HFMJÆPS

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MAE-010B

BGA-24/BGA-36

24kV/36kV Metal-enclosed SF_6 Gas Insulated Switchgear

Japan AE Power Systems Corporation

Design Concept

Design Concept

This switchgear conforms to IEC62271-200, and all primary components employed therein are in accordance with the relevant IEC standards.
It is designed to accommodate high-performance vacuum circuit breaker (VCB), which has been designed and tested in accordance with IEC62271-100.
SF6 gas insulation used in conjunction with VCB has resulted in switchgear setting new standards with respect to;

- Operation reliability
- Reduced maintenance work
- Safety for persons
- Free from environmental pollution
- Reduced dimensions and less space requirements
- Current interruption by VCB with zero SF6 gas pressure (equal to atmospheric pressure)

Features

Safety

No exposure of high-voltage live part to the air.
Complete interlocking system against erroneous operation.
Equipment of manual operation mechanism in an emergency.

User-friendly

Visualized operation mechanisms equipped with mimic bus and symbols.
All switching devices can be operated from remote.
Compact size achieved by optimal arrangement of devices.

Imperious to environment

High-voltage live part is completely protected against moisture and dust.

Reliability

Reliable gas-insulated busbar system.
Keeping the ability of breaking circuit,even if the insulating gas pressure becomes zero.
Reduction in number of parts achieved by simple structure.

Adaptability

Adaptable for various requirements of network by employing plug-in type voltage transformer and lightning arrester.
Insulating performance is imperious to the installation altitude.
Test of high-voltage part can be fully performed without any gas handling.

Economical Efficiency

Easy maintenance.
No maintenance is needed for high-voltage equipment in the gas compartment.
SF6 gas is not polluted by arc because of employing vacuum circuit breaker.
(SF6 gas is used only as insulation medium.)

Technical Specification

Technical data

Table 1 Switchgear

Switchgear type		BGA-24	BGA-36	
Applicable standards		IEC62271-200		
Clasification of switchgear		SF6-insulated metal-enclosed		
Service condition		●Altitude ＜1000 m ●Ambient temperature Max. 40℃, Min.-5℃ 24Hrs. average ＜35℃ ●Relative humidity 24Hrs. average ＜95% 1 month average ＜90%		
Rated voltage (kV)		24	36	
Rated current(A)		1250, 2000	1250, 2000, 2500	
Rated frequency (Hz)		50 / 60		
Insulation level	1 min power frequency (kV rms)	50	70	
	1.2×50μs impulse (kV peak)	125	170	
Rated short-time withstand current (kA-sec)		25 - 3	25 - 3	31.5 - 3
Degree of protection	HV compartment	IP65		
	LV compartment	IP40		
	Operating box	IP30		
Gas pressure	Rated pressure (MPa)	0.05	0.08	
	Low pressure alarm stage (MPa)	0.03	0.06	
Operation of 3-position isolator		Motorized / manual		
Auxiliary voltage	Control circuit (V)	DC 24, 30, 110, 125		
	Motor circuit (V)	AC 220, 230, 240 / DC110, 125		

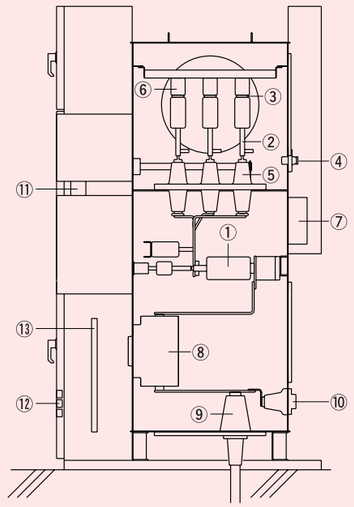
Table 2 Vacuum Circuit-Breaker (VCB)

VCB model		VGA-32		VGA-33
Applicable standards		IEC62271-100		
Rated voltage (kV) ※		24	36	
Rated current (A)		1250, 2000	1250, 2000	1250, 2000, 2500
Rated frequency (Hz)		50 / 60		
Insulation level ※	1 min power frequency (kV rms)	50	70	
	1.2×50μs impulse (kV peak)	125	170	
Rated short-circuit breaking current (kA)		25	25	31.5
Rated short-circuit making current (kA peak)		63		
Rated short-time withstand current (kA-sec)		25 - 3	25 - 3	31.5 - 3
Operating duty ※※		O—0.3sec—CO—3min—CO O—3min—CO—3min—CO		
Rated closing time (sec)		0.05		
Rated opening time (sec)		0.05		
Rated break time (sec)		0.07		
Rated TRV for terminal fault	Rate of rise (kV/μs)	0.47	0.57	
	TRV peak voltage (kV)	41	62	
Type of operating mechanism		Motor charged spring stored energy		

※ : Rated voltage for circuit-breaker is 36kV and 24kV is just application to the lower rating.
※※ : Other duties, O-0.3sec-CO-15sec-CO, O-0.3sec-CO-1min-CO-1min-CO are also available.

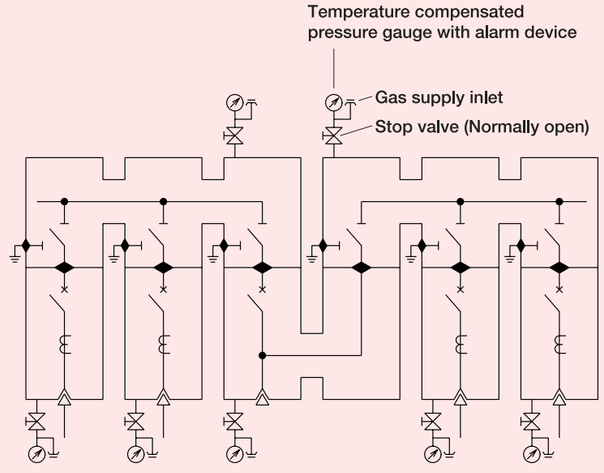
Technical Specification

Construction



① Vacuum interrupter
② 3-position isolator
③ Main busbar
④ Earth terminal
⑤ Bushing
⑥ Insulator
⑦ Rupture disc
⑧ Current transformer
⑨ Cable socket
⑩ Testing socket
⑪ Gas density monitor
⑫ Voltage indicator
⑬ Terminal Block

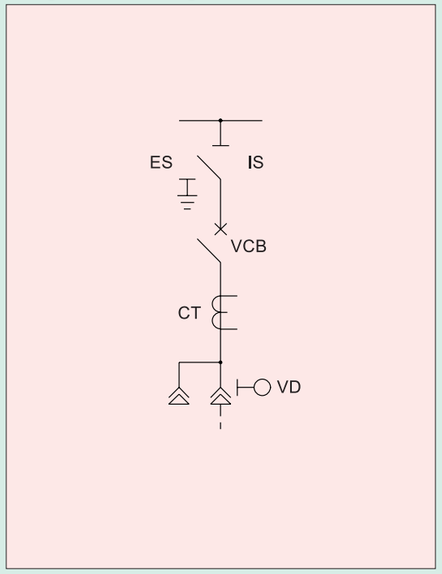
Gas monitoring system



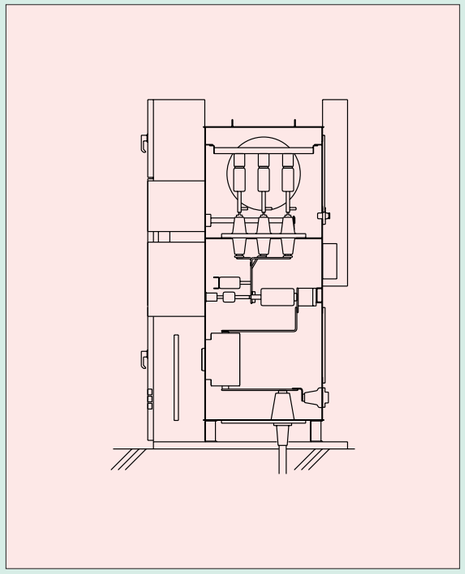
Basic Pattern (Single Busber System)

Feeder panel

Single Line Diagram



Cross-sectional view



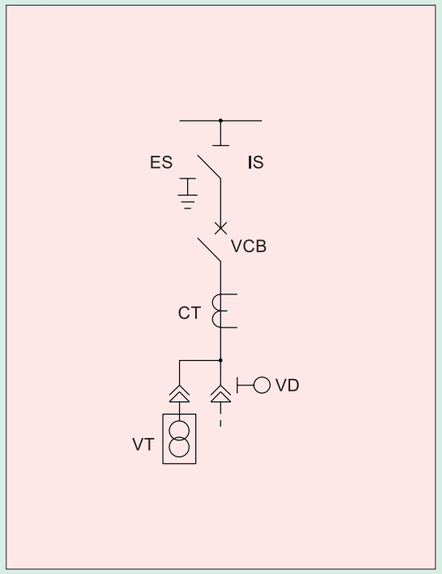
24kV
W=650
H=2350
D=1300

36kV
W=700
H=2450
D=1400

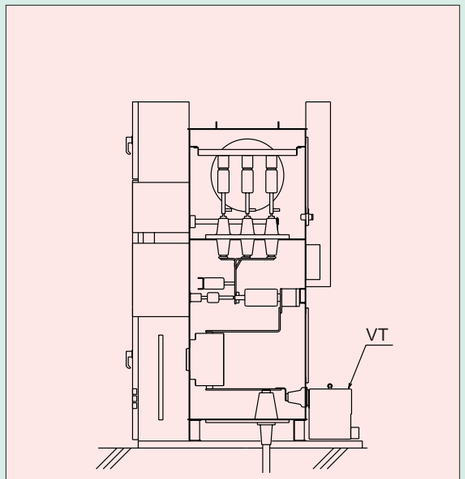
36kV, 31.5kA
W=700
H=2650
D=1500

Feeder panel with VT

Single Line Diagram



Cross-sectional view



24kV
W=650
H=2350
D=1550

36kV
W=700
H=2450
D=1650

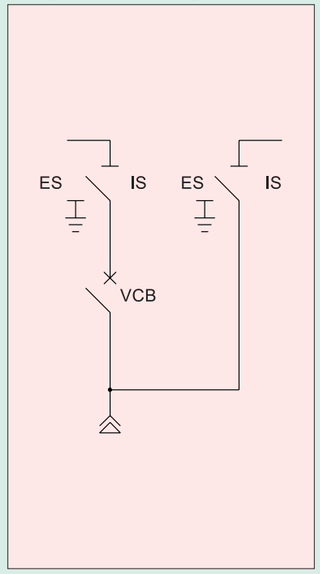
36kV, 31.5kA
W=700
H=2650
D=1750

Note: Dimensions and components may be changed according to the specifications.

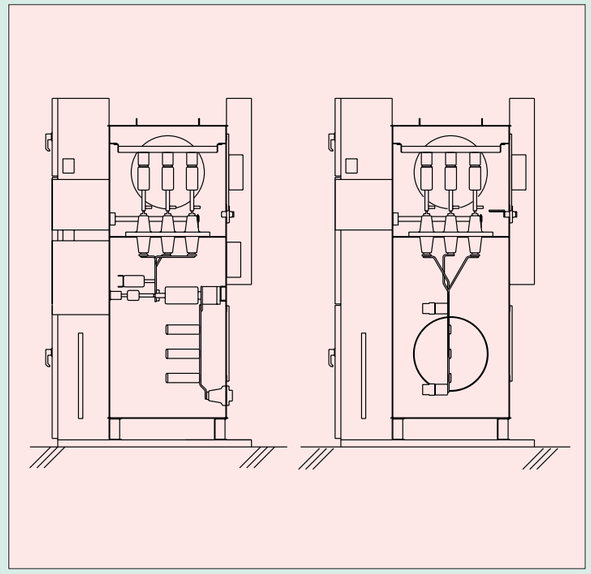
Basic Pattern (Single Busber System)

Bus section panel

Single Line Diagram



Cross-sectional view



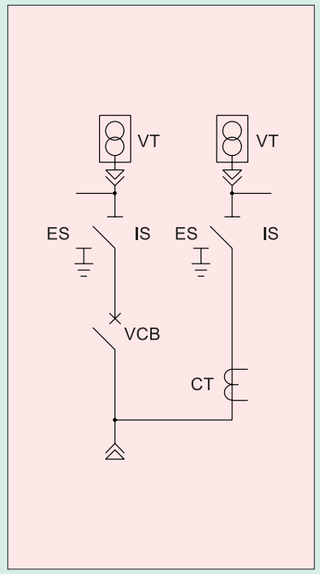
24kV
W=1300
H=2350
D=1300

36kV
W=1400
H=2450
D=1400

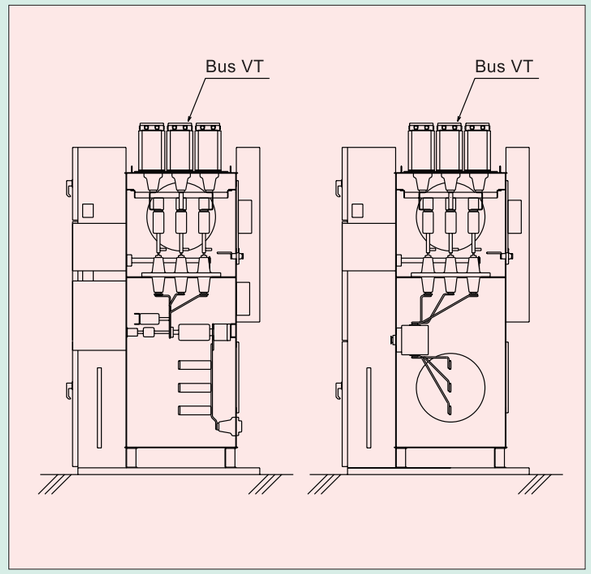
36kV, 31.5kA
W=1400
H=2650
D=1500

Bus section panel with CT&Bus VT.

Single Line Diagram



Cross-sectional view



24kV
W=1300
H=2550
D=1300

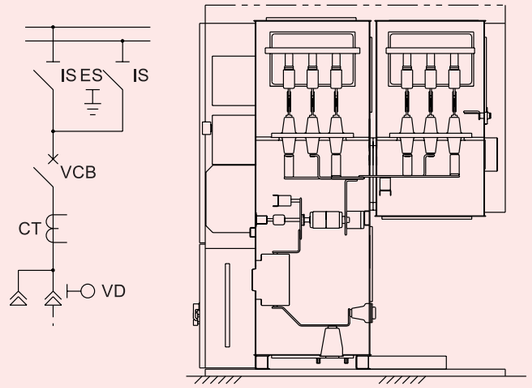
36kV
W=1400
H=2650
D=1400

36kV, 31.5kA
W=1400
H=3000
D=1500

Note: Dimensions and components may be changed according to the specifications.

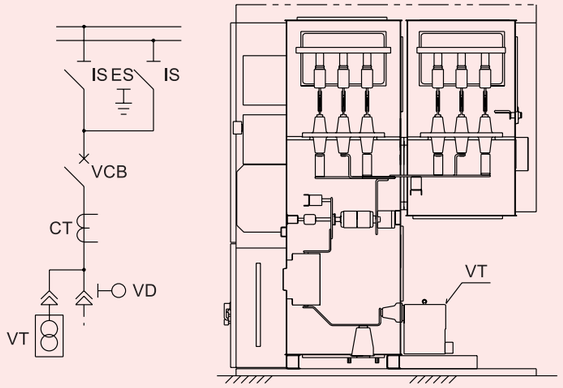
Basic Pattern (Double Busber System)

Feeder panel



36kV,
1200/2000A,
25kA
W=700
H=2650
D=2200

Feeder panel with VT

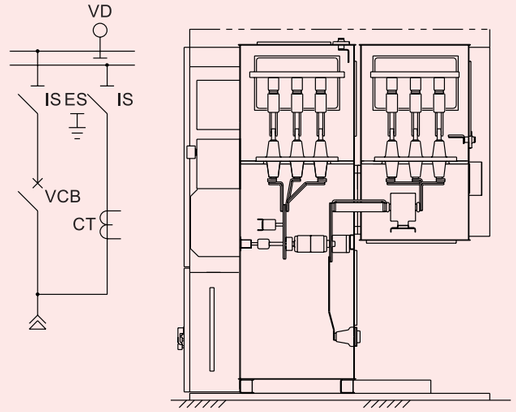


36kV,
1200/2000A,
25kA
W=700
H=2650
D=2200

Note: Dimensions and components may be changed
according to the specifications.

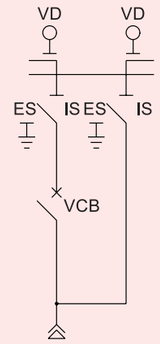
Basic Pattern (Double Busber System)

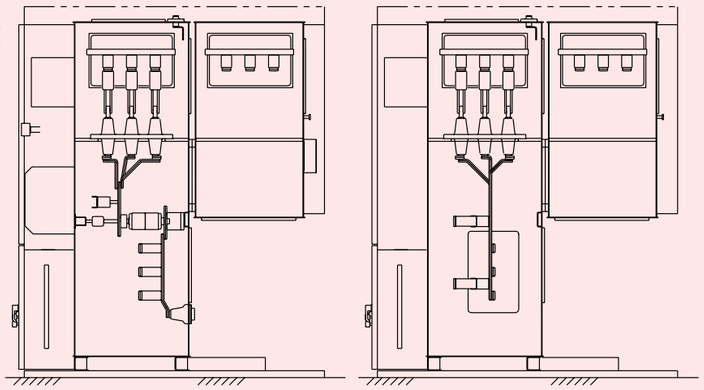
Bus coupler panel with CT



36kV,
1200/2000A,
25kA
W=700
H=2650
D=2200

Bus section panel





36kV,
1200/2000A,
25kA
W=1400
H=2650
D=2200

Note: Dimensions and components may be changed
according to the specifications.

Installation

The individual switchgear, which has been assembled, wired up and tested in factory are delivered to site.
Site works for installation require only the setting of the switchgear in the position, connections of inter-panel joints of busbars and cablings of both power and control cables.
The typical maintenance space, dimensions of cable pit and foundation are shown in Fig.2 and Fig.4 respectively.

Fig.1 Single Line Diagram

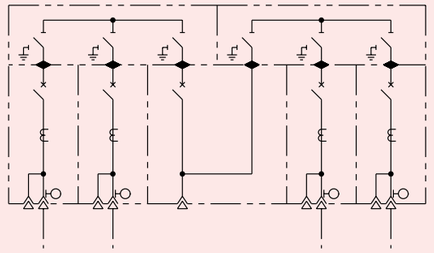


Fig.2 Maintenance Space

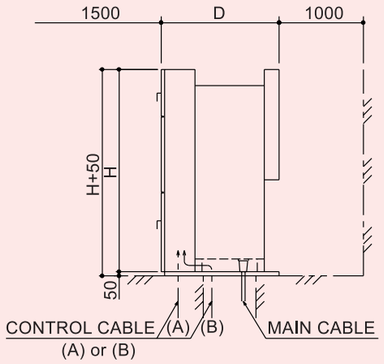


Fig.3 Switchgear Alignment

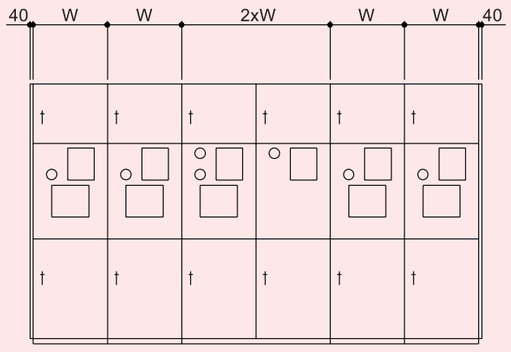
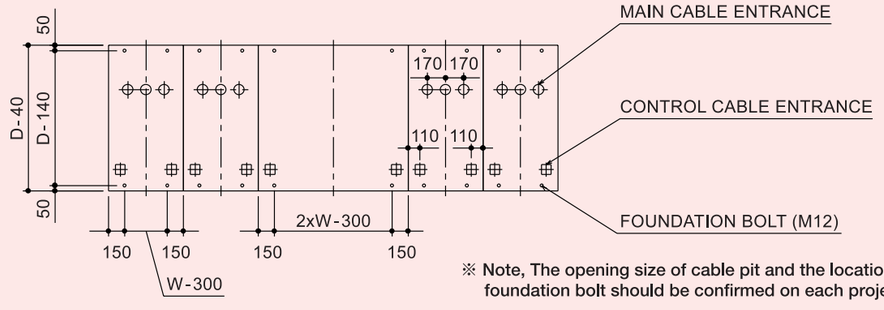


Fig.4 Foundation



※ Note, The opening size of cable pit and the location of foundation bolt should be confirmed on each project.

Cable Termination and Testing

BGA-24/36 employs high reliable cable termination system, which is of pre-molded plug-in type for various types of 24/36kV power cables.
The cable plug can be equipped with capacitive voltage diverter to connect with the neon voltage indication lamps for continuous voltage monitoring of main circuit. And also it allows phase sequence check by portable phase comparator after connection of cables. In addition, high voltage test plug is available to perform both primary injection test for CTs and high voltage test for cables connected to switchgear.
Typical arrangement of cable termination system and high voltage test plug are shown in Fig. 5. The following tools/accessories are optionally available to the cable termination system.

1. High voltage test plug
   for primary injection test and high voltage test
2. Protection cap
   for protecting withdrawn cable connectors against damage and dirt
3. Blind cap
   for protection against electric-shock hazard for live cable connector
4. Dummy plug
   for sealing and voltage-proof closing of plug-in socket
5. Phase comparator
   for phase sequence check
6. 3-phase earthing and short-circuit device
   for earthing and short-circuit of cable circuit of switchgear

The earthing of main busber and line side shall be performed as shown as in Fig.6.

Fig.5 HV test plug

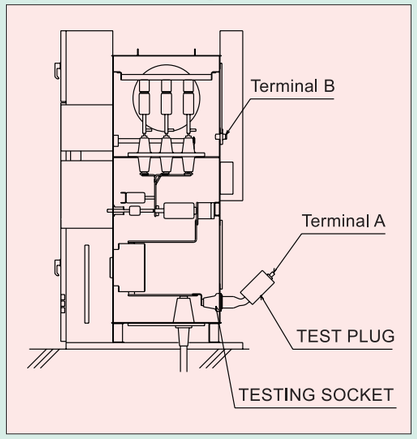
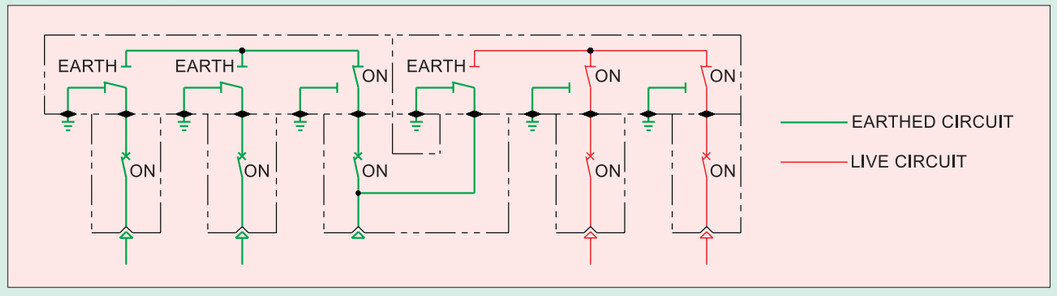


Fig.6 Earthing



Ancillary Equipment

BGA-24/36 provides the following ancillary equipment.

1. Mechanical indicators
   a. Operating counter of circuit breaker
   b. Spring, "Charged-Discharged"
   c. Circuit breaker "ON"
   d. Circuit breaker "OFF"
   e. 3-position isolator "ON"
   f. 3-position isolator "OFF"
   g. 3-position isolator "Ready to Earth"
2. Padlocking facilities (Option)
   a. Front door of LV compartment
   b. Maunal "ON" and "OFF" push button switches of circuit breaker
   c. Inlet for manual operating handle of 3-position isolator