24kV/36kV Metal-Enclosed SF6 Gas Insulated Switchgear

MEIDEN
Quality connecting the next

HICLAD 20GB/HICLAD 30GB

Compact, reliable, and economic for medium-voltage applications

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.
SF_6 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 SF_6 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.
Enhancement of reliability by 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.
SF_6 gas is not polluted by arc because of employing VCB.
(SF_6 gas is used only as insulation medium.)

24kV/36kV

Technical Specification

Technical data

Table 1 Switchgear

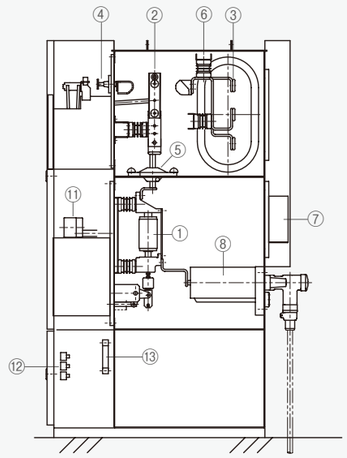
Switchgear model		HICLAD 20GB		HICLAD 30GB
Switchgear type		NBG-24		BGB-36
Applicable standards		IEC62271-200		
Clasification of switchgear		SF6-insulated metal-enclosed		
Service condition		● Altitude ＜ 1000m	● Ambient temperature Max. 40℃, Min. -5℃ 24h. average ＜ 35℃	● Relative humidity 24h.average ＜ 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 × 50 μs impulse (kV peak)	125		170
Rated short-time withstand current (kA-s)		25-3		31.5-3
Degree of protection	HV compartment	IP65		
	LV compartment	IP40		
Gas pressure	Rated pressure (MPa)	0.05		0.08
	Alarm pressure (MPa)	0.02		0.06
Operation of 3-position isolator		Motorized / Manual		
Auxiliary voltage	Control circuit (V)	DC 30, 110, 125, 220		
	Motor circuit (V)	AC 220, 230, 240 / DC 110, 125		

Table 2 Vacuum Circuit-Breaker (VCB)

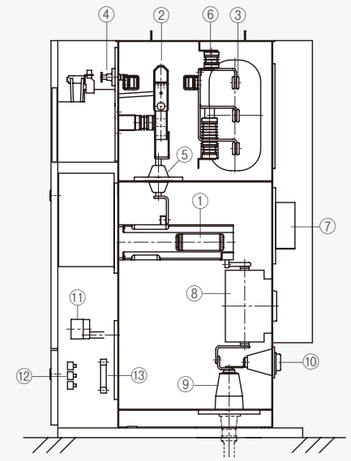
VCB model		NVG-22	VGB-33
Applicable standards		IEC62271-100	
Rated voltage (kV)		24	36
Rated current (A)		1250, 2000	1250, 2000, 2500
Rated frequency (Hz)		50/60	
Insulation level	1 min power frequency (kV rms)	50	70
	1.2 × 50 μs impulse (kV peak)	125	170
Rated short-circuit breaking current (kA)		25	31.5
Rated short-circuit making current (kA peak)		63	82
Rated short-time withstand current (kA-s)		25-3	31.5-3
Operating duty*		O-0.3sec.-CO-3min-CO	
Rated closing time (s)		0.05	
Rated opening time (s)		0.05	
Rated break time (s)		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	

* : Other duties, O-0.3sec.-CO-15sec.-CO, O-0.3sec.-CO-1min-CO-1min-CO are also available.

Construction



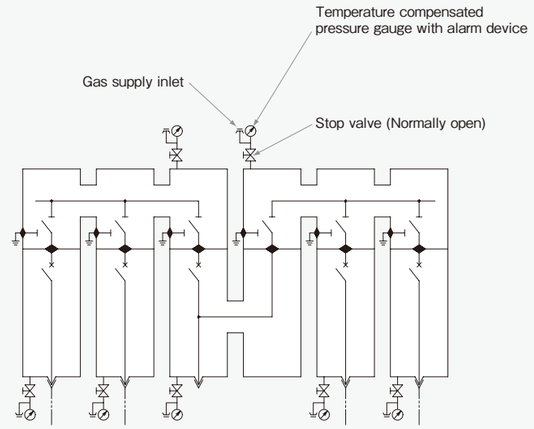
20GB
(Rear Cable Connection Type)



30GB
(Bottom Cable Connection Type)

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

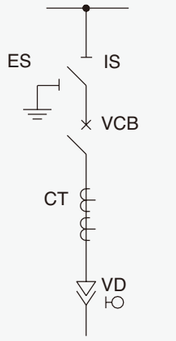
Gas monitoring system



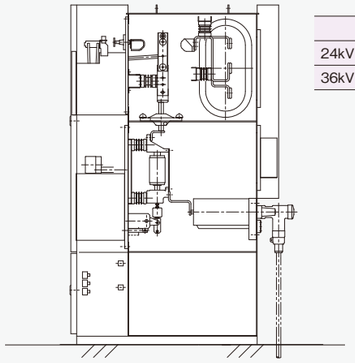
Basic Pattern (Rear Cable Connection Type)

Feeder panel

Single line diagram



Cross-sectional view

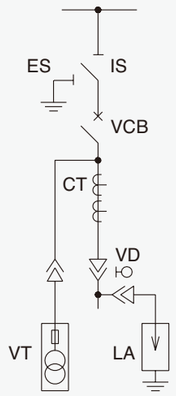


	W	H	D
24kV (1250A)	650	2050	1350
36kV (1250A)	650	2100	1400

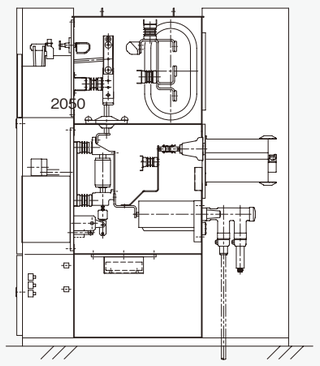
Unit : mm

Feeder panel with VT

Single line diagram



Cross-sectional view



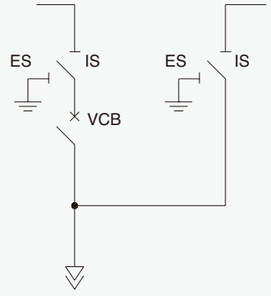
	W	H	D
24kV (1250A)	650	2050	1650
36kV (1250A)	700	2100	1850

Unit : mm

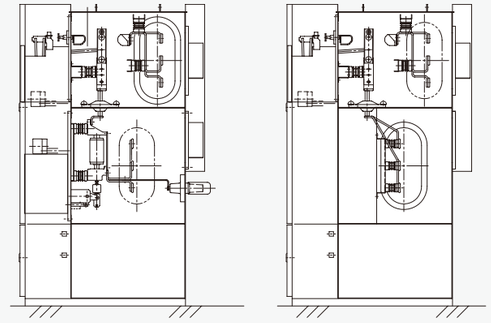
Note: Dimensions and components may be changed according to the specifications.

Bus section panel

Single line diagram



Cross-sectional view

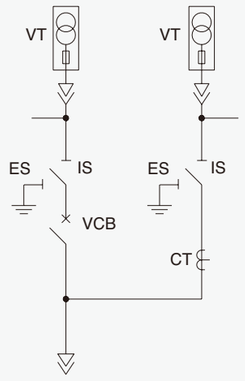


	W	H	D
24kV (1250A)	1300	2050	1350
36kV (1250A)	1300	2100	1400

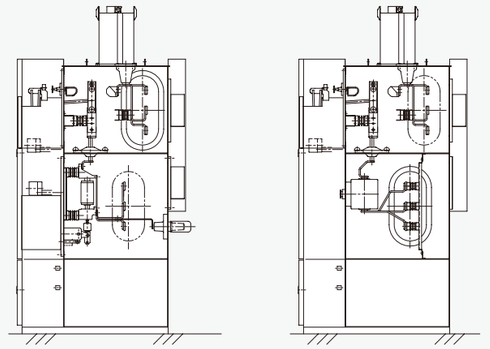
Unit : mm

Bus section panel with CT & Bus VT

Single line diagram



Cross-sectional view



	W	H	D
24kV (1250A)	1300	2450	1350
36kV (1250A)	1300	2700	1400

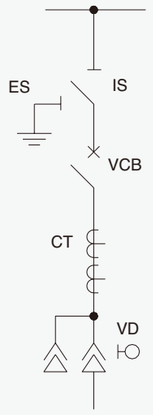
Unit : mm

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

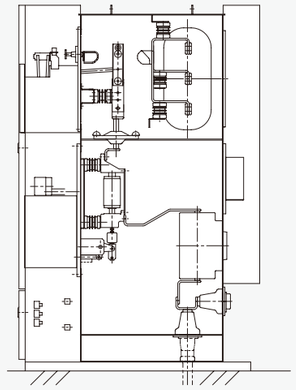
Basic Pattern (Bottom Cable Connection Type)

Feeder panel

Single line diagram



Cross-sectional view

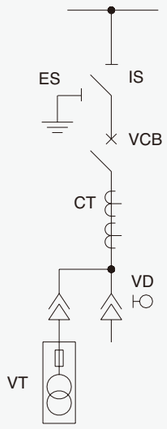


	W	H	D
24kV (1250A)	650	2050	1350
24kV (2000A)	700	2050	1350
36kV (1250A)	650	2100	1350
36kV (2000A)	700	2100	1350
36kV (2500A)	800	2100	1350

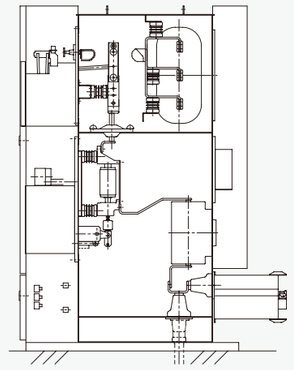
Unit : mm

Feeder panel with VT

Single line diagram



Cross-sectional view



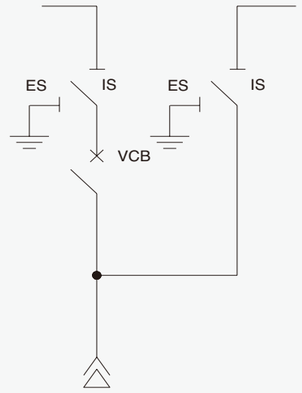
	W	H	D
24kV (1250A)	650	2050	1650
24kV (2000A)	700	2050	1650
36kV (1250A)	650	2100	1850
36kV (2000A)	700	2100	1850
36kV (2500A)	800	2100	1850

Unit : mm

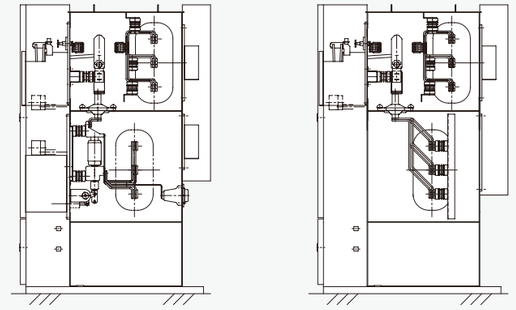
Note: Dimensions and components may be changed according to the specifications.

Bus section panel

Single line diagram



Cross-sectional view

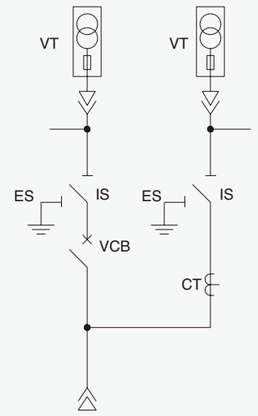


	W	H	D
24kV (1250A)	1300	2050	1350
24kV (2000A)	1400	2050	1350
36kV (1250A)	1300	2100	1350
36kV (2000A)	1400	2100	1350
36kV (2500A)	1600	2100	1350

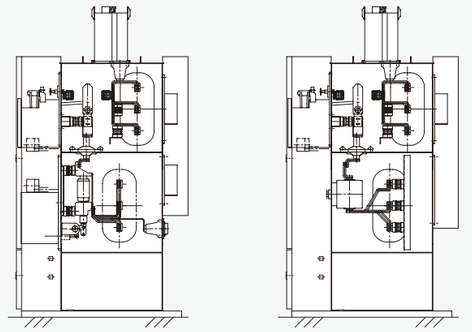
Unit : mm

Bus section panel with CT & Bus VT

Single line diagram



Cross-sectional view



	W	H	D
24kV (1250A)	1300	2450	1350
24kV (2000A)	1400	2450	1350
36kV (1250A)	1300	2700	1350
36kV (2000A)	1400	2700	1350
36kV (2500A)	1600	2700	1350

Unit : mm

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

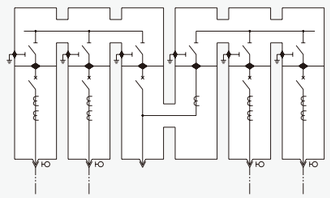


Fig.2 Maintenance Space

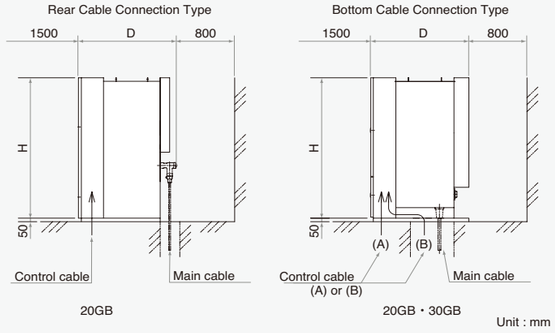


Fig.3 Switchgear Alignment

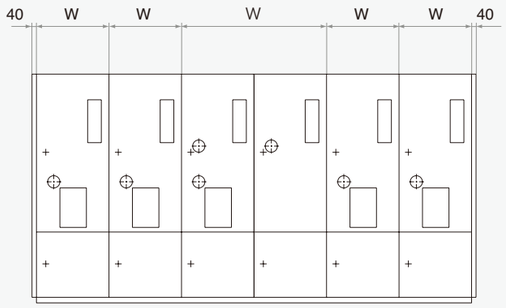
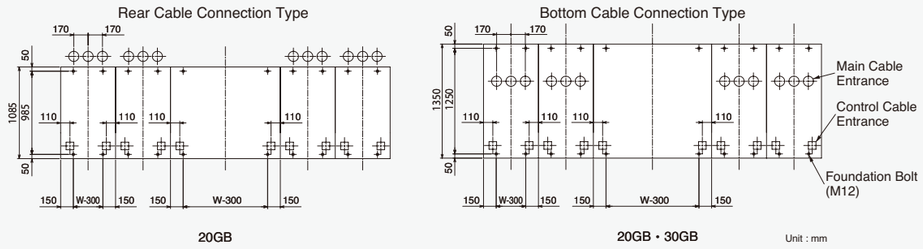


Fig.4 Foundation



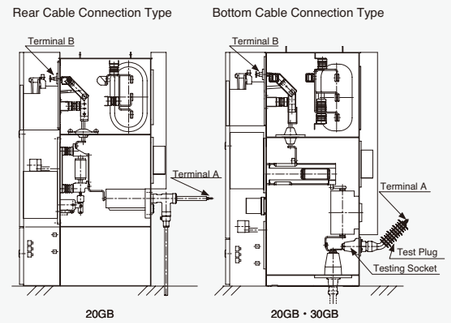
Note: The opening size of cable pit and the location of foundation bolt should be confirmed on each project.

Cable Termination and Testing

HICLAD 20GB/30GB 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.

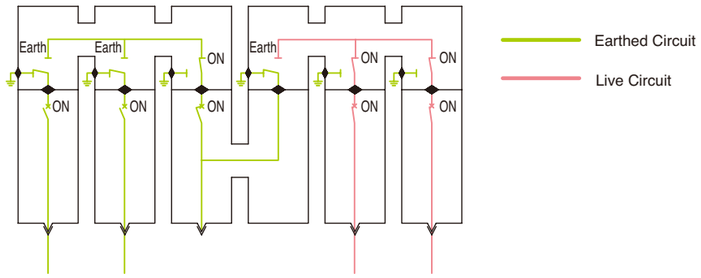
1. High voltage test plug / adapter
   for primary injection test and high voltage test
2. Protection cap
   for protecting withdrawn cable connectors against damage and dirt
3. Blind cap
   for protection against electric-shock hazard
   for live cable connector
4. Dummy plug / Sealing end
   for sealing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

Fig.5 HV Test Plug



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

Fig.6 Earthing



Ancillary Equipment

HICLAD 20GB/30GB 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. Manual “ON” and “OFF” push button switches of circuit breaker
c. Inlet for manual operating handle of 3-position isolator

MEIDEN

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MEIDEN TECHNICAL CENTER NORTH AMERICA LLC

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