

12kV xDL Removable AC Metal-enclosed Switchgear



EATON

Powering Business Worldwide



Automotive



Aerospace



Truck



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Powering business worldwide

Eaton delivers the hundreds of power distribution products that are answering the demands of today's fast changing world.

We help our customers worldwide manage the power they need for buildings, aircraft, trucks, cars, machinery and entire businesses. And we do it in a way that consumes fewer resources.

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Eaton is driving the development of new technologies – from hybrid drivetrains and emission control systems to advanced engine components – that reduce fuel consumption and emissions in trucks and cars.

Higher expectations

We continue to expand our aerospace solutions and services to meet the needs of new aviation platforms, including the high-flying light jet and very light jet markets.

Building on our strengths

Our hydraulics business combines localised service and support with an innovative portfolio of fluid power solutions to answer the needs of global infrastructure projects, including locks, canals and dams.

Powering Greener Buildings and Businesses

Eaton's Electrical Group is a leading provider of power quality, distribution and control solutions that increase energy efficiency and improve power quality, safety and reliability. Our solutions offer a growing portfolio of "green" products and services, such as energy audits and real-time energy consumption monitoring. Eaton's Uninterruptible Power Supplies (UPS), variable-speed drives and lighting controls help conserve energy and increase efficiency.



MV switchgear technology is in our DNA

Eaton Corporation is a worldwide leader in the design, manufacture, and sale of safe, reliable and high-performance medium voltage power distribution equipment in accordance with IEC, ANSI and GB / DL standards

Complete Global Medium Voltage Switchgear Solutions

Eaton, a premier leader in designing and manufacturing power distribution and protection equipment in the electrical industry, offers a comprehensive range of medium voltage (MV) solutions to meet the needs of virtually every application. From products that feature cutting-edge design that allow for easy access, maintenance and space savings, to arc-resistant products that enhance safety, Eaton's medium voltage solutions provide a variety of products for every need. Additionally, Eaton's global service network provides maximum customer support in all regions of the world.

As one of the few completely vertically integrated and diversified industrial manufacturers in the world, Eaton designs not only MV assemblies, but also the key components that comprise the MV solutions – from steel housing and circuit breaker compartments to vacuum interrupters, circuit breakers, bus systems and fuses.

Eaton's MV heritage, strengthened by acquisitions such as Westinghouse DCBU, Cutler Hammer, MEM and Holec, has resulted in breakthrough MV technologies and numerous international patents over the years.

Part of Eaton's complete electrical PowerChain Solutions – which help businesses minimize risks while realizing greater reliability, cost efficiencies, capital utilization and safety – Eaton's medium voltage equipment meets all standards and certifications such as IEC, NEMA / ANSI, GB / DL, UL, IEEE, KEMA and CSA.

When it comes to medium voltage solutions, you can trust the one name with a long history of proven performance: Eaton.

Eaton's range of
SF₆ free switchgear
for Medium Voltage



An Eaton Green Solution



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12kV xDL Removable Metal-enclosed Switchgear

General

xDL removable metal-enclosed switchgear (hereafter called as the switchgear) is the latest generation of indoor complete power distribution equipment developed by Eaton, with three phase AC 50Hz, 7.2-12kV single busbar section system. It is mainly used in power plant, substation, industrial and mining factories, as well as high-rise buildings, for power reception and power distribution, with functions of controlling, protecting and detecting electric circuits.

The switchgear can be fitted with Eaton's W-VACi, E-VAC and VCP-W withdrawable vacuum circuit breakers. With modular design, the front cubicle of the switchgear is composed of low-voltage compartment, circuit breaker compartment and maintenance compartment, while its rear cubicle includes busbar compartment and cable compartment. They can be assembled separately, easy for batch production and maintenance. This complete equipment can meet requirements of China Grid towards medium-voltage switchgears, and also meet special requirements of "Five-Prevention", completely closed door operation and the working condition of totally enclosed, complete isolation, complete insulation.

The following features allow users to have maintenance-free or least-maintenance equipments:

- The vacuum interrupter applies ceramic shell with vacuity $\leq 10^{-6}$ Pa, guaranteeing 25-year operation life
- The spring operating mechanism requires only minimum maintenance
- After the switchgear's back door is opened, cable terminal and current transformer can be repaired
- Standard components are used, with stocks available, to meet user's requirements.

xDL safe and reliable switchgear

- Completely metal-clad and totally enclosed
- Each compartment in the switchgear is separated and independent from each other
- Quick-closing earthing switch is used for earthing and manual short circuit
- Reliable Five-Prevention interlock can effectively prevent from mal-operation and entrance into energized compartments.
- All the operations on the device can and also should be conducted on the condition of completely closed door, including opening/closing of circuit breaker, racking in/out of circuit breaker's trolley, opening/closing of earthing switch.
- Easily view circuit breaker's position, its opening/closing and energy charged status, via front door observation window
- Enlarged pressure relief channel for the circuit breaker improves heat dissipation efficiency with increased safety.
- Front maintenance or rear maintenance mode can be selected easily, due to customer's requirements
- In accordance with GB3906 and DL404, the switchgear passes each type test by National Center for Quality Supervision & Testing of High voltage Apparatus
- Higher level of technical performance with long creepage distance and compound insulation



W-VACi circuit breaker



E-VAC circuit breaker



VCP-W circuit breaker

12kV xDL Removable AC Metal-enclosed Switchgear

xDL highly practicable switchgear

- Tightly enclosure can prevent dirt and small animals from entrance
- Operation on completely closed door condition maximizes personal safety for operating staff
- Trolley for vacuum circuit breaker is maintenance free, with the matched operating mechanism requiring minimum maintenance
- Vacuum circuit breaker's compartment door is fitted with emergency opening device to conduct emergency opening operation without opening the compartment door.
- Trolley for vacuum circuit breakers has good interchangeability, providing easy replacement of circuit breakers
- Wiring for secondary circuit is in sufficient sized ducts, stylish looking and easy to check
- Sufficient space is provided, easy for cable connection
- Earthing switch can be operated either automatically or manually. Both ways are independent from each other.
- The turnover supporter and meter mounting board in the meter box facilitates secondary wiring and repairing
- The uniform lifted earthing busbar is easy for field connection
- With modular design for cubicles, the whole cubicle can be removed separately after removing the split-board, avoiding gripping between cubicles and facilitating maintenance operations such as removing and replacing cubicles in a fast and direct way.

xDL widely applicable switchgear

- Equipped with standard transformers
- Various cable termination can be used
- Multiple cables can be connected parallel (up to 6 cables per phase)
- Adaptable to incoming and outgoing of cable or busbar, or mixed incoming and outgoing of cable and busbar
- The switchgear can adapt to several primary schemes with uniform interface sizes

Standards applied

- GB3906
- GB/T11022
- DL402
- DL404
- DL593

Switchgear design report

Technical parameters

Table 1 Technical parameters of the switchgear

Type		xDL
Rated voltage	kV	12
Rated power frequency withstand voltage(1min)	kV	42
Rated lightning impulse withstand voltage(BIL)	kV	75
Rated frequency	Hz	50/60
4s thermal withstand current (RMS)	kA	20, 25, 31.5, 40, 50, 63/3s**
Rated peak withstand current (Peak)	kA	50, 63, 80, 100, 125, 160**
Main busbar rated current	A	1250,1600,2000,2500,3150,4000, 6300**
Branch busbar rated current	A	630, 1250, 1600, 2000, 2500, 3150, 4000*, 4000/6300FC**
Cubicle width (W)	mm	800, 1000
Cubicle depth (D)	mm	1500 (1650)
Cubicle height (H)	mm	2200
Protection degree		IP4X for metal enclosure(IP2X for opened compartment door of circuit breaker)
Weight	kg	700-1000(trolley included)

* The switchgear requires forced cooling

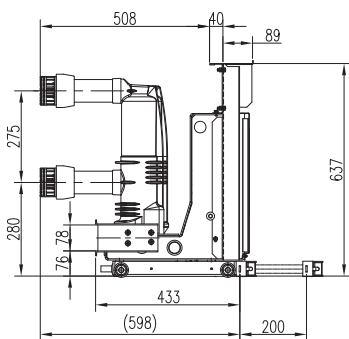
** Special cubicle type, with W*D*H (1100*1900*2400). For more details, please contact Eaton representatives.

12kV xDL Removable AC Metal-enclosed Switchgear

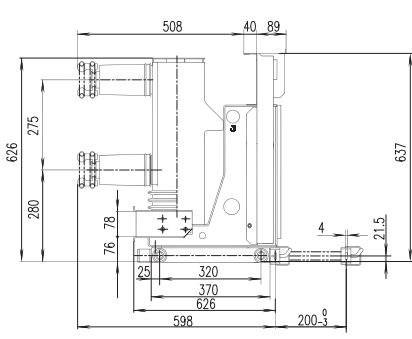
Key technical data for W-VACi, E-VAC, VCP-W63W type vacuum circuit breakers

Part no.		W-VACi	E-VAC	VPC-W63W
Rated voltage	kV	12	12	12
Rated power frequency withstand voltage(1min)	kV	42	42	42
Rated lightning impulse withstand voltage(BIL)	kV	75	75	75
Rated frequency	Hz	50	50	50/60
Rated current	A	630, 1250, 1600, 2000, 2500, 3150, 4000*		4000, 6300*
Rated short circuit breaking current(RMS)	kA	25, 31.5, 40, 50	25, 31.5, 40,50	63
Rated short circuit making current (Peak)	kA	63, 80, 100, 125	63, 80, 100, 125	160
4s thermal withstand current (RMS)	kA	25, 31.5, 40, 50	25, 31.5, 40, 50	63/3s
Arcing time maximum	ms	< 15	< 15	< 15
Mechanical life	times	30000/20000/10000	30000	10000
Automatic reclosing operation sequence		0-0.3s-CO-180s-CO	0-0.3s-CO-180s-CO	0-180s-CO-180s-CO
Energy charging motor power	W	90	65/80	440
Energy charging motor voltage (DC/AC)	V	110/ 220	110/ 220	110/ 220
Energy charging time of motor	S	≤ 15	≤ 15	≤ 15
Opening/closing coil voltage (DC/AC)	V	110/220	110/220	110/220

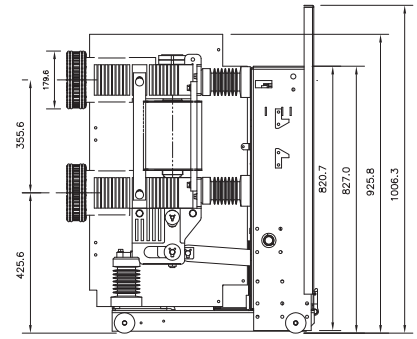
* Forced cooling is required



Outline of W-VACi
Vacuum circuit breaker
(1250A/31.5KA)
Figure 2



Outline of E-VAC
vacuum circuit breaker
(1250A/31.5KA)
Figure 3



Outline of VCP-W63W
vacuum circuit breaker
(4000A/63KA)
Figure 4

12kV xDL Removable AC Metal-enclosed Switchgear

Features of W-VACi circuit breakers

- In accordance with standards including IEC, GB and DL
- Using the latest EATON encapsulated vacuum interrupter, with chopping current below 3A
- The latest EATON spring operating mechanism with impact construction
- Ideal switching resistance load, inductive load and capacitive load
- Light weight
- Motor operation for both DC and AC applications
- Maintenance free

Features of E-VAC circuit breakers

- In accordance with standards including GB and DL
- Using the latest EATON vacuum interrupter, with chopping current below 3A
- The mature spring operating mechanism with impact construction
- Ideal switching resistance load, inductive load and capacitive load
- Economical choice
- Motor operation for both DC and AC applications
- Maintenance free

Features of VCP-W63W circuit breakers

- Totally imported circuit breakers
- Conforming to GB standards
- Very high rated current with natural cooling up to 4000A, and forced cooling up to 6300A
- Rated short circuit breaking current is 63kA, while rated short circuit making current is 160kA

Surface treatment

Door and terminal blanking plates apply epoxy resin power spray coating, while the cubicles of the switchgear use zinc-aluminum-magnesium steel sheet or aluminum-zinc coating steel sheet. The above adopted treatment methods and materials ensure a very strong anti-corrosion capacity for the switchgear housing.

In consideration of requirement for temperature rise, the related busbar compartment parts need to be sprayed with matt black paint.

Frame

- Design is based on GB3906 standard
- Main materials for cubicles use 2.0mm zinc-aluminum-magnesium steel sheet or aluminum-zinc coating steel sheet, and adopt double-bender technology with features of high strength, good anti-corrosion and good anti-oxygenic property. No need for surface treatment. Parts assembling uses high strength bolts or rivet connection with features of high precision and good rigidity for fitting
- Enclosing and isolation of low voltage compartment, VCB compartment, busbar compartment and cable compartment adopts steel sheet separation. Independent pressure releasing channel is provided in all compartments except for low-voltage compartment.
- No welding points for the frame. Special fixture are used in assembling, ensuring very high assembling precision
- VCB compartment is designed with metal or SMC automatically shutter to meet requirements of simultaneously automatic isolation between circuit breaker and busbar side
- VCB compartment is fitted with special guide rail to facilitate trolley to push in or draw out easily
- Each functional unit is fitted with doors possessing lock and hinge. Distance between hinges ≤ 330 mm
- The frame is tidy, firm and aesthetically looking after processing and assembling
- The protection degree for the switchgear shell can reach IP4X after enclosed

Busbar and auxiliary wire

Busbar

- Designed in accordance with GB11022 standard. Busbar materials inside the cubicle are all of high quality electro-refined copper
- The maximum dimension for busbar of each phase is three pieces of 120*10mm² busbar with maximum continuous current of 4000A. The selected busbar section can meet the requirements of system peak withstand current 125kA and 4s thermal withstand current 50kA. In the case of abnormal environmental climate, the section can ensure system to work normally.
- For the special cubicle with rated current of 6300V, please contact EATON.
- Selection of busbar materials shall be based on GB3906.
- Busbar is pre-drilled with four sides as R5mm rounded corners before delivery. As rated current is 4000A, the connection plate of branch bus shall be silver plating
- Fixing bolts of busbar use 8.8 class high strength steelness bolts, allowing busbar to mount in an easy, smooth and very solid way
- Earthing busbar size is commonly 60*5mm². This section can bear 40kA/1s short time current. Earthing busbar is pre-drilled before delivery.

Auxiliary circuit

- Conductor section specification: current circuit 2.5mm²
voltage circuit 1.5mm²
- Insulation degree: 2000V
- Connection mode: fixed terminal block groups the amount of terminal block groups shall satisfy user's demand, reserving 10% as backup and with linking plates available

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Circuit breaker trolley

Circuit breaker trolley is a central type with its design conforming to GB1984 standard.

The circuit breaker with same type and rated capacity rate is fully exchangeable.

The mechanical interlock unit for mal-operation is installed between circuit breaker trolley and the switchgear. When circuit breaker is closing, trolley can not push in or draw out. Only when the trolley is in SERVICE or TEST position, circuit breaker can be closing.

The moving contact is tulip type using compressed spring or band spring with silver plating surface. Flexible connection permits higher tolerance allowance. The good contact causes the smaller resistance of main circuit and low temperature rise.

Mechanical life (CO cycle): W-VACi as 30000 times, E-VAC as 30000 times, VCP-W63W as 10000 times.

Allowable breaking times under rated current: W-VACi as 30000 times, E-VAC as 30000 times, VCP-W63W as 10000 times.

The operation mechanism is the energy charging spring type. At the moment when the circuit breaker is opening, the spring recharges energy.

The expected life of vacuum interrupter is 25 years. And the chopping current of the vacuum interrupter is limited to $\leq 3A$. Operation times of circuit breaker can be displayed by the counter on the panel.

The circuit breaker is fitted with display and controller shown as follows:

- Mechanical display of opening and closing status
- Energy charging display of energy charging motor
- Manual energy charging spring unit
- Local closing button
- Local tripping button

Circuit breaker compartment

A special guide rail is installed inside the circuit breaker compartment for circuit breaker trolley to slide and work on it. In the compartment, the trolley has "SERVICE", "TEST" and "REMOVED" positions. When trolley is moving from "TEST" position to "SERVICE" position, shutter is opened automatically; when trolley is moving in a negative direction, then the shutter is closed automatically to completely isolate primary contact. (See figure 5).

The door of the circuit breaker compartment is fitted with the emergency opening button (unique design from EATON). In case of emergency, without opening trolley compartment door, the manual opening may be conducted, to ensure safety of operators. (See figure 6)

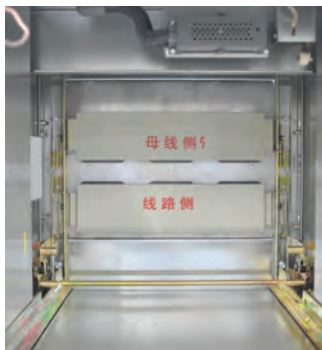


Figure 5



Figure 6

Cable compartment

The cable compartment can be fitted with current transformer, earthing switch and surge arrester. xDL switchgear provides customers with rear panel mounting and maintenance mode. The design of the cable compartment and the switchgear can satisfy various cables in and out modes, for example, bottom in bottom out or top in top out mode.

The cable connection can connect 3 400mm² three-core cables in parallel, easy for connection. (See figure 7). Height of cable mounting is $\geq 750mm$.



Figure 7

Busbar compartment

Based on Chinese customer's requirements, adjacent busbar compartments adopt metal baffle plate and bushing isolation to prevent possible accident from spreading out; larger busbar compartment busbar mounting and maintenance window; window periphery adopts edge fold processing, to reduce injuries to operators; busbar supporter adopt epoxy resin Insulators, supporting insulator to adopt long creepage distance ($\geq 240mm$). When the distance between phases and to earth is larger than 125mm, busbar within the cubicle usually adopt air insulation method. Otherwise, it will adopt compound Insulation method. Then, the whole bus is covered with thermal shrinkage insulated sleeve. The busbar lapping area is protected by insulation hood. (see figure 8)



Figure 8

12kV ET1 Removable AC Metal-enclosed Switchgear

Low voltage compartment

Panel and inner space of low voltage compartment can be equipped with relay protective components, meters, air switch, energized display, simulation bus and various secondary components. The modular grid plate is used for mounting indoor secondary equipment. It can flexibly allocate every secondary component and facilitate secondary connection.

Fitted with advanced microprocessor-based relay, additional communication interface can be incorporated into substation integrated automation.

Microprocessor-based relay provides protective function and possesses multiple functions such as displaying, recording and alarming of substation's key information. Fitted with standard RS232 or RS485 serial interface, it can be connected with substation monitoring system.

Low voltage compartment has following control and display units

- Local/ remote selector switch
- Signal indicator: opening/closing status, and indication of circuit breaker service trolley operating, testing position and the earthing switch in closing position
- High voltage voltage indicator (connected with capacitor voltage divider of cable compartment)

Mounting foundation diagram

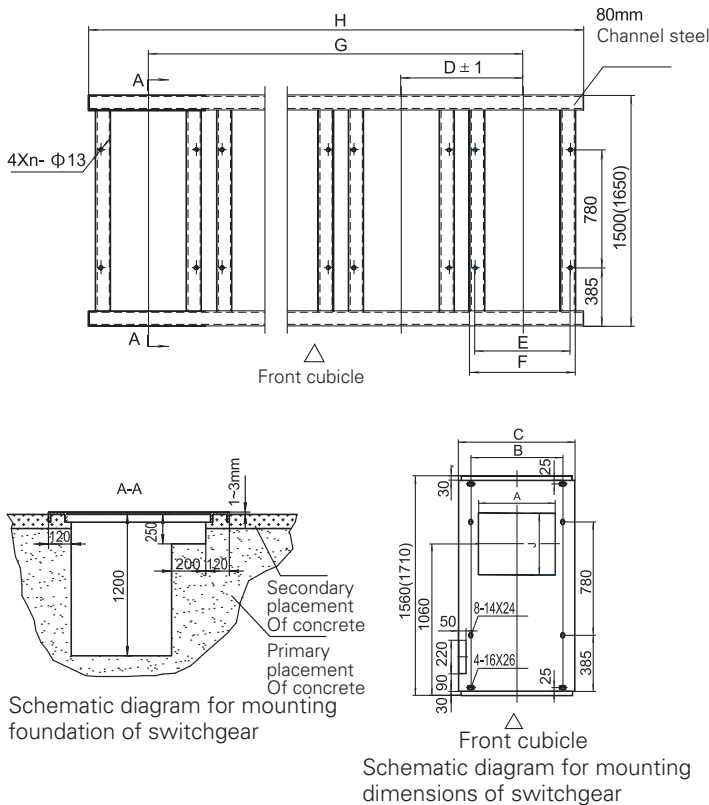


图9

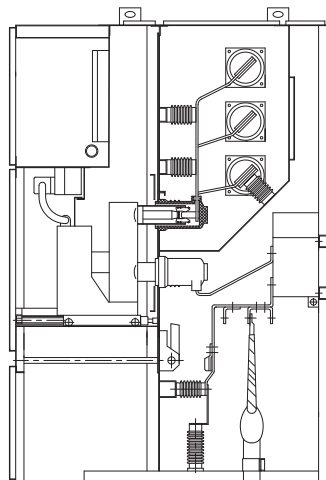


Figure 10 Schematic diagrams for switchgearConstruction

Cubicle width (mm)	A	B	C	D	E	F	G	H	J
800	530	630	800	800	630	700	(n-1)*800	(n-1)*800+790	450
1000	730	830	1000	1000	830	900	(n-1)*1000	(n-1)*1000+990	450

Note:

1. n is the number of cubicles with same width
2. Value in the bracket is the value of depth as 1710mm.

12kV xDL Removable AC Metal-enclosed Switchgear

Safety and maintenance

Design of the switchgear can ensure safety of operators and equipment itself with convenient maintenance for China's users.

Safe operation

In order to ensure that the switchgear and the trolley operate in correct sequence, the switchgear is equipped with reliable mechanical or electrical interlock. For key measures, please see Table 3.

Five-prevention requirement	Detailed measures
Prevent from incorrectly switching	If the circuit breaker is already in closing status, the interlocking rod moves backward. At this moment, movement of closing spring release plate can not raise the lever to release the lock latch.
Prevent operating trolley in load condition	Operations on completely closed door condition fully ensure the safety of operators. There is a mechanical interlock between circuit breaker trolley and the switchgear. Only when the circuit breaker trolley in TEST and SERVICE positions, the closing can be conducted. When the circuit breaker is in closing status, the circuit breaker will automatically trip when the circuit breaker trolley is drawn by mistake.
Prevent switching-on earthing switch in live condition	Circuit breaker trolley is in SERVICE position, when the cable compartment is energized, earthing switch can not operate with mechanical interlock.
Prevent earthing switch energizing in earthing position	When earthing switch is closed, then with mechanical interlock, the circuit breaker, the entering operating hole can not be opened in the circuit breaker trolley, and the trolley can not enter into SERVICE position. Then the primary circuit can not be connected. Only when earthing switch is in opening position, the trolley can rack from TEST position to SERVICE position.
Prevent from entering into energized separation	The bus compartment, trolley compartment and cable compartment are separated to each other. When the trolley is moved to TEST position or DISCONNECTED position, the shutter will automatically close and primary stationary contact is isolated completely. When the cable compartment is fitted with voltage indicator or mechanical interlock, the back door can open only after earthing switch is closed. If the back door is not closed, earthing switch can not open.
Secondary plug	When the trolley is in central position and SERVICE position, the secondary plug is locked and can not be removed.

Interlock/protection for mal-operation

- Fitted with a series of Five-Prevention interlock devices, to prevent danger and corresponding mal-operation with serious consequences. Therefore, it prevents effectively operating staff and the switchgear. The interlock device has following functions:
- When circuit breaker and earthing switch are in opening position, the trolley can move from TEST/isolation position to SERVICE position. If the circuit breaker is in closing condition and is racked, the trolley will trip automatically when moving from TEST/isolation position to SERVICE position. Reverse movement has the same result (mechanical interlock)
- Only when the trolley is completely engaged in TEST or SERVICE position, the circuit breaker can close (mechanical interlock)
- If the trolley is in TEST or SERVICE position without control voltage, the circuit breaker can not close. It can only be manually opened (mechanical interlock)
- If the trolley is in SERVICE position, the control plug is locked and can not be pulled out.
- When the earthing switch is closed, the trolley can not move from TEST/isolation position to SERVICE position; when the trolley is in SERVICE position, the earthing switch can not be closed (mechanical interlock)
- Additional interlock device such as lockout electromagnet can be mounted on the trolley and/or earthing switch operation mechanism. Customers shall make a request in ordering.
- After the trolley is in REMOVED position, the shutter can be locked out with padlock.
- When and only when earthing switch is closed, the cable compartment back door can be opened (mechanical interlock). If back door is not closed, the earthing switch can not open.
- In order to further satisfy requirement from specific customers, switchgear cable compartment door can be equipped with energized compulsory locking unit.

Safety of operating staff

- The switchgear is metal-enclosed and already passed Type Test for internal arcing fault
- Only when cubicle doors are completely closed or live parts can not be accessed, operation of circuit breakers is allowed
- When the cubicle door is closed, it is possible to check for energizing condition in the cubicle without accessing live parts
- Switchgear cubicle and all metal separation plates are earthing with set-up special earthing terminal for connection, providing good earthing continuity

Maintenance

Below features provide users with maintenance free or minimum maintenance

- Vacuum interrupter is ceramic housing, with vacuity 10^{-6} Pa and the guarantee of 25-year operation life
- Spring operating mechanism only needs least maintenance
- After opening switchgear's back door, the cable terminal box and current transformer can be repaired
- Standard components are adopted with available stocks, meeting user's needs

Switchgear earthing unit

- Connecting each cubicles with prepared connecting plates
- Connecting all necessary earthing lead in the switchgear
- Connecting the foundation frame with the earthing bar. If the cubicles in line exceed 10 sets, then two earthing bar connecting points is required.

12kV xDL Removable AC Metal-enclosed Switchgear

General requirement for switchgear installing

The installing foundation of switchgear shall meet the related stipulations of "Technical code for erection and acceptance for power construction". The installing foundation of switchgear generally needs two concrete grouting procedures. The first is for embedded installing parts of switchgear and for laying foundation channels. The second grouting is for floor supplemental layer. Its height is usually 60mm. The height for floor supplemental concrete layer shall be lower than the channel level for 3-6mm.

The form of the primary and the secondary cable chute of switchgear depend on switchgear's installing position and construction condition.

The error per m² for installing foundation surface of the switchgear is lower than 1mm. The total error for its length is not over 3mm. According to engineering demand and instructions on the drawing, the switchgear is transport to specific location. In case of a long row of switchgears (above 10 sets), it is recommended start the split-assembling process from the middle switchgear.

Special transportation tools such as crane, fork truck are used. Roller and crowbar is strictly forbidden to use. The circuit breaker trolley can be drawn out from the switchgear and be kept in another place for safekeeping.

When installing, the first cubicle shall be adjusted first, or the first section shall meet horizontal and vertical requirements. The installation plainness of the switchgear shall not exceed 2mm.

After adjusting the first cubicle, other cubicles are mounted. Pay attention to have the side cutout aligning to the mounted section.

Climate and environment

12KV xDL switchgear is designed to fully consider factors such as customer's local climate and environmental conditions, and meet other special requirements as well.

Climate and environment condition	Normal applicable conditions	Auxiliary measures
Altitude (m)	≤1000	With auxiliary measures, ≤2500
Temperature max. (°C)	40	Technical parameter selection can meet > 40
Temperature min. (°C)	-15	Heater is equipped
Daily average relative humidity	95%	Hearer anti-condensing is equipped
Monthly average relative humidity	90%	Hearer anti-condensing is equipped
Seismic earth acceleration	Horizontal acceleration does not exceed 0.2g	Passed seismic test
	Vertical acceleration does not exceed 0.1g	Passed seismic test
	Safety factor >1.67	Passed seismic test
Coastal effect (light see wind with salt)	IP4X	Housing applies coating aluminum-zinc steel sheet or epoxy powder spray coating

Conforming to China's power standard

- For cubicle live parts, the net distance of its phase to phase and phase to earth is ≥125mm
- * If some parts of the above mentioned conditions are not satisfied, then insulation shutter made by flame-retardant material is used. In addition, the air gap between the shutter and live parts shall be longer than 30mm.
- Creepage distance of the insulator ≥240mm
- Power frequency withstand voltage and lightning impulse withstand voltage value meet requirements of China's power standard

Installation of busbar

The main busbar is supported by insulator. Coupling method is adopted between main buses and between main busbar and branch busbar.

Wipe the busbar with clean dry soft cloth. Check busbar for any damage. Cover the connection area with conductive paste or neutral Vaseline.

After installation, the fixing bolts are tightened with torque wrench. Cover the connection area well with insulation hood.

Attached documents, spare parts as well as accessories

List of attached documents

- Quality certificate
- Packing list
- Delivery inspection report
- Installation & operation instruction
- Transportation and storage instruction
- List of spare parts and accessories
- Secondary connection diagram
- Other related data

Spare parts and accessories

To supply based on customer's request and requirements, with supply decisions made by both sides.

Selection of switchgear

For technical parameter and connection scheme in details, please see switchgear technical parameter table and main connection scheme table (see attached Table 6).

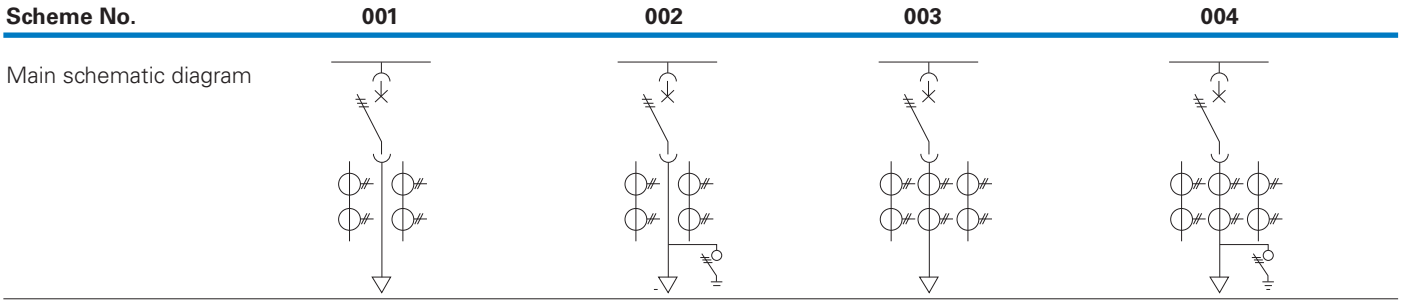
If a customer has special requirement, please contact and consult with our Eaton's related representative.

Ordering notes

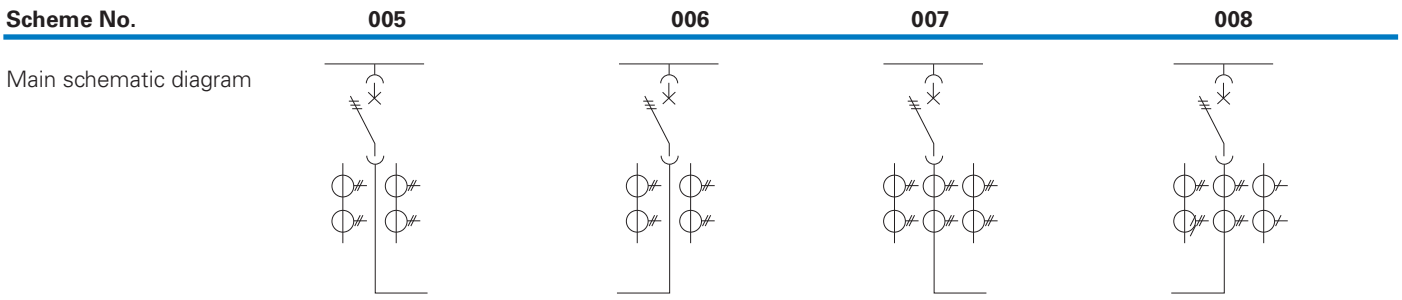
Please contact us before ordering.

12kV xDL Removable AC Metal-enclosed Switchgear

Single Line Diagram

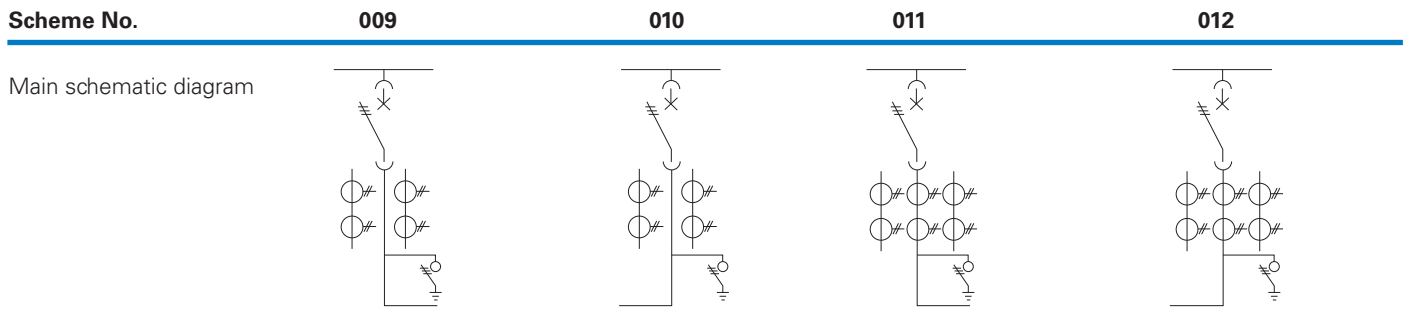


Main equipment				
Application	Cable incoming and outgoing	Cable incoming and outgoing	Cable incoming and outgoing	Cable incoming and outgoing
Rated current	630~4000	630~4000	630~4000	630~4000
W-VAC/VAC	1	1	1	1
LZZB8-10A3	2	2	3	3
JDZ2/JDZX				
H.V.fuse				
Earthing switch		1		1
Surge arrester				
Voltage indicator	Optional	Optional	Optional	Optional



Main equipment				
Application	Right coupling	left coupling	Right coupling	left coupling
Rated current	630~4000	630~4000	630~4000	630~4000
W-VAC/VAC	1	1	1	1
LZZB8-10A3	2	2	3	3
JDZ2/JDZX				
H.V.fuse				
Earthing switch				
Surge arrester				
Voltage indicator	Optional	Optional	Optional	Optional

12kV xDL Removable AC Metal-enclosed Switchgear



Main equipment				
Application	Right coupling	left coupling	Right coupling	left coupling
Rated current	630~4000	630~4000	630~4000	630~4000
W-VAC/VAC	1	1	1	1
LZZB8-10A3	2	2	3	3
JDZ2/JDZX				
H.V.fuse				
Earthing switch	1	1	1	1
Surge arrester				
Voltage indicator	Optional	Optional	Optional	Optional



Main equipment	
Application	Busbar coupling
Rated current	630~4000
W-VAC/VAC	1
LZZB8-10A3	
JDZ2/JDZX	
H.V.fuse	
Earthing switch	
Surge arrester	
Voltage indicator	Optional

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Scheme No.	017	018	019	020
Main schematic diagram				
Main equipment				
Application	Voltage measuring	Voltage measuring	Voltage measuring Protection	Voltage measuring Protection
Rated current				
W-VAC/VAC				
LZZB8-10A3				
JDZ2/JDZX	2JDZ ₂ -10	3JDZX-10	2JDZ ₂ -10	3JDZX-10
H.V.fuse			3	3
Earthing switch				
Surge arrester			3	3
Voltage indicator				

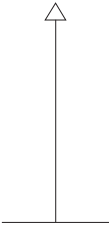
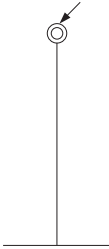
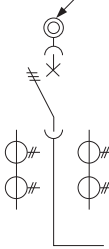
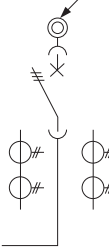
Scheme No.	021	022	023	024
Main schematic diagram				
Main equipment				
Application	Voltage Left and Right coupling	Voltage Left and Right coupling	Voltage measuring Protection	Voltage measuring Protection
Rated current				
W-VAC/VAC				
LZZB8-10A3				
JDZ2/JDZX	2 JDZ ₂ -10	3 JDZX-10	2 JDZ ₂ -10	3 JDZX-10
H.V.fuse	3	3	3	3
Earthing switch				
Surge arrester			3	3
Voltage indicator				

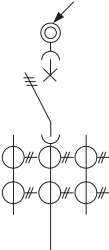
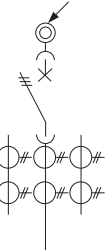
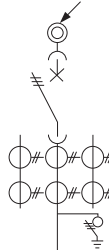
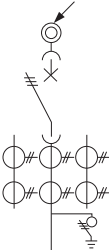
12kV xDL Removable AC Metal-enclosed Switchgear

Scheme No.	025	026	027	028
Main schematic diagram				
Main equipment				
Application	Voltage measuring Protection	Voltage measuring Protection	Voltage measuring Protection	Voltage measuring Protection
Rated current				
W-VAC/VAC				
LZZB8-10A3				
JDZ2/JDZX	2JDZ ₂ -10	3JDZX-10	2JDZ ₂ -10	3JDZX-10
H.V.fuse	3	3	3	3
Earthing switch				
Surge arrester	3	3	3	3
Voltage indicator				

Scheme No.	029	030	031	032
Main schematic diagram				
Main equipment				
Application	Left and right incoming	Cable incoming and outgoing	Cable incoming and outgoing	
Rated current				
W-VAC/VAC	630~4000	630~4000	630~4000	
LZZB8-10A3				
JDZ2/JDZX				
H.V.fuse				
Earthing switch			1	
Surge arrester				
Voltage indicator	Optional	Optional	Optional	

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Scheme No.	033	034	035	036
Main schematic diagram				
Main equipment				
Application	Cable overhead incoming	overhead incoming	overhead incoming	overhead incoming
Rated current	630~4000	630~4000	630~4000	630~4000
W-VAC/VAC			1	1
LZZB8-10A3			2	2
JDZ2/JDZX				
H.V.fuse				
Earthing switch				
Surge arrester				
Voltage indicator	Optional	Optional	Optional	Optional

Scheme No.	037	038	039	040
Main schematic diagram				
Main equipment				
Application	Cable overhead incoming	Cable overhead incoming	Cable overhead incoming	Cable overhead incoming
Rated current	630~4000	630~4000	630~4000	630~4000
W-VAC/VAC	1	1	1	1
LZZB8-10A3	3	3	3	3
JDZ2/JDZX				
H.V.fuse				
Earthing switch			1	1
Surge arrester				
Voltage indicator	Optional	Optional	Optional	Optional

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Scheme No.	041	042	043	044
Main schematic diagram				
Main equipment				
Application	Overhead incoming and outgoing	Overhead incoming and outgoing	Overhead incoming and outgoing	Overhead incoming and outgoing
Rated current	630~4000	630~4000	630~4000	630~4000
W-VAC/VAC	1	1	1	1
LZZB8-10A3	2	2	3	3
JDZ2/JDZX				
H.V.fuse				
Earthing switch	1	1		
Surge arrester				
Voltage indicator	Optional	Optional	Optional	Optional

Scheme No.	045	046	047	048
Main schematic diagram				
Main equipment				
Application	Self feeding tra.			
Rated current				
W-VAC/VAC				
LZZB8-10A3				
JDZ2/JDZX				
H.V.fuse	3			
Earthing switch	1(30/50KVA)			
Surge arrester				
Voltage indicator	Optional			

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Scheme No.	049	050	051	052
Main schematic diagram				
Main equipment				
Application	Metering	Metering	Isolated incoming and outgoing	Isolated incoming and outgoing
Rated current			630~4000	630~4000
W-VAC/VAC				
LZZB8-10A3	2	2		
JDZ2/JDZX	2JDZ ₂ -10	2JDZ ₂ -10		
H.V.fuse	3	3		
Earthing switch				
Surge arrester				
Voltage indicator			Optional	Optional

Scheme No.	055	056
Main schematic diagram		
Main equipment		
Application		Metering
Rated current		
W-VAC/VAC		
LZZB8-10A3		2
JDZ2/JDZX		2JDZ ₂ -10
H.V.fuse		3
Earthing switch		
Surge arrester		
Voltage indicator		

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Scheme No.	057	058	059	060
Main schematic diagram				
Main equipment				
Application	Cable overhead incoming	Cable overhead incoming	Cable overhead incoming	Cable overhead incoming
Rated current	630-4000	630-4000	630-4000	630-4000
W-VAC/VAC	1	1	1	1
LZZB8-10A3	2	2	3	3
JDZ2/JDZX	2	2	2	2
H.V.fuse	3	3	3	3
Earthing switch		1		1
Surge arrester				
Voltage indicator	Optional	Optional	Optional	Optional

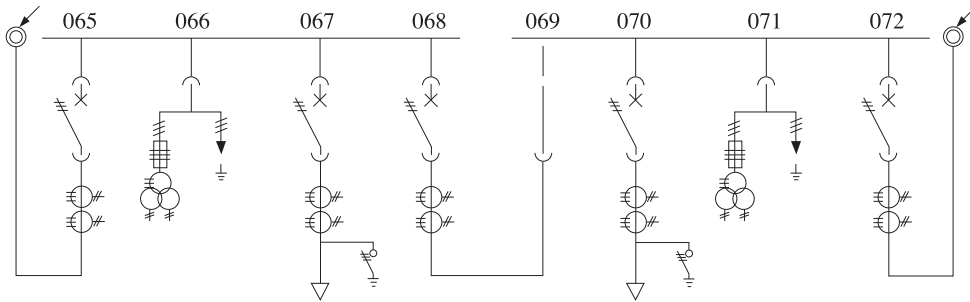
Scheme No.	061	062	063	064
Main schematic diagram				
Main equipment				
Application	Cable overhead incoming	Cable overhead incoming		
Rated current	630-4000	630-4000		
W-VAC/VAC	1	1		
LZZB8-10A3	2	2		
JDZ2/JDZX	3	3		
H.V.fuse	3	3		
Earthing switch		1		
Surge arrester				
Voltage indicator	Optional	Optional		

12kV xDL Removable AC Metal-enclosed Switchgear

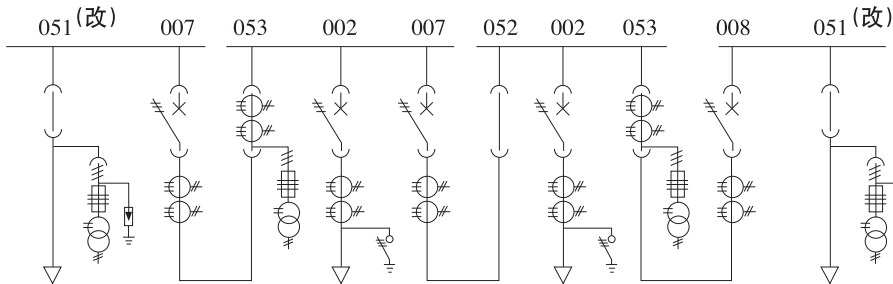
Scheme No.	065	066	067	068
Main schematic diagram				
Main equipment				
Application	Motor feeder	Motor feeder	Motor feeder	
Rated current	400123	400133	40012313	
W-VAC/VAC				
LZZB8-10A3				
JDZ2/JDZX				
H.V.fuse				
Earthing switch				
Surge arrester				
Voltage indicator	Optional	Optional	Optional	

Scheme No.	069	070	071	072
Main schematic diagram				
Main equipment				
Application	Motor feeder	Motor feeder		
Rated current	40013313	40013313		
W-VAC/VAC				
LZZB8-10A3				
JDZ2/JDZX				
H.V.fuse				
Earthing switch				
Surge arrester				
Voltage indicator	Optional	Optional		

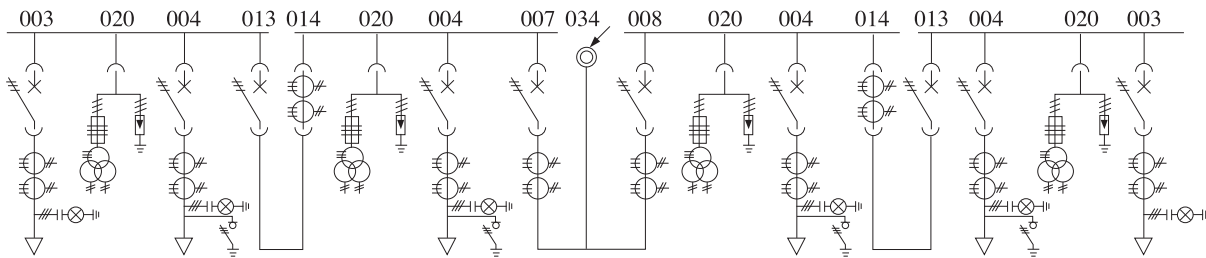
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Typical primary scheme (1)



Typical primary scheme (2)



Typical primary scheme (3)



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