Metal-Clad Switchgear

ROTARY SWITCHGEAR
Licensed by HITACHI

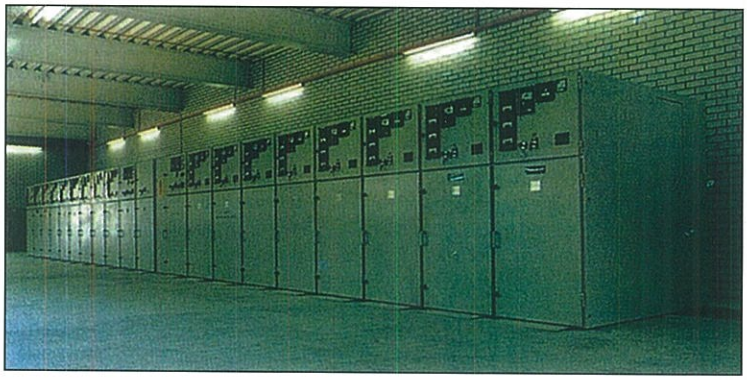
Metal-Clad Switchgear

Designed for Performance, Safety, Ease of Handling and Maintenance

Since their development in 1964, HITACHI METAL-CLAD SWITCHGEAR, using vacuum circuit breaker technology, have been supplied to and are in use in electric power facilities the world over. Providing rapid and safe interruption even of heavy fault currents, these switchgear have earned their reputation for reliability, safety and easy maintenance. They continue to prove themselves in applications throughout the world, satisfying users who demand the very highest standards of performance.

Performance

HITACHI's proven vacuum breaker technology assures rapid and sure interruption even of heavy current.
Elimination of oil used in conventional circuit breakers assures long contact life.



Safety

Elimination of oil in the design eliminates the possibility of explosion or fire.
Metal partitions and insulating bushings guard against the propagation of fault between compartments.
Safety shutter plates operate automatically when the breaker is drawn out, shielding the fixed isolating contacts
All compartments are separated and earthed.
Full interlocking makes maloperation virtually impossible.

Easy Handling

All controls and interlocks are located on the front panel, for easy routine service operations.
All service instructions and operating positions are clearly marked.

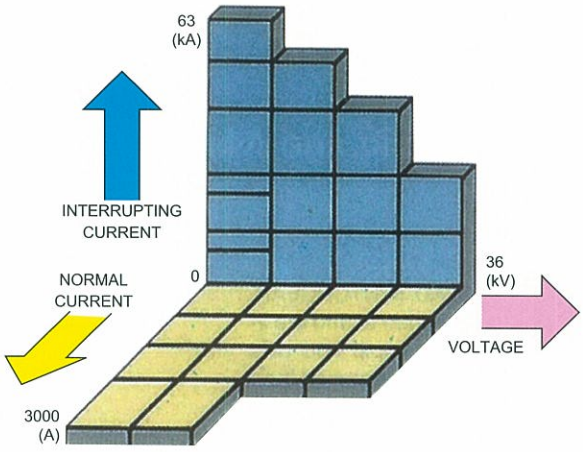
Easy Maintenance

Vacuum technology eliminates the need for contact maintenance. Space for cable termination is provided in the power cable compartment.
A removable barrier simplifies maintenance of busbars and supporting insulators.
The compact, light-weight HI-VAC CIRCUIT BREAKER can be easily removed for maintenance.

Rotary Switchgear Licensed by HITACHI

Hi-VAC Breakers

Vacuum Technology Assures Superior Performance



Wide rating ranges of vacuum circuit breaker

Total Interruption within Three Cycles

The HIGH-VAC BREAKER can interrupt even a heavy fault current within three cycles. The high dielectric strength of the vacuum and patented HITACHI multipole axial magnetic field electrode ensure that arc extinction usually occurs at the first zero current. Full dielectric power recovers quickly after arc extinction. The HIGH-VAC BREAKER also has high-speed reclosing capacity, for rapid return to normal operation after fault.

Long Service Life

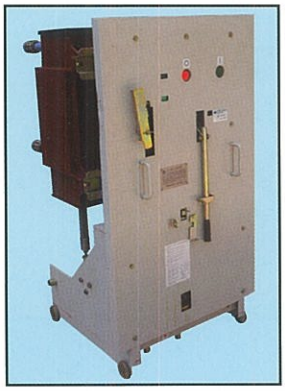
The special vacuum-cast copper alloy electrodes resist melting and deterioration, even when interrupting a heavy current. Unlike bulk oil circuit breakers, contact erosion due to deterioration of the oil is eliminated for longer contact life and continuous quality performance. Special HITACHI vacuum technology assure that the vacuum condition can be maintained within guaranteed ranges for more than 20 years under normal conditions. HI-VAC BREAKERS can handle up to 50 short-circuit current interruptions, or 10,000 rated current switchings, or 20,000 mechanical operations.

Minimum Maintenance Required

Because the contacts are hermetically sealed within the interrupters, they are protected from contamination by foreign elements, eliminating the need for contact maintenance. And of course, there is no oil which requires changing.

Fire Hazard Eliminated

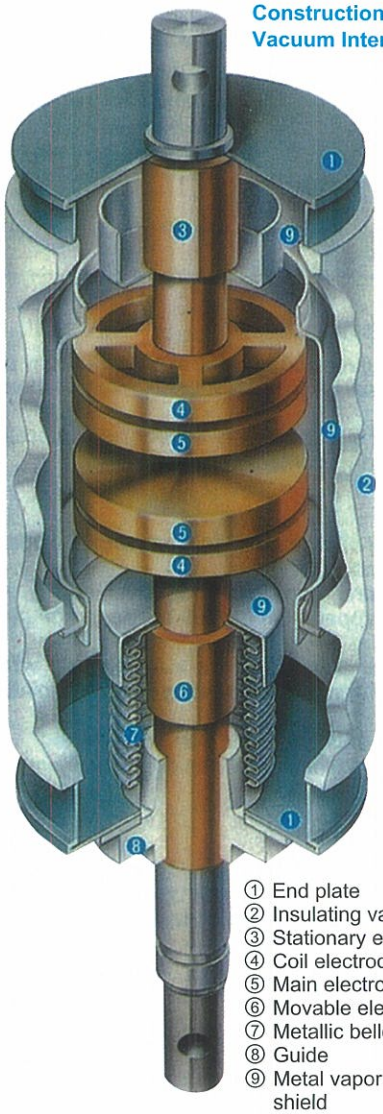
Because vacuum, and not oil, is used as the di-electric, the danger of fire, noxious fumes, or explosions - always present with conventional oil circuit breakers - is eliminated.



EISHO Vacuum Circuit Breaker from Taiwan
Licensed by HITACHI

HITACHI's patented multipole axial magnetic field electrode uses a main electrode and collectrode to induce an axial magnetic field, distributing the arc uniformly over the entire electrode surface for rapid arc extinction. Also stringent testing of pressure rise within the vacuum (not greater than 5 X 10^{-7} torr / week) is performed before shipment to assure that HI-VAC BREAKERS maintain their guaranteed vacuum condition for years.

Construction of Vacuum Interrupter

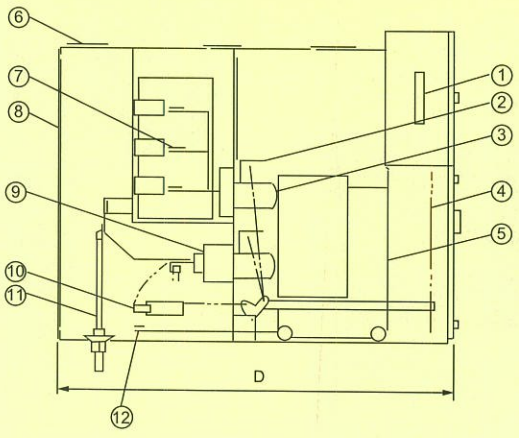


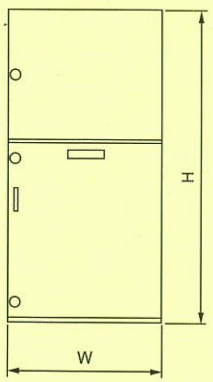
① End plate
② Insulating vacuum envelope
③ Stationary electric terminal
④ Coil electrode
⑤ Main electrode
⑥ Movable electric terminal
⑦ Metallic bellows
⑧ Guide
⑨ Metal vapor condensing shield

12kV Switchgear

St'd	Rated Voltage (kV)	BIL (kV)	Short Time Current (kA)	Type & Form	Rated Current (A)	Rated Busbar Current (A)	Dimensions (mm)				Weight (kg)
							Width (W)		Height (H)	Depth (D)	
							BIL75	BIL95			
IEC BS	12	75 95	16	HB10GF-16FA	630	1,250	700	800	1,800	1,800	1,000
					1,250						
			20	HB10GF-20FA	630	1,250	700	800	1,800	1,800	1,000
					1,250						
					630	2,000	700	800	1,700	2,000	1,100
					1,250						
					2,000						
			25	HB10GF-25FA	630	1,250	700	800	1,700	2,000	1,100
					1,250						
					630	2,000					
					1,250						
					2,000						1,200
			31.5	HB10GF-31FA	1,250	1,250	900	900	2,300	2,000	1,250
					1,250	2,000					
					2,000						
			40	HB10GF-40FA	1,250	1,250	900	900	2,300	2,000	1,250
					1,250	2,000					
					2,000						
			50	HB10GF-50FA	1,250	1,250	900	900	2,300	2,000	1,400
					1,250	2,000					
					2,000						
ANSI	8.25 15	95	23	HS10GF-23FA	600	1,200	-	800	1,700	2,000	1,200
					1,200						
					600	2,000					
					1,200						
					2,000						
			36	HS10GF-36FA	1,200	1,200	-	900	2,300	2,000	1,250
					1,200	2,000					
					2,000						
			48	HS10GF-48FA	1,200	1,200					1,400
					1,200	2,000					
					2,000						

Outline of 12kV switchgear





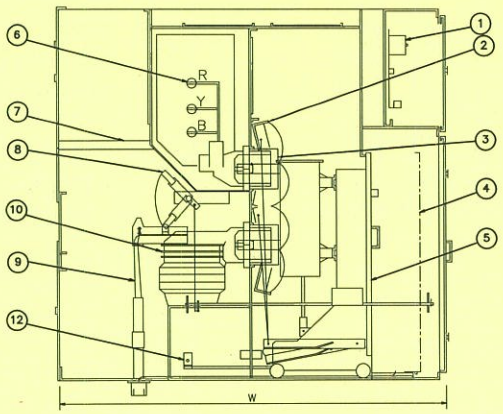
① Terminal blocks
② Safety shutter
③ Primary disconnecting device
④ VCB in isolated position
⑤ VCB in service position
⑥ Pressure relief flapper
⑦ Busbars
⑧ Rear cover
⑨ Current transformer
⑩ Built-in fault-make earthing switch
⑪ Cable termination
⑫ Earth busbar

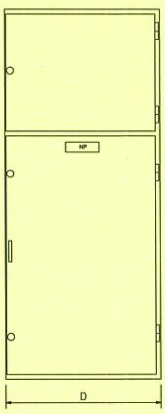
24kV Switchgear

St'd	Rated Voltage (kV)	BIL (kV)	Short Time Current (kA)	Type & Form	Rated Current (A)	Rated Busbar Current (A)	Dimensions (mm)			Weight (kg)
							Width (W)	Height (H)	Depth (D)	
IEC BS	24	125	25	HB20GF-25FA	630	1,250	900	2,050	2,200	1,600
					1,250					
					630	2,000				
					1,250					
					2,000					1,700
ANSI	23	125	25	HS20GF-25FA	600	1,200	900	2,050	2,200	1,600
					1,200					
					600	2,000				
					1,200					
					2,000					1,700
IEC 62271-200 (Singapore)	24	125	25 KA 3 secs	* HS20GF-25FA-R	800	1250 with FBC	900	2,050	2,200	1400 (Dead) 1700 (Live)
					1,250					

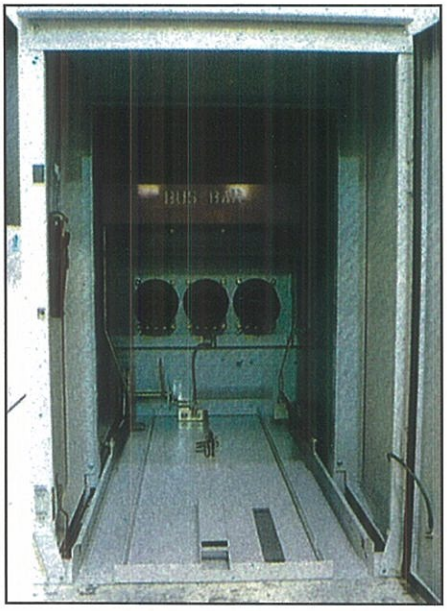
* Assembled in Singapore.

Outline of 24kV switchgear





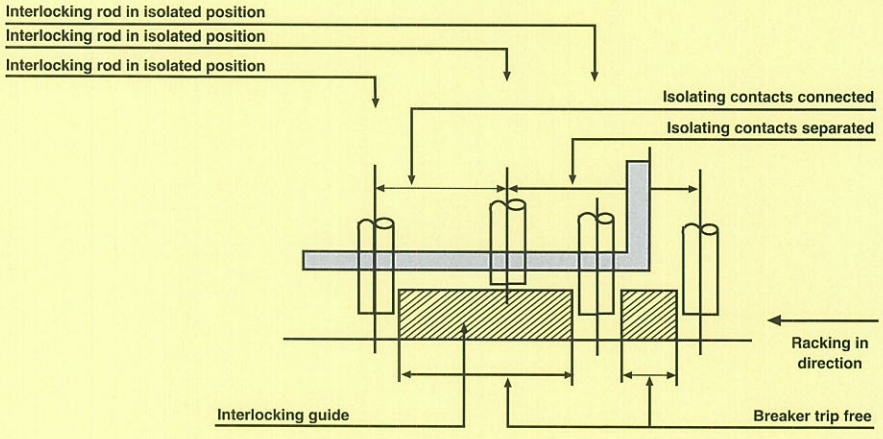
① Terminal blocks
② Safety shutter
③ Primary disconnecting device
④ VCB in isolated position
⑤ VCB in service position
⑥ Main busbars
⑦ Pressure relief flapper
⑧ Built-in fault-make earthing switch
⑨ Cable termination
⑩ Current transformer
⑪ Rear cover
⑫ Earth busbar



Automatic Safety Shutters

These shutters operate automatically during isolation of the circuit to cover the busbar and circuit main contacts and protect personnel against accidental contact with these elements.

The shutters for the busbar and the circuit spouts can each be operated manually for primary injection testing and earthing.



Breaker closing operation	Yes	No	Yes	No	Yes
Breaker tripping operation	Yes	N/A	Yes	No	Yes
Insertion of drawout handle	Yes	No	Yes [1]	No	Yes [1]
Earthing switch closing operation		No [2]		Yes	

Notes
1) Yes, if the circuit breaker is in the open position.
2) No, if the circuit breaker is in the service position or between service position and isolated (test) position.

Interlocks

Mechanical interlocks are provided to prevent maloperation. These interlocks ensure the following:

- The circuit breaker can be isolated from or inserted into the service position only when the circuit breaker is open.
- The circuit breaker can be closed only when it is in the service or isolated (test) position.
- The circuit breaker isolating mechanism can be operated only when the circuit breaker is open.
- For models with a built-in earthing switch, the circuit breaker cannot be closed while the earthing switch is closed; similarly, the earthing switch cannot be closed while the circuit breaker is in the service position.

The diagram and table at left summarizes the interlocking functions.

Easy Maintenance

Earthing Device

The earthing device is used to earth the circuit or busbars during maintenance. Different types of earthing devices are available. All, however, are provided with the following safety interlocks.

- The circuit breaker cannot be inserted into the service position while the earthing device is closed.
- The earthing device cannot be closed while the circuit breaker is in the service position

Attachment type

Extension contacts and a shortening bar are attached to the circuit breaker isolating contacts, either on the circuit or the busbar side. Earthing is accomplished by closing the circuit breaker manually.

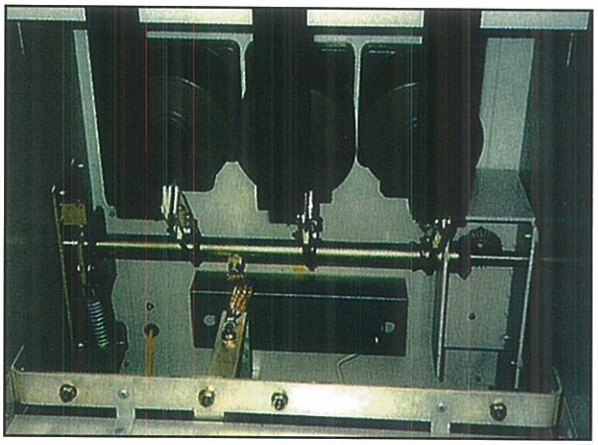
Fault-make truck type

A circuit breaker modified earthing device or truck-mounted fault-make switch is used to earth the busbar and cable. With these earthing devices, earthing can be accomplished when the device is in the service position.

Built-in fault-make type

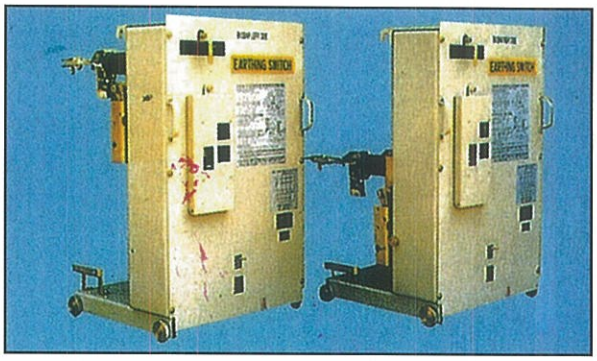
A manually operated fault-make earthing switch is installed in the cable compartment of each feeder or measuring unit for busbar earthing.

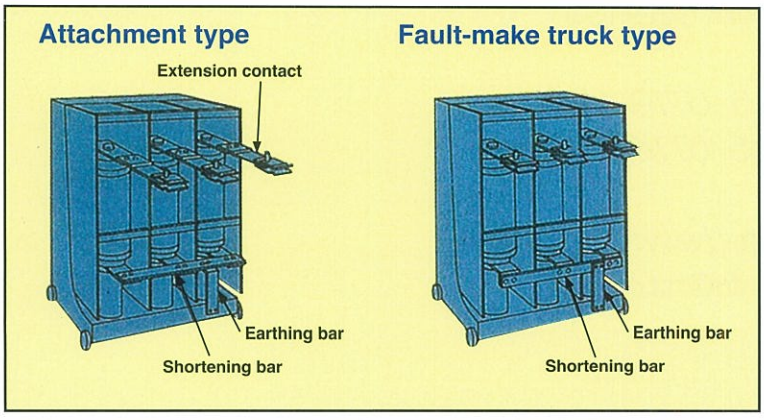
Built-in fault-make type



Manual operation of earthing switch

Truck mounted fault-make





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