CHINT

Power Transmission & Distribution

KYN28A-12(Z) (GZS1)

Steel Armored Withdrawable
AC Metal-enclosed Switchgear

Installation and Instruction Manual



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CATALOGUE

1. General 1

2. Types and Meanings 1

3. Service Conditions 1

4. Main Technical Parameters 2

5. Structure and Operating Principle 2

6. Examples of Typical Schemes of Main Circuit 6

7. Outline and Installation Dimension 9

8. Installation and Debugging 10

9. Operation and Maintenance 12

10. Notice for Maintenance 15

11. Transportation and Storage 15

12. Attached Files and Spare Parts 16

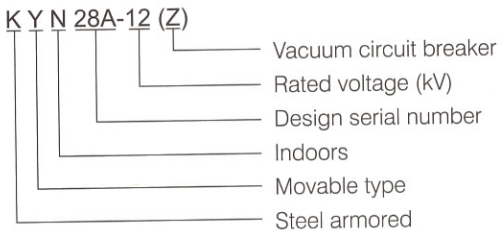
13. After-sale Service 16

KYN28A-12(Z) (GZS1) Steel Armored Withdrawable AC Metal-enclosed Switchgear

1. General

The KYN28A-12(Z) (GZS1) steel armored withdrawable AC metal-enclosed switchgear, developed by CHINT Electric Co.,Ltd. (hereinafter called the "switchgear" for short), is a complete set of distribution unit, consisting of 3.6～12kV three-phase AC 50Hz single-bus and single-bus section system. It is generally applied for the controlling protection and monitoring during receiving, transmitting and starting of large high-voltage motor, etc. in power plants, transmitting system of SME generators, power distribution system in industrial and mining enterprises and secondary substation in power system. The performance of this switchgear meets the requirements of GB3906, IEC62271-200, etc. It has the "Five-Prevention" interlocking function, namely preventing operating circuit breaker hand trolley with load, preventing error opening and closing the circuit breaker, preventing closing the circuit breaker with earthing switch closed, preventing entering the electrified compartment by mistake, preventing wrongly closing the earthing switch with electricity. Besides, as a power distribution device with high performance, it can be used with ZN63A-12(VS1) vacuum circuit breaker developed by our corporation, as well as with the vacuum circuit breakers as VD4, 3AH, VB2, EV12, etc.

2. Types and Meanings



3. Service Conditions

3.1 Normal service conditions

3.1.1 The ambient air temp: -15℃～+40℃;

3.1.2 The altitude does not exceed 4000m;

3.1.3 Relative humidity: Daily average ≤95%

Monthly average ≤90%;

3.1.4 Earthquake intensity: ≤8 scale;

3.1.5 Located without fire, explosion, terribly dirty, chemical corrosion and severe vibration.

3.2 Special service conditions:

For the application exceeding the normal service conditions regulated by GB3906, it shall be based on the negotiation between the user and manufacturer.

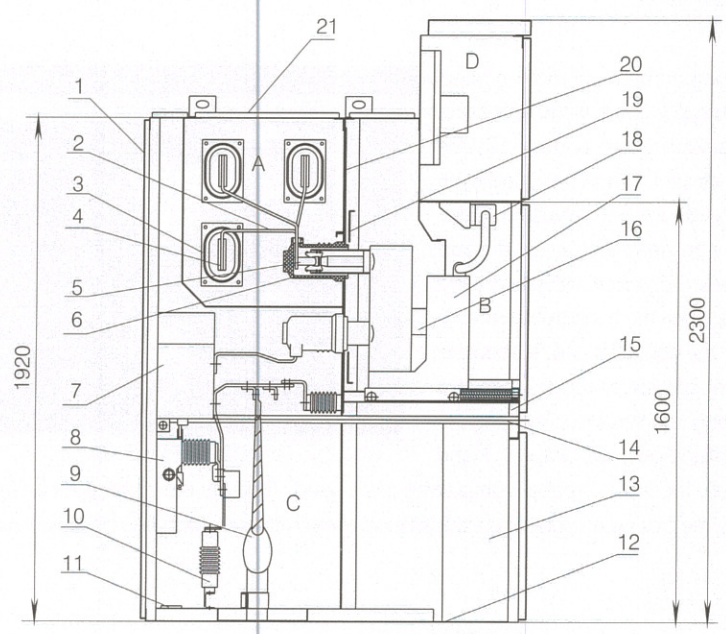
4. Main Technical Parameters

No.	Name	Unit	Matching circuit breaker	
			ZN63A-12 (VS1)	VD4 and other types
1	Rated voltage	kV	12	12
2	1 min power frequency withstand voltage	kV	42	42
3	Rated surge withstand voltage (peak)	kV	75	75
4	Rated frequency	Hz	50	50
5	Rated current	A	630、1250、1600、2000、2500、3150、4000、5000	
6	Rated current of branch bus	A	630、1250、1600、2000、2500、3150、4000、5000	
7	Rated short time withstand current (effective value)	kA	16、20、25、31.5、40、50	16、20、25、31.5、40、50
8	Rated withstand current (peak)	kA	40、50、63、80、100、125	40、50、63、80、100、125
9	Rated duration of short-circuit	s	4	3
10	Protection grade		IP4X for casing, and IP2X while the doors of compartments and circuit breaker cubicle are open	
11	Quality	kg	700~1200	700~1200

5. Structure and Operating Principle

The switchgear consists of two main parts, cabinet body and intermediate extractable component (hand trolley) (see Graph 1). Cabinet body is divided into four independent compartments. The protection grade for casing is IP4X, which is IP2X when doors of each small compartments and the circuit breaker cubicle are open. The equipment is prepared with aerial lead-in and lead-out wires and cables and other functions, which enable it to serve as a power distribution device with various schemes and types through permutation and combination. This switchgear can be debugged and maintained from front. Thus, it can be lay one over the other back-to-back and mounted against the wall, therefore, safety and flexibility are improved, and footprint is saved.

Graph 1 Structure of the switchgear



A. bus compartment
B. breaker hand trolley compartment
C. cable compartment
D. relay metering cabinet
1. casing
2. branch bus
3. bus bushing
4. main bus
5. stationary contactor
6. contactor box
7. current transformer
8. earthing switch
9. cable
10. arrester
11. main grounding bus
12. bedplate
13. control line channel
14. operating mechanism for earthing switch
15. extractable level partition board
16. heating device
17. circuit breaker hand trolley
18. secondary plug
19. partition board (valve)
20. movable partition board
21. pressure-relieving channel

5.1 Casing and others

The material for casing of the switchgear adopted cold-roll quality steel sheets or aluminum-zinc-coated steel sheets. The casing is processed by CNC machine tool and with multiple-folding technology. Thus the cabinet is not only with high accuracy, corrosion and oxidation resistance, but with lighter cabinet weight, higher mechanical strength and better appearance compared with other equivalent equipment. The cabinet body is of assemble type and connected with reveted nuts and high strength bolts. Therefore, shorten the process-cycle for the product, delivers high universality to the components, with little footprint ocupied, and easy operation and put into comissioning.

5.2 Hand trolley

The frame of hand trolley is assembled with good-quality steel sheets after being processed by CNC machine tool. Collocated with the insulation for the cabinet, hand trolley makes the mechanical interlock more safe, reliable and flexible. With different uses, there are different hand trolleys, such as circuit breaker hand trolley, voltage transformer hand trolley, metering hand trolley, isolating hand trolley. All these hand trolleys are interchangeable as long as they are of same size. Each hand trolley has two positions, testing position and working position, with individual locating device on each position, ensuring reliable interlocking. During operation, the preventing wrong operation interlock procedure must be strictly followed. All kinds of hand trolleys are pushed-in and drawn-out through rocker, easy and flexible for all kinds of watchman during operation. To move hand trolley away from the cabinet, it is easy to use one special transfer carrier to take it away, as well as for various examining and maintenance. Besides, the hand trolley is intermediate type, with little footprint occupied, and is easy for examining and maintenance.

Circuit breaker hand trolley is mounted with vacuum circuit breaker and others auxiliary. After being placed into the circuit breaker compartment in the cabinet with the transfer carrier, hand trolley can be reliably locked at the breaking position (testing position), meanwhile, the position can be displayed after connecting the position indicating light of the secondary circuit.

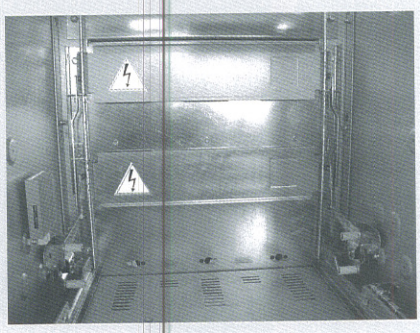
5.3 Compartments

The main electrical components of the equipment are arranged in the independent compartment, namely, breaker hand trolley compartment, bus compartment, cable compartment, relay metering cabinet. Protection grade between compartments reaches IP2X. Except relay compartment, all other three compartments are with individual pressure-relieving trunk. The intermediate type brings more passages for maintenance and positions of cable compartments, thus, multiplex cables for the equipment can be connected.

5.3.1Circuit breaker compartment B

Rails are mounted by the sides of the compartment, for moving hand trolley (17) from opening position or testing position to working position in the cabinet. Contactor box (6) and partition board (valve) (19) are mounted on the back wall of the compartment. When hand trolley is moving from opening position to working position, the valves on upper and lower contactor boxes interlock with hand trolley, and open simultaneously. Operate the valve in reversed direction, valve and hand trolley auto stop. Effective partition forms when the hand trolley returns to a certain position to completely cover the contactor box. Meanwhile, since there is no interlock between upper and lower valves, the valve electrified side can be totally locked during maintenance, ensuring the maintainer are free of touching any electrified body, see Graph 2. Hand trolley can still be operated when the door for circuit breaker compartment is closed. Through the sight glass on the upper door, the position of the hand trolley, the closing and opening state and the energy storage status can be observed.

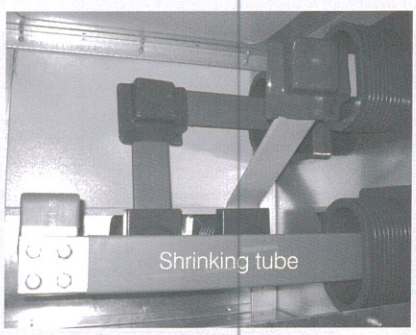
Graph 2 Valve mechanism

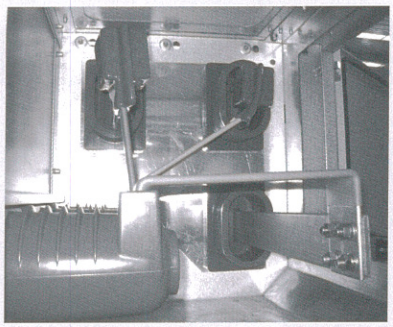


5.3.2 Bus compartment A

Main bus are matched and connected throughout every three cabinets and fixed with bushes and contactor boxes. The connection between main bus and inter-bus is rectangular copper bus-bars, while bus-coupler with couplets is adopted when applied for high current use. Without any supports, branch bus is connected to contactor box (6) and main bus with bolts. For special requirements, main bus is mounted with shrink tubes and connecting face with insulation cover (see Graph 3). Buses for adjacent cabinets are fixed with bushing (3). Thus the air cushion reserved by inter-bus can prevent burn-off in case of any electric arc due to internal failure. Bushing (3) can effectively isolate the failure and prevent it spreading over other cabinets.

Graph 3 Installation methods between bus and branch bus, shrinking tube and insulation cover







Insulation cover

5.3.3 Cable compartment C

Since the switchgear is of intermediate type, there is more space in the cable compartment. Current transformer (7) and earthing switch (8) are mounted on the back wall of the compartment. After moving the hand trolley (17) and extractable level partition board (15) away (see Graph 3), the constructor can enter the cabinet from front for assembly and maintenance. Cables in cable compartments are connected with conductors. According to different currents, each phase can be connected with 1～3 pcs doubling single conductor cables. If necessary, each phase can be connected with 6 pcs doubling single conductor cables. Allocated removable sheet metal or non-magnetized sheet metal at the bottom of connecting cables for slotting, as well as protection cables and rubber covers for sealing, ensure convenience, safety and reliability during construction.

5.3.4 Relay metering cabinet

Protection components, meters, operation indicator for relay, especially secondary equipment with special requirements, can be mounted in relay metering compartment. Control lines are laid in the channel with sufficient space with metal cover overhead, isolating secondary lines from the compartment with high voltage. The channel at left side is reserved for lead-in-out the control wires, while wires for in-house of this cabinet is laid at the right side. The top-plate of relay metering compartment reserves with small bus penetration holes for easy working, the plate can be rotated during wiring, for easy installation.

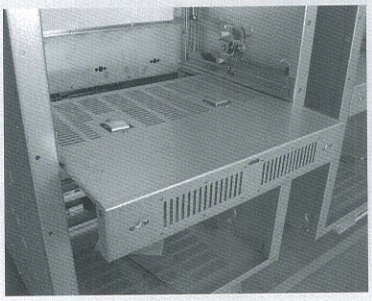
5.4 Interlock device preventing wrong operation

The equipment is mounted with safe and reliable interlocking device inside, totally meeting the requirements of "Five-Prevention".

5.4.1 The door for metering compartment is mounted with cue button or KK type changeover switch, preventing wrongly opening or closing the circuit breaker.

5.4.2 The circuit breaker can be opened or closed only when the hand trolley is at the testing or working position. After closing the circuit breaker, the hand trolley can not move any more, preventing wrongly opening or closing the circuit breaker with load.
5.4.3 Only when the earthing switch is at the closed position can hand trolley be moved from testing or breaking position to working position. Only when the hand trolley is at the testing or breaking position can earthing switch be closed (earthing switch can be equipped with voltage indicating device). Thus it can be realized with preventing wrongly closing earthing switch with load and preventing closing the circuit breaker when earthing switch is at the closed position.
5.4.4 The lower door and back blanking plate can not be opened when earthing switch is at the opening position, preventing wrongly entering electrified compartment (see Graph 5).

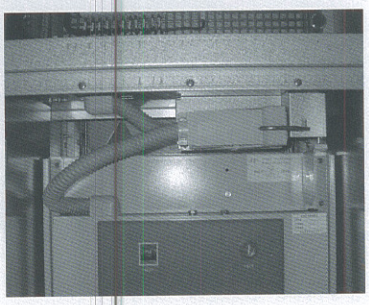
Graph 4 Disassembly method of level partition board



Graph 5 Interlocking earthing switch and back blanking plate



Graph 6 Interlocking gear for secondary inserter



5.4.5 Besides, extra latching electromagnet can be mounted inside of hand trolley as request. Thus manual opening, rather than closing can be done without any control voltage.
5.4.6 When hand trolley is at the working position, the secondary plug (Graph 6) is locked and can not be plugged out.
5.4.7 Electrical interlocking for all cabinets
Magnetic locking device can be mounted on the earthing switch operating mechanism, thus, the reliability is highly improved. The ordering is based on user’ s preference.

5.5 Pressure-relieving device
Pressure-relieving devices are mounted above the circuit breaker hand trolley compartment, bus compartment and cable compartment. In case of any electric arc caused by internal failure of circuit breaker or bus, air pressure rises up with the arcs and the special sealing ring on the door encloses the front of the cabinet. The top metal pressure-relieving plate can be auto-opened to release pressure and discharge air, thus ensure the safety of operator and switch cabinet.

5.6 Interlocking the secondary plug with the position of hand trolley
The connection between the secondary cables on switch equipment and the circuit breaker hand trolley is realized with manual secondary plug. The moving contactor of secondary plug is connected with the circuit breaker hand trolley by nylon extension bellows. The bedplate for secondary stationary contactor is placed at the upper right of hand trolley compartment. Only at the testing or breaking position can circuit breaker hand trolley be plugged-in and undone secondary plug. Due to the mechanical interlocking, when the circuit breaker hand trolley is at working position, the secondary plug is locked and can not be undone. Besides, closing electromagnetic lock can be added according to related requirements. Thus, the closing mechanism of circuit breaker hand trolley is locked by electromagnet. The circuit breaker hand trolley can not be closed until the secondary plug is connected, while it can be opened under this condition.

5.7 Operation indicator

With user's request, operation indicator for detecting running state of primary loop can be placed in this switch cabinet. The indicator consists of two units, high voltage sensor and portable indicator, connected with each other by conducting lines. This device can not only indicate whether the high voltage loop is electrified or not, but can be matched with electromagnetic lock and form forced locking, preventing closing electrified earthing switch, preventing entering the electrified compartment by mistake, thus, fool highly improve the proof performance of matched fittings.

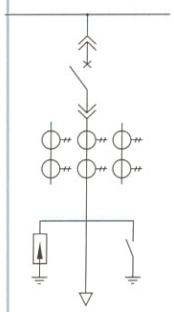
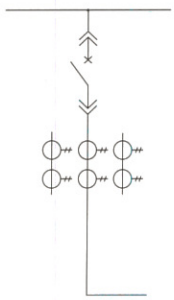
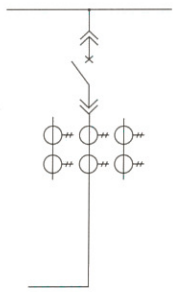
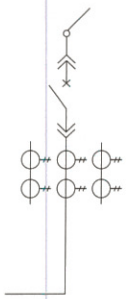
5.8 Prevent condensing

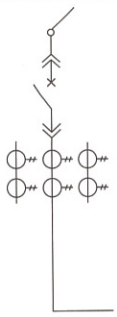
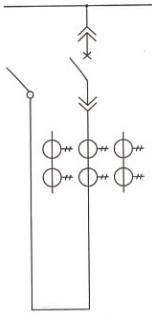
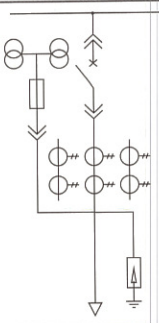
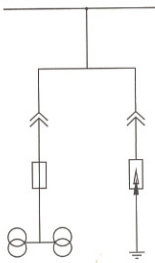
To prevent the danger due to condensing caused by high humidity and great temp difference, heater is placed individually in circuit breaker compartment and cable compartment to prevent condensing. Meanwhile, temp and condensing monitoring sensors, matched with heaters, can be arranged to form auto-monitoring system.

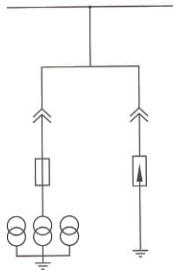
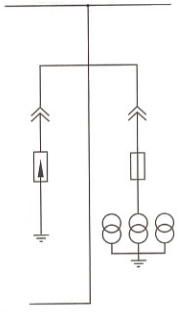
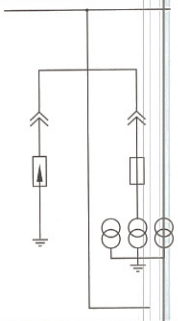
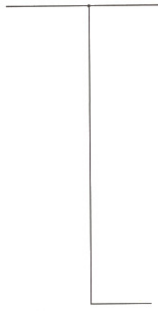
5.9 Earthing device

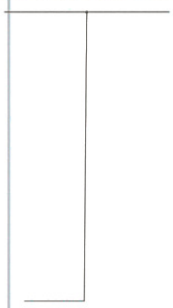
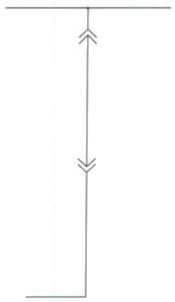
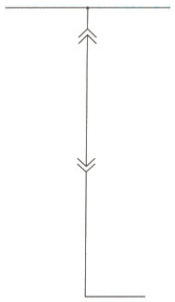
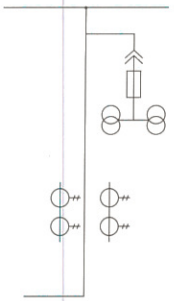
Main earthing copper bus-bar, with corresponding size, is independently placed in the cable compartment. It can penetrate through adjacent cabinets and keeps good contact with the cabinets. This earthing bus-bar is for those components with direct earthings. Since the whole cabinet is built up with aluminized zinc sheets or steel plates, the entire cabinet is well grounded, ensuring the safety of operators and the cabinet.

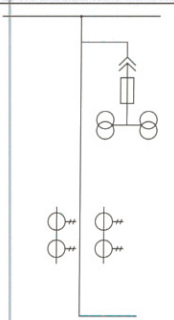
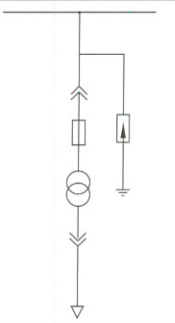
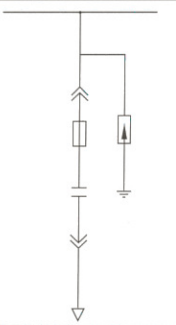
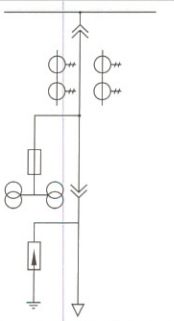
6. Examples of Typical Schemes of Main Circuit

Scheme No.		006	011	013	019
Example of primary wiring					
Cabinet body size (W×L×H)(mm)		650 800 1000 ×1500×2300	650 800 1000 ×1500×2300	650 800 1000 ×1500×2300	800 1000 ×1500×2300
Rated current (A)		630~5000A			
Main components	Vacuum circuit breaker	1	1	1	1
	Current transformer	3	3	3	3
	Voltage transformer				
	High voltage fuse				
	Earthing switch	1			
	Arrester	3			
Usage		Receiving or feeding power	Connection (Right)	Connection (Left)	Aerial lead-in wire (Left connection)
Note		Rated current =1600A, width shall be 1000mm.			

Scheme No.		021	026	034	042
Example of primary wiring					
Cabinet body size (W×L×H)(mm)		800 1000 ×1500×2300	800 1000 ×1660×2300	800 1000 ×1500×2300	800 1000 ×1500×2300
Rated current (A)		630~5000A			
Main components	Vacuum circuit breaker	1	1	1	
	Current transformer	3	3	3	
	Voltage transformer			JDZ10-10 2	JDZ10-10 2
	High voltage fuse			3	3
	Earthing switch				
	Arrester				3
Usage		Aerial lead-in wire (Right connection)	Aerial lead-in and lead-out wires	Lead-in cable +PT	Voltage measurement + arrester
Note		Rated current =1600A, width shall be 1000mm.			

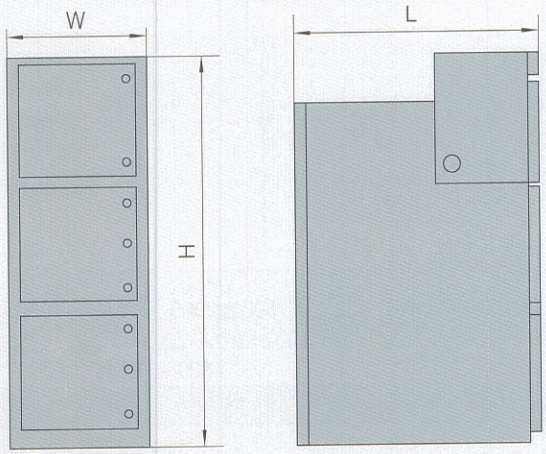
Scheme No.		043	050	051	052
Example of primary wiring					
Cabinet body size (W×L×H)(mm)		800 1000 ×1500×2300	800 1000 ×1500×2300	800 1000 ×1500×2300	650 800 ×1500×2300 1000
Rated current (A)		630~5000A			
Main components	Vacuum circuit breaker				
	Current transformer				
	Voltage transformer	JDZX10-10 3	JDZX10-10 3	JDZX10-10 3	
	High voltage fuse	3	3	3	
	Earthing switch				
	Arrester	3	3	3	
Usage		Voltage measurement + arrester	Voltage measurement + arrester + bus-bar connection	Voltage measurement + arrester + bus-bar connection	bus-bar connection
Note		Rated current =1600A, width shall be 1000mm.			

Scheme No.		053	055	056	061
Example of primary wiring					
Cabinet body size (W×L×H)(mm)		800 1000 ×1500×2300	800 1000 ×1500×2300	800 1000 ×1500×2300	800 1000 ×1500×2300
Rated current (A)		630~5000A			
Main components	Vacuum circuit breaker				
	Current transformer				2
	Voltage transformer				JDZ10-10 2
	High voltage fuse				3
	Earthing switch				
	Arrester				
Usage		Bus-bar connection	Isolation + Connection (Left)	Isolation + Connection (Right)	Metering + Connection (Left)
Note		Rated current =1600A, width shall be 1000mm.			

Scheme No.		062	077	078	079
Example of primary wiring					
Cabinet body size (W×L×H)(mm)		800 1000 ×1500×2300	800 1000 ×1500×2300	800 1000 ×1500×2300	800 1000 ×1500×2300
Rated current (A)		630~5000A			
Main components	Vacuum circuit breaker				
	Current transformer	2	2	2	2
	Voltage transformer	JDZ10-10 2	Transformer 1	Capacitor 3	JDZ10-10C 2
	High voltage fuse	3	3	3	3
	Earthing switch				1
	Arrester		3	3	3
Usage		Metering + Connection (Right)	Lead-in +metering	Lead-in +metering	Lead-in +metering
Note		Rated current =1600A, width shall be 1000mm.			

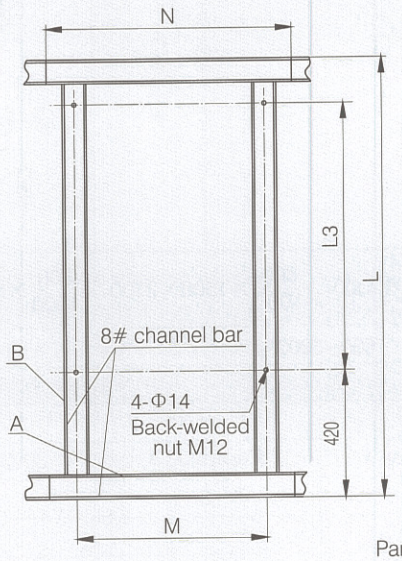
7. Outline and Installation Dimension

Outline Dimension

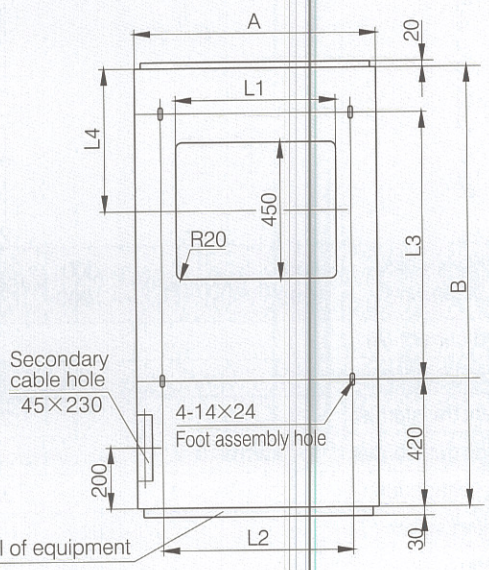


	Height (H) (mm)	2300
Width (W) (mm)	Rated voltage of branch bus =1250A, hot stable current is 31.5kA.	650
	Rated voltage of branch bus =1250A, hot stable current is 40kA.	800
	Rated voltage of branch bus =1600A	1000
Length (L) (mm)	Lead-out cables	1500
	Aerial lead-in and lead-out cables	1660

Installation Dimension

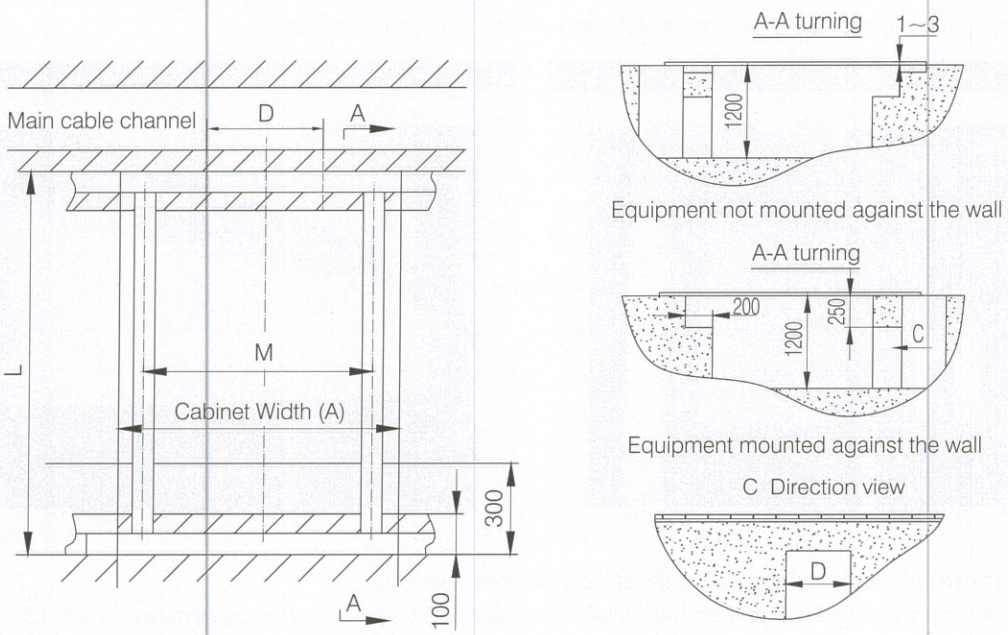


Install baseplate with channel bar (Top view)



Dimension figure of the baseplate of switchgear

Graph 7 Ground plot for installation



Width (A)	Length (B)	M	N	D	L1	L2	L3	L4	L
650	1500 cable	480	650	430	380	480	880	470	1450
	1660 aerial							630	1610
800	1500 cable	630	800	580	530	630	880	470	1450
	1660 aerial							630	1610
1000	1500 cable	830	1000	730	730	830	880	470	1450
	1660 aerial							630	1610

8. Installation and Debugging

8.1 Base form

8.1.1 The construction of the installation base of the switchgear shall comply with the related terms in The Code of Erection and Acceptance for Electric Power Construction.

8.1.2 The installation base of the switchgear shall be concreted twice. The first concreting is for the basis of structural units namely angle bar or square bar and channel bar. The second concreting is for making supplementary layer over floor, generally with the thickness of 60mm. When making supplementary layer, the height of concrete shall be 1～3mm lower than the plane of structural units.

8.1.3 Ground plot of switch installation, see Graph 7.

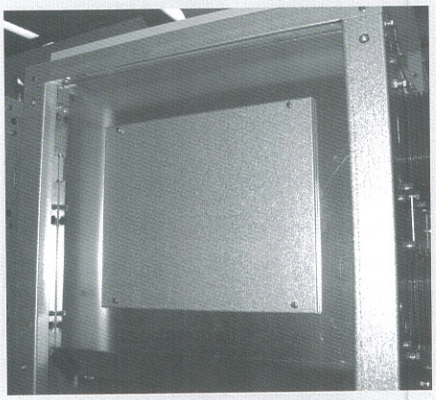
8.2.1 When the cabinet is single-laid, the walkway in front of the cabinet is suitable to 2.5m. When the cabinet is bi-serial-laid, the walkway shall be 3m.

8.2.2 Based on the request of project and pattern indications, the switchgear shall be moved to specific position. Suppose a long serial of equipment is laid (more than 10 cabinets), the arrangement can be started from middle part.

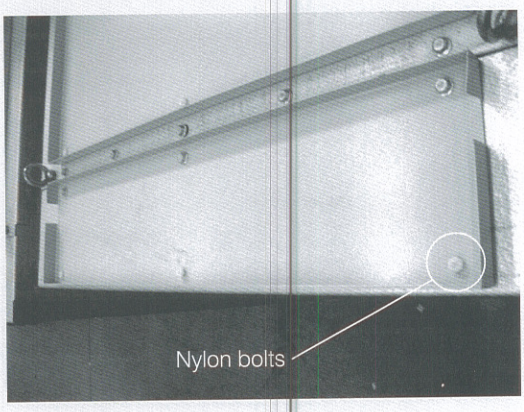
8.2.3 During transportation, special carrier is required, e.g. hoist, fork truck, but roller craw-bar is forbidden.

8.2.4 Loosen the bolts on the back covering plate in bus compartment and remove the covering plate (see Graph 8). If it is required, loosen the bolts on top-plate of bus compartment and remove the pressure-relieving board (21). (During assembly, nylon bolts for pressure-relieving must be mounted, see Graph 9).

Graph 8 Covering plate of bus compartment



Graph 9 Pressure-relieving cover and plastic bolts



8.2.5 Loosen and remove the bottom plate of cable compartment (12).

8.2.6 Remove the covering plate from the control wire channel on the left side of equipment (see Graph 10).

8.2.7 On the basis of the above steps, the switch cabinet can be mounted one by one, both transversally and longitudinally, the plainness within 2mm.

8.2.8 When the equipment is completely assembled, attach the equipment to the basic frame with M12 down holding bolts or weld it to the frame.

8.3 Installation of bus

Follow the procedures:

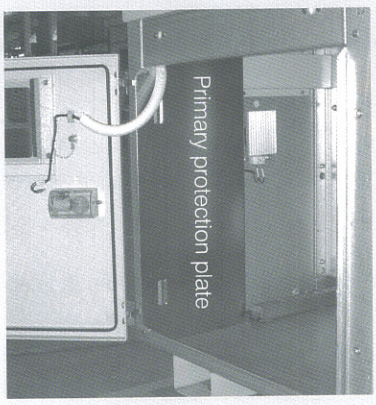
8.3.1 Wipe the bus with dry clean soft cloth, check whether the insulation tube is damaged, and smear conductive paste or neutral Vaseline over the connecting positions.

8.3.2 Lay the bus from one cabinet to another, connect bus section with corresponding branch buses, insert proper chocks and tighten up with bolts during connection.

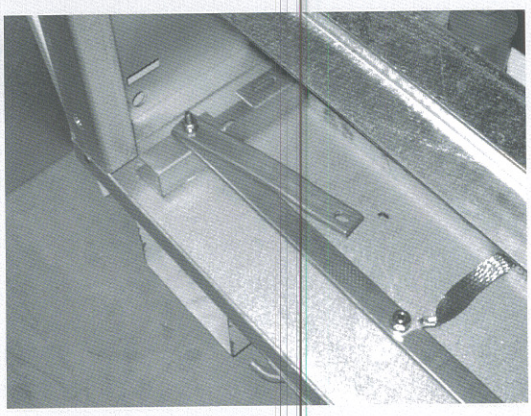
8.4 Earthing device of the switchgear

8.4.1 Connect the earthing bus (11) of all cabinets with the pre-laid connection board (see Graph11).

Graph 10 Primary protection plate (lower left)



Graph 11 Earthing bus-bar



8.4.2 Connect all introducing wires to be grounded in switch cabinets.

8.4.3 Connect basic frame with earthing bar. Two or more earthing bars are required when the serial cabinets is more than 10.

8.5 Checking after installation of switchgear

8.5.1 All main components to be checked for damaged, if any, to be stopped from using and to be replaced.

8.5.2 Wipe dirt, especially those on the insulation surface, since the dirt during transportation and storage can affect the insulating performance.

8.5.3 All fitting bolts to be checked whether loosen or not and connecting wires whether fallen down or not. **Pay great attention: use hexagon spanner to check whether stationary contactors (see Graph 15) are tightened.** Check the connecting state of all circuits and earthing bodies.

8.5.4 After pushing the circuit breaker hand trolley into the cabinet, manually operate all interlocking, power storage and opening and closing mechanism, observe whether energy storage state, indications for opening and closing positions and all other parts are normal. Meanwhile, modify the pointer back to nil position, adjust the relay, and check the correctness of secondary connection according to circuit diagram.

9. Operation and Maintenance

9.1 During operation, not only the related regulations but the following issues shall be observed.

9.1.1 Operation procedure

Although the switchgear is designed with correct interlocking for all operation procedures, during the courses of putting-in and drawing-out of the parts, the operator shall strictly follow the operating instruction and this specification, never operating at his will. Furthermore, when the operation is blocked, it should not be operated forcedly without any analysis. Otherwise, the equipment is easily to be damaged and even worse cause accidents.

9.1.1.1 Operation for circuit breaker cabinet without earthing (see Graph 12)

a) Placing the removable part of circuit breaker in the cabinet: Before pushing the circuit breaker trolley into the cabinet, carefully check the integrity of the circuit breaker and whether any parts are missing, or any sundry and tools are left in the mechanism case or the switch. After confirmed the issues above, place and lock the trolley on the transfer truck. Push the transfer truck to the front of the cabinet, lift the trolley up to the proper position and then insert the locking plate at the front of the transfer truck into the jack panel of partition board and lock the truck with cabinet. Next, release the hook lock of the circuit breaker trolley and push the trolley into the cabinet steadily and lock down. After confirming with the sound locking of trolley and cabinet, revoke the locking of truck and cabinet. Finally, move away the transfer truck.

Graph 12 Assembly course of breaker



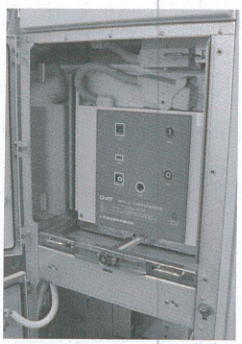
End-to-end connection of trolley and cabinet



Push in the breaker



Testing position



Working position

b) In-cabinet operation for trolley: When the trolley is placed into the cabinet, it is at the testing or open position in cabinet (withdrawing position). To put the trolley into operation, first keep the trolley at the testing or open position and then properly plug in the auxiliary circuit plug. If the power is connected, the indicating light on the panel in metering compartment shines. At this time the trolley can be electrically operated when the main circuit is not connected. To continue the operation, first close and lock the doors to all cabinets with keys, and confirm that the breaker is at open position. At this time, insert the operating crank handle of trolley into the operating hole on the middle panel, and turn the handle clockwise until the handle is blocked obviously, and hearing a clatter sound means indicating the change-over of auxiliary switch. Meanwhile, the indicating light for working position on the panel in metering compartment shines. Then remove the handle. Therefore, the main circuit is connected, while the circuit breaker is at the working position and can be opened and closed through control circuit.
To withdraw the trolley from the working position, first confirm the circuit breaker is at the open position, then insert and turn the crank handle of trolley until the handle is blocked obviously and making a clatter sound indicting the change-over of auxiliary switch. Thus, the trolley returns to testing position (withdrawing position), with main circuit completely broke, and metal valve closed.

c) Remove the trolley from the cabinet: To remove the trolley from the cabinet, first confirm the trolley is at the testing position, then revoke the auxiliary circuit plug and lock the withdrawable plug to the trolley frame. Next move the transfer truck to the front of the cabinet (the same action with the put-in course), and unlock and pullout the trolley. After confirming the trolley is totally moved and locked onto the truck, revoke the locking of the truck and cabinet. Draw the truck back with a certain distance and keep it steady. During long transportation, the trolley shall be pushed with great care, in case of any accident.

d) Confirm the opening or closing state of circuit breaker in cabinet: It can be judged from both the indicator sign on the panel of circuit breaker trolley and the indicating light on the panel in metering compartment.
Look through the sight glass on the middle panel of cabinet and find the green indicator sign, indicating open position. If the auxiliary circuit plug is connected, the indicating light on metering panel shines. Look through the sight glass on the middle panel of cabinet and find the red indicator sign, indicating closed position. If the auxiliary circuit plug is connected, the indicating light on metering panel shines.

9.1.1.2 Operation for circuit breaker cabinet with earthing

The procedure for putting circuit breaker trolley in and taking it out of cabinet is totally the same with that of circuit breaker cabinet with earthing switch. During the courses of operating hand trolley in cabinet and opening and closing earthing switch, some notices shall be observed as the followings.

a) Operation of hand trolley in cabinet
To push the trolley to the working position, apart from observing the requirements in 9.1.1.1b., it shall be confirmed that the earthing switch is open. Otherwise, the next operation can not be achieved.

b) Open and close earthing switch
To close the earthing switch, first confirm the hand trolley returned to the testing or open position and remove the pushing crank handle. Then, push down the interlocking bending plate by the operating hole of earthing switch, and insert the operating handle of earthing switch and turn it 90° clockwise. Thus, the earthing switch is closed. With another 90° turning counter-clockwise, earthing switch is opened.

9.1.1.3 Operation for common isolating cabinets

Since isolating hand trolley is not capable of connecting and breaking the power, it is not permitted to push or pull the on-load trolley. Only after changing over auxiliary contactor in circuit breaker trolley cabinet and revoke the electrical interlocking with isolating trolley can the trolley be operated. Detailed operating procedure is the same with that for breaker hand trolley.

9.1.2 Notice for interlocking

9.1.2.1 The interlocking for this equipment is mechanical interlock-oriented, with auxiliary electrical interlock. Functionally, the "Five Prevention" interlocking can be achieved. However, the operator can not ignore the operating instruction. Only with the combination of operating instruction and technique can the interlocking give full play, preventing accident due to error operation.

9.1.2.2 Most of the interlocking and unlocking are achieved in the courses of normal operation, extra operating procedure is not required. In case operation is blocked (e.g. drag increment during operating), first check whether there is any error operation, rather than deal with forced operation which may cause damage to the equipment and fool operation even worse.

9.1.2.3 For special requirements, some interlocking is permitted to be unlocked emergency (see Graph 13) (e.g. interlocking for lower face panel and earthing switch). Emergency unlocking must be used deliberately and not be used frequently. Necessary protection measurements are required during emergency unlocking which shall be reinstated to the interlocking immediately after handling.

9.2 Except for the related instruction during maintenance, the followings shall be paid great attention to.

9.2.1 Observing the specification of vacuum circuit breaker, check the circuit breaker and make necessary modifications.

9.2.2 Check the push-in mechanism and the related interlocking, make sure they meet the demand in the specification.

9.2.3 Check the contactors on main circuit. Wipe the dirty grease over the movable and stationary contactors, check whether any damage to the contactors. Check the tulip contactor (see Graph 14), whether the spring load with any obvious change or not, and whether any abnormality or oxidation of the zinc coat due to high temp. If any, it shall be treated in time.

9.2.4 Check the abnormality of contact elements on auxiliary circuit and make necessary modifications.

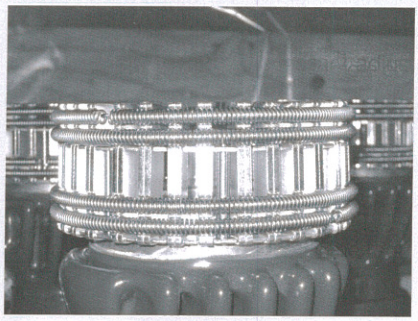
9.2.5 Check all the parts of earthing circuit, e.g. earthing contactors, main earthing wire and gate earthing, etc, ensuring the continuity of electrical conductivity.

9.2.6 Check all fasteners. If any loose, the fasteners shall be tightened immediately, especially those for stationary contactors and bus-bar (see Graph 15).

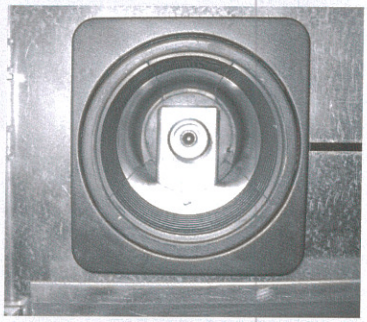
Graph 13 Emergency unlocking for lower door



Graph 14 Tulip contactor and garter spring



Graph 15 Fixing bolts for stationary contactors



10. Notice for Maintenance

During maintenance, the followings shall be observed, apart from the maintenance regulations.

10.1 Check related parameters of the circuit breaker, which shall be done at the open position without any power storage.

10.2 Check any abnormality of push-in mechanism, transmission mechanism and all interlocking mechanisms.

10.3 Check any damage on contactors of the main circuit, and wipe the dirty grease over the contactors.

10.4 Check any abnormality of plug-in units on auxiliary circuit.

10.5 Check the reliability of all earthing.

10.6 Check any loose of all connecting parts of the main circuit.

11.Transportation and Storage

11.1 The following issues shall be noticed during transportation and storage:

11.1.1 Switchgear is assembled in the factory, with hand trolley at the working position, doors to cabinets closed. The bus-bar, fasteners and accessories are packaged independently.

11.1.2 The equipment is transported erectly with such tools as hoist, fork truck and hand lift-davit. (See Graph 16)

11.1.3 The receiver shall do the following at the arrival of the switchgear:

a) Inform our service engineer to carry out the open-package inspection.

b) Check the integrity and any damage of the equipment. Check the correctness and completeness of marks and certificate. Check whether the specification is supplied or not.

c) Keep detailed record of any missing part, deficiencies and damages during transportation, inform related department.

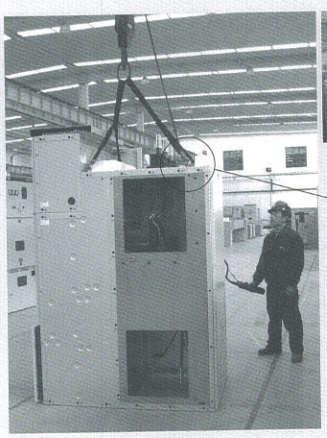
d) Great damages shall be recorded with pictures.

11.2 Intermediate storage

For intermediate storage, the switchgear shall be placed at certain location free from any potential damage to the equipment and the installation materials.

The switchgear shall be stored at dry and well-ventilated place, independently and erectly arranged. Make routine inspection for any condensing before the formal installation.

Graph 16 Loading and unloading by hoist and fork truck





Lifting eye ϕ30

Lifting angle≥60°

Loading and unloading by hoist



Loading and unloading by fork truck

12. Attached Files and Spare Parts

12.1 Quality Certificate

12.2 Packing list

12.3 Delivery inspection report

12.4 Instruction manual

12.5 Checklist of equipment and spare parts

12.6 Primary system diagram, secondary wiring plan and stretched-out view of secondary basic diagram

12.7 Operating crank handle input in trolley, operating handle for earthing switch, power storage handle, spanner for emergency unlocking and transfer truck with input trolley (see Graph 17)

Graph 17 A variety of tools



Operating handle of breaker



Operating handle for earthing switch



Power storage handle



Spanner for emergency unlocking



Transfer truck

13.After-sale Service

After-sale Service Tel: 021-67777777-83231 021-67777777-83083

We assure you rapid, circumspect and professional service.
We hope to embrace any suggestion of the related new product and product innovation as well.

CHINT ELECTRIC CO., LTD

Address:
International Trade Department
1255 Wenhe Road, Songjiang District
Shanghai 201614, China
Tel: (+86)-21-6777 7777
Fax: (+86)-21-6777 7777-83000

Http:// en.chintelectric.com
E-mail:shouhou@chint.com

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