

24kV Cubicle type Vacuum Insulated Switchgear

Hitachi's New Generation Switchgear takes over the advantages of GIS (compactness & reliability) and AIS (accessibility).



Cubicle type Vacuum Insulated Switchgear

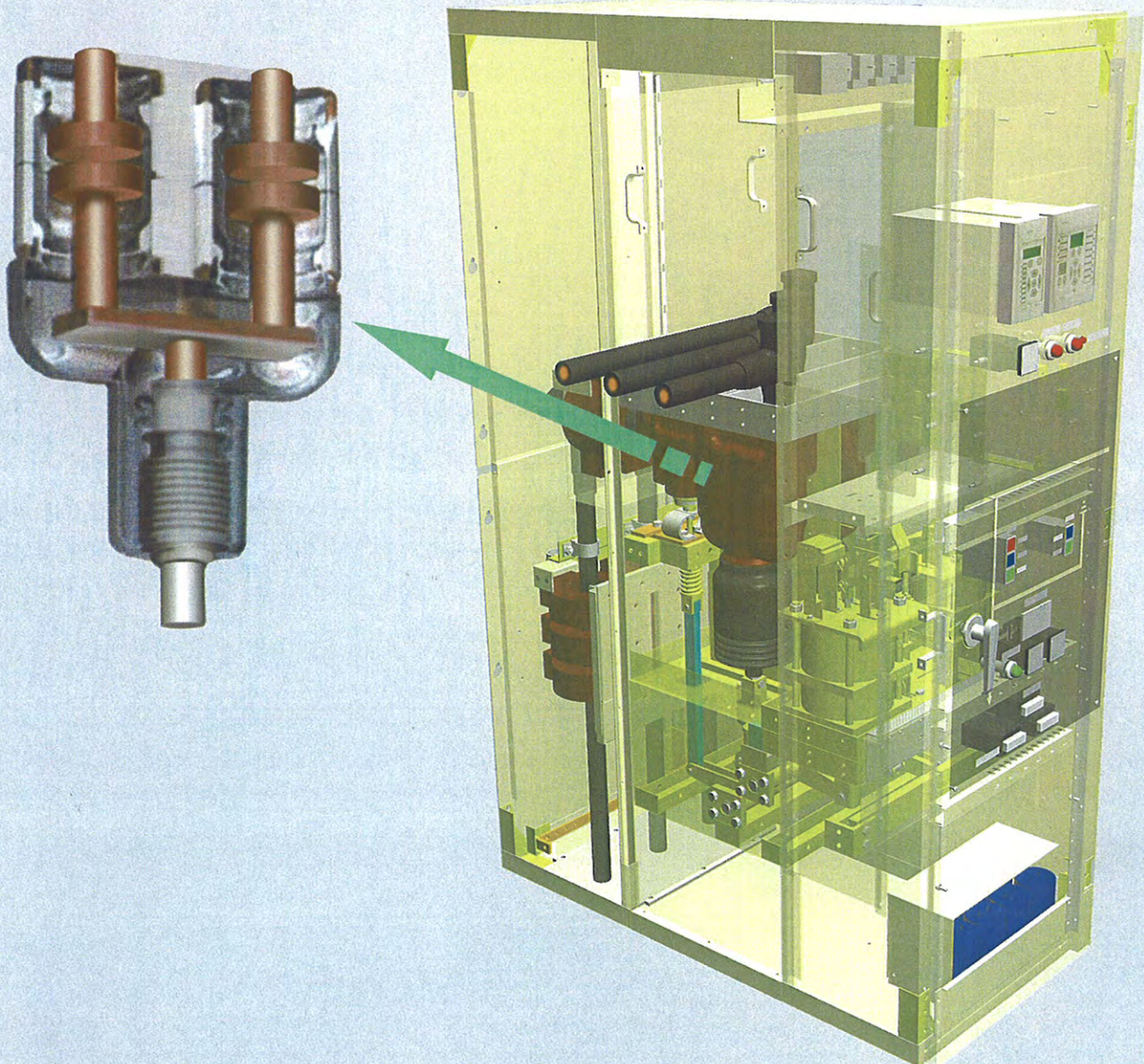
Furthermore evolved new generation switchgear

The Cubicle type Vacuum Insulated Switchgear has features of compactness & reliability of GIS (Gas Insulated Switchgear) and accessibility of AIS (Air Insulated Switchgear) based on Hitachi's vacuum technologies.

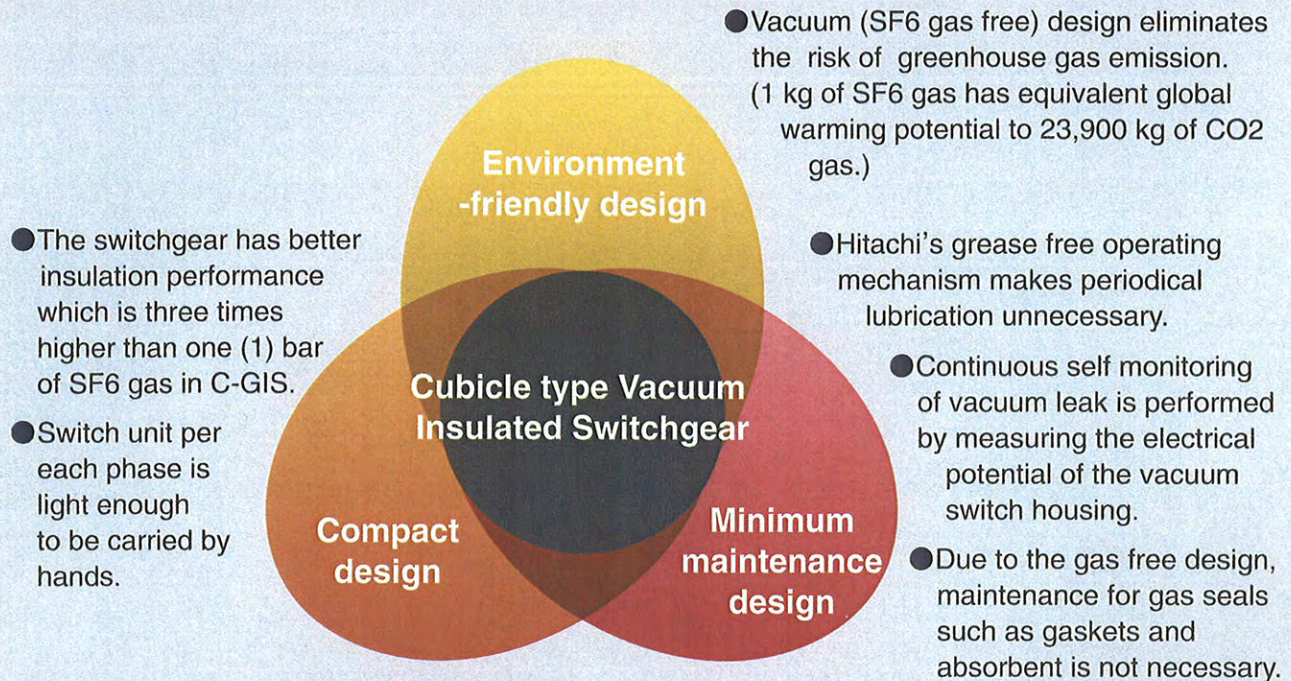
The Cubicle type Vacuum Insulated Switchgear is environment friendly and easily accessible for installation and maintenance people.

Vacuum insulated switch

The vacuum switch consists of two contacts and it takes the role of an interrupter and disconnecter. This dual contact design increases the reliability of the interrupter and disconnecter.



Design concepts



Reliability

- Hitachi's grease free electro-magnetic actuator has stable operating characteristics over the long term.
- Vacuum brazing technology proven on VCBs for years ensures reliability of seal for the vacuum switch housing.
- Each contact of the double break three position vacuum switch has a 24kV-25kA breaking and insulating capability.

Safety

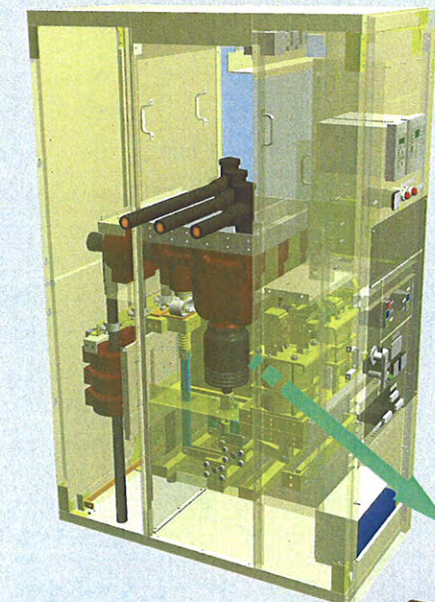
- The phase segregated construction avoids a phase to phase short circuit fault.
- Internal fault in the vacuum chamber does not cause hazardous pressure rise so that pressure relief device is not required.
- The double break three position vacuum switch is also insulated with molded epoxy resin against the accidental earth fault caused by a vacuum leak.
- The vacuum earthing switch has a fault making capability.

Environment resistance

- Hitachi's vacuum switch is designed to reduce contamination from condensation, salt or corrosive gas.
- A vacuum housing and rotating shafts are made of stainless steel to strengthen against corrosion.

Basic design of Vacuum Insulated Switchgear

Vacuum Insulated Switchgear is SF6 gas free and easy for maintenance



Busing CT for protection

Feeder voltage is continuously monitored by VD.

Vacuum ES

VD

Insulated busbar

Outer surface of the molded sheath has an earthed layer to keep contact safety.

Double break three position vacuum insulated switch as CBDS

Bellows enclosure for the operating rod

Operating rod

CBDS , ES, cable bushing, busbar bushing and VD are integrated in one molded compact component per each phase.

Vacuum leakage monitoring method

The vacuum chamber of a vacuum switch consists of a metallic enclosure and ceramic insulators. The metallic enclosure is insulated with molded insulating sheath as shown in Figure 1. If vacuum leak occurs, the potential of the metallic enclosure becomes high due to flash over between conductor and metallic enclosure. The electrode on the molded insulating sheath is capacitively coupled with the metallic enclosure. Therefore the potential of the metallic enclosure is monitored by the electrode as shown in Figure 2.

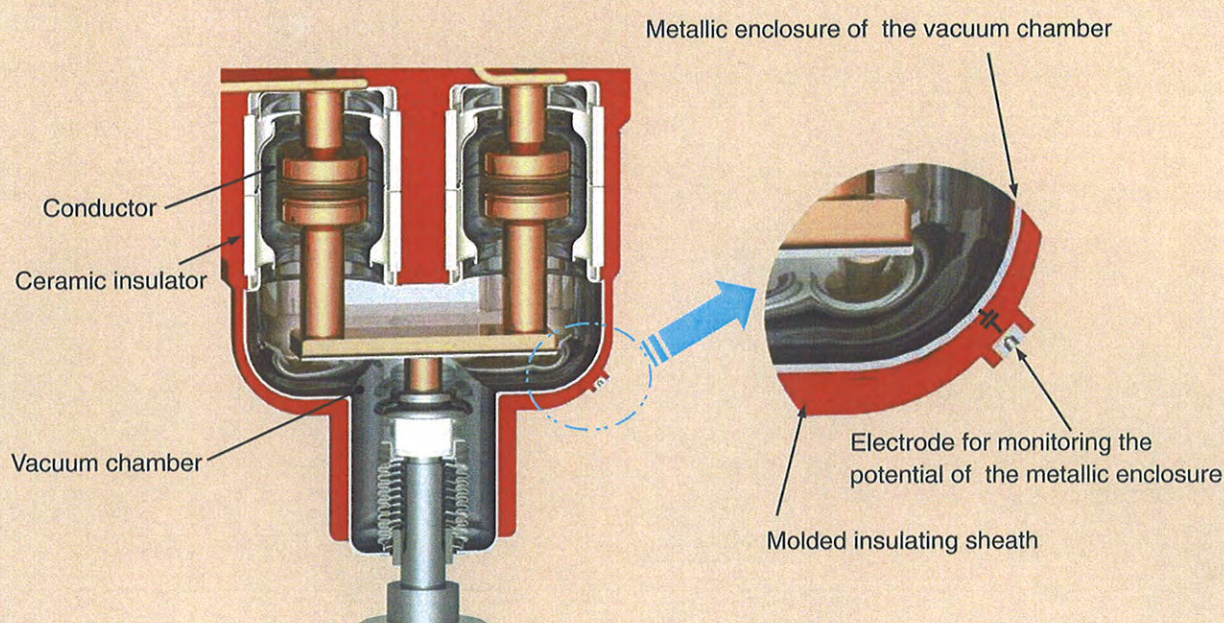


Fig.1 Construction of the vacuum chamber

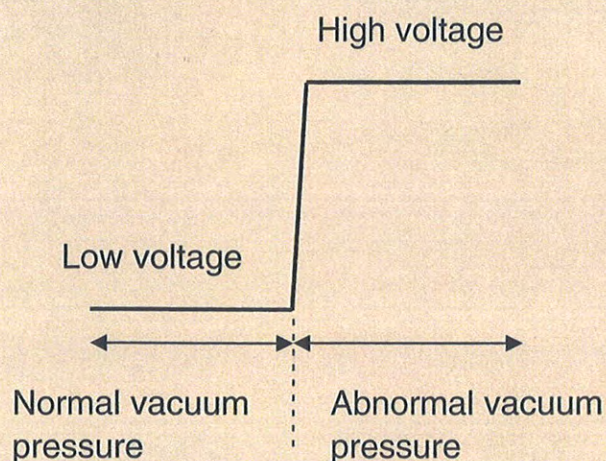
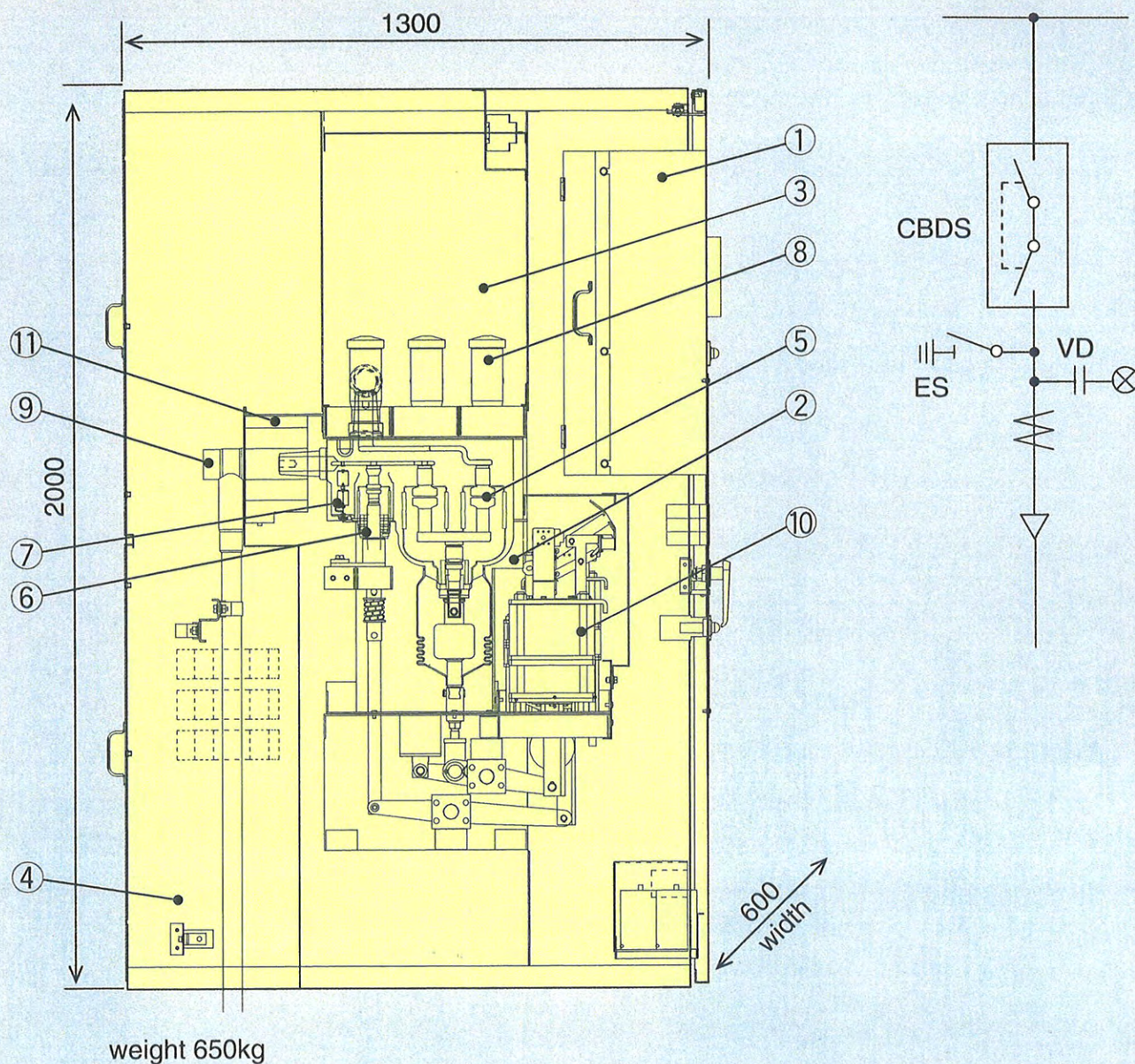


Fig.2 Vacuum leak monitoring

Switchgear panel

Feeder metering panel (Double cable type)



① Low voltage control compartment

② Switch compartment

③ Busbar compartment

④ Cable compartment

⑤ Double break three position
vacuum circuit breaker : CBDS

⑥ Vacuum earthing switch : ES

⑦ Voltage detector : VD

⑧ Insulated busbar

⑨ Cable sealing end

⑩ Electromagnetic actuator

⑪ Current transformer for protection

Ratings



Rated voltage			kV	24
Rated frequency			Hz	50/60
Rated short duration power frequency withstand voltage			kV	50
Rated lightning impulse withstand voltage			kVp	125
Rated peak withstand current			kAp	65
Rated short circuit making current			kAp	65
Rated short time withstand current 3s			kA	25
Rated short circuit breaking current			kA	25
Rated normal current - busbar			A	1250
Rated normal current - feeder			A	630/800/1250
Switchgear Panel	Width	feeder	mm	600
		bus section	mm	600
		metering	mm	600
	Depth	feeder	mm	1300
		bus section	mm	1300
		metering	mm	1300
	Height		mm	2000
	Weight	feeder	kg	650
		bus section	kg	750
		metering	kg	750

Standards IEC60694, IEC62271-100, IEC62271-200
(2002) (2003) (2003)



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