separated, the fuse link shall be equipped according to the capacity.				

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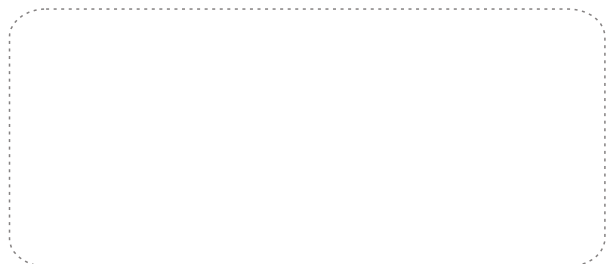
华仪电气股份有限公司
HUAYI ELECTRIC CO.,LTD.

Office Add: No.138 Ningkang W. Road,Yueqing City,
Zhejiang, P.R. China P.C.:325600

Factory Add: Weisi Road, Yueqing Economic Development zone
Yueqing, Zhejiang, P.R. China

Tel: 0577-62558769 Fax: 0577-27898866 / 62538979

Website: www.heag.cn, www.heag.ar E-mail: sales@heag.com



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