The right choice for ultimate yield!

LS ELECTRIC strives to maximize your profits in gratitude for choosing us as your partner.

Vacuum Circuit Breaker

Susol Series

User's Manual

Safety Instructions

- Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference.

LS ELECTRIC

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Safety Precautions

▶ Please follow the safety precautions to prevent users from any possible electrical accidents or dangers by using the product properly and safely in advance.

Safety precaution is classified into three safety alert symbols, Danger, Caution, and Warning. The meanings are as follows:

⚠ Danger	**Not following this instruction may result in serious injury or even sudden death**
⚠ Warning	**Not following this instruction may result in serious injury or even death**
⚠ Caution	**Not following this instruction may result in light injury or product damage**

▶ The meaning of each symbol in this manual and on your products is as follows.

⚠ This is the safety alert symbol which is to warn users of dangerous situation or to call attention to careful operation.
Read and follow instructions carefully to avoid dangerous situation.

This symbol alerts the users to the presence of "dangerous voltage" which may result in an electric shock under specified conditions.

⚠ DANGER

Do not touch the electrically charged parts (Conductor and Terminal conducting parts) underenergized conditions.
Otherwise, it may result in severe physical injury or even death by electric shock.

Safety Precautions

⚠ WARNING

1. Inspection and maintenance have to be performed by a qualified electrician.
   Otherwise, there is the danger of malfunction, severe physical injury or electric shock.

2. When the circuit breaker is in service, don't open the front cover.
   Otherwise, there is the danger of severe physical injury or electric shock.

3. Do not contact the internal structure when front cover is opened.
   Otherwise, there is the danger of malfunction, severe physical injury or electric shock.

4. When the circuit breaker is in service, don't rack out the circuit breaker.
   Otherwise, there is the danger of severe physical injury or electric shock.

5. Inspection and maintenance have to be performed only after shutting off the electric power and discharging a charge current.
   Otherwise, there is the danger of severe physical injury or electric shock.

6. Please tighten the bolts and screw with specified torque.
   Otherwise, there is the danger of over–heat or fire.

7. After performing installation, maintenance or inspection, remove some foreign objects like tools, wires or bolts.
   Otherwise, there is the danger of short circuit or fire.

8. When performing a maintenance, make sure if VCB is tripped and it is maintained in DISCONNECTED position.
   Otherwise, there is the danger of electric shock.

9. Do not move a circuit breaker by holding main circuit terminals.
   Otherwise, there is the danger of an electric accidents by temperature rise.

10. If transporting a VCB that is installed in switchgear, it shall be in the DISCONNECTED position.
    If a VCB is transported while in the CONNECTED position, the contact resistance of the contacting parts may increase, which can result in overheating or damage.

Safety Precautions

⚠ CAUTION

1. Do not alter the control circuit at the discretion of the user.
   Otherwise, there is a risk of malfunction or damage to the products.
2. The circuit breakers must be kept in dry condition and keep away from the water.
   Otherwise, there is a danger of insulation deterioration.
3. This product must be stored in an area free of corrosive gas.
   Otherwise, there is a risk of product damage, including discoloration, temperature rise, or burns on contacts due to increased contact resistance.
4. When storing VCBs for an extended period, cover them with dust covers to prevent dust from entering.
   Otherwise, it may lead to electrical accidents during operation due to the reduced dielectric strength.

Unpacking and Service Conditions

■ Unpacking

1. When unpacking the package, take care to handle the circuit breaker, standard components, and accessories.
2. Ensure that the instruction manual and the test report of the final testing are included in each PVC envelope.
3. If any damage or breakage of the products is found, immediately notify the LS ELECTRIC sales office or service representatives.
4. If any damage or breakage of the products caused by the carrier is found, immediately file a claim with the carrier and notify the shipping company.

■ Service conditions (Indoor type)

1. Normal service condition
   Designed to ANSI/IEEE Std. C37.09(IEEE C37.04) with the following limit values:

Unpacking and Service Conditions

1. Normal operating condition
   Designed to ANSI/IEEE Std. C37.04 with the following limit values:
   ■Ambient temperature
   * Maximum : +40 ℃ * Maximum 24 hour average : +35 ℃
   * Minimum : -5 ℃
   ■Maximum site altitude : ≤1000 m above sea level.
   ■Humidity
   * 24 hour average value : ≤95%
   * One month average value : ≤90%
2. Special operating conditions
   Special operating conditions are to be agreed upon by the manufacturer and the user. The manufacturer must be consulted in advance regarding each special operating condition in the following cases or locations.
   using at the following cases or places : .
   ■ Site altitude higher than the normal conditions or ambient temperature exceeding the normal conditions.(-30℃)
   ■ In locations heavily influenced by sea wind
   ■ In typically wet places with high humidity
   ■ In locations with significant water or oil vapors
   ■ In places with explosive, flammable, or noxious gases
   ■ In places with a lot of dust
   ■ In places with abnormal vibration or impact
   ■ In locations with heavy ice and snow
   ■ In the case of using under special conditions other than those mentioned above

Transporting, Storage and Disposal

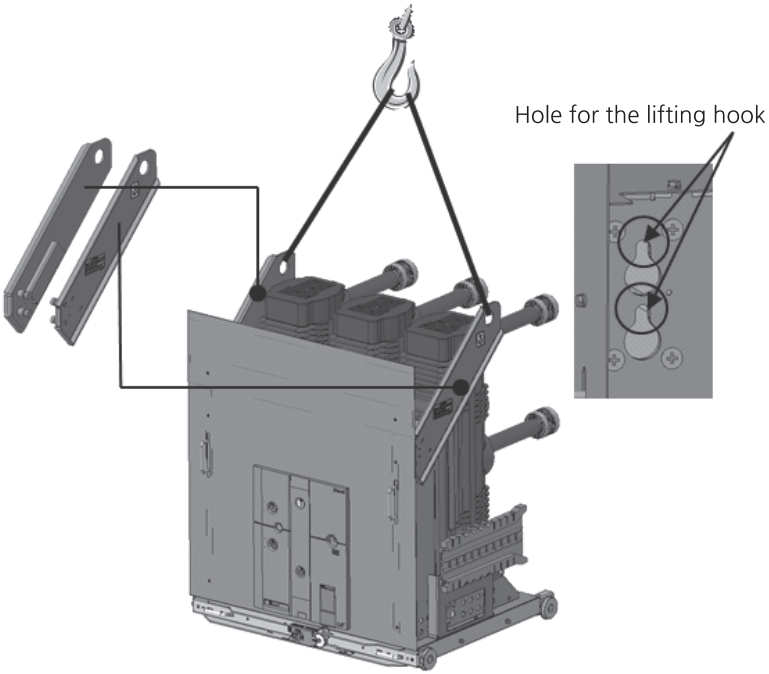
■ Transporting

⚠ WARNING

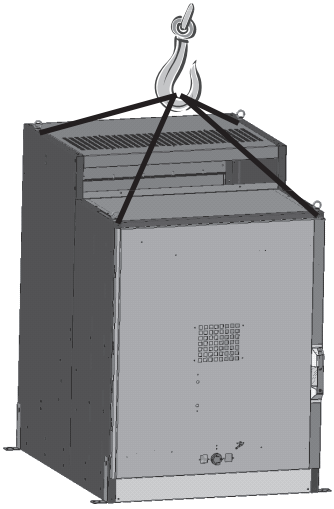
1. **Do not move the circuit breaker by handling main circuit bus terminals.**
   Otherwise, there is a risk of electrical accidents due to rising temperatures.
2. **Make sure to remove the lifting hook for centering weight before racking the circuit breaker into the CB compartment of the switchgear.**
   Otherwise, there is a danger of product damage or a short circuit.

Transporting, Storage and Disposal

1. For lifting or moving the circuit breaker, a specified lifting device should be used.
   The hook should be inserted into the designated hole or portion. (Refer to figure)
2. Before inserting the circuit breaker into the CB compartment of the switchgear, please remove the lifting hooks provided for centering weight.
3. When lifting the circuit breaker with a cradle, it should be raised using a fixing bracket. (Refer to the installation guide for the fixing bracket in the user manual.)
4. When placing the circuit breaker on the ground, be careful not to drop or to impact It.



Transporting, Storage and Disposal



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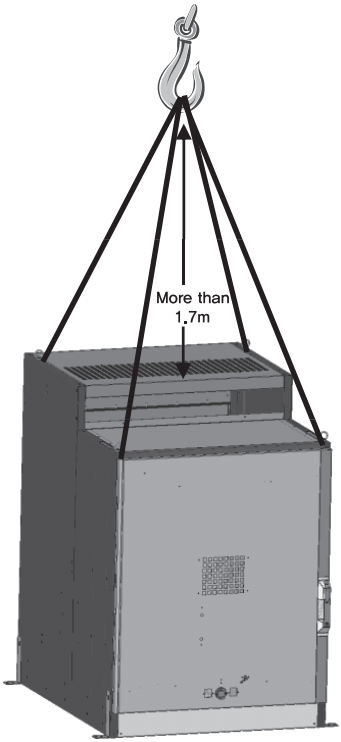

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Transporting, Storage and Disposal

■ Storage

⚠ CAUTION

1. **The circuit breakers must be stored in a clean, dry, dust-free, and condensation-free environment.**
   Otherwise, it may cause a weakening of insulation.
2. **This product must be stored in an area free of corrosive gas.**
   Otherwise, there is a risk of product damage, including discoloration, temperature rise, or burns on contacts due to increased contact resistance.

■ Disposal

⚠ CAUTION

1. **When disposing of the product, do so at a designated place with no impact on the environment.**
   Otherwise, it may cause environmental pollution.

1. According to the ISO 14000, separate all of them as metallic or non-metallic material and dispose them at a designated place after dividing all of material as renewable materials and other materials which may cause an environmental pollution.
2. If there are any materials you want to remake, please contact us.
3. In the case of special materials that produce noxious gas when destroyed by fire, be sure to dispose of them at an approved location.

Installation

⚠ CAUTION

1. VCB lifespan and performance can be guaranteed with periodic visual inspections and maintenance.
   - It shall be kept clean by removing foreign objects around or inside the switchgear.
   - Corrective action shall be taken in advance to limit any dust and high humidity, as these may result in unexpected faults or accidents.
   - The switchgear door shall be kept well-closed to prevent it from being invaded by rats or frogs, which may cause electrical incidents.
   - Sufficient effort shall be made to maintain it in a dry condition if it is installed in the presence of high humidity or during the rainy season. Humidity is fatal to electrical systems.
   - Check if the wire is well-coated and the paint does not come off the panel.
   - Corrective action shall be taken if the installation site has a higher or lower temperature than the specified operating range.
2. Any incident or damage resulting from customer neglect or mistakes will void the warranty.

⚠ WARNING

1. Installing VCB at outdoor switchgear
   - Extra care shall be taken to avoid condensation on the surface of VCB insulating materials by suitable ventilation or inner heating.
   - Use after performing Insulation resistance or dielectric strength test. (At least once per quarter)

   The reduced dielectric strength can be a major factor causing short-circuit.

Installation

For safe and normal operation of circuit breaker installed in switchgear, a very careful and special installation should be followed.

- Handle with care when raising up by a lift or other means because the circuit breaker may lurch.
- Before inserting the circuit breaker, which has special lifting hooks for centering weight, into the CB compartment of the switchgear, remove the lifting hooks.
- When installing a fixed type of circuit breaker into switchgear, secure the contactor with the same torque value by passing through the mounting holes (6−Ø 14) after inserting spring washers into the head of the bolt without applying excessive pressure or alterations.
- Take care not to apply pressure or permanent tension from bus bars or other objects to the main bus terminals.
- Keep the terminal of the bushing horizontal and centered, otherwise the tulip/finger contacts of the circuit breaker may overheat and burn during use.
- Remove dust or other foreign substances.
- When bolting, follow the recommended torque values specified in Table 1.

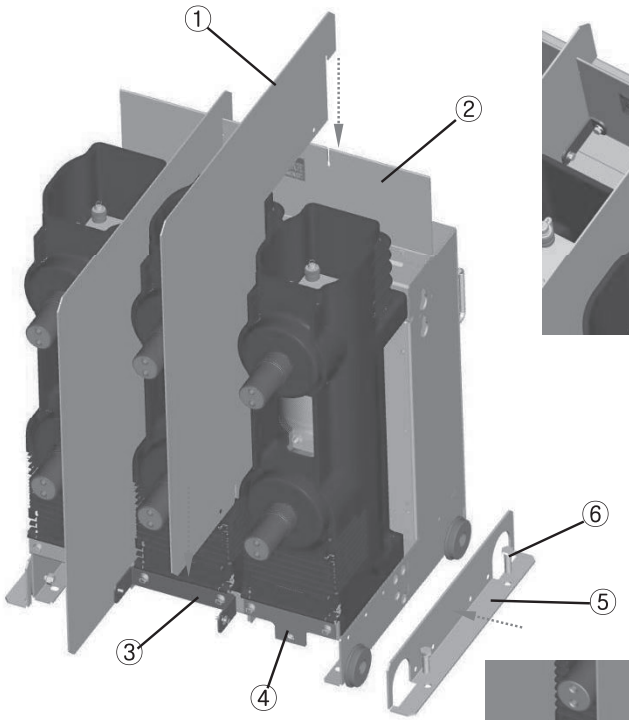
⚠ WARNING

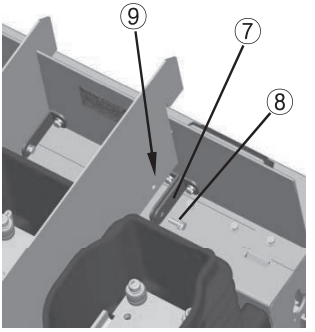
1. When assembling bolts and screws, follow the instructions with the recommended torque values.
   Failure to do so may result in overheating or burns.
2. Do not alter the control circuit at your discretion.
   Doing so may cause malfunction or damage to the products.

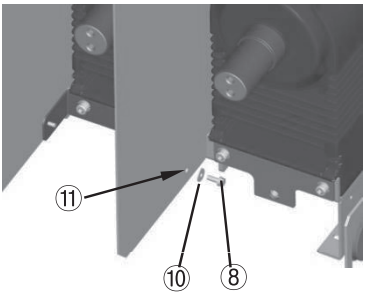
〈Table 1〉 Torque value

Size of bolt \ Torque	Steel (kgf · cm)	Brass (kgf · cm)
M 3	7.3 (6.2 – 8.4)	4.3 (3.7 – 4.9)
M 3.5	11.2 (9.5 – 12.9)	6.6 (5.6 –7.6)
M 4	16.8 (14.2 – 19.3)	9.8 (8.4 – 11.3)
M 5	33.0 (28 – 37)	19.1 (16.2 – 22.0)
M 6	56.0 (48 – 65)	33.0 (28 – 38)
M 8	135 (115 – 156)	89 (68 – 91)
M 10	270 (230 – 310)	159 (135 – 182)
M 12	470 (410 – 540)	270 (230 – 310)

Installation: Fixed type circuit breaker (P-type)



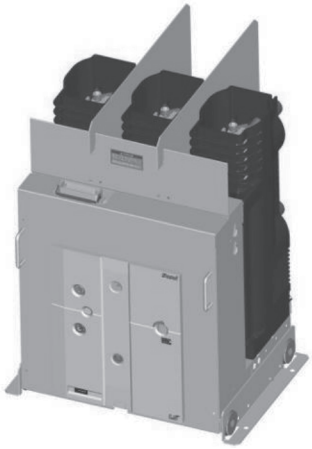


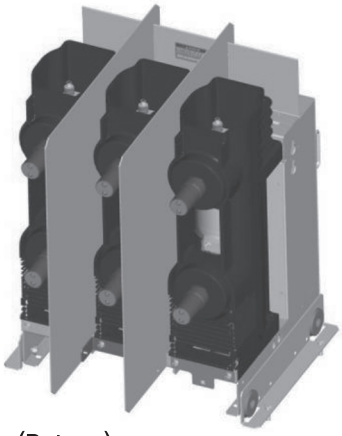


<Figure 1> Installation of Fixed type circuit breaker

① Insulation Barrier
② Upper Cover
③ Lower supporter
④ Earthing Plate
⑤ Fixing Flange
⑥ Screw 1 – It is not offered separately
⑦ Upper barrier supporter
⑧ Screw 2 & Nut
⑨ Upper barrier mounting hole
⑩ Barrier supporting washer
⑪ Lower barrier mounting hole

Installation: Fixed type circuit breaker (P-type)





■ **Installation of fixed type circuit breaker (P-type)**

1. Installation guide

1) Install in each phase ① the insulation barriers (2 pieces) shown in figure 1.

a. Insert the upper groove of ① the insulation barriers to ② the groove of upper cover,and locate the barriers between ⑦ upper barrier supporters.

b. Insert the lower groove of ① the insulation barriers to the frame of circuit breaker, and locate the barrier on side of the lower supporter.

c. Assemble ⑧ screws, nuts through ⑨ the upper mounting hole and ① the insulation barrier hole.

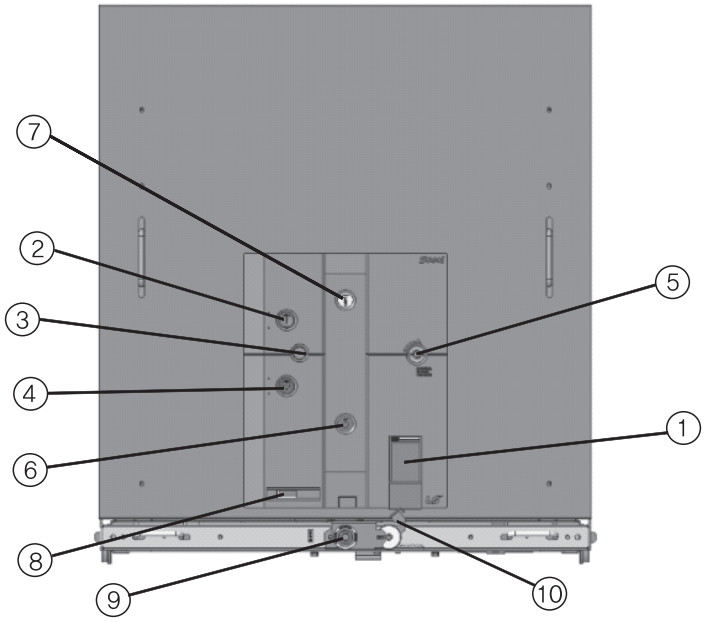
d. Assemble ⑧ screws through ⑪ the lower mounting hole and ① the insulation barrier hole.
(In case of assembling of bolts, must use supporting ⑩ washer between ⑧ screws and ① barrier)

2) Remove the fixing flange which is assembled for moving at side of the circuit breaker. The flange is firstly inserted in the wheel pointed out with the arrow figure 1. Then the circuit breaker is installed in the switch gear using the mounting hole of the fixed bracket

Install ⑤ the flange in both side of the circuit breaker. After installing, the circuit breaker must be fixed without any wavering.

3) Earthing cable can be assembled at the hole ④ using M12

1. Front View



〈Figure 2〉 Front part of circuit breaker

① Name plate
② Manual closing button
③ Key lock
④ Manual trip button
⑤ Manual charging hole
⑥ Contact position indicator
⑦ Closing spring charge indicator
⑧ Operation cycle counter
⑨ Insertion & Draw-out screw
⑩ Unlocking lever

Structure and operation

1.1 Operating method for operating mechanism

The operating mechanism is designed to be operated by manual and/or electrical motor.

1) Manual operation

① **Closing Spring Charge** : Insert a manual charging handle into a manual charging hole (Fig.2/No.5) and rotate it over 20 times clockwise until it runs idle. At the same time of charging completion it sounds "clatter"

② **Manual Closing** : If the "CLOSE" button (Fig.2/No.2) on the front of circuit-breaker is pressed the closing operation is started and the red color of "CLOSE" plate is appeared by rotation of the contact position indicator (Fig.2/No.6) simultaneously.

③ **Manual Trip** : If the "OPEN" button (Fig.2/No.4) is pressed until the trip latch will be release the trip operation is performed and the green color of "OPEN" plate is appeared by rotation of the contact position indicator (Fig.2/No.6). The electrical remote control for above operations is available if each signals is provided since this operating mechanism have electrical closing and tripping devices.

〈Figure 3.1〉 Charged

〈Figure 3.2〉 Discharged

2) Electrical operation

① **Electrical charge** : Apply the rated voltage to the control terminals A1+ and A2- . If the rated voltage is applied, closing spring is automatically charged by a geared motor.If the control power is provided to the control circuit of circuit-breaker, the charging motor with a gear box is activated and it starts to charge the spring. After a completion of charging for the closing spring the control power for motor will be disconnected by the limit switch of motor. At this stage the closing spring will be recharged automatically as repeating the above sequence according to manual closing operation. If it is not charged completely, the closing operation of the circuit breaker is impossible.

② **Electrical closing** : Remote closing can be made by energizing the closing coil (CC). Apply the rated voltage to the control terminals A3+ and A4- and close the breaker.

③ **Electrical trip** : Remote opening can be made by energizing the shunt trip device or under voltage trip device.

A) In the case of TC, apply the rated voltage to A5+ and A6- of control circuit terminals

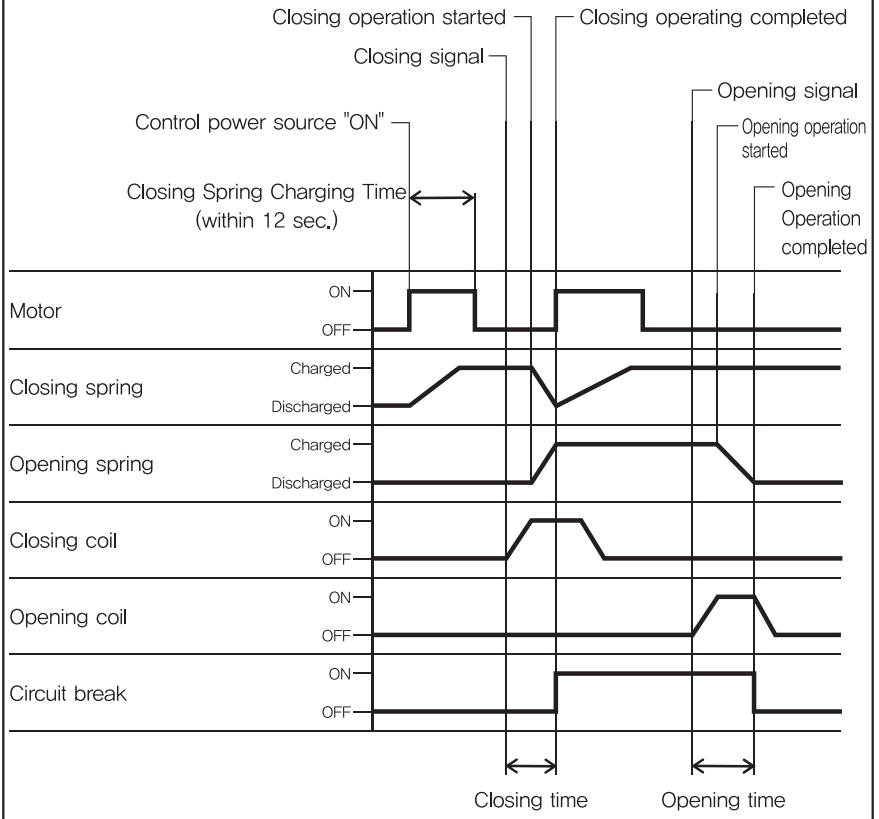
B) In the case of UVT, remote opening is possible by connecting the switch in series to D1+ and D2- terminal where UVT or UVT controller gets connected.

3) High-speed reclosing operation

This operating mechanism is available for the high-speed reclosing (O-0.3s-CO) operating duty by remote operation at the status that the main circuit is "CLOSE" and the closing spring is "CHARGED" For this operation the auto charging of closing spring should be within 10 sec. This circuit-breaker is available for auto charging of closing spring within 8 sec.

1.2 Operating sequence

The sequence of operating mechanism is as follows;



〈Figure 4〉 Operating Sequence

1.3 Operating frequency

In order to keep the operating mechanism parts or components at the best service condition, please avoid any unnecessary operation and also attend the followings.

* Make a successive operation 10 operations with the minimum time interval (about 12 sec.) required for charging the closing spring. (The 30 min. of time interval should be required at least after a successive operation)
* Operate 20 times per an hour.
* Operate 100 times per a day.

In case of requiring frequent switching operation or any severe operating duty under the dusty and polluted environment, it needs to be added the frequency of periodic inspection or maintenance.

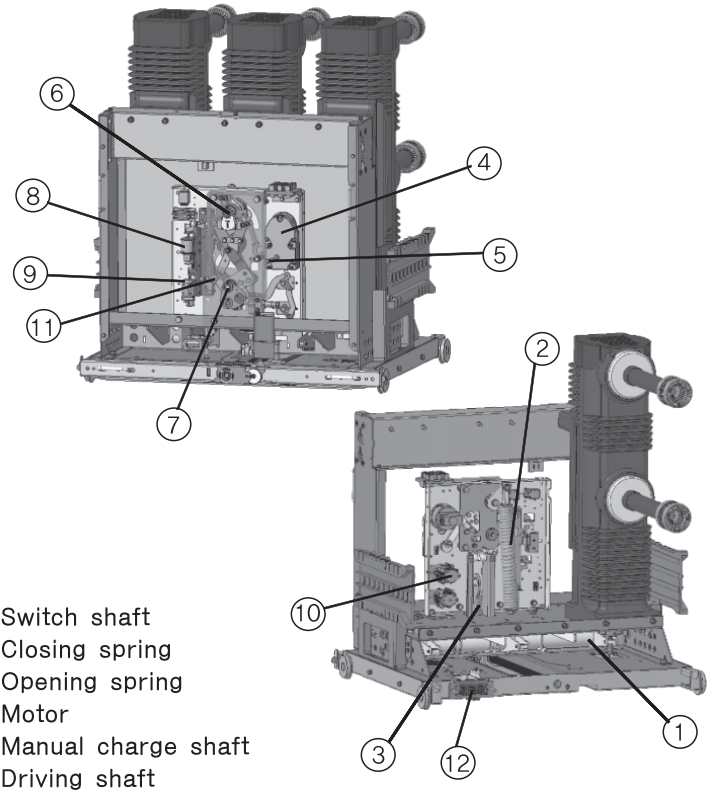
1.4 The theory of motor operation

Operating sequence	Operating results		Possible successive operation
	Main circuit contact status	Closing spring status	
Input a control power Electrical charging	OPEN		Closing–Trip(C–O)
CB Closing	CLOSE		Trip(O)
Auto Recharging	CLOSE		Trip–Closing–Trip (O–CO)
CB Trip	OPEN		Closing–Trip(O)
CB Closing	CLOSE		Trip(O)
Auto Recharging	CLOSE		Trip–Closing–Trip (O–CO)
High–speed Reclosing	OPEN		Auto Recharging Starting
	CLOSE		
	OPEN		
Auto Charging Completed	OPEN		Closing–Trip (CO)
CB Closing	CLOSE		Trip(O)
Auto Recharging	CLOSE		Trip –Closing –Trip (O–CO)

1.5 The theory of motor operation

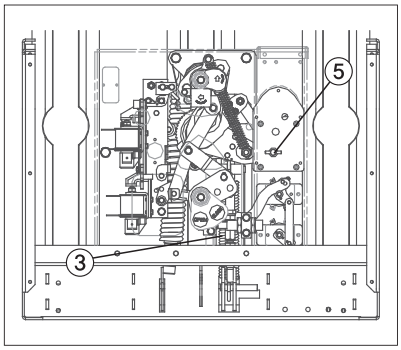
Operating sequence	Operating results		Possible successive operation
	Main circuit contact status	Closing spring status	
Manual Charging	OPEN		Closing–Trip (C–O)
CB Closing	CLOSE		Trip (O)
CB Trip	OPEN		–
Spring Charging	OPEN		Closing–Trip (C–O)
CB Closing	CLOSE		Trip (O)
Manual Recharging	CLOSE		Trip–Closing–Trip (O–C–O)
High–speed Reclosing	OPEN		–
	CLOSE		
	OPEN		
Manual Charging	OPEN		Closing–Trip (O)
CB Closing	CLOSE		Trip (O)
Manual Recharging	CLOSE		Trip –Closing –Trip (O–C–O)
CB Closing	CLOSE		Trip (O)

2. Operating mechanism parts



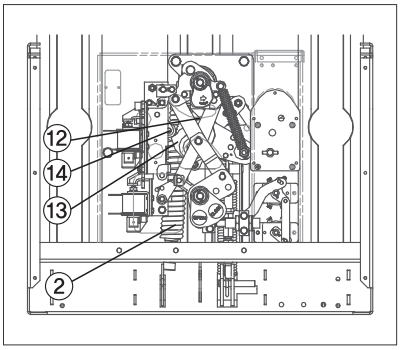
① Switch shaft
② Closing spring
③ Opening spring
④ Motor
⑤ Manual charge shaft
⑥ Driving shaft
⑦ Driven shaft
⑧ Closing coil
⑨ Trip coil
⑩ Aux. S/W (Auxiliary switch)
⑪ Trip latch
⑫ Auto connector

〈Figure 5〉 Structure of operation mechanism



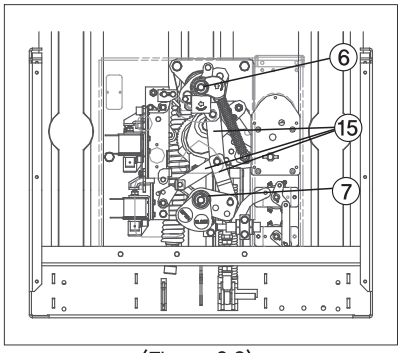
〈Figure 6.1〉

1) Main circuit is "ON"
The closing and opening spring are discharged



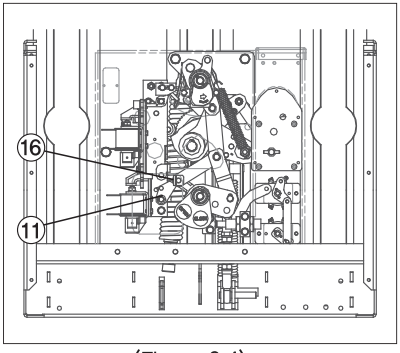
〈Figure 6.2〉

2) Main circuit is "ON"
The closing spring is charged
The opening spring is discharged



〈Figure 6.3〉

3) Main circuit is "OFF"
The closing spring is discharged
The opening spring is charged



〈Figure 6.4〉

4) Main circuit is "OFF"
The closing and opening spring are charged.

② Closing spring
③ Opening spring
⑤ Manual charging shaft
⑥ Driving shaft
⑦ Driven shaft
⑪ Trip latch
⑫ Gear cam
⑬ Crank shaft
⑭ Trip latch and roller
⑮ Linkage
⑯ Roller

2.1 Operation of operating mechanism

1) **Main circuit opening 1**

Figure 6.1 shows the main circuit is open status, the closing spring (2) and the opening spring (3) are discharged status. If the gear cam (12) is rotated clockwise by manual or electrical motor, then the closing spring (2) will be charged.

2) **Main circuit opening 2**

Figure 6.2 shows the main circuit is open status and the closing spring (2) is charged. In this situation, the crank shaft (13) connected with the closing spring (2) is located passing through the Death Point and is getting a rotation force of clockwise, but it maintains the current situation since the roller of closing latch (14) is engaging this rotation. At this time the motor will be stopped when the closing spring is charged completely.

3) **Main circuit closing 1**

Figure 6.3 shows the main circuit is closed status and the opening spring is only charged. If the roller (14) is released from the cam of crank shaft (13) by a closing signal, the crank shaft will be rotated clockwise. At the same time the driving shaft (6) connected with linkages and the driven shaft (7) are rotating mutually and the closing operation will be completed. At this time the opening spring is charged and tit maintains the closed status since the trip latch (11) is engaging the roller (17) connected with the driven shaft (7) even if the driven shaft (7) is getting a force counter–clockwise by the opening spring.

4) **Main circuit closing 2**

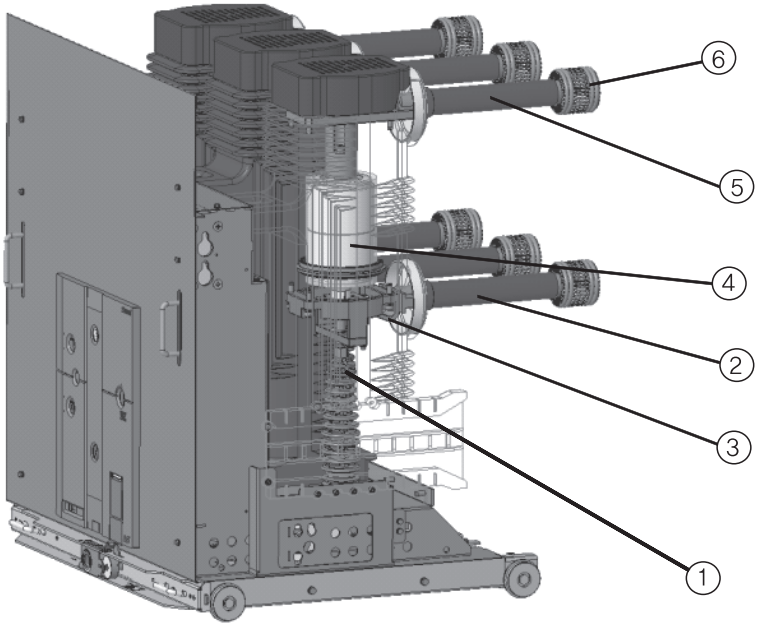
According that the main circuit is transferring to the closed status, the motor (4) is operated again and the discharged closing spring (2) will be recharged.

Figure 6.4 shows the main circuit is the closed status and the closing spring is recharged status.

If the trip latch (11) release the roller (16) by a trip signal, the main circuit will be tripped by the driven shaft (7) is rotated counterclockwise.

At this time it becomes the status as figure 6.2 that the opening spring (3) is discharged and the closing spring (2) is charged status.

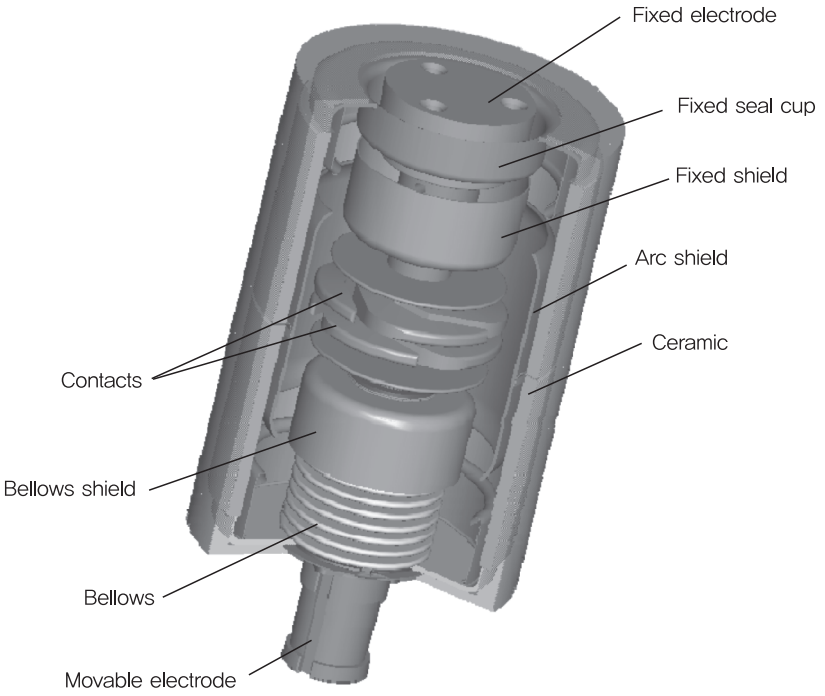
3. Main circuit parts



〈Figure 7〉 Structure of main circuit parts

① Insulation rod
② Lower terminal
③ Shunt
④ Vacuum interrupter
⑤ Heat sink
⑥ Tulip contactor

4. Vacuum Interrupter (VI)



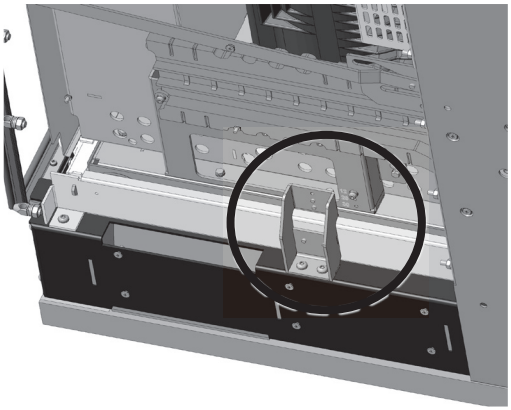
〈Figure 8〉 Structure of vacuum interrupter

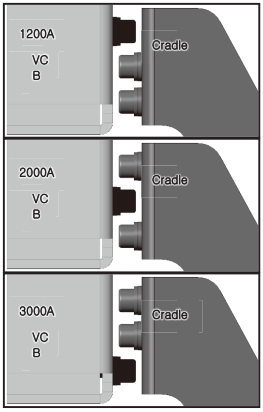
■ The vacuum interrupters has a high dielectric strength with high vacuum integrity (approx. 5x10–5 Torr) and the gaps of between a stationary contact and moving moving contact are 6~20mm according to the rated voltage. Both contacts are designed to extinguish the arc easily and are made of special alloy in order to reduce the contact wearing by short circuit interruption and the overload, or arc energy when switching. The internal side is completely sealed to prevent the deterioration of vacuum integrity.

Code plate (38kV H-Type)

⚠ CAUTION

Code plates are provided for both the VCB and the Cradle to implement an interlock function that allows the VCB to be inserted based on the classification of ratings. This mechanism ensures that the VCB can only be inserted when the rated current of the VCB matches that of the Cradle.
Please be cautious that if the ratings differ, forcing the insertion may cause damage to the equipment.





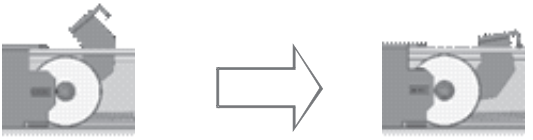
Code plates according to each rated current

Racking-in/out Operation (H-Type)

1. Racking-In/Out operation

The circuit breaker is designed with three positions (Disconnected, Test, Connected). Disconnected position only can be operated manually without control power when the shutter is closed. Test position can be operated manually but also electronically by control power even if shutter is closed. As the breaker gets closer to the connected position, a greater force is necessary to turn the handle due to the shutter opening and main circuit terminal connection. In the connected position, the shutter is open and the main circuit and the control circuit is connected.

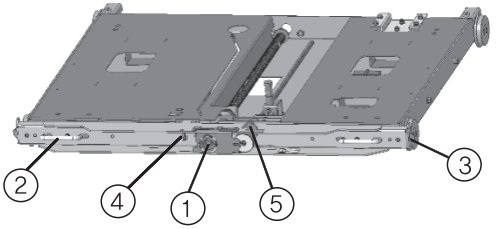
☞ Insert the racking-in/out handle into the racking-in/out screw (Figure 9.1/No.1)
☞ Before racking-in/out, press the unlocking lever (Figure 9.1/No.5) to unlock.



- Turning clockwise will put the breaker into connected position
- Turning counterclockwise will put the breaker into disconnected position.

1.1 Manual Racking-In : Disconnected → Test

1) Following indicators shall be checked.
   Close/Open Indicator : OPEN Charged/Discharged Indicator : Discharged
2) After inserting the racking-in/out handle into the racking-in/out screw, press the unlocking lever to unlock. If turning the handle clockwise, VCB starts to be racking-in.
3) If turning 5 times (a 50mm move), the VCB reaches the test position and makes a "click" sound at the same time, and then the unlocking lever goes up and becomes locked.
4) Check if the position indicator mechanically interlocked is in test position.
5) A circuit breaker cannot be closed between the disconnected and test position.
6) At this point control power is automatically connected and the shutter is still closed.



① Racking-In/Out screw
② Handle
③ Sliding Plate
④ Position Indicator
⑤ Unlocking Lever

〈Figure 9.1〉 Disconnected position of Racking-In/Out device

Racking-in/out Operation (H-Type)

1.2 Manual Racking-In : Test → Connected

1) Following indicators shall be checked.
   Close/open Indicator : OPEN Charged/Discharged Indicator : Charged
2) After inserting the racking-in/out handle into the racking-in/out screw, press the unlocking lever to unlock. If turning the handle clockwise, VCB starts to be racking-in.
3) If you rotate 44 times (a 440mm move), the breaker will reach the connected position and make a "click" sound, and then the unlocking lever goes up and becomes locked.
4) Check if the position indicator mechanically interlocked is in connected position.
5) A circuit breaker cannot be closed between the disconnected and test position.
6) Main contact and aux. contact are connected and the shutter is open.

1.3 Manual Racking-Out : Connected Position → Test Position

1) Following indicators shall be checked.
   Close/Open Indicator : OPEN Charged/Discharged Indicator : Charged
2) Racking-out operation goes in reverse with manual racking-in operation (Test → Connected).
3) If turning the racking-in/out handle counterclockwise, VCB starts to be racking-out
4) Check if the position indicator mechanically interlocked is in test position.

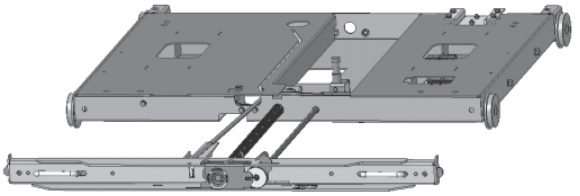
1.4 Manual Racking-Out : Test Position → Disconnected Position

1) Following indicators shall be checked.
   Close/Open Indicator : OPEN Closing Spring Indicator : Charged
2) Racking-out operation goes in reverse with manual racking-in operation (Disconnect →Test).
3) Racking-out begins when the racking-in/out handle Is rotated counterclockwise.
4) Check if the position indicator mechanically interlocked is in disconnected position.

⚠ CAUTION

1. **Do not position a circuit breaker on any position besides the DISCONNECTED Position, TEST Position and/or CONNECTED Position.**
   It may cause of malfunction or damage to products.

Racking-in/out Operation (H-Type)



〈Figure 9.2〉 Connected position of Racking-In/Out device

– Racking– In/Out Operation

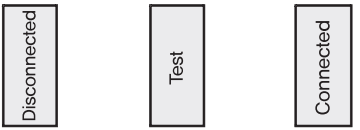
	Disconnected	Test	Connected
Distance from Disconnected position/ Number of strokes	0 mm/ 0 time	50 mm/ 5 times	490 mm/ 49 times
Manual Operation	Possible	Possible	Danger
Electric Operation	Impossible	Possible	Possible
Control Voltage	Detached	Automatic	Automatic
Shutter	Closed	Closed	Open
Main Circuit Status	Disconnected	Disconnected	Connected
Position Indication	position indicator	position indicator	position indicator
Requirement for Draw in/out operation	Contact: OPEN, Unlocking Lever: Activated		

※ For your safety, make sure the breaker is in OPEN position before racking in/out.

※ Racking-in/out operation is only possible when VCB is in OPEN position, While moving to different positions VCB cannot be closed.

1.5 Check of Position Indicator during Racking In/Out

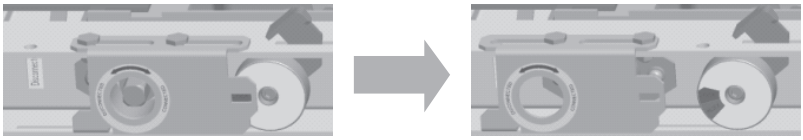
A position indicator (Figure 9.1/No.4) is placed on the front lower left side of the breaker's racking-in/out device. Name plate of Disconnected, Test, Connected is attached on the position indicator so that the position of circuit breaker can be easily confirmed. After installation, always make sure of the breaker's position by looking at the indicator.



Racking-in/out Operation (H-Type)

1.6 Position Padlock

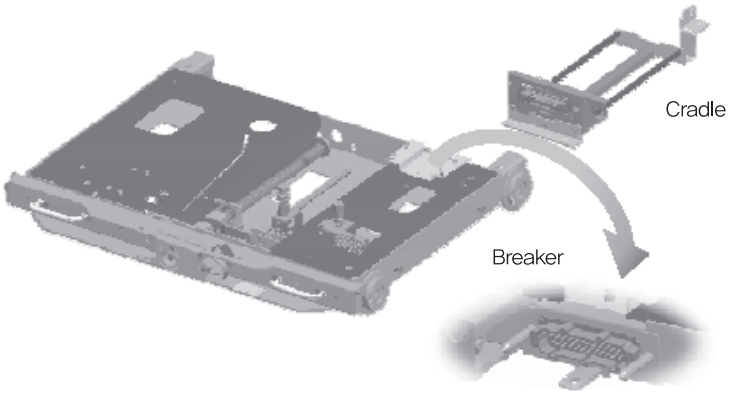
It is located at the screw hole to prevent the racking-in/out of a breaker from the present position (Disconnected, Test or Connected)



Unlock Position　　Lock Position

1.7 Auto connection

When the breaker is moved to Test position from Disconnected position the connector for control powers is automatically connected.
In case of reverse moving of the breaker the connector is automatically disconnected.



Racking-in/out Operation (H-Type)

1.8 Auto trip and energy release device

■ Auto trip

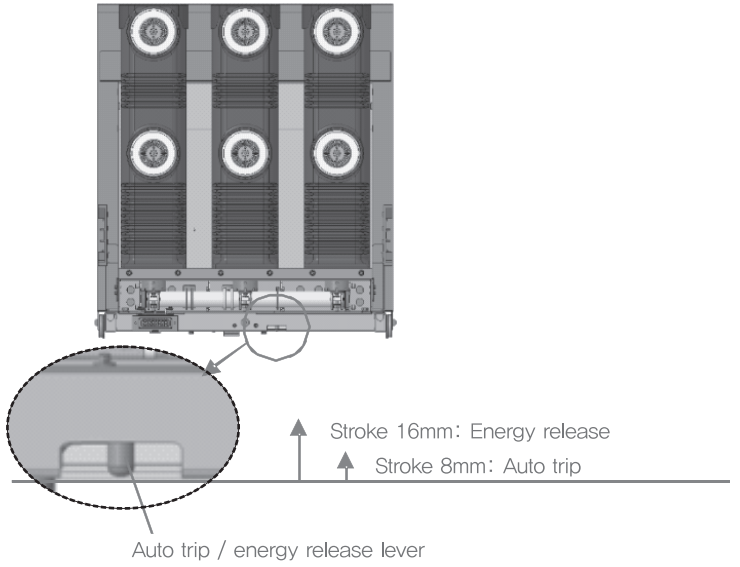
– Auto Trip device operates to work by Auto Trip/Energy Release Lever stroke on bottom of truck.

– Auto Trip Device makes breaker “Open” status when it is “Close” status.

■ Energy release

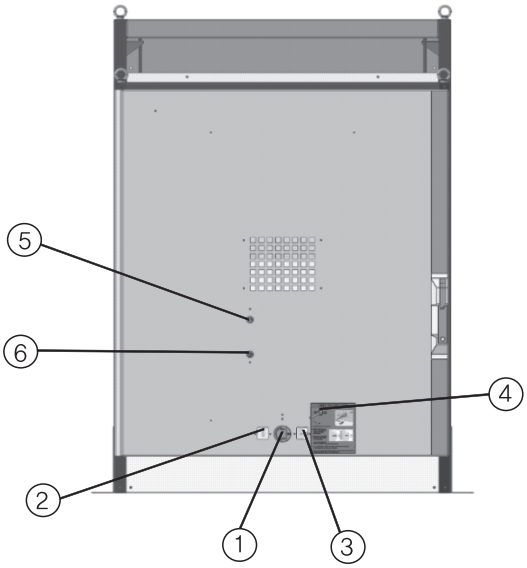
– Energy release device operates to work by Auto Trip/Energy Release Lever stroke on bottom of truck.

– Energy Release device operates when circuit breaker is “spring charged”, “Close” status and “Closing spring charged in close status” and it releases all energies of circuit breaker.



Racking-in/out Operation (Cradle)

2. Racking-In/Out operation (Cradle with VCB)



〈Figure 10〉 Structure of cradle

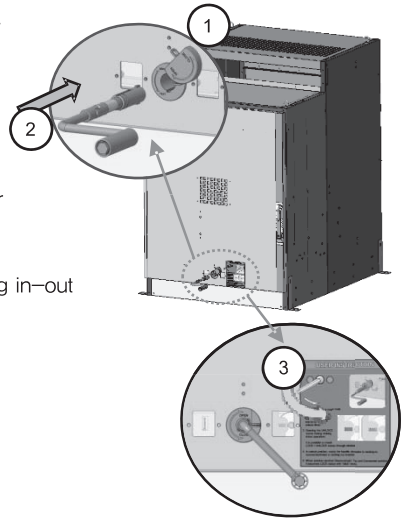
① Racking-in/out handle cover
② Position display window
③ LOCK/UNLOCK display window
④ Unlock lever
⑤ Emergency/Manual ON push button
⑥ Emergency/Manual OFF push button

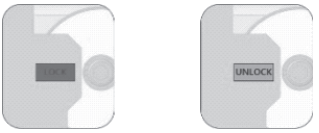
Racking-in/out Operation (Cradle)

The circuit breaker is designed with three positions (Disconnected, Test, Connected). Disconnected position only can be operated manually without control power when the shutter is closed. Test position can be operated manually but also electronically by control power even if shutter is closed. As the breaker gets closer to the connected position, a greater force is necessary to turn the handle due to the shutter opening and main circuit terminal connection. In the connected position, the shutter is open and the main circuit and the control circuit is connected.

1) Open the racking-in/out handle cover (Figure 10/No.1)
2) Insert the racking-in/out handle into the racking-in/out hole. (Figure 10/No.1)
3) Before racking-in/out, make sure UNLOCK status by turning unlock lever counterclockwise. (Figure 10/No.4)
4) Keeping UNLOCK status during racking in-out operation.

※It is possible to check status through LOCK/UNLOCK display window





Lock Unlock

5) In unlock position, rotate the handle clockwise to racking in, counterclockwise to racking out breaker.
6) When breaker reaches Disconnected, Test and Connected position, it becomes LOCK status with "clock" sound.

※If breaker is "CLOSE", it is possible to heard stomping sound by auto trip operation between "Connected position" to "Test position".

※If breaker is "CLOSE with Spring Charged', it is possible to heard stomping sound by auto trip operation between 'Test position' to 'Disconnected position'.

Accessory (Circuit breaker)

■ Under Voltage Trip device(UVT)

– UVT installed inside of the circuit breaker so as to trip the circuit breaker when the main/control voltage drops below the specified voltage. UVT is instantaneous type. If you want to delay the time, please connect theUVT time–delay device independently.

– The closing of a circuit breaker is impossible mechanically or electrically if control power not supplied to UVT. To close the circuit breaker, 85% of rated voltage should be applied to both terminals of UVT coil (D1, D2).

1. Rated voltage and characteristics of UVT

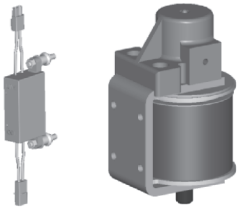
Rated voltage(Vn)		Operating voltage range(V)		Power consumption (VA or W)		Trip time (ms)
DC(V)	AC(V)	Pick up	Drop out	Inrush	Stead–state	
48~60	48	0.65~0.85Vn	0.44~0.6Vn	200	5	≤50ms
100~130	100~130					
200~250	200~250					

2. Specification of using wire

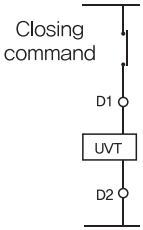
Refer to the below table regarding the length of wire when using trip coil with 48~60[V] of rate voltage as power consumption due to inrush current is about 200VA for coil operation. Coil can be non–operating in case of not corresponding with the wire specification listed below.

		Rated voltage(Vn)	
		DC/AC 48(V)	
Wire type		#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
Operating Voltage	100%	233.2m	143.9m
	85%	62.5m	39.3m

3. External configuration and Wiring diagram



External configuration



Wiring diagram

Accessory (Circuit breaker)

■ **Key Lock**

· When it is locked by a key, the closing operation is not available (electrically and mechanically) without a Key.

*** Instruction**

– KEY cannot be separated in UNLOCK position, and only separated in the LOCK position.

– After "OFF" button of circuit breaker is pushed, rotate a key counter–clockwise direction and separate a key. In LOCK position, the closing of a circuit breaker is impossible mechanically or electrically.

■ **"ON" , "OFF" Button Cover**

· To prevent the mis–operating, button cover protects 'ON' or 'OFF' button.

· It is available to operate by push bar.

Push Bar

■ **"ON" , "OFF" Button Padlock**

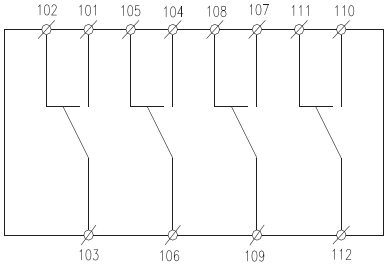
· To prevent the mis–operating, button padlock protects 'ON' or 'OFF' button.

· It is available to operate after release button padlock.

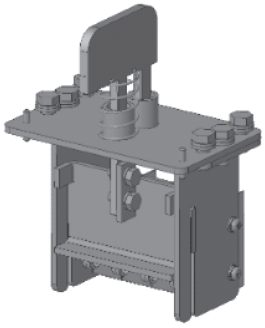
Accessory (H-type Cradle)

■ Mechanism Operated Cell Switch (MOC)

MOC which indicates the "ON" or "OFF" condition of circuit breaker, but operated only when the circuit breaker is in "CONNECT" position. (installed in the bottom of cradle). User's can use "a" or "b" contacts for various purposes.



Wiring diagram

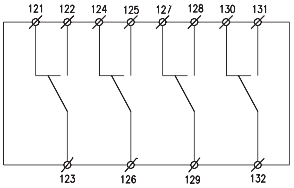


"a" Contact: 101–103,104–106,107–109,110–112
"b" Contact: 102–103,105–106,108–109,111–112

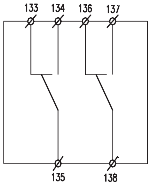
■ Truck Operated Cell Switch (TOC)

- TOC(DISCONNECT/TEST) which indicates the "TEST" state of the VCB. It is operated by the movement of the VCB.
- TOC(TEST/CONNECT) which indicates the "CONNECT" state of the VCB. It is operated by the movement of the VCB. User's can use "a" or "b" contacts for various purposes.
- Both TOCs are installed on the bottom of the cradle.

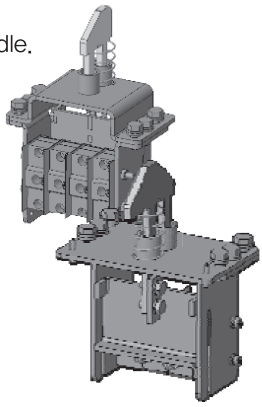
TOC(TEST/CONNECT)



TOC(DISCONNECT/TEST)



Wiring diagram

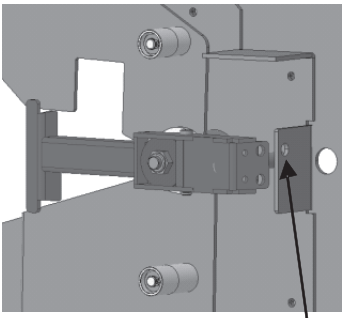


"a" Contact: 122–123,125–126,128–129,131–132,134–135,137–138
"b" Contact: 121–123,124–126,127–129,130–132,133–135,136–138

Accessory (H-type Cradle)

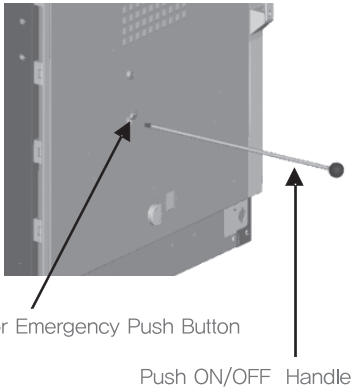
■ **Shutter Padlock**

- After removing VCB from the cradle, for the safety while maintenance works, shutter padlock enables the lock of shutters in closed position.
- While circuit breaker' s racking-in operation, the cradle shutter automatically opened.
- To prevent the shutter opening, you can use a lock through a hole. Please remove the lock before racking-in circuit breaker to the cradle.



■ **Door Emergency Push Button**

- Keeping the door closed, the closing or opening of circuit breaker can be carried out by means of PUSH ON/OFF handle through the Door Emergency Push Button.
- There is a hole for under lock and key at ON/OFF Push button housing.



Accessory (H-type Cradle)

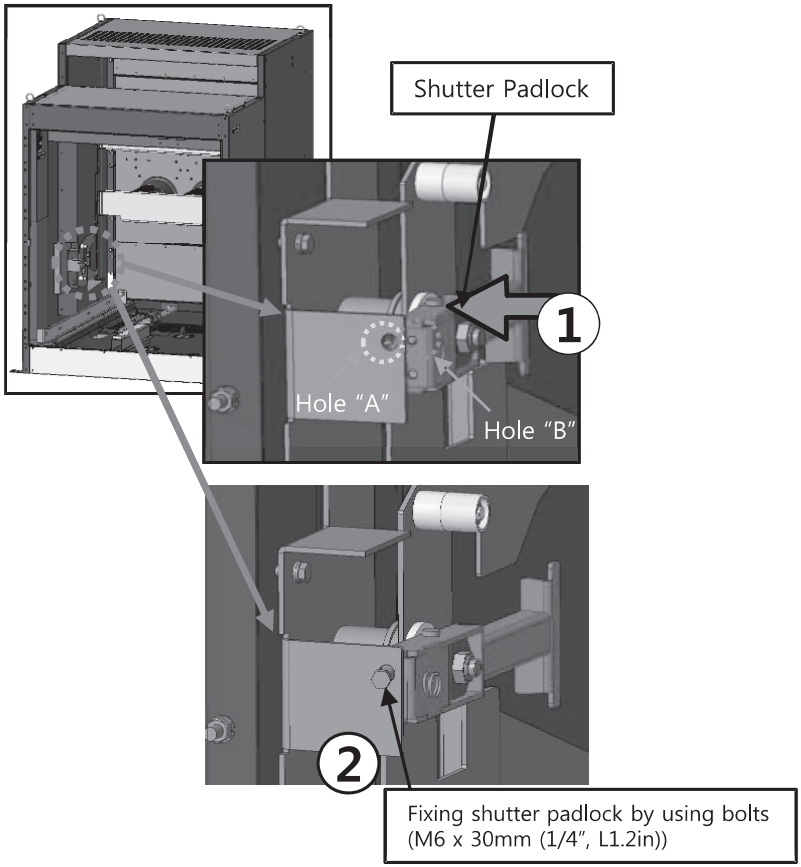
■ **Bushing Barrier**

** If user requires to 170kV of withstanding impulse required, bushing barrier needs to assemble.

** If there is no shutter padlock in your cradle, go to (2).

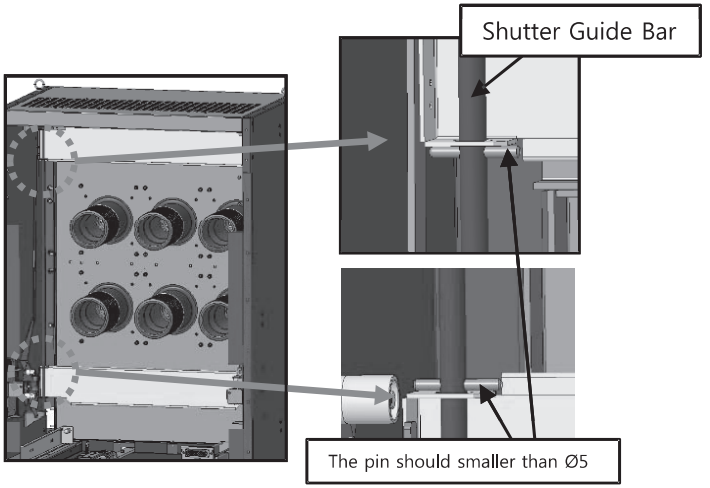
(1) Release shutter padlock

- Push both side of shutter padlock to outside direction for aligning hole "A" and "B". Put into bolt through the hole for fixing the padlock.

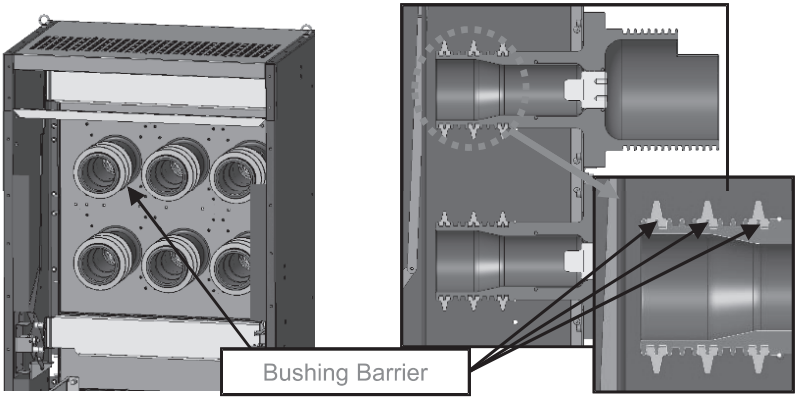


Accessory (H-type Cradle)

(2) After opening the shutter, fixing the shutter by putting some pins into shutter guide bar. Do both shutter guide bar.



(3) The bushing barriers have to be assembled with 2nd , 6th and 10th extrusion of each bushing. Bushing barriers should assemble as same as pictures below.



Maintenance and Inspection

1. General caution

⚠ DANGER

Do not touch the electrically charged parts (Conductor and Terminal conducting parts) under energized conditions.
Otherwise, it may result in severe physical injury or even death by electric shock.

⚠ WARNING

1. Inspection and maintenance have to be performed by a qualified electrician.
   Otherwise, there is the danger of malfunction, severe physical injury or electric shock.
2. When the circuit breaker is in service, don't open the front cover.
   Otherwise, there is the danger of severe physical injury or electric shock.
3. When the circuit breaker is in service, don't rack out the circuit breaker.
   Otherwise, there is the danger of severe physical injury or electric shock.
4. Inspection and maintenance have to be performed only after shutting off the electric power and discharging a charge current.
   Otherwise, there is the danger of severe physical injury or electric shock.
5. Please tighten the bolts and screw with specified torque.
   Otherwise, there is the danger of over-heat or fire.
6. After performing installation, maintenance or inspection, remove some foreign objects like tools, wires or bolts.
   Otherwise, there is the danger of short circuit or fire.
7. When performing a maintenance, make sure if VCB is tripped and it is maintained in TEST position.
   Otherwise, there is the danger of electric shock.
8. Do not move a circuit breaker by holding main circuit terminals.
   Otherwise, there is the danger of an electric accidents by temperature rise.

Maintenance and Inspection

⚠ CAUTION

1. Do not alter the control circuit at one's discretion.
   may cause of malfunction or damage to products.

〈Table 2〉 Period of maintenance and inspection

Check Item	Maintenance and inspection interval	
	Normal condition	Abnormal condition (dusty and wet places)
Usual inspection	6 months	1 month
Periodic inspection	1∼2 years after an installation. Once 3 years after that	A periodic inspection
Special inspection	If necessary	If necessary

2. Routine inspection

Make an inspection for the contactor on service between the periodic inspection. Be careful for not getting in touch with any energized parts when opening the door of switchgear.

〈Table 3〉 Items for routine inspection

Check Item	Check list	Method	Solution
Switching indicator	Verifying a normal operation	Visual	Investigating the cause and repair
Control circuit	Verifying aconnection of connectors	Visual	Investigating the cause and repair
Operating counter	Verifying a time of operation	Visual	Check the contactor if exceeding 10,000 operations
Others	Verifying abnormal noise, smell	Visual	After disconnecting the main power, investigating and repair

Notice) The indicated numbers on operating counter is obtained from the ON–OFF operation performed during manufacturing and quality inspection process.

3. Periodic inspection

〈Table 4〉 Items of periodic inspection (1)

Check Item		Check list	Method	Solution	
Operation and Equipment parts		Check abnormal assembling parts	Verify a smooth operation by visual or manual	Clean and grease Replace if necessary	Every periodic inspection, Every 5000 operations
		Check parts to be lubricated			
		Check dust and foreign material			
		Check whether C–Rings, spring pins and divider pins are wrinkled or missed			
Control circuit	Wiring	Poor connection and/or loose wirings	Visual	Retighten any loose parts Replace if necessary	Every periodic inspection
	Closing, tripping device	Check component of Movable parts.			
	Aux. Switch	Check a discoloration of coil Check links and contacts			

Maintenance and Inspection

Check Item		Check list	Method	Solution	Frequency
Main circuit terminals		Check all connections Check the corrosion, discoloration	Visual	Check the torque. Replace if necessary	Every periodic inspection
V.I	Vacuum integrity	Check the vacuum density	Vacuum integrity Testing method. Check the withstand test	Replace V.I. if necessary	Every periodic inspection, Every 5000 operations
Aux. Device	Switching Indicator	Check the normal operation	Visual	Check fixed bolts. Replace if necessary	
Insulation Resistance		Main circuit: Over 500MΩ	1000V Megger	Clean it after finding the cause. Replace if necessary	Every a periodic inspection
		Control circuit: Over 2MΩ	500V Megger		
Withstand voltage test		Main circuit: 1.5 x R.Voltage for 10 min.	Test and check with a withstand voltage tester	Clean and replace if necessary	Every periodic inspection, every 5000 operations
Operating Characteristics test		Testing for trip/close Testing for trip-free Check the minimum of operating voltage	Perform the electrical testing after a manual operation test	Inspect and repair if finding a matter. Replace if necessary.	Every periodic inspection, Every 6 years
Con-tact part	Contact Finger	Check the sectional traces of heat or discoloration. Check the damage of arc. Check the condition of applied grease on the con-tactor surface.	Visual (Use a microscope if necessary.)	Replace. Apply grease on contact surface. *Specification: HITALUBE280G	Every periodic inspection, Annually
	Contact Spring	Check the sectional traces of heat or discoloration. Check the damage of arc. Check transformation or mechanical crack of a coil.	Visual (Use a microscope if necessary.)	Replace.	Every periodic inspection, Annually
	VCB & Cradle Terminal	Check the sectional traces of heat or discoloration. Check the damage of arc. Check the amount of eccentricity between terminals. - Tulip type: within ±3mm	Visual (Use a microscope if necessary.) Tightening force	Replace. Apply grease on contact part *Specification: HITALUBE280G	Every periodic inspection, Annually

Check Item	Check list	Method	Solution	Frequency
Contact resistance of main circuit	Measure a contact resistance of main circuit after drawing out the VCB –It must be less than 120% of final inspection report value –The variation resistance between phases must be less than 25%	The voltage drop method (DC 100A) Measure with inserting the same size copper bar (make a jig for measuring if necessary)	1. Dismantle the contactors 2. Clean the discoloration, corrosion or heated parts of arc 3. Clean the contactor surface after removing foreign substances 4. Apply specified grease *Specification: HITALUBE280G	Annually
Temperature rising	Check the temp. rising of contacted and connection parts *The max. available limit of temp. rising – Contacted part: 65K – Connected part: 75K (K: Temperature rise)	Visual Infrared camera	Carry out a close inspection	As occasion demands

Notice) Replacement of contactors

The replacement of contactors must be decided with a close inspection and carried out by LSIS service staff. Please follow below 1, 2, 3 when the contactors are replaced.

1. Apply specified grease after replacement. (specification: HITALUBE280G)
2. Measure the contact resistance of main circuit with no–load mechanical operating test after replacement.
   The measured values should be compared with the measured values before replacement and they should be put on record.
3. If there are traces of arc when replacing contactors, the terminals should be replaced.
   In case that there aren't any traces, wipe clean on terminal surface.

〈Table 5〉 Items of periodic inspection (2)

	Item	Check list	Method	Solution
Common components of the contactor	Insulated frame Insulated tube Heat shrinkable tube	Check condensation, humidity, stain, discoloration and damage	Visual Clean it, then measure the insulation resistance	Wipe it clearly with a dry cloth

4. Special inspection

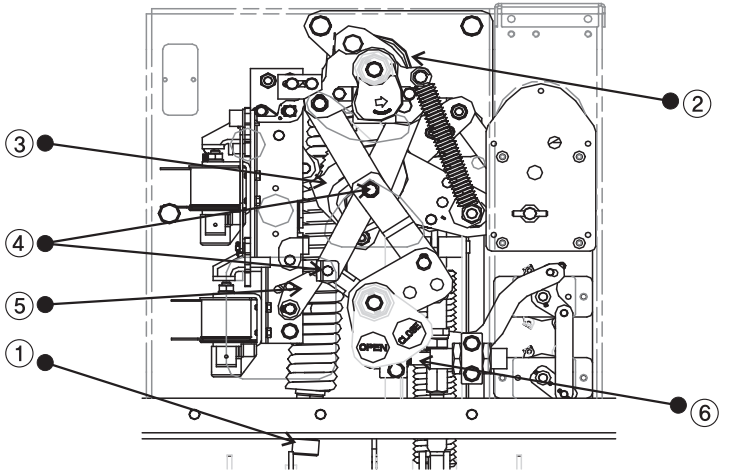
Make a special inspection in case of situation as table 6

〈Table 6〉 Special inspection

NO	Inspection item	Inspection method
1	When interrupting short–circuit(fault) current several times	Check wearing contacts of vacuum interrupter
2	In case of appearing a abnormal situation at service operation	Check defective parts

5. Lubricant points for operating parts

When using a circuit breaker for a long period, lubricate its surface of operating and frictional parts with grease because its operating mechanism runs rapidly. The important parts are indicated with the mark of ←● in the figure below. When lubricating, clean the points and check the condition of wear, and then lubricate them with the grease. Take care of not applying at the wiring connection part of control circuit.

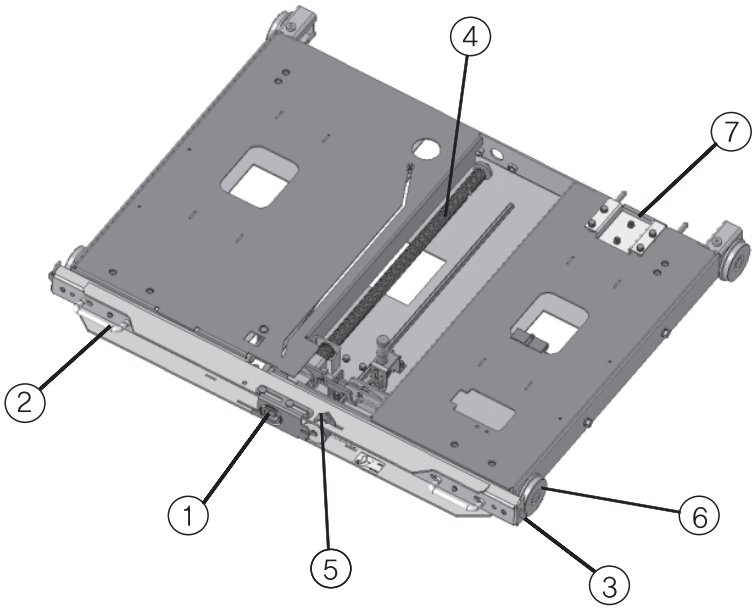


〈Figure 11〉 Opening state of main circuit

NO	Lubricant Point
1	Fixing part of opening spring
2	Fixing part of closing spring
3	Closing latch roller and crank arm
4	Connecting pin of linkage
5	Trip latch and roller
6	Guide pin for O.D.P

6. Racking-In/Out inspection

Please check the deformation of main body, operating condition, and lubricant points while performing the periodic inspection. Verify that the lower Racking-in/out frame is firmly tightened to the main body. The handle (2) and the wheel (6) must be manually pulled or rotated smoothly. If it is too loose or rough, replace or reassemble. After moving Racking-in/out device connected with main body to the Connected position, apply grease on the surface of draw in/out screw (4), and unlocking lever (5). Please examine any modifications and functions of the sliding plate (3) and auto connector (7). While examining, do not activate any outer device if a circuit breaker is not completely in the disconnected position.



Ratings

<Table 7-1> Rating Table

Type			UVH–27□25□12		
Rated voltage		(kV)	27		
Rated current		(A)	1200		
Rated frequency		(Hz)	60		
Rated interrupting current		(kA)	25		
Rated interrupting capacity		(MVA)	1170		
Rated short-time current		(kA)	25 / 4sec		
Rated making current		(kA)	65		
Rated interrupting time		(cycle)	3		
Withstand Voltage	Frequency	(kV)	60		
	Impulse (kV/1.2 × 50 μs)		125		
TRV increasing rate		(kV/μs)	0.51		
TRV MAX Value		(kV)	46.3		
Operating duty			O-0.3s-CO-15s-CO		
Control voltage		(V)	DC48~60V AC 48V	ADC 100~130V	ADC 200~250V
Control current for closing		(A)	≤ 8	≤ 3.5	≤ 2.5
Control current for opening		(A)	≤ 8	≤ 3.5	≤ 2.5
Current of motor operation (Steady Current/Inrush Current)		(A)	≤ 6/≤ 30	≤ 3/≤ 20	≤ 2.6/≤ 17
Standard aux contacts			4a4b, 10a10b		
Rated opening time		(s)	≤ 0.04		
No-load closing time		(s)	≤ 0.06		
Motor charging time		(s)	≤ 12		
Pole distance		(mm)	275		
Weight (Pp, Hp-type)		(kg)	260		
Installation type			Pp, Hp		
Applicable standard			IEEE C37.09, IEEE C37.20.2		

Ratings

<Table 7-2> Rating Table

Type			UVH-38□32□12		UVH-38□32□20
Rated voltage		(kV)	38		
Rated current		(A)	1200		2000
Rated frequency		(Hz)	60		
Rated interrupting current		(kA)	31.5		
Rated interrupting capacity		(MVA)	2070		
Rated short-time current		(kA)	31.5 / 3sec		
Rated making current		(kA)	81.9		
Rated interrupting time		(cycle)	3		
Withstand Voltage	Frequency	(kV)	80		
	Impulse (kV/1.2 × 50 μs)		170		
TRV increasing rate		(kV/μs)	0.60		
TRV MAX Value		(kV)	65.2		
Operating duty			O-0.3s-CO-15s-CO		
Control voltage		(V)	DC48~60V AC 48V	ADC 100~130V	ADC 200~250V
Control current for closing		(A)	≤ 8	≤ 3.5	≤ 2.5
Control current for opening		(A)	≤ 8	≤ 3.5	≤ 2.5
Current of motor operation (Steady Current/Inrush Current)		(A)	≤ 6/≤ 30	≤ 3/≤ 20	≤ 2.6/≤ 17
Standard aux contacts			4a4b, 10a10b		
Rated opening time		(s)	≤ 0.04		
No-load closing time		(s)	≤ 0.06		
Motor charging time		(s)	≤ 12		
Pole distance		(mm)	300		
Weight (P, H-type)		(kg)	400		400
Installation type			P, H		
Applicable standard			IEEE C37.09, IEEE C37.20.2		

Ratings

<Table 7-3> Rating Table

Type			UVH-38□40□12		UVH-38□40□20
Rated voltage		(kV)	38		
Rated current		(A)	1200		2000
Rated frequency		(Hz)	60		
Rated interrupting current		(kA)	40		
Rated interrupting capacity		(MVA)	2633		
Rated short-time current		(kA)	40 / 3sec		
Rated making current		(kA)	104		
Rated interrupting time		(cycle)	3		
Withstand Voltage	Frequency	(kV)	80		
	Impulse (kV/1.2 × 50 μs)		170		
TRV increasing rate		(kV/μs)	0.60		
TRV MAX Value		(kV)	65.2		
Operating duty			O-0.3s-CO-15s-CO		
Control voltage		(V)	DC48~60V AC 48V	ADC 100~130V	ADC 200~250V
Control current for closing		(A)	≤ 8	≤ 3.5	≤ 2.5
Control current for opening		(A)	≤ 8	≤ 3.5	≤ 2.5
Current of motor operation (Steady Current/Inrush Current)		(A)	≤ 6/≤ 30	≤ 3/≤ 20	≤ 2.6/≤ 17
Standard aux contacts			4a4b, 10a10b		
Rated opening time		(s)	≤ 0.04		
No-load closing time		(s)	≤ 0.06		
Motor charging time		(s)	≤ 12		
Pole distance		(mm)	300		
Weight (P, H-type)		(kg)	400		400
Installation type			P,H		
Applicable standard			IEEE C37.09, IEEE C37.20.2		

Ratings

<Table 7-4> Rating Table

Type			UVH-38□32□30		UVH-38□40□30
Rated voltage		(kV)	38		
Rated current		(A)	3000		
Rated frequency		(Hz)	60		
Rated interrupting current		(kA)	31.5		40
Rated interrupting capacity		(MVA)	2070		2633
Rated short-time current		(kA)	31.5 / 4sec		40 / 3sec
Rated making current		(kA)	81.9		104
Rated interrupting time		(cycle)	3		
Withstand Voltage	Frequency	(kV)	80		
	Impulse (kV/1.2 × 50 μs)		170		
TRV increasing rate		(kV/μs)	0.60		
TRV MAX Value		(kV)	65.2		
Operating duty			O-0.3s-CO-15s-CO		
Control voltage		(V)	DC48~60V AC 48V	ADC 100~130V	ADC 200~250V
Control current for closing		(A)	≤ 8	≤ 3.5	≤ 2.5
Control current for opening		(A)	≤ 8	≤ 3.5	≤ 2.5
Current of motor operation (Steady Current/Inrush Current)		(A)	≤ 6/≤ 30	≤ 3/≤ 20	≤ 2.6/≤ 17
Standard aux contacts			4a4b, 10a10b		
Rated opening time		(s)	≤ 0.04		
No-load closing time		(s)	≤ 0.06		
Motor charging time		(s)	≤ 12		
Pole distance		(mm)	300		
Weight (P, H-type)		(kg)	455		
Installation type			P,H		
Applicable standard			IEEE C37.09, IEEE C37.20.2		

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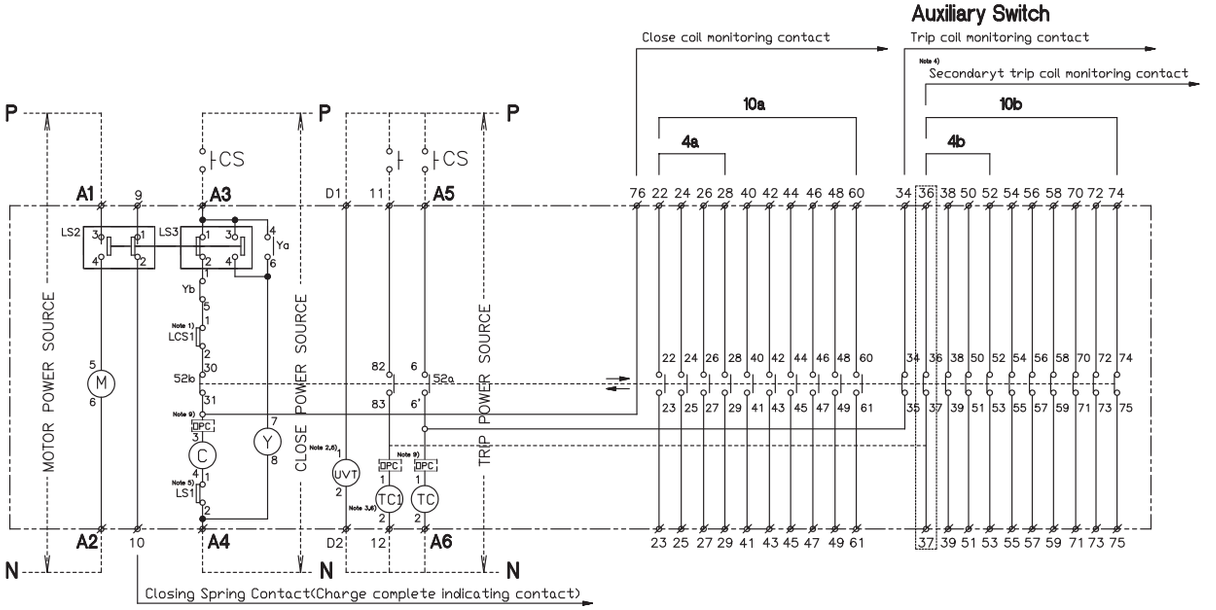
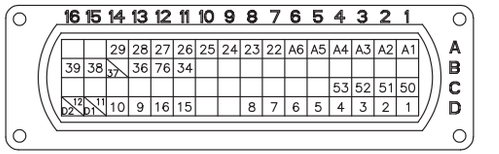
Circuit Diagram (B Type connector for the withdraw type VCB)



ø : External terminal of VCB
52 : Vacuum circuit breaker
M : Spring charging motor
TC : Trip coil
TC1 : Secondary trip coil
C : Closing coil
Y : Anti-pump relay
UVT : Under voltage Trip
52a : Auxiliary switch (NO)
52b : Auxiliary switch (NC)
LS1 : Close interlock limit switch (only withdrawable type)
LS2 : Motor stop, close spring charged indication limit switch
LS3 : Anti-close, anti-pumping limit switch
LCS1 : Trip latch checking switch (preventing closing unless the trip latch is properly reset)
OPC : One Pulse Controller

Note) 1. LCS1 - Latch Checking Switch
In case of selecting UVT, LCS1 is applied by default, so cannot select it additionally.
2. UVT - Under Voltage Trip (Terminal No.:D1,D2)
3. TC1 - Secondary Trip Coil (Terminal No.:11,12)
4. Secondary trip coil monitoring contact (Terminal No. 36)
In case Secondary trip coil monitoring contact is selected, 'b' contact(36,37) are not available.
5. In case of the fixed type CB, LS1(Closing-interlock Limit Switch) is not available.
6. In above optional accessories, UVT and TC1 can not be selected simultaneously.
7. Above circuit diagram is based on "OPEN" state of VCB and closing spring is charged.
8. Please follow the direction of P and N shown on the circuit diagram.
9. OPC - One Pulse Controller
1) In the case of AC power, OPC is added to all CC,TC,TC1 or UVT lines.
Due to the resistance of the controller, Close&Trip Coil Monitoring is not possible.
2) In the case of DC power, OPC is added to the CC line only when the Keylock option is added.
At this time, Close Coil Monitoring is not possible.

OPTION



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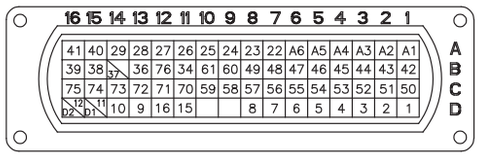

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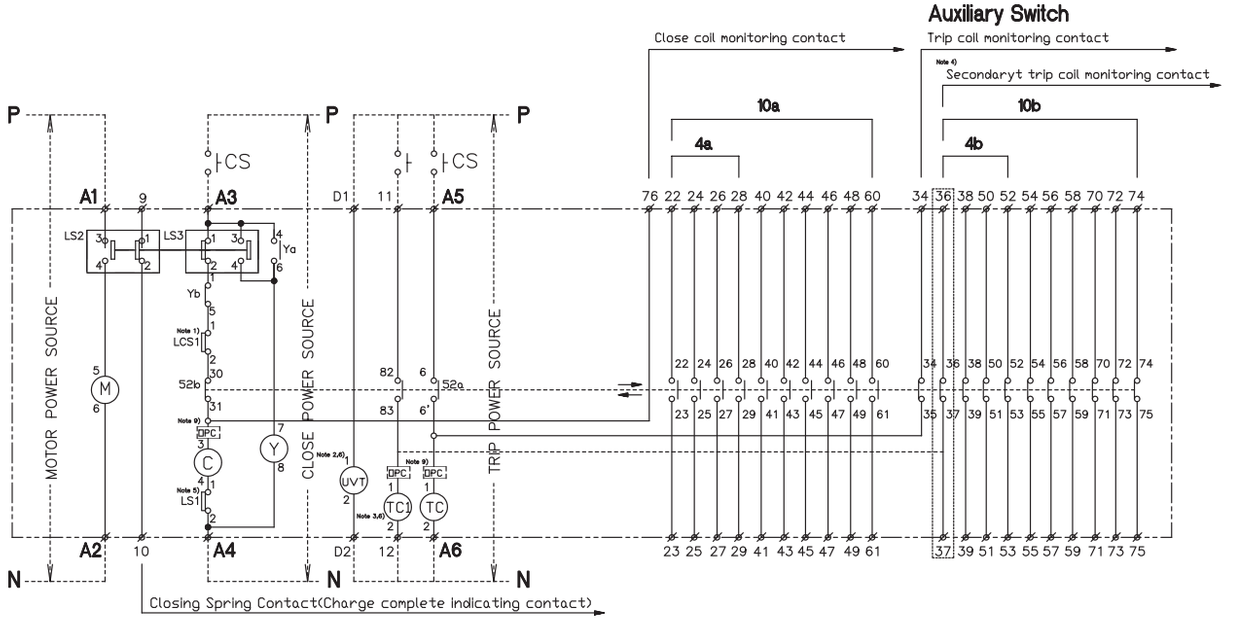
<Connector Terminal Configration>

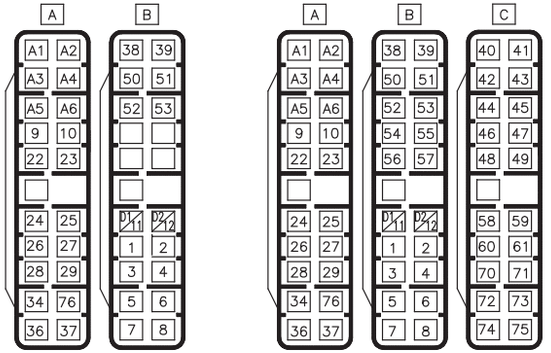
Circuit Diagram (A Type connector for the fixed type VCB)



⌀ : External terminal of VCB	52a : Auxiliary switch (NO)
52 : Vacuum circuit breaker	52b : Auxiliary switch (NC)
M : Spring charging motor	LS1 : Close interlock limit switch (only withdrawable type)
TC : Trip coil	LS2 : Motor stop, close spring charged indication limit switch
TC1 : Secondary trip coil	LS3 : Anti-close, anti-pumping limit switch
C : Closing coil	LCS1 : Trip latch checking switch (preventing closing unless the trip latch is properly reset)
Y : Anti-pump relay	OPC : One Pulse Controller
UVT : Under voltage Trip	

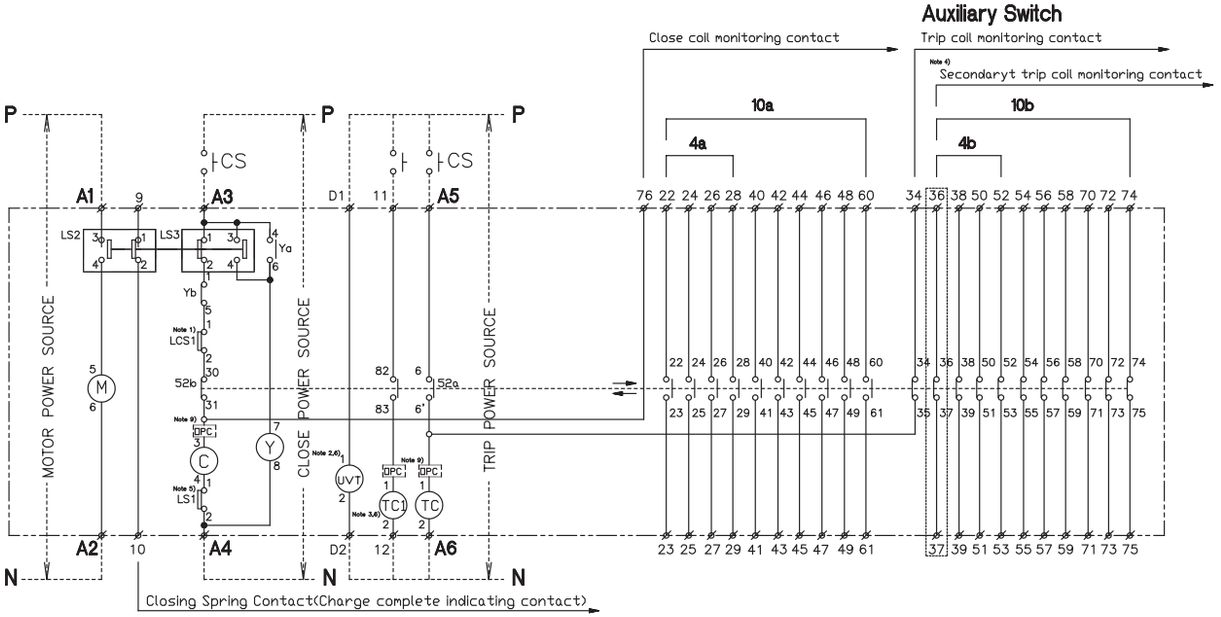
Note) 1. LCS1 - Latch Checking Switch
In case of selecting UVT, LCS1 is applied by default, so cannot select it additionally.
2. UVT - Under Voltage Trip (Terminal No.:D1,D2)
3. TC1 - Secondary Trip Coil (Terminal No.:11,12)
4. Secondary trip coil monitoring contact (Terminal No. 36)
In case Secondary trip coil monitoring contact is selected, 'b' contact(36,37) are not available.
5. In case of the fixed type CB, LS1(Closing-interlock Limit Switch) is not available.
6. In above optional accessories, UVT and TC1 can not be selected simultaneously.
7. Above circuit diagram is based on "OPEN" state of VCB and closing spring is charged.
8. Please follow the direction of P and N shown on the circuit diagram.
9. OPC - One Pulse Controller
1) In the case of AC power, OPC is added to all CC,TC,TC1 or UVT lines.
Due to the resistance of the controller, Close&Trip Coil Monitoring is not possible.
2) In the case of DC power, OPC is added to the CC line only when the Keylock option is added.
At this time, Close Coil Monitoring is not possible.

OPTION



<Connector Terminal Configration>

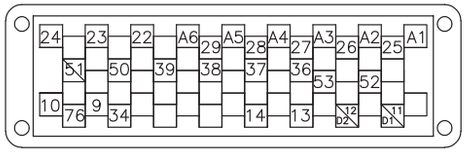
Circuit (Q type connector for the fixed type VCB)



ø : External terminal of VCB	52a : Auxiliary switch (N□)
52 : Vacuum circuit breaker	52b : Auxiliary switch (NC)
M : Spring charging motor	LS1 : Close interlock limit switch (only withdrawable type)
TC : Trip coil	LS2 : Motor stop, close spring charged indication limit switch
TC1 : Secondary trip coil	LS3 : Anti-close, anti-pumping limit switch
C : Closing coil	LCS1 : Trip latch checking switch (preventing closing unless the trip latch is properly reset)
Y : Anti-pump relay	□PC : □ne Pulse Controller
UVT : Under voltage Trip	

Note) 1. LCS1 - Latch Checking Switch
In case of selecting UVT, LCS1 is applied by default, so cannot select it additionally.
2. UVT - Under Voltage Trip (Terminal No.:D1,D2)
3. TC1 - Secondary Trip Coil (Terminal No.:11,12)
4. Secondary trip coil monitoring contact (Terminal No. 36)
In case Secondary trip coil monitoring contact is selected, 'b' contact(36,37) are not available.
5. In case of the fixed type CB, LS1(Closing-interlock Limit Switch) is not available.
6. In above optional accessories, UVT and TC1 can not be selected simultaneously.
7. Above circuit diagram is based on "□PEN" state of VCB and closing spring is charged.
8. Please follow the direction of P and N shown on the circuit diagram.
9. □PC - □ne Pulse Controller
1) In the case of AC power, □PC is added to all CC,TC,TC1 or UVT lines.
Due to the resistance of the controller, Close&Trip Coil Monitoring is not possible.
2) In the case of DC power, □PC is added to the CC line only when the Keylock option is added.
At this time, Close Coil Monitoring is not possible.

OPTION



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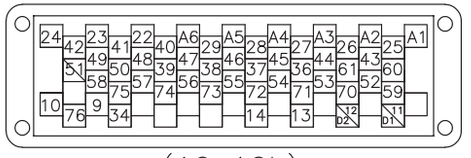

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<Connector Terminal Configration>

Warranty

Model Name			Buying Date	
Serial No.			Warranty Period	1years
Customer Information	Name			
	Address			
	Tel.			
Sales Office (Distributor)	Name			
	Address			
	Tel.			

- Product quality is strictly controlled and inspected.
- If he defective part is identified to have been properly used under the guarantee term, it will be repaired at our expense.
- The problems occur out of warranty term will be repaired at your expense.
- When applying for repair, please present this warranty.

■ **In-Warranty Repair – Under Guarantee Term**

■ **Out-of-Warranty Repair**

The guarantee will not be applied to any of the below listed conditions even if the term of guarantee is still valid.

- Defect caused by misusage or improper maintenance of customer
- Defect caused by improper repair or modification by unauthorized distributors or service center
- Damage caused by natural phenomenon such as earthquake, fire, flooding and lightning
- Claim guarantee without presented warranty form.

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