HG-SERIES

Vacuum Circuit Breakers

LV & MV Circuit Breakers

HYUNDAI
HEAVY INDUSTRIES

VACUUM CIRCUIT BREAKERS

CONTENTS

HG-SERIES

Globalization of Technology

HG-SERIES

Vacuum Circuit Breakers

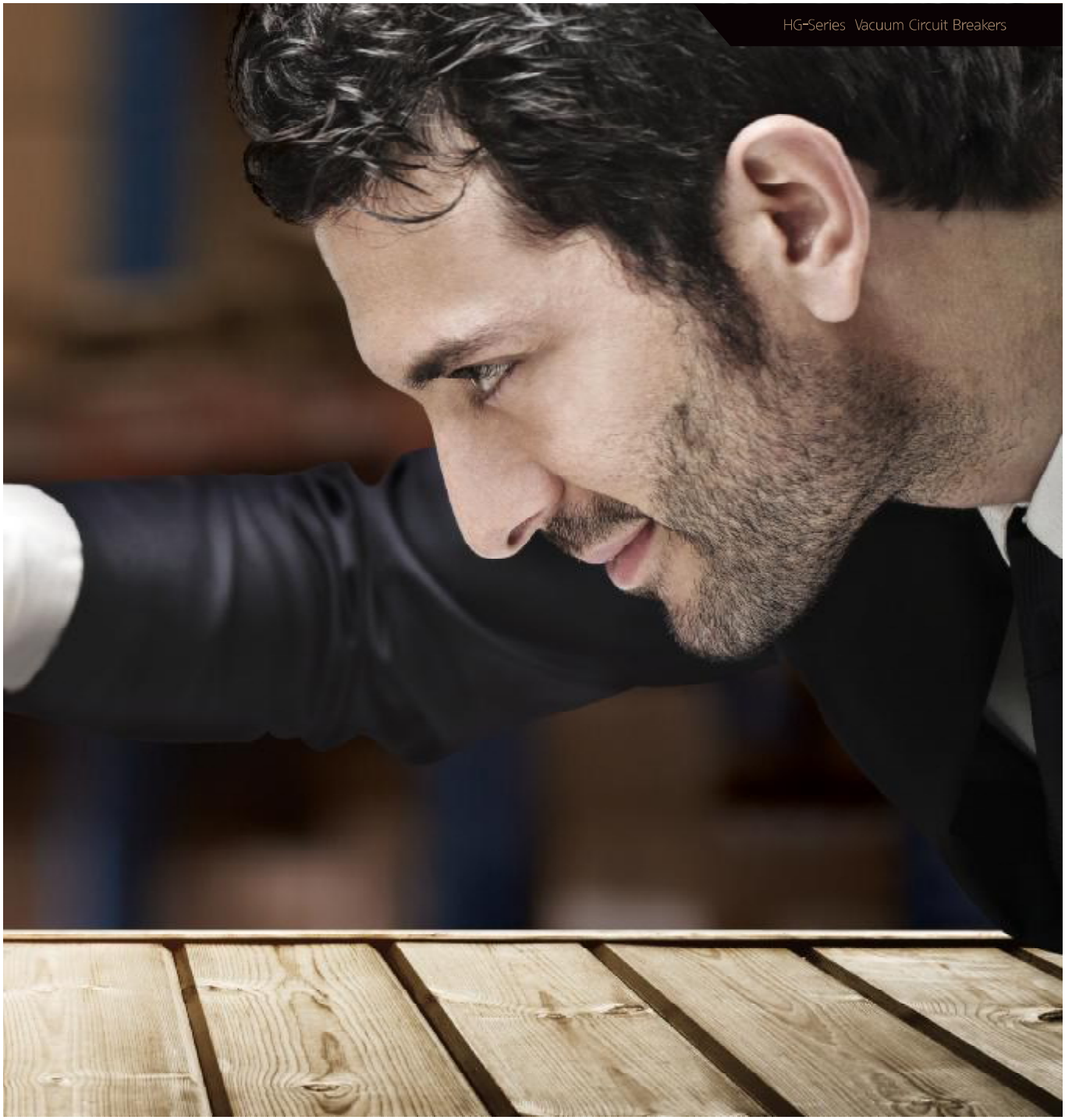
Various Selectivities and Improved User Conveniences

A Variety of Installation

HG-Series joins the electric power system with world-class technologies.

Fixed Type

Fixed type cannot be drawn-in and out from the switchgear.



Draw-Out Type: ES/FS Cradle

ES cradle is the basic structure type without safety shutter and bushing. FS cradle is equipped with the safety shutter.

Draw-Out Type: GS Cradle

GS type is an optimized cradle with mold bushing and safety shutter.

* GE Cradle: GS cradle with earthing switch

Draw-Out Type: MS Cradle

MS cradle is the compartment type with door and available for all GS type cradle.

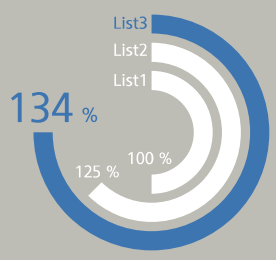
* ME Cradle: MS cradle with earthing switch

Certified Reliability and Stability by International Standard IEC 62271-100

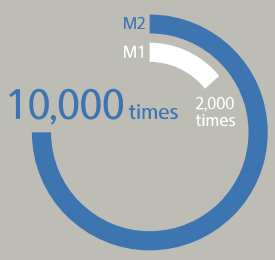
HG-SERIES

Standard and Certification

E2 (List 3) | Arc Energy



M2 | Mechanical Endurance



C2 | T60: Duty 1 Time, O: 24 Times
CO: No Restriking during 24 Times

CERTIFICATE

KERI

HG-Series VCB's reliability and breaking capacity is verified by acquiring severe type test class E2 (List 3), M2, C2 in IEC 62271-100 (2012).

Compact Design and Improved Electrical Delivery Capacity by Optimized Structure

HG-SERIES

Optimized the Natural Cooling Structure

HG-Series realized excellent insulation and temperature characteristics by applying a natural cooling structure consisting of insulation frame cover.

Simple Structure

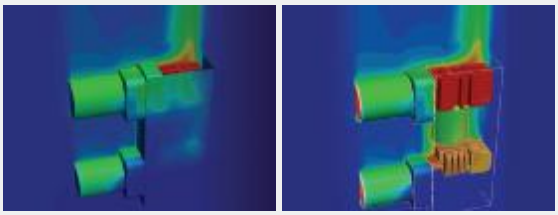
Optimized design of pole part allows maximized efficiency and convenient maintenance.

Maximized Cooling Effect by Natural Cooling Structure

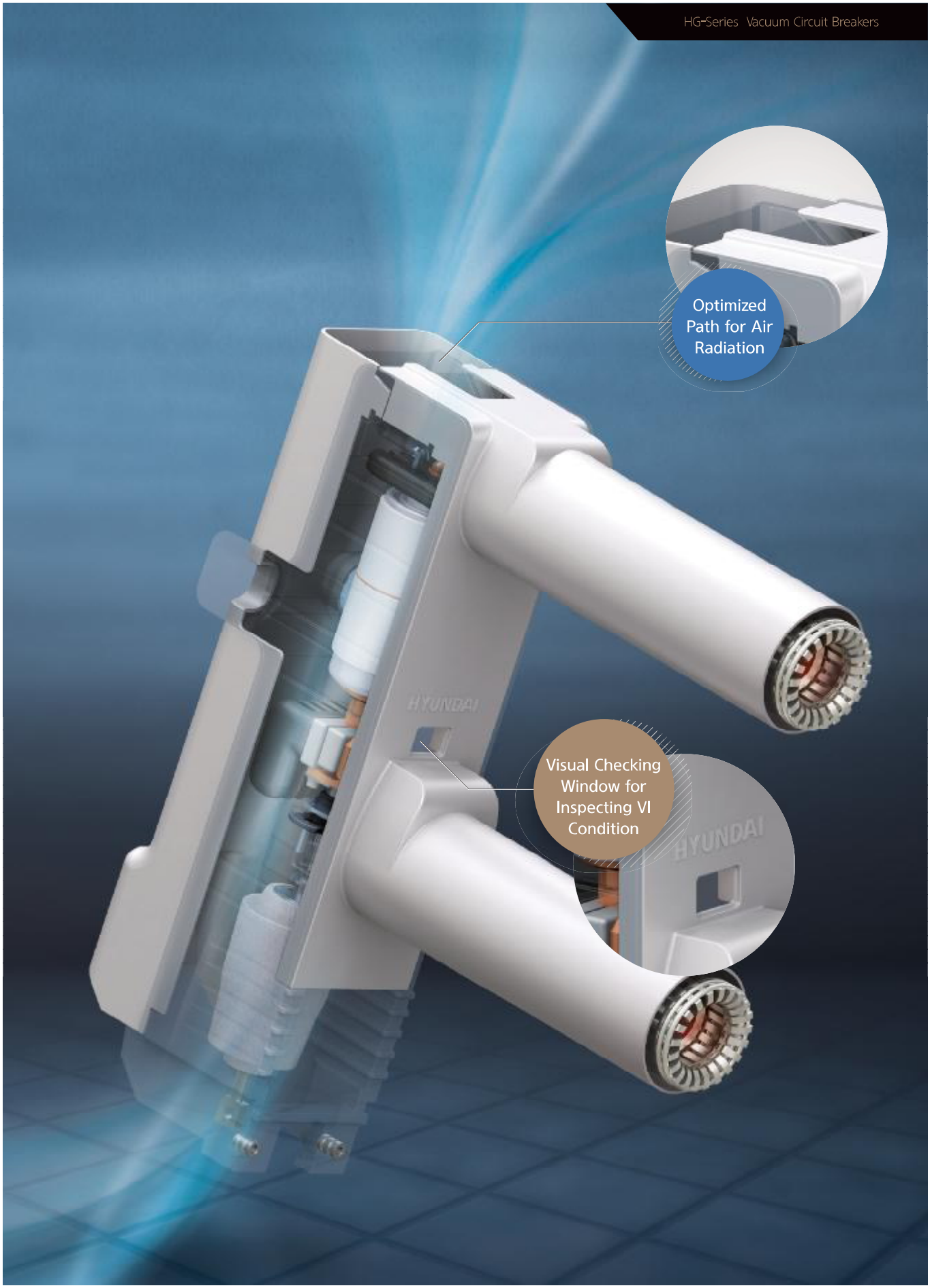
Natural cooling structure allows maximized path for air to move.

Maintenance Free

VI condition can be inspected easily from outside of pole part.



Temperature rise limit by radiant heat effect.


Optimized
Path for Air
Radiation
Visual Checking
Window for
Inspecting VI
Condition
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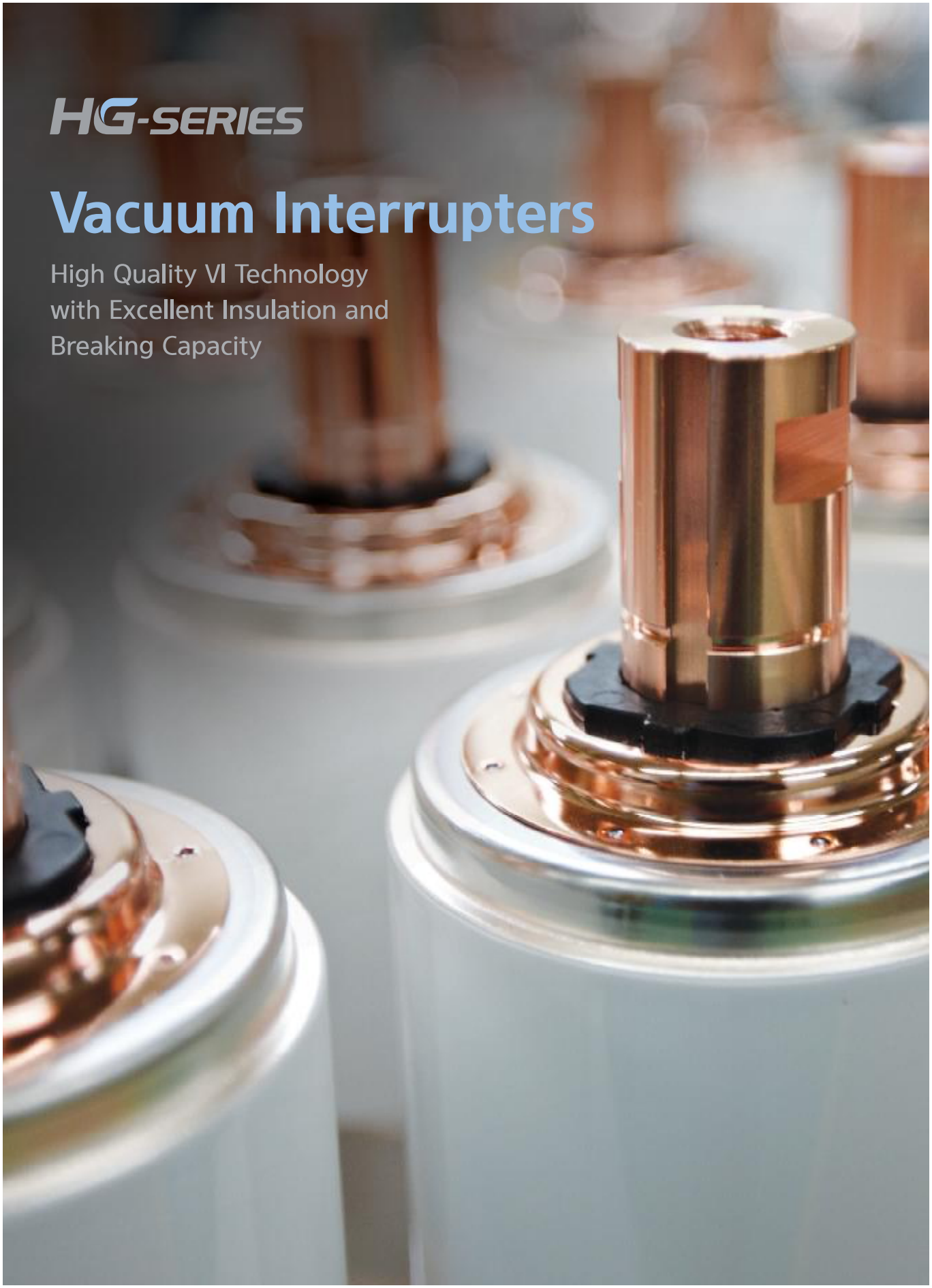
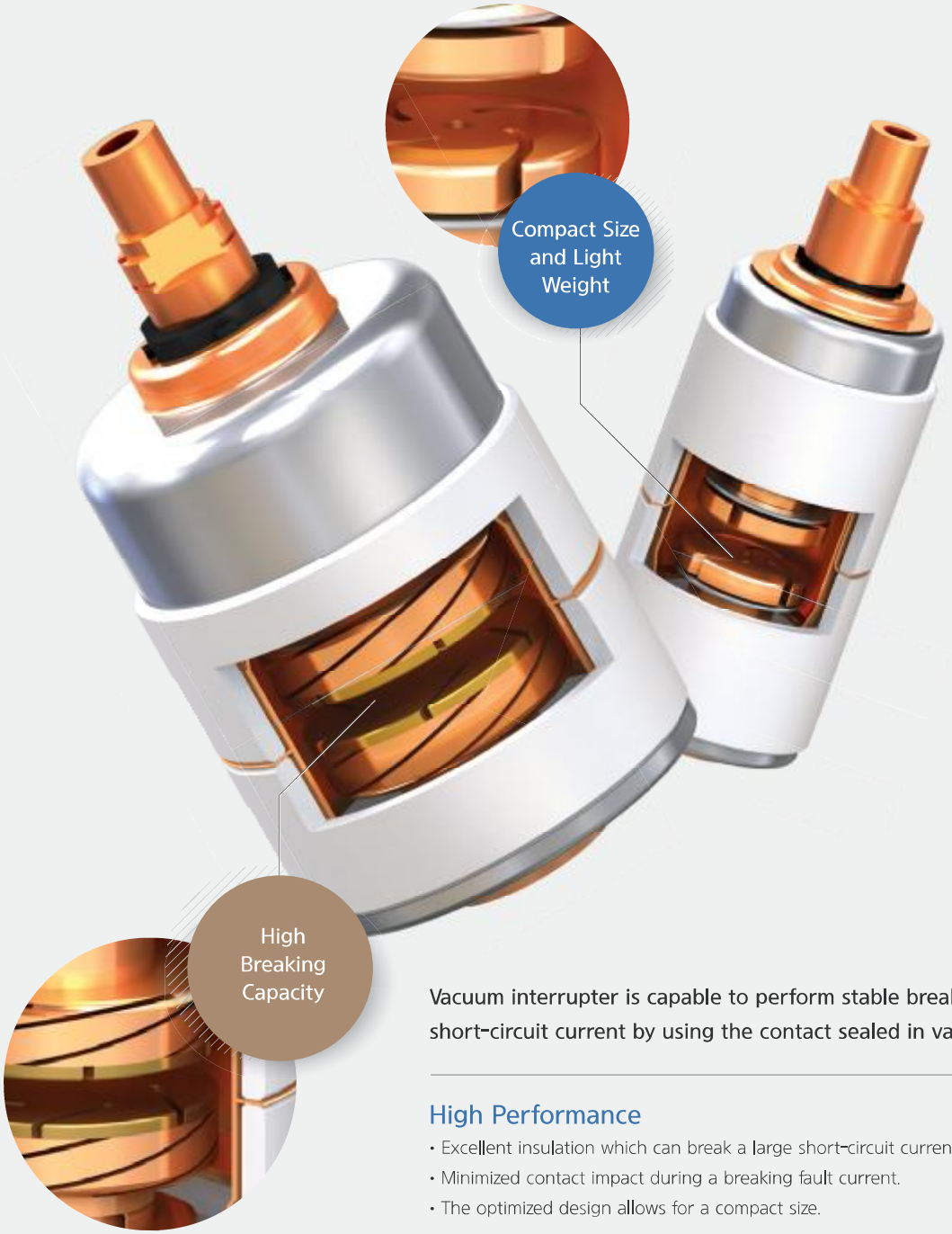

HG-SERIES
Vacuum Interrupters
High Quality VI Technology
with Excellent Insulation and
Breaking Capacity



Vacuum interrupter is capable to perform stable breaking short-circuit current by using the contact sealed in vacuum.

High Performance

- Excellent insulation which can break a large short-circuit current.
- Minimized contact impact during a breaking fault current.
- The optimized design allows for a compact size.

Environment-Friendly

- It is designed environment-friendly structure by welding in the high vacuum condition.

Maintenance Free

- Maintaining low leakage rates after long use.
- Maintaining a high density vacuum status after long use.

Suitable for IEC International Standards

General Information

Vacuum Circuit Breaker (VCB) and Vacuum Interrupter (VI)

- Vacuum circuit breaker performs switching circuit and quenching arc occurred during breaking fault current, in vacuum status.
- Hyundai Heavy Industries (HHI) vacuum circuit breakers have long life cycle with minimized leakage rate and high reliability by adapting vacuum interrupter based on technology know-hows for 25 years.
- HG-Series VCB is capable of protecting and controlling the circuit or transformer by applying 7.2 - 25.8 kV switchgear. Also, HG-Series VCB has dielectric strength, 1.3 times of rated voltage by adopting insulation type of creepage distance expansion. Especially, it can be realized natural cooling structure by optimizing path of current delivery.

Vacuum Circuit Breaker (VCB)

Vacuum Interrupter (VI)

Appilcation Standard and Certification

HG-Series vacuum circuit breaker is certified by IEC 62271-100 (2012) and laboratory which is a member of STL.

Appilcation Standard

IEC 62271-1 (2008)
High-voltage switchgear and controlgear
- Part 1: Common specifications

IEC 62271-100 (2012)
High-voltage switchgear and controlgear
- Part 2: Alternating-current circuit breaker

Certification

ACCREDIA
Certification published by italian test organization.

STL
Test certification only published by STL member with STL guide.

Electrical Endurance: E2 (List 3)

E2 grade is the highest electrical endurance which is provided by IEC 62271-100 and there are three operating sequence as List 1, List 2, List 3.
List 3 is added in 2008. T10, T30 test decrease and T60 increases for high breaking capacity.
HG-Series VCB is certified as E2 (List 3).

Mechanical Endurance: M2

IEC standard designates mechanical endurance because performance and quality level shall be chosen by customer.
HG-Series VCB is certified as M2 grade.

M1

- Previous test (characteristic, dielectric, resistance)
- Verification test after 2,000 times (characteristic, dielectric, resistance)

M2

- Previous test (characteristic, dielectric, resistance)
- Verification test after 2,000 times of operating sequences (characteristic, dielectric, resistance)
- Verification test after 10,000 times of operating sequences (characteristic, dielectric, resistance)

Capacitive Current Switching: C2

When shutting off charging current, possibility of restrike is increased due to abnormal voltage between contacts.
If restriking happens, there is a possibility of insulation breakdown because of high surge voltage.
Therefore, capacitive current test is classified by C1 and C2.
HG-Series VCB is certified as C2 grade.

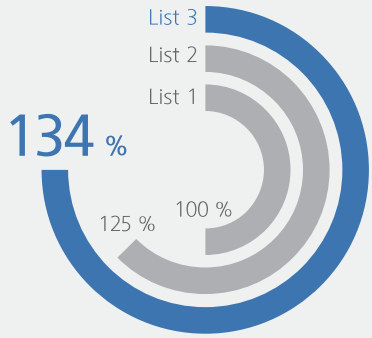
C1

Allows 2 restrikes during every 24 times of O and CO

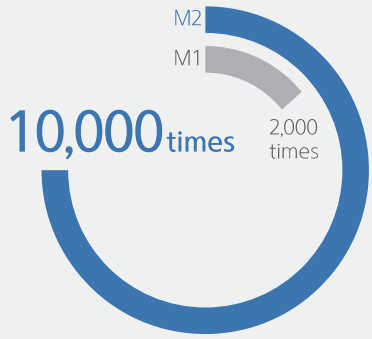
C2

T60 duty 1 time, no restrike during every 24 times of O and CO

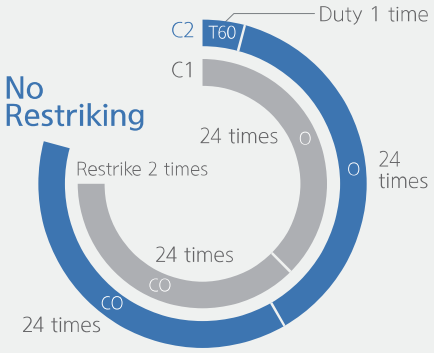
E2 (List 3) | Arc Energy



M2 | Mechanical Endurance



C2 | T60: Duty 1 Time, O: 24 Times CO: No Restriking during 24 Times



Types

7.2 kV

Model Name			HGV114□ [1]			HGV115□					HGV116□				
Rated voltage			7.2 kV			7.2 kV					7.2 kV				
Rated short-circuit breaking current			25 kA			31.5 kA					40 kA				
Breaking capacity			312 MVA			393 MVA					499 MVA				
Rated current			630 A	1,250 A	2,000 A	1,250 A	2,000 A	2,500 A	3,150 A	4,000 A	1,250 A	2,000 A	2,500 A	3,150 A	4,000 A
Phase distance x Terminal distance (mm)		150 x 205	● [2]	●											
		150 x 210	■	■											
		210 x 310	△	△	△	△	△				△	△			
		275 x 310						◈	◈	◈			◈	◈	◈
Installation	Fixed type	XA	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈
	Draw out type	ES	■	■											
		FS	■	■											
		GS, GE	● △	● △	△	△	△	◈	◈	◈	△	△	◈	◈	◈
		MS, ME	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈

※ 1) □ : Rated current (1: 630 A / 2: 1,250 A / 4: 2,000 A / 6: 2,500 A / 7: 3,150 A / 8: 4,000 A)
2) For example: You can choose ES or FS in case of the HGV1141, when phase distance x terminal distance is 150 x 210 mm.
(● : 150 x 205, ■ : 150 x 210, △ : 210 x 310, ◈ : 275 x 310)

12 kV

Model Name			HGV214□ [1]			HGV215□					HGV216□				
Rated voltage			12 kV			12 kV					12 kV				
Rated short-circuit breaking current			25 kA			31.5 kA					40 kA				
Breaking capacity			520 MVA			655 MVA					831 MVA				
Rated current			630 A	1,250 A	2,000 A	1,250 A	2,000 A	2,500 A	3,150 A	4,000 A	1,250 A	2,000 A	2,500 A	3,150 A	4,000 A
Phase distance x Terminal distance (mm)		150 x 205	●	●											
		150 x 210	■	■											
		210 x 310	△	△	△	△	△				△	△			
		275 x 310						◈	◈	◈			◈	◈	◈
Installation	Fixed type	XA	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈
	Draw out type	ES	■	■											
		FS	■	■											
		GS, GE	● △	● △	△	△	△	◈	◈	◈	△	△	◈	◈	◈
		MS, ME	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈

17.5 kV

Model Name			HGV314□ [1]			HGV315□					HGV316□				
Rated voltage			17.5 kV			17.5 kV					17.5 kV				
Rated short-circuit breaking current			25 kA			31.5 kA					40 kA				
Breaking capacity			758 MVA			955 MVA					1,212 MVA				
Rated current			630 A	1,250 A	2,000 A	1,250 A	2,000 A	2,500 A	3,150 A	4,000 A	1,250 A	2,000 A	2,500 A	3,150 A	4,000 A
Phase distance x Terminal distance (mm)		150 x 205	●	●											
		150 x 210	■	■											
		210 x 310	△	△	△	△	△				△	△			
		275 x 310						◈	◈	◈			◈	◈	◈
Installation	Fixed type	XA	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈
	Draw out type	ES	■	■											
		FS	■	■											
		GS, GE	● △	● △	△	△	△	◈	◈	◈	△	△	◈	◈	◈
		MS, ME	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈

24 / 25.8 kV

Model Name			HGV611□ [1]			HGV614□		
Rated voltage			24 kV, 25.8 kV			24 kV, 25.8 kV		
Rated short-circuit breaking current			12.5 kA			25 kA		
Breaking capacity			520 MVA			1,039 MVA		
Rated current			630 A	1,250 A	2,000 A	630 A	1,250 A	2,000 A
Phase distance x Terminal distance (mm)		150 x 205						
		150 x 210						
		210 x 310	△	△	△	△	△	△
		275 x 310						
Installation	Fixed type	XA	△	△		△	△	△
	Draw out type	ES	△	△		△	△	△
		FS	△	△		△	△	△
		GS, GE	△	△	△	△	△	△
		MS, ME	△	△	△	△	△	△

Structure

External Structure

- All components are modularized.
- Power is supplied to VI. Closing spring can be charged by electrical or manual operation until link is stopped at the latch for preparation of closing. For reference, mechanism is operated by power from closing spring.
- VCB is closed by a manual closing button or an electric closing signal. VI contact is pressured by releasing the closing spring, and at the same time, the trip spring will be ready for trip operation.
  Also, discharged closing spring is ready for next operation after it is charged by a motor.
  HG-Series VCB realizes synchronization, rapid load transmission and rapid auto-reclosing.

Slide-In Module

1. Connection Part
2. Bushing Cover
3. Shutter
4. Bushing
5. Cradle
6. Pole Part
7. Control Jack
8. VCB
9. Truck (Draw-In and Out Device)

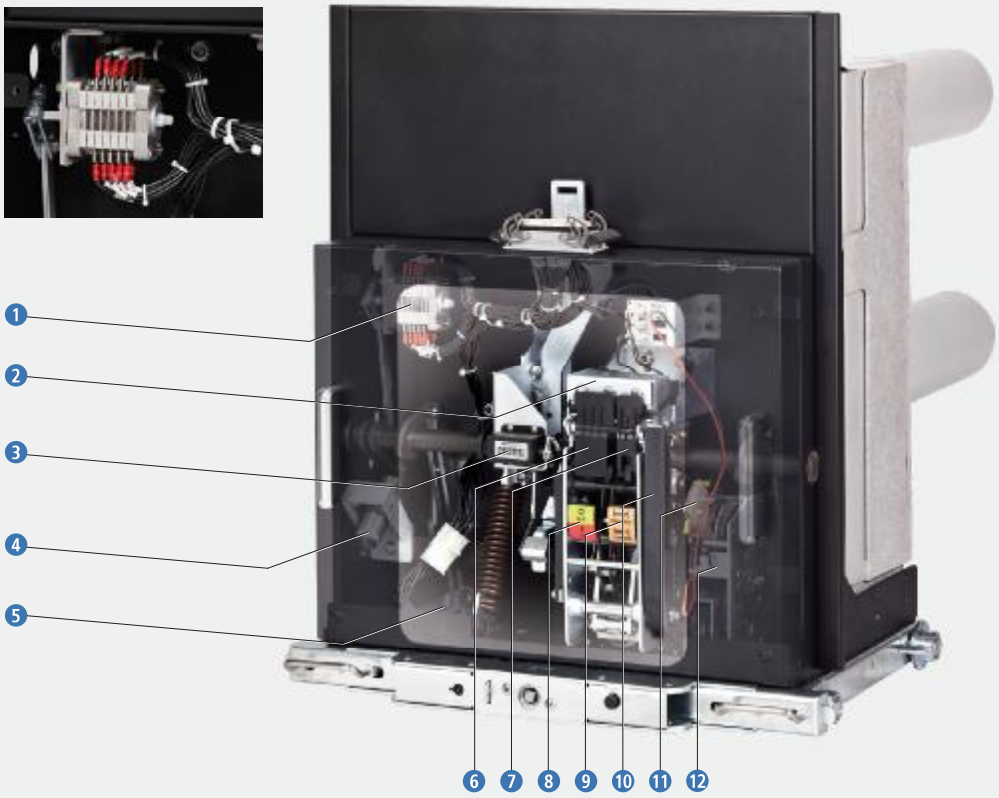
Internal Structure

Trip Free Mechanism

- In case a trip signal occurs during operation, the trip signal is released without delivering driving force to the pole part. Thus, the trip position is kept by the VCB without VI operation.
- This function is included in the internal part of mechanism.

Anti-Pumping Mechanism

- HG-Series VCB has stable and efficient anti-pumping function.
- This function is included in the internal part of mechanism.

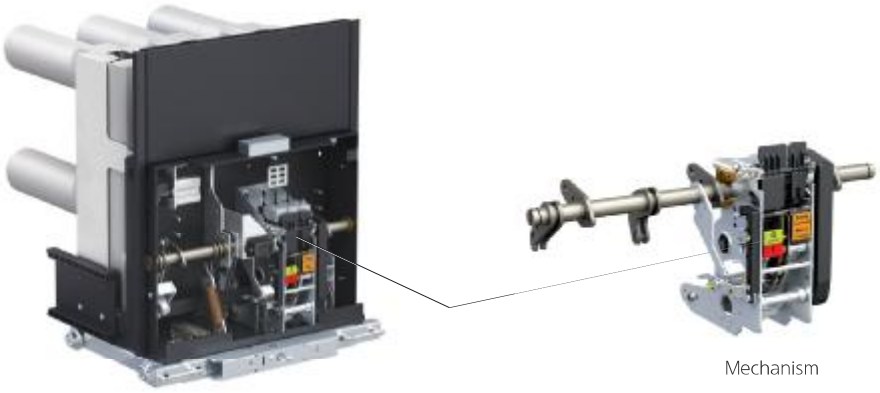


Circuit Breaker Operating Mechanism

1. Auxiliary Switch
2. Closing Coil, Trip Coil
3. Counter
4. Oil Dash Pot
5. Position Switch
6. Manual Trip Button
7. Manual Closing Button
8. ON/OFF Indicator
9. Closing Spring Charged Indicator
10. Manual Charging Handle
11. Spring Charged Limit Swich
12. Charging Motor

Operating Mechanism

On/Off Structure and Characteristic



Mechanism

Charging

When the manual handle or motor is operated, the latching device prepares the VCB for closing operation.

Closing

To input close signal, the VI contact input rises to the appropriate pressure by releasing the closing spring.

Recharging

After VCB is closed, the closing spring can be recharged by the motor or manual handle. During this process, if control power is connected, the motor automatically recharges for rapid-auto reclosing.

Tripping

To input trip signal, the VI contact restores to the trip position by releasing contact pressure.

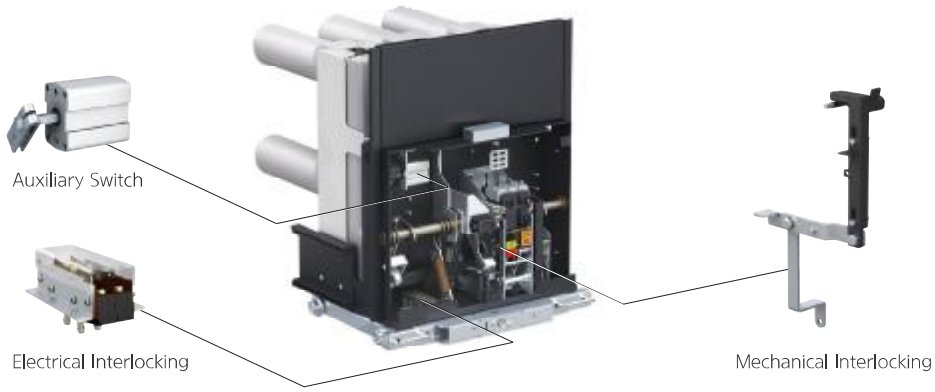
Interlocking

Mechanical Interlocking

In case of draw-out type VCB, it can only be inserted under the open handle position.
Also, it cannot be operated under service or test position (On/Off is not available).

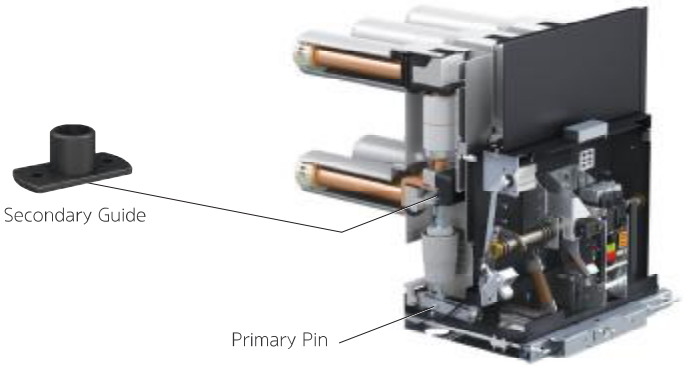
Electrical Interlocking

Auxiliary switch that shows VCB position can be used to operate interlock function in electrical circuit.
Interlocking makes it possible to prevent insertion of a disconnecting switch by supervision of on/off status of VCB contact.
Also, it blocks all operations of VCB when the disconnecting switch is in abnormal position.



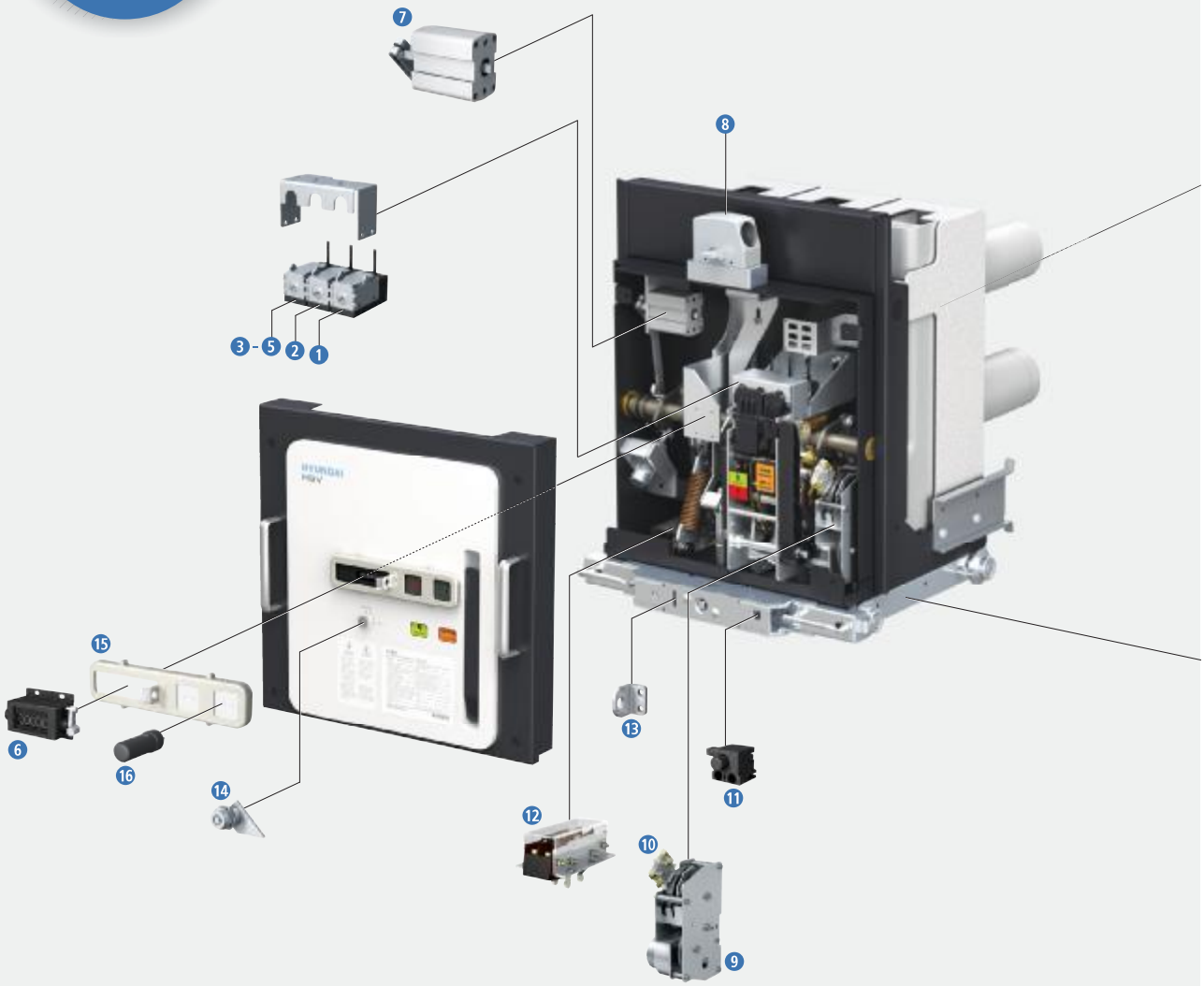
High Reliability of VI Operation

The special structure among insulated rod, pin, guide and VI realizes minimized movement of eccentricity and straightness of VI during on/off operation. Additionally, the chattering energy balance between closing spring and VI pressure spring is minimized.



Accessories

Body

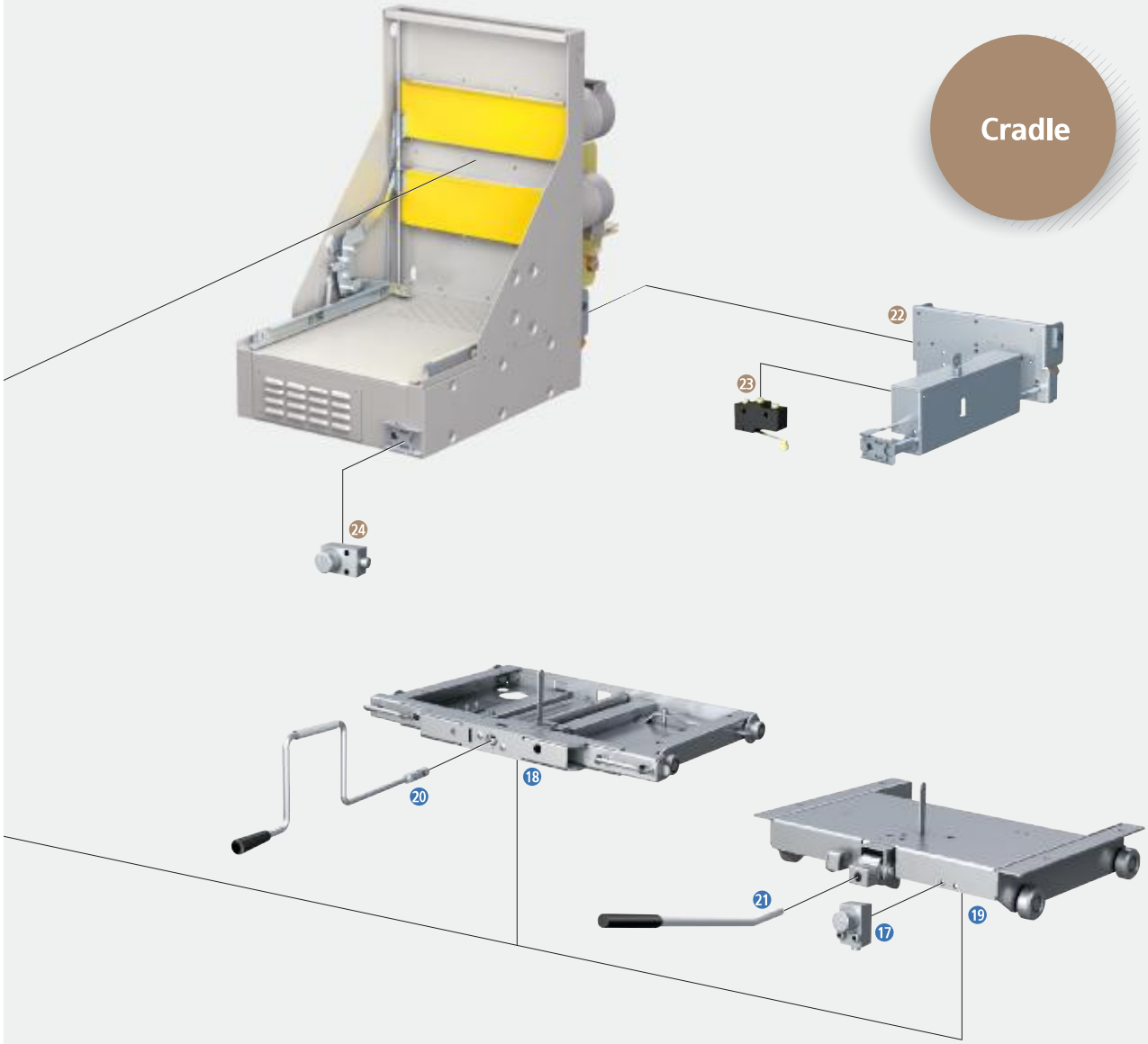


Accessories and Options

1 Close Coil	5 C.T Operated Release	9 Charging Motor
2 Trip Coil	6 Counter	10 Spring Charged Limit Switch
3 Secondary Trip Coil	7 Auxiliary Switch	11 Door Interlock
4 UVR (Under Voltage Release)	8 Jack Interlock	12 Position Switch

※ It cannot be available No. 3 4 5 at the same time.

Cradle



Accessories and Options

- 13 Position Pad (G/M)
- 14 Key Lock
- 15 Button Cover
- 16 Manual Operating Bar
- 17 Position Padlock (E/F)
- 18 Draw-In and Out Device (G/M)
- 19 Draw-In and Out Device (E/F)
- 20 Draw-In and Out Device (G/M)
- 21 Draw-In and Out Device (E/F)
- 22 Earthing Switch
- 23 Earthing Switch Monitoring Contact
- 24 Key Lock for Earthing Switch

Accessories

Draw-In and Out Handle

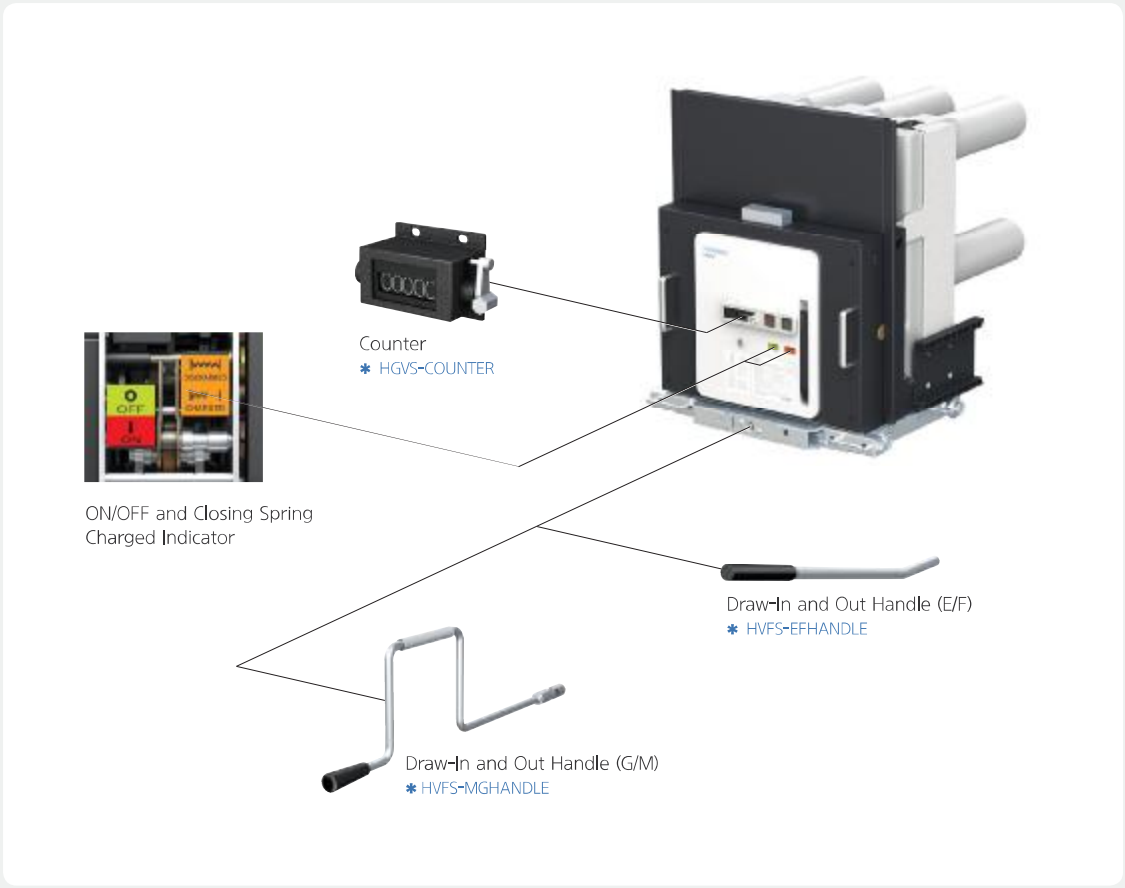
- This device is used to draw-in and out of the VCB.
- Only one type of handle is supplied according to the installation type
- It is a standard component with VCB.

Counter

- This device indicates the number of operations.
- Standard is five digits.

On/Off and Closing Spring Charged Indicator

- This device indicates the state of VCB position.
- Also, it indicates charging condition of closing spring.



※ ✱: Order code for purchase

Draw-In and Out Device

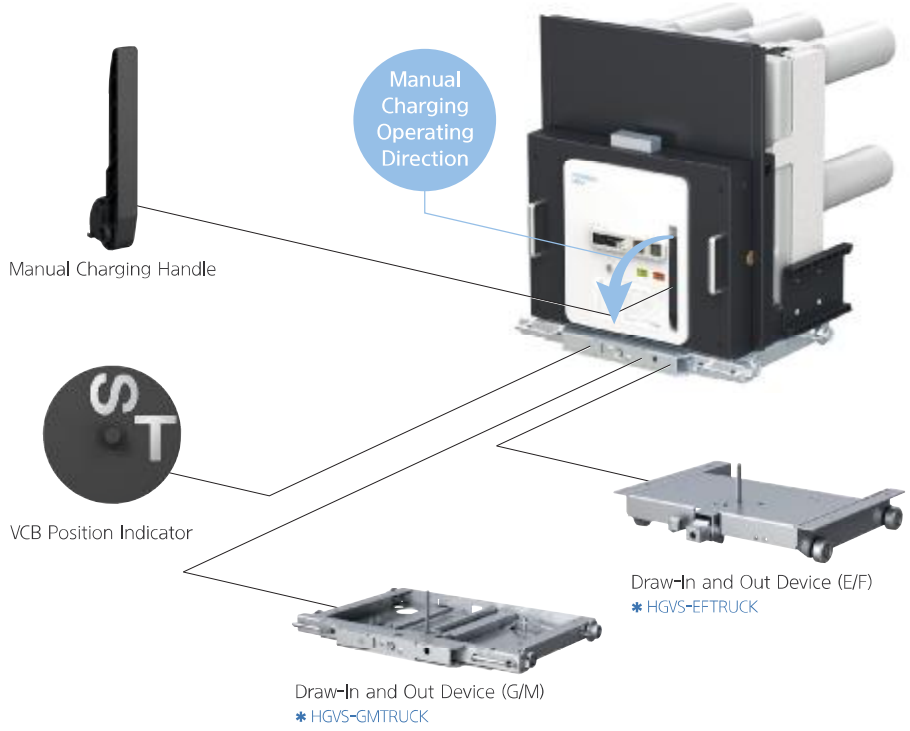
- This device is used in moving VCB to test or service position.
- There are two positions for VCB, test and service position, and this device is only applied for draw-out VCB type.
- Draw-in and out device is divided in two, according to the cradle type. (E, F: Latch type, G, M: Screw type)

Manual Charging Handle

- This device is the handle for charging close spring.
- It is a standard component of VCB.

VCB Position Indicator

- This device indicates the current position of VCB when operating draw-in and out.
- Only availble for G, M type



※ ✱ : Order code for purchase

Accessories

Trip Coil

- This device is the control coil to trip VCB from remote area by using the external voltage as below.
- A trip coil is included in the VCB.

Rating

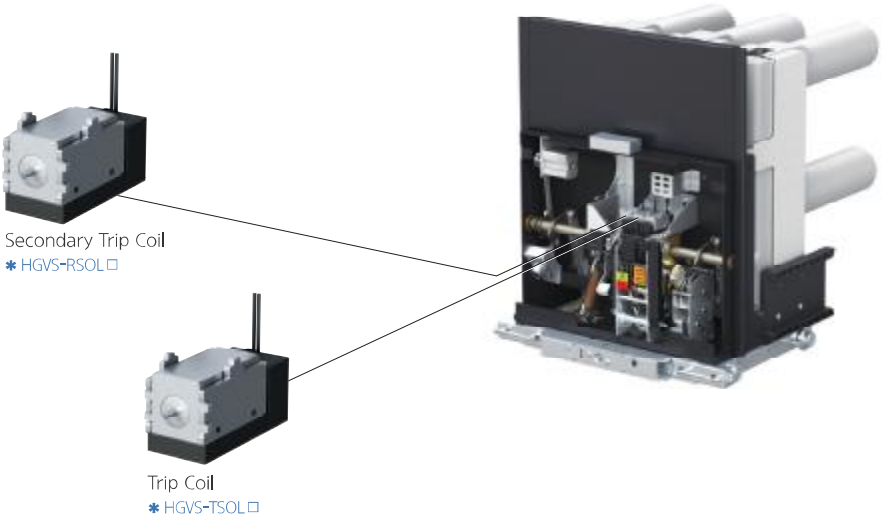
Control Power		Rated Voltage (Un)	Current (A)
	DC	24 V	8.5 A
	A/DC	48 - 60 V	4.2 A
		100 - 130 V	2 A
		200 - 250 V	1 A
Range		65 - 120 %	
Consumption Power		DC = 200 W, AC = 200 VA	
Time		approx. 120 ms	
Continous Power		DC = 4 W, AC = 4 VA	
Dielectric Strengh		2,000 V 50/60 Hz (1 min)	

Secondary Trip Coil

- This device is a spare control coil to trip VCB from remote area by using the external voltage as below.
- Cannot be used at the same time with UVR and CT operated release.

Rating

Control Power		Rated Voltage (Un)	Current (A)
	DC	24 V	8.5 A
	A/DC	48 - 60 V	4.2 A
		100 - 130 V	2 A
		200 - 250 V	1 A
Range		65 - 120 %	
Consumption Power		DC = 200 W, AC = 200 VA	
Time		approx. 120 ms	
Continous Power		DC = 4 W, AC = 4 VA	
Dielectric Strengh		2,000 V 50/60 Hz (1 min)	



※ -✱ : Order code for purchase
-□ : Operating voltage (1: DC 24 V, 2: A/DC 48 - 60 V, 4: A/DC 100 - 130 V, 6: A/DC 200 - 250 V)

Close Coil

- This device is the control coil to close VCB from remote area by using the external voltage as below.
- A close coil is included in the VCB.

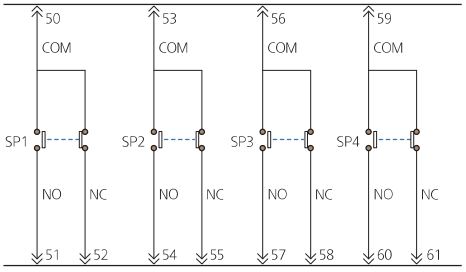
Rating

Control Power		Rated Voltage (Un)	Current (A)
	DC	24 V	8.5 A
	A/DC	48 - 60 V	4.2 A
		100 - 130 V	2 A
		200 - 250 V	1 A
Range		65 - 120 %	
Consumption Power		DC = 200 W, AC = 200 VA	
Time		approx. 120 ms	
Continous Power		DC = 4 W, AC = 4 VA	
Dielectric Strengh		2,000 V 50/60 Hz (1 min)	

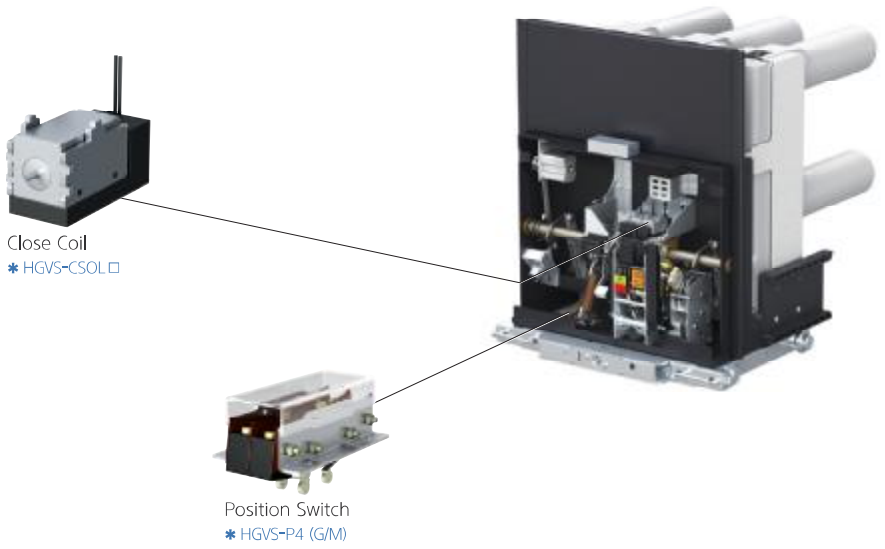
Position Switch

- This device is the limit switch to indicate the position of VCB (Test or Service)
- Standard G, M type is "2NO + 2NC" (Assembled inside the VCB).
- Standard E, F type is "1NO + 1NC" (Assembled on the cradle base).

G/M Type



E/F Type



※ -✱ : Order code for purchase
-□ : Operating voltage (1: DC 24 V, 2: A/DC 48 - 60 V, 4: A/DC 100 - 130 V, 6: A/DC 200 - 250 V)

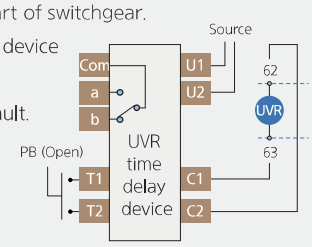
Accessories

UVR (Under Voltage Release)

- This device is the control coil to automatically trip VCB, when control voltage is dropped down or off.
- UVR tripping time is instantaneous normally, but in case of adding UVR time delay device to UVR, operating time can be delayed as below chart.
- If control voltage is out of range as below, it is impossible to close VCB electrically and mechanically.
- It cannot be used with C.T. operated release and secondary trip coil at the same time.

UVR Time Delay Device

- This device is the time delay unit used for delaying trip time as setting value. It is the external option, installed in side of cradle or other part of switchgear.
- This device is the control device to prevent VCB trip on instantaneous blackout fault.
- Control voltage must be set same as that of UVR.

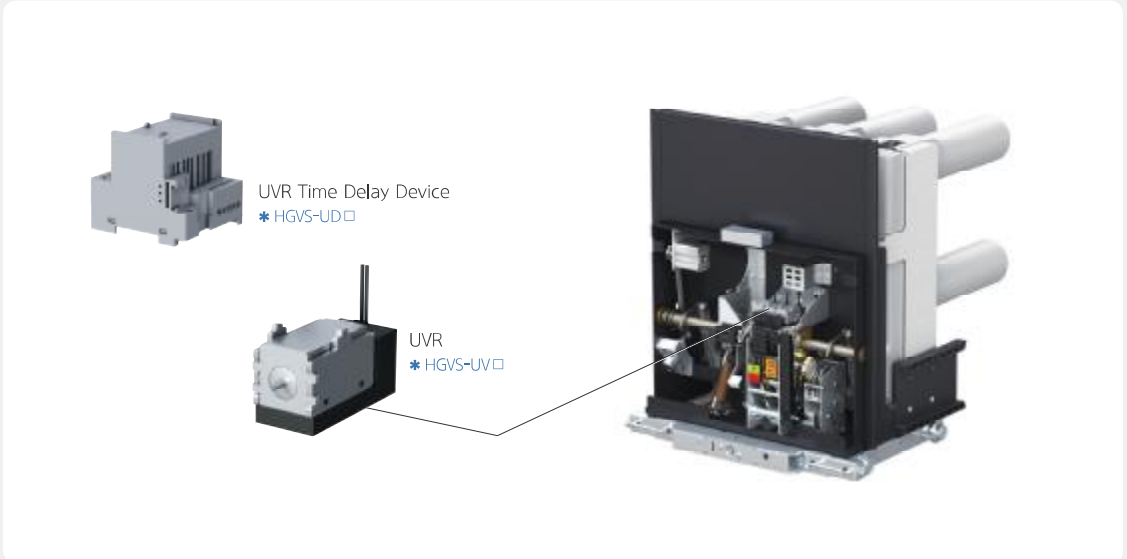


Rating

Control Power		Rated voltage (Un)	Current (A)
	DC	24 V	10.5 A
	A/DC	48 - 60 V	4.3 A
		100 - 130 V	2 A
		200 - 250 V	1 A
Range		Drop out: 40 - 60 %	
		Pick up: 65 - 85 %	
Consumption Power		DC = 200 W, AC = 200 VA	
Time		approx. 120 ms	
Continous Power		DC = 4 W, AC = 4 VA	
Dielectric Strengh		2,000 V 50/60 Hz (1 min)	

Rating

Control Power		Rated voltage (Un)	Current (A)	
			Inrush	Static
	DC	24 V	10.5 A (200 VA)	1.05 A (below 4 AV)
	A/DC	48 - 60 V	4.3 A (200 VA)	0.43 A (below 4 AV)
		100 - 130 V	2 A (200 VA)	0.2 A (below 4 AV)
		200 - 250 V	1 A (200 VA)	0.1 A (below 4 AV)
Range		Drop out: 40 - 60 %		
		Pick up: 65 - 85 %		
Delay Time		0.5, 1.0, 1.5, 3.0 sec		
Dielectric Strengh		2,000 V 50/60 Hz (1 min)		



※ -✱ : Order code for purchase
-□ : Operating voltage (1: DC 24 V, 2: A/DC 48 - 60 V, 4: A/DC 100 - 130 V, 6: A/DC 200 - 250 V)

Auxiliary Switch

- This is the contact switch to indicate on/off state of VCB.
- Standard contact is "4NO + 4NC".
- It can be extended to "10NO + 10NC" as options.

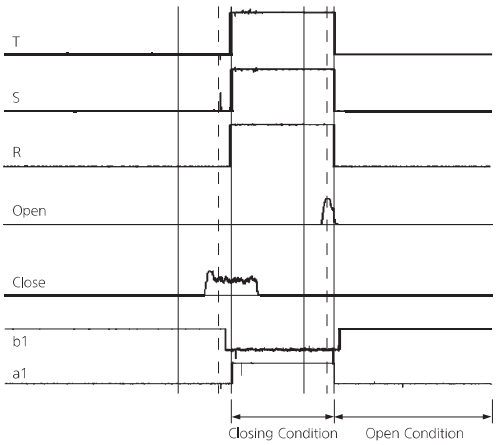
Rating

Type		Control connector
Contacts	Standard	4NO + 4NC
	Option for Extension	10NO + 10NC
Voltage (Un)		A/DC 24 - 250 V
Current (A)		Ith2 = 10 A
Power Frequency Withstand Voltage		2,000 V 50/60 Hz (1 min)
Resistance		3 MΩ

Rated Current and Breaking Capacity Per Each Control Voltage

Voltage	T	In	Icu
AC 220 V	15 ms	2.5 A	25 A
DC 24 V	15 ms	10 A	12 A
DC 60 V	15 ms	6 A	8 A
DC 110 V	15 ms	4 A	5 A
DC 220 V	15 ms	1 A	1.5 A

Time Chart



Auxiliary Switch
✱ HGVS-ASW□

※ -✱ : Order code for purchase
-□ : Operating voltage (4: 4NO + 4NC, 10: 10NO + 10NC)

Accessories

Charging Motor

- This is the electric motor to charge close spring.
- When charging is complete, limit switch cuts the control power.
- When VCB is to be ON condition, motor is recharged immediately.

Rating

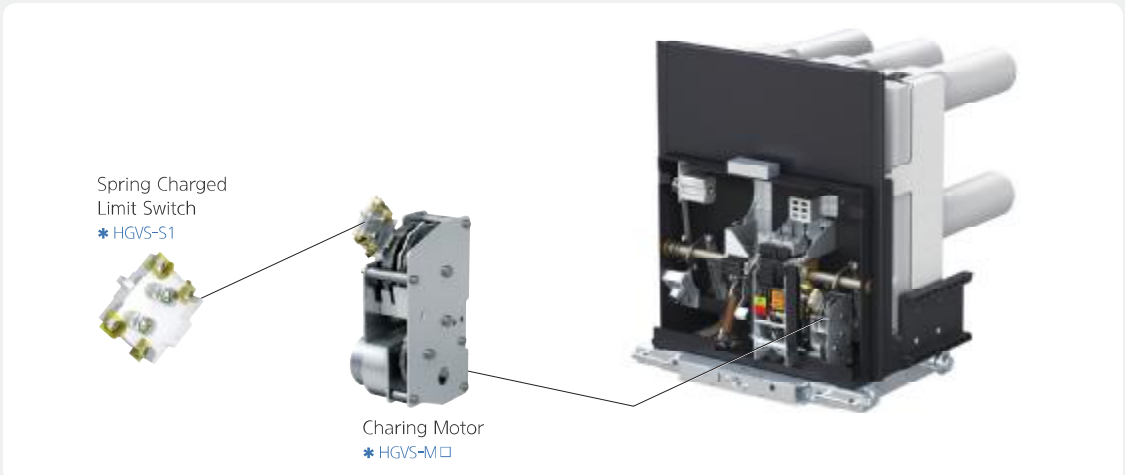
Control Power		Rated voltage (Un)	Current (A)
	DC	24 V	12 A
	A/DC	48 - 60 V	6 A
		100 - 130 V	3 A
		200 - 250 V	1.5 A
Range		80 - 110 % Un	
Within 25 kA	Starting Power	DC = 500 W, AC = 500 VA	
	Consumption Power	DC = 200 W, AC = 200 VA	
	Starting Time	approx. 0.2 sec	
	Running Power	DC = 5 W, AC = 5 VA	
	Charging Time	3 - 5 sec	
	Power Frequency Withstandard Voltage	2,000 V 50/60 Hz (1 min)	
Within 40 kA	Starting Power	DC = 900 W, AC = 900 VA	
	Consumption Power	DC = 350 W, AC = 350 VA	
	Starting Time	approx. 0.2 sec	
	Running Power	DC = 5 W, AC = 5 VA	
	Charging Time	3 - 5 sec	
	Power Frequency Withstandard Voltage	2,000 V 50/60 Hz (1 min)	

Spring Charged Limit Switch

- This is the limit switch contact to indicate charged and discharged state of close spring. (1NO)

Rated Current and Breaking Capacity Per Each Control Voltage

Voltage	T	In	Icu
AC 220 V	15 ms	2.5 A	25 A
DC 24 V	15 ms	10 A	12 A
DC 60 V	15 ms	6 A	8 A
DC 110 V	15 ms	4 A	5 A
DC 220 V	15 ms	1 A	1.5 A



※ -✱ : Order code for purchase
-□ : Operating voltage (1: DC 24 V, 2: A/DC 48 - 60 V, 4: A/DC 100 - 130 V, 6: A/DC 200 - 250 V)

Button Cover

- This is a safety cover to guard against accidental or unauthorized activation by the operators.
- Also, it can be used as a padlock.
- Key for the button cover is optional.
  (10 mm hole provided.)

Key Lock

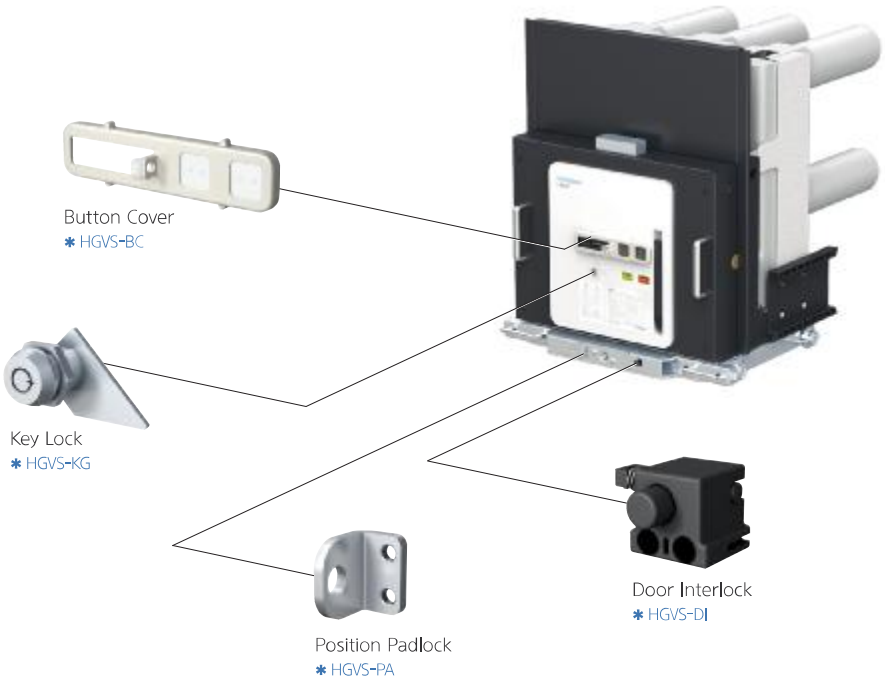
- This is the safety device to lock VCB operation as operating condition.
- It is impossible to input electrically or mechanically in the locked status.

Position Padlock

- This is a safety device to guard against accidental or unauthorized activation by the operators.
- Key for the position padlock is optional.
  (8 mm hole provided.)

Door Interlock

- This is a safety device to prevent draw-in and out of VCB when the switchgear door is open.
- Only available for MS and ME cradles.



※ ✱ : Order code for purchase

Accessories

C.T Operated Release

- This is the trip release device operated by 2nd current of CT in the fault current condition.
- It cannot be used with under voltage release and secondary trip coil at the same time.

Rating

Rating Current	1.0 A
Operating Current	0.85 A

Manual Operating Bar

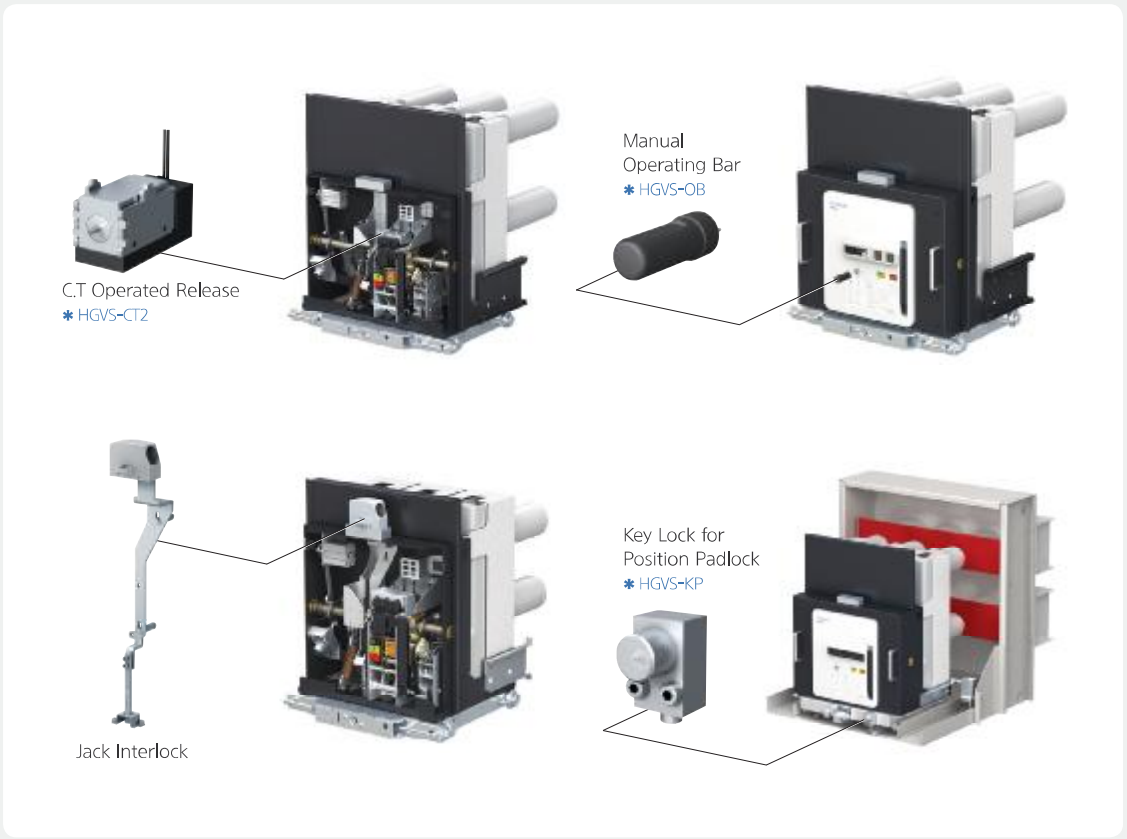
- This is the manual operationg device to control VCB under padlocking button cover.
- Only operator should keep a key of padlock unit
- Only available when VCB is in the test position because of size (Length).

Jack Interlock

- This is the interlock device to prevent malconnection of control connector.
- It cannot be isolated under service condition or moving state (Only available in the test position).
- Only available for G, M type cradles.

Key Lock for Position Padlock

- This is the device to lock or release the VCB at allocated position.
- Only available for E, F type cradles.



※ ✱ : Order code for purchase

Earthing Switch

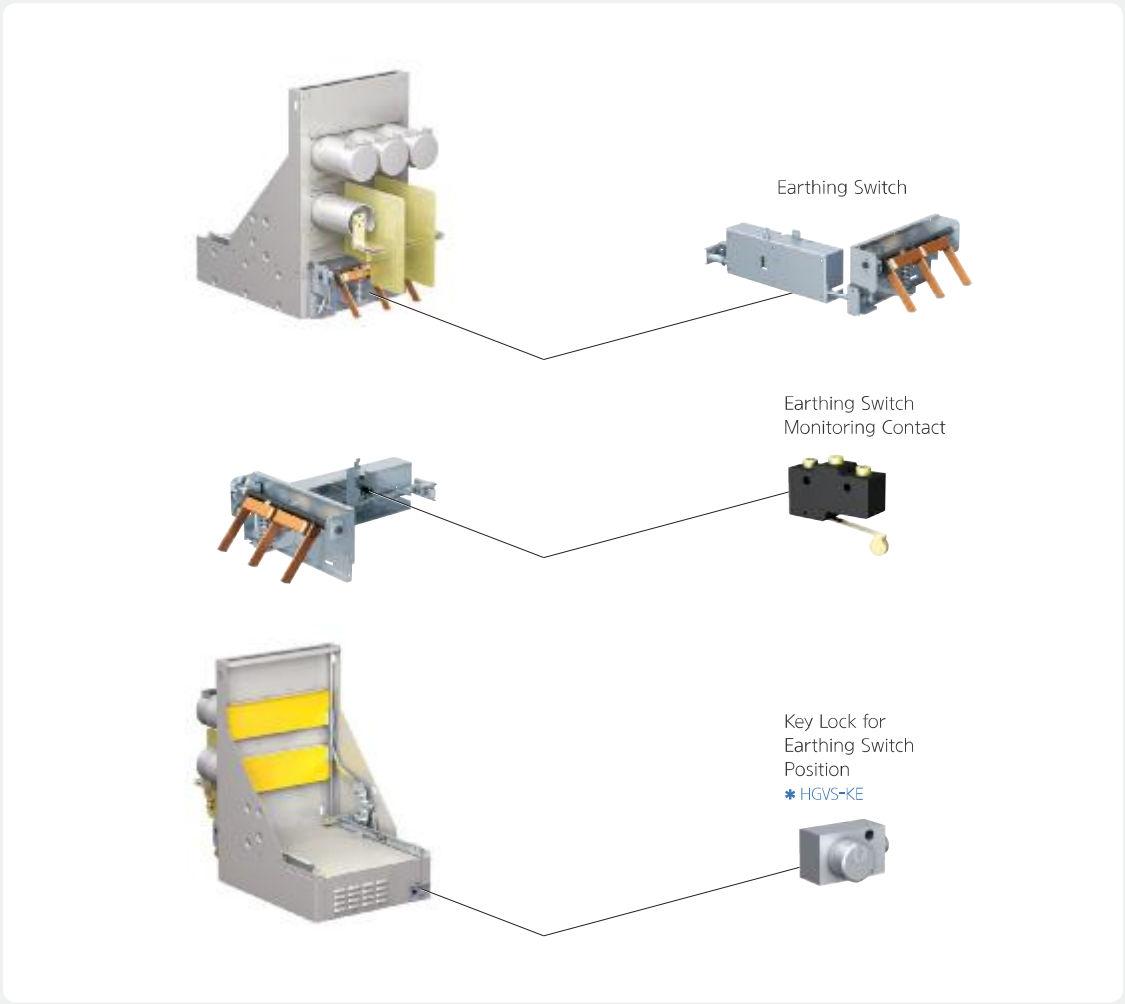
- This is the safety device to discharge the charging current of load part before maintenance.
- Only available for G, M type cradle.

Earthing Switch Monitoring Contact

- This is the contact to indicate on/off state of earthing switch by using 1NO + 1NC contacts.
- It is used for preventing fault from any operation.
- It is mandatory to choose this option in case of applying earthing switch.

Key Lock for Earthing Switch Position

- This is the safety device to lock the earthing switch during maintenance.



※ ✱ : Order code for purchase

Accessories

Vacuum Checker

This portable device is for checking the vacuum degree of vacuum interrupter.

Order Code	HAFS-VC9
Input Voltage	AC 200 - 220 V
Output Voltage	AC 11 kV / AC 22 kV
Weight (Net)	22 kg
Type	Portable

Auxiliary Contact and Lead Cable

- A, B: Control connector to VCB and pin are provided. (Lead cable is not provided.)
- C, D: Standard size of control circuit lead cable is 2.2 m and is applicable over 1.5 SQ.
- Only one type of the two above is provided as a basic option. You should choose one from 4NO + 4NC or 10NO + 10 NC.

Connector
✱ HGVS-JACK□

Lead Cable
✱ HGVS-LC□

※ -✱ : Order code for purchase
-□ : Auxiliary contact (4: 4NO + 4NC, 10: 10NO + 10NC)

Condenser Trip Device (CTD)

This device can trip VCB by using charged power in capacitor without control power.
Features of this device are as follows.

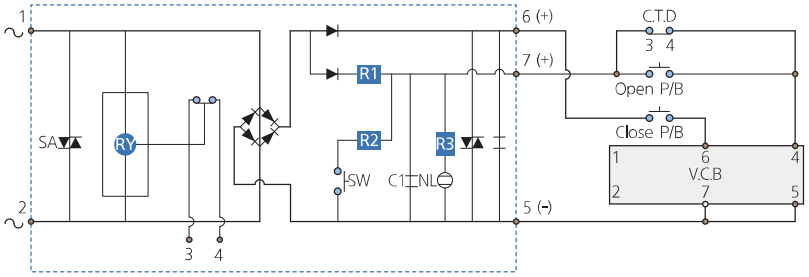
- Using the relay contact 3, 4 installed in device, VCB can be automatically tripped from remote area.
- Delay setting for switches are like the followings.
  - ON: Delay (Operation after delay within 1.5 sec)
  - OFF: By-pass (Without delay)

- You do not need to use an additional rectifier because CTD and rectifier functions are assembled together in the product and it is designed to operate 2 A below of its usual load current.

Order Code	HVFS-T7	HVFS-T9	HVFS-T4	HVFS-T6
Rated Input Voltage	AC 110 V	AC 220 V	DC 110 V	DC 220 V
Charing Voltage	DC 145 V	DC 290 V	DC 110 V	DC 220 V
Current Capacity	DC 2 A			
Time Delay	0 or within 1.5 [1)]			
Frequency	50/60 Hz		-	

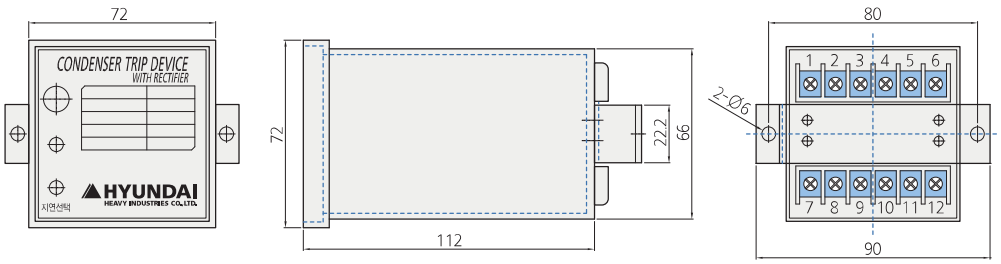
※ 1) When CTD is cooperated with VCB, control voltage of VCB must be DC because put of CTD is DC.

AC



AC Input Power
NO. 1, 2
Condensor Trip Power
NO. 7 (+), 5 (-)
DC Power
NO. 6 (+), 5 (-)
Delay Contact (Combined Auto Trip)
NO. 3, 4

(Unit : mm)



Order Information

VCB

❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
HGV	61	4	4	F	GS	4	4	4	C	P2

Model Name
❶ VCB

Ratings
❷ Rated Voltage ❸ Short Circuit Current ❹ Rated Current

Pole Center Distance
❺ Phase Distance

Installation Type
❻ Cradle Type

Control Voltage
❼ Motor ❽ Closing Coil ❾ Trip Coil

Auxiliary Contact
❿ Auxiliary Contact and Circuit Connector

Accessories
⓫ Accessories

❷ Rated Voltage	
11	7.2 kV
21	12 kV
31	17.5 kV
61	24/25.8 kV

❸ Short Circuit Current	
1	12.5 kA
4	25 kA
5	31.5 kA
6	40 kA

❹ Rated Current	
1	630 A
2	1,250 A
4	2,000 A
6	2,500 A
7	3,150 A
8	4,000 A

❺ Phase Distance	
C	150 mm
F	210 mm
I	275 mm

❻ Installation Type	
XA	Body
EA	ES type body
ES	ES cradle (without shutter)
E3	ES cradle (Phase distance 300 mm for 24 kV 630/1,250 A)
FA	FS type body
FS	FS cradle (with non-metal shutter)
F3	FS cradle (Phase distance 300 mm for 24 kV 630/1,250 A)
GA	GS type body
GS	GS cradle (with bushing and metal shutter)
GE [1)]	GS cradle (with earthing switch)
MS	Cell type cradle
ME [1)]	MS cradle (with earthing swtich)

❼ – ❾ Control Voltage	
1	DC 24 V
2	A/DC 48 – 60 V
4	A/DC 100 – 130 V
6	A/DC 200 – 250 V

❿ Auxiliary Contact and Circuit Connector	
A [10)]	Connector and pin (4NO + 4NC)
B [10)]	Connector and pin (10NO + 10NC)
C	Lead cable (4NO + 4NC)
D	Lead cable (10NO + 10NC)

⓫ Accessories	
EE [1)]	Earthing switch monitoring contact (1NO + 1NC)
U□ [2)]	Under voltage release (□: Operating voltage)
R□ [2)]	Secondary shunt release (□: Operating voltage)
D□ [3)]	UVR time delay device (□: Operating voltage)
KG	Electrical/Mechanical key lock
BC [4)]	Button cover (Padlocking available without key)
C2 [2)]	CT operated release 1.0 A
PA	Position padlock (without key)
DI [5)]	Door interlock
JI [6)]	Jack interlock
N□ [7)]	Flame retardant cable
P□ [8)]	Position switch
TS	Trip circuit supervision
KP	Key lock for position padlock
KE [9)]	Key lock for earthing switch
OB [5)]	Manual operating bar
EI [6)11)]	Blocking earthing switch at service position
B□ [12)]	For special use
ZZ	Specially required

※ **1)** It is necessary to put "-EE" end of order code for odering earthing switch type cradle (GE, ME).
2) It cannot be available U□, R□, and C□ at the same time.
3) Only available to VCB included UVR (U□).
4) Available to both close button and trip button.
5) Only available to MS, ME cradle.
6) Only available to GA, GS, GE, MS, ME.
7) □ : A (4NO + 4NC), B (10NO + 10NC)
8) □ : 2 (1NO + 1NC per each position), 4 (2NO + 2NC per each position)
9) Only available to MS, ME cradle.
10) Only supply pins without lead cable.
11) In case of VCB body only, "EI" option must be applied together.
12) Only available to 12 kV VCB: Phase distance.
□: 1 (150 mm), 2 (210 mm), 3 (275 mm)

Cradle

❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
GVL	61	4	4	F	ME	0	0	0	0	KL

Model Name
❶ Draw-Out Frame (Cradle)

Ratings
❷ Rated Voltage ❸ Short Circuit Current ❹ Rated Current

Pole Center Distance
❺ Phase Distance

Installation Type
❻ Cradle Type

Control Voltage
❼ Motor ❽ Closing Coil ❾ Trip Coil

Auxiliary Contact
❿ Auxiliary Contact and Circuit Connector

Accessories
⓫ Accessories

❷ Rated Voltage	
11	7.2 kV
21	12 kV
31	17.5 kV
61	24/25.8 kV
❸ Short Circuit Current	
1	12.5 kA
4	25 kA
5	31.5 kA
6	40 kA

❹ Rated Current	
1	630 A
2	1,250 A
4	2,000 A
6	2,500 A
7	3,150 A
8	4,000 A
❺ Phase Distance	
C	150 mm
F	210 mm
I	275 mm

❻ Installation Type	
ES	Draw-in and out type
FS	Draw-in and out type
GS	Draw-in and out type
GE [1]	Draw-in and out type
MS	Draw-in and out type
ME [1]	Draw-in and out type
❼ - ❾ Control Voltage	
0	-
❿ Auxiliary Contact and Circuit Connector	
0	-

⓫ Accessories	
KE	Key lock for earthing switch
EE [1]	Earthing switch monitoring contact (1NO + 1NC)
DM [2]	Door interlock
TB [2]	Emergency trip bar
ZZ	Specially required

※ 1) It is necessary to put "-EE" end of order code for odering earthing switch type cradle (GE, ME).
2) Only for MS, ME cradle.

Vacuum Interrupter

	HCV	6B

Model Name
VI

Ratings

Ratings	
3B	7.2 / 12 / 17.5 kV 25 kA 630 / 1,250 / 2,000 A
3D	7.2 / 12 / 17.5 kV 31.5 / 40 kA 1,250 / 2,000 A
3E	7.2 / 12 / 17.5 kV 31.5 / 40 kA 2,500 /3,150 / 4,000 A
6B	24 / 25.8 kV 12.5 / 25 kA 630 / 1,250 / 2,000 A

Ratings and Specifications

Accessories (Standard)

1	Close push button
2	Trip push button
3	On/Off indicator
4	Charging/Discharging/Discharge indicator
5	Closing coil
6	Trip coil (Shunt)
7	Auxiliary switch (4NO + 4NC, 10NO + 10NC)
8	Control jack (65 pin used)
9	Counter
10	Manual handle
11	Draw-in & out handle
12	Draw-in & out device
13	Female arm
14	Motor
15	Tulip contact
16	VCB position indicator
17	Spring charged limit switch

Accessories (Option)

1	UVR (Under voltage release)
2	Secondary trip coil (Shunt)
3	Position switch
4	Jack interlock
5	Key lock
6	Button cover (Padlocking availabe without key)
7	UVR delay device
8	CTD (Condenser trip device)
9	Door interlock
10	Position padlock (without key)
11	Earthing switch
12	Limit switch for earthing switch (1NO + 1NC)
13	Key lock for position padlock
14	CT. operated release
15	Non-flammable cable
16	Trip circuit supervision
17	Key lock of earthing switch position
18	Emergency trip bar

Ratings (7.2 kV)

Model Name			HGV114□ [1]			HGV115□ [1]					HGV116□ [1]				
Standard			IEC 62271-100 (2012)												
Rated voltage		(kV)	7.2												
Rated short time withstand current		(kA/4s)	25			31.5					40				
Rated short-circuit breaking current		(kA)	25			31.5					40				
Rated short-circuit making current		(kA)	65			82					104				
Rated current		(A)	630	1,250	2,000	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]
Rated frequency		(Hz)	50/60 Hz												
Breaking capacity		(MVA)	312			393					499				
Operating duty			O-0.3s-CO-15s-CO												
Insulation level	Power frequency withstand voltage (1 min)	Ud (kV)	20												
	Lightning impulse withstand voltage (1.2 x 50 μs)	Up (kV)	60												
Type test class	Mechanical		M2 (10,000 times)												
	Electrical		E2 (List3)												
	Capacitive current breaking capacity		C2												
Rated opening time		(ms)	≤ 40												
Rated breaking time		(cycle)	3												
Rated closing time		(ms)	≤ 65												
Operating mechanism			Motor spring type												
Auxiliary contacts			4NO + 4NC (Max. 10NO + 10NC)												
Control voltage	Closing coil		DC 24V, A/DC 48 - 60V, A/DC 100 - 130V, A/DC 200 - 250V												
	Opening coil		DC 24V, A/DC 48 - 60V, A/DC 100 - 130V, A/DC 200 - 250V												
Operating life (times)	Electrical operation		refer to table 1, 40 page												
	Mechanical operation		30,000 [2]												
Phase distance x Terminal distance (mm)	150 x 205		● [4]	●											
	150 x 210		■	■											
	210 x 310		△	△	△	△	△				△	△			
	275 x 310							◈	◈	◈			◈	◈	◈
Installation	Fixed type	XA	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈
	Draw-out type	ES	■	■											
		FS	■	■											
		GS, GE	● △	● △	△	△	△	◈	◈	◈	△	△	◈	◈	◈
		MS, ME	●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈
Weight (kg)	VCB	Fixed type	70	70	110	90	130	170	170	170	90	130	170	170	170
		Draw-out type	100	105	130	125	160	200	200	200	125	160	200	200	200
	Cradle	ES	55	55											
		FS	60	60											
		GS	70	70	90	85	90	120	120	120	85	90	120	120	120
		GE	135	135	160	155	160	190	190	190	155	160	190	190	190
		MS	140	140	160	155	160	190	190	190	155	160	190	190	190
		ME	210	210	235	230	235	265	265	265	230	235	265	265	265

※ **1)** □ : Rated current (1: 630 A / 2: 1,250 A / 4: 2,000 A / 6: 2,500 A / 7: 3,150 A / 8: 4,000 A)
2) It can be used without replacement up to 10,000 cycles. In order to extend durability, it needs appropriate maintenance as per instrction manual.
3) In case of 4,000 A, it needs to be adopted forced circulation using fan operated by thermostat. Fan is not provided seperately.
4) (● : 150 x 205, ■ : 150 x 210, △ : 210 x 310, ◈ : 275 x 310)

Ratings and Specifications

Ratings (12 kV)

Model Name				HGV214□ [1]			HGV215□ [1]					HGV216□ [1]				
Standard				IEC 62271-100 (2012)												
Rated voltage			(kV)	12												
Rated short time withstand current			(kA/4s)	25			31.5					40				
Rated short-circuit breaking current			(kA)	25			31.5					40				
Rated short-circuit making current			(kA)	65			82					104				
Rated current			(A)	630	1,250	2,000	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]
Rated frequency			(Hz)	50/60 Hz												
Breaking capacity			(MVA)	520			655					831				
Operating duty				O-0.3s-CO-15s-CO												
Insulation level	Power frequency withstand voltage (1 min)		Ud (kV)	28 (42) [4]												
	Lightning impulse withstand voltage (1.2 x 50 μs)		Up (kV)	75 (82) [4]												
Type test class	Mechanical			M2 (10,000 times)												
	Electrical			E2 (List3)												
	Capacitive current breaking capacity			C2												
Rated opening time			(ms)	≤ 40												
Rated breaking time			(cycle)	3												
Rated closing time			(ms)	≤ 65												
Operating mechanism				Motor spring type												
Auxiliary contacts				4NO + 4NC (Max. 10NO + 10NC)												
Control voltage	Closing coil			DC 24 V, A/DC 48 - 60 V, A/DC 100 - 130 V, A/DC 200 - 250 V												
	Opening coil			DC 24 V, A/DC 48 - 60 V, A/DC 100 - 130 V, A/DC 200 - 250 V												
Operating life (times)	Electrical operation			refer to table 1, 40 page												
	Mechanical operation			30,000 [2]												
Phase distance x Terminal distance (mm)	150 x 205			● [5]	●											
	150 x 210			■	■											
	210 x 310			△	△	△	△	△				△	△			
	275 x 310								◈	◈	◈			◈	◈	◈
Installation	Fixed type	XA		●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈
	Draw-out type	ES		■	■											
		FS		■	■											
		GS, GE		● △	● △	△	△	△	◈	◈	◈	△	△	◈	◈	◈
		MS, ME		●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈
Weight (kg)	VCB	Fixed type		70	70	110	90	130	170	170	170	90	130	170	170	170
		Draw-out type		100	105	130	125	160	200	200	200	125	160	200	200	200
	Cradle	ES		60	60											
		FS		65	65											
		GS		70	70	90	85	90	120	120	120	85	90	120	120	120
		GE		135	135	160	155	160	190	190	190	155	160	190	190	190
		MS		140	140	160	155	160	190	190	190	155	160	190	190	190
		ME		210	210	235	230	235	265	265	265	230	235	265	265	265

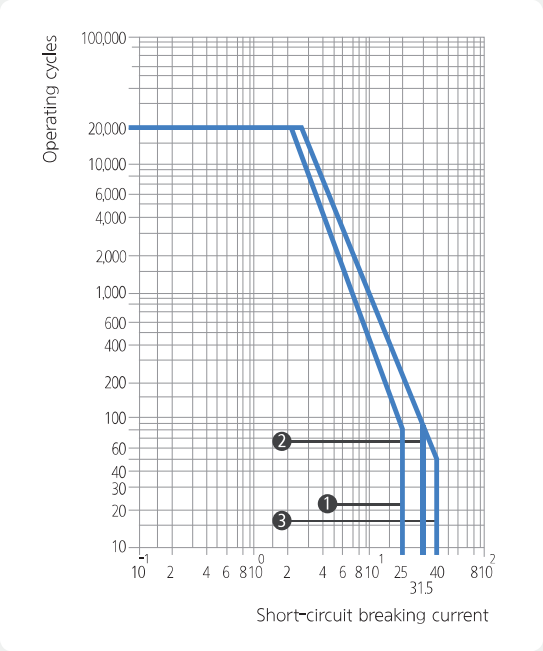
※ **1)** □ : Rated current (1: 630 A / 2: 1,250 A / 4: 2,000 A / 6: 2,500 A / 7: 3,150 A / 8: 4,000 A)
2) It can be used without replacement up to 10,000 cycles. In order to extend durability, it needs appropriate maintenance as per instrction manual.
3) In case of 4,000 A, it needs to be adopted forced circulation using fan operated by thermostat. Fan is not provided separately.
4) When making a purchase order, B□'s option must be selected.
1 (Phase distance: 150 mm), 2 (Phase distance: 210 mm), 3 (Phase distance: 275 mm)
5) (● : 150 x 205, ■ : 150 x 210, △ : 210 x 310, ◈ : 275 x 310)

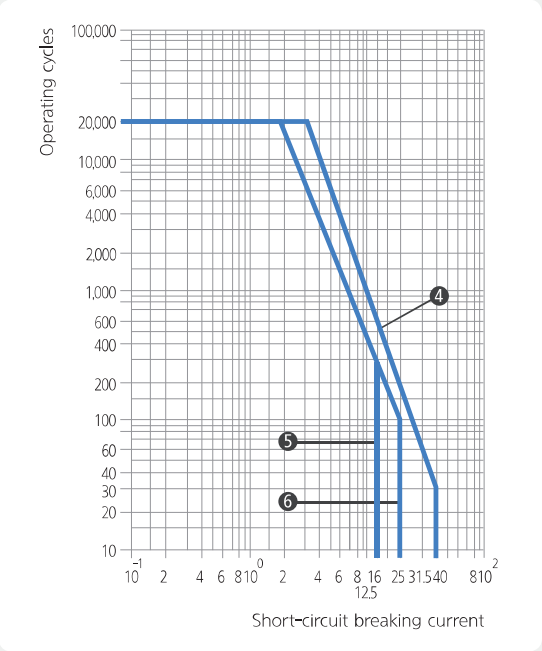
Ratings (17.5 kV) (24 / 25.8 kV)

HGV314□ [1]			HGV315□ [1]					HGV316□ [1]					HGV611□ [1]			HGV614□ [1]		
IEC 62271-100 (2012)													IEC 62271-100 (2012)					
17.5													24 (25.8)					
25			31.5					40					12.5			25		
25			31.5					40					12.5			25		
65			82					104					32.5			65		
630	1,250	2,000	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]	630	1,250	2,000	630	1,250	2,000
50/60 Hz													50/60 Hz					
758			955					1,212					520			1,039		
O-0.3s-CO-15s-CO													O-0.3s-CO-15s-CO					
38													60					
95													125					
M2 (10,000 times)													M2 (10,000 times)					
E2 (List3)													E2 (List3)					
C2													C2					
≤ 40													≤ 40					
3													3					
≤ 65													≤ 65					
Motor spring type													Motor spring type					
4NO + 4NC (Max. 10NO + 10NC)													4NO + 4NC (Max. 10NO + 10NC)					
DC 24 V, A/DC 48 - 60 V, A/DC 100 - 130 V, A/DC 200 - 250 V													DC 24 V, A/DC 48 - 60 V, A/DC 100 - 130 V, A/DC 200 - 250 V					
DC 24 V, A/DC 48 - 60 V, A/DC 100 - 130 V, A/DC 200 - 250 V													DC 24 V, A/DC 48 - 60 V, A/DC 100 - 130 V, A/DC 200 - 250 V					
refer to table 1, 40 page													refer to table 1, 40 page					
30,000 [2]													30,000 [2]					
●	●																	
■	■																	
△	△	△	△	△				△	△				△	△	△	△	△	△
					◈	◈	◈			◈	◈	◈							
●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈	△	△		△	△	△
■	■												△	△		△	△	△
■	■												△	△		△	△	△
● △	● △	△	△	△	◈	◈	◈	△	△	◈	◈	◈	△	△	△	△	△	△
●	●	△	△	△	◈	◈	◈	△	△	◈	◈	◈	△	△	△	△	△	△
70	70	110	90	130	170	170	170	90	130	170	170	170	115	115		115	115	130
100	105	140	125	160	200	200	200	125	160	200	200	200	145	145	160	145	145	160
70	70												95	95		95	95	125
75	75												105	105		105	105	130
70	70	90	85	90	120	120	120	85	90	120	120	120	95	95	100	95	95	100
135	135	160	155	160	190	190	190	155	160	190	190	190	175	175	180	175	175	180
140	140	160	155	160	190	190	190	155	160	190	190	190	180	180	190	180	180	190
210	210	235	230	235	265	265	265	230	235	265	265	265	265	265	275	265	265	275

※ **1)** □ : Rated current (1: 630 A / 2: 1,250 A / 4: 2,000 A / 6: 2,500 A / 7: 3,150 A / 8: 4,000 A)
2) It can be used without replacement up to 10,000 cycles. In order to extend durability, it needs appropriate maintenance as per instrction manual.
3) In case of 4,000 A, it needs to be adopted forced circulation using fan operated by thermostat. Fan is not provided separately.

Ratings and Specifications





Electrical Endurance Curve Number Depending on VCB Type (Table 1)

Rated Voltage	Rated Breaking Current	Curve Number					
		630 A	1,250 A	2,000 A	2,500 A	3,150 A	4,000 A
7.2	25	❶	❶	-	-	-	-
	31.5	-	❷	❷	-	-	-
	40	-	❸	❸	❸	❸	❸
12	25	❶	❶	-	-	-	-
	31.5	-	❷	❷	-	-	❹
	40	-	❹	❹	❹	❹	-
17.5	25	❶	❶	-	-	-	-
	31.5	-	❷	❷	-	-	-
	40	-	❹	❹	❹	❹	-
24 / 25.8	12.5	❺	❺	-	-	-	-
	25	❻	❻	❻	-	-	-

Rated Operating Sequence

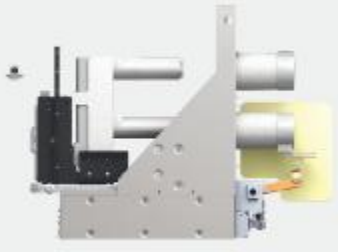
The determined grade of endurance and reliability through rated operating sequence test.

Type	Rated Operating Sequence	Remark
Standard type	O - 15s - CO - 3 min - CO	O: Open sequence C: Close sequence CO: Direct open sequence after close sequence
	CO - 15s - CO	
High-speed auto reclosing type	O - 0.3s - CO - 3 min - CO	
	O - 0.3s - CO - 15s - CO	

Draw-In and Out

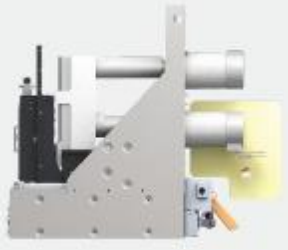
The table below shows the It is possible to check whether or not to use the safety function at each position.

Removed



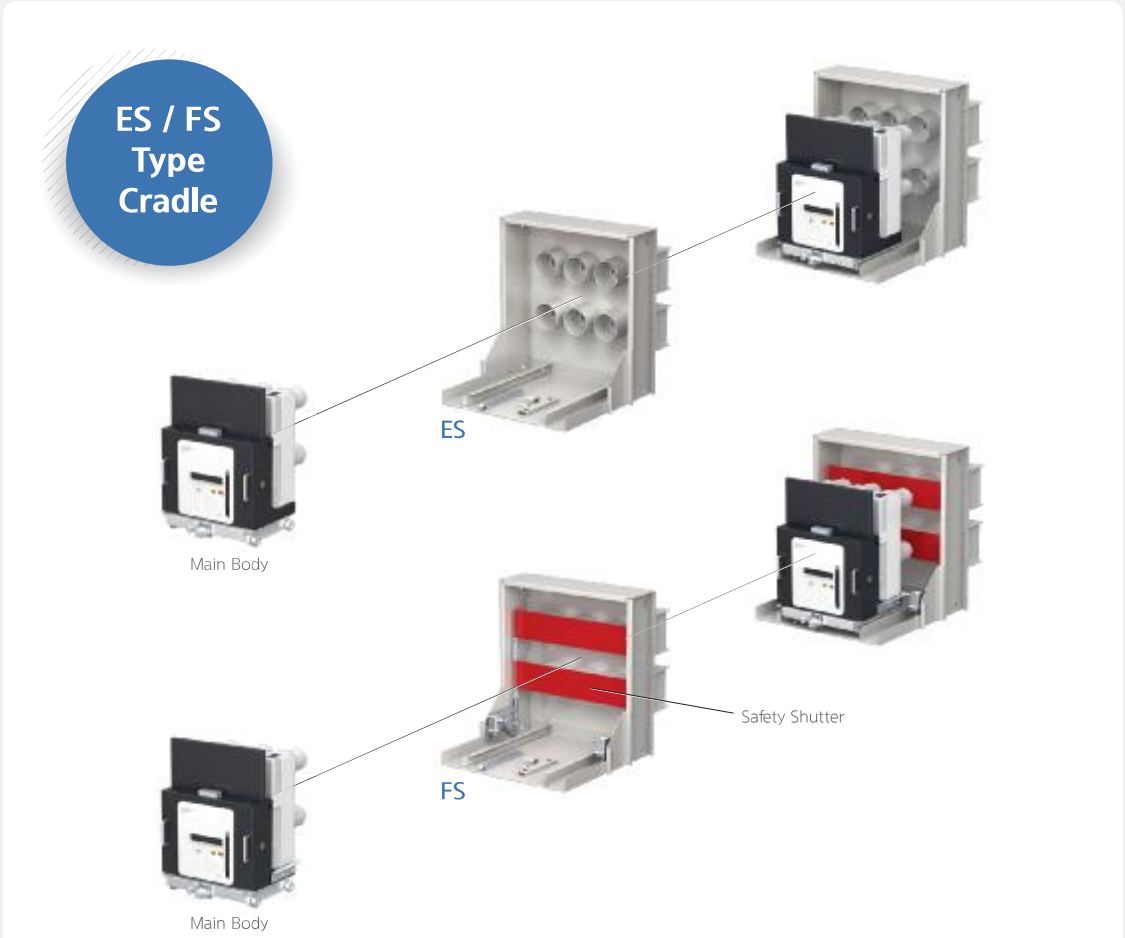
Test

Service



VCB Position	Position ← →				Status
	Removed	Test	→ → → Draw-In Draw-Out ← ← ←	Service	
Cradle shutter					Shutter padlock: N/A
					Shutter padlock: Available
Cradle door					Door open: N/A
					Door open: Available
Control jack					Separation: N/A
					Separation: Available
VCB					Operation: N/A
					Operation: Available
Earthing switch					Close E/S: N/A
					Close E/S: Available

Installation



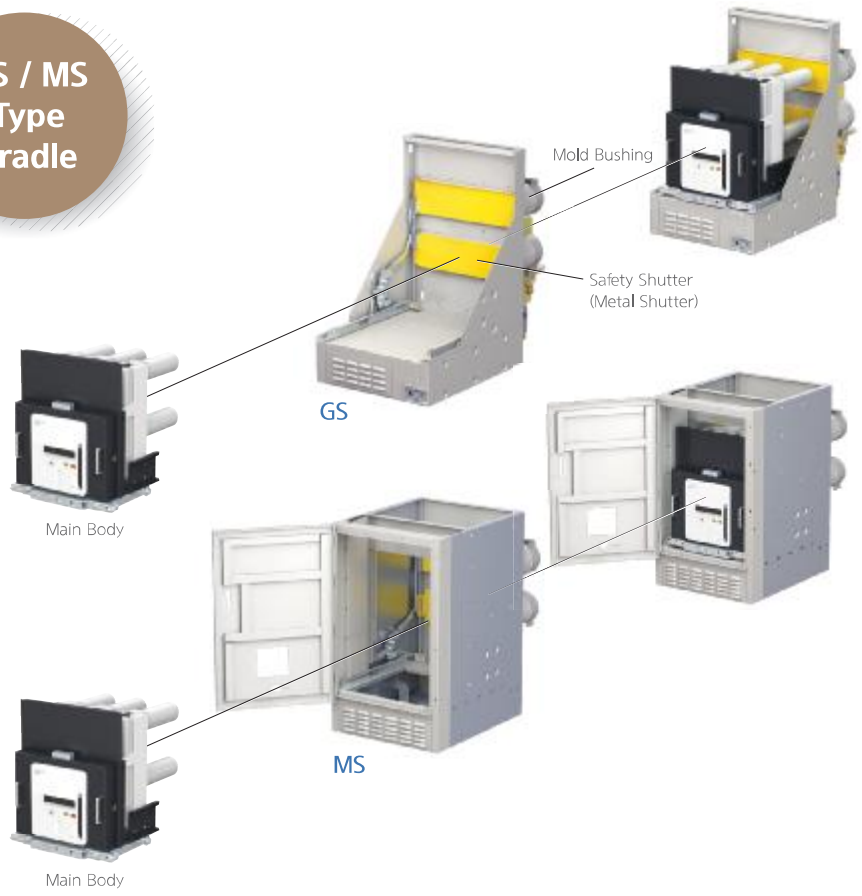
ES Type Cradle

- Structure: Metallic cradle without safety shutter and bushing.
- Method of draw-in and out: Lever type
- Features
  - Easy operation and maintenance
  - Easy modification to FS type cradle

FS Type Cradle

- Structure: ES type cradle + Safety shutter (Insulated shutter)
- Method of draw-in and out: Lever type
- Features
  - Circuit breaker is isolated perfectly from bus room by the insulated shutter.

GS / MS Type Cradle



GS Type Cradle

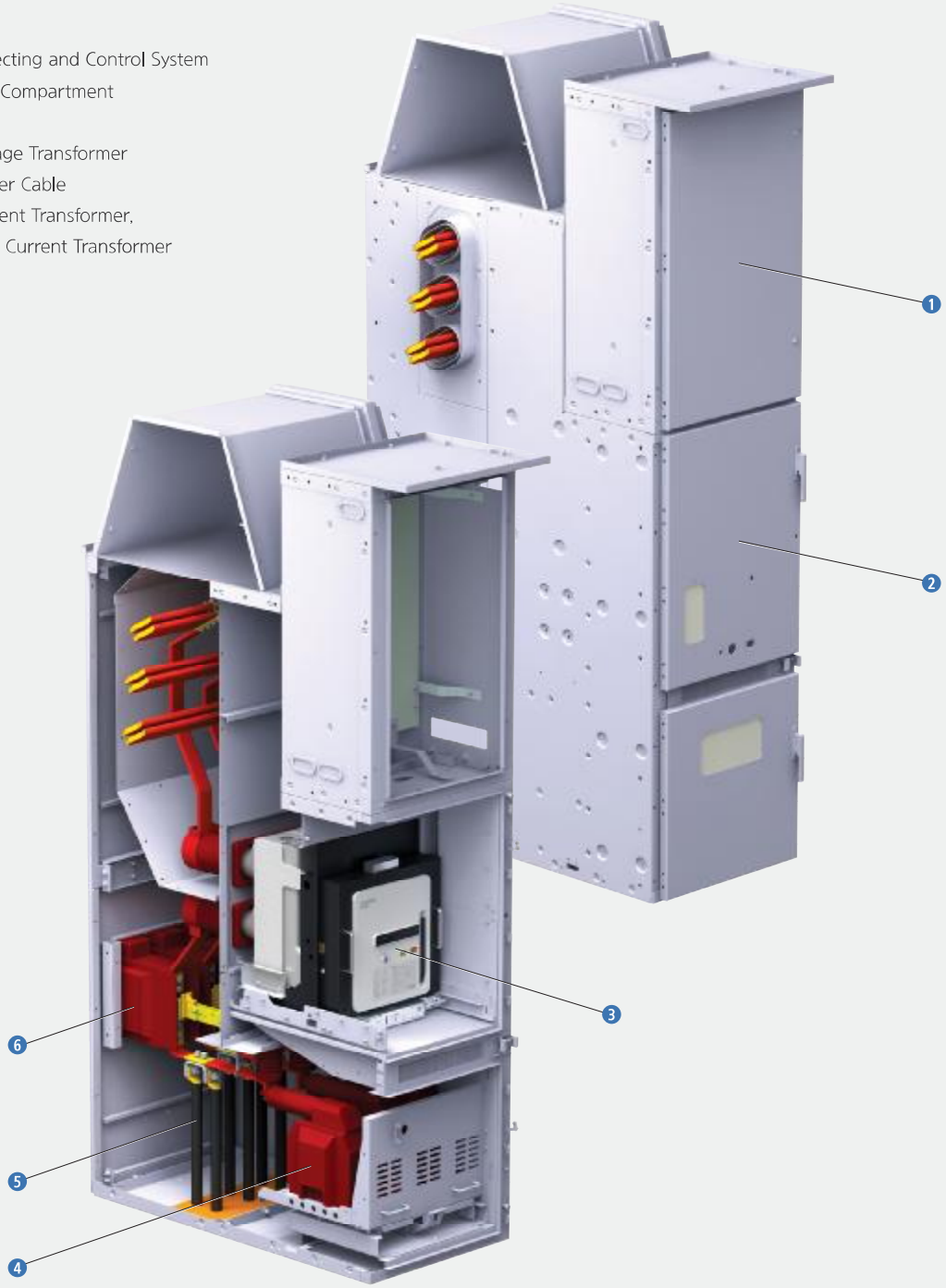
- Structure: Optimized metallic frame with metallic shutter and mold bushing.
- Method of draw-in and out: Screw type
- Features
  - Circuit breaker is isolated perfectly from bus room by safety shutter and mold bushing.
  - Isolated cover is applied to connect bus for safety.
  - Various options including earthing switch are available.

MS Type Cradle

- Structure: Optimized metallic CB compartment type
- Method of draw-in and out: Screw type
- Features
  - Can be used on front door closing condition for safety.
  - Various options including earthing switch are available.

Application to Switchgear

1. Detecting and Control System
2. VCB Compartment
3. VCB
4. Voltage Transformer
5. Power Cable
6. Current Transformer,
   Zero Current Transformer



Easy to Apply for Switchgear

M type cradle has a convenient and safe metallic isolated structure.

- Optimized metallic isolated structure
- Easy to maintenance when using draw-in and out device, truck.
  - It is available to draw-in and out only when door is closed.
  - The position indicator can show the circuit breaker condition.
- Safety function and optional parts provided.
  - Connection to control power and interlock function.
  - Earthing switch and interlock function.

MS Type Cradle

VCB in the Cradle

Cradle Empty

Cradle Front

Cradle Back

Vacuum Interrupter

High Reliability

High performance is assured based on high technique accumulated for 25 years

Compact Size and Light Weight

- Optimized size and weight based on innovative insulation technique and contact

Various Specification and Application

- Applicable breaking capacity 25 kA from 7.2 kV to 24/25 kV.
- Applicable breaking capacity 40 kA from 7.2 kV to 17.5 kV.
- Complies with international standard

Easy Maintenance

- High reliability and long life time due to very low leakage rate.
- It is possible to stay in dense vacuum environment for a long time due to special materials containing low rate of gas.

Ratings

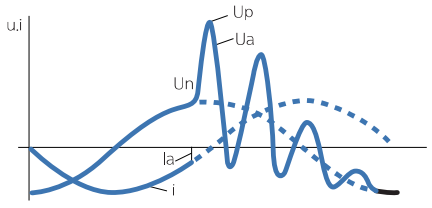
Type			HCV 3B	HCV 3D	HCV 3E	HCV 6B
Rated voltage		(kV)	7.2, 12, 17.5	7.2, 12, 17.5	7.2, 12, 17.5	24, 25.8
Rated current		(A)	630, 1,250, 2,000	1,250, 2,000	2,500, 3,150, 4,000	630, 1,250, 2,000
Rated short-circuit breaking current		(kA)	25	31.5/40	31.5/40	12.5/25
Electrical function	Rated making current	(kA)	65	104	104	65
	Rated withstand short time current	(kA/4s)	25	31.5, 40	31.5, 40	12.5, 25
	Rated frequency	(Hz)	50/60	50/60	50/60	50/60
	Power frequency withstand voltage	(kA)	38 (42)	38 (42)	38 (42)	60
	Impulse withstand voltage	(kA)	95	95	95	125
Mechanical function	Contact gap	(mm)	10 ± 1	10 ± 1	10 ± 1	12 ± 1
	Max. overtravel	(mm)	2	2	2	2
	Max. rebound	(mm)	2	2	2	2
	Average opening velocity	(m/s)	0.8 - 1.1	1.0 - 1.2	1.0 - 1.2	1.0 - 1.2
	Average closing velocity	(m/s)	0.7 - 1.0	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1
	Self closing force (at full stroke)	(kgf)	15	20	20	15
	Contact errosion limitation	(mm)	3	3	3	3
	Contact bounding	(ms)	2	2	2	2
	Mechanical life (at no-load)	(times)	30,000	30,000	30,000	30,000
	Closing force	(kgf)	250 ± 10	380 ± 10	380 ± 10	250 ± 10

Structure of Vacuum Interrupter

- HHI vacuum interrupters consist of contact tips, arc shield, bellows, ceramic, movable and fixed stems.
- The contacts are closed and opened by the motion of the movable part, which is connected to the mechanism.
- The bellows continuously preserve high vacuum condition even if VI is mechanically operated.
- The arc shield protects the ceramic insulator from losing its dielectric properties due to metal vapor.
- The materials of vacuum interrupter parts are carefully selected to enable excellent electrical characteristics in order to maintain vacuum degree for a long time.

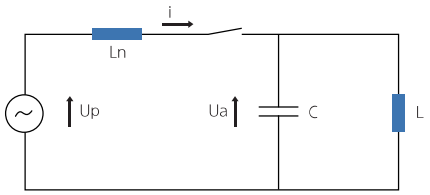
Vacuum Interrupter

Technical Information



Un: Power-frequency phase to earth voltage
Ua: Voltage at load-side breaker terminals
Up: Maximum overvoltage on the load side
I: Power-frequence current
Ia: Chopping current

(Fig.1) Overvoltage due to current chopping when interrupting an inductive current.



Un: Power-frequency phase to earth voltage
Ua: Voltage at load-side breaker terminals
I: Load current
Ln: Inductance of power system
L: Inductance of load
C: Capacitance of load

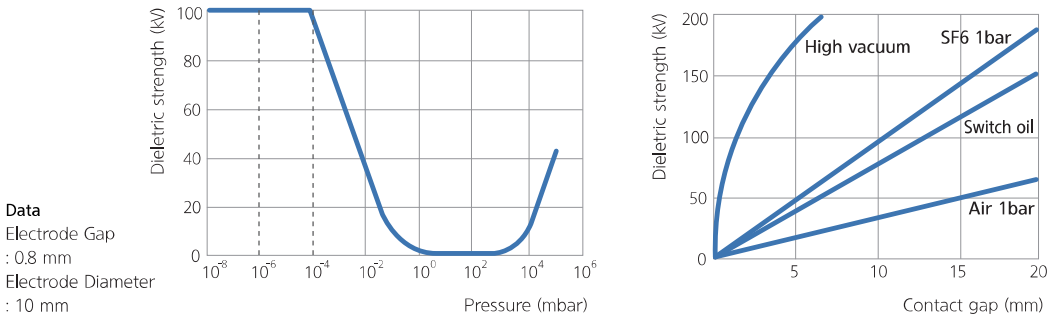
(Fig.2) Single phase equivalent circuit for interrupting inductive current

High Short-Circuit Breaking Capacity

HHI vacuum interrupter has compact size by applying AMF and RMF contact structure.

Low Chopping Current

It is possible to affect another equipment by transient voltage occurred on breaking the metal vapor arc condition under the low level current. HG-Series vaccum interrupter keeps the chopping current below 5 A by using CuCr contact.



(Fig.3) Dieletric strength in vacuum

High Dielectric Strength

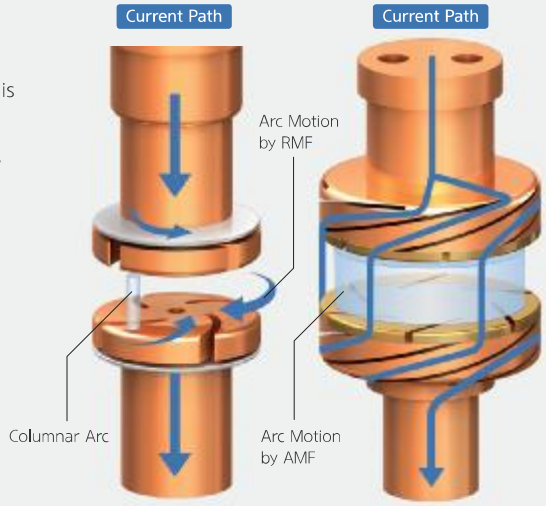
After contact is opened, short-circuit current remains as metal vapor in arc or plasma state between contacts.
Arc is extincted at current zero point and metal vapor loses its electric conductive character in few seconds.
Dielectric strength in vacuum condition is recovered soon.
The steady state pressure in a vacuum interrupter is less than 1×10^{-7} mbar so that VI has high dielectric strength.

Minimal Contact Stress

Electrical life time has been improved by minimizing contact stress through improved characteristics of arc voltage and arcing time.

Arc Quenching

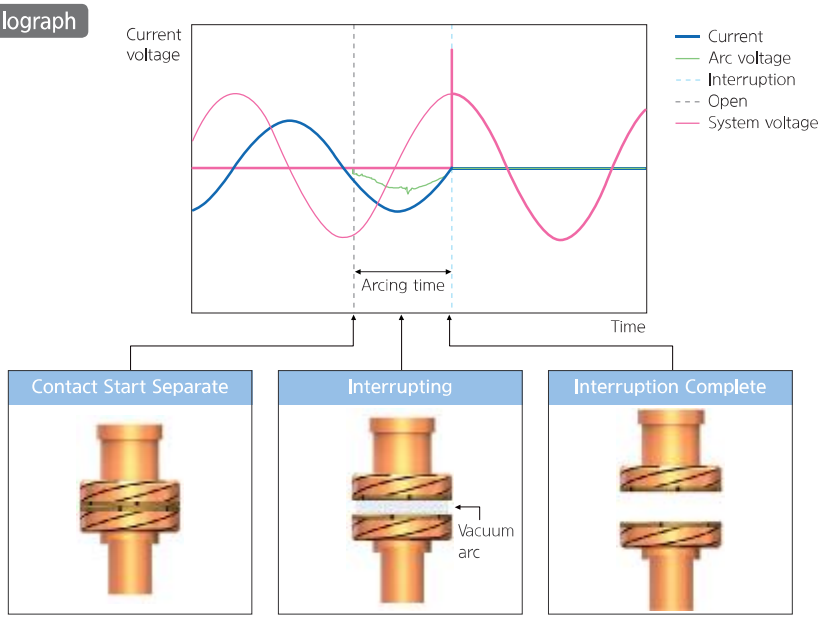
It is called "Pinch Effect" that high temperature arc is accumulated in a point of unprocessed flat contact when it is opened.
In order to prevent this phenomenon, AMF and RMF type is applied and by doing this, arc gas can be evenly distributed on the surface of contact.



Characteristic of Breaking Current

When the contact is opened, the arc is occurred between the contacts and is continued until next current zero point.
When this happens, the arc gas causes metal vapor due to melting of contact and if it is accumulated at one point, it results in decline of breaking characteristic due to gradual increase in metal vapor.
Therefore, it is important to prevent overheating of specific parts in order to improve breaking characteristic.
HG-Series VCB applied RMF and AMF type VI as arc quenching technology.
RMF (Radial magnetic field) is the VI type to quench arc by revolving radial direction magnetic field.
Likewise, AMF (Axial magnetic field) is the VI type to quench arc by spreading axial direction magnetic field.

Interruption Oscillograph



Service Environment

Standard Service Environment

All values below are in accordance with IEC 62271-100 (IEC 62271-1).

| Usual Temperature | -5 ~ +40 ℃ (24 hours average temperature is below 35 ℃)
| Usual Altitude | 1,000 m or less above sea level
| Relative Humidity | 95 % or less (24 hours average value is below 95 %)

※ Please read and understand these instructions prior to product operation because environmental condition can affect performance and durability of the product directly.

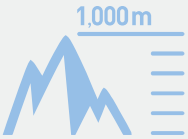
If ambient temperature is above 40 ℃, please use the product according to compensated current [Derating]

When you use the product in a humid and wet place, insulation performance of product may slow down.

It is better to use dust cover or a desiccant, if you use the product in high humidity and dusty places. External shock and vibration can cause damage in operating mechanism of product.

When circuit breaker is closed or tripped for long time, you should switch the load current periodically for keeping performance of insulation.

If circuit breaker is stored in corrosive condition, please keet the circuit breaker in enclosed room to minimize the damage.



Circuit breaker's insulation strength may decline at high altitudes.
Please adopt upper rating model after checking compensation factor for insulation.

Abnormal Service Condition

HG-Series vacuum circuit breaker is designed and manufactured to use in standard service condition designated by IEC.
If you use our circuit breaker in abnormal condition as listed below, please consult us in advance.

- Where the altitudes and ambient temperature are over the standard service condition.
- Coastal area with high concentration of salt and sea wind.
- Frozen area with heavy snow and ice
- Places where frequent shocks and vibration occur
- Humid place where humiditiy exceeds the standard service condition
- Rainfall region with high humidity
- Dusty places, corrosive and flammable condition
- Other conditions out of standard service condition

Compensated Insulation Performance Above 1,000 m from Sea Level

As altitude level increases the insulation performance decreases. Thus, you should select a product considering the compensated factors below.

※ **VCB select ≥ Rated voltage under power-frequency withstand voltage and BIL x Compensated factor**

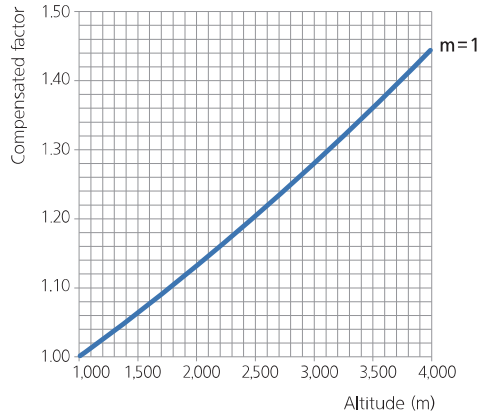
Example) To select VCB using condition rated voltage 7.2 kV, altitude 2,000 M

Rated voltage: 7.2 kV, altitude: 2,000 M

- Compensated factor: 1.13
- Rated BIL: 60 kV
- Power frequency withstand voltage: 20 kV / min
- Compensated power frequency withstand voltage: 20 x 1.13 = 22.6 kV / min
- Compensated BIL: 60 x 1.13 = 67.8 kV

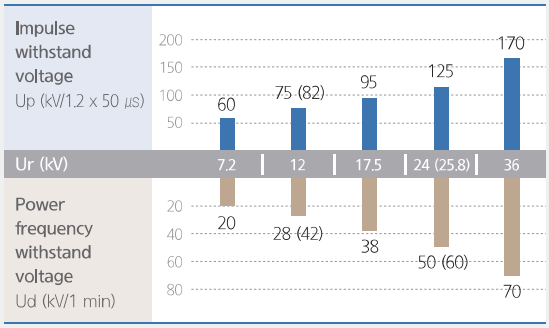
Therefore, it is appropriate to select 12 kV VCB.

When Altitude Above Sea Level is More Than 1,000 m



Altitude	1,000 m	1,500 m	2,000 m	2,500 m	3,000 m
Compensated Factor	1.0	1.06	1.13	1.2	1.28

Withstand Voltage Criteria According to IEC 62271-1



Rated Current Compensation According to the Ambient Temperature

When Ambient Temperature is Above 40 °C

If ambient temperature is over the standard, you must compensate the rated current as below formula.

$$I_s = I_r \sqrt{\left\{ \frac{\theta_{max} - \theta_\alpha}{\theta_\gamma} \right\}}$$

I_s : Compensated rated continuous current

I_r : Rated current (-5 - +40 °C)

θ_{max} : Allowable max. temperature

θ_α : Ambient temperature

θ_γ : Max. acceptable temperature at VCB

Example) To calcuate compensated rated current of 2,000 A under ambient temperature 50 °C

$$2{,}000 \times \sqrt{\frac{105-50}{65}} = 1{,}840 \text{ A}$$

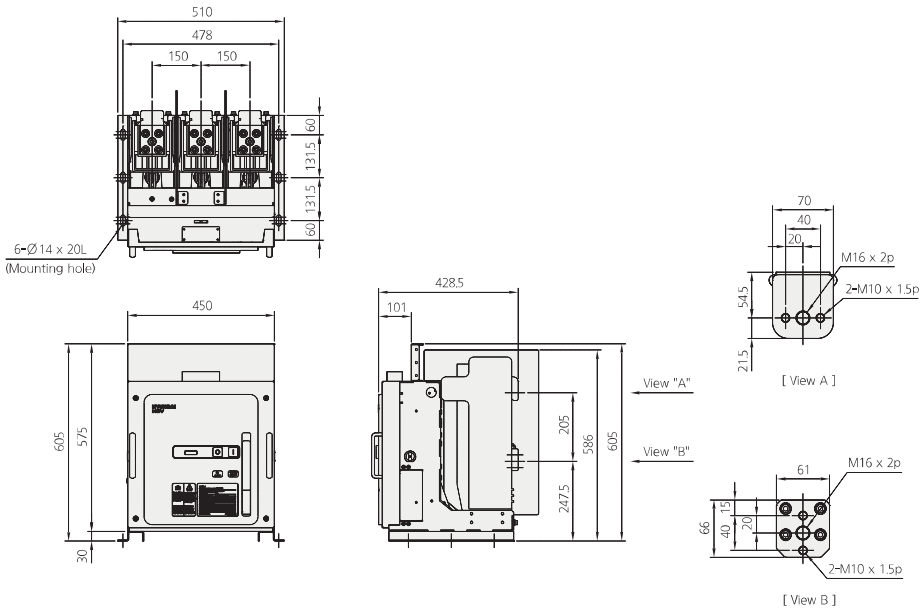
Allowable Load Current by Ambient Temperature

Rated Current	Ambient Temperature (°C)				
	-5 - 40	45	50	55	60
4,000	4,000	3,843	3,679	3,508	3,328
3,150	3,150	3,026	2,898	2,763	2,621
2,500	2,500	2,402	2,300	2,193	2,080
2,000	2,000	1,922	1,840	1,754	1,664
1,250	1,250	1,201	1,150	1,096	1,040
630	630	605	580	553	524

Dimensions (VCB)

HGV 1141, 1142, 2141, 2142-XA (7.2 / 12 kV) Fixed Type

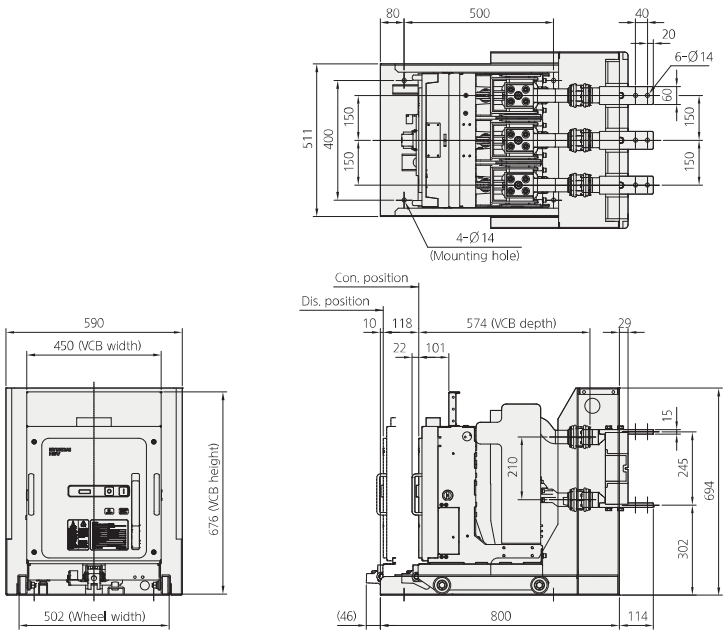
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1141, 1142-ES (7.2 kV) Draw-In and Out, Lever Type

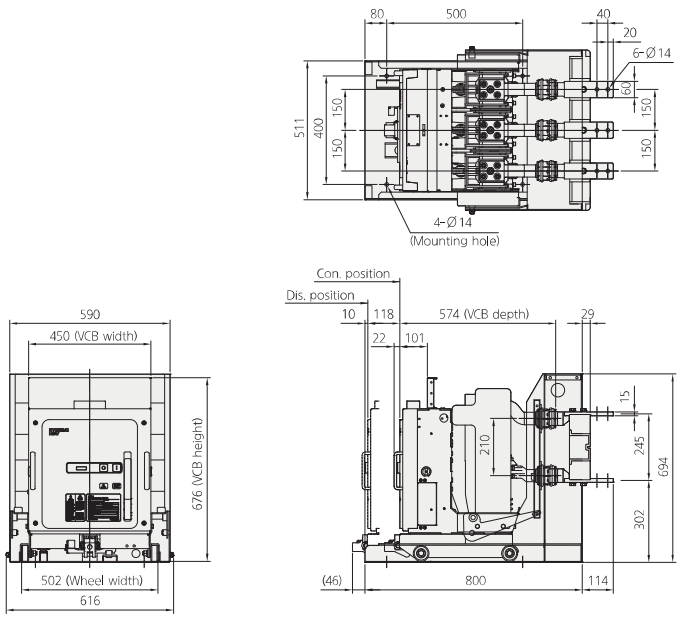
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1141, 1142-FS (7.2 kV) Draw-In and Out, Lever Type

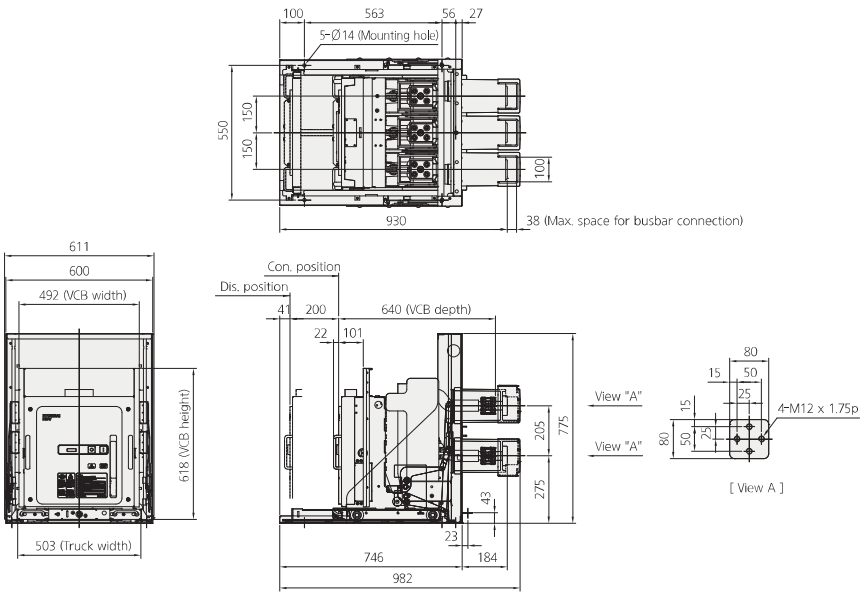
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1141, 1142, 2141, 2142-GS (7.2 / 12 kV) Draw-In and Out, Screw Type

(Unit: mm)

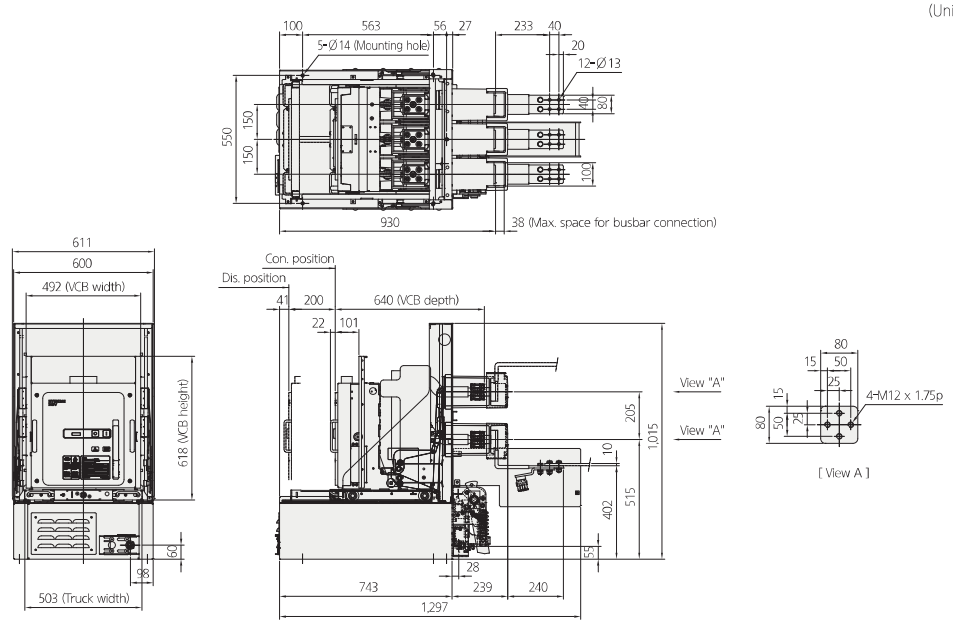


※ Dimensions may be revised without notice.

Dimensions

HGV 1141, 1142, 2141, 2142-GE (7.2 / 12 kV) Draw-In and Out, Screw Type

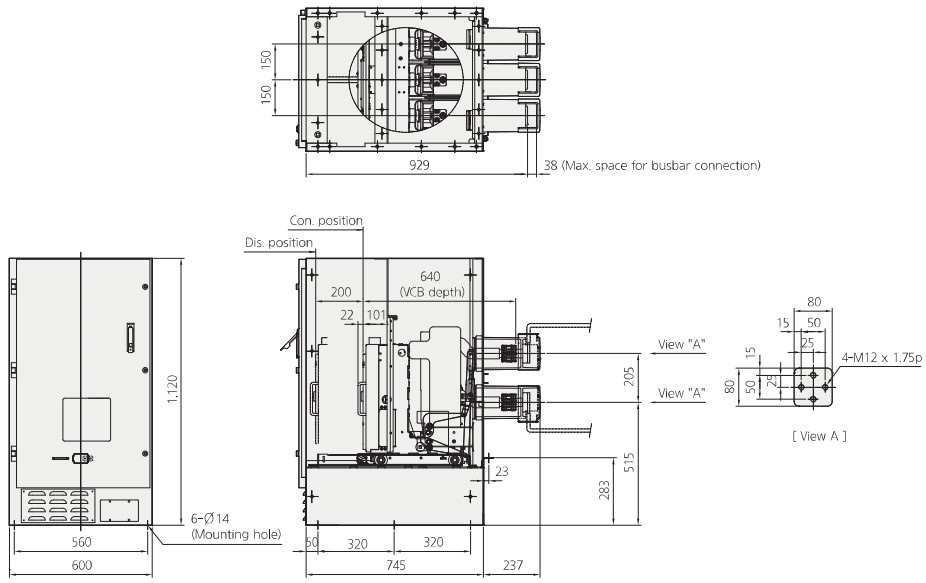
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1141, 1142, 2141, 2142-MS (7.2 / 12 kV) Draw-In and Out, Screw Type

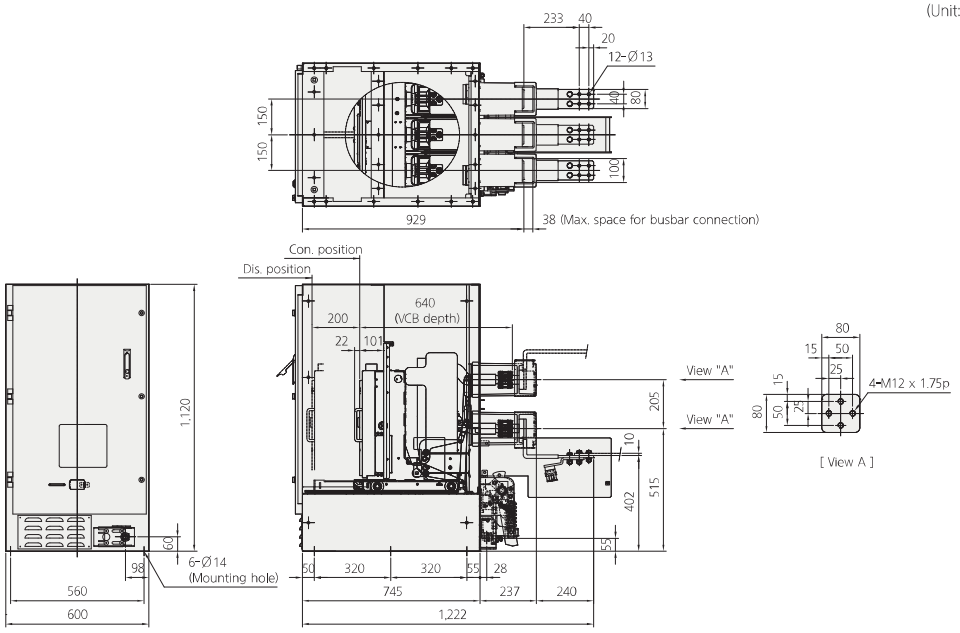
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1141, 1142, 2141, 2142-ME (7.2 / 12 kV) Draw-In and Out, Screw Type

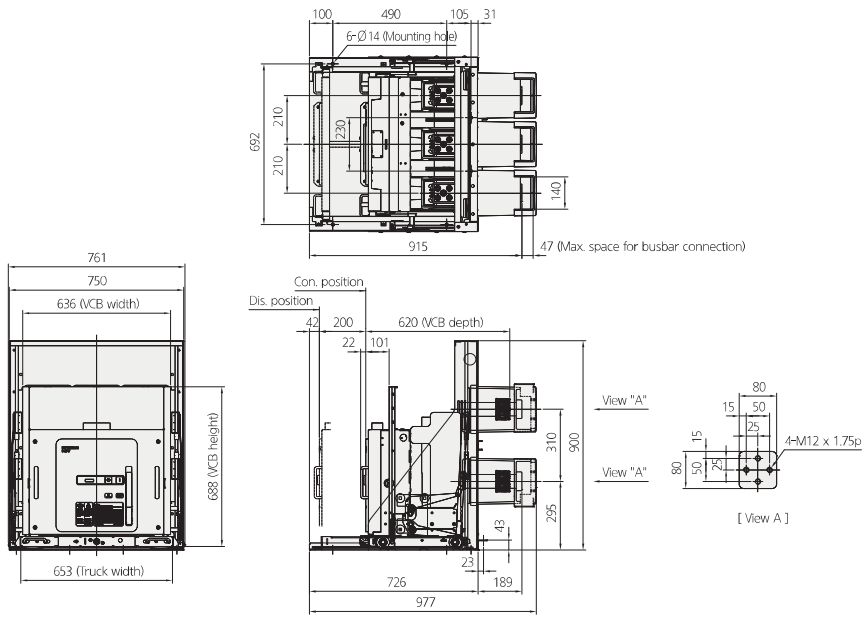
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1141, 1142, 1144, 2141, 2142, 2144-GS (7.2 / 12 kV) Draw-In and Out, Screw Type

(Unit: mm)



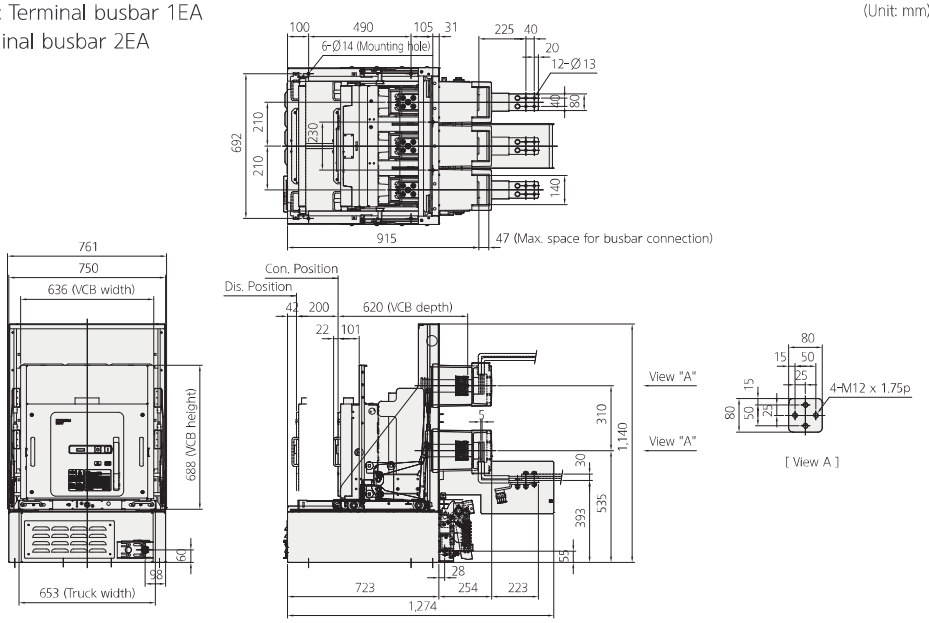
※ Dimensions may be revised without notice.

Dimensions

HGV 1141, 1142, 1144, 2141, 2142, 2144-GE (7.2 / 12 kV) Draw-In and Out, Screw Type

- 630 / 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

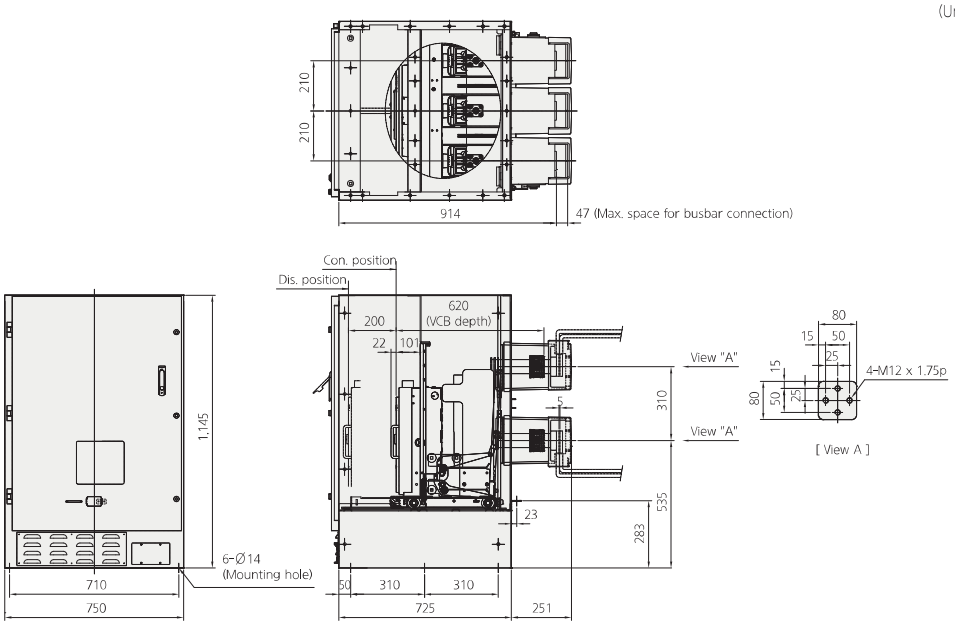
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1141, 1142, 1144, 2141, 2142, 2144-MS (7.2 / 12 kV) Draw-In and Out, Screw Type

(Unit: mm)

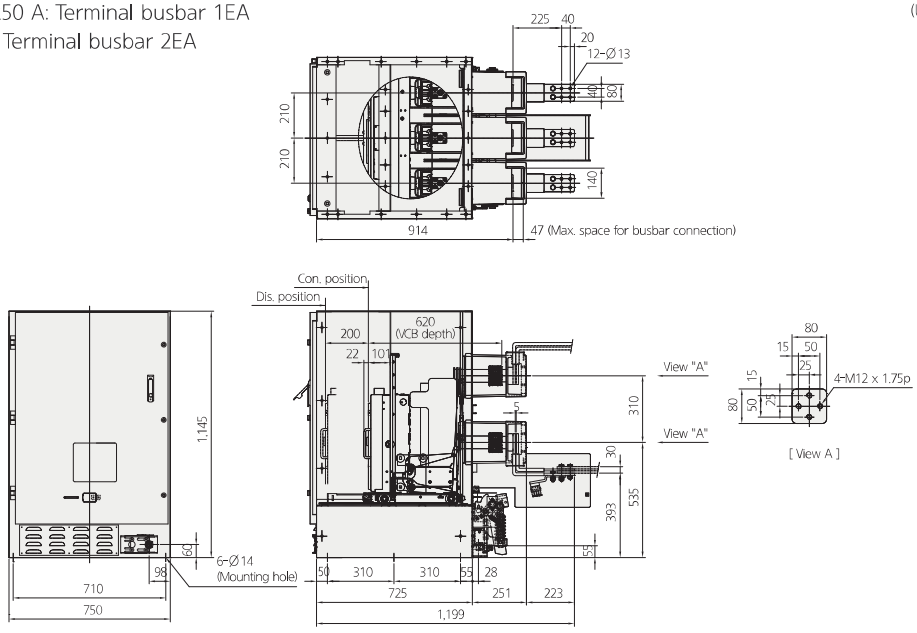


※ Dimensions may be revised without notice.

HGV 1141, 1142, 1144, 2141, 2142, 2144-ME (7.2 / 12 kV) Draw-In and Out, Screw Type

- 630 / 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

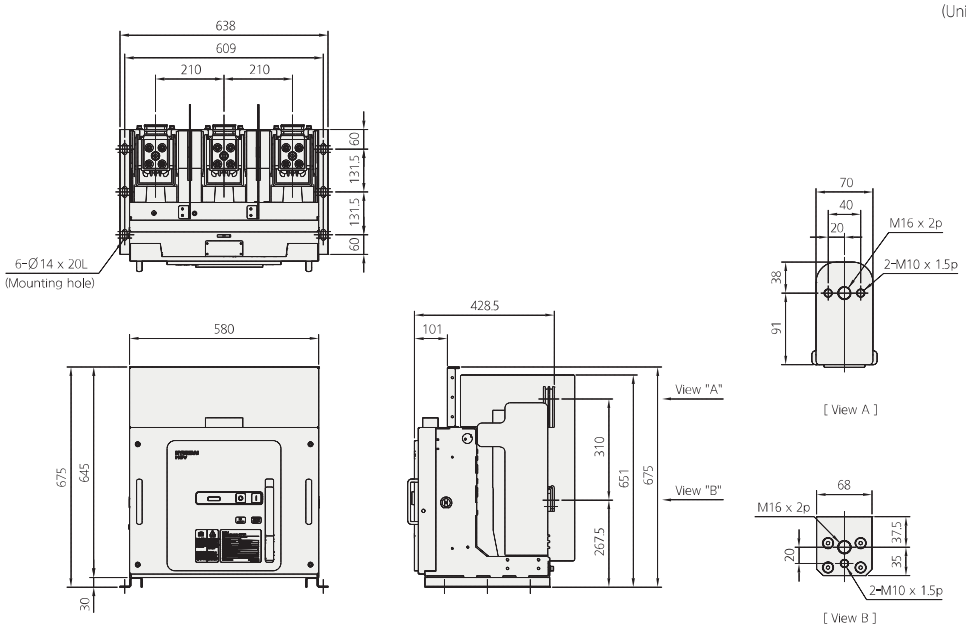
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1144, 2144-XA (7.2 / 12 kV) Fixed Type

(Unit: mm)

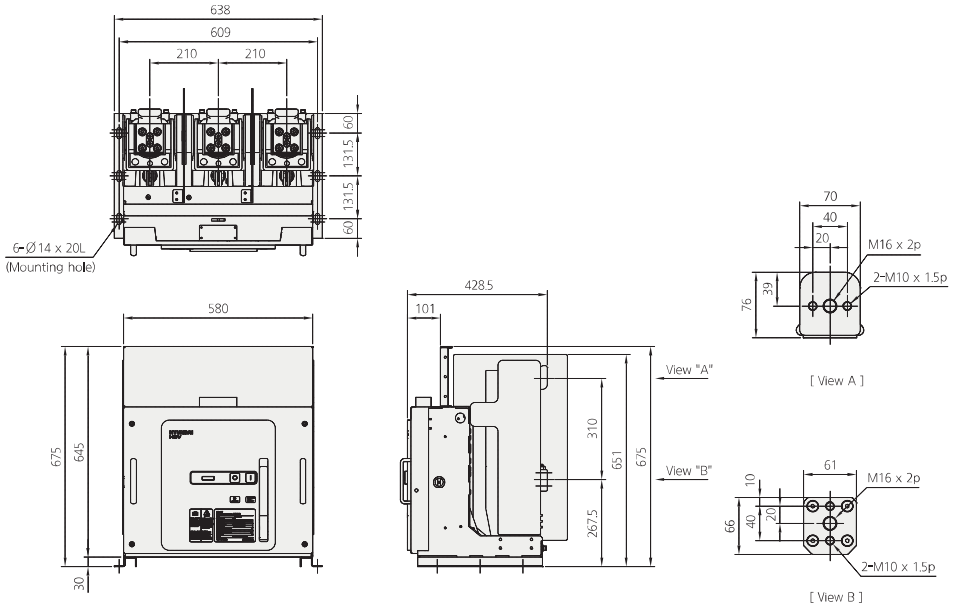


※ Dimensions may be revised without notice.

Dimensions

HGV 1152, 1162, 2152, 2162-XA (7.2 / 12 kV) Fixed Type

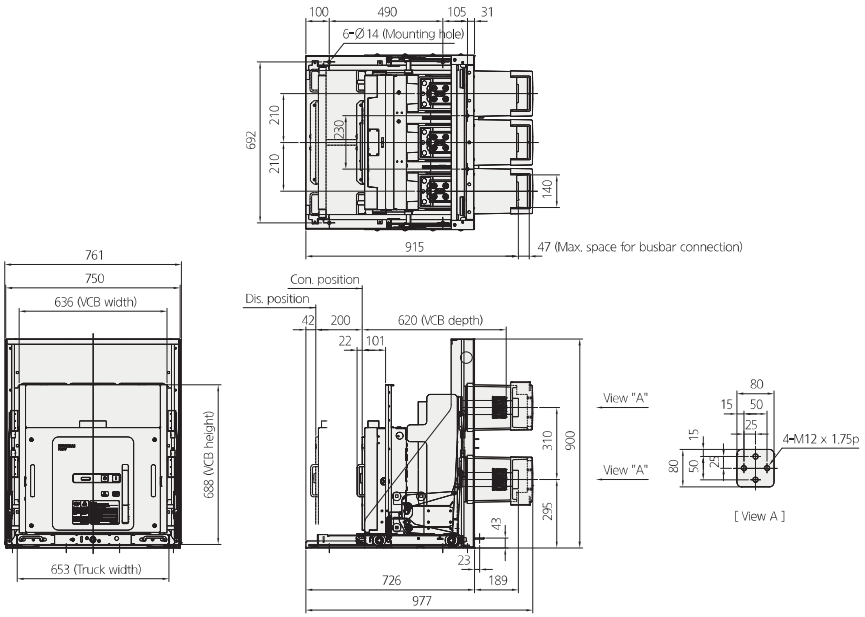
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1152, 1154, 1162, 1164, 2152, 2154, 2162, 2164-GS (7.2 / 12 kV) Draw-In and Out, Screw Type

(Unit: mm)

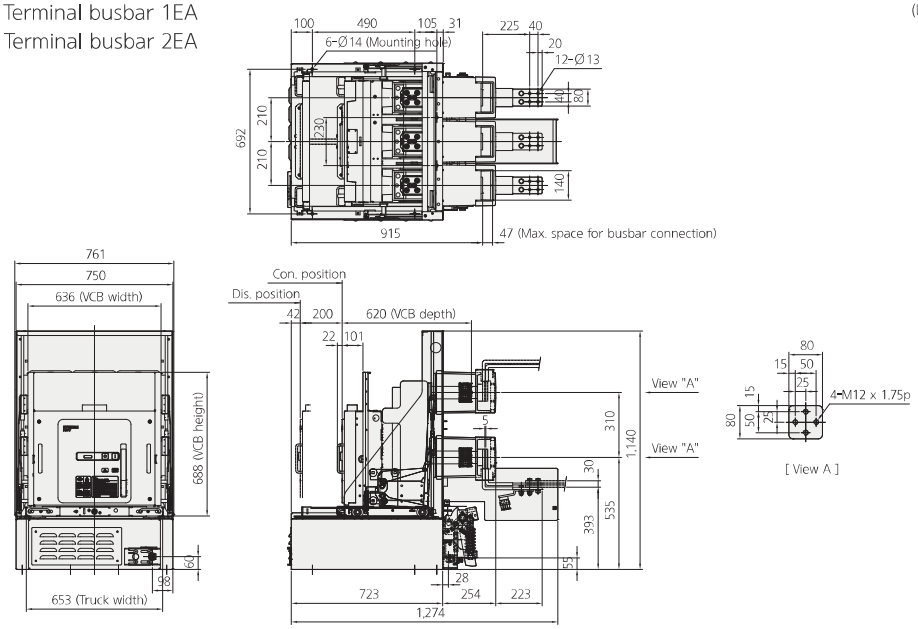


※ Dimensions may be revised without notice.

HGV 1152, 1154, 1162, 1164, 2152, 2154, 2162, 2164-GE (7.2 / 12 kV) Draw-In and Out, Screw Type

- 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

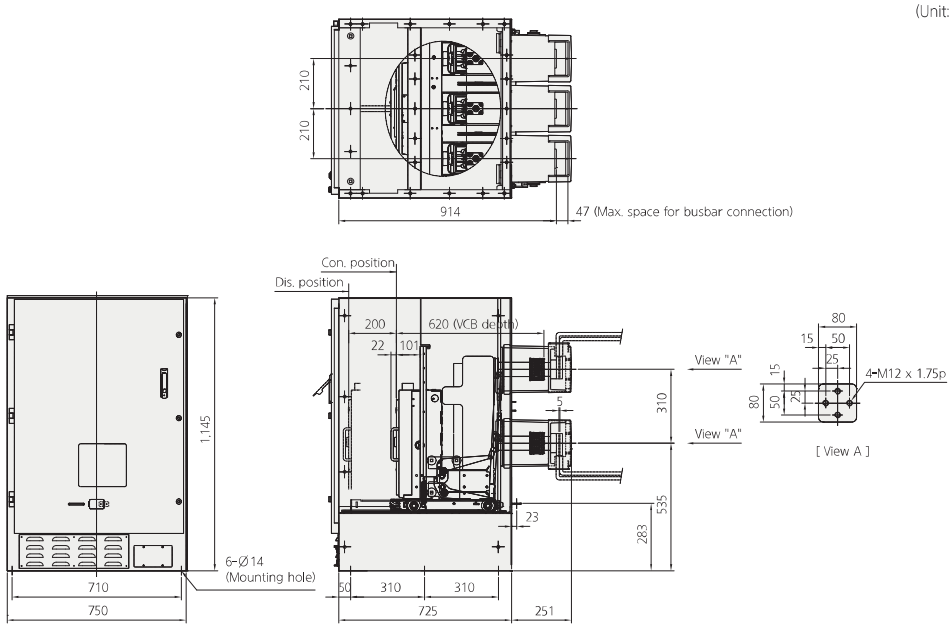
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1152, 1154, 1162, 1164, 2152, 2154, 2162, 2164-MS (7.2 / 12 kV) Draw-In and Out, Screw Type

(Unit: mm)



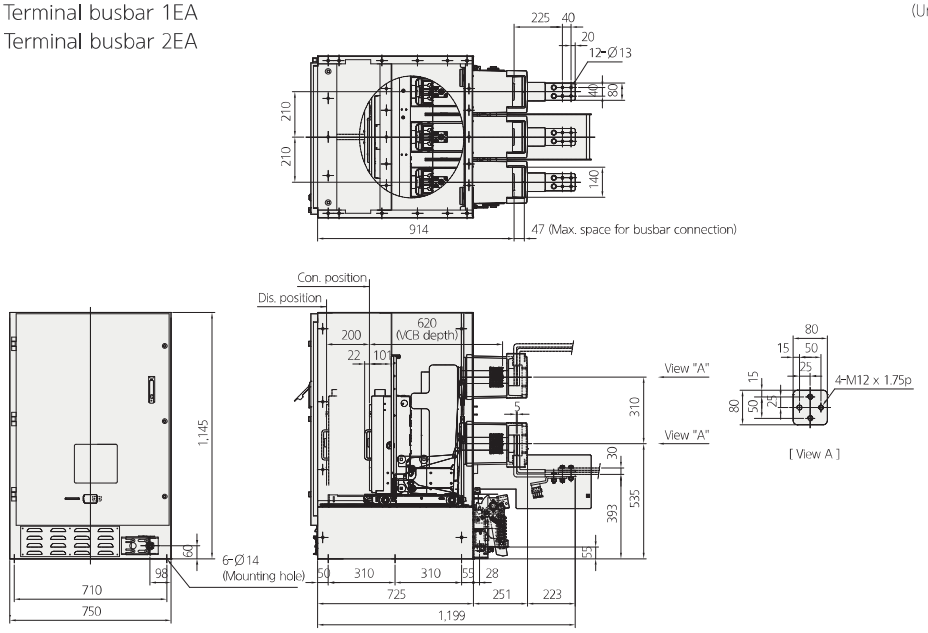
※ Dimensions may be revised without notice.

Dimensions

HGV 1152, 1154, 1162, 1164, 2152, 2154, 2162, 2164-ME (7.2 / 12 kV) Draw-In and Out, Screw Type

- 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

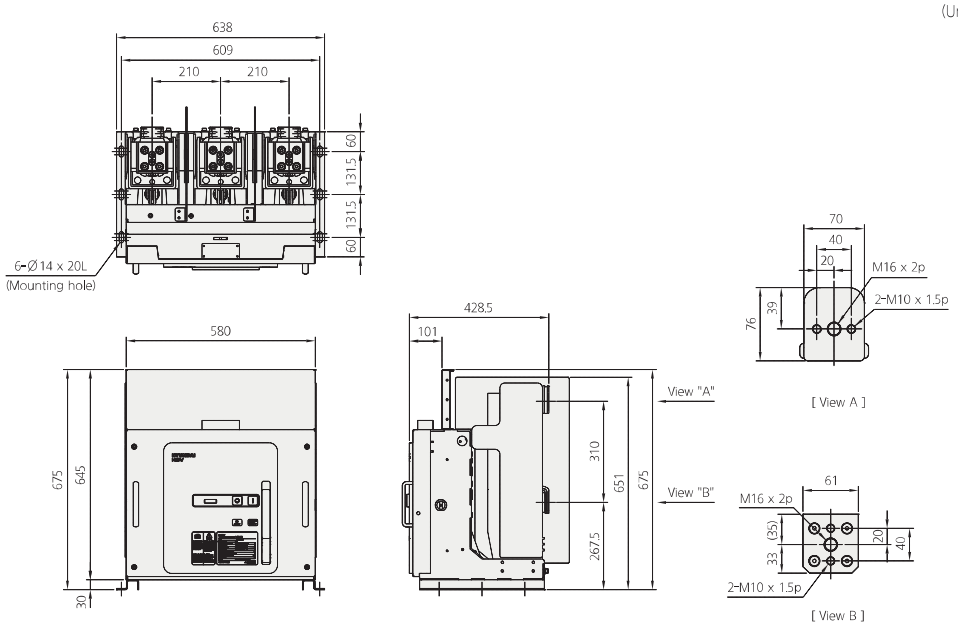
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 1154, 1164, 2154, 2164-XA (7.2 / 12 kV) Fixed Type

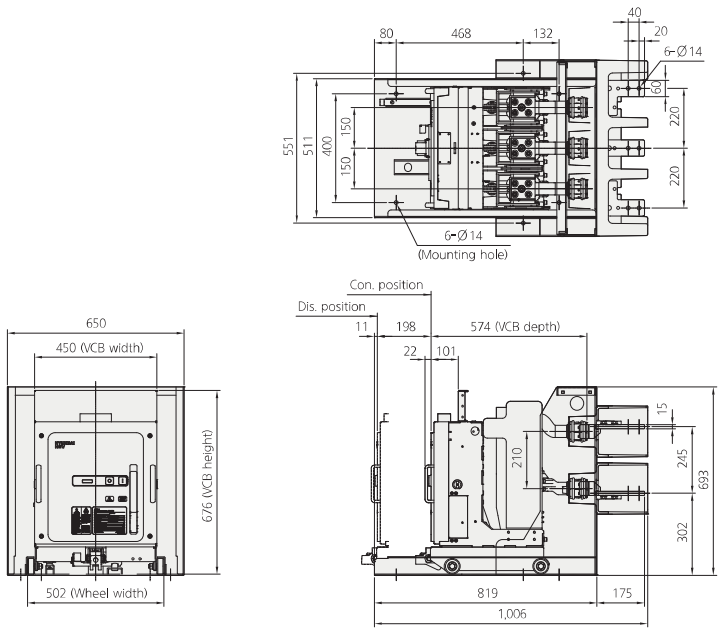
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 2141, 2142-ES (12 kV) Draw-In and Out, Lever Type

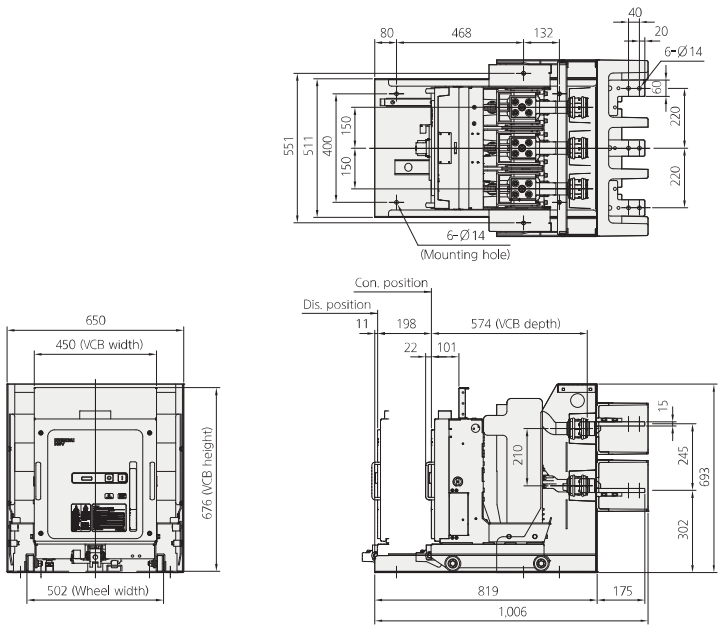
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 2141, 2142-FS (12 kV) Draw-In and Out, Lever Type

(Unit: mm)

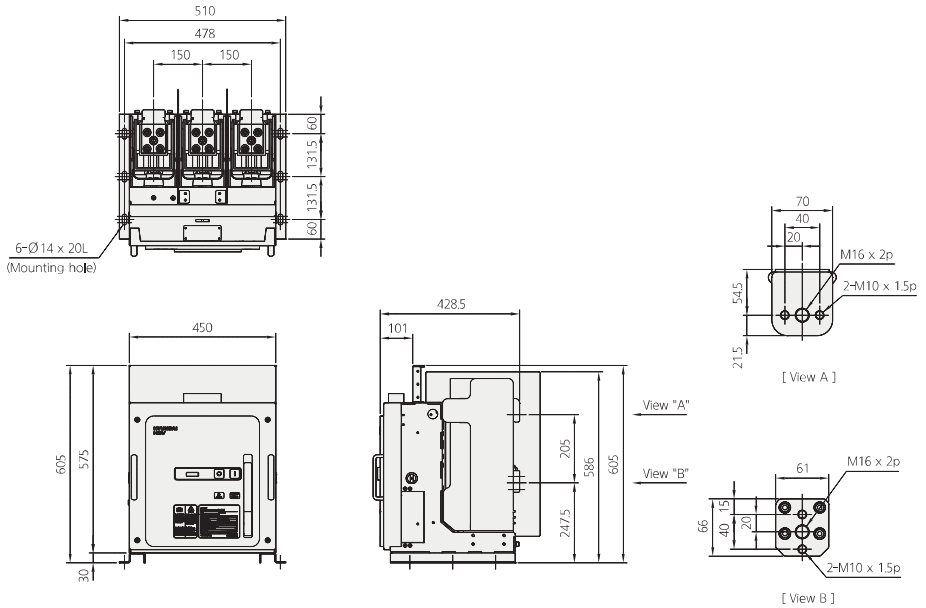


※ Dimensions may be revised without notice.

Dimensions

HGV 3141, 3142-XA (17.5 kV) Fixed Type

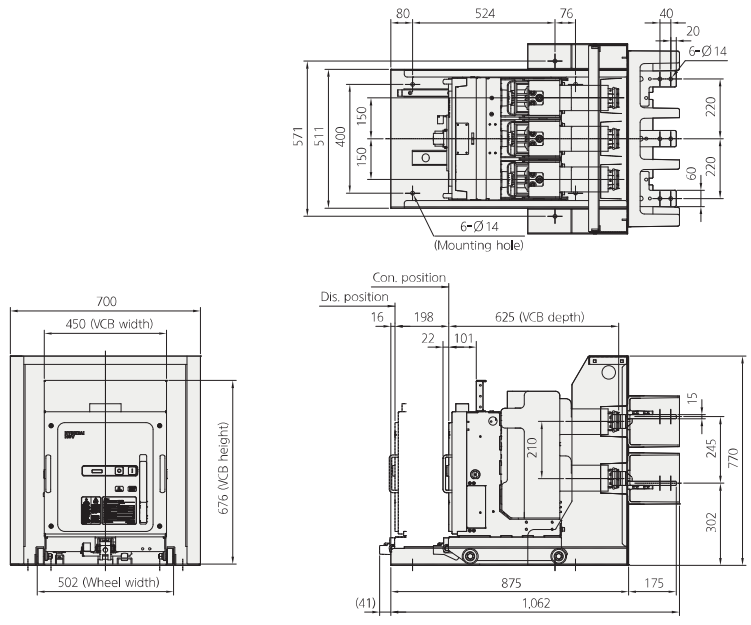
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3141, 3142-ES (17.5 kV) Draw-In and Out, Lever Type

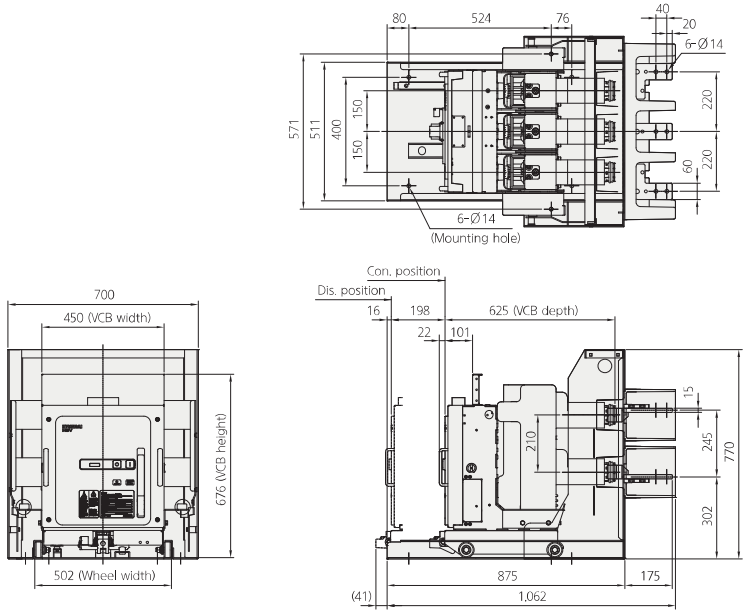
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3141, 3142-FS (17.5 kV) Draw-In and Out, Lever Type

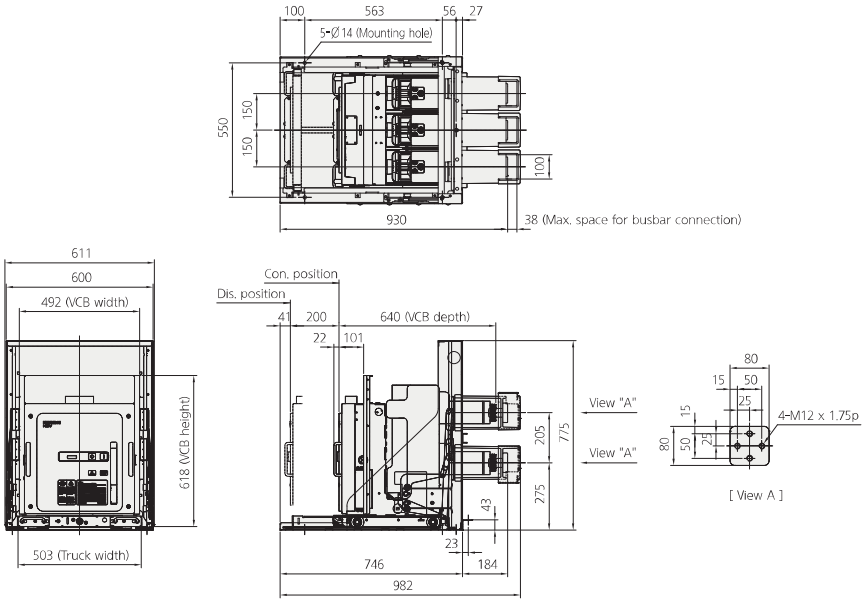
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3141, 3142-GS (17.5 kV) Draw-In and Out, Screw Type

(Unit: mm)

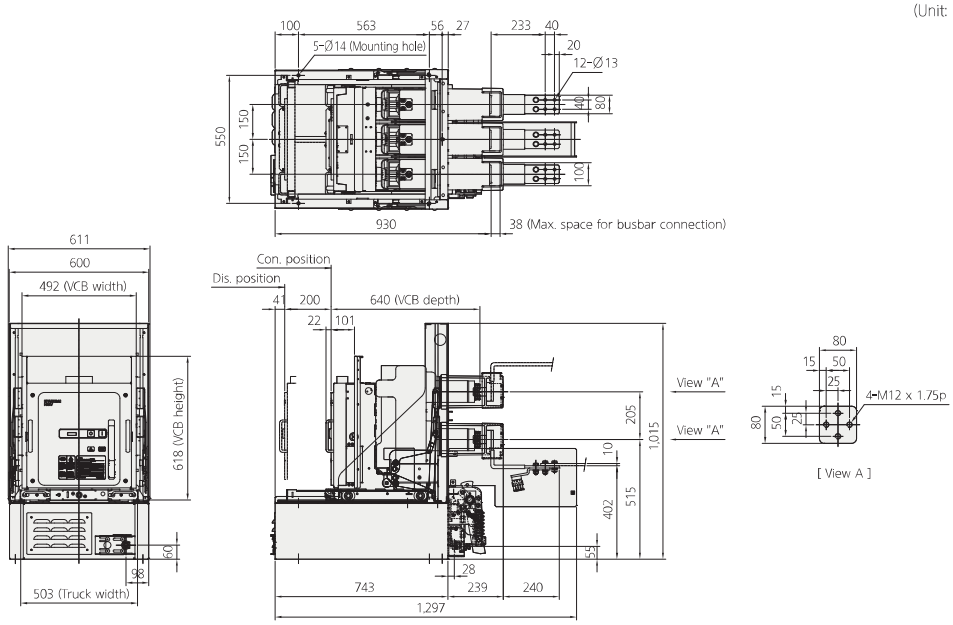


※ Dimensions may be revised without notice.

Dimensions

HGV 3141, 3142-GE (17.5 kV) Draw-In and Out, Screw Type

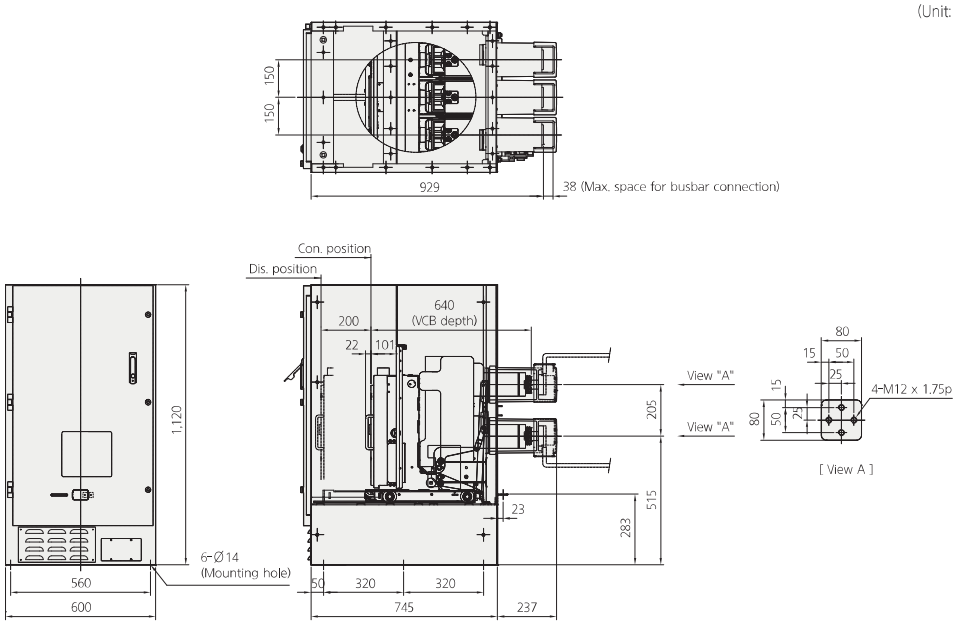
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3141, 3142-MS (17.5 kV) Draw-In and Out, Screw Type

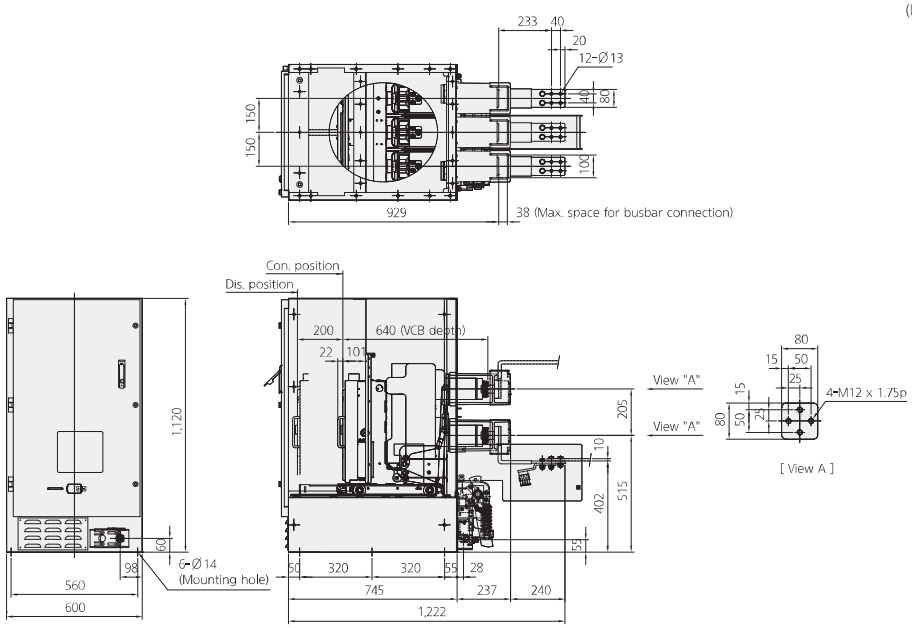
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3141, 3142-ME (17.5 kV) Draw-In and Out, Screw Type

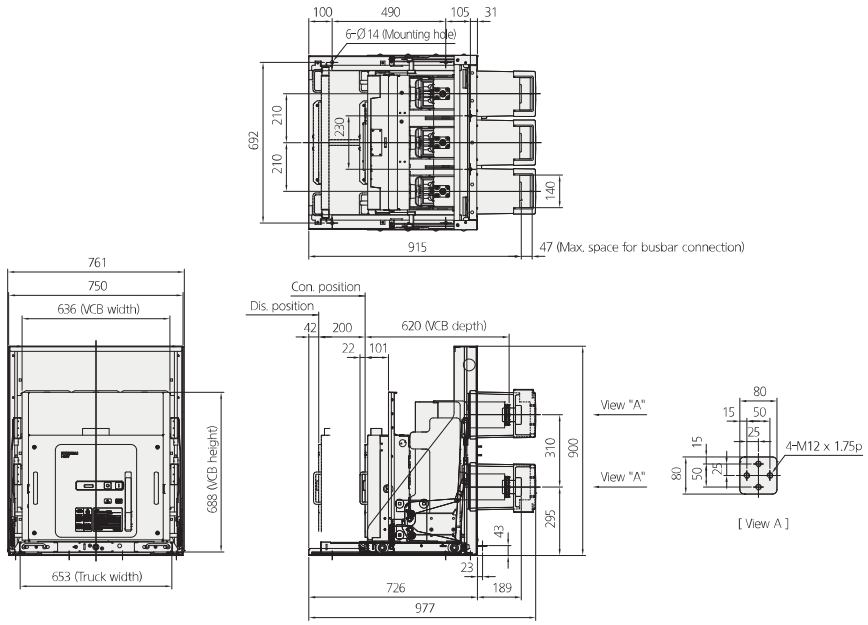
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3141, 3142, 3144-GS (17.5 kV) Draw-In and Out, Screw Type

(Unit: mm)



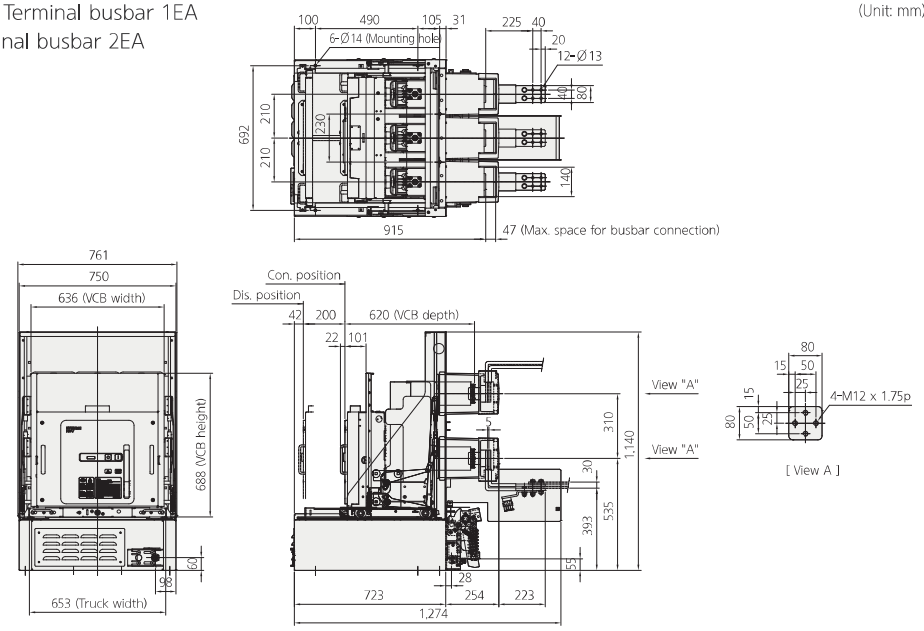
※ Dimensions may be revised without notice.

Dimensions

HGV 3141, 3142, 3144-GE (17.5 kV) Draw-In and Out, Screw Type

- 630 / 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

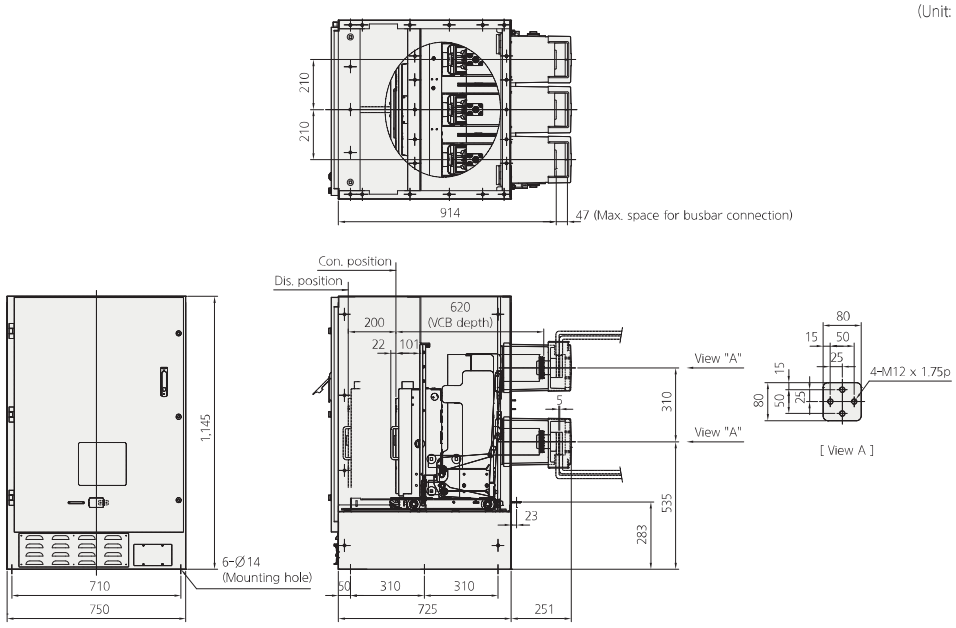
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3141, 3142, 3144-MS (17.5 kV) Draw-In and Out, Screw Type

(Unit: mm)

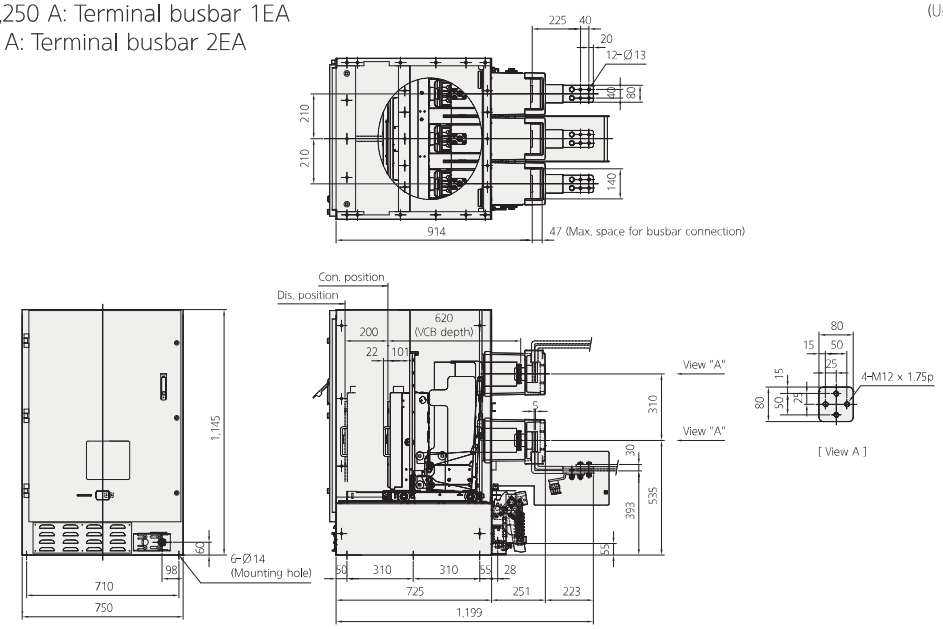


※ Dimensions may be revised without notice.

HGV 3141, 3142, 3144-ME (17.5 kV) Draw-In and Out, Screw Type

- 630/1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

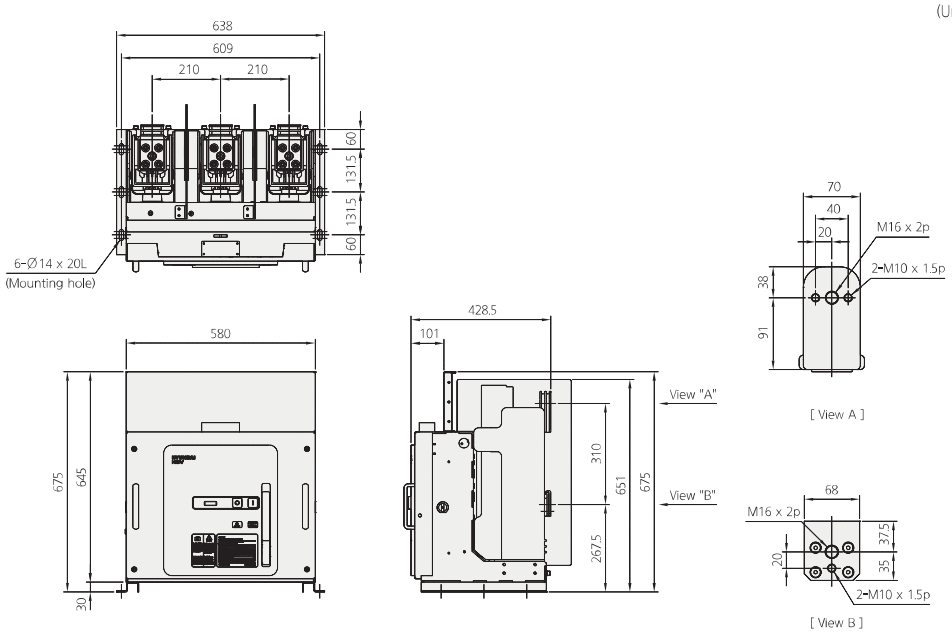
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3144-XA (7.2 / 12 / 17.5 kV) Fixed Type

(Unit: mm)

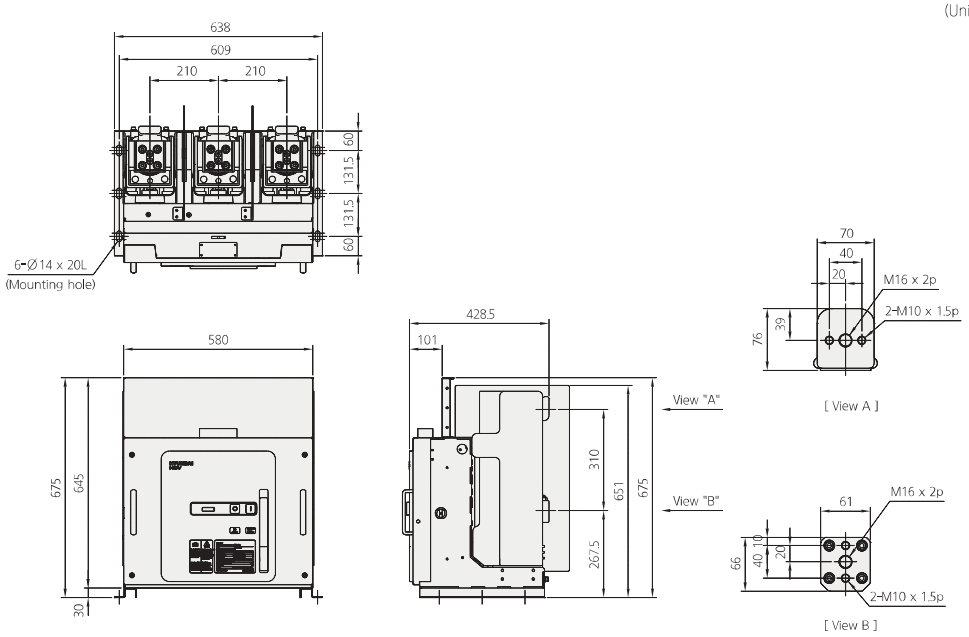


※ Dimensions may be revised without notice.

Dimensions

HGV 3152, 3162-XA (17.5 kV) Fixed Type

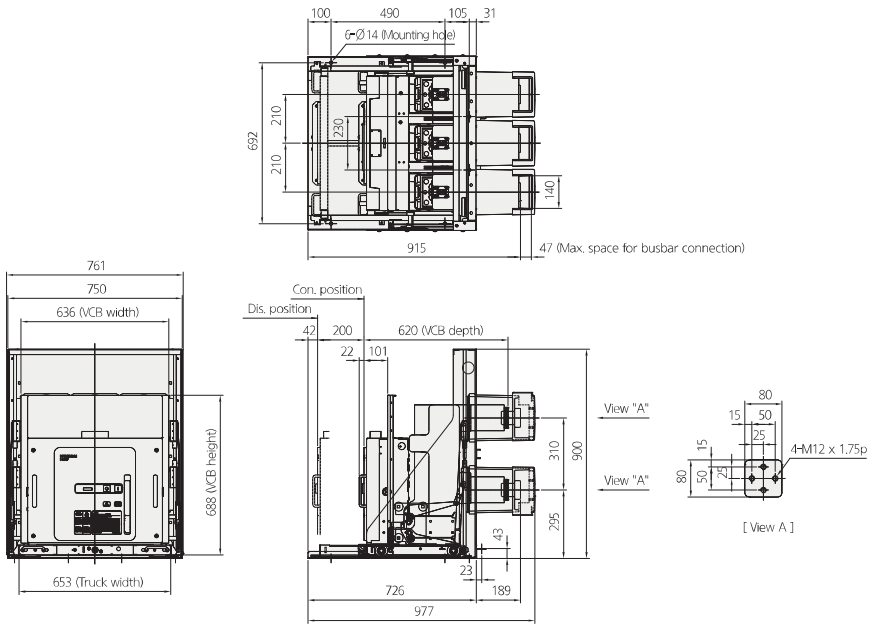
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3152, 3154, 3162, 3164-GS (17.5 kV) Draw-In and Out, Screw Type

(Unit: mm)

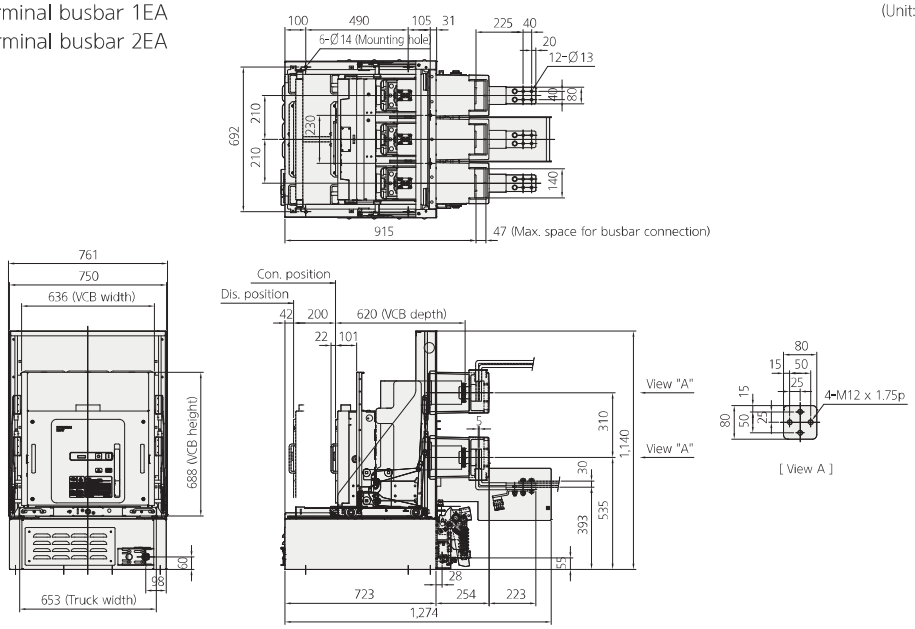


※ Dimensions may be revised without notice.

HGV 3152, 3154, 3162, 3164-GE (17.5 kV) Draw-In and Out, Screw Type

- 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

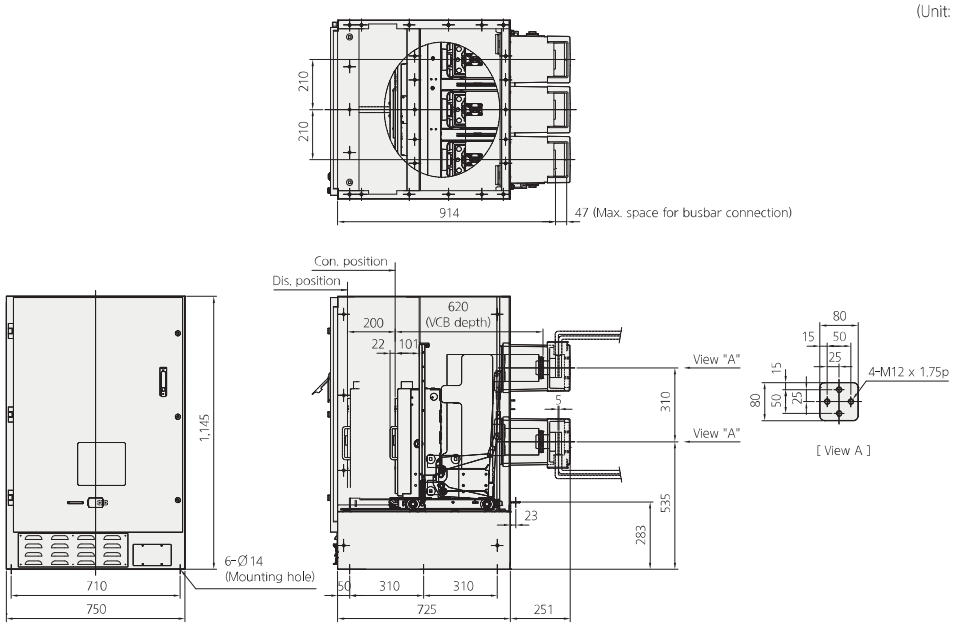
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3152, 3154, 3162, 3164-MS (17.5 kV) Draw-In and Out, Screw Type

(Unit: mm)



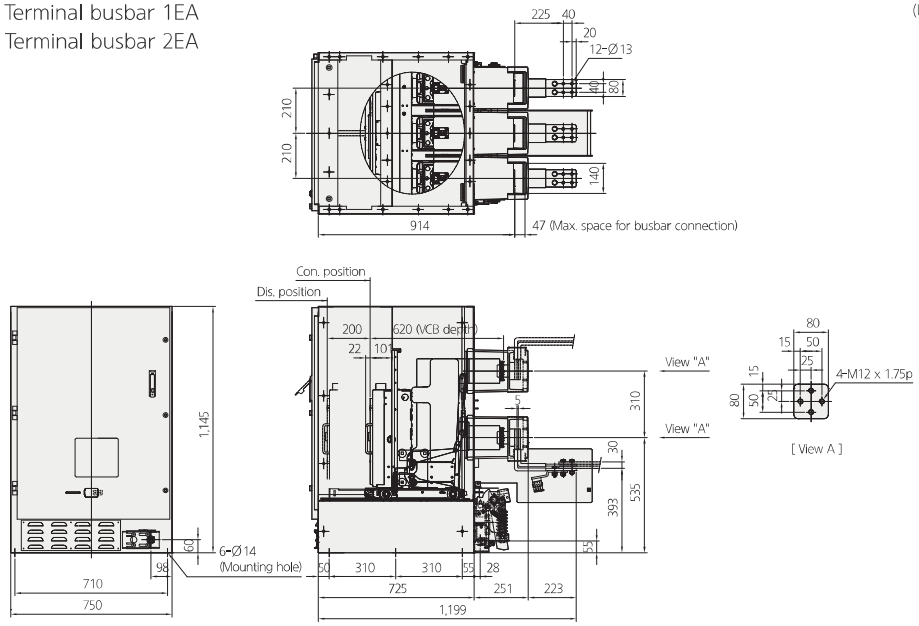
※ Dimensions may be revised without notice.

Dimensions

HGV 3152, 3154, 3162, 3164-ME (17.5 kV) Draw-In and Out, Screw Type

- 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

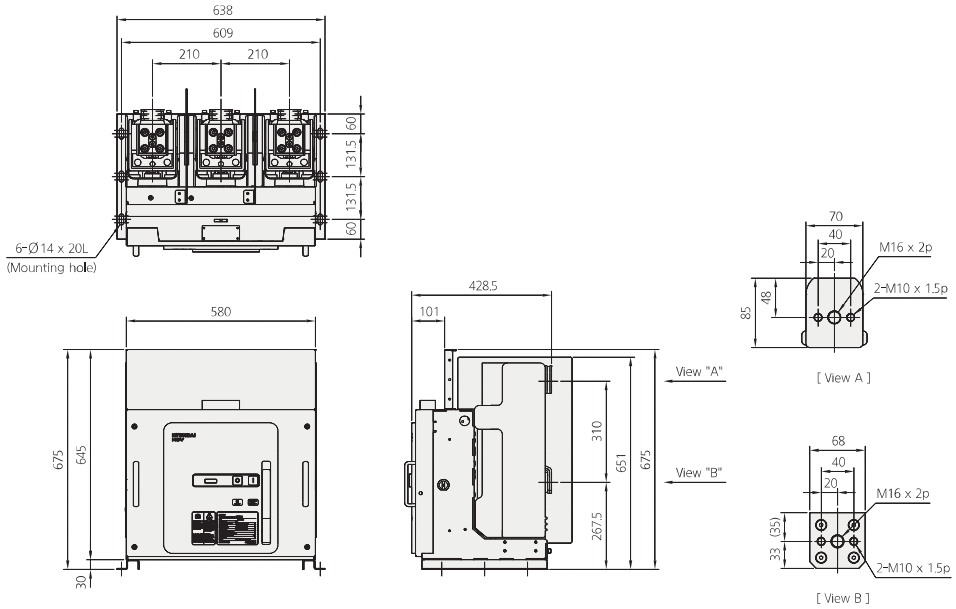
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 3154, 3164-XA (17.5 kV) Fixed Type

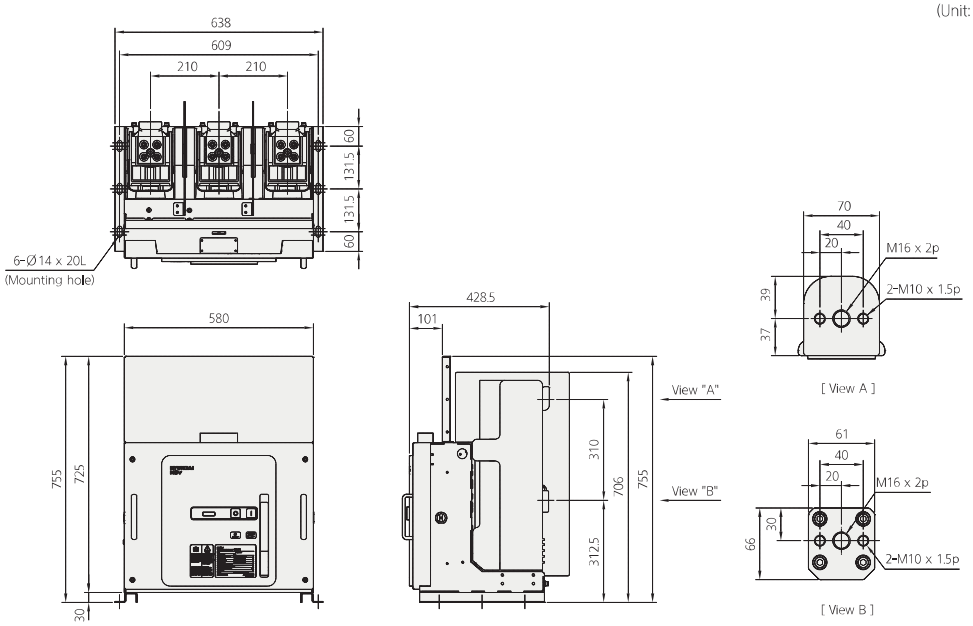
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 6111, 6112, 6141, 6142-XA (24 / 25.8 kV) Fixed Type

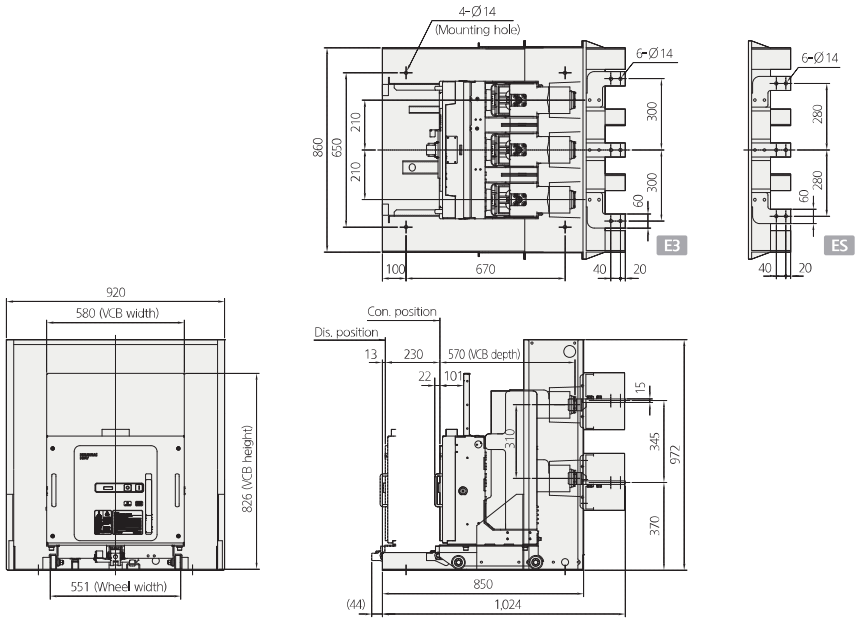
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 6111, 6112, 6141, 6142-ES/E3 (24 / 25.8 kV) Draw-In and Out, Lever Type

(Unit: mm)

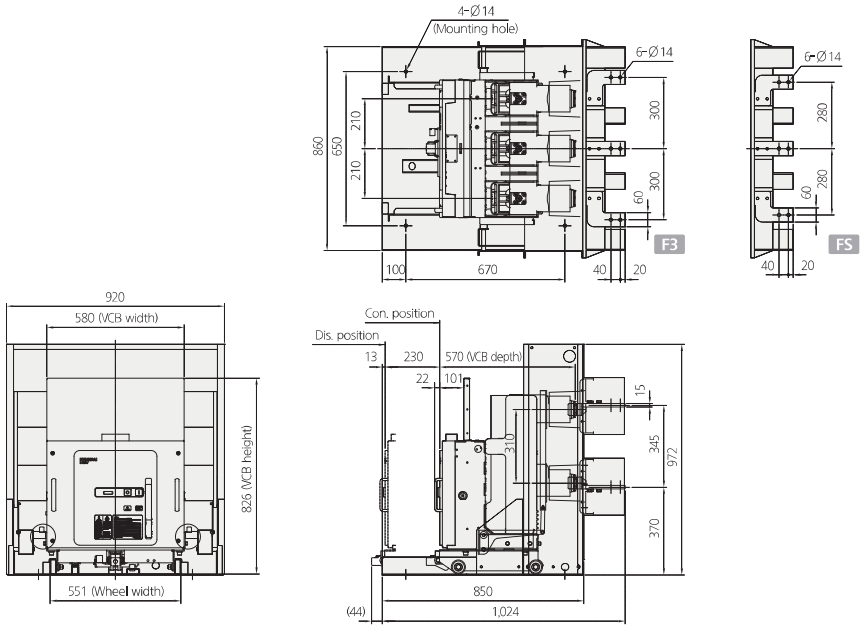


※ Dimensions may be revised without notice.

Dimensions

HGV 6111, 6112, 6141, 6142-FS/F3 (24 / 25.8 kV) Draw-In and Out, Lever Type

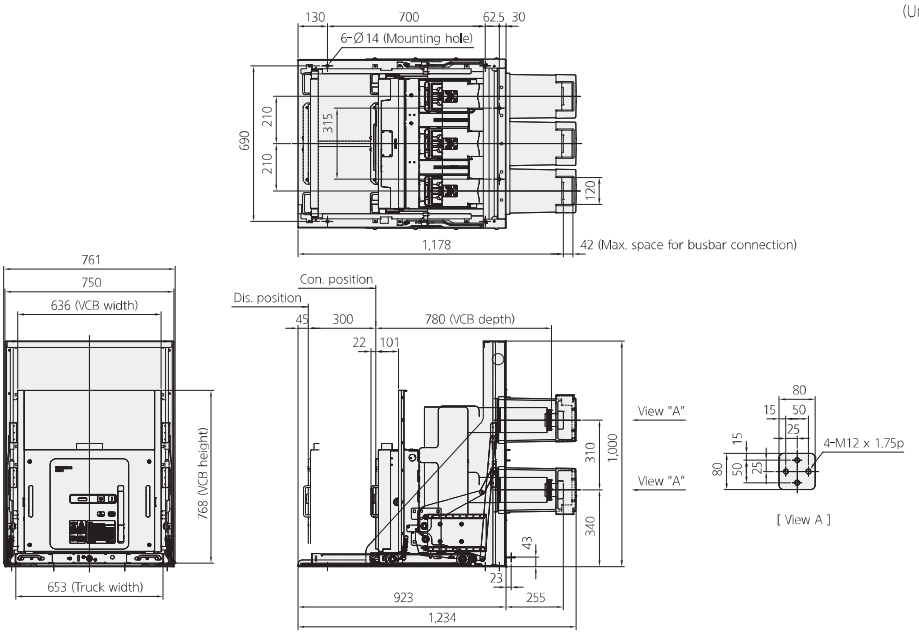
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 6111, 6112, 6114, 6141, 6142, 6144-GS (24 / 25.8 kV) Draw-In and Out, Screw Type

(Unit: mm)

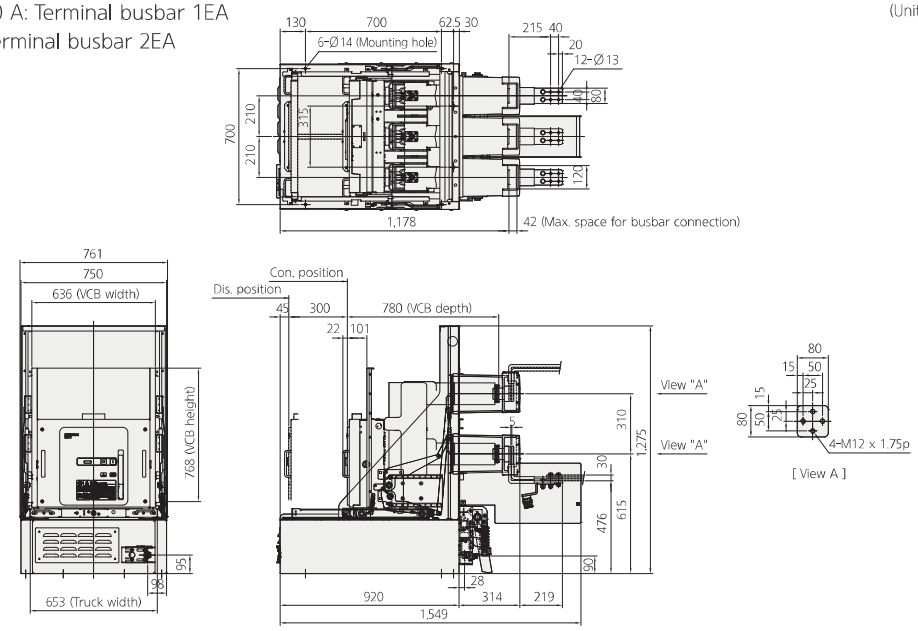


※ Dimensions may be revised without notice.

HGV 6111, 6112, 6114, 6141, 6142, 6144-GE (24 / 25.8 kV) Draw-In and Out, Screw Type

- 630 / 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

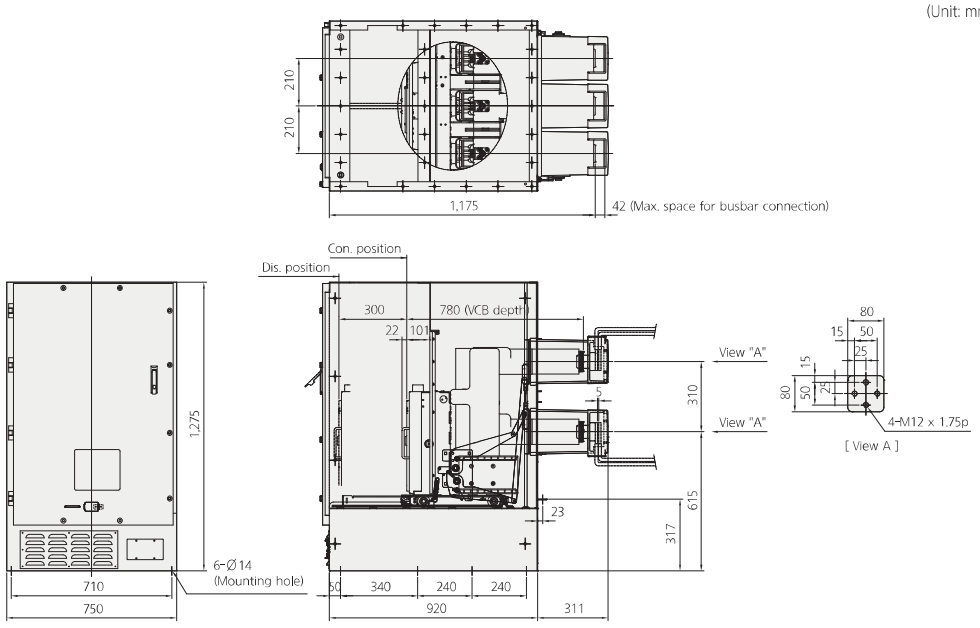
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 6111, 6112, 6114, 6141, 6142, 6144-MS (24 / 25.8 kV) Draw-In and Out, Screw Type

(Unit: mm)



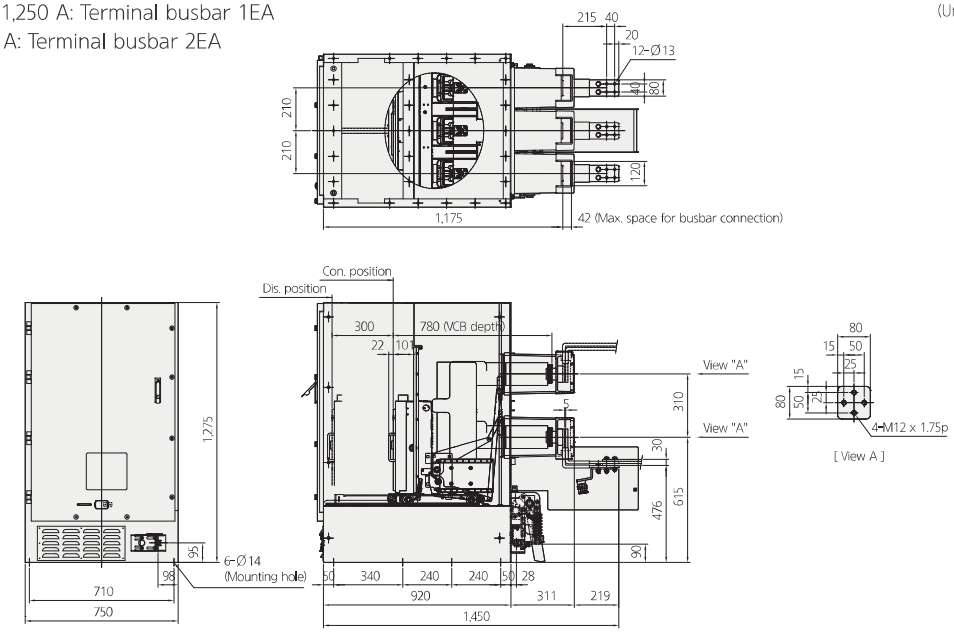
※ Dimensions may be revised without notice.

Dimensions

HGV 6111, 6112, 6114, 6141, 6142, 6144-ME (24 / 25.8 kV) Draw-In and Out, Screw Type

- 630 / 1,250 A: Terminal busbar 1EA
- 2,000 A: Terminal busbar 2EA

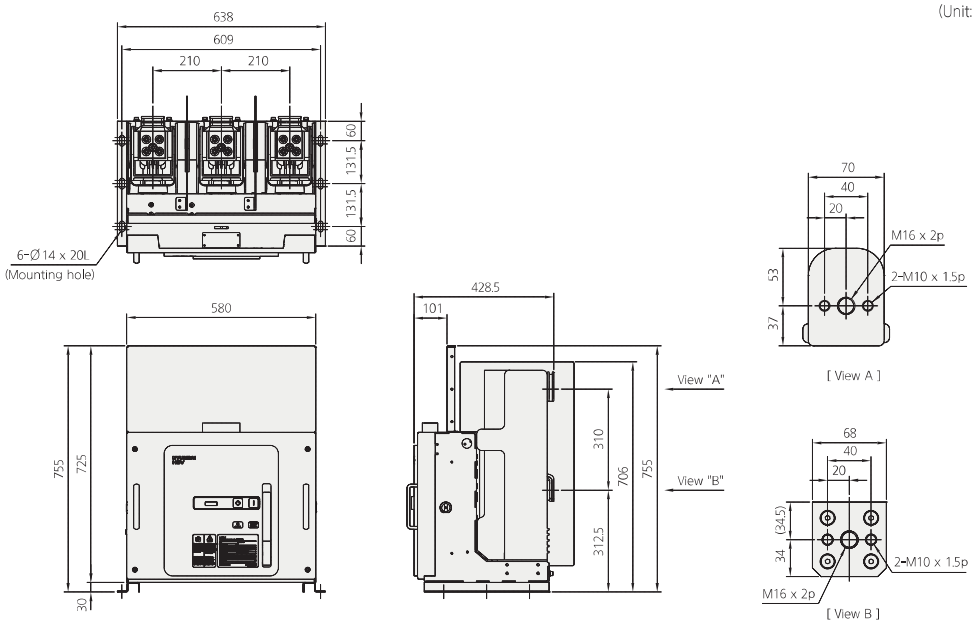
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 6144-XA (24 / 25.8 kV) Fixed Type

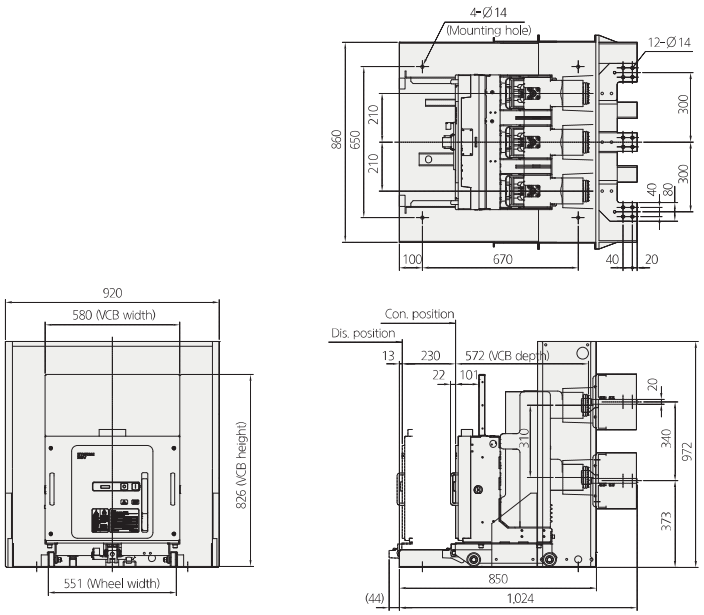
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 6144-ES (24 / 25.8 kV) Draw-In and Out, Lever Type

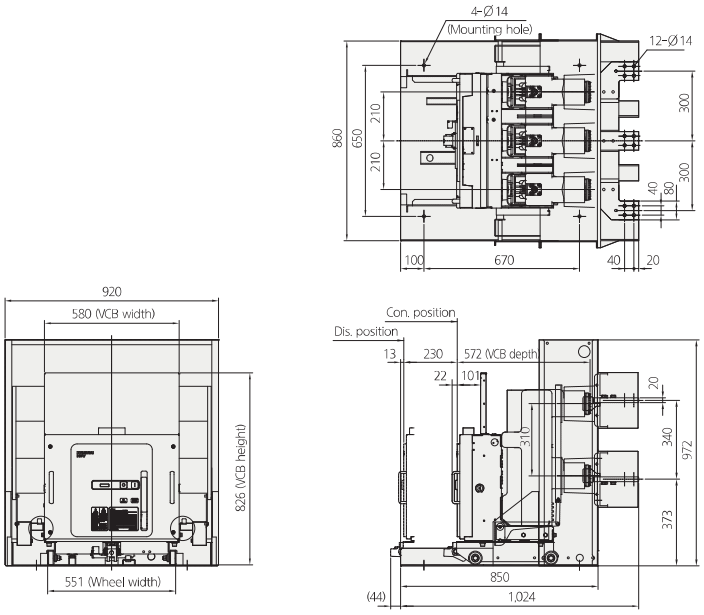
(Unit: mm)



※ Dimensions may be revised without notice.

HGV 6144-FS (24 / 25.8 kV) Draw-In and Out, Lever Type

(Unit: mm)

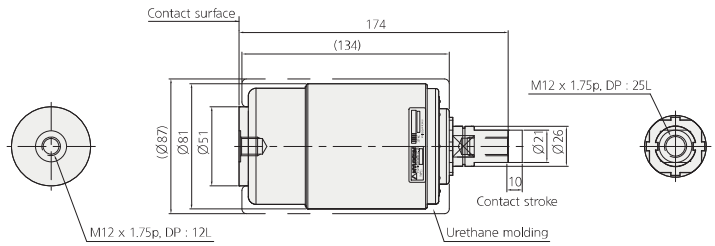


※ Dimensions may be revised without notice.

Dimensions (VI)

HCV-3B

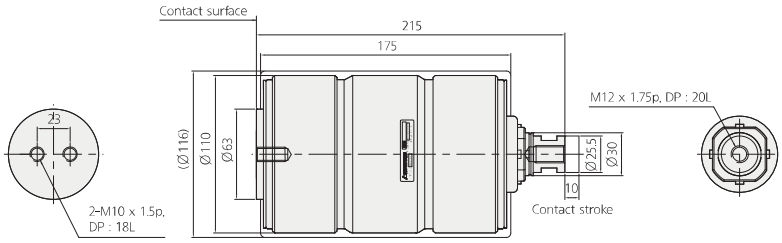
(Unit: mm)



※ Dimensions may be revised without notice.

HCV-3D

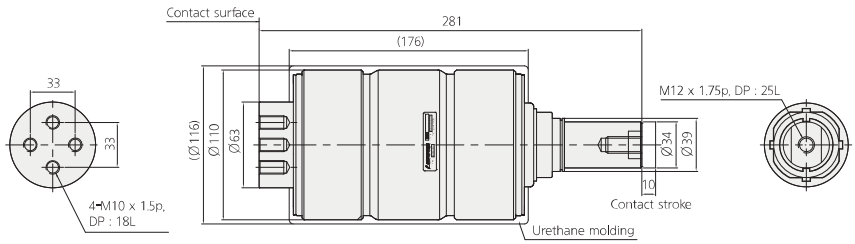
(Unit: mm)



※ Dimensions may be revised without notice.

HCV-3E

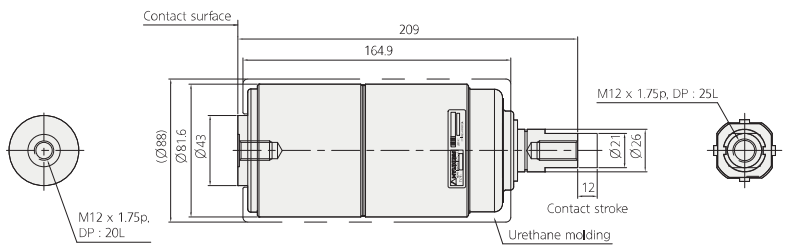
(Unit: mm)



※ Dimensions may be revised without notice.

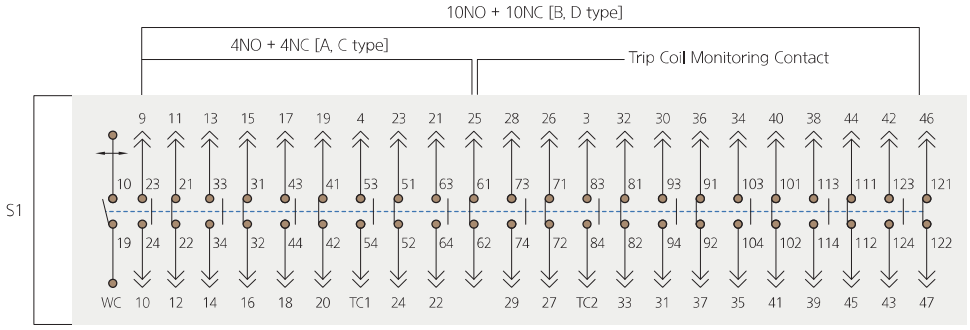
HCV-6B

(Unit: mm)

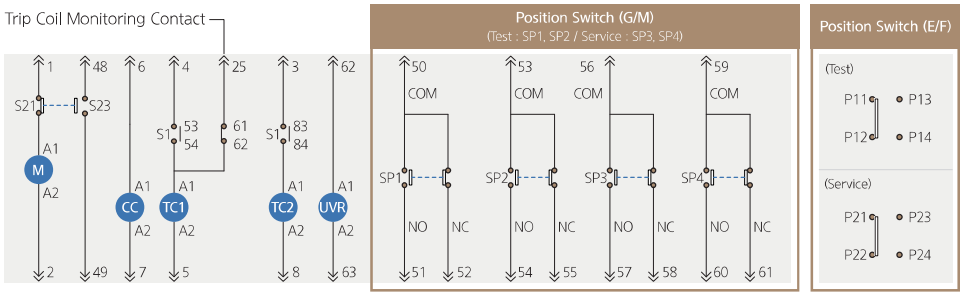


※ Dimensions may be revised without notice.

Control Circuit Diagram

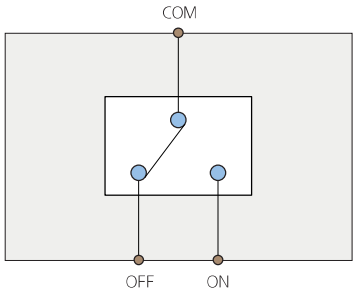


Auxiliary Switch



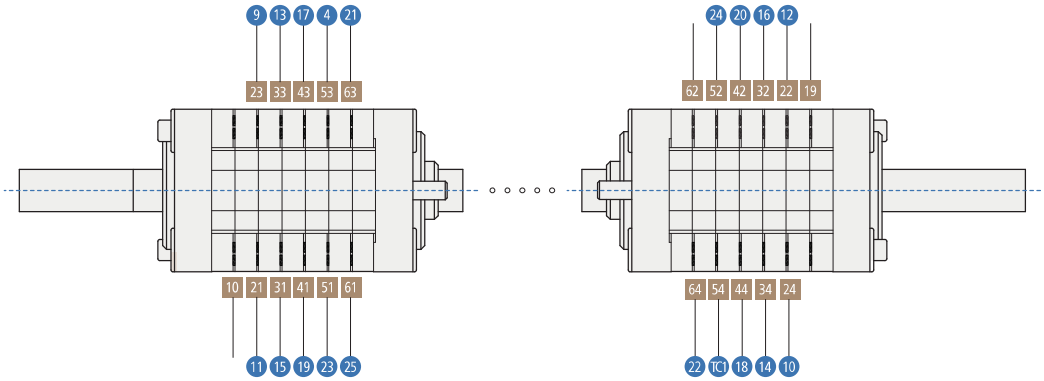
Legend			
M	Motor	S21	Motor Control Switch
CC	Closing Coil (Close)	S23	Limit Switch for Spring Charge
TC1	Trip Coil (Open)	S1	Auxiliary Switch
TC2	Secondary Trip Coil	SP1 - 4	Position Switch (Test: 2C, Service: 2C)
UVR	Under Voltage Release		

Diagram of Limit Switch for Earthing Switch



Connecting Terminal Arrangement

Auxiliary Switch



Control Jack Terminal No.

Auxiliary Switch

Control Jack Terminal

Maintenance List

Failure Conditions and Measurements

Condition	Cause	Measurements
Closing spring is not charged	Impossible for electrical charging • Disconnection of control cable • Motor/limit switch failure	• Check the connection of control cable • Replacement of motor/limit switch
	Impossible for manual spring charging	Check the condition of operating mechanism part
VCB is not inserted	Impossible for electrical and manual input • Disconnection of control cable • Motor charging failure • Interlocking failure • Control voltage failure • Operation of UVR or secondary trip coil	• Check the connection of control cable • Check the connection of motor • Check the condition of interlock operation • Check the control voltage (Minimum control voltage: rating x 85 %)
	Not complete input operation or trip shortly after input	Check the condition of operating mechanism part
VCB is not tripped	Impossible for electrical and manual trip • Disconnection of control cable • Auxiliary switch failure • Control voltage failure	• Check the connection of control cable • Replacement of auxiliary switch • Check the control voltage (Minimum control voltage: rating x 70 %)
VCB is not drawn-in/out	Inserting failure of draw-in and out handle	• Check the inserting condition of draw-in and out handle • Check the shutter mechanism part or assemble condition of operating part • Check the condition of interlock operation • Check the condition of interlock device during it is being interlocked
	Interference between shutter and VCB	
	Interlocking failure	
	Interlocking failure of draw in and out device	
Position switch is not operated	Disconnection of control cable	• Check the connection of control cable • Replacement of position switch
	Position switch failure	

Regular Checking List

Checking Item	Checking List	Checking Cycle
General term	1. Polish the surface of insulation part	Every 2 years
	2. Check the damage of external part	
	3. Check the condition of bolts and nuts are tightened at operating mechanism part	
	4. Check the damage of C-ring and snap-retainer	
	5. Check the connecting condition between terminal and bus	
Operating test	1. Check the electrical or mechanical operating condition of operating mechanism part	Every 2,000 times operations or 10 times breaking short-circuit current
	2. Check the normal operation of on/off indicator and counter	
Insulation resistance	Measure the insulation resistance between pole-pole or pole-ground by 1,000 V megger	Every 2 years
Withstand-voltage test	Test the power frequency withstand voltage as specified test value	Every 2 years
Grease applied	1. Apply grease at rotate and friction operating each part (Specification of grease: CHEMAX HHI 5000#1)	Every 2 years
	2. Re-apply a small amount of grease after wiping a terminal with a dry cloth (Specification of grease: lithium soap-based grease)	
Vaccum interrupter	1. Visually check the worn-out state of contact (Replace the VI in case of white mark of VI stem being less than 1/2 with VCB on condition)	Every 2 years
	2. Check the vaccum degree by using vacuum checker with VCB trip condition)	

Ordering Forms

Please mark ☑ list for each item.

1. Rated Voltage	
7.2 kV	☐
12 kV	☐
17.5 kV	☐
24/25.8 kV	☐
2. Frequency	
50 Hz	☐
60 Hz	☐
3. Rated Breaking Current	
12.5 kA	☐
25 kA	☐
31.5 kA	☐
40 kA	☐
4. Rated Current	
630 A	☐
1,250 A	☐
2,000 A	☐
2,500 A	☐
3,150 A	☐
4,000 A	☐
5. Pole Center Distance (Refer to Page 37)	
150 mm	☐
210 mm	☐
275 mm	☐

6. Cradle Type			
XA	☐	ES	☐
E3	☐	FS	☐
F3	☐	GS	☐
GE	☐	MS	☐
ME	☐		

7. Control Voltage (Motor)	
DC 24 V	☐
A/DC 48 - 60 V	☐
A/DC 100 - 130 V	☐
A/DC 200 - 250 V	☐
8. Control Voltage (Close Coil)	
DC 24 V	☐
A/DC 48 - 60 V	☐
A/DC 100 - 130 V	☐
A/DC 200 - 250 V	☐
9. Control Voltage (Trip coil)	
DC 24 V	☐
A/DC 48 - 60 V	☐
A/DC 100 - 130 V	☐
A/DC 200 - 250 V	☐
10. Auxiliary Contact	
4NO + 4NC	☐
10NO + 10NC	☐

11. Accessories	
Position switch (P2) ▶ 1NO + 1NC	☐
Position switch (P4) ▶ 2NO + 2NC	☐
UVR time delay device (D□) ▶ Check the control voltage ▶ Available to be used only with UVR ▶ Set the same control voltage with UVR	☐
Position padlock (PA) ▶ Key not supplied	☐
Key lock for position padlock (KP) ▶ Key attached at VCB	☐
Key lock for earthing switch (KE) ▶ Key attached cradle ▶ Available only for GE or ME cradle	☐
Key lock (KG)	☐
Earthing switch monitoring contact (EE) ▶ 1NO + 1NC ▶ Available only for GE or ME type	☐
Trip supervision (TS)	☐
Button cover (BC) ▶ Available for input/trip operating ▶ Key not supplied	☐
Flame-retardant cable (N□)	☐
Jack interlock (JI)	☐
Door interlock (DI) ▶ Available only for MS, ME type	☐
Manual operating bar (OB)	☐
UVR (U□) ▶ Check the control voltage	☐
Secondary trip coil (R□) ▶ Check the control voltage	☐
C.T operated release (C2) ▶ Rated current 1.0 A	☐
Non standard (ZZ)	☐

※ It is not available for operating UVR, secondary trip coil and C.T operated release at the same time.

12. Spare Parts	
Motor	☐
Close coil	☐
Trip coil	☐
Auxiliary switch	☐
Draw-in and out handle (M, G type)	☐
Draw-in and out handle (E, F type)	☐
Key lock for earthing switch	☐
Key lock for positiorn padlock	☐
Position switch	☐
C.T operated release	☐
Control circuit cable	☐
Control circuit connector	☐
UVR	☐
UVR time delay device	☐
Vacuum checker	☐
Condensor trip device	☐
Vacuum interrupter	☐

※ Refer to the information such as control voltage and draw in and out type before odering.

Order Information for Spare Parts

Draw-in and out handle
G, M type:
HVFS-MGHANDLE
E, F type:
HVFS-EFHANDLE

Counter
HGVS-COUNTER

Draw-in and out device
G, M type:
HGVS-GMTRUCK
E, F type:
HGVS-EFTRUCK

Close coil
HGVS-CSOL □

Trip coil
HGVS-TSOL □

Secondary trip coil
HGVS-RSOL □

UVR
HGVS-UV □

UVR time delay device
HGVS-UD □

Motor
HGVS-M □

C.T operated release
1.0 A:
HGVS-CT2

Auxiliary switch
4NO + 4NC:
HGVS-ASW4
10NO + 10NC:
HGVS-ASW10

Spring charged limit switch
1NO:
HGVS-S1

Position switch
HGVS-P2
1NO + 1NC (E / F type)
HGVS-P4
2NO + 2NC (G / M type)

Button cover
HGVS-BC

Manual operating bar
HGVS-OB

Key lock
Impossible to input electrically, mechanically under keylock
HGVS-KG

Position padlock
Non key:
HGVS-PA

Door interlock
HGVS-DI

Key lock for earthing switch
HGVS-KE

Key lock for position padlock
HGVS-KP

Control circuit connector
4NO + 4NC:
HGVS-JACK4
10NO + 10NC:
HGVS-JACK10

Control circuit cable
4NO + 4NC:
HGVS-LC4
10NO + 10NC:
HGVS-LC10

Vacuum checker
HAFS-VC9

Condensor trip device
Input DC110 V: **HVFS-T4**
Input DC220 V: **HVFS-T6**
Input AC110 V: **HVFS-T7**
Input AC220 V: **HVFS-T9**

※ Refer to the information such as control voltage and draw in and out type before odering.

HG-SERIES

Vacuum Circuit Breakers

H-HIS-WC-LE-B84-00, 2014.12 Designed by JC Creative

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