

Installation, Operation and Maintenance Instruction

# Vacuum Circuit Breaker



## Safety Instructions

- Please read carefully this safety instructions before products are put into service.
- This manual should be retained by those who in charge of maintenance and repair or ultimate users.
- This instruction manual shall be kept within easy reach of users.



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## Safety Precautions

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

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) under energized 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 TEST 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 VCB which is installed at switchgear, it shall be in Test position.**  
If transporting VCB when it is in SERVICE position, the contact resistance of contacting parts gets higher and it may result in over-heat or damage.

## Safety Precautions

### CAUTION

- 1. Do not alter the control circuit at one's discretion.**  
Otherwise, there is the danger of malfunction or damage to products.
- 2. The circuit breakers must be kept in dry condition and keep away from the water.**  
Otherwise, there is the danger of deterioration of insulation.
- 3. This product must be stored at the place with no corrosive gas.**  
Otherwise, there is the danger of a product damage (discoloration, temperature rise or burns on contacts due to the increased contact resistance.)
- 4. When storing VCB for a long period of time, put dust cover on them to prevent dust from entering.**  
Otherwise, it may result in electrical accidents during the operation since dielectric strength gets reduced.

## Unpacking and Service Conditions

### ■ Unpacking

1. When unpacking the package, take care to handle the circuit breaker, standard components and accessories.
2. Certify that the instruction manual and a test report of final testing were packed inside each PVC envelop.
3. If damage or breakage of products are founded, immediately notifyLSIS'sales office or service representatives.
4. If damage or breakage of products by the carrier are founded, immediately file a claim with the carrier and notify the shipping company.



### ■ Service conditions(Indoor type)

1. Normal service condition  
Design to IEC 62271-100(IEC 62271-1), with the following limits values :

## Unpacking and Service Conditions

- Ambient temperature
  - \* Maximum : +40°C      \* Maximum 24 hour average : +35°C
  - \* Minimum : -5°C
- Maximum site altitude : ≤ 1000m above sea level
- Relative Humidity
  - \* 24 hour average value : ≤ 95%
  - \* One month average value : ≤ 90%

### 2. Special service conditions

Special service conditions are to be agreed on by the manufacturer and user. The manufacturer must be consulted in advance about each special service conditions using at the following cases or places :

- Higher level of site altitude or ambient temperature exceeding the normal conditions (Minimum Temperature:-40°C)
- At place much influence by sea wind.
- At a wet place with high humidity usually
- At places with much water or oil vapors
- At places with an explosive, flammable or noxious gas
- At places with much dust
- At places with abnormal vibration or impact
- At places with much ice and snow
- In case of using at other special conditions besides above cases

## Transporting, Storage and Disposal

### ■ Transporting



1. **Do not move the circuit breaker by handling main circuit bus terminals.**  
Otherwise, there is the danger of electric accidents by temperature increasing.
2. **Make sure to remove the lifting hook for centering weight before racking in circuit breaker into CB compartment of switchgear.**  
Otherwise, there is the danger of damage to products or short circuit.

## Transporting, Storage and Disposal

1. Please use hook and rope to lift or transport the circuit breaker. The hook should be put into the designated hole or position.
2. Before inserting circuit breaker into CB compartment of switchgear, please remove the lifting hooks.
3. When lifting the circuit breaker with a switchgear, it should be raised at the SERVICE position.
4. When placing the circuit breaker on the ground, be careful not to drop or to impact the breaker.



Circuit Breaker



## Transporting, Storage and Disposal

### ■ Storage



#### CAUTION

1. **The circuit breakers must be stored in clean, dry, dust and condensation-free environment.**  
may cause a weakness of insulation.
2. **The products must be stored at the place with no corrosive gas.**  
Otherwise, there is the danger of a product damage (discoloration, temperature rise or burns on contacts due to the increased contact resistance).

### ■ Disposal



#### CAUTION

1. **When making a disposal, dispose it at a designated place with no affection to environment.**  
May cause an 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. In case of being materials whatever you want to remake please contact us.
3. In case of special materials making noxious gas when destroying by fire, be sure to dispose them at an approved place.

## Installation

### CAUTION

1. VCB life span and performance can be guaranteed when periodic visual inspection and maintenance are in place.
  - It shall be kept clean by removing the foreign objects around or inside switchgear.
  - Corrective action shall be taken in advance to limit any dust and high humidity since they may result in unexpected faults or accidents.
  - Switchgear door shall be well closed to prevent it from being invaded by rats or frogs which may cause the electrical incidents.
  - Sufficient effort shall be made to maintain it in a dry condition if it is installed in presence of high humidity or during the rainy season. Humidity is fatal to electricity.
  - Check if the wire is well coated and paint dose not come off from the switchgear.
  - The corrective action shall be taken if the installation place has a higher or lower temperature than specified operating range.
2. Any incident or damage resulting from customer' s neglect or mistake 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. (More than one time 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 lift, etc. because circuit breaker lurches.
- Before inserting circuit breaker which have special lifting hooks for centering weight into CB compartment of switchgear remove lifting hooks.
- When installing a fixed type of circuit breaker into switchgear, fix the contactor with same torque value by passing through mounting holes (6- $\varnothing$  14) after inserting spring washers into head of bolt without high pressure or alteration.
- Take care not to apply pressure or permanent tension by bus bars or others to main bus terminals.
- Keep the terminal of switchgear horizontal and centered, otherwise the tulip/finger contacts of circuit breaker may result in over-heat and burns in use.
- Remove dust or other foreign substances.
- When bolting, follow the recommended torque value specified in Table 1.



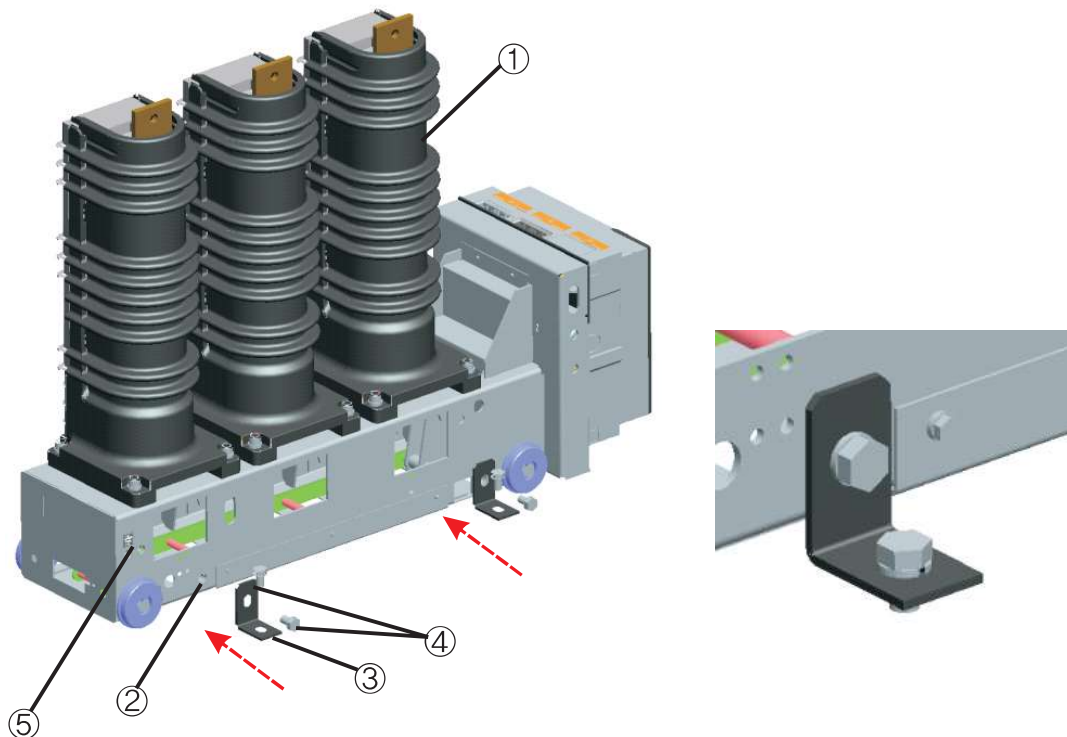
### WARNING

- 1. When making bolts and screw assembling, follow the instruction with recommended torque values.**  
May result in over-heat or burns.
- 2. Do not alter the control circuit at one's discretion.**  
May cause of malfunction or damage to 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)

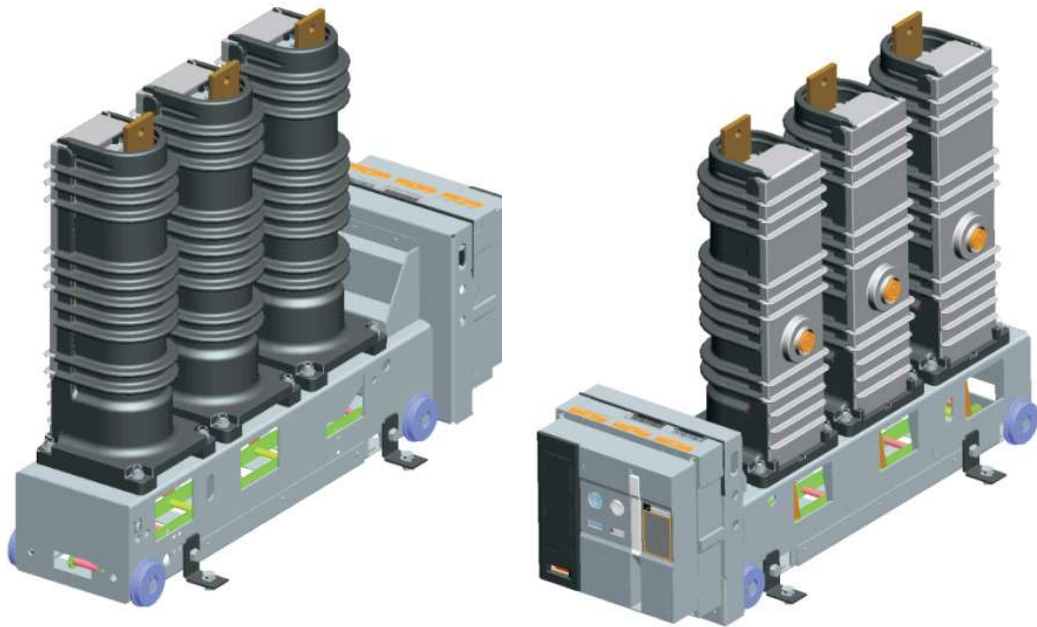
## Installation: Fixed type circuit breaker



〈Figure 1〉 Installation of fixed type circuit breaker

- ① Main circuit housing
- ② Fixing Flange assembling hole
- ③ Fixing Flange
- ④ Fixing Screw (M12) – It is not offered separately
- ⑤ Earthing busbar assembling hole

## Installation: Fixed type circuit breaker



### ■ Installation of fixed type circuit breaker

#### 1. Installation guide

- 1) Individually packing fixing Flange ③ is basically offered in case of fixed type circuit breaker.

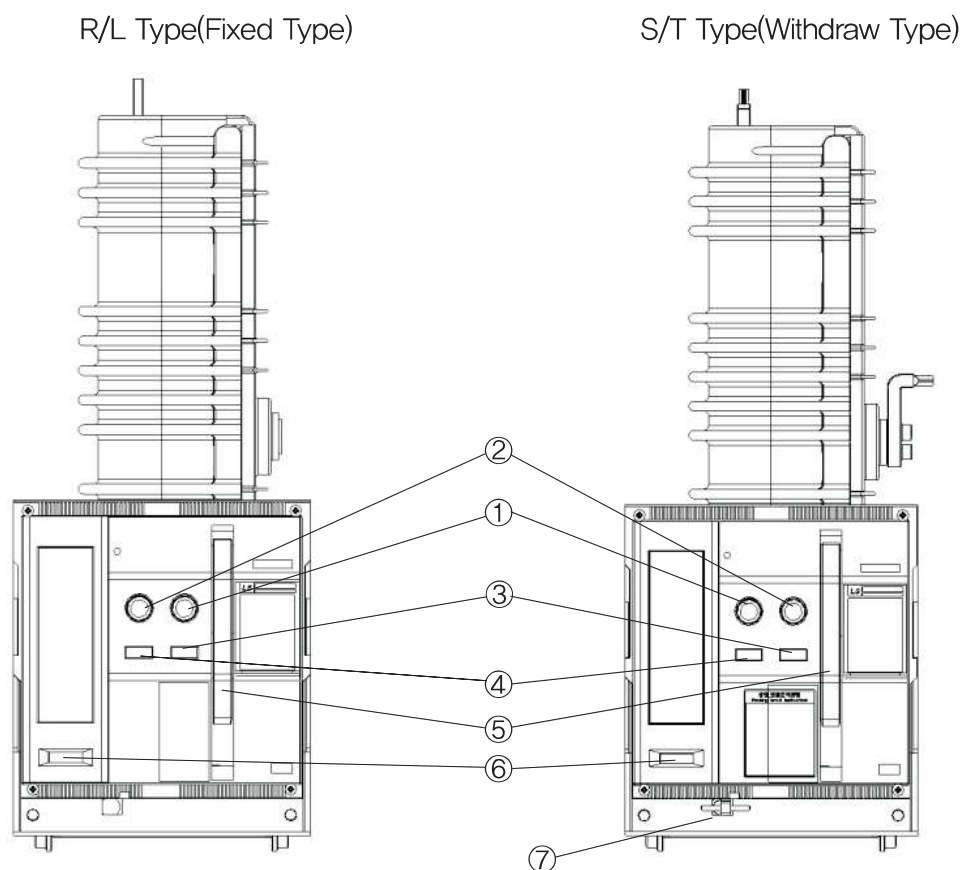
The fixed bracket is firstly placed Fixing Flange assembling hole

② as shown figure 1. Then, using the fixing screw ④, assemble a fixing Flange ③ as shown figure 1. After install of fixing flange

③, you shall be confirm that circuit breaker is fixed perfectly.

## Structure and operation

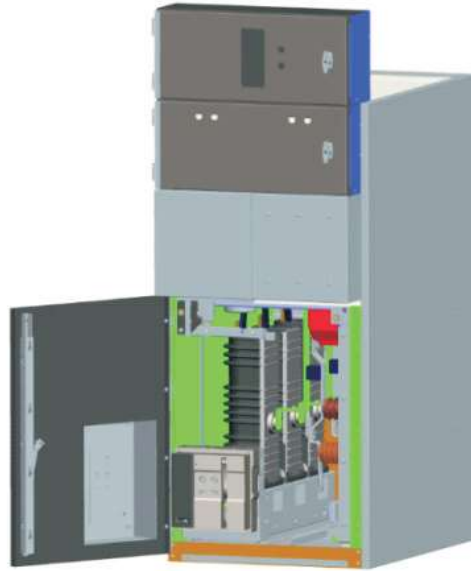
### 1. Front View



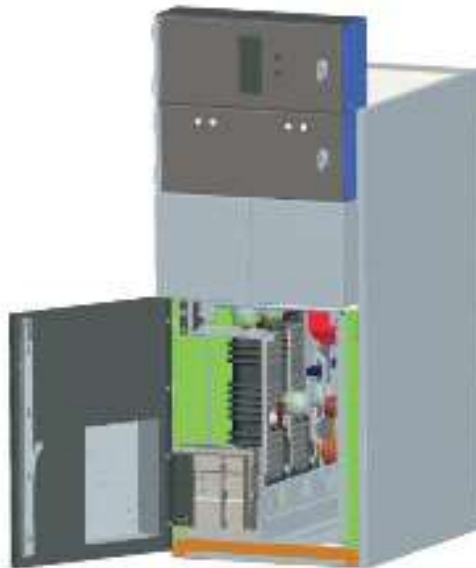
〈Figure 2〉 Front part of circuit breaker

- ① Push ON Button
- ② Push OFF Button
- ③ Charge/Discharge Indicator
- ④ ON/OFF Indicator
- ⑤ Manual Charging Handle
- ⑥ Operation Counter
- ⑦ Interlock Lever

## Structure and operation



R/L Type(Fixed Type)



S/T Type(Withdraw Type)

〈Figure 3〉 Combination of circuit breaker and switchgear according to each type

## Structure and operation

### 1.1 Operating method for operating mechanism

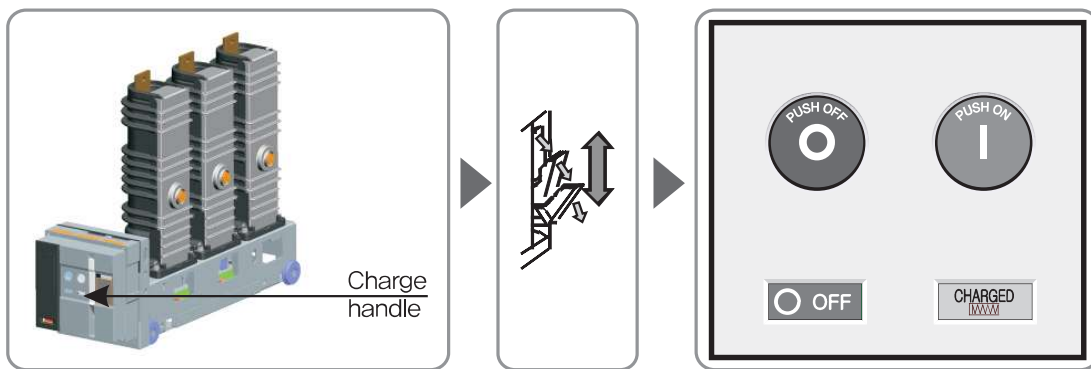
#### 1) Manual operation

– VL Type

##### ① Manual charging

A) Charge the handle 5~ 6 times with full strokes.

b) When the closing spring is completely charged, the charging indicator shows "CHARGED".

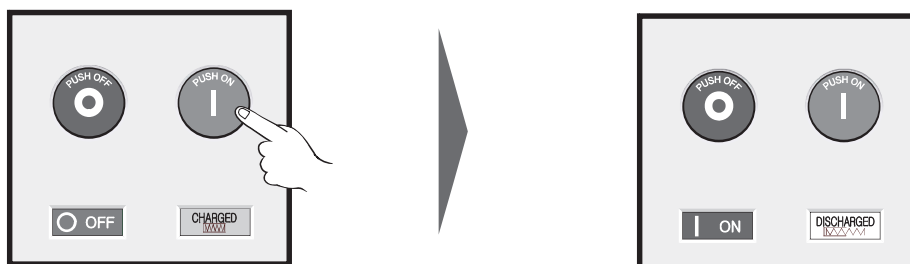


##### ② Manual closing

a) Push ON button.

b) The breaker will be closed.

c) ON/OFF indicator shows "ON" and the charge indicator shows "DISCHARGED".



##### ③ Manual tripping

a) Push the OFF button and breaker will be tripped.

B) The ON/OFF indicator shows "OFF".





## Structure and operation

### 2) Electrical operation

#### ① Electrical operation

Closing operation is done by charging the closing spring from remote control. If pushing OFF button, closing spring is automatically charged by a geared motor and a circuit breaker is closed by ON button.

#### ② Electrical closing

Remote closing can be made by energizing the closing coil (CC). Apply the rated voltage to A3+ and A4- of the control circuit terminals And close the circuit breaker.

#### ③ Electrical opening

- a) Remote opening can be made by energizing the trip coil (TC) or the under voltage trip (UVT) device.
- b) In the case of TC, apply the rated voltage to A5+ and A6- of control circuit terminals
- c) 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

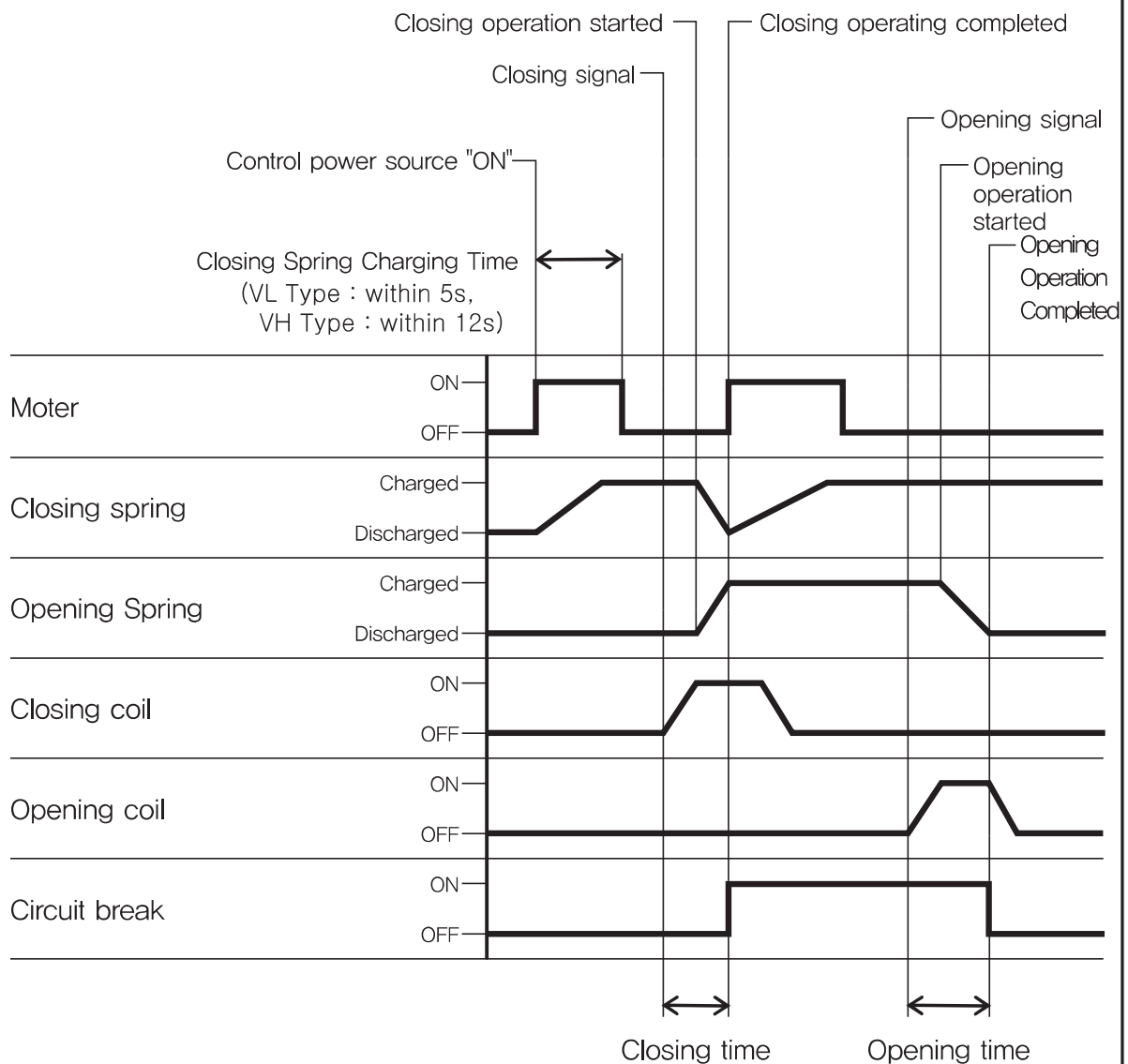
This operating mechanism is available for the high-speed reclosing (O-0.3s-CO) operating duty by remote operation at the status that the main circuit is "CLOSE" and the closing spring is "CHARGED"

To perform the operating duty of multiple auto reclosing (O-0.3s-CO-15s-CO), the closing spring shall be charged automatically within 15sec. This circuit breaker is available for auto charging of closing spring within 5 sec.

## Structure and operation

### 1.2 Operating sequence

The sequence of operating mechanism is as follows;



<Figure 4> Operating Sequence

## Structure and operation

### 1.3 Operating frequency

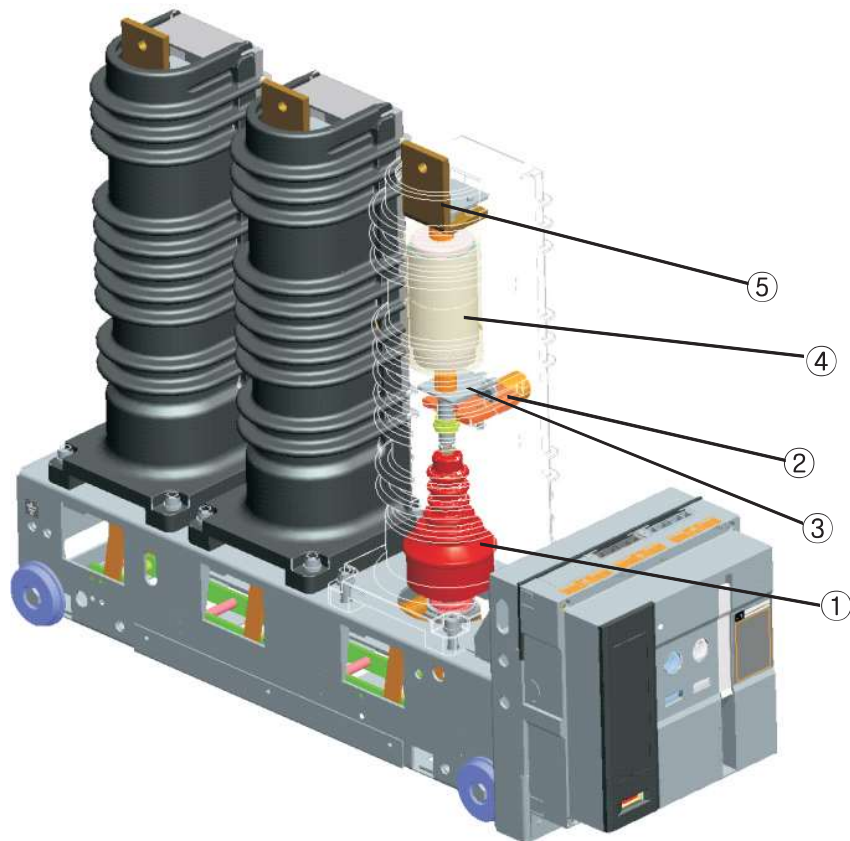
In order to keep the operating mechanism parts or components at the best service condition, please avoid any unnecessary operation and also attend the followings.

- \* Make a successive operation 10 operations with the minimum time interval (about VL Type 5s., VH Type 12s) 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.

## Structure and operation

### 2. Main Circuit

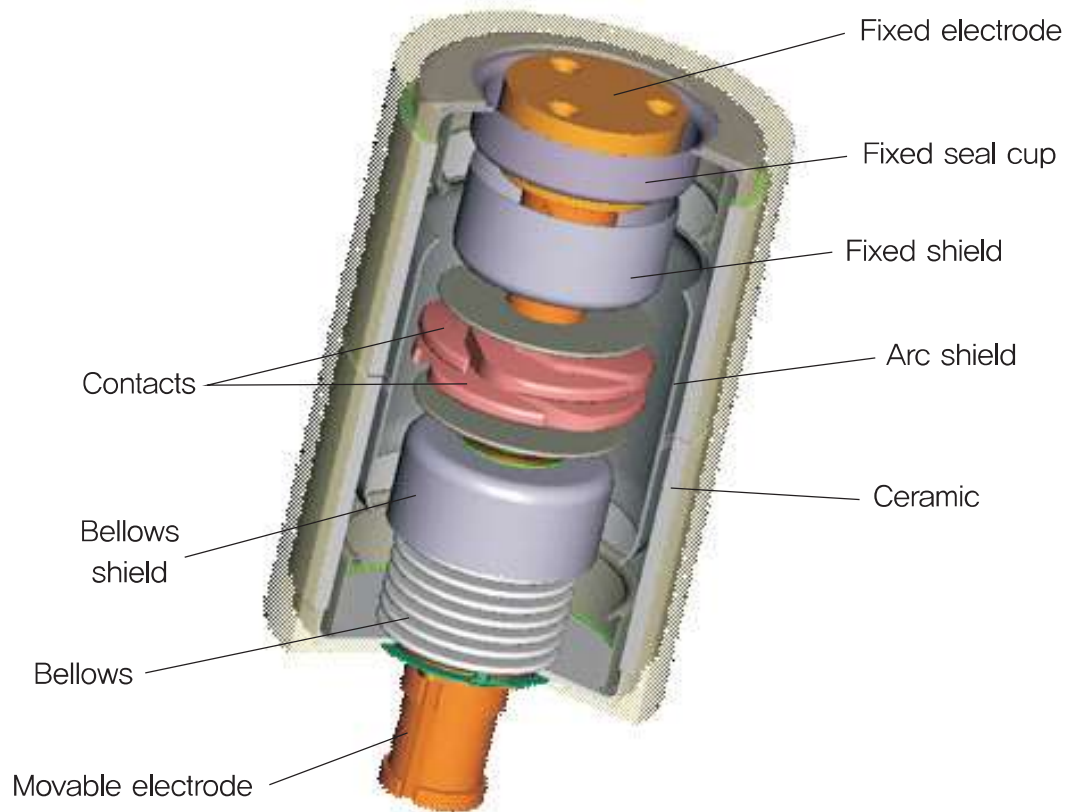


〈Figure 5〉 Structure of main circuit parts

- ① Insulation rod
- ② Lower terminal
- ③ Shunt
- ④ Vacuum interrupter
- ⑤ Upper terminal

## Structure and operation

### 3. Vacuum Interrupter (VI)



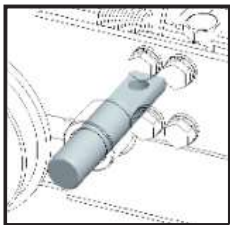
〈 Figure 6 〉 Structure of vacuum interrupter

- The vacuum interrupters has a high dielectric strength with high vacuum integrity (approx.  $5 \times 10^{-5}$  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.

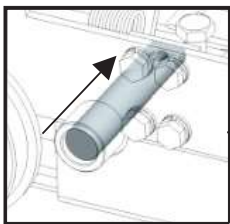
Racking-in/out Operation

**⚠ CAUTION**

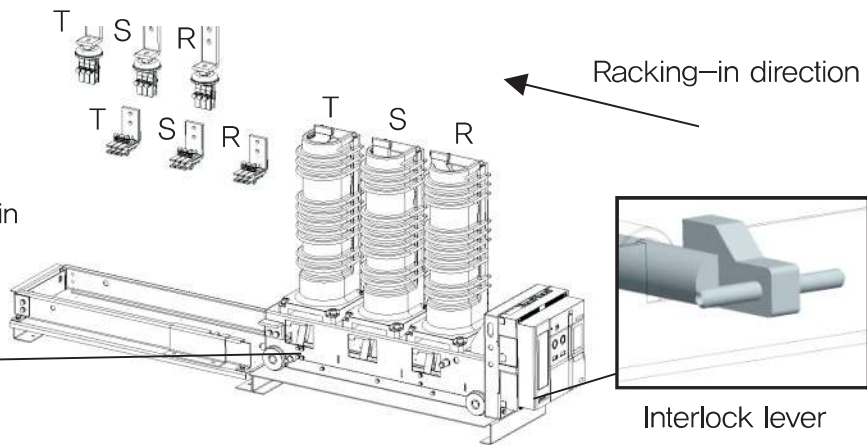
1. Do not position a circuit breaker on any position besides the SERVICE Position(SERVICE) and/or Test Position(TEST). It may cause of malfunction or damage to products.



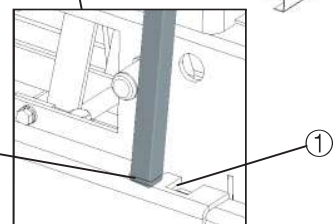
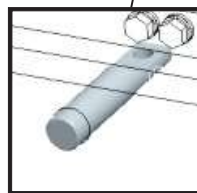
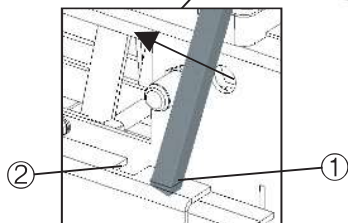
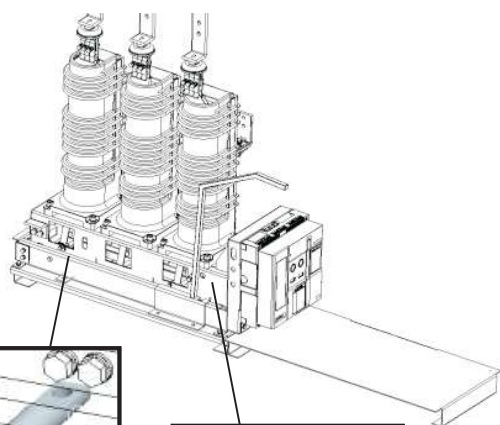
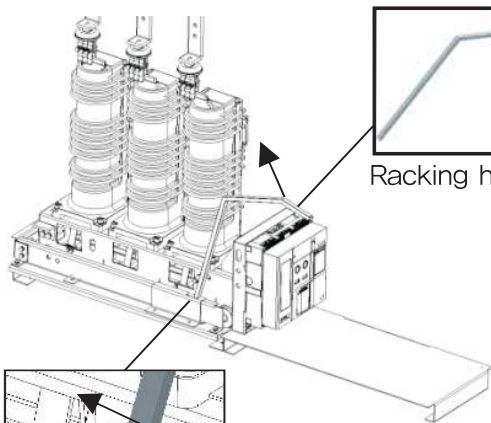
Extrusion of interlock pin



Insertion of interlock pin

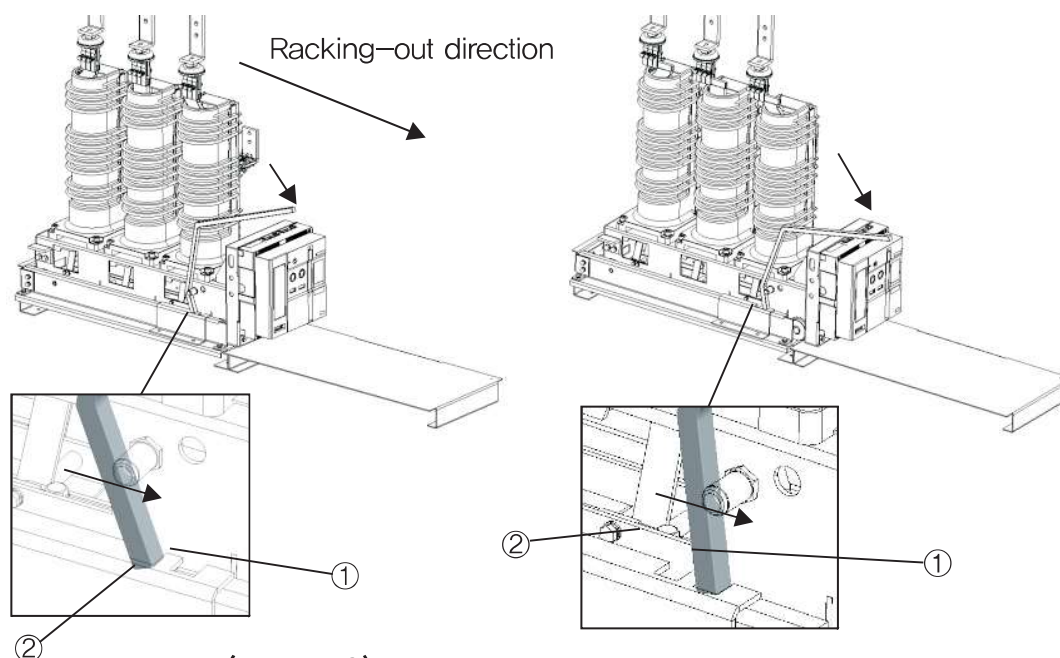


Test (Disconnected) position



Service (Fully inserted) position  
 <Figure 7> Racking-in operation

## Racking-in/out Operation



〈Figure 8〉 Racking-out operation

### 2. Racking-in/out operation

In order to make an operation of Racking-in/out, you shall be confirm align state of terminals of circuit breaker and switchgear, while circuit breaker is placed on supporter plate.

#### 2.1 Racking-in operation(Test Position → Service Position)

- 1) Make sure that the ON/OFF indicator is at “OFF” position
- 2) After confirm align state of terminals of circuit breaker and switchgear, push the circuit breaker along the Racking-in direction, while pulling the interlock lever(Interlock pin move inside of the bush) as shown figure 7(each arrow means direction of force).
- 3) Being in contact moment R,S, and T phase terminals of circuit breaker with same things of switchgear, insert the racking handle into ① hole which placed switchgear rail plate as shown figure 7. And then, continue the racking-in operation by pushing the pin of circuit breaker frame using the racking handle.
- 4) Being in racking-in moment about 67% R,S, and T phase terminals of circuit breaker into same things of switchgear, insert the racking handle into ② hole which placed switchgear rail plate. And then, continue push the circuit breaker to service position.
- 5) You shall be confirm extrusion of interlock pin through switchgear rail hole.

#### 2.2 Withdraw operation(Service Position → Test Position)

- 1) Make sure that the ON/OFF indicator is at “OFF” position
- 2) While pulling the interlock lever, insert the racking handle into ② hole which placed switchgear rail plate as shown figure 8.
- 3) You take reverse action of Insert operation(Test Position → Service Position). Check the direction of racking handle(Refer to figure 8).



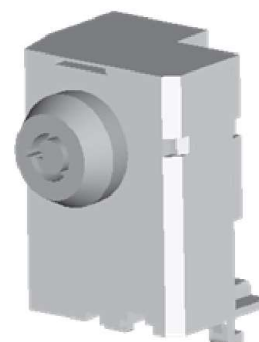
## Accessory (Circuit breaker-VL Type)

### ■ Key Lock

- When it is locked by a Key, the closing operation is not available 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.
- After inserting a key and rotating clockwise, the pushed "OFF" button returns in the original position. Then, the closing of a circuit breaker is possible 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.





## Maintenance and Inspection

### 1. General caution



**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.



- 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 insert or withdraw 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 months
Periodic inspection	1~2 years after an installation. Once 3years after that	A periodic inspection
Special inspection	If necessary	If necessary

## Maintenance and Inspection

### 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 a connection 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	Visual	Retighten any loose parts Replace if necessary	Every periodic inspection
	Closing, tripping device			
	Aux. Switch			

## 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	Every periodic inspection, Every 5000 operations
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 contactor 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 & Switch gear Terminal	Check the sectional traces of heat or discoloration, Check the damage of arc, Check the amount of eccentricity between terminals. - Clip type: within ±2mm - Tulip type : within ±3mm	Visual (Use a microscope if necessary.) Tightening force	Replace, Apply grease on contact part *Specification: HITALUBE280G	Every periodic inspection, Annually

## Maintenance and Inspection

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 clot,

### 4. Special inspection

Make a special inspection in case of situation as Table 6

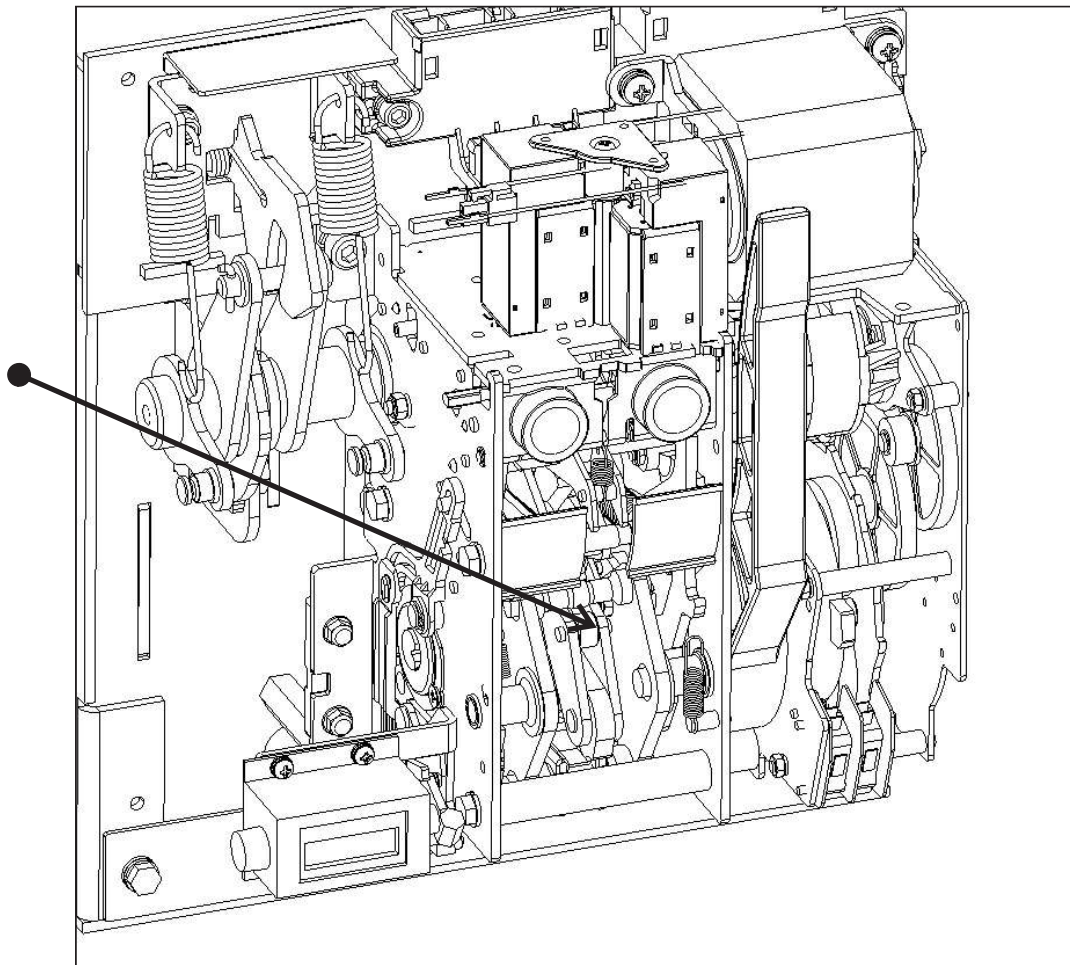
<Table 6> Special inspection

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

## Maintenance and Inspection

### 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 9〉 Opening state of main circuit

Rating

〈Table 7-1〉 Ratings Table

Type		VL-06□20H06,13	VL-06□25H06,13		
Rated voltage	(kV)	7.2			
Rated current	(A)	630	1250		
Rated frequency	(Hz)	50/60			
Rated interrupting current	(kA)	20	25		
Rated interrupting capacity	(MVA)	250	312		
Rated short -time current	(kA)	20/3sec	25/3sec		
Rated making current	(kA)	52	65		
Rated interrupting time	(cycle)	3			
Withstand Voltage	Frequency (kV)	20			
	Impulse (kV/1.2×50μs)	60			
TRV increasing rate	(kV/μs)	0.24			
TRV Max. Value	(kV)	12.3			
Operating duty		O-0.3s-CO-15s-CO			
Control voltage	(V)	DC24~30V	DC48~60V, AC 48V	AC/DC 100~130V	AC/DC 200~250V
Current of motor operation		≤ 8	≤ 4	≤ 2	≤ 1
Control current for closing	(A)	≤ 8	≤ 4	≤ 4	≤ 2
Control current for opening (Steady Current/Inrush Current)	(A)	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 1 / ≤ 5
Standard aux. contacts		4a4b			
Rated opening time	(s)	≤ 0.04			
No-load closing time	(s)	≤ 0.07			
Motor Charging Time	(s)	≤ 5			
Pole distance	(mm)	230			
Weight of Circuit breaker (kg)	Fixed Type (R/L)	80			
	Withdraw Type (R/L)	85			
Installation type		R,L,S,T			
Applicable standard		IEC 62271-100			

## Rating

〈Table 7-2〉 Ratings Table

Type	VL-12□16H06,13	VL-12□20H06,13	VL-12□25H06,13	
Rated voltage (KV)	12			
Rated current (A)	630	1250		
Rated frequency (Hz)	50/60			
Rated interrupting current (KA)	16	20	25	
Rated interrupting capacity (MVA)	333	416	520	
Rated short-time current (kA)	16/3sec	20/3sec	25/3sec	
Rated making current (kA)	42	52	65	
Rated interrupting time (cycle)	3			
Withstand Voltage	Frequency (kV)	28		
	Impulse (kV/1.2×50μs)	75		
TRV Increasing rate (kV/μs)	0,34			
TRV Max. Value (KV)	20.6			
Operating duty	O-0.3s-CO-15s-CO			
Control voltage (V)	DC24~30V	DC48~60V, AC 48V	AC/DC 100~130V	AC/DC 200~250V
Current of motor operation (A)	≤ 8	≤ 4	≤ 2	≤ 1
Control current for closing (A)	≤ 8	≤ 4	≤ 4	≤ 2
Control current for opening (A) (Steady Current/Inrush Current)	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 1 / ≤ 5
Standard aux. contacts	4a4b			
Rated opening time (s)	≤ 0,04			
No-load closing time (s)	≤ 0,07			
Motor Charging Time (s)	≤ 5			
Pole distance (mm)	230			
Weight of Circuit breaker (kg)	Fixed Type (R/L)	80		
	Withdraw Type(R/L)	85		
Installation type	R,L,S,T			
Applicable standard	IEC 62271-100			



Rating

〈Table 7-3〉 Ratings Table

Type	VL-17□16H06,13	VL-17□20H06,13	VL-17□25H06,13
Rated voltage (KV)	17,5		
Rated current (A)	630	1250	
Rated frequency (Hz)	50/60		
Rated interrupting current (kA)	16	20	25
Rated interrupting capacity (MVA)	485	606	758
Rated short (kA)	16/3sec	20/3sec	25/3sec
Rated making current (kA)	42	52	65
Rated interrupting time (cycle)	3		
Withstand Voltage	Frequency (kV)	38	
	Impulse (kV/1.2x50μs)	95	
TRV Increasingrate (kV/μs)	0.42		
TRV Max. Value (KV)	30		
Operating duty	O-0,3s-CO-15s-CO		
Control voltage (V)	DC24~30V	DC48~60V, AC 48V	AC/DC 100~130V AC/DC 200~250V
Current of motor operation (A)	≤ 8	≤ 4	≤ 2
Control current for closing (A)	≤ 8	≤ 4	≤ 4
Control current for opening (Steady Current/Inrush Current) (A)	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10
Standard aux. contacts	4a4b		
Rated opening time (s)	≤ 0,04		
No – load closing time (s)	≤ 0,07		
Motor Charging Time (s)	≤ 5		
Pole distance (mm)	230		
Weight of Circuit breaker (kg)	Fixed Type(R/L)	80	
	Withdraw Type(R/L)	85	
Installation type	R,L,S,T		
Applicable standard	IEC 62271-100		

## Rating

〈Table 7-4〉 Ratings Table

Type	VL-20□16H06,13	VL-20□20H06,13	VL-20□25H06,13	
Rated voltage (kV)	24			
Rated current (A)	630	1250		
Rated frequency (Hz)	50/60			
Rated interrupting current (kA)	16	20	25	
Rated interrupting capacity (MVA)	665	831	1039	
Rated short (kA)	16/3sec	20/3sec	25/3sec	
Rated making current (kA)	42	52	65	
Rated interrupting time (cycle)	3			
Withstand Voltage	Frequency (kV)	50		
	Impulse (kV/1.2×50μs)	125		
TRV Increasing rate (kV/μs)	0.47			
TRV Max. Value (kV)	41			
Operating duty	O-0.3s-CO-15s-CO			
Control voltage (V)	DC24~30V	DC48~60V, AC 48V	AC/DC 100~130V	AC/DC 200~250V
Current of motor operation (A)	≤ 8	≤ 4	≤ 2	≤ 1
Control current for closing (A)	≤ 8	≤ 4	≤ 4	≤ 2
Control current for opening (Steady Current/Inrush Current) (A)	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 1 / ≤ 5
Standard aux. contacts	4a4b			
Rated opening time (s)	≤ 0.04			
No – load closing time (s)	≤ 0.07			
Motor Charging Time (s)	≤ 5			
Pole distance (mm)	230			
Weight of Circuit breaker (kg)	Fixed Type (R/L)	80		
	Withdraw Type (R/L)	85		
Installation type	R,L,S,T			
Applicable standard	IEC 62271-100			

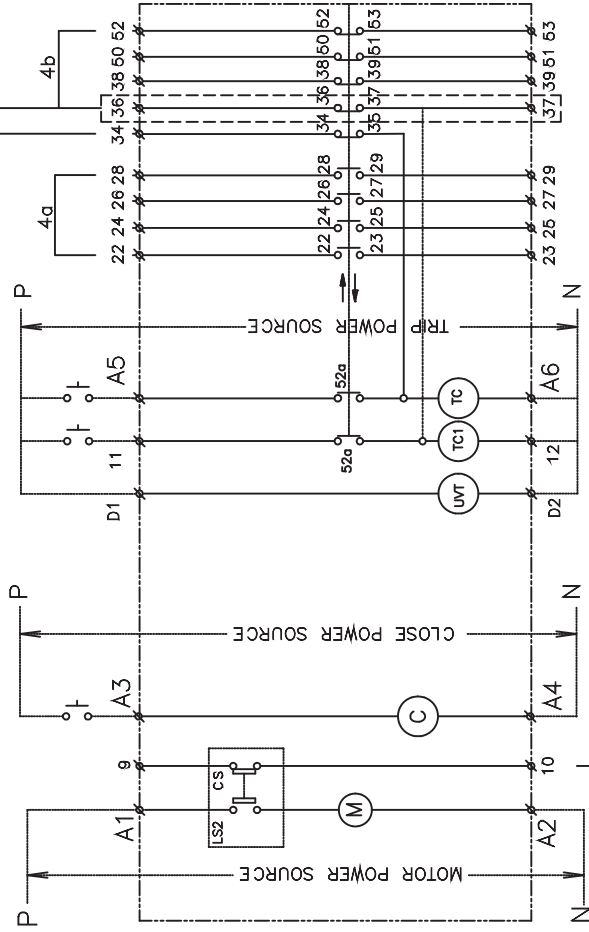
Rating

〈Table 7-5〉 Ratings Table

Type	VL-25□16H06,13	VL-25□20H06,13	VL-25□25H06,13	
Rated voltage (kA)	25.8			
Rated current (A)	630	1250		
Rated frequency (Hz)	50/60			
Rated interrupting current (kA)	16	20	25	
Rated interrupting capacity (MVA)	715	894	1117	
Rated short –time current (kA)	16/3sec	20/3sec	25/3sec	
Rated making current (kA)	42	52	65	
Rated interrupting time (cycle)	3			
Withstand Voltage	Frequency (kV)	60		
	Impulse (kV/1,2×50μs)	125		
TRV increasing rate (kV/μs)	0.49			
TRV Max. Value (kV)	44.2			
Operating duty	O-0,3s-CO-15s-CO			
Control voltage (V)	DC24~30V	DC48~60V, AC 48V	AC/DC 100~130V	AC/DC 200~250V
Current of motor operation (A)	≤ 8	≤ 4	≤ 2	≤ 1
Control current for closing (A)	≤ 8	≤ 4	≤ 4	≤ 2
Control current for opening (A) (Steady Current/Inrush Current)	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 1 / ≤ 5
Standard aux. contacts	4a4b			
Rated opening time (S)	≤ 0.04			
No –load closing time (S)	≤ 0.07			
Motor Charging Time (S)	≤ 5			
Pole distance (mm)	230			
Weight of Circuit breaker (kg)	Fixed Type (R/L)	80		
	Withdraw Type(R/L)	85		
Installation type	R,L,S,T			
Applicable standard	IEC 62271-100			

# Circuit Diagram

● Control Circuit Diagram



- ∅ : External terminal of VCB
- 52 : Vacuum circuit breaker
- M : Spring charging motor
- TC : Trip coil(SHT)
- TC1 : Secondary Trip coil(SHT1)
- C : Closing coil(CC)
- UVT : Under Voltage Trip
- 52a : Auxiliary switch (NO)
- 52b : Auxiliary switch (NC)
- LS2 : Motor stop limit switch
- CS : Closing spring charged indication limit switch

- Note) 1. UVT – Under Voltage Trip (Terminal NO.:D1, D2)  
 2. TC1 – Secondary Trip Coil (Terminal NO.:1,12)  
 3. Secondary Trip Coil Monitoring Contact (Terminal NO.:36)

In case Secondary Trip Coil TCM Contact is selected, 'b' contact(Terminal No.:36, 37) are not available.  
 4. Close and Trip coil is One Pulse type, excluding Trip coil (DC110, 220V)  
 5. In above optional accessories, UVT and TC1 can not be selected simultaneously.  
 6. Directions of P and N must be followed, which are written at circuit diagram.

\* Above circuit diagram is based on "OFF" state of VCB and closing spring is charged.

Closing\_Spring Contact(Charge complete indicating contact)

<Connector Terminal Configuration>

A Type

