Derwent
Top 100
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2020

Susol Super Solution

ANSI VCB

ANSI Vacuum Circuit Breakers

LS ELECTRIC

Susol

Super Solution

Susol VCB

Susol VCB is full line-up new VCB which has the high interrupting capacity, large current(~50kA, ~3000A), and maximized compatibility with existing products through the dual phases and compact sized models.

Contents


Plug Insert Instruction
After the Interlock Lever is operated,
Make Sure the plug is inserted.
Susol
MCCB
UTS250L
ON
250A
40°C
3P

Susol VCB

Vacuum Circuit Breaker, VCB is installed in the medium voltage distribution lines to protect life and load equipment. In case of accidents such as over current, short circuit and ground fault current, VCB works by interrupting the circuit through the inner Vacuum Interrupter which is acted by signal from the outside separate relay.

Susol VCB responds.

- customer needs for the breakers with high interrupting capacity and large current due to the integration and increase of the load capacity.
- worldwide trend of diversification in the medium voltage distribution lines.
- increase of the reliability for the temperature characteristics of circuit breakers.

Premium-type products to improve convenience and reliability of medium voltage switchgear configuration.

- full line-up modeling to the high interrupting capacity and large current.
- main structure with high reliability application.
- a variety of accessories and ability to maximize.

Suitable for use as the main circuit breaker to protect key installations in the places such as device industry, power plants, high-rise buildings, large ships.

▶ Strengthening of the high interrupting capacity and large current models and full line-up new VCB models to high/middle/low.

Voltage	Interrupting current	Rated current
05/15kV	25/31.5/40/50kA	1200/2000/3000A
27kV	25kA	1200A
38kV	31.5/40kA	1200/2000A

▶ Main circuit structure with high reliability.

- Maximizing the durability and reliability of the main circuit contactors (Stego Tulip contactor).
- Strong structure for the temperature rise (Natural cooling system).

▶ Convenience of switchgear configuration and a variety of accessories.

- CB compartment structure: Metal isolation structures to prevent the accident spread and ensure safety. And the convenience of switchgear building is extended by its module style.
- A variety of accessories: UVT, Locking Magnet, Plug Interlock, Key lock, Temperature Sensor, MOC, TOC, Earthing S/W.
- Maximizing compatibility with existing products through the dualistic deployment of phases and compact models.

※ Type testing is complete for all models according to latest standard, IEEE Std C37.09, IEEE Std C37.20.2, ANSI C37.54, ANSI C37.55, UL (CSA)

Susol VCB Family

Susol VCB series are premium-type products featuring main structure with high reliability application and a variety of accessories and ability to maximize to be suitable for use as the main circuit breaker to protect key installations in the places such as device industry, power plants, high-rise buildings, large ships

4.76/15/27kV (UVL-05/15/27)

- Rated short-time (to withstand current): 4sec
- Rated operating sequence: O-0.3s-CO-15s-CO
- Various cradle: Ha, Hb type
- CB Compartment for MCSG available
- A variety of control power
  - DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V
  - AC 48V, AC 100~130V, AC 220~250V
- A variety of accessories
  - VCB part: Charge switch, UVT, Secondary trip coil, Latch checking switch, Position switch, Locking magnet, Plug interlock, Key lock, Button cover, Button padlock, Padlock (H type Door interlock), MOC
  - Cradle part: MOC (Mechanical Operated Cell switch), TOC (Truck Operated Cell switch), Temperature sensor, Earthing switch & accessaries, Door, Door interlock, Door emergency button
  - Others: Racking in/out handle, UVT Time delay controller, CTD (Condensor Trip Device), Temperature module
- Disconnected/Test/Connected Automatic Position Indicator
- Standards and certification
  - IEEE Std C37.09, ANSI C37.54, UL Listed & CSA

Ur (kV)	Isc (kA)	Ir (A)
4.76	25	1200
		2000
	31.5	1200
		2000
15	25	1200
		2000
	31.5	1200
		2000
27	25	1200

Full line – up & Compact

Full line-up new VCB models to the high interrupting capacity and large current (~ 50kA, ~ 3000A) featuring maximization of compatibility with existing products through the dualistic deployment of phases and compact models

4.76/15kV (VH-05/15)

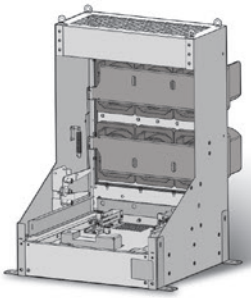
- Rated short-time (to withstand current): 2sec
- Rated operating sequence: O-0.3s-CO-3min-CO
- Various cradle: H type
- CB Compartment for MCSG available
- A variety of control power
  - DC 48V, DC 110V, DC 125V, DC 220~250V
  - AC 48V, AC 110V, AC220V
- A variety of accessories
  - VCB part: Charge switch, UVT, Secondary trip coil, Latch checking switch, Position switch, Locking magnet, Plug interlock, Key lock, Button cover, Button padlock, Padlock (H type Door interlock), MOC
  - Cradle part: MOC (Mechanical Operated Cell switch), TOC (Truck Operated Cell switch), Temperature sensor, Earthing switch & accessaries, Door, Door interlock, Door emergency button
  - Others: Racking in/out handle, UVT Time delay controller, CTD (Condensor Trip Device), Temperature module
- Disconnected/Test/Connected Automatic Position Indicator
- Standards and certification
  - IEEE Std C37.09

38kV (UVH-38)

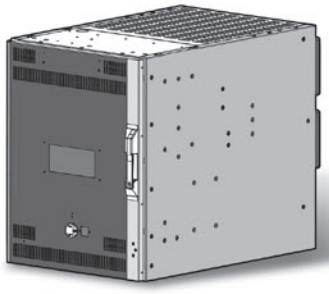
- Rated short-time (to withstand current): 4sec
- Rated operating sequence: O-0.3s-CO-15s-CO
- Various cradle: H type
- CB Compartment for MCSG available
- A variety of control power
  - DC 48V, DC 110V, DC 125V, DC 220~250V
  - AC 48V, AC 110V, AC220V
- A variety of accessories
  - VCB part: Charge switch, UVT, Secondary trip coil, Latch checking switch, Position switch, Locking magnet, Plug interlock, Key lock, Button cover, Button padlock, Padlock (H type Door interlock), MOC
  - Cradle part: MOC (Mechanical Operated Cell switch), TOC (Truck Operated Cell switch), Temperature sensor, Earthing switch & accessaries, Door, Door interlock, Door emergency button
  - Others: Racking in/out handle, UVT Time delay controller, CTD (Condensor Trip Device), Temperature module
- Disconnected/Test/Connected Automatic Position Indicator
- Standards and certification
  - IEEE Std C37.09

Ur (kV)	Isc (kA)	Ir (A)
4.76	40	1200
		2000
		3000
	50	1200
		2000
		3000
15	40	1200
		2000
		3000
	50	1200
		2000
		3000

Ur (kV)	Isc (kA)	Ir (A)
38	31.5	1200
		2000
	40	1200
		2000



Ha type

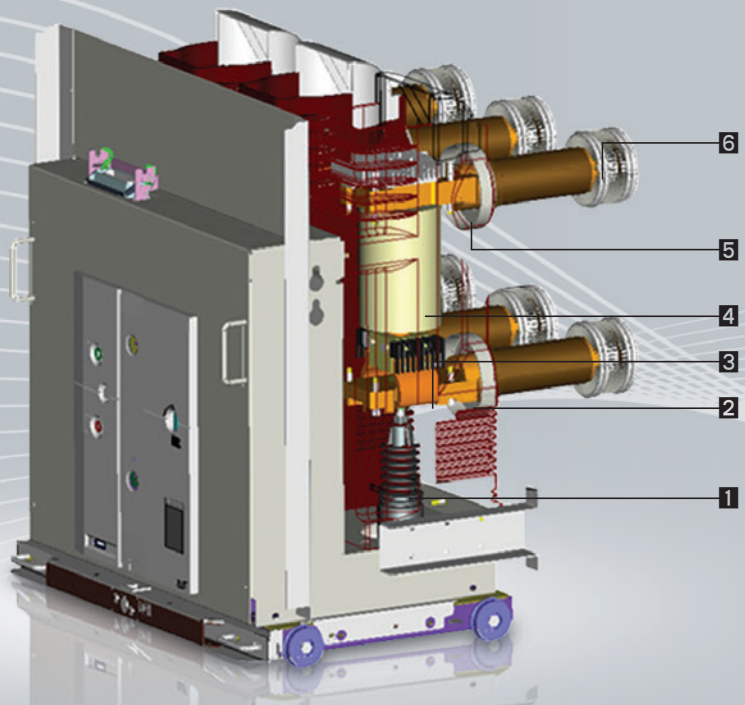


He, Hf type

VH type

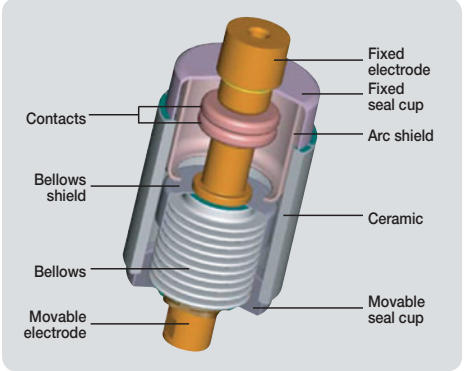
Main circuit structure with high reliability

Susol VCB



Breaker

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



Vacuum Interrupter, VI

The vacuum rate within the VI is very high (approximately $5x10^{-5}$ Torr) and the spacing between fixed contact and movable contact is about 6~20mm, depending on the voltage.

The contacts are in a structure that arc can easily be extinguished and the surfaces of the contacts are made of special alloy (copper-chromium) and the interior is completely sealed to prevent loss of vacuum.

Therefore the wearing of the contacts can be minimized in the event of short-circuit and the arc energy by overvoltage or switching can be reduced effectively.

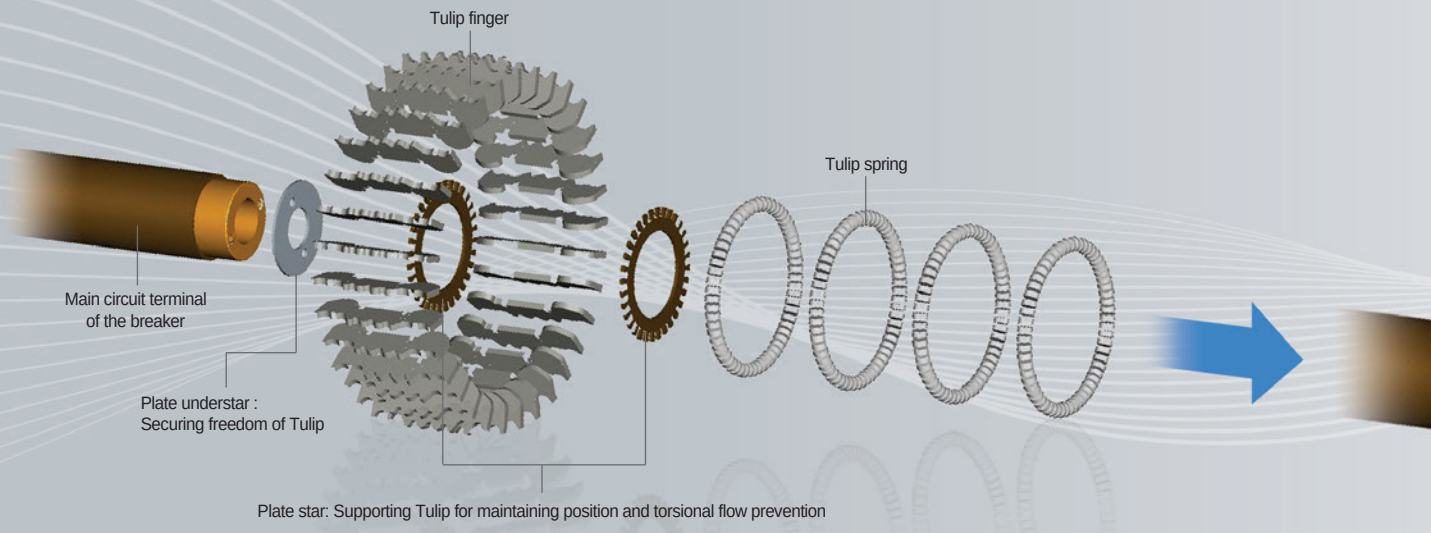
Convenience and Variety

- Maximizing the durability and reliability of the main circuit contactors (Stego Tulip contactor)
- Strong structure for the temperature rise (Natural cooling system)

Stego Tulip

Main circuit structure with high reliability

- Maximizing the durability and reliability of the main circuit contactors (Stego Tulip contactor)
- Strong structure for the temperature rise (Natural cooling system)



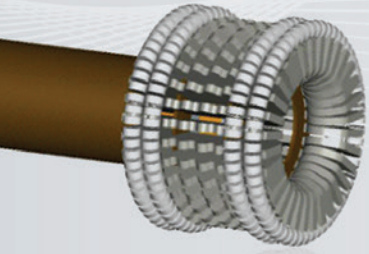
Structure of Stego Tulip Terminal

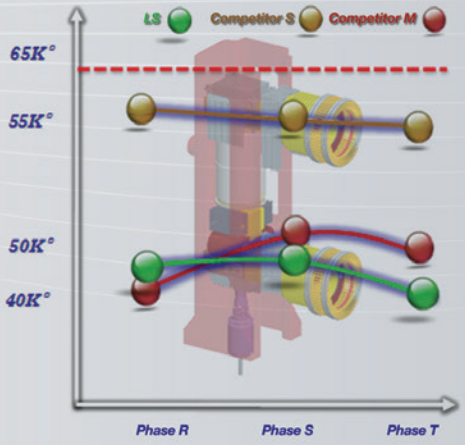
- Maintaining the connection between breaker and cradle for the optimum current path through securing freedom of Tulip.
- Increasing the heat dissipation area of the contactors and minimizing aging.

4.76/15/27/38kV ...

(UVL-05/15/27, VH-05/15, UVH-38)

- Drawout / natural cooling system
- Improved temperature characteristics and ensured high reliability





UVL type Tulip contactor

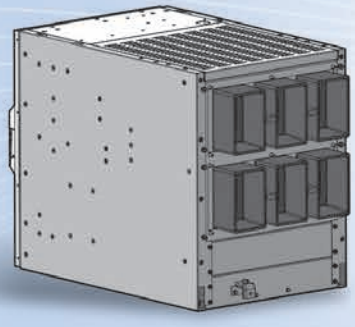
VH Type Tulip contactor

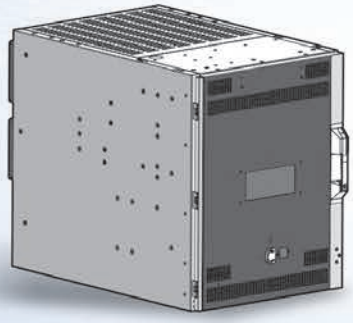
UVH type Tulip contactor

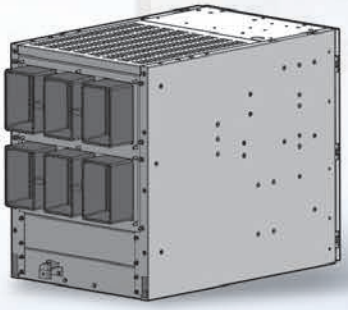
CB Compartment

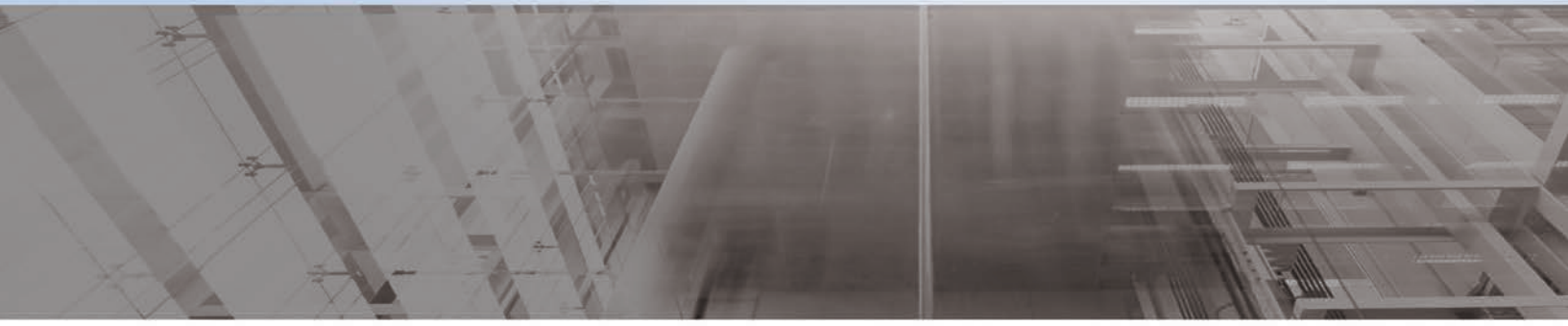
Convenience in building switchgears

- CB compartment structure: H type cradle
- Metal isolation structure to prevent the accident spread and ensure safety
- Convenience of switchgear building



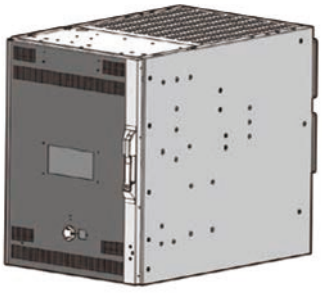






4.76/15/27/38kV 25/31.5/40/50kA

- Metal isolation structure to prevent the accident spread and ensure safety
- Convenience of operation by Truck
  - Drawable in the closed position of the switchgear door
  - Racking-in/out positions indicated mechanically
- Equipped with safety devices and accessories
  - Control power connected Interlock
  - Earthing S/W and interlock, MOC/TOC (ANSI)
- Convenience in building switchgears
  - Module assembly with CB compartment



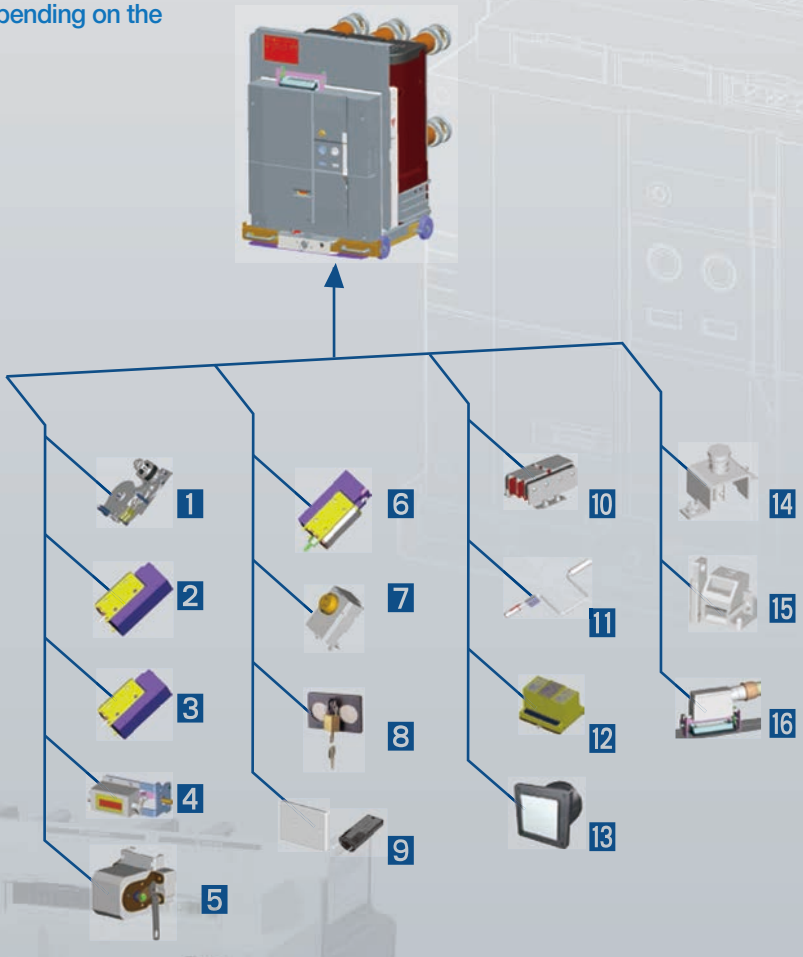
Accessories of CB compartment (H type cradle)

- MOC (Mechanism Operated Cell S/W)
- TOC (Truck Operated Cell S/W)
- Shutter Padlock
- Temperature Sensor
- Door Emergency ON/OFF Button
- Earthing switch & Accessaries
  Key lock for Earthing S/W
  Locking Magnet for Earthing S/W
  Position S/W for Earthing S/W
- TM (Temperature Monitoring Unit)

Accessories

A variety of accessories for UVL-05/15/27

If accessories are attached to the breaker, the function of the breaker is upgraded. Susol VCB provides a variety of accessories depending on the purpose.

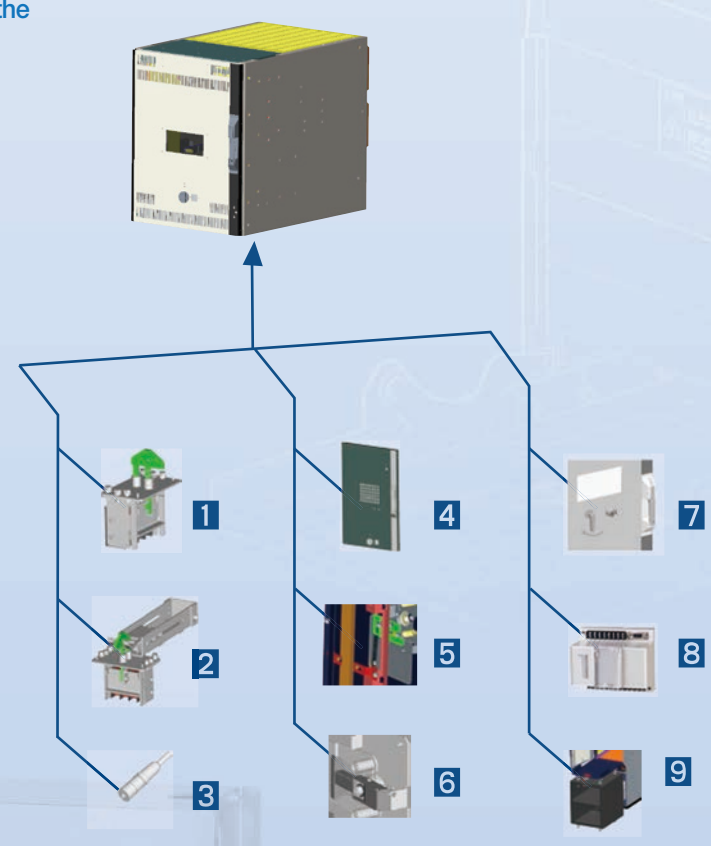


Breaker

1 Motor
2 Closing coil
3 Trip coil
4 Counter
5 Auxiliary contact
6 UVT coil
7 Key lock
8 Button padlock
9 Button cover
10 Position switch
11 Racking in/out handle
12 UVT Time delay controller
13 CTD (Condenser trip device)
14 MOC
15 Padlock
16 Plug Interlock

A variety of accessories for UVCL-05/15/27

If accessories are attached to the cradle, the function of the breaker is upgraded. Susol VCB provides a variety of accessories depending on the purpose.



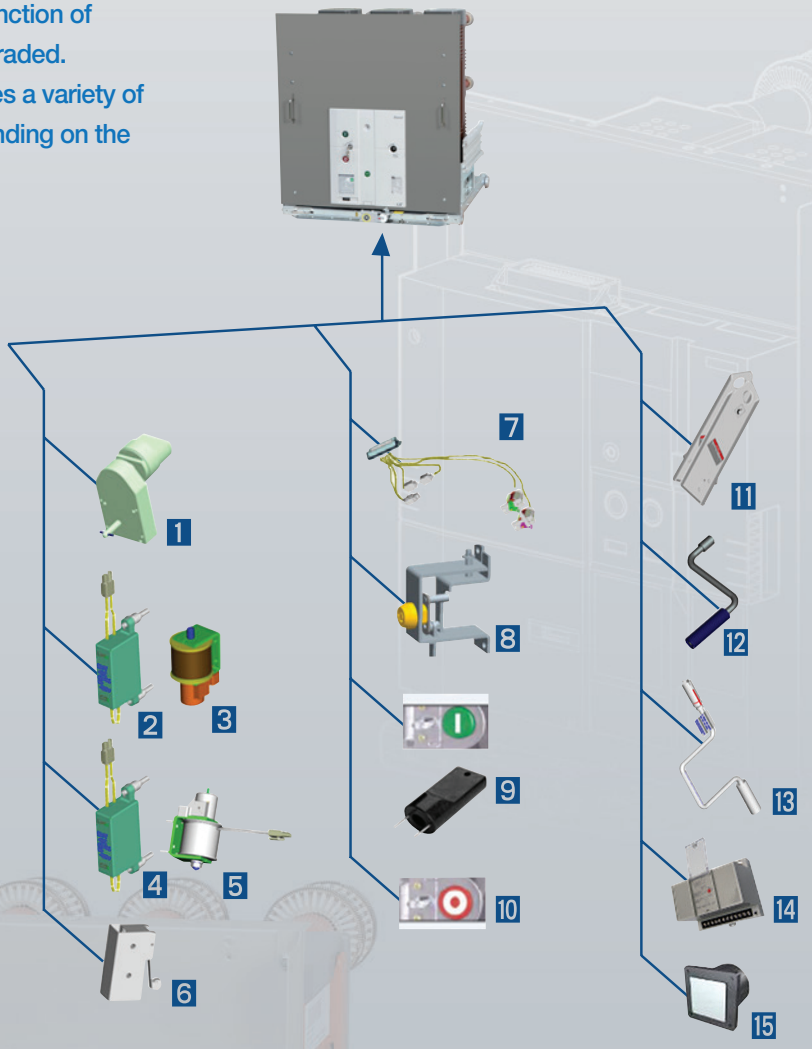
Cradle (H type)

1 TOC (Truck operated cell s/w)
2 MOC (Mechanical operated cell s/w)
3 Temperature sensor
4 Door
5 Door interlock
6 Shutter padlock
7 Emergency ON/OFF button
8 TM (Temperature monitoring unit)
9 Lift Interlock

Accessories

A variety of accessories for UVH-38

If accessories are attached to the breaker, the function of the breaker is upgraded. Susol VCB provides a variety of accessories depending on the purpose.

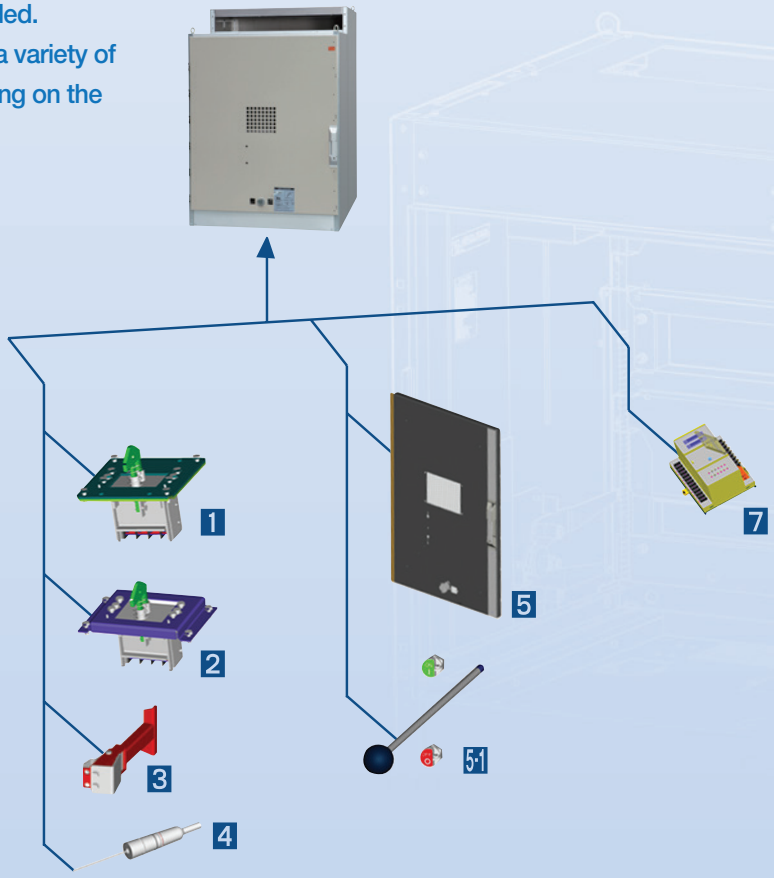


Breaker

1 Motor
2 AC/DC coil rectifier
3 Trip coil/Closing coil
Secondary trip coil
4 AC/DC UVT coil rectifier
5 UVT coil
6 Latch checking switch
7 Auxiliary contact wire
8 Key lock
9 Button cover/Push bar
10 Button padlock
11 Lifting hook
12 Charge handle
13 Racking in/out handle
14 UVT Time delay controller
15 CTD (Condenser trip device)

A variety of accessories for UVCH-38

If accessories are attached to the cradle, the function of the breaker is upgraded. Susol VCB provides a variety of accessories depending on the purpose.



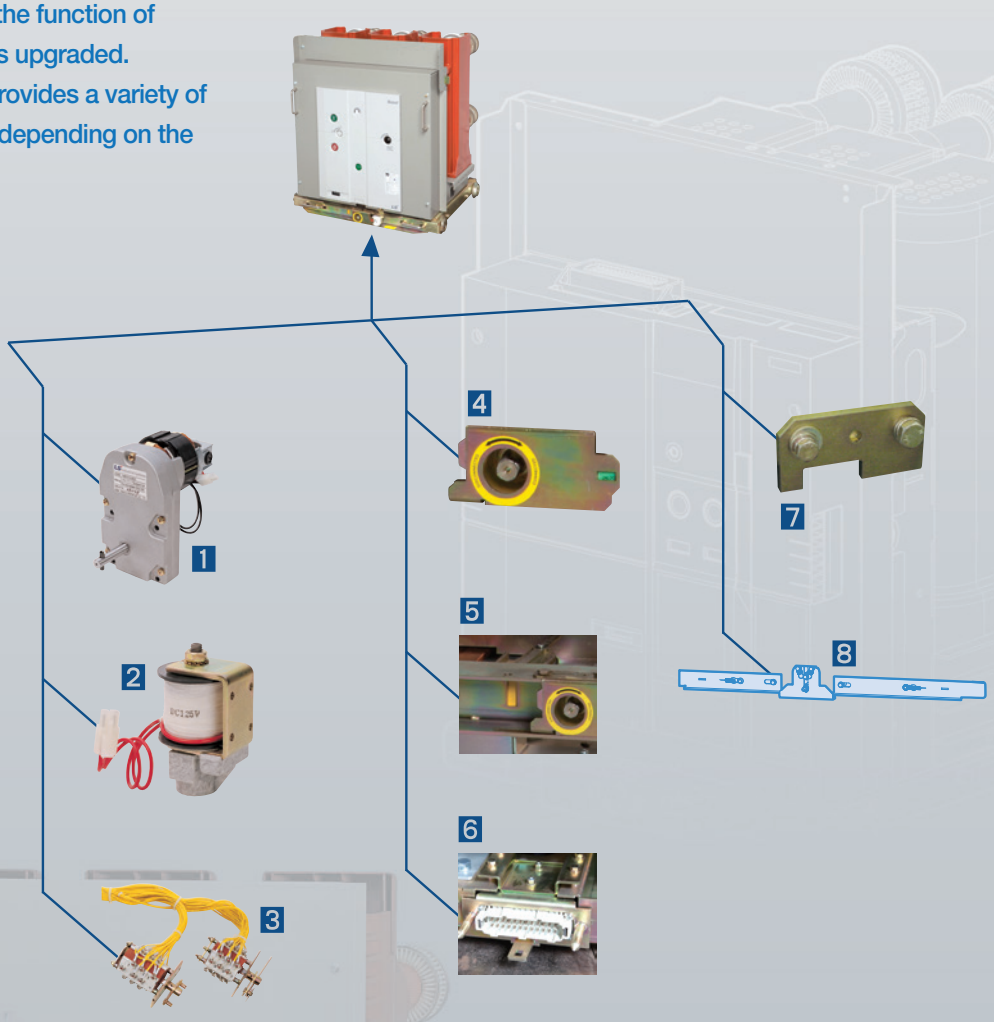
Cradle (H type)

1 MOC (Mechanism operated cell switch)
2 TOC (Truck operated cell switch)
3 Shutter padlock
4 Temperature sensor
5 Door
5-1 Emergency ON/OFF button
7 TM (Temperature monitoring unit)

Accessories

A variety of accessories for VH-05/15

If accessories are attached to the breaker, the function of the breaker is upgraded. Susol VCB provides a variety of accessories depending on the purpose.

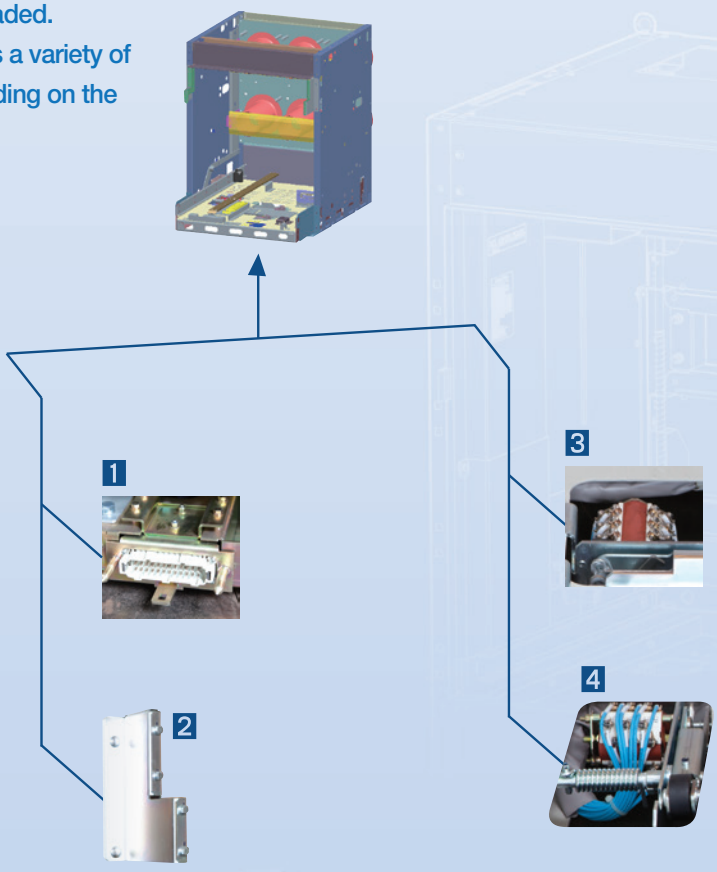


Breaker

1 Motor
2 Trip coil/Closing coil
3 Auxiliary Contact
4 Position padlock
5 Mechanical position indicator
6 Auto connection
7 Code plate
8 Charge interlock

A variety of accessories for VCL-05/15

If accessories are attached to the cradle, the function of the breaker is upgraded. Susol VCB provides a variety of accessories depending on the purpose.



Cradle (H type)

1 Auto connection
2 Charge interlock
3 Mechanically operated cell switch (MOC)
4 Truck operated cell switch (TOC)

External structure of VCB

Susol

Breaker ... UVL type

Name of each part

1. CLOSE Button
2. OPEN Button
3. Charge/Discharge Indicator
4. CLOSED/OPEN Indicator
5. Manual Charging Handle
6. Operation Counter
7. 3 Position Indicator
   (Disconnected, Test, Connected)

Back side

Breaker ... UVH type

Name of each part

1. CLOSE Button
2. OPEN Button
3. Charge/Discharge Indicator
4. CLOSED/OPEN Indicator
5. Manual Charging Handle
6. Key Lock
7. Operation Counter
8. 3 Position Indicator
   (Disconnected, Test, Connected)

Back side

Basic functions

Manual operation

① **Manual Charge**

a) UVL type: operate the charge handle 7-8 times as a fully stroke.
b) UVH type: Insert the charge handle into the handle slot first. Rotate the handle clockwise 40 times more and then charge will be complete with a click sound.
- When the closing spring is charged fully "CHARGED" is displayed at the charge indicator.

② **Manual closing**

a) Pressing the CLOSE Button the breaker is closed.
b) With the closing of the breaker "CLOSE" is displayed at CLOSED/OPEN Indicator and "DISCHARGED" at the charge indicator.

③ **Manual trip**

a) Pressing the OPEN Button the breaker is opened.
b) "OPEN" is displayed at CLOSED/OPEN Indicator.

Electric operation

① **Electric charge**

The breaker is remotely closing with charging of closing spring.
If the breaker trips the closing spring is automatically charged by gear motors.

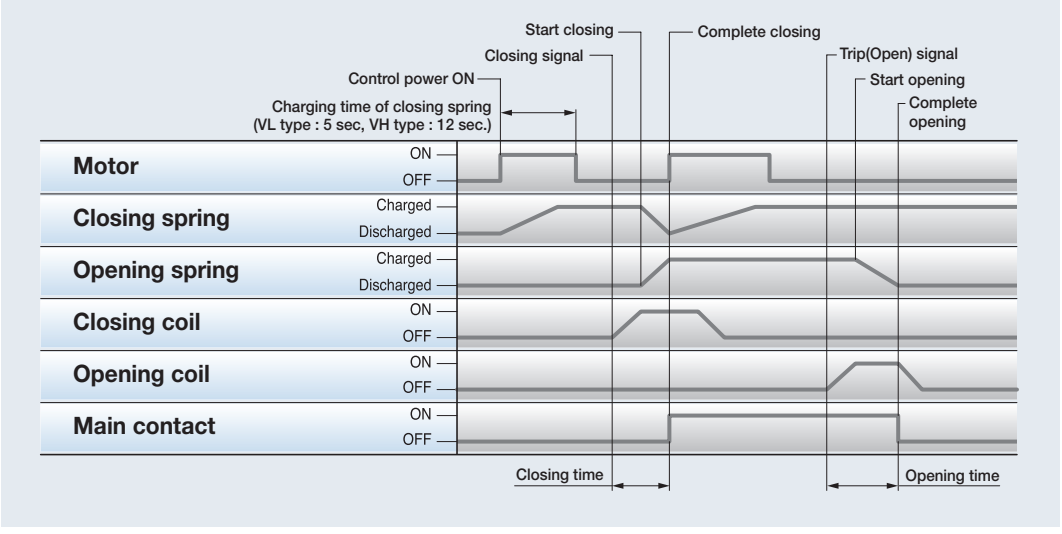
② **Electric closing**

Remote closing is operated by the closing coil.

③ **Electric trip**

Remote trip can be operated by the trip coil or UVT coil.

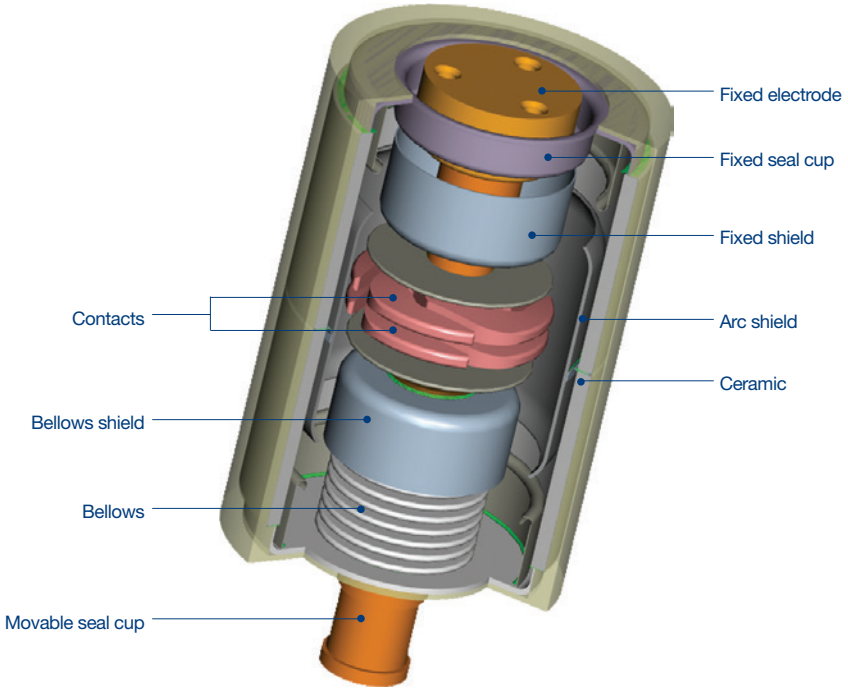
Main contacts are operated by the energy of the spring mechanism and closing spring is charged by the motor in the mechanism.
Breaker is closed by closing coil and tripped by trip coil.
These operations are repeated in VCB as shown in the below sequence chart.

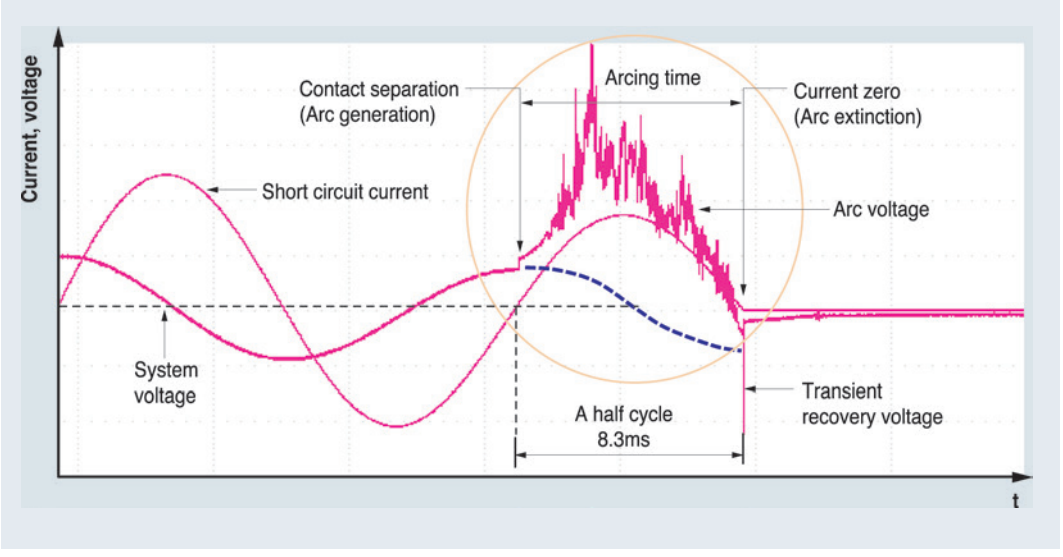


Sequence of the switching mechanism

The interruption of vacuum interrupters

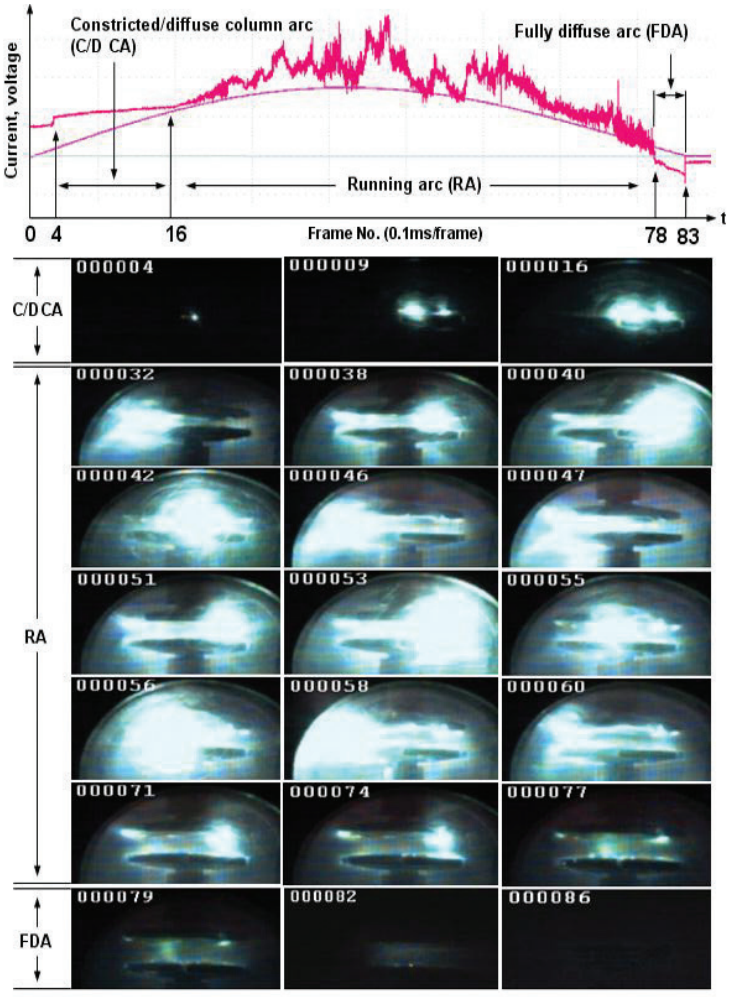
The interruption of VCB is carried out by the vacuum interrupters.
Interrupter contacts as a key part made of copper - chromium (CuCr) material with spiral shape have low contact wear characteristics and withstand voltage is excellent.
Spiral contacts make the arc generated between the surfaces of contacts rotated around the surface of contact by the induced magnetic field generated due to the spiral contact structure, which results in preventing local heating, thereby corruption and interrupting instantaneously.





An example of oscillogram obtained through the interrupting test using LC resonant circuit

The interruption of vacuum interrupters

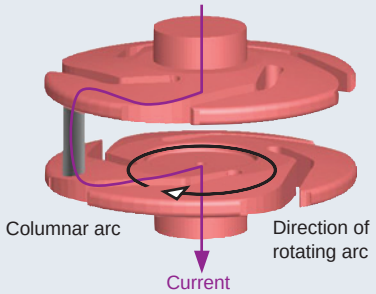


Arc voltage waveforms and arc image captured during arcing time

In case of using the flat contact any of the designs do not reflect on when contacts are opening the arc with high temperature is contracted and fixed in the center of the contacts,Which is called pinch effect.
To prevent the effect two kinds of contact shapes are designed.
One is Axial magnetic field which spreads the arc before its contraction, and the other is Radial magnetic field which permits the contraction of the arc but makes it rotated to disperse the energy.
Because contracted arc is shaped like a cylinder it is called Contracted arc or columnar arc.

Spiral contact structure (Radial magnetic field), using the force (F = j×B) generated by the interaction of the radial magnetic field caused by the current flowing through the arc between two contacts, disperse the arc energy evenly on the surface of contact by rotating the arc that is contracted by the pinch effect so as to minimize contact damage.
The images show arc behavior during the arcing time of about 8ms by shooting with high-speed camera capable of shooting 10,000 frames per sec. (0.1ms/frame) by focusing on parts of the arcing time on the above graph and simultaneously measured arc voltage also represented to show arc state by section.

Radial magnetic field type contact

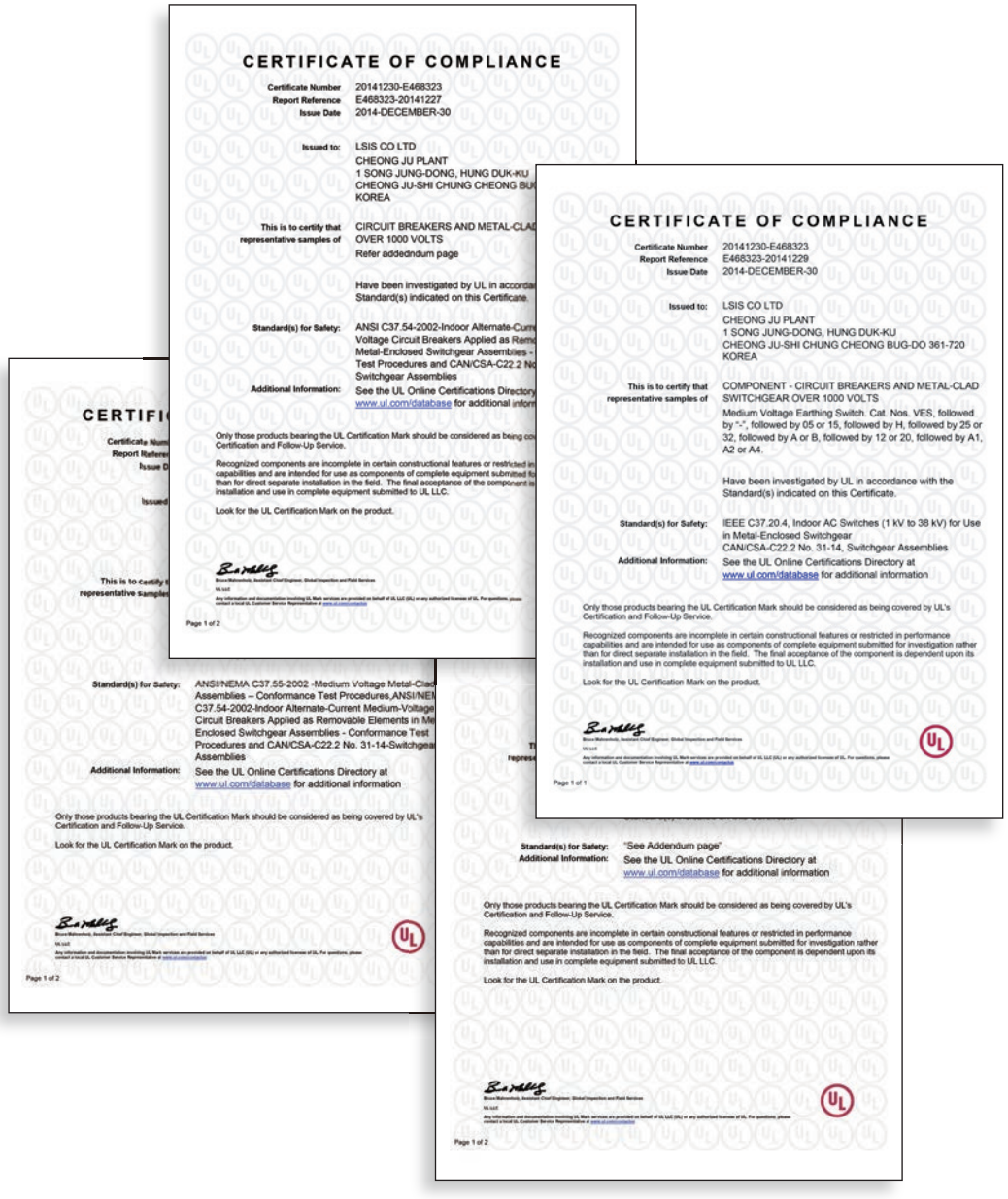


Arc driving principle in the contacts of
Radial magnetic field

Susol VCB has been type tested and obtained certifications according to the latest IEC standard at international testing laboratory and can be installed and applied at the environment and conditions in accordance with the standard.

● **Standard**
- IEEE Std C37.09, ANSI C37.54, UL Listed & CSA

● **Test and certification**
- Test report (KERI)
- Test report (KEMA)



CERTIFICATE OF COMPLIANCE

Certificate Number 20141230-E468323
Report Reference E468323-20141227
Issue Date 2014-DECEMBER-30

Issued to: LSIS CO LTD
CHEONG JU PLANT
1 SONG JUNG-DONG, HUNG DUK-KU
CHEONG JU-SHI CHUNG CHEONG BU
KOREA

This is to certify that representative samples of: CIRCUIT BREAKERS AND METAL-CLAD
OVER 1000 VOLTS
Refer addeddnum page

Have been investigated by UL in accorda
Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI C37.54-2002-Indoor Alternate-Curre
Voltage Circuit Breakers Applied as Remo
Metal-Enclosed Switchgear Assemblies -
Test Procedures and CAN/CSA-C22.2 No
Switchgear Assemblies

Additional Information: See the UL Online Certifications Directory
www.ul.com/database for additional inform

Only those products bearing the UL Certification Mark should be considered as being co
Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in
capabilities and are intended for use as components of complete equipment submitted fo
than for direct separate installation in the field. The final acceptance of the component is
installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

Page 1 of 2

CERTIFICATE OF COMPLIANCE

Certificate Number 20141230-E468323
Report Reference E468323-20141229
Issue Date 2014-DECEMBER-30

Issued to: LSIS CO LTD
CHEONG JU PLANT
1 SONG JUNG-DONG, HUNG DUK-KU
CHEONG JU-SHI CHUNG CHEONG BUG-DO 361-720
KOREA

This is to certify that representative samples of: COMPONENT - CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 1000 VOLTS
Medium Voltage Earthing Switch. Cat. Nos. VES, followed by "-", followed by 05 or 15, followed by H, followed by 25 or 32, followed by A or B, followed by 12 or 20, followed by A1, A2 or A4.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: IEEE C37.20.4, Indoor AC Switches (1 kV to 38 kV) for Use in Metal-Enclosed Switchgear
CAN/CSA-C22.2 No. 31-14, Switchgear Assemblies

Additional Information: See the UL Online Certifications Directory at
www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

Page 1 of 1

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This is to certify t
representative samples

Standard(s) for Safety: ANSI/NEMA C37.55-2002 -Medium Voltage Metal-Clad
Assemblies – Conformance Test Procedures,ANSI/NE
C37.54-2002-Indoor Alternate-Current Medium-Voltage
Circuit Breakers Applied as Removable Elements in Me
Enclosed Switchgear Assemblies - Conformance Test
Procedures and CAN/CSA-C22.2 No. 31-14-Switchgea
Assemblies

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Page 1 of 2

Standard(s) for Safety: "See Addendum page"
Additional Information: See the UL Online Certifications Directory at
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Page 1 of 2

UVL-05/15/27

Breaker

UVL — 15 H 32 A 12

Basic model name	
UVL	Susol VCB

Rated voltage (kV)	
05	4.76
15	15
27	27

Version	
P	Fixed
H	H type drawout (for MCSG)

Interrupting current (kA)	
25	25
32	31.5

Phase distance/Compatibility	
A	150mm
B	210mm
C	254mm
D	275mm
R	150mm (Compact MCSG)
S	210mm (Compact MCSG)&CI

P type
- 4.76/15kV 25/31.5kA 1200/2000A (Phase 150/210/254)
- 27kV 25kA 1200A (Phase 254)

H type
- 4.76/15kV 25/31.5kA 1200A (Phase 150/210)
- 4.76/15kV 25/31.5kA 2000A (Phase 210)
- 4.76/15kV 25/31.5kA 1200A (Phase 150/210, Compact MCSG)
- 4.76/15kV 25/31.5kA 2000A (Phase 210, CI)

Rated current (A)	
12	1200A
20	2000A

UVL-15H32A12 — M1 C1 T1 SB2 U1 A 13···

Motor control voltage	
M0	Without motor
M1	DC 110V
M2	DC 200~250V
M3	DC 125V
M4	DC 24V~30V
M5	AC 48V~60V
M6	AC 48V
M7	AC 100V~130V
M8	AC 200V~250V

Trip coil voltage	
T0	Without trip coil
T1	DC 110V
T2	DC 200~250V
T3	DC 125V
T4	DC 24V~30V
T5	AC 48V~60V
T6	AC 48V
T7	AC 100V~130V
T8	AC 200V~250V

UVT	
U0	Without UVT
U1	DC 110V
U2	DC 200~250V
U3	DC 125V
U4	DC 24V~30V
U5	AC 48V~60V
U6	AC 48V
U7	AC 100V~130V
U8	AC 200V~250V

Note) UVT is only applicable for Fixed type (P Type)

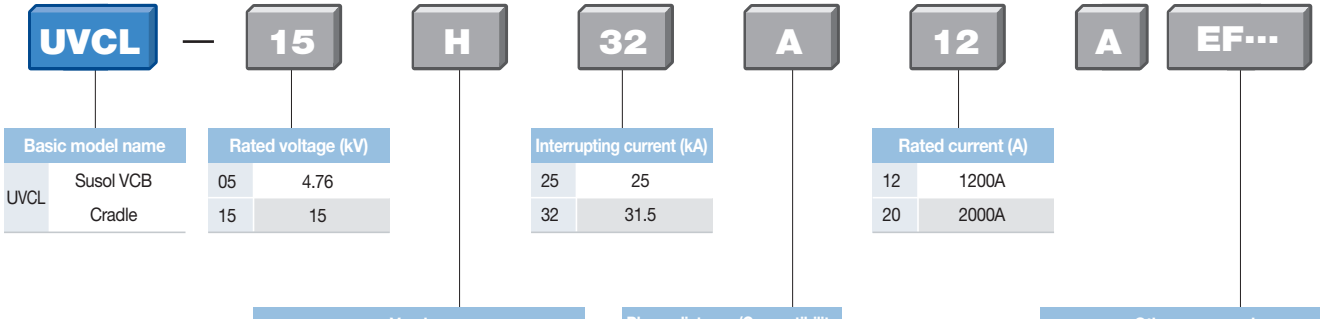
Other accessories Note)	
A1	Secondary Trip coil
A2	Secondary Trip Coil with TCS Contact
A3	Position s/w (Test: 1a1b, Service: 2b)
A4	Position s/w (Test: 2a, Service: 2a)
A5	Position s/w (Test: 1a1b, Service: 1a1b)
A7	Keylock
A8	Button Padlock
A9	Button cover
AA	Lead Wire
AB	User Plug (Part)
AC	Plug Interlock
AD	Padlock (H type)
AE	MOC
AI	Mecha Shaft Interlock Lever
AL	Energy Release
AM	Keylock (KirkKey, CAMLOCK type)
AN	Keylock (KirkKey, CN22 type)
AP	Keylock (KirkKey, Double CAMLOCK type)
AV	CT operated coil 1A
AW	CT operated coil 5A
AX	Button Padlock In Open

Closing coil voltage	
C0	Without closing coil
C1	DC 110V
C2	DC 200~250V
C3	DC 125V
C4	DC 24V~30V
C5	DC 48V~60V
C6	AC 48V
C7	AC 100V~130V
C8	AC 200V~250V

Connector and wire		
SA2	Standard	A type connector, 4a4b
SA4		A type connector, 10a10b
SB2		B type connector, 4a4b
SA4		B type connector, 10a10b

Note)
1. In case of selecting accessories such as A1(Secondary coil), A4(position S/W 2a2a), A7(key lock), A147 is type name in the ordering.
2. Unable to select A1(Secondary Trip Coil),U1~U8(UVT) simultaneously.
3. A3(Position S/W 1a3b), A4(Position S/W 2a2b) and A5(Position S/W 2a2b) can not be selected simultaneously.
4. A1(Secondary Trip Coil) and A2(Secondary Trip Coil with TCS Contact) can not be selected simultaneously.
5. A8(Button Padlock) and A9(Button Cover), AP(Button Padlock In Open) can not be selected simultaneously.
6. A7(Keylock), AM(KirkKey, CAMLOCK Type), AN(KirkKey, CN22 type),AX(Double Keylock) can not be selected simultaneously.
7. When A1(Secondary Trip Coil) is selected the maximum available auxiliary contacts are 9a9b.
8. When A2(Secondary Trip Coil with TCS Contact) is selected the maximum available auxiliary contacts are 4a3b, 9a8b.
9. H type breaker includes options such as AC(Plug Interlock), AD(Padlock(H type)), AE(MOC) as standard.
10. AI (Mecha Shaft Interlock Lever) is available only for 12kV, P type

Cradle



Basic model name	
UVCL	Susol VCB
	Cradle

Rated voltage (kV)	
05	4.76
15	15

Interrupting current (kA)	
25	25
32	31.5

Rated current (A)	
12	1200A
20	2000A

Version	
Ha	MCSG Cradle type
He	Compact MCSG drawout (Arc)
Hf	Compact MCSG drawout (Non-Arc)

Phase distance/Compatibility	
A	150mm
B	210mm
P	150mm
S	210mm

P and S types available for version Ha
- P type: Phase distance 150. Bushing CT installation impossible
- S type: Phase distance 210. Bushing CT installation impossible

A and B types available for version He
- A type: Phase distance 150. For 1200A only
- B type: Phase distance 210. For 1200A and 2000A

A and B types available for version Hf
(Bushing CT installable)
- B type: Phase distance 210. For 1200A and 2000A

Other accessories	
AE	Shutter padlock
AF	TOC
AG	MOC
AH	Door
AJ	Door Interlock
AK	Door Emergency Push Button
AM	H type, Lead Wire 4a4b (Standard)
AN	H type, Lead Wire 10a10b (Standard)

Note) 1. Ha type cradle cannot use a door and door options. You can use a door for He, Hf type cradle only.
2. AJ and AK can not be selected without door(AH).
3. TM(Temperature Monitoring) should be used with AL(Temperature Sensor).
4. H type lead wire(AM, AN) is required for cradle in case of using H type breaker.
5. If H type breaker options A8 (Button Padlock) and A9 (Button Cover), AP(Button Padlock In Open) are selected the cradle option AK (Door Emergency Push Button) is not available.
6. H type breaker includes options such as AE(Shutter padlock), AE(TOC), AG(MOC), AH(Door), AJ(Door Interlock) as standard.

UVH-38

Breaker

UVH — 38 H 32 E 12

Basic model name	
UVH	Susol VCB

Rated voltage (kV)	
38	38

Version	
P	Fixed
H	H type drawout (for MCSG)

Interrupting current (kA)	
32	31.5
40	40

Phase distance/Compatibility	
E	300mm

Rated current (A)	
12	1200A
20	2000A

UVH-38H32E12 — M1 C1 T1 SB2 U1 A 16···

Motor control voltage	
M0	Without motor
M1	DC 110V
M2	DC 220~250V
M3	DC 125V
M5	DC 48V
M6	AC 48V
M7	AC 110V
M8	AC 220V

Trip coil voltage	
T0	Without trip coil
T1	DC 110V
T2	DC 220~250V
T3	DC 125V
T5	DC 48V
T6	AC 48V
T7	AC 110V
T8	AC 220V

UVT	
U0	Without UVT
U1	DC 110V
U2	DC 220~250V
U3	DC 125V
U5	DC 48V
U6	AC 48V
U7	AC 110V
U8	AC 220V

Note) UVT is only applicable for Fixed type (P type)

Closing coil voltage	
C0	Without closing coil
C1	DC 110V
C2	DC 220V~250V
C3	DC 125V
C5	DC 48V
C6	AC 48V
C7	AC 110V
C8	AC 220V

Connector and wire	
SA2	Standard A type connector, 4a4b
SA4	Standard A type connector, 10a10b
SB2	Standard B type connector, 4a4b
SB4	Standard B type connector, 10a10b
SC2	Standard AutoCon. connector, 4a4b
SC4	Standard AutoCon. connector, 10a10b

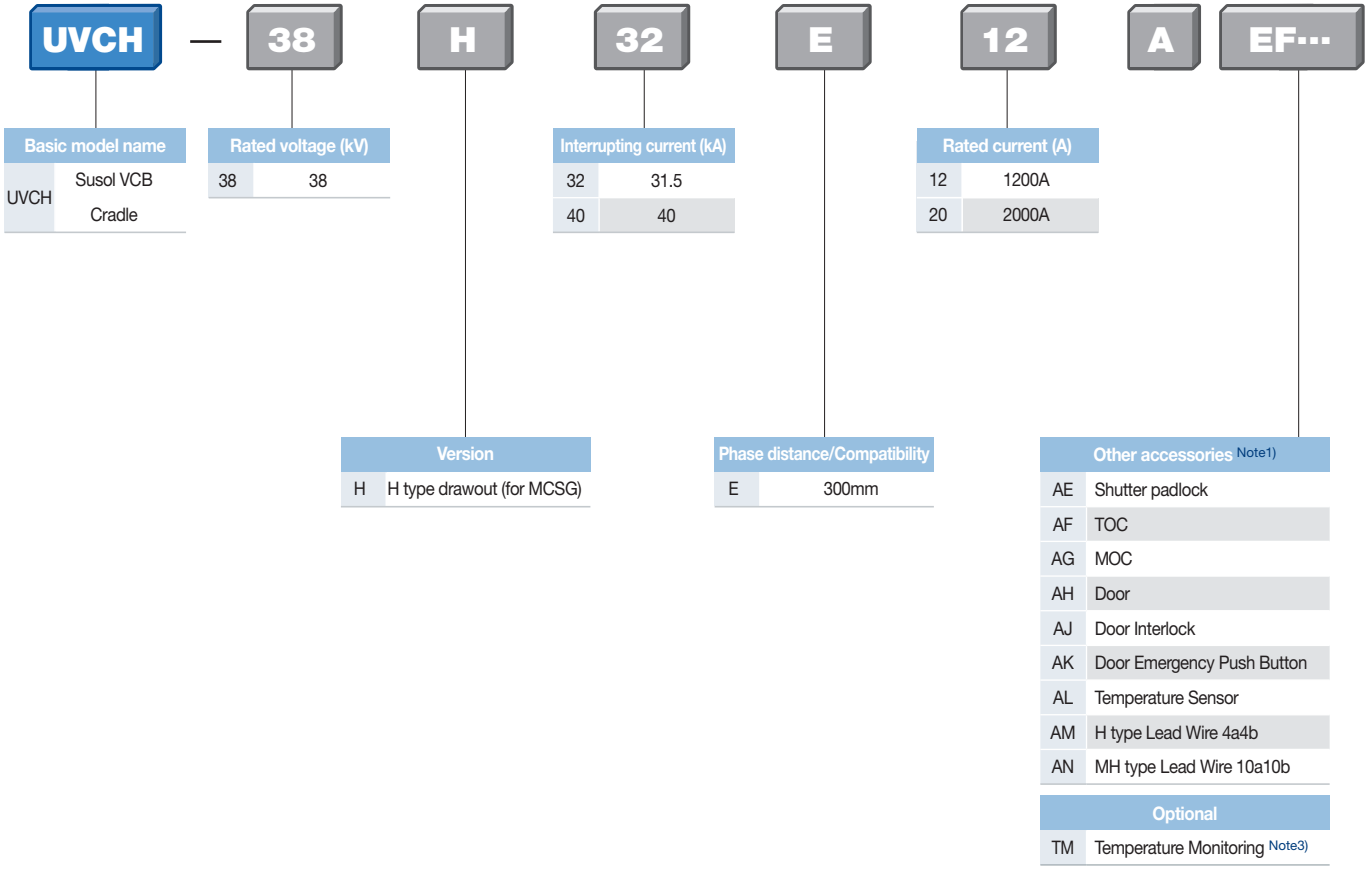
1. H type is for SC2 and SC4 only. (Auto connection type)
2. P type corresponds to both SA and SB type

Other accessories	
A1	Secondary Trip coil
A2	Secondary Trip Coil with TCS Contact
A6	Latch checking s/w
A7	Keylock
A8	Button padlock
A9	Button cover
AA	Lead Wire
AB	User Plug(Part)
AE	MOC

Optional	
CTD1	Condenser Trip Device (AC110V)
CTD2	Condenser Trip Device (AC220V)
UDC1	UVT Time Delay Controller (ADC110V)
UDC2	UVT Time Delay Controller (ADC220V)
UDC3	UVT Time Delay Controller (ADC48V)
CTU	Coil Test Unit

Note)
1. In case of selecting accessories such as A1(Secondary coil), A7(key lock), A8(Button Padlock) A178 is type name in the ordering.
2. Unable to select A1(Secondary Trip Coil),U1~U8(UVT) simultaneously.
3. A1(Secondary Trip Coil) and A2(Secondary Trip Coil with TCS Contact) can not be selected simultaneously.
4. A8(Button Padlock) and A9(Button Cover) can not be selected simultaneously.
5. When A2(Secondary Trip Coil with TCS Contact) is selected the maximum available auxiliary contacts are 4a3b, 9a9b.
6. H type breaker includes options such as AE(MOC) as standard.
7. In case of selecting UVT A6 (Latch checking S/W) is not allowed. A6 (Latch checking S/W) is installed by default to make electrical interlock with UVT.

Cradle



Basic model name	
UVCH	Susol VCB
	Cradle

Rated voltage (kV)	
38	38

Interrupting current (kA)	
32	31.5
40	40

Rated current (A)	
12	1200A
20	2000A

Version	
H	H type drawout (for MCSG)

Phase distance/Compatibility	
E	300mm

Other accessories Note1)	
AE	Shutter padlock
AF	TOC
AG	MOC
AH	Door
AJ	Door Interlock
AK	Door Emergency Push Button
AL	Temperature Sensor
AM	H type Lead Wire 4a4b
AN	MH type Lead Wire 10a10b

Optional	
TM	Temperature Monitoring Note3)

Note) 1. AJ and AK can not be selected without door (AH).
2. TM (Temperature Monitoring) should be used with AL (Temperature Sensor).
3. H type lead wire - one of AM, AN is required for cradle in case of H type breaker.
4. If H type breaker options A8 (Button Padlock) and A9 (Button Cover) are selected the cradle option AK (Door Emergency Push Button) is not available.
5. H type breaker includes options such as AE (Shutter padlock), AE (TOC, AG (MOC), AH (Door), AJ (Door Interlock) as standard.

Types and ordering information

Susol

VH-05/15

Breaker

VH — **15** **H** **50** **C** **30**

Basic model name	
VH	Susol VCB

Rated voltage (kV)	
05	4.76
15	15

Version	
H	H type drawout (for MCSG)

Interrupting current (kA)	
40	40
50	50

Phase distance/Compatibility	
C	254mm

Rated current (A)	
12	1200A
20	2000A
30	3000A

VH-15H50C30 — **M1** **C1** **T1** **SB2** **U1** — **A** **16···**

Motor control voltage	
M0	Without motor
M1	DC 110V
M2	DC 220~250V
M3	DC 125V
M5	DC 48V
M6	AC 48V
M7	AC 110V
M8	AC 220V

Trip coil voltage	
T0	Without trip coil
T1	DC 110V
T2	DC 220~250V
T3	DC 125V
T5	DC 48V
T6	AC 48V
T7	AC 110V
T8	AC 220V

UVT	
U0	Without UVT

Note)
1. In case of selecting accessories such as A1(Secondary coil), A7(key lock), A8(Button Padlock) A178 is type name in the ordering.
2. Unable to select A1(Secondary Trip Coil),U1~U8(UVT) simultaneously.
3. A1(Secondary Trip Coil) and A2(Secondary Trip Coil with TCS Contact) can not be selected simultaneously.
4. A8(Button Padlock) and A9(Button Cover) can not be selected simultaneously.
5. H type breaker includes options such as AE(MOC) as standard.
6. In case of selecting UVT A6 (Latch checking S/W) is not allowed. A6 (Latch checking S/W) is installed by default to make electrical interlock with UVT.

Closing coil voltage	
C0	Without closing coil
C1	DC 110V
C2	DC 220V~250V
C3	DC 125V
C5	DC 48V
C6	AC 48V
C7	AC 110V
C8	AC 220V

Connector and wire	
SC1	Standard AutoCon. connector, 3a3b

Optional	
CTD1	Condenser Trip Device (AC110V)
CTD2	Condenser Trip Device (AC220V)
UDC1	UVT Time Delay Controller (ADC110V)
UDC2	UVT Time Delay Controller (ADC220V)
UDC3	UVT Time Delay Controller (ADC48V)
CTU	Coil Test Unit

Other accessories	
A1	Secondary Trip coil
A6	Latch checking s/w
A7	Keylock
A8	Button padlock
A9	Button cover
AA	Lead Wire
AB	User Plug(Part)
AE	MOC

Cradle

VCH — **15** **H** **50** **C** **30** — **A** **FG···**

Basic model name	
VCH	Susol VCB
	Cradle

Rated voltage (kV)	
05	4.76
15	15

Version	
Ha	MCSG Cradle type

Interrupting current (kA)	
40	40
50	50

Phase distance/Compatibility	
C	254mm

Rated current (A)	
12	1200A
20	2000A
30	3000A

Other accessories	
AF	TOC
AG	MOC
AM	H type Lead Wire 3a3b

Optional	
TM	Temperature Monitoring

Ratings - 4.76/15/27kV 25/31.5kA 1200/2000A

Susol

UVL-05/15/27

Item			UVL–05□25,32□12,20						UVL–15□25,32□12,20						UVL–27□25□12
Rated maximum voltage		(kV)	4.76						15						27
Rated continuous current		(A)	1200			2000			1200			2000			1200
Rated power frequency		(Hz)	50/60												
Power frequency withstand voltage		(kA)	19						36						60
Full wave lightning impulse withstand voltage		(kA)	60						95						125
Rated short-time current	r.m.s.	(kA)	25/31.5												25
	Peak	(kA)	65/81.9												65
Short-time current duration		(sec)	4												
Rated short-circuit current	Breaking	(kA)	25/31.5												25
	Making	(kA)	65/81.9												65
Rated interrupting capacity		(MVA)	207/260						650/820						1170
Rated Interrupting time		(cycle)	3												
Standard operating duty			O-0.3s-CO-15s-CO												
apacitance current switching			C2												
Rated closing control voltage		(V)	DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V, AC 48V, AC 100~130V, AC 220~250V												
Rated trip control voltage		(V)	DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V, AC 48V, AC 100~130V, AC 220~250V												
Mechanical endurance		(Operations)	M2 (10,000)												
Electrical endurance			Reference Standard (page 88)												
Standard aux. contacts	Type		4a4b, 10a10b												
	Rated Continuous current		DC 10A												
	Baeaking capacity		600W												
	Endurance (Mechanical, Interrupting)	(Operations)	10,000												
Operate temperature	Low		-40°C												
	High		-40°C												
Rated opening time		(sec)	≤ 0.04												
Rated closing time		(sec)	≤ 0.06												≤ 0.07
Installation	Fixed		P type												
	Draw-out		H type												
Phase distance		(mm)	150	210	254	150	210	254	150	210	254	150	210	254	254
Weight	Ha, Cradle [1]	(kg)	90	-	-	-	100	-	90	-	-	-	100	-	-
	He, Cradle [2]	(kg)	375	405	-	-	425	-	375	405	-	-	425	-	-
	Hf, Cradle [3]	(kg)	310	340	-	-	360	-	310	340	-	-	360	-	-
	H, Circuit Breaker [4]	(kg)	130	140	-	-	160	-	130	140	-	-	160	-	-
	H, Circuit Breaker [5]	(kg)	115	120	-	-	145	-	115	120	-	-	145	-	-
	P, Circuit Breaker	(kg)	85	100	110	100	115	125	85	100	110	100	115	125	125
Applicable standard			IEEE Std C37.09, ANSI C37.54												IEEE Std C37.09

1) MCSG Cradle type
2) Compact MCSG type(Arc)
3) Compact MCSG type(Non-Arc)
4) VCB for Compact MCSG type(Arc)
5) VCB for Compact MCSG type(Non-Arc)
* H type is a box type cradle with CB compartment style structure.

Ratings - 38kV 31.5/40kA 1200/2000A

Susol

UVH-38

Item			UVH–38□32,40□12,20	
Rated maximum voltage		(kV)	38	
Rated continuous current		(A)	1200	2000
Rated power frequency		(Hz)	60	
Power frequency withstand voltage		(kA)	80	
Full wave lightning impulse withstand voltage		(kA)	170	
Rated short-time current	r.m.s.	(kA)	31.5/40	
	Peak	(kA)	81.9/104	
Short-time current duration		(sec)	4	
Rated short-circuit current	Breaking	(kA)	31.5/40	
	Making	(kA)	81.9/104	
Rated interrupting capacity		(MVA)	2074/2633	
Rated Interrupting time		(cycle)	3	
Standard operating duty			O-0.3s-CO-15s-CO	
apacitance current switching			C2	
Rated closing control voltage		(V)	DC 48V, DC 110V, DC 125V, DC 220~250V, AC 48V, AC 110V, AC220V	
Rated trip control voltage		(V)	DC 48V, DC 110V, DC 125V, DC 220~250V, AC 48V, AC 110V, AC220V	
Mechanical endurance		(Operations)	M2 (10,000)	
Electrical endurance			Reference Standard (page 88)	
Standard aux. contacts	Type		4a4b, 10a10b	
	Rated Continuous current		DC 10A	
	Baeaking capacity		600W	
	Endurance (Mechanical, Interrupting)	(Operations)	10,000	
Operate temperature	Low		-40°C	
	High		-40°C	
Rated opening time		(sec)	≤ 0.04	
Rated closing time		(sec)	≤ 0.06	
Installation	Fixed		P type	
	Draw-out		H type	
Phase distance		(mm)	300	
Weight	Ha, Cradle1)	(kg)	350	
	He, Cradle2)	(kg)	400	
	Hf, Cradle3)	(kg)	360	
Applicable standard			IEEE Std C37.09	

Ratings - 4.76/15kV 40/50kA 1200/2000/3000A

Susol

VH-05/15

Item			VH–05□40,50□12,20,30			VH–15□40,50□12,20,30		
Rated maximum voltage		(kV)	4.76			15		
Rated continuous current		(A)	1200	2000	3000	1200	2000	3000
Rated power frequency		(Hz)	60					
Power frequency withstand voltage		(kA)	19			36		
Full wave lightning impulse withstand voltage		(kA)	60			95		
Rated short-time current	r.m.s.	(kA)	40/50					
	Peak	(kA)	104/130					
Short-time current duration		(sec)	2					
Rated short-circuit current	Breaking	(kA)	40/50					
	Making	(kA)	104/130					
Rated interrupting capacity		(MVA)	330/412			1040/1300		
Rated Interrupting time		(cycle)	3					
Standard operating duty			O-0.3s-CO-3min-CO					
apacitance current switching			C2					
Rated closing control voltage		(V)	DC 48V, DC 110V, DC 125V, DC 220~250V, AC 48V, AC 110V, AC220V					
Rated trip control voltage		(V)	DC 48V, DC 110V, DC 125V, DC 220~250V, AC 48V, AC 110V, AC220V					
Mechanical endurance		(Operations)	M2 (10,000)					
Electrical endurance			Reference Standard (page 88)					
Standard aux. contacts	Type		4a4b, 10a10b					
	Rated Continuous current		DC 10A					
	Baeaking capacity		600W					
	Endurance (Mechanical, Interrupting)	(Operations)	10,000					
Operate temperature	Low		-30°C					
	High		40°C					
Rated opening time		(sec)	≤ 0.04					
Rated closing time		(sec)	≤ 0.06					
Installation	Fixed		P type					
	Draw-out		H type					
Phase distance		(mm)	254					
Weight	H, Cradle	(kg)	248	248	286	248	248	286
	H, Circuit Breaker	(kg)	230	230	265	230	230	265
Applicable standard			IEEE Std C37.09					

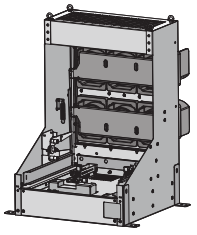
Accessory

Susol

Mounting Position	Type	Accessory	Supplied as			Remarks	page
			UVL-05/15/27	UVH-38	VH-05/15		
Breaker (Internal)	M	Motor	●	●	●	Attached at the factory	36
	CC	Closing Coil	●	●	●	Attached at the factory	37
	TC	Trip Coil	●	●	●	Attached at the factory	38
	A1	Secondary Trip Coil	Option	Option	Option	Attached at the factory	39
	SA (SB)	Auxiliary Contact 4a4b	●	●	-	Attached at the factory	41
		Auxiliary Contact 10a10b	Option	Option	-		
	SC1	Auxiliary Contact 3a3b	-	-	●	Attached at the factory	42
	SC2	Auxiliary Contact 4a4b	-	●	-	Attached at the factory	42
	SC4	Auxiliary Contact 10a10b	-	Option	-	Attached at the factory	42
	U	Under Voltage Trip Coil	Option	Option	-	Attached at the factory	43
	A3	Position S/W(Test: 1a1b, Connect: 2b)	Option	-	-	Attached at the factory	44
	A4	Position S/W(Test: 2a, Connect: 2a)	Option	-	-	Attached at the factory	44
	A5	Position S/W(Test: 1a1b, Connect: 1a1b)	Option	-	-	Attached at the factory	44
	A6	Latch Checking Switch	-	Option	Option	Attached at the factory	44
	-	Counter	●	●	●	Attached at the factory	42
	A7	Keylock	Option	Option	Option	Attached at the factory	45
	A8	Button Padlock	Option	Option	Option	Attached at the factory	46
	A9	Button cover	Option	Option	Option	Attached at the factory	47
	AA	Lead Wire: A/B type connector	Option	Option	Option	Attached at the factory	48
	AB	Plug/Terminal for Lead Wire	Option	Option	Option	Attached at the factory	48
	AC	Plug Interlock	●	-	-	Attached at the factory	49
	AD	Padlock (H type)	●	-	-	Attached at the factory	49
	AE	MOC(Mechanical Operated Cell Switch	●	●	●	Attached at the factory	50
	AI	Mecha Shaft Interlock Lever	Option	-	-	-	-
	AM	Keylock(KirkKey, CAMLOCK Type)	Option	-	-	Attached at the factory	45
	AN	Keylock(KirkKey, CN22 Type)	Option	-	-	Attached at the factory	45
	AP	Keylock(KirkKey, Double CAMLOCK Type	Option	-	-	Attached at the factory	45
	AV	CT operated coil 1A	Option	-	-	Attached at the factory	40
	AW	CT operated coil 5A	Option	-	-	Attached at the factory	40
	AX	Button Padlock In Open	Option	-	-	Attached at the factory	46
		Position padlock	-	●	●	Attached at the factory	51
		Mechanical position indicator	●	●	●	Attached at the factory	51
		Auto connection	-	●	●	Attached at the factory	52
		Code plate	-	-	●	Attached at the factory	52
		Charge interlock	●	-	●	Attached at the factory	-
		Auto discharge	-	●	-	Attached at the factory	-
		Trip coil monitoring contact	●	●	●	Attached at the factory	53
Breaker (External)	CTD1	Condenser Trip Device(AC110V)	Option	Option	Option	-	55
	CTD2	Condenser Trip Device(AC220V)	Option	Option	Option	-	55
	UDC1	UVT Time Delay Controller(AD110V)	Option	Option	Option	-	56
	UDC2	UVT Time Delay Controller(AD220V)	Option	Option	Option	-	56
	UDC3	UVT Time Delay Controller(AD48V)	Option	Option	Option	-	56
	CTU	Coil Test Unit	Option	Option	Option	-	54
	TM	Temperature Monitoring	Option	Option	Option	-	57

* ●: Basic Installation

Mounting Position	Type	Accessory	Supplied as			Remarks	page
			UVL-05/15/27	UVH-38	VH-05/15		
Cradle	AE	Shutter padlock	●	●	-	Attached at the factory	58
	AF	TOC(Truck Operated Cell Switch)	●	●	●	Attached at the factory	58, 64
	AG	MOC(Mechanical Operated Cell Switch)	●	●	●	Attached at the factory	59, 63
	AH	Door	Option	Option	-	Attached at the factory	59
	AJ	Door Interlock	Option	Option	-	Attached at the factory	60
	AK	Door Emergency Push Button	Option	Option	-	Attached at the factory	60
	AL	Temperature Sensor	Option	Option	Option	Attached at the factory	61
	AM	Type H Lead Wire 3a3b	-	-	●	Attached at the factory	62
	AM	Type H Lead Wire 4a4b	Option	●	-	Attached at the factory	62
	AN	Type H Lead Wire 10a10b	Option	Option	-	Attached at the factory	62
	AS	Bushing Barrier(170kV for 38kV)	-	Option	-	Attached at the factory	-
		Door padlock	●	-	-	Attached at the factory	62
		Auto connection	-	●	●	Attached at the factory	52
		Charge interlock	●	-	●	Attached at the factory	63
		Auto discharge	-	●	-	Attached at the factory	-

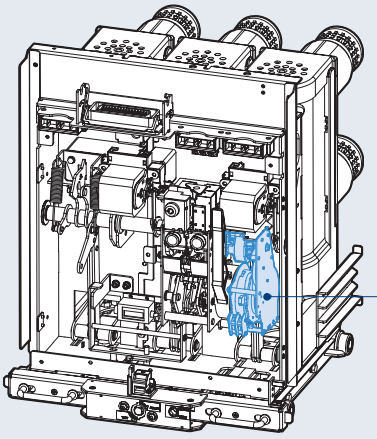


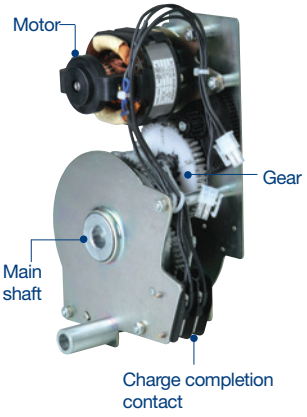
Motor: M

Installed inside of a breaker as standard

UVL type

- Charge the closing spring of a circuit breaker by the external power source. When the charging is complete, control power of the motor will be "OFF" by the built-in Limit S/W. Without the external power source, charge manually.

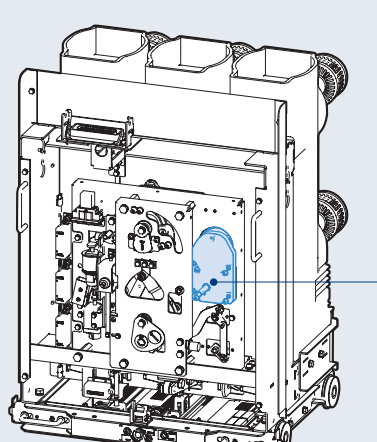




	UVL type							
Input voltage (Vn)	DC 24~30V	DC 48~60V	DC 110V	DC 125V	DC 220~250V	AC 48V	AC 100~130A	AC 200~250V
Load current (A)	≤ 5	≤ 3	≤ 1	≤ 1	≤ 0.5	≤ 3	≤ 1	≤ 0.5
Starting current (A)	5 times of load current							
Charge time	Within 5 sec.							

Note) Rated operation and control voltage range, see page 40.

VH/UVH type



	VH/UVH type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220~250V	AC 48V	AC 110V	AC 220V
Load current (A)	≤ 6	≤ 3	≤ 3	≤ 2.6	≤ 6	≤ 3	≤ 2.6
Starting current (A)	≤ 30	≤ 20	≤ 20	≤ 17	≤ 30	≤ 20	≤ 17
Charge time	Within 12 sec.						

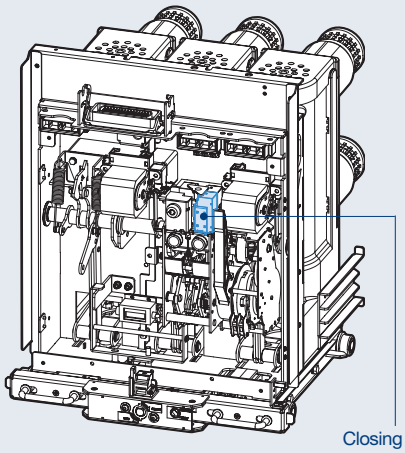
Note) Rated operation and control voltage range, see page 40.

Closing Coil: CC

Installed inside of a breaker as standard

UVL type

- It is a control device which closes a circuit breaker, when applying voltage continuously or instantaneously over 200ms to the coil control terminals.

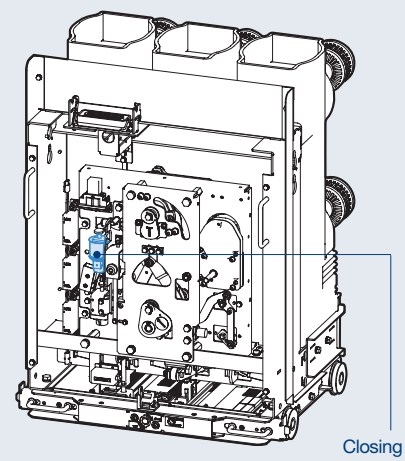


	UVL type							
Input voltage (Vn)	DC 24~30V	DC 48~60V	DC 110V	DC 125V	DC 220~250V	AC 48V	AC 100~130V	AC 200~250V
Power consumption (inrush, VA)	200							
Power consumption (steady, VA)	≤ 5							

Note) Rated operation and control voltage range, see page 40.

VH/UVH type

- It is a control device which closes a circuit breaker, when applying voltage continuously about 45ms to the coil control terminals. Electrical pumping preventing circuit is built in.



	VH/UVH type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220~250V	AC 48V	AC 110V	AC 220V
Rated current (A)	≤ 8	≤ 3	≤ 3	≤ 2.5	≤ 8	≤ 3	≤ 2.5

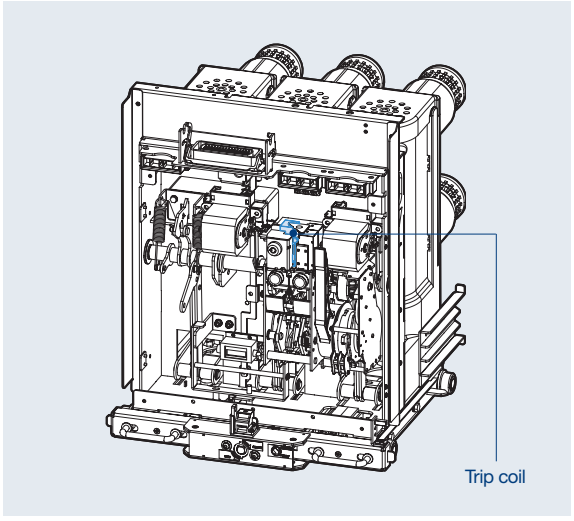
Note) Rated operation and control voltage range, see page 40.

Trip Coil: TC

Installed inside of a breaker as standard

UVL type

- It is a control device which trips a circuit breaker from remote place, when applying voltage continuously or instantaneously over 35ms to coil control terminals.
- When UVT coil is installed, its location is changed.

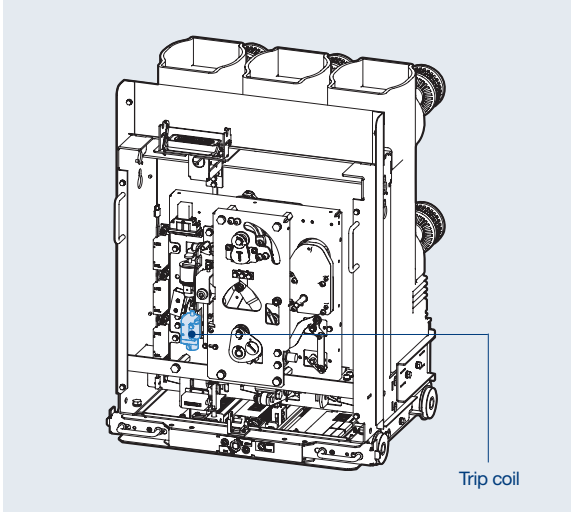


	UVL type							
Input voltage (Vn)	DC 24~30V	DC 48~60V	DC 110V	DC 125V	DC 220~250V	AC 48V	AC 100~130V	AC 200~250V
Power consumption (inrush, VA)	200		400			200		
Power consumption (steady, VA)	≤ 5		–			≤ 5		

Note) Rated operation and control voltage range, see page 40.

VH/UVH type

- It is a control device which trips a circuit breaker, when applying voltage continuously or instantaneasly over 35ms to the coil control terminals.



	VH/UVH type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220~250V	AC 48V	AC 110V	AC 220V
Rated current (A)	≤ 8	≤ 3	≤ 3	≤ 2.5	≤ 8	≤ 3	≤ 2.5

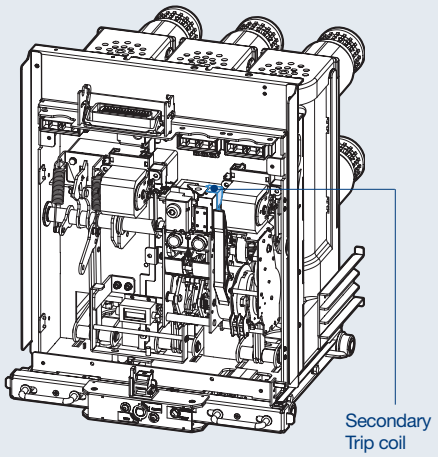
Note) Rated operation and control voltage range, see page 40.

Secondary Trip Coil: A1

Installed inside of a breaker as an option

UVL type

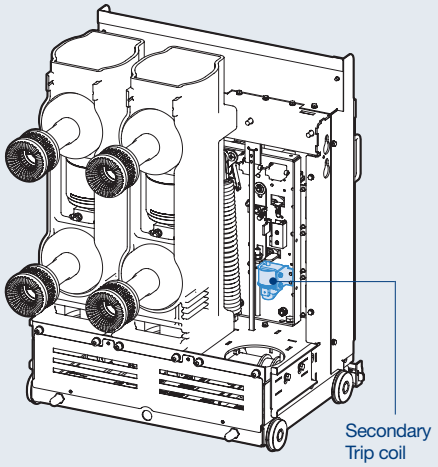
- It is a control device which trips a circuit breaker doubly from the outside. If the trip coil (T) fails, it can trip a circuit breaker safely.
- Trip coil: Install it at existing location.
- Secondary trip coil: Install it on the right side of the trip coil.
- It is not available with UVT coil when installing secondary trip coil.



	UVL type							
Input voltage (Vn)	DC 24~ 30V	DC 48~ 60V	DC 110V	DC 125V	DC 220~ 250V	AC 48V	AC 100~ 130V	AC 200~ 250V
Power consumption (inrush, VA)	200		400			200		
Power consumption (steady, VA)	≤ 5		–			≤ 5		

VH/UVH type

- It is a control device which trips a circuit breaker doubly from the outside. If the trip coil (T) fails, it can trip a circuit breaker safely.
- It is not available with UVT coil when installing secondary trip coil.



	VH/UVH type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220~250V	AC 48V	AC 110V	AC 220V
Rated current (A)	≤ 8	≤ 3	≤ 3	≤ 2.5	≤ 8	≤ 3	≤ 2.5

Rated operation and control voltage range

Rated control voltage range	DC Voltage range		Remarks
	Motor, Closing	Trip	
24	-	14~28	
48	38~56	28~56	
125	100~140	70~140	
250	200~280	140~280	
Applied standard	IEEE C37.09		

Rated control voltage range	AC Voltage range	Remarks
	Motor, Closing, Trip	
24	-	
48	-	
120	104~127	
240	208~254	
Applied standard	IEEE C37.09	

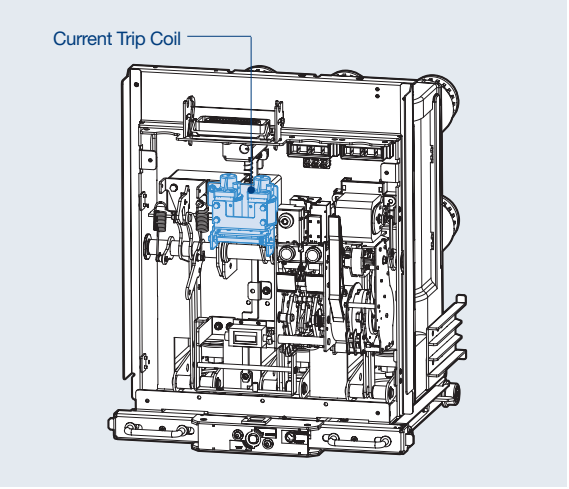
CT operated coil

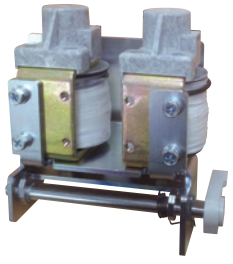
Installed inside of a breaker as an option

UVL type : AV, AW

- This trip coil uses the output of the CT as its control power source and is used with over current relay in combination. Two current trip coils are supplied.
- Coil impedance(Z) is like below
  - 1A: 160Ω or less, Operating current AC 1A (AV)
  - 5A: 6Ω or less, Operating current is AC 5A (AW)
- CT must be installed at load side.
  If it is installed at bus side there is the danger of malfunction or damage to CT.
- Don't disconnect the control power connector on main power is live condition at connect position.
  Otherwise there is the danger of malfunction or damage to CT.

* CT is recommended to use 15VA 5P10 and more.
* This coil is applicable to non-effectively grounded neutral systems.





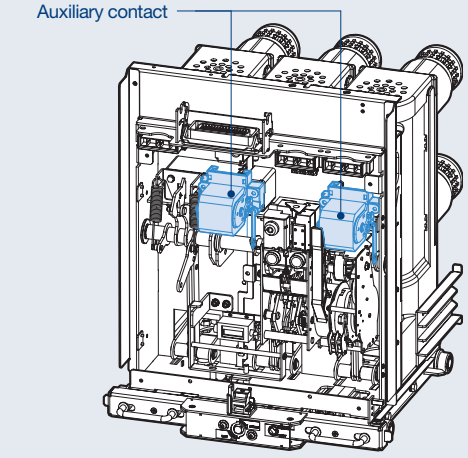
Auxiliary Contact: SA

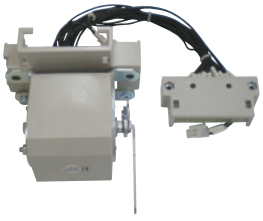
Installed inside of a breaker as an option

UVL type

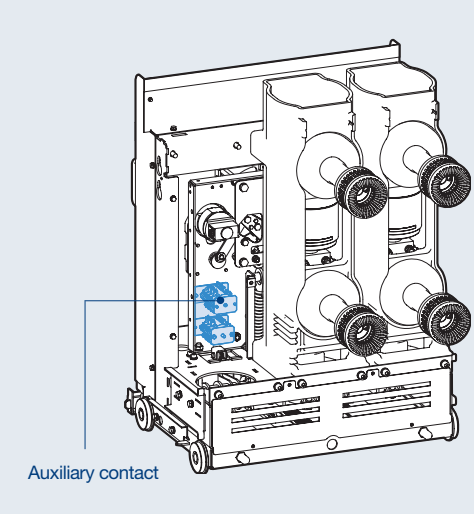
- It is a contact used to monitor ON/OFF status of a breaker from remote place.
- The auxiliary contacts supplied as standard configuration is 4a4b. 10a10b is also available on request.

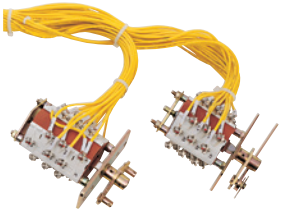
Item	UVL/VH/UVH-27 type
Standard	4a4b
Optional	10a10b





VH/UVH type





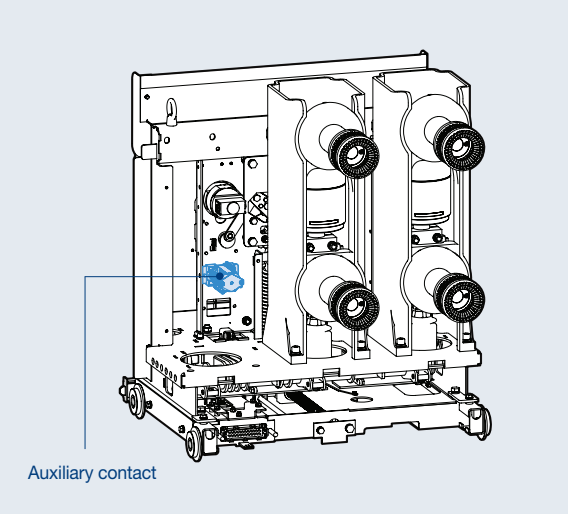
UVL/VH/UVH type					
Item			Resistive load (A)	Inductive load (A)	Remarks
Contact configuration	AC	250V	10	5	For all models
		125V	10	5	
	DC	250V	10	5	
		125V	10	5	
		30V	10	5	

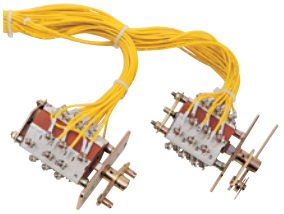
Auxiliary Contact: SC1

Installed inside of a breaker as an option

VH-05/15 type

- It is a contact used to monitor ON/OFF status of a breaker from remote place.
- The auxiliary contacts supplied as standard configuration is 3a3b.
- Two(2) “Early b” auxiliary contact is provided. (Terminal No. 56-57, 58-59)





Item		Resistive load(A)	Inductive load(A)
Contact configuration	DC 125V	10	5

Counter: C

Installed inside of a breaker as standard

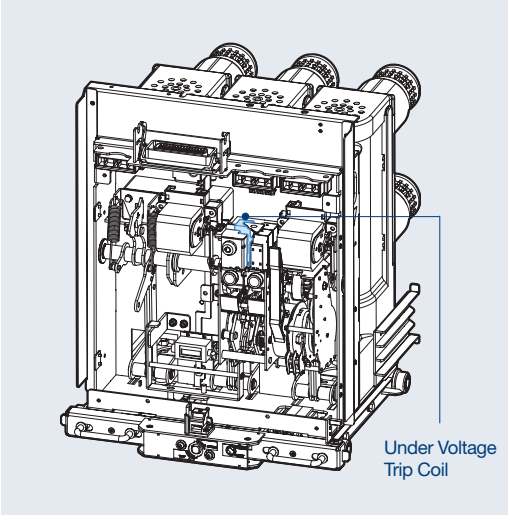
UVL/VH/UVH type

- It displays the total number of ON/OFF operations of a breaker.

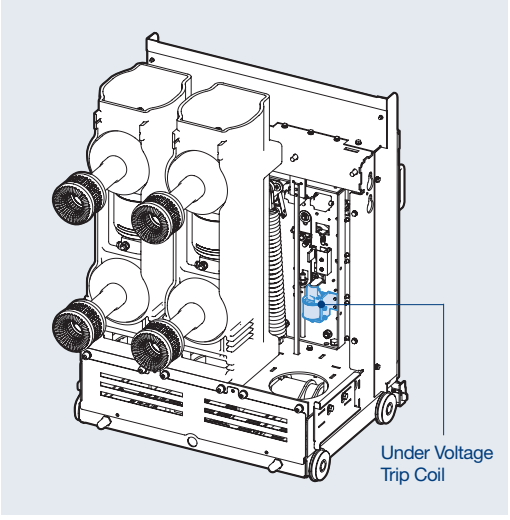
Under Voltage Trip Coil: U

Installed inside of a breaker as an option

UVL type



UVH type



UVL type

VH/UVH type

- It is installed inside of a breaker to trip when the main power or control power voltage drops below certain value. Instantaneous type is only available with UVT coil and Time delay type is available by connecting UVT coil and UVT time delay controller.
- The closing of a circuit breaker is impossible mechanically or electrically if control power is not supplied to UVT. To close the circuit breaker, 65~85% of rated voltage should be applied.
- UVT and secondary trip coil will not be selected together.

* UVT is only applicable for Fixed type (P type)

1. UVT rated voltage and characteristic
   - Operating voltage range: Pick up 0.65~0.85Vn, Drop out 0.4~0.6Vn
   - Operating voltage ranges based on the minimum value of each rated voltage (Vn)

	UVL type							
Input voltage (Vn)	DC 24~30V	DC 48~60V	DC 110V	DC 125V	DC 220V	AC 48V	AC 100~130V	AC 200~250V
Power consumption (inrush, VA)	200							
Power consumption (steady, VA)	≤ 5							

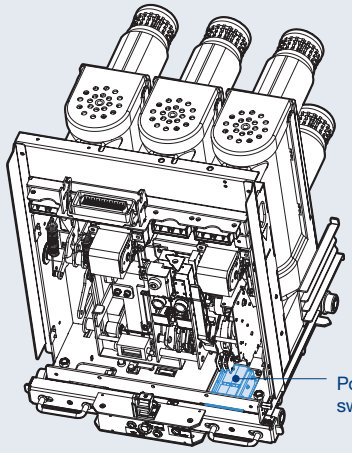
	UVH type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220V	AC 48V	AC 110V	AC 220V
Power consumption (inrush, VA)	350						
Power consumption (steady, VA)	≤ 10						

Position Switch: A3, A4, A5

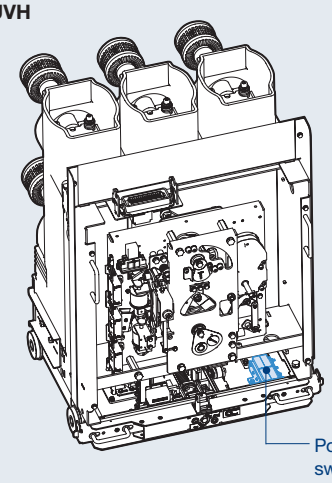
Installed inside of a breaker as an option

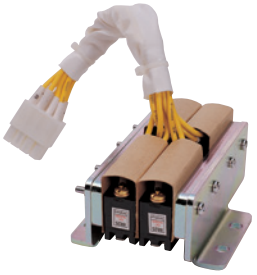
UVL type - H Cradle

UVL



VH/UVH

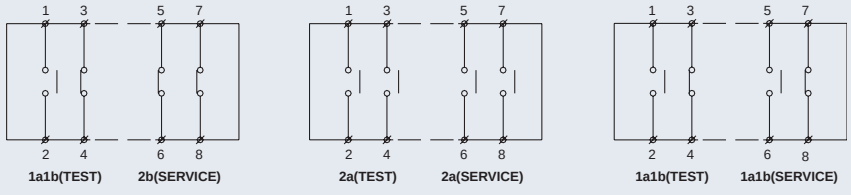




Large model (VH/UVH)

- This switch is used to indicate the breaker position (CONNECT, TEST), and contact configuration is 2a2a or 2a2b, 1a3b.

Contact configuration

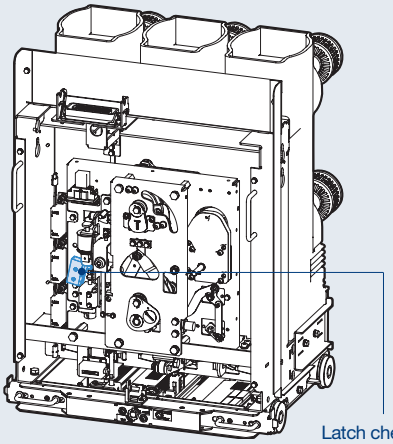


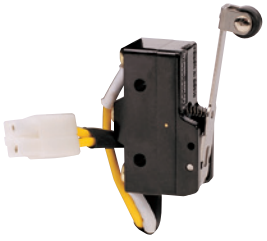
Latch checking switch: A6

Installed inside of a breaker as an option

VH/UVH type

- This switch works in conjunction with the mechanism of the breaker. It checks if the breaker is ready to be closed.
- When the mechanism is OFF and the closing spring is at charged status the switch becomes "ON", which means the mechanism is ready to be closed.
- If the latch is not in a proper position the switch prevents the breaker from closing.
  In case of VH type it is connected internally in series with the closing coil.





Keylock: A7, AM, AN, AP

Installed inside of a breaker as an option

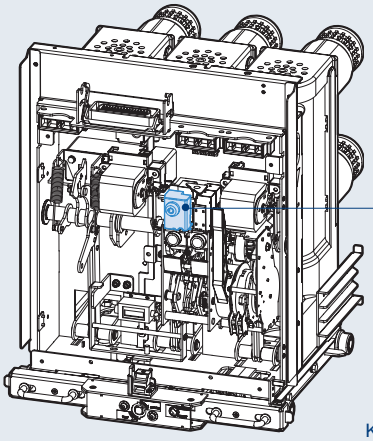
UVL type

• The key is to unlock the locking device first to close the breaker electrically and mechanically.

*How to operate
- It is not possible to pull out the key in the unlocked position, possible only in locked status.
- Pushing "OFF" switch of a breaker turn the key counter-clockwise to the locked position and pull it out.
- It is not possible to close the breaker electrically and mechanically in the locked position.
- Insert the key and turn clockwise and then the breaker can be closed electrically and mechanically.

1. A7: KEYLOCK(NORMAL Type)
2. AM: KIRKKEY LOCK(CAMLOCK Type)
3. AN: KIRKKEY LOCK(CN22 Type)
4. AP: KIRKKEY LOCK(DOUBLE CAMLOCK Type)

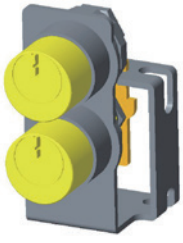
* The KIRKKEY is not provided separately when ordering AM, AN or AP option. The assembling bracket and instruction manual are provided.




A7

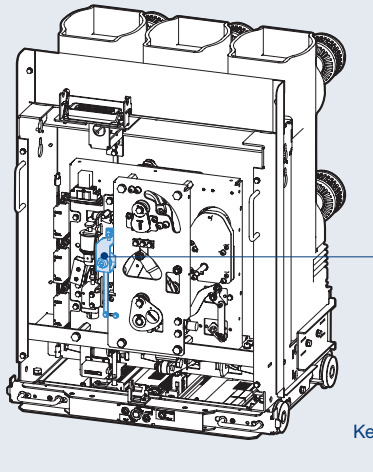

AM


AN


AP

VH/UVH type

*How to operate
- It is not possible to pull out the key in the unlocked position, possible only in locked status.
- Trip the breaker first and then turn the key counter-clockwise to the locked position and pull it out.
- It is not possible to close the breaker electrically and mechanically in the locked position.



Button Padlock: A8, AX

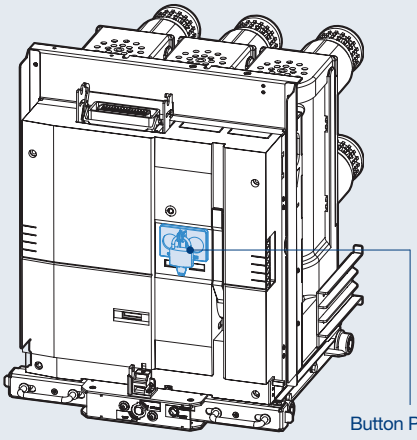
Installed outside of a breaker as an option

UVL type

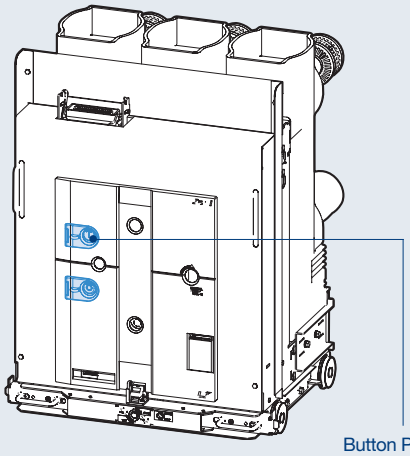
- It is to prevent manual operation of ON/OFF button due to user's wrong handling.
- A8 option: It is not possible to handle ON/OFF manual operation under the "Button lock" status.
- AX option :It is not possible to handle ON/OFF manual/electrical operation under the "Button lock" status.

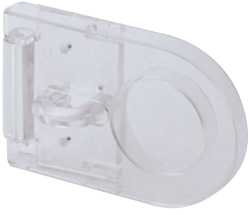
* Key lock is not supplied.

1. A8: KEYLOCK(NORMAL Type)
2. AX: Button Padlock In Open



VH/UVH type



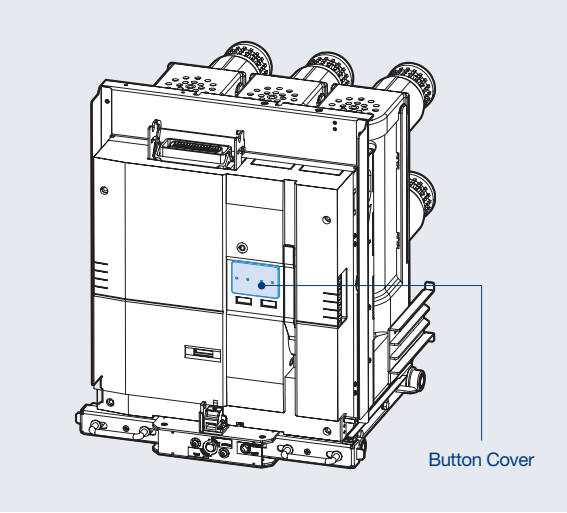


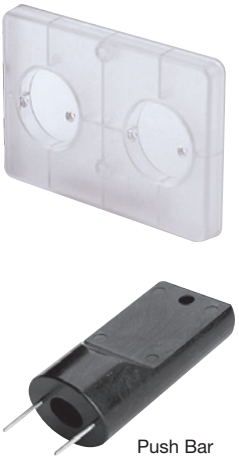
Button Cover: A9

Installed outside of a breaker as an option

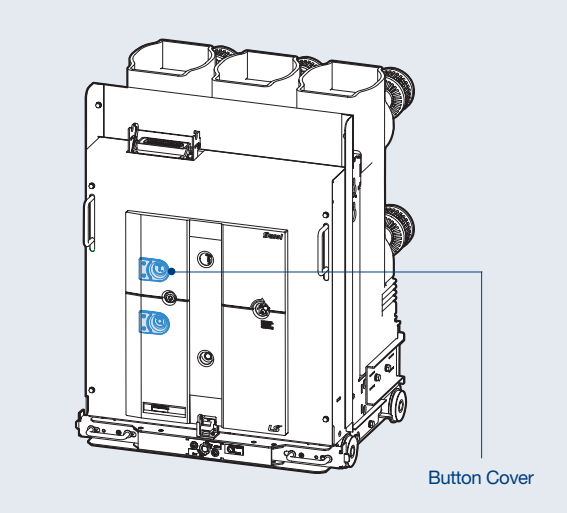
UVL type

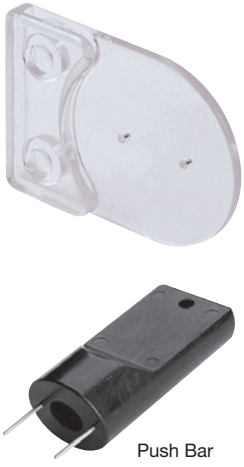
- It is a protection cover to prevent an accident due to unintended operation of ON/OFF button.
- Use the push-bar to operate the ON/OFF button.





VH/UVH type



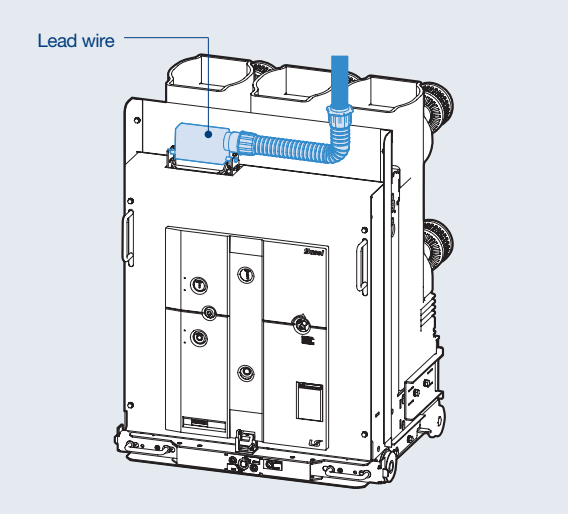


Lead wire: AA

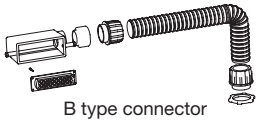
Supplied separately from a breaker as an option

UVL/UVH type

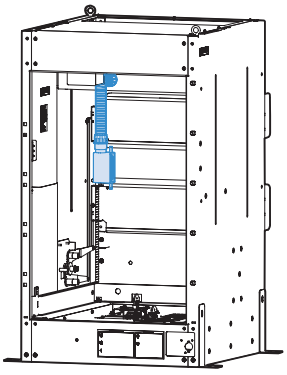
- It is to connect with the control circuit of a breaker from outside. (supply wire length: 2m)
- A type connector is supplied for P/E/F/G type of UVL VCB.
- B type connector is supplied for P type of VH/UVH VCB.
- In case of H type breaker of VL and VH models the Lead wire is installed in the cradle when supplied.



A type connector



B type connector



Supply ways of Lead wires by VCB model

VCB model \ Cradle type	P	E	F	G	H
UVL	Enclosed in the breaker				Enclosed in the breaker Installed in the cradle (option)
VH/UVH	Enclosed in the breaker				Enclosed in the breaker Installed in the cradle (option)

Plug/Terminal for lead wire

Supplied separately from a breaker as an option

UVL/UVH type

A type connector

B type connector

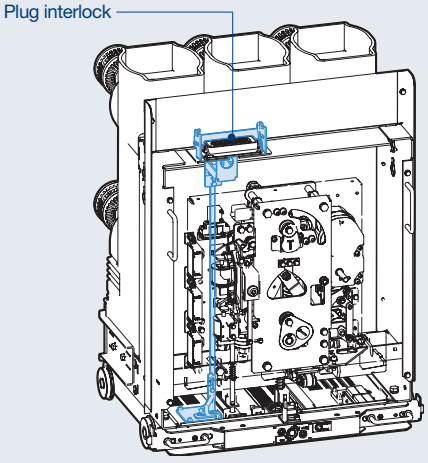
- It is connector to connect with the connector installed in the breaker. (supply connectors and terminal only for lead wire)
- Type of connector is depends on the type of connector installed in the breaker- A or B.

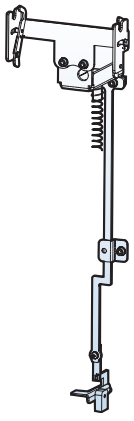
Plug interlock: AC

Installed inside of a breaker as an option

UVL type

- It checks if the control power connector on the cradle (H type) is connected with the connecting terminal of the breaker before the proceeding of draw-in or out.
- It is not allowed to seperate the control power connector from the breaker in the position of draw-in /out or CONNECT, but TEST position.



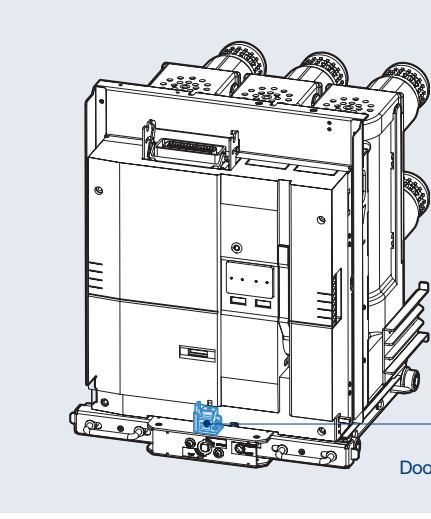


Padlock/Door racking interlock: AD

Installed outside of a breaker as an option

UVL type

- With this door options for H type cradle draw-in/out is allowed only when the door is closed.
- If draw-in /out is necessary when the door is open, use the operation lever put in the slot of the breaker handle.
  Insert it into the hole in the bottom of door interlock.
- Padlock is also optional, which can lock to prevents the draw-in/out of the breaker in the position of TEST and CONNECT.

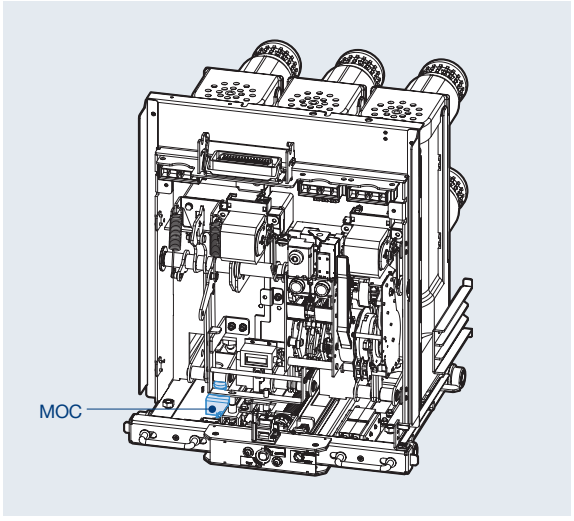


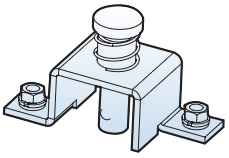
MOC drive device: AE

Installed inside of a breaker as an option

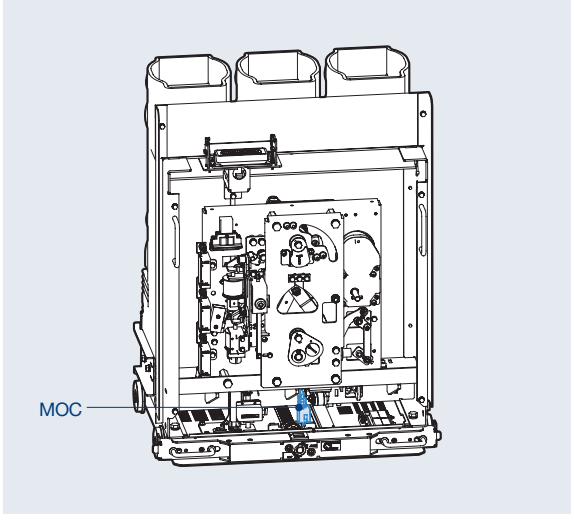
UVL type

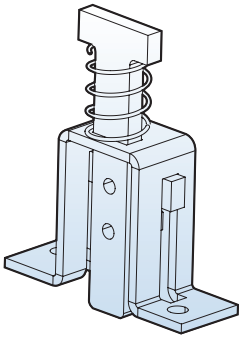
- It must be installed in the breaker to drive the MOC installed in H type cradle.
- MOC, Mechanically operated cell switch is the device to indicates the Closed/Trip status of VCB in 'CONNECT' position only.
- This MOC drive device in the breaker should be installed when MOC in the cradle is used.





VH/UVH type



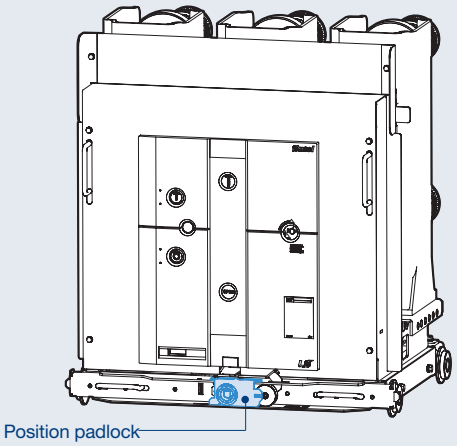


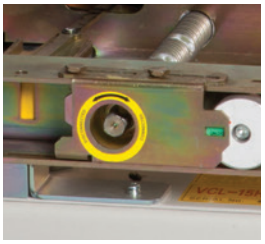
Position padlock

Installed inside of a breaker as an option

VH/UVH type

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



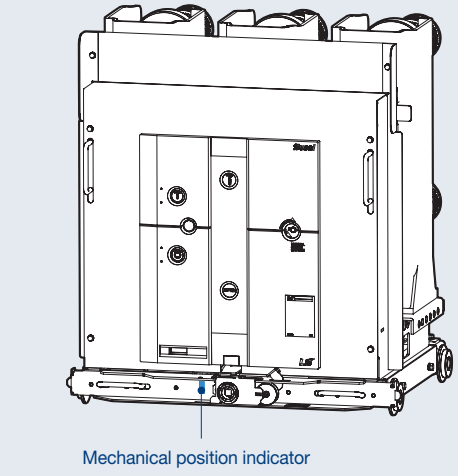


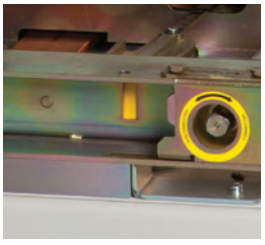
Mechanical position indicator

Installed inside of a breaker as an option

VH/UVH type

- It is located in the lower part of a breaker to check the present position - Disconnected, Test or Connected- easily.



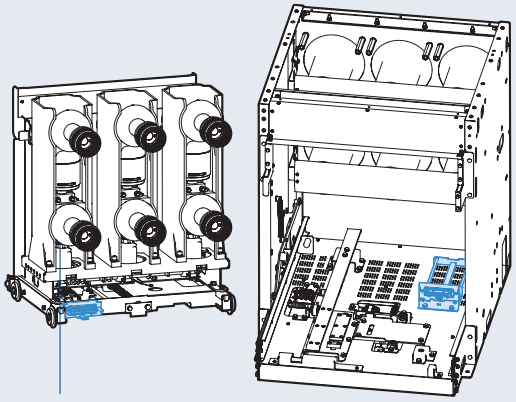


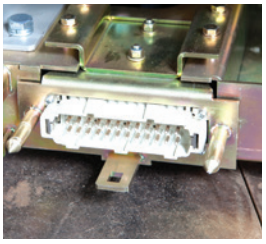
Auto connection

Installed inside of a breaker as an option

VH/UVH type

- 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.



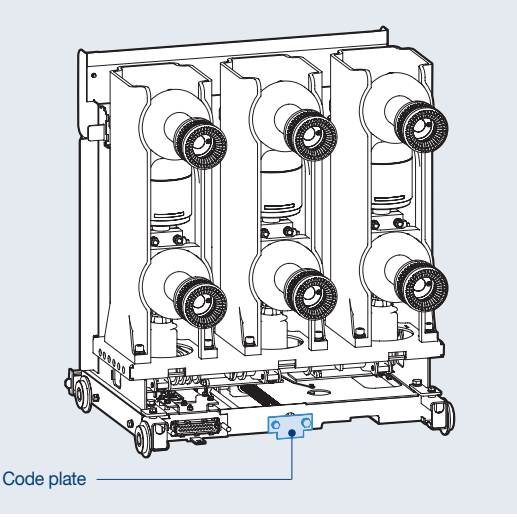


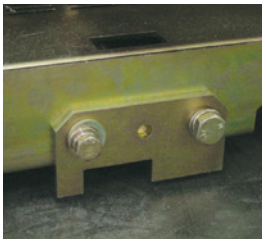
Code plate

Installed inside of a breaker as an option

VH-05/15 type

- When the breaker is inserted to the cradle, if the ratings does not match with the cradle, it mechanically prevents the breaker from being inserted into the cradle.



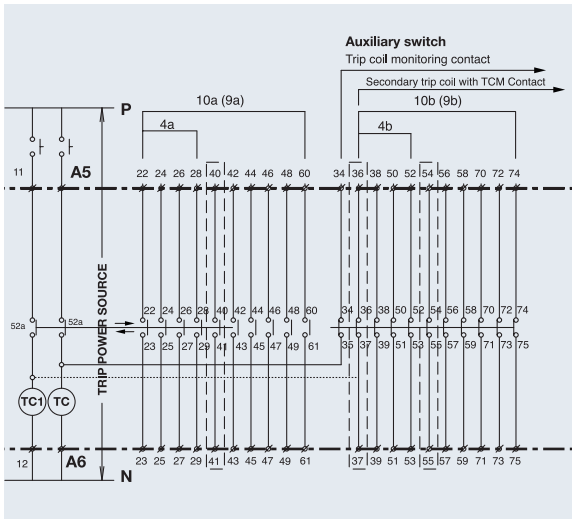


Trip coil monitoring contact

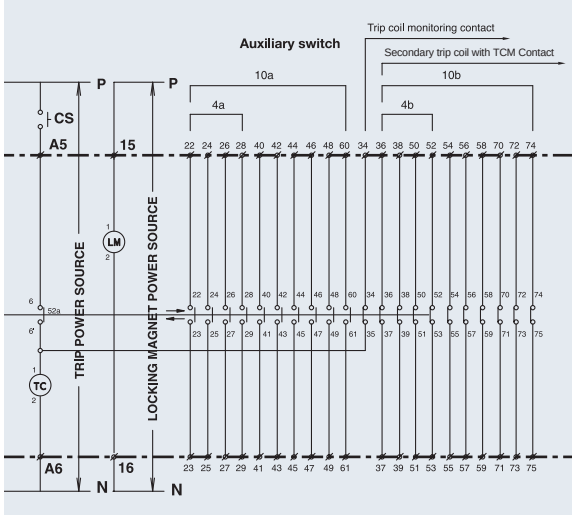
Installed inside of a breaker as an option

UVL type

- Device for monitoring the functions of the trip coils.
- Supplied as standard for VL model and optional for VH model.
- To monitor the trip coils connect its terminals with the trip coil monitoring relay as shown on the circuit diagram.
  - If the trip coil is normal: closed-circuit consisting
  - If the trip coil is damaged: open circuit
  1) Terminals A5 and A6 monitor the trip coils in closed position of the breaker.
  2) Terminal A6 and aux. contact terminal 34 monitor the trip coils in trip position of the breaker.
- Coil Test Unit is opional, which enable monitoring the coils by connecting in parallel with the trip coil operation switch.
- In case of UVL type this contact works with the trip coils such as T1, T2, T3, T4 and T5. For VH/UVH type it works with all trip coils.



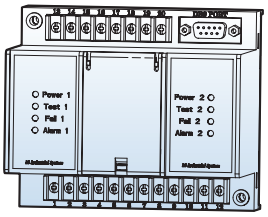
UVH type



Coil Test Unit: CTU

Installed outside of a breaker as an option

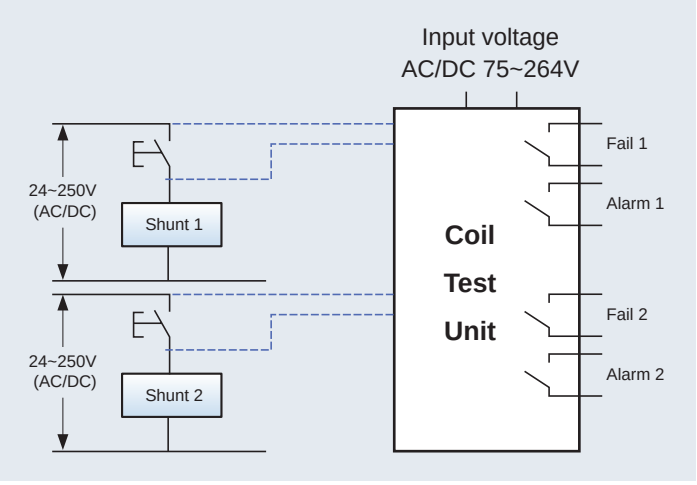
UVL/VH/UVH type

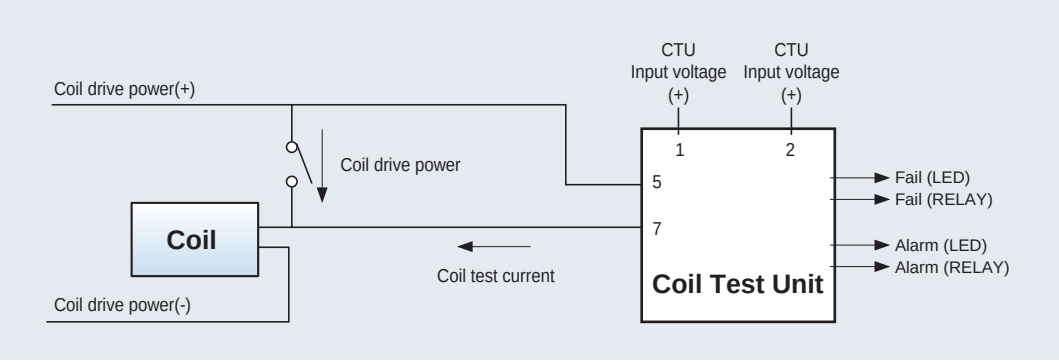


- When no current flows through the coil it gives the test current which does not cause the coil to operate to check whether the coil is disconnected or not.
  - If the test current flows normally: coil normal
  - If the test current does not flow through: coil disconnected

※ **As it is connected in parallel with the control part of the coil the normal operation of the coil is not affected.**
※ **Monitoring of the running coils is not possible.**
※ **One test unit can monitor up to two coils.**

1. Input voltage: AC/DC 75V~264V
2. Contact output
   1) 2×a contacts for Fail indication and 2×a contacts for Alarm
   2) 250Vac/10A Resistive, 30Vdc/10A Resistive
3. Disconnection test cycle is 12 seconds (Test LED blinks)
4. The default operation
   If Fail happens (coil disconnected), Fail LED turns on and the Fail contacts become short state.
   If Fail happens three times in series, Alarm LED turns on and the Alarm contacts become short state.
   In order to clear the Alarm status push up DIP switch on the front and then push down it (Off → On → Off)





Condenser trip device: CTD

Installed outside of a breaker as an option

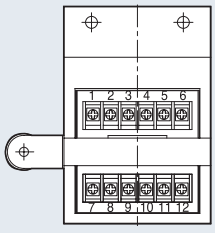
Ratings

Ratings	Specification	
Model	CB - T1	CB - T2
Rated input voltage (V)	AC 100/110	AC 200/220
Frequency (Hz)	50/60	50/60
Rated charge voltage (V)	140/155	280/310
Charging time	Within 10sec.	Within 10sec.
Trip possible time	Within 30sec.	Within 30sec.
Range of Input voltage	85%~110%	85%~110%
Condenser capacity (μF)	1,000	560

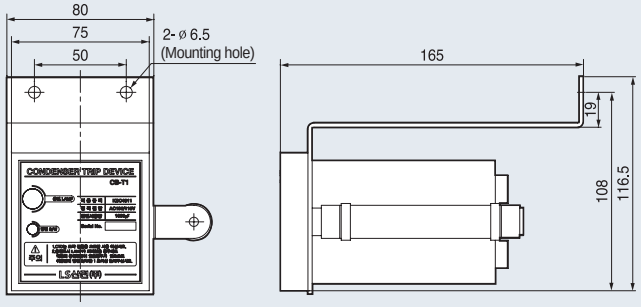
UVL/VH/UVH type

- It gets a circuit breaker tripped electrically within regular time when control power supply is broken down and is used with Shunt coil, SHT. In case there is no DC power, It can be used as the rectifier which supplies DC power to a circuit breaker by rectifying AC power.
- Tripping within 30 seconds on the power failure is possible. However after that automatic trip circuit must be configured separately in the switchgear.

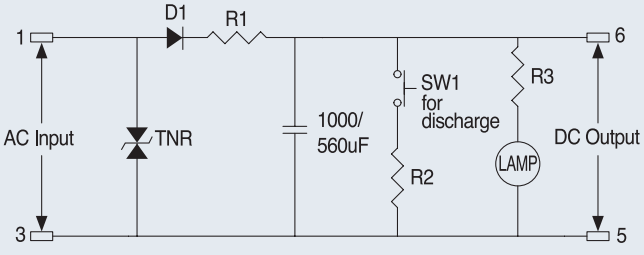
Terminal arrangement



External dimension



Circuit diagram



UVT Time delay: UDC

Installed outside of a breaker as an option

UVL/VH/UVH type

- UVT time delay, UDC is to delay the trip signal from UVT.
  Without UDC the breaker will be tripped instantaneously by the trip signal from UVT installed inside of the breaker even in the the momentary power failure.
- UDC can delay the trip time to avoid this unintended instantaneous trip in the event of such power failure.
- It can be installed on the cradle or inside of the switchgear.
- UDC provides output contacts for indication of trip status due to the UVT coil inside of the breaker.
  b contact is closed at normal state and a contact is closed at trip.

1. Characteristics

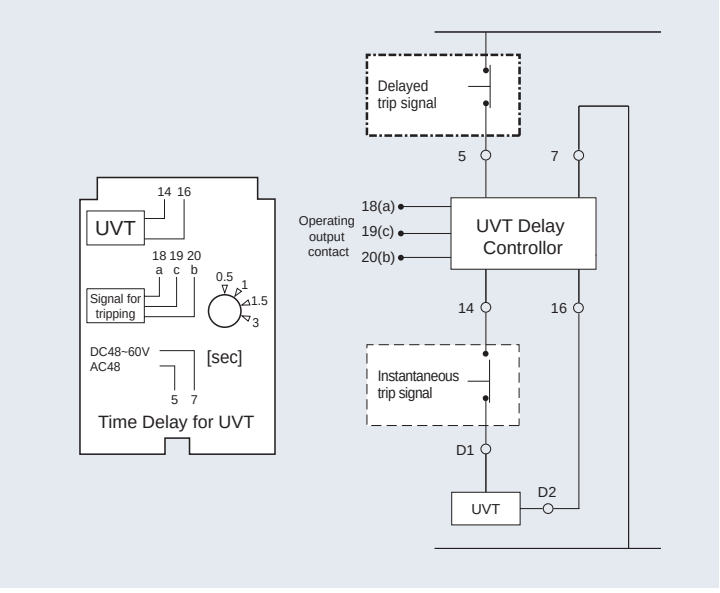
Rated voltage (Vn)		Opration voltage range (V)		Consumption (VA or W)		Time delay (ms)
DC (V)	AC (V)	Pick up	Drop out	Inrush	Steady - state	
48~60	48	0.65~0.85 Vn	0.4~0.65 Vn	200	≤ 5	0.5, 1, 1.5, 3
100~130	100~130					
200~250	200~250					

- Operating voltage ranges are based on the minimum value of each rated voltage (Vn)

2. Ratings of output contacts

Rated voltage (V)	Rated current (A), Resistive load	Max. switching voltage (A)	Max. switching current (A)
24V DC	≤ 12	110V DC 250V AC	15
120V AC	≤ 12		
250V AC	≤ 10		

3. Wiring diagram

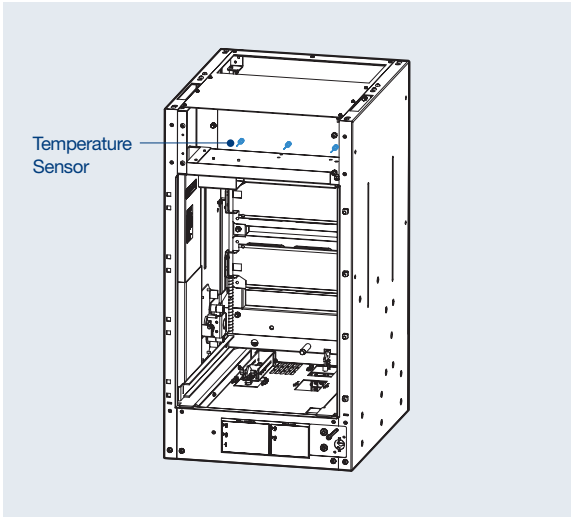


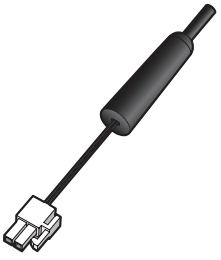
Temperature sensor and monitoring unit: TM

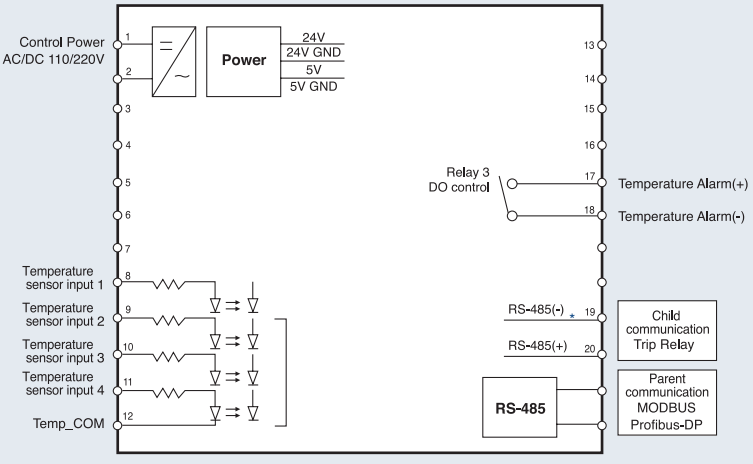
Installed outside of a breaker as an option

UVL/VH/UVH type

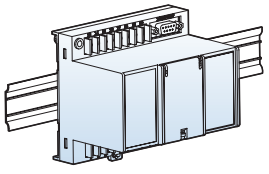
- Temperature Alarm Unit displays the input temperature detected through the temperature sensor installed in H-type cradle.
- Temperature sensor can be installed up to three (R, S, T phase).
- Temperature Alarm Unit converts the temperatures detected from the senser in the cradle and displays the maximum value and can transmit it throug communication.
- If the input temperature is above standard it may cause alarm.
  Temperature Alarm Unit supports Modbus/ RS-485 communication and contact us Profibus-DP communication.

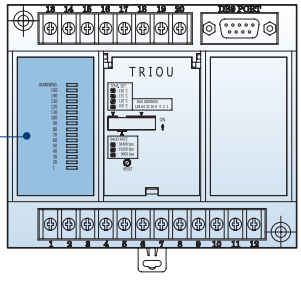




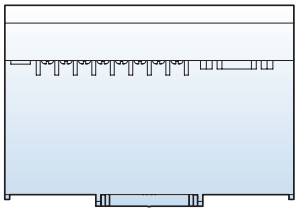


Temperature sensor and monitoring unit





LED temperature display (℃): 10 ~150℃,
Warning
Display maximum value of temperatures



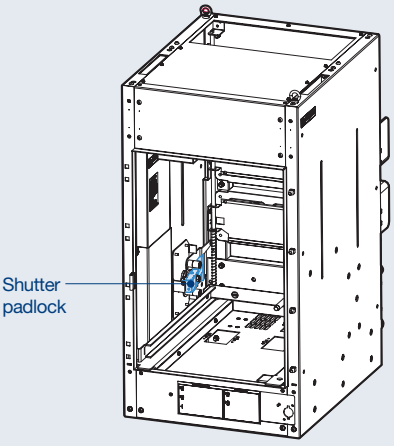
Shutter padlock: AE

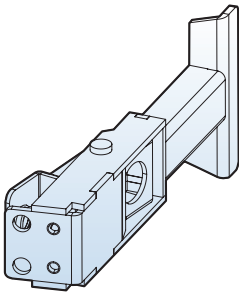
Built-in a cradle as an option

UVL/UVH type

It is the locking device to lock the primary and secondary shutter in closed state for safety while the breaker is drawn out for maintenance.

- When the breaker is drawn in, the shutter is automatically opened.
- There is a hole for padlock to lock the shutter.
- It can be applied only to H type cradle.





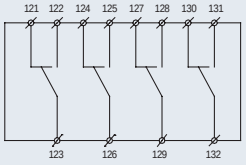
Truck operated cell switch (TOC: AF)

Built-in a cradle as an option

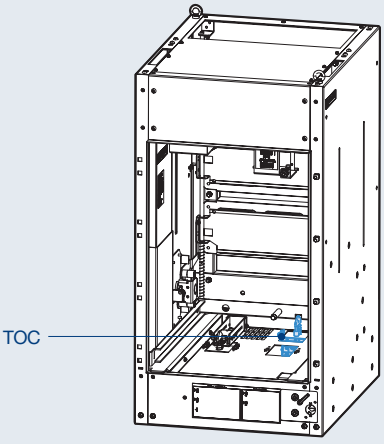
UVL/UVH type

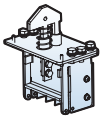
- This auxiliary switch is used to indicate the 'CONNECT' position of VCB. It is installed in the bottom of a H type cradle and operated by the frame of a breaker.
- TOC is consisted of 4 cell switches with changeover contacts as below diagram.

Circuit diagram

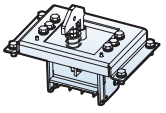


a Contact: 122-123, 125-126, 128-129, 131-132,
b Contact: 121-123, 124-126, 127-129, 130-132





VL type



VH Type

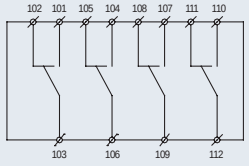
Mechanical Operated Cell Switch (MOC)

Built-in a cradle as an option

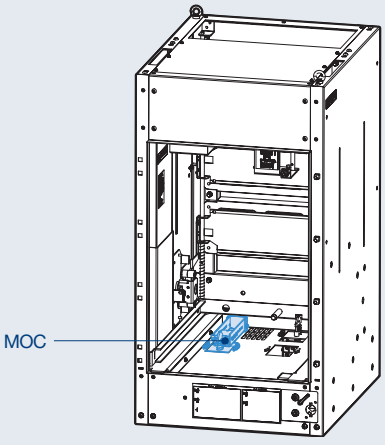
UVL/UVH type

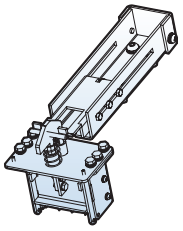
- This auxiliary switch is used to indicate the Close/Trip of VCB. It is operated mechanically at the CONNECT position and installed in the bottom of a H type cradle and operated by the frame of a breaker.
- MOC is consisted of 4 cell switches with changeover contacts as below diagram.

Circuit diagram

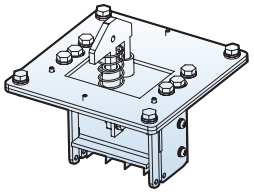


a Contact: 101-103, 104-106, 107-109, 110-112,
b Contact: 102-103, 105-106, 108-109, 111-112





VL type



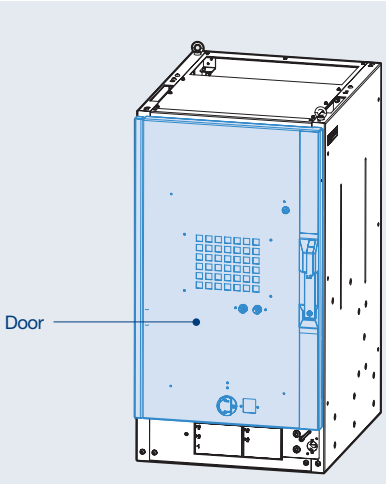
VH Type

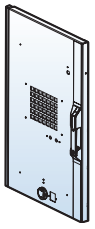
Door: AH

Built-in a cradle as an option

UVL/UVH type

- It is outside door for H type cradle.
- Accessories are available for the door.



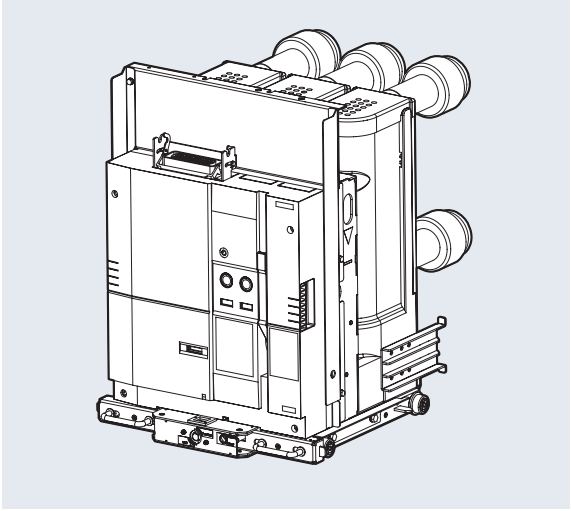


Door Interlock: AJ

Built-in a cradle as an option

UVL/UVH type

- When the Door is installed to H type cradle, this door interlock prevents opening it at CONNECT position.

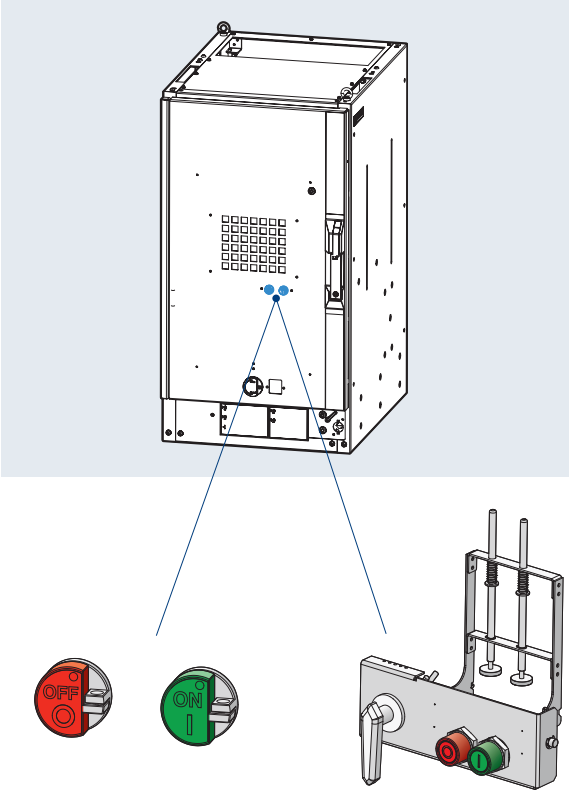


Door Emergency Push button: AK

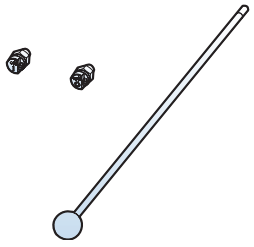
Built-in a cradle as an option

UVL/UVH type

- It is used to enable the Close/Trip of the breaker manually from outside of the door installed to H type cradle during an emergency.
- Push the ON/OFF button by ON/OFF handle supplied seperately.



Door Emergency Push button

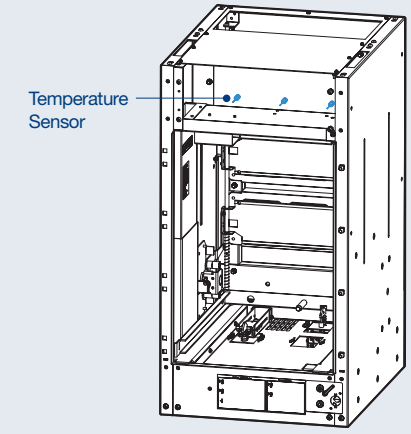


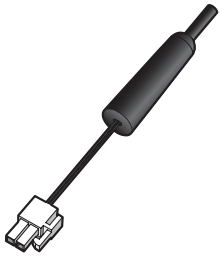
Temperature Sensor: AL

Built-in a cradle as an option

UVL/UVH type

- This sensor is used to detect the temperature in H-type cradle combined with Temperature monitoring unit.
- It can be installed up to three (R, S, T phase).



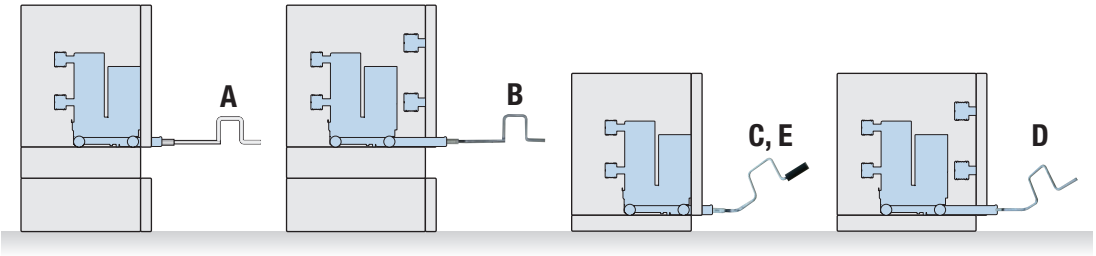


Racking In/Out handle

Susol VCB offers various kinds of handle suitable for each use of types and models. The order can be proceeded with the code below and ordering quantity is flexibly adjustable.

Type	Cradle		Racking in/out handle			Charging handle	
	Type		Code	Appearance	Description	Code	Appearance
UVL	Ha, He, Hf	A	55223172407		Normal type	Not required	
		B	55223172403		Extention type (Normal)		
		C	55223172405		Universal type		
		D	55223172406		Extention type (Universal)		
VH/UVH	Ha, H	E	55213163003		Universal type	55213143006	

Racking in/out handle for cradle

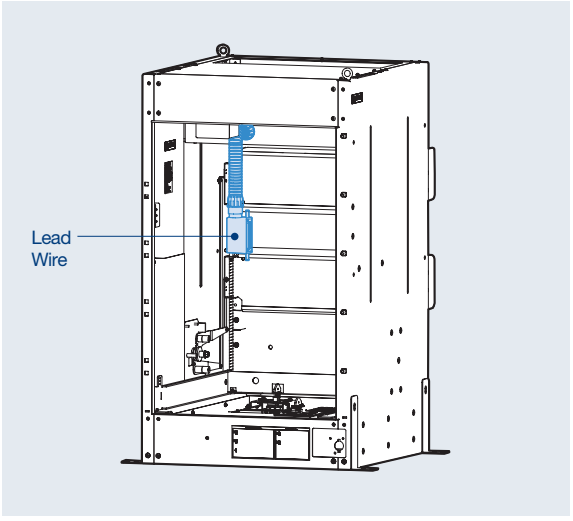


Type H Cradle Lead Wire: AM, AN

Built-in a cradle as an option

UVL/UVH type

- In case of H type breaker of UVL and UVH models the Lead wire is installed in the cradle when supplied.
- 4a4b or 10a10b contacts are selectable according to the auxiliary contact of the breaker. Flame retardant cable is used for 4a4b.

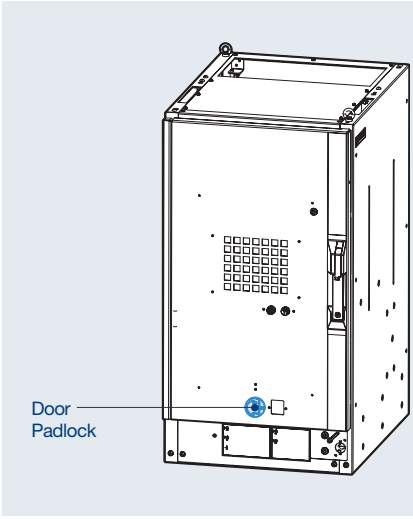


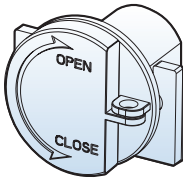
Door Padlock

Built-in a cradle as an option

UVL/UVH type

- It is supplied with a door for H type cradle as standard.
- It can be locked by seperate padlock to prevent entering the maunal handle.



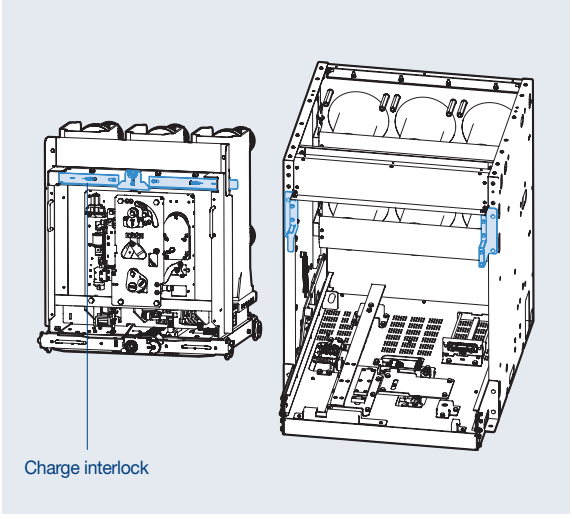


Charge interlock

Installed inside of a breaker as an option

VH-05/15 type

- In case the breaker is drawn-out when the closing spring is charged in the 'Disconnected' position, it prevents the complete withdrawal of the circuit breaker from the housing.

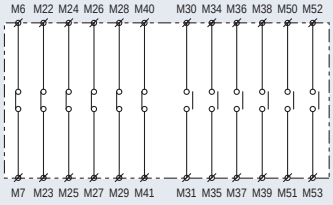


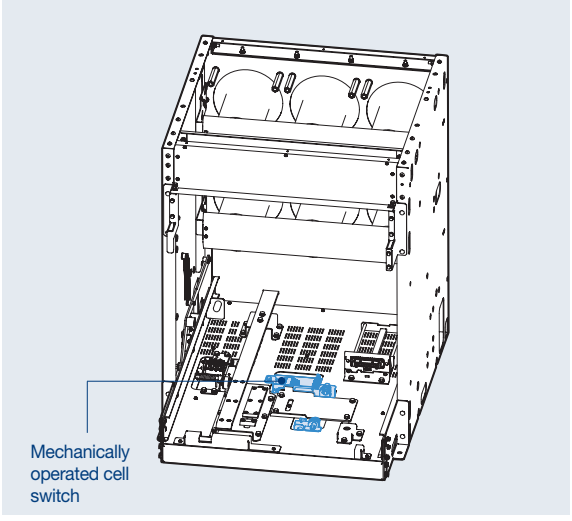
Mechanically operated cell switch (MOC)

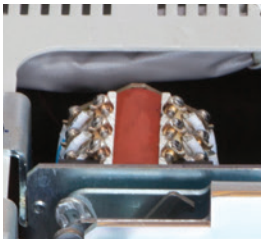
Installed inside of a breaker as an option

VH-05/15 type

- This 6a6b switch indicates the 'ON' or 'OFF' condition of a VCB and is operated in the positions of 'Connected' and 'Test'.
  Below circuit diagram is based on 'OFF' status of VCB.





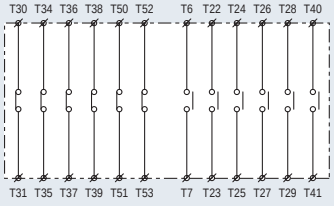


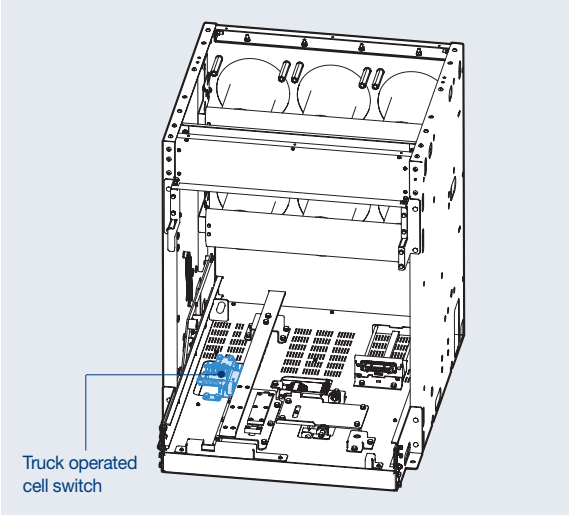
Truck operated cell switch (TOC)

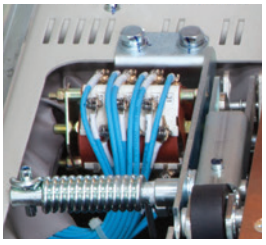
Built-in a cradle as an option

VH-05/15 type

- This 6a6b switch indicates the 'Connected' state of a VCB and is operated by the movement of a VCB frame.
  Below circuit diagram is based on 'Test' status of VCB.



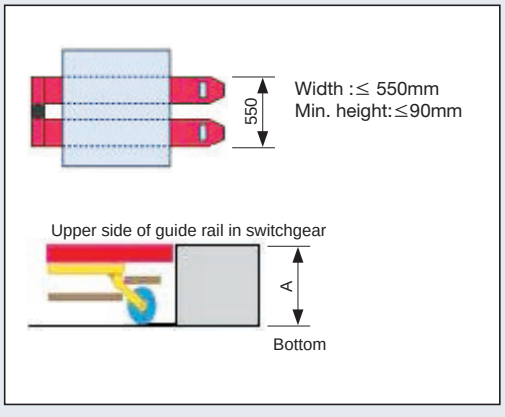




Auxiliary guide frame

- Auxiliary guide frame is provided in order to move safely 36/40.5kV breaker into the switchgear.
- It can be used in combination with the hand pallet which meets the requirement shown below.

Applicable hand pallet



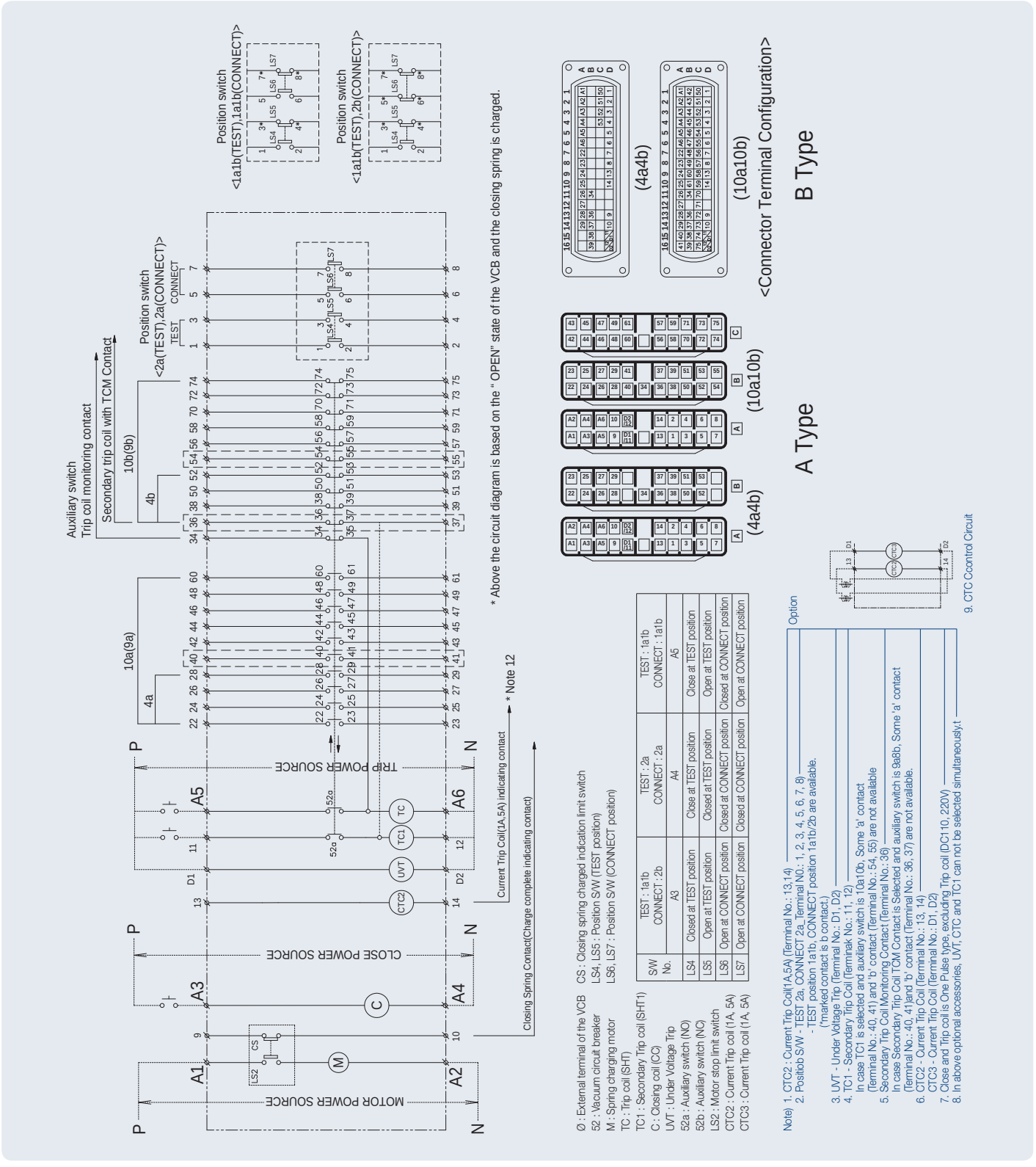
<Fig 1>

If dimension A in Fig. 1 is less than 120mm B type pallet can be used.
In case of more than 120mm C type must be applied.

Control circuit diagram

Susol

UVL-05/15/27



Ø : External terminal of the 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
CTC2 : Current Trip coil (1A, 5A)
CTC3 : Current Trip coil (1A, 5A)

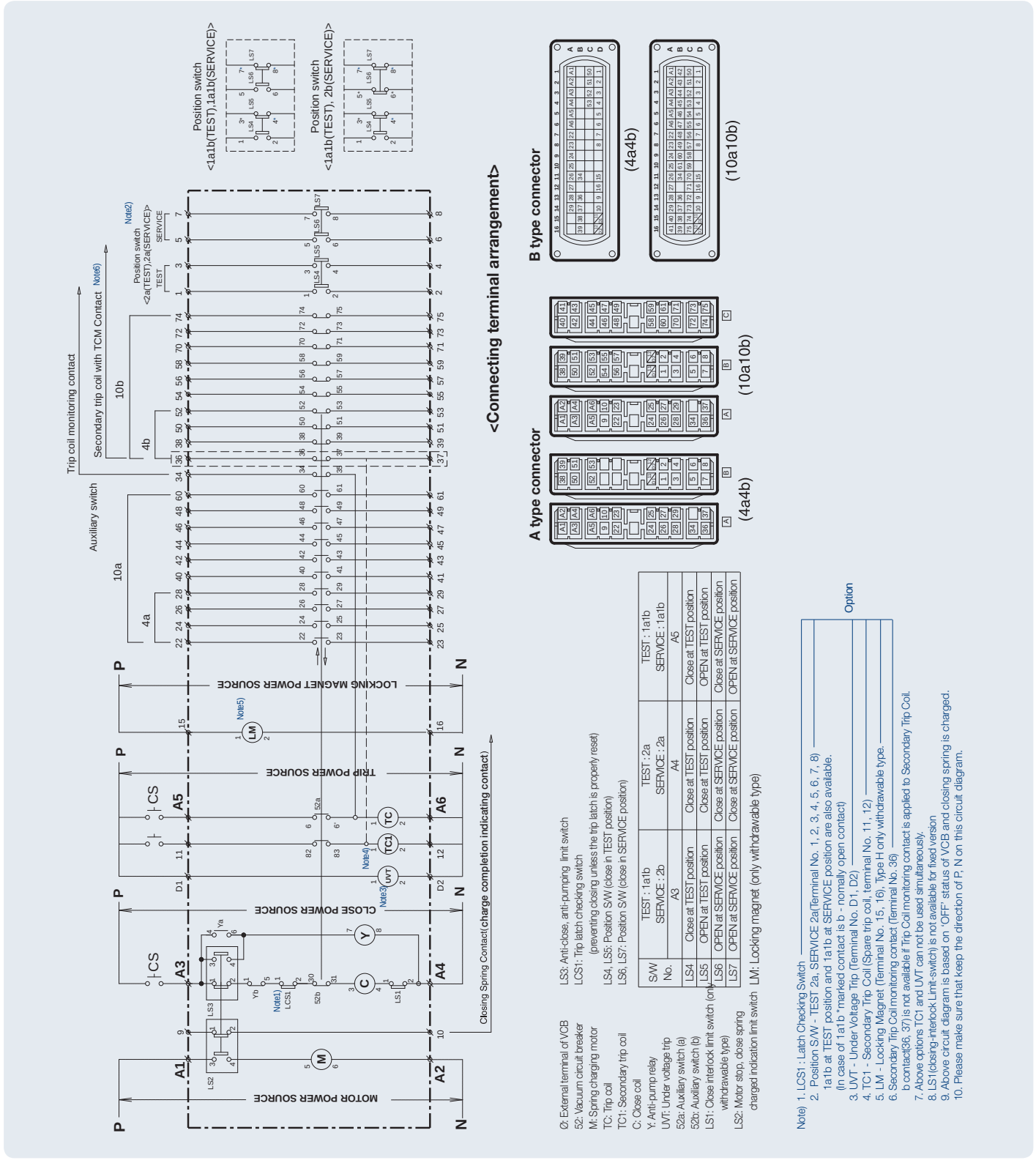
CS : Closing spring charged indication limit switch
LS4, LS5 : Position S/W (TEST position)
LS6, LS7 : Position S/W (CONNECT position)

S/W No.	TEST : 1a1b CONNECT : 2b	TEST : 2a CONNECT : 2a	TEST : 1a1b CONNECT : 1a1b
	A3	A4	A5
LS4	Closed at TEST position	Close at TEST position	Close at TEST position
LS5	Open at TEST position	Closed at TEST position	Open at TEST position
LS6	Open at CONNECT position	Closed at CONNECT position	Closed at CONNECT position
LS7	Open at CONNECT position	Closed at CONNECT position	Open at CONNECT position

Note) 1. CTC2 : Current Trip Coil(1A,5A) (Terminal No.: 13,14)
2. Positiob S/W - TEST 2a, CONNECT 2a, Terminal NO.: 1, 2, 3, 4, 5, 6, 7, 8)
- TEST position 1a1b, CONNECT position 1a1b/2b are available.
(*marked contact is b contact.)
3. UVT - Under Voltage Trip (Terminal No.: D1, D2)
4. TC1 - Secondary Trip Coil (Terminak No.: 11, 12)
In case TC1 is selected and auxiliary switch is 10a10b, Some 'a' contact
(Terminal No.: 40, 41) and 'b' contact (Terminal No.: 54, 55) are not available
5. Secondary Trip Coil Monitoring Contact (Terminal No.: 36)
In case Secondary Trip Coil TCM Contact is Selected and auxiliary switch is 9a8b, Some 'a' contact
(Terminal No.: 40, 41)and 'b' contact (Terminal No.: 36, 37) are not available.
6. CTC2 - Current Trip Coil (Terminal No.: 13, 14)
CTC3 - Current Trip Coil (Terminal No.: D1, D2)
7. Close and Trip coil is One Pulse type, excluding Trip coil (DC110, 220V)
8. In above optional accessories; UVT, CTC and TC1 can not be selected simultaneously.t

Option

UVH-38



Ø: External terminal of VCB
52: Vacuum circuit breaker
M: Spring charging motor
TC: Trip coil
TC1: Secondary trip coil
C: Close coil
Y: Anti-pump relay
UVT: Under voltage trip
52a: Auxiliary switch (a)
52b: Auxiliary switch (b)
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)
LS4, LS5: Position S/W (close in TEST position)
LS6, LS7: Position S/W (close in SERVICE position)

S/W No.	TEST : 1a1b SERVICE : 2b	TEST : 2a SERVICE : 2a	TEST : 1a1b SERVICE : 1a1b
	A3	A4	A5
LS4	Close at TEST position	Close at TEST position	Close at TEST position
LS5	OPEN at TEST position	Close at TEST position	OPEN at TEST position
LS6	OPEN at SERVICE position	Close at SERVICE position	Close at SERVICE position
LS7	OPEN at SERVICE position	Close at SERVICE position	OPEN at SERVICE position

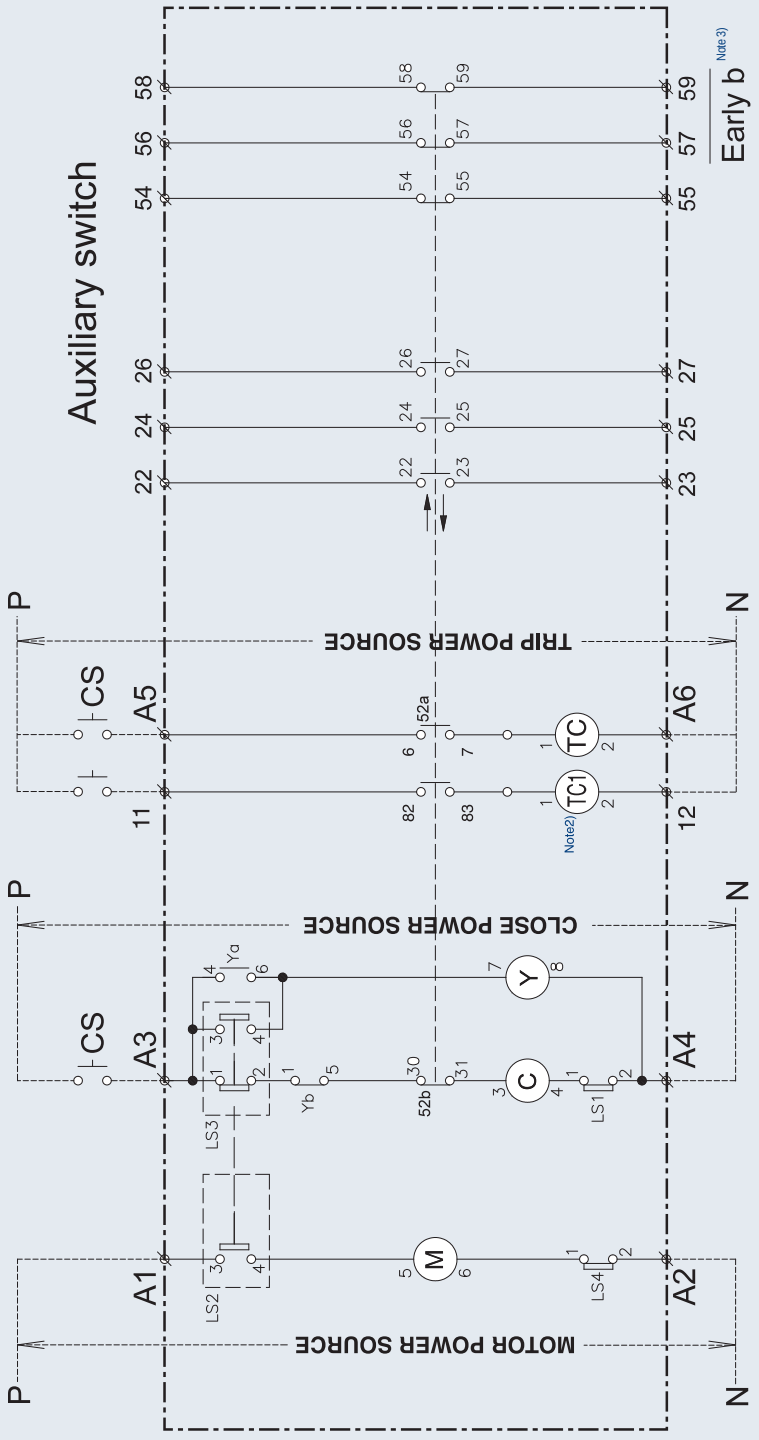
LM: Locking magnet (only withdrawable type)

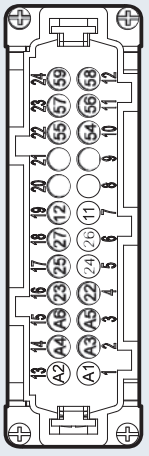
Note) 1. LCS1 : Latch Checking Switch
2. Position S/W - TEST 2a, SERVICE 2a(Terminal No. 1, 2, 3, 4, 5, 6, 7, 8)
1a1b at TEST position and 1a1b at SERVICE position are also available.
(In case of 1a1b * marked contact is b - normally open contact)
3. UVT - Under Voltage Trip (Terminal No. D1, D2)
4. TC1 - Secondary Trip Coil (Spare trip coil, terminal No. 11, 12)
5. LM - Locking Magnet (Terminal No. 15, 16), Type H only withdrawable type.
6. Secondary Trip Coil monitoring contact (Terminal No. 36)
b contact(36, 37) is not available if Trip Coil monitoring contact is applied to Secondary Trip Coil.
7. Above options TC1 and UVT can not be used simultaneously.
8. LS1(closing-interlock Limit-switch) is not available for fixed version
9. Above circuit diagram is based on 'OFF' status of VCB and closing spring is charged.
10. Please make sure that keep the direction of P, N on this circuit diagram.

Option

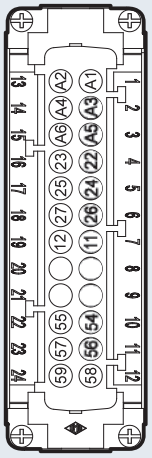
Control circuit diagram

VH-05/15





SECONDARY DISCONNECT WIRING
(FRONT VIEW OF RECEPTACLE PLUG, VCB)



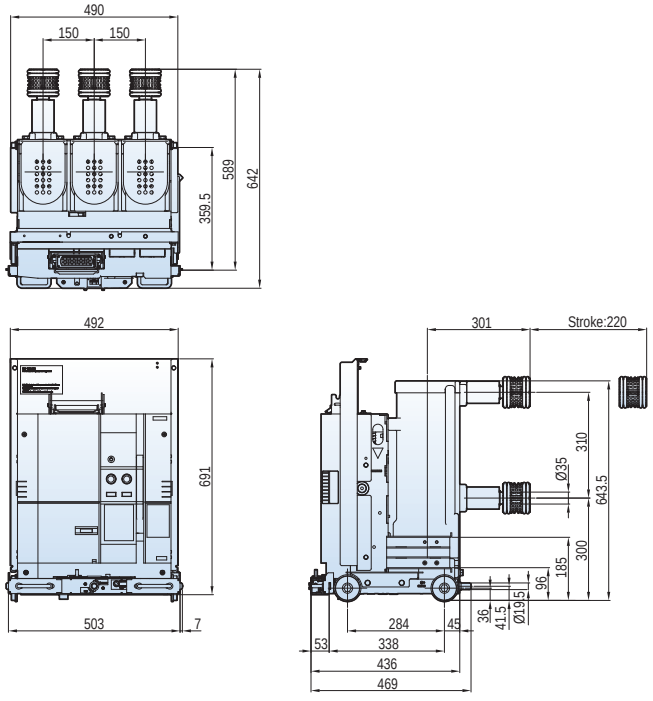
SECONDARY DISCONNECT WIRING
(FRONT VIEW OF TAP PLUG, CRADLE)

Ø : External terminal of VCB
52 : Vacuum circuit breaker
M : Spring charging motor
TC : Trip coil
TC1 : Secondary trip coil(Option)
C : Closing coil
Y : Anti-pump relay
52a : Auxiliary switch (NO)
52b : Auxiliary switch (NC)
LS1 : Close interlock limit switch
LS2 : Motor stopping limit switch
LS3 : Anti-closing, Anti-pumping limit swich
LS4 : Motor charging interlock limit swich

Note) 1. Above circuit diagram is based on 'OFF' status of VCB and closing spring is charged.
2. TC1(Option) - Secondary Trip Coil(Spare trip coil, terminal No.11,12)
3. Two(2) "Early b" auxiliary contact is provided.(Terminal No.56-57, 58-89)
4. Please follow direction of P,N marked in the above circuit diagram.

4.76/15kV, 25/31.5kA, 1200A

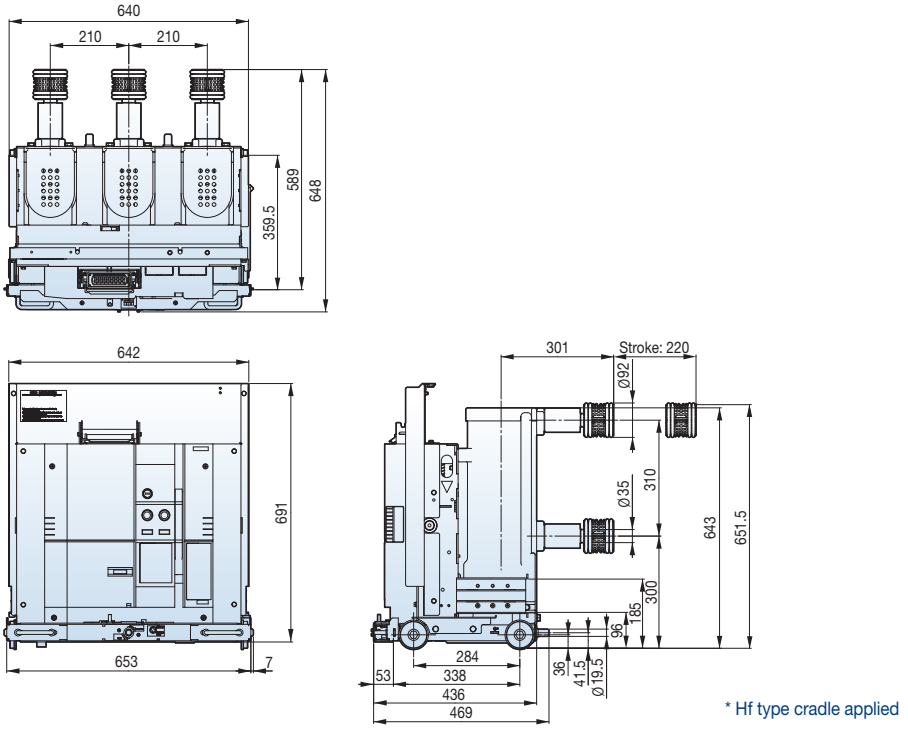
Withdrawable (H type unit, phase distance 150mm)



* Ha, Hf type cradle applied

4.76/15kV 25/31.5kA 1200A

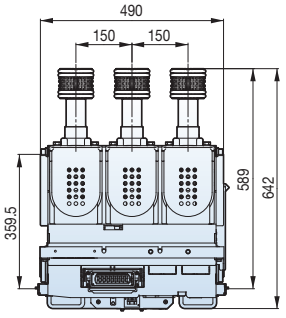
Withdrawable (H type unit, phase distance 210mm)

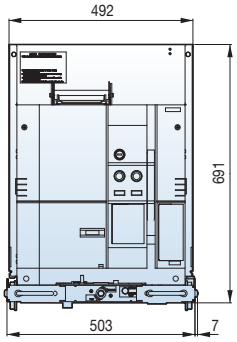


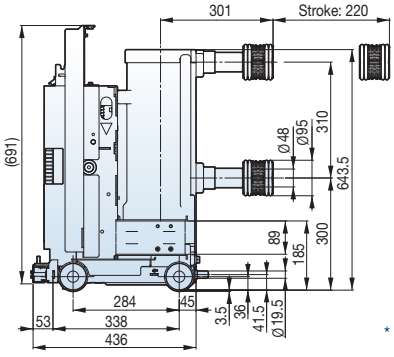
* Hf type cradle applied

4.76/15kV 25/31.5kA 1200A

Withdrawable (H type unit, phase distance 150mm)

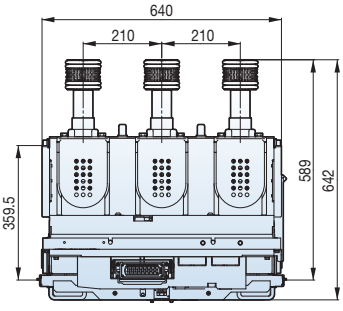


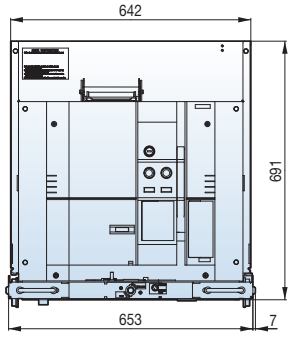


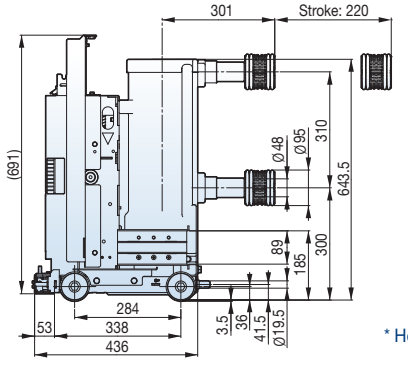


* He type cradle applied

Withdrawable (H type unit, phase distance 210mm)



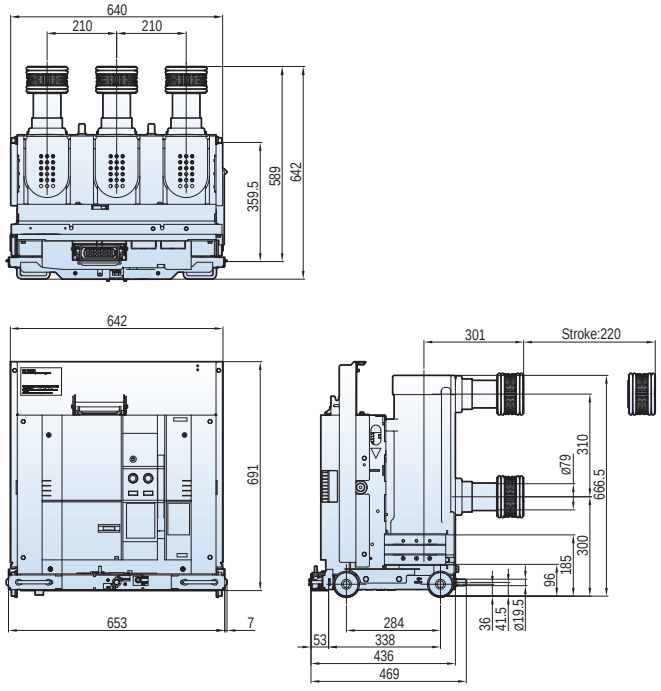




* He type cradle applied

4.76/15kV, 25/31.5kA, 2000A

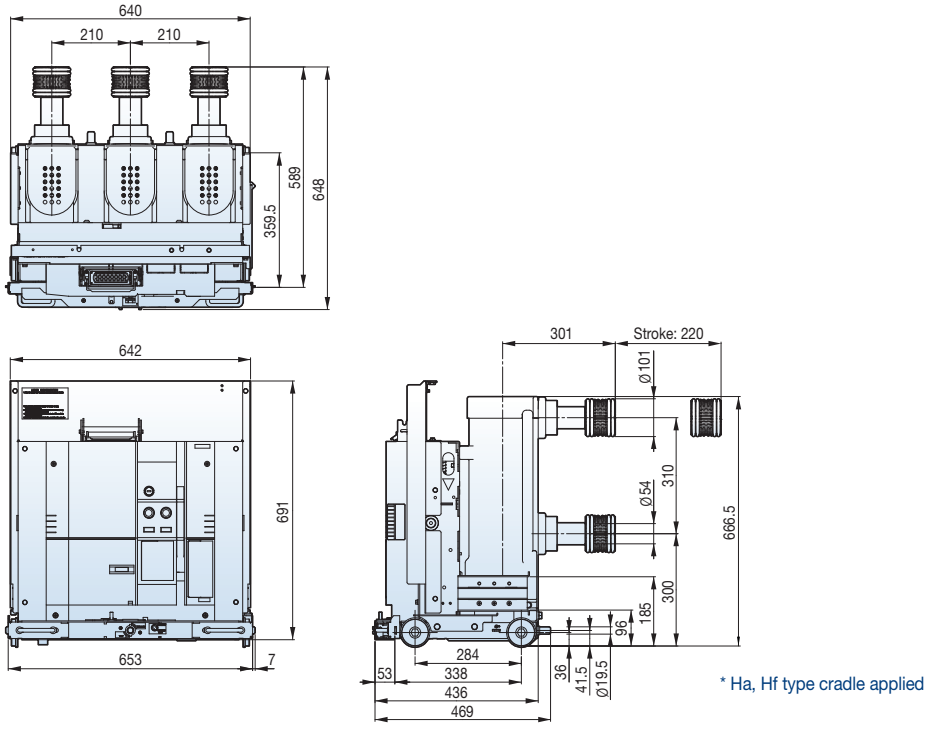
Withdrawable (H type unit, phase distance 210mm)



* He type cradle applied

4.76/15kV 25/31.5kA 2000A

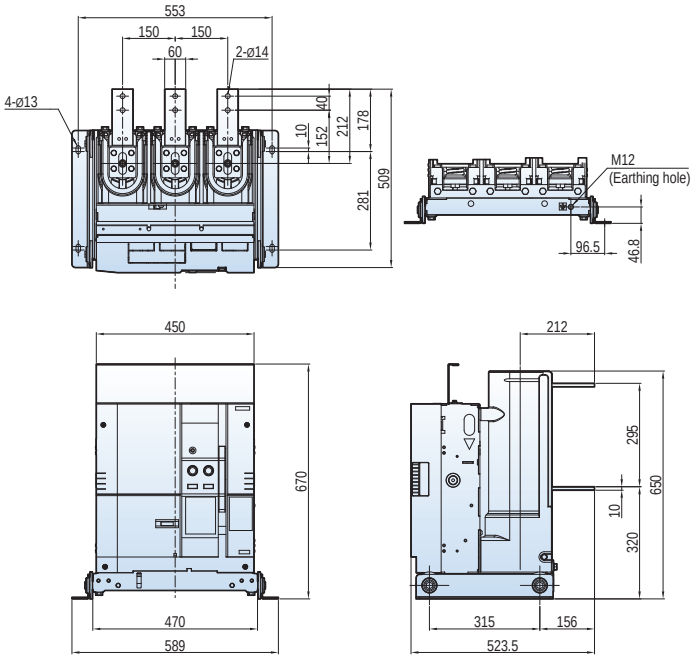
Withdrawable (H type unit, phase distance 210mm)



* Ha, Hf type cradle applied

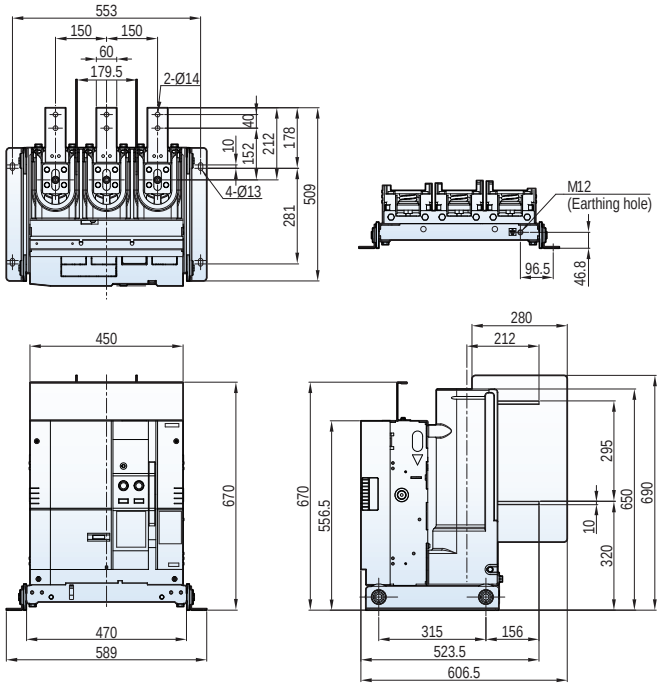
4.76kV, 25/31.5kA, 1200A

Fixed (P type, Phase distance 150mm)



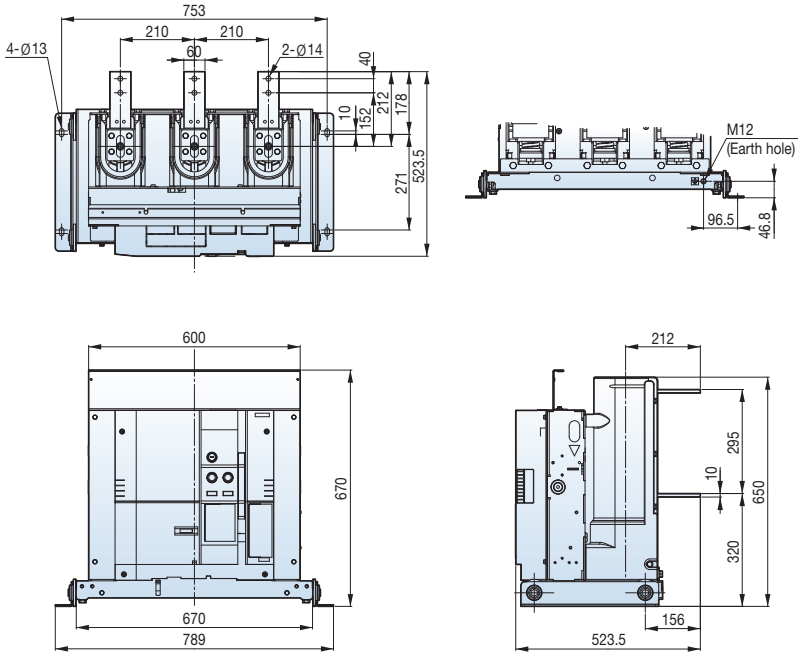
15kV, 25/31.5kA, 1200A

Fixed (P type, Phase distance 150mm)



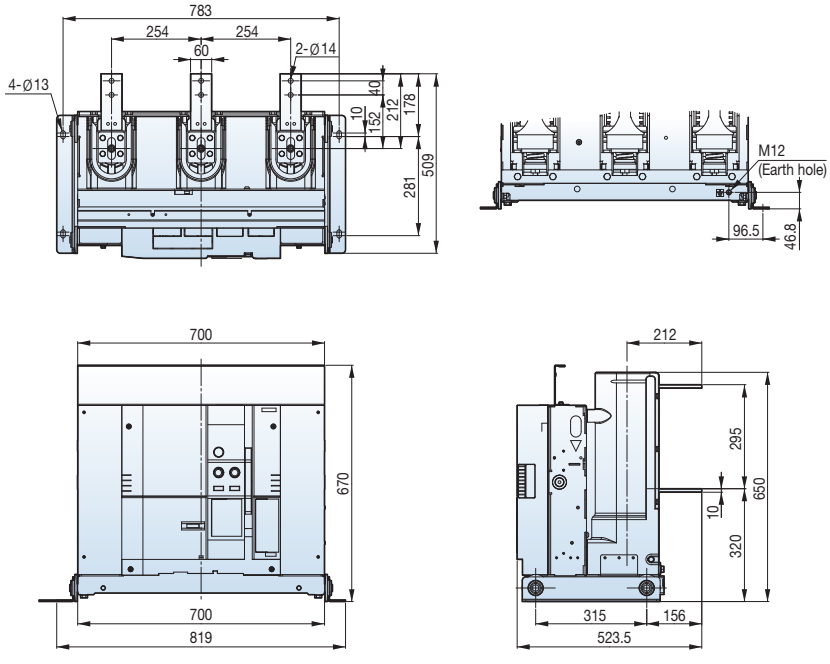
4.76/15kV 25/31.5kA 1200A

Fixed (P type, Phase distance 210mm)



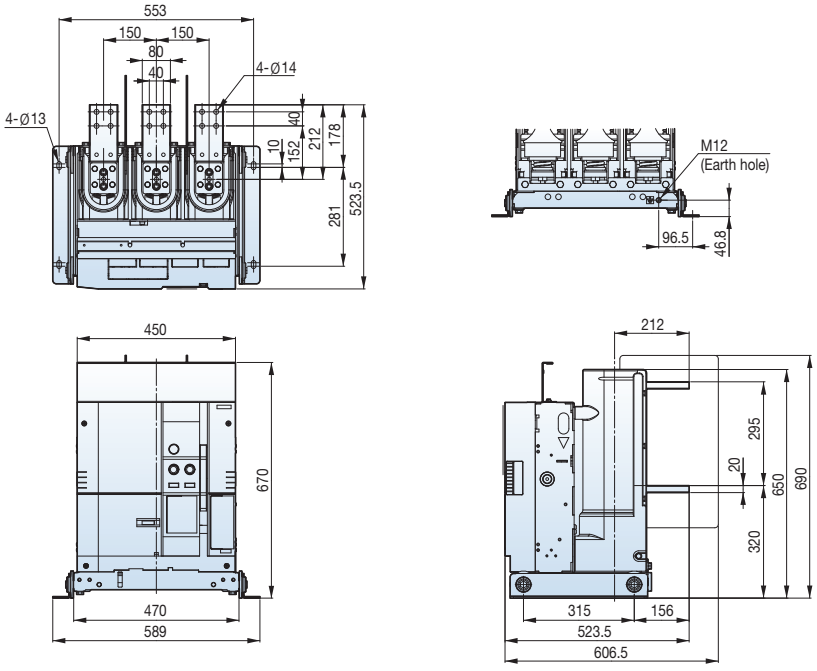
4.76/15kV 25/31.5kA 1200A

Fixed (P type, Phase distance 254mm)



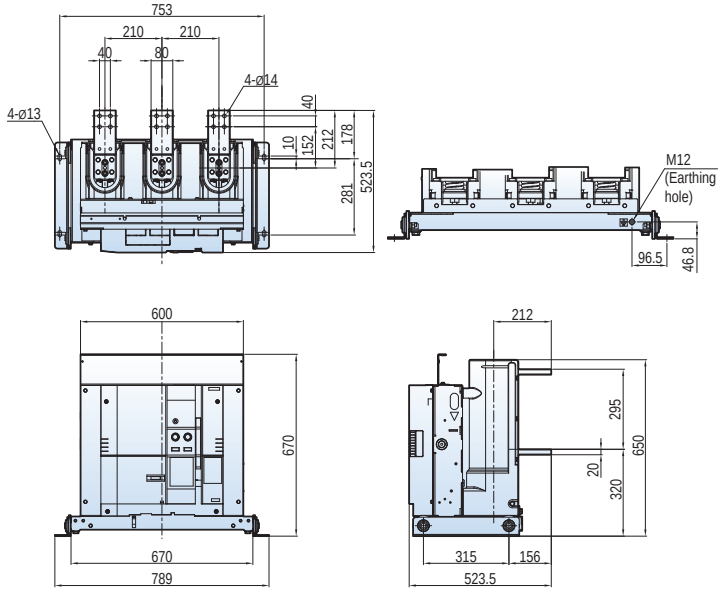
4.76/15kV 25/31.5kA 2000A

Fixed (P type, Phase distance 150mm)



4.76kV, 25/31.5kA, 2000A

Fixed (P type, Phase distance 210mm)



15kV, 25/31.5kA, 2000A

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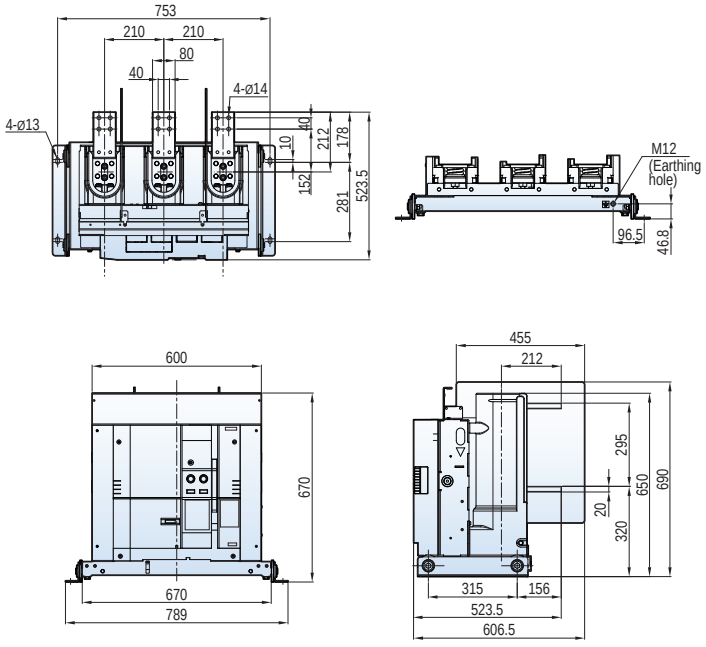
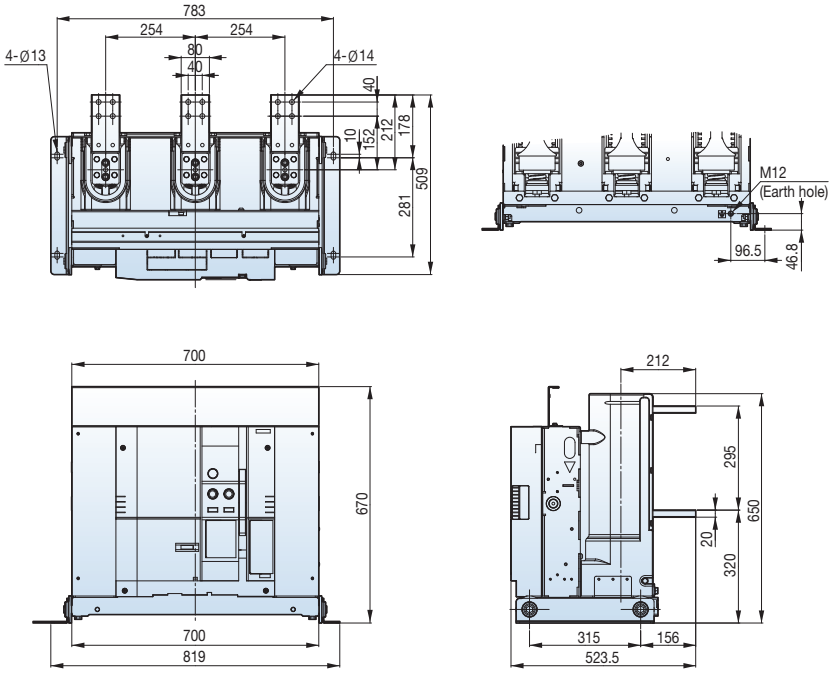


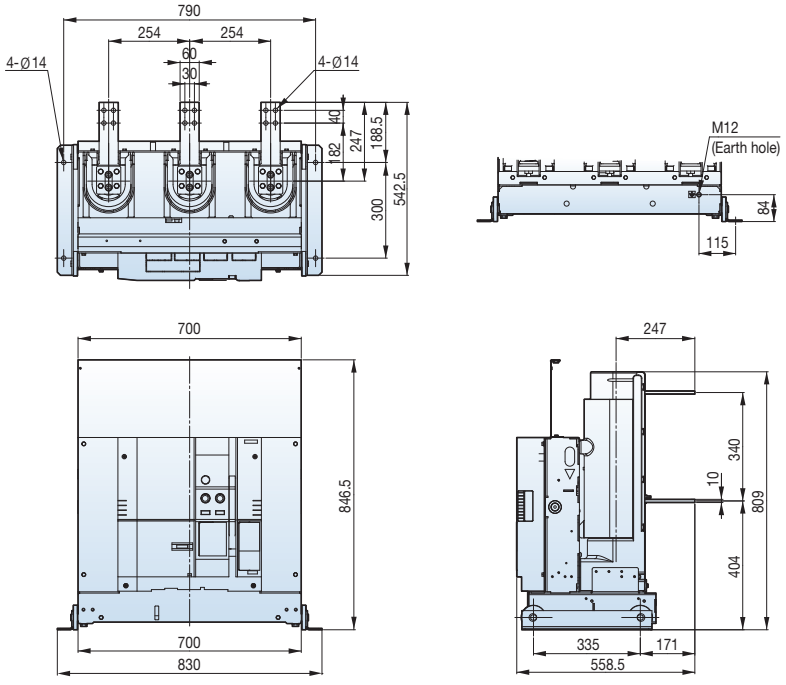
4.76/15kV, 25/31.5kA, 2000A

Fixed (P type, Phase distance 254mm)



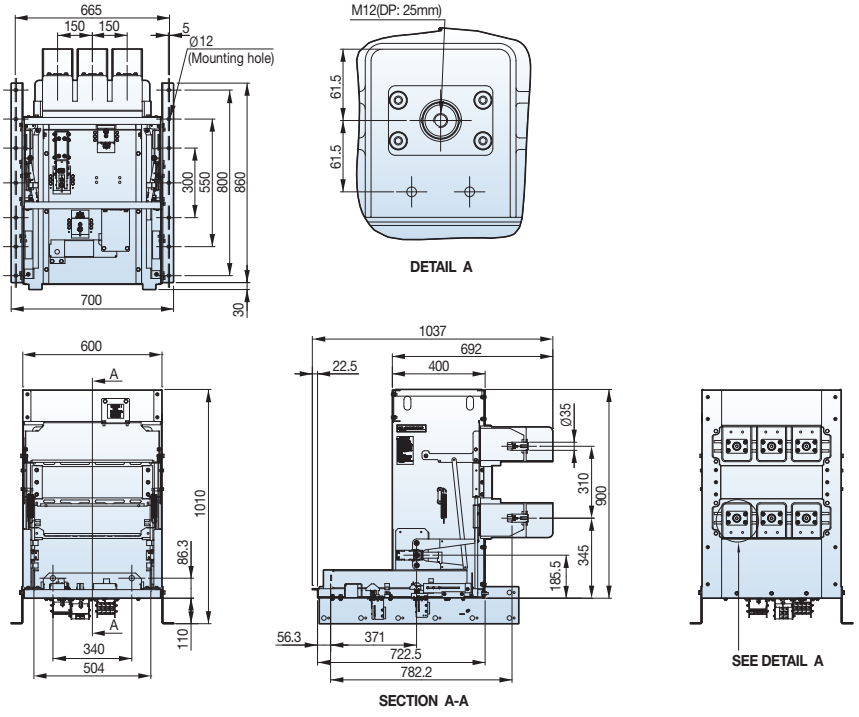
27kV 25kA 1200A

Fixed (P type, Phase distance 254mm)



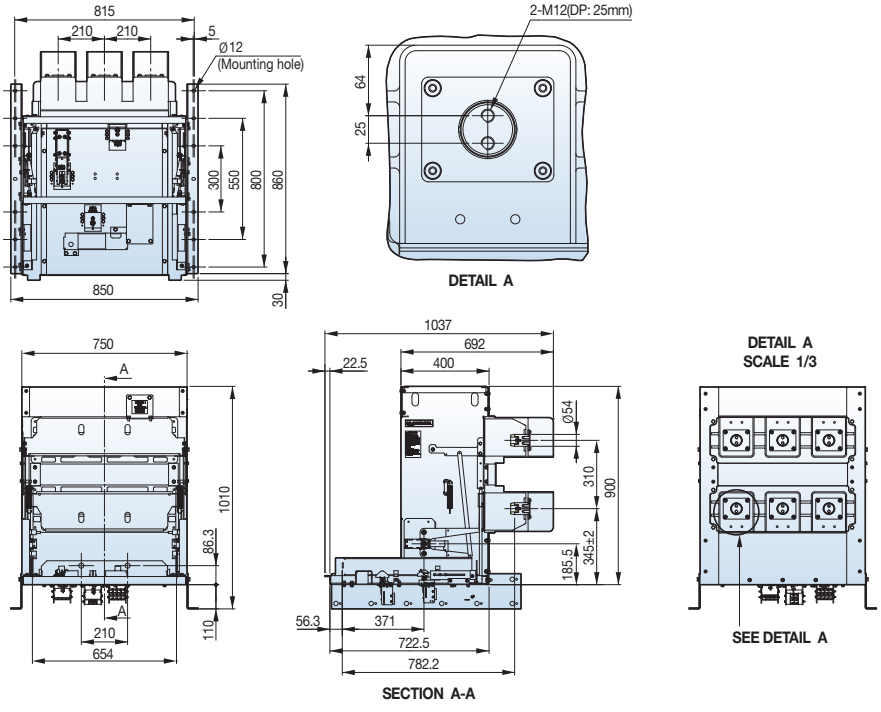
4.76/15kV 25/31.5kA 1200A

Withdrawable (Ha type cradle, phase distance 150mm)



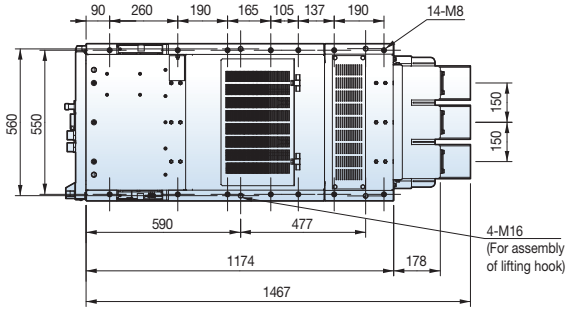
4.76/15kV 25/31.5kA 2000A

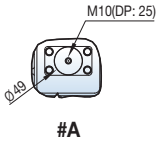
Withdrawable (Ha type cradle, phase distance 210mm)

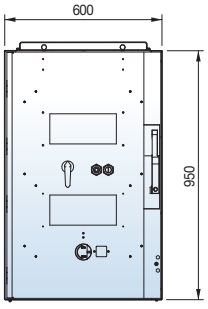


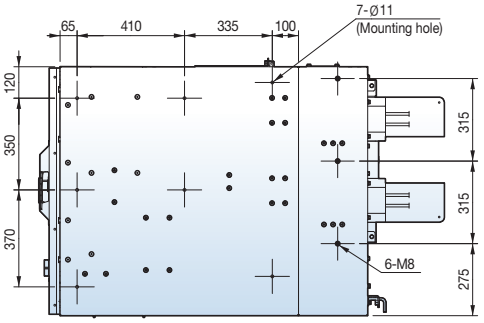
4.76/15kV 25/31.5kA 1200A

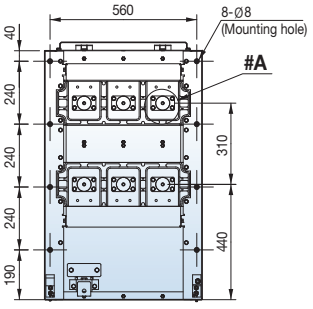
Withdrawable (He type cradle, Arc, phase distance 150mm)

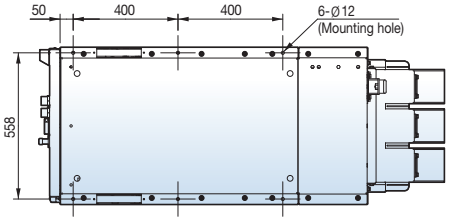






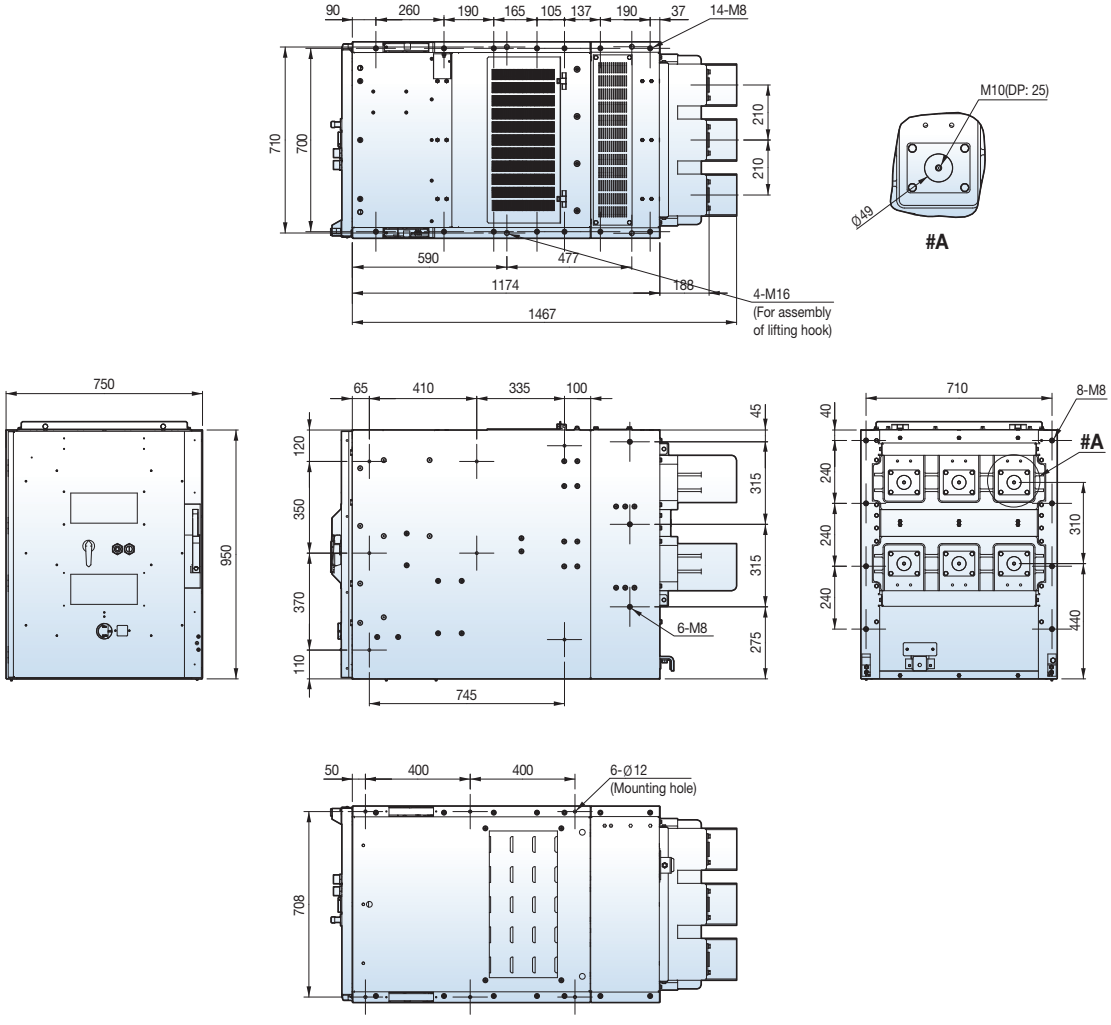






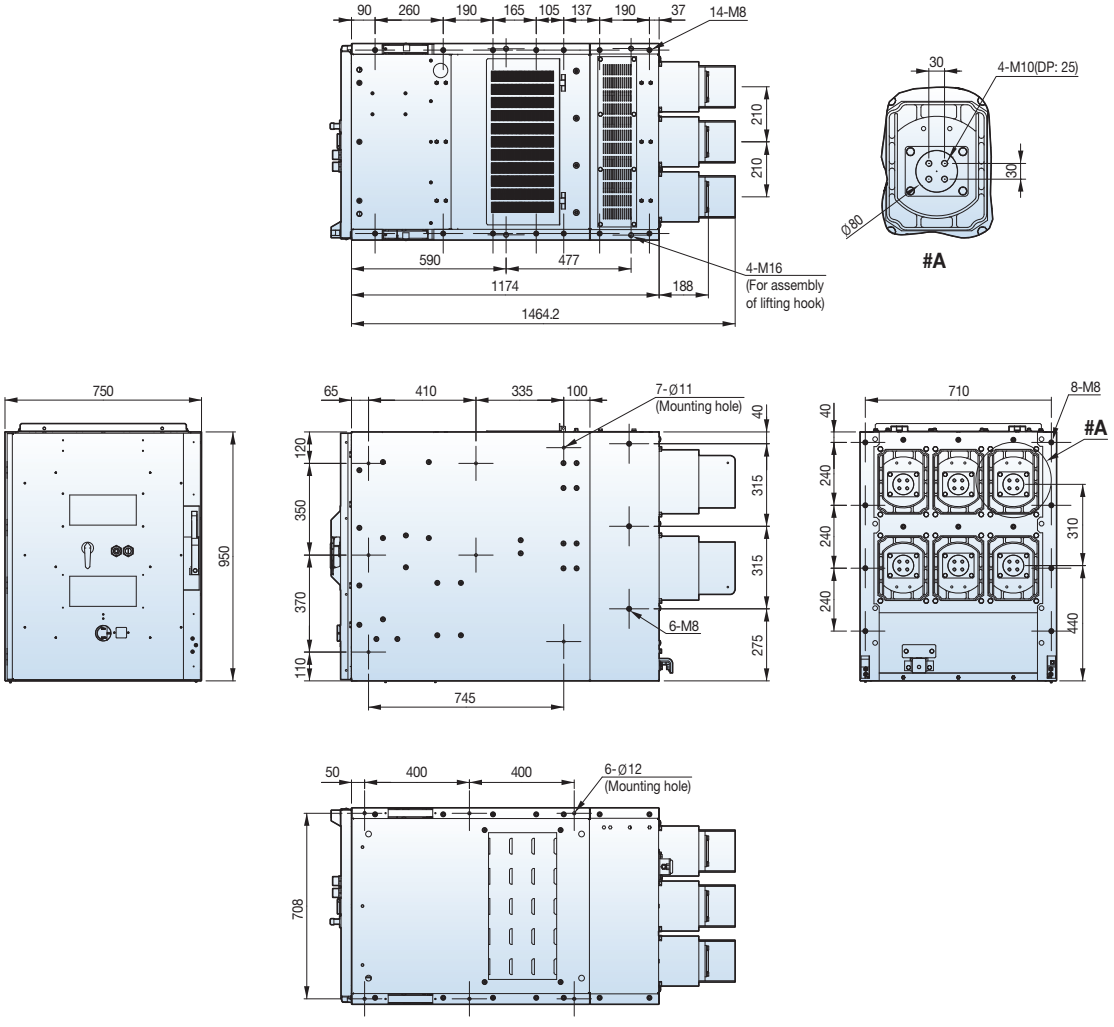
4.76/15kV 25/31.5kA 1200A

Withdrawable (He type cradle, Arc, phase distance 210mm)



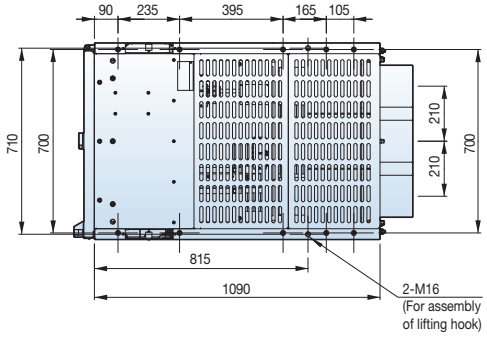
4.76/15kV 25/31.5kA 2000A

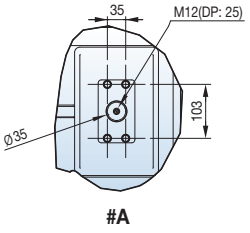
Withdrawable (He type cradle, Arc, phase distance 210mm)

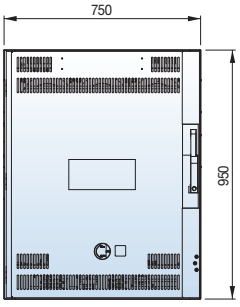


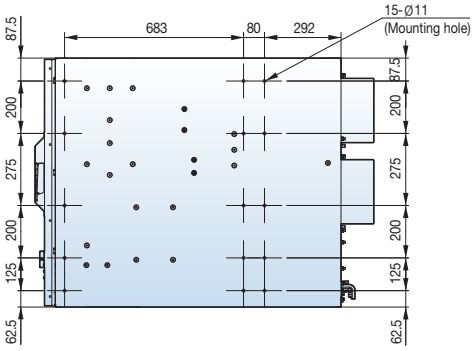
4.76/15kV 25/31.5kA 1200A

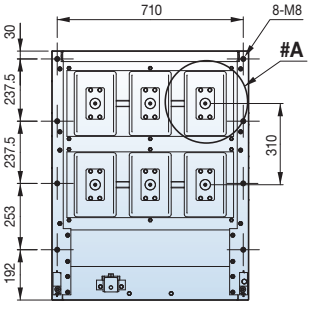
Withdrawable (Hf type cradle, Non-Arc , phase distance 210mm)

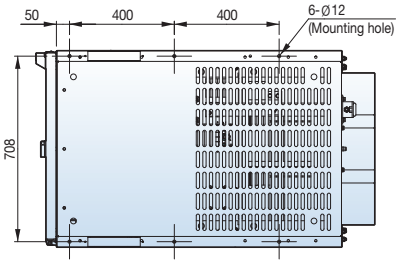






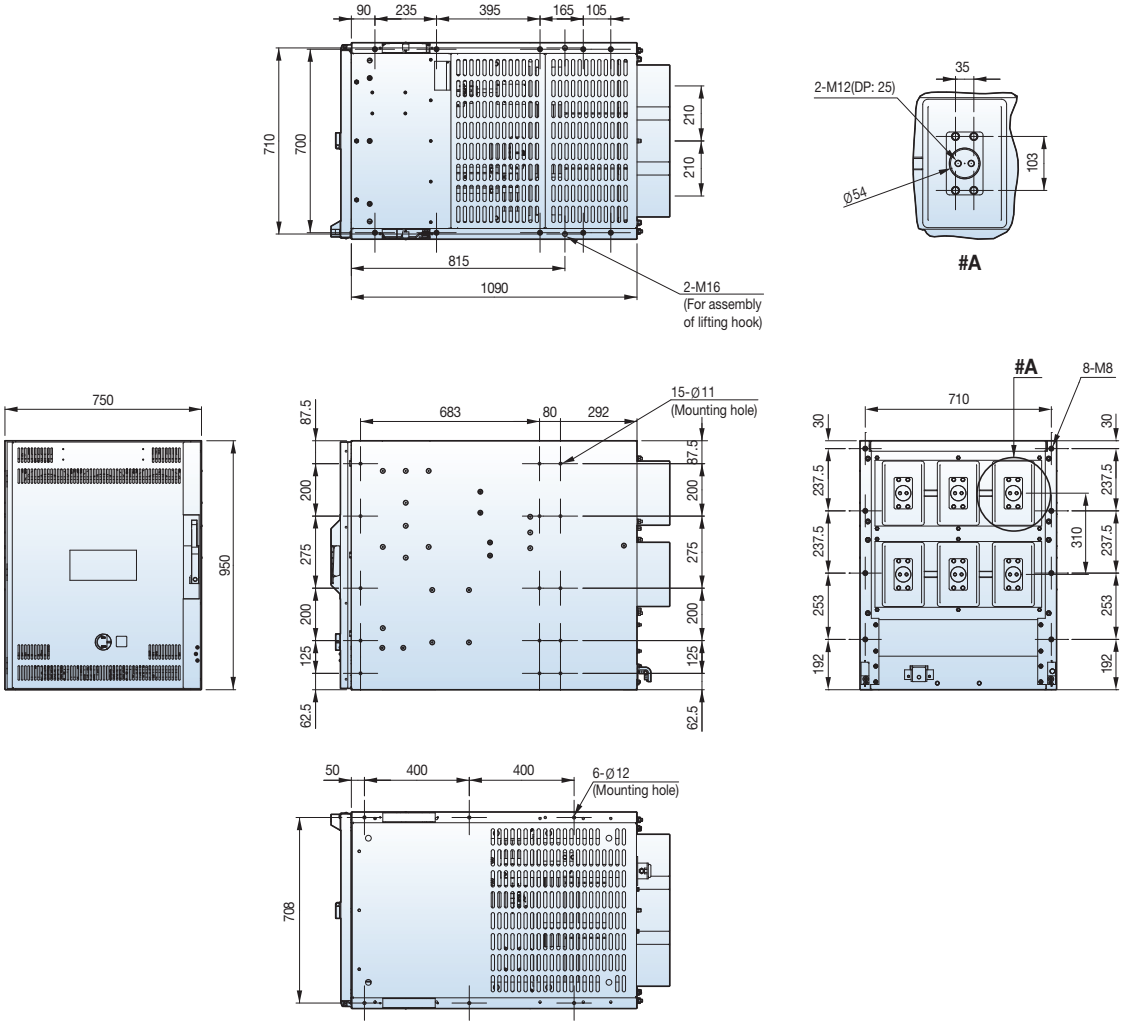






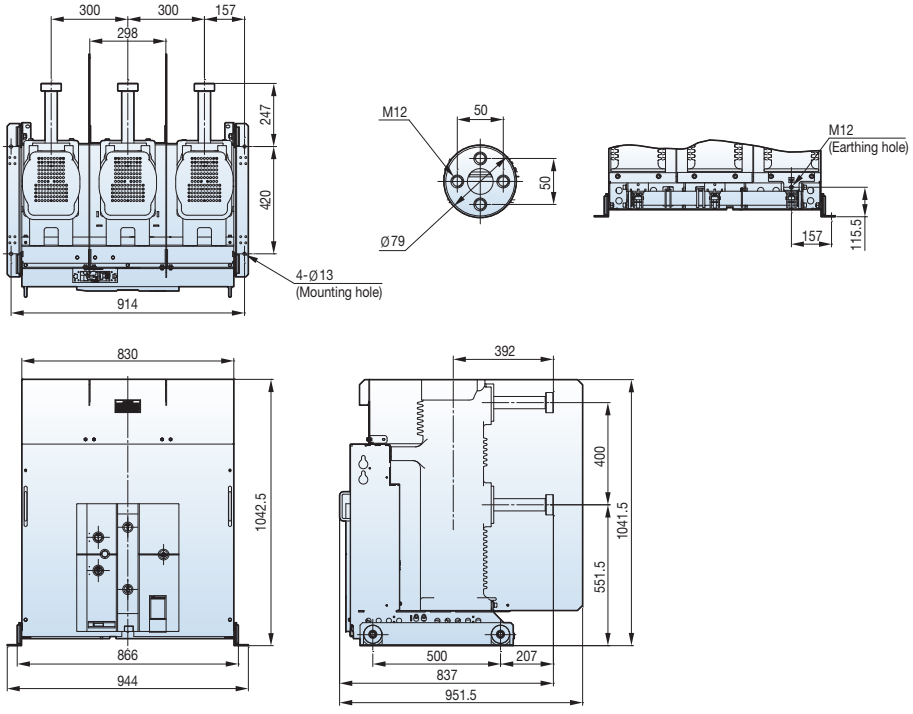
4.76/15kV 25/31.5kA 2000A

Withdrawable (Hf type cradle, Non-Arc , phase distance 210mm)

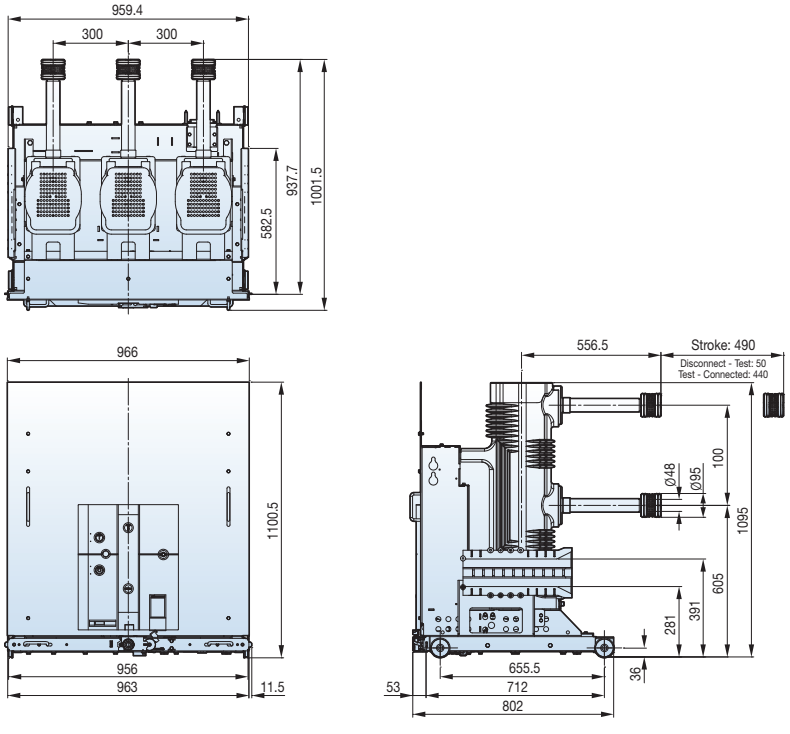


38kV 31.5/40kA 1200/2000A

Fixed (P type, Phase distance 300mm)

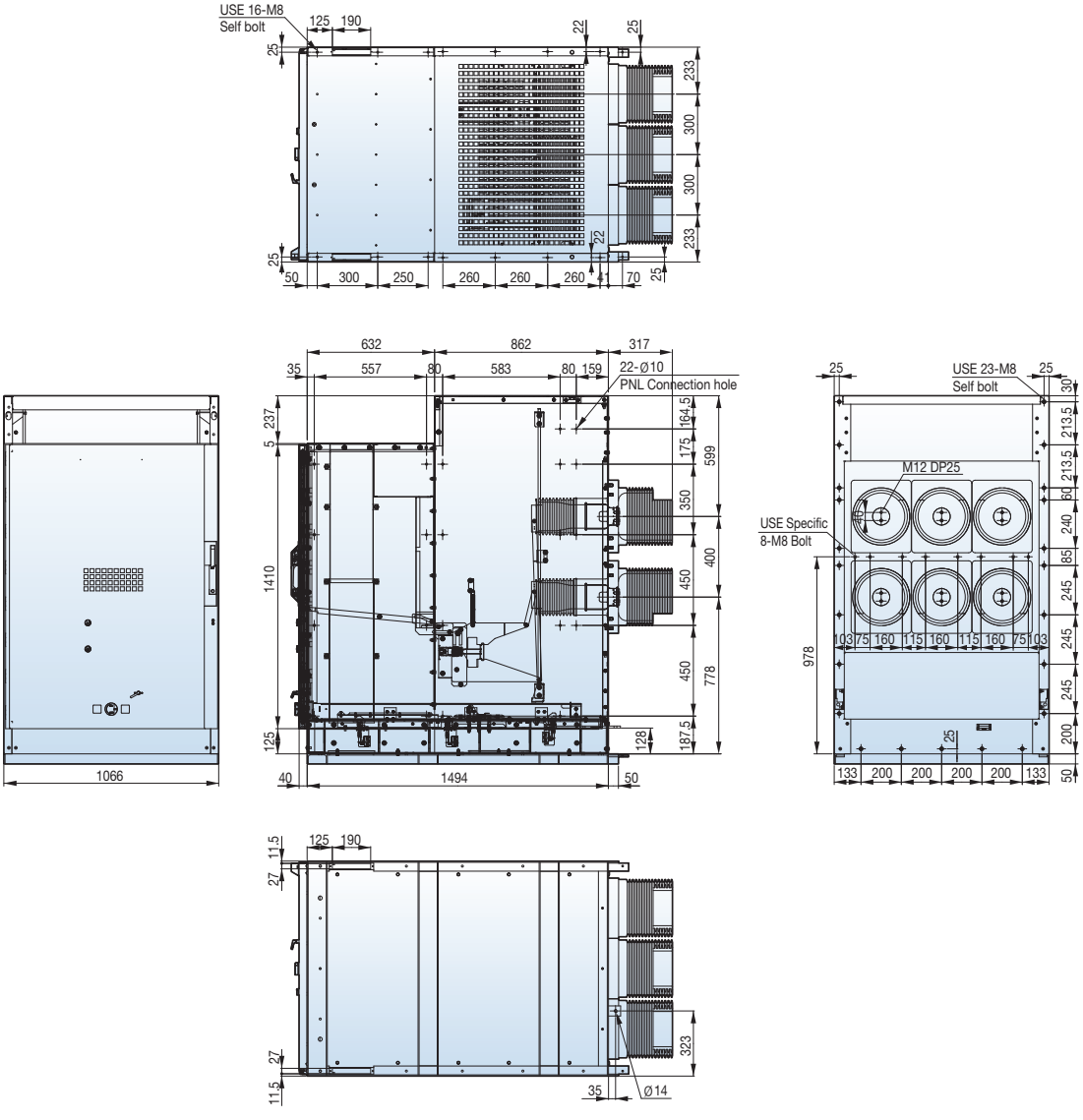


Withdrawable (H type unit, phase distance 300mm)



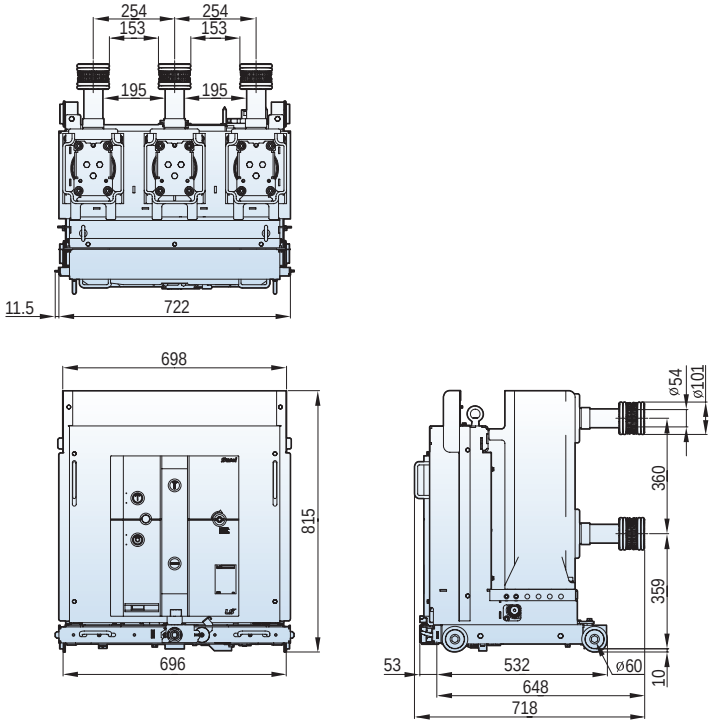
38kV 31.5/40kA 1200/2000A

Withdrawable (H type cradle, phase distance 300mm)



4.76/15kV, 40/50kA, 1200/2000A

Withdrawable (H type unit, phase distance 254mm)



4.76/15kV, 40/50kA, 3000A

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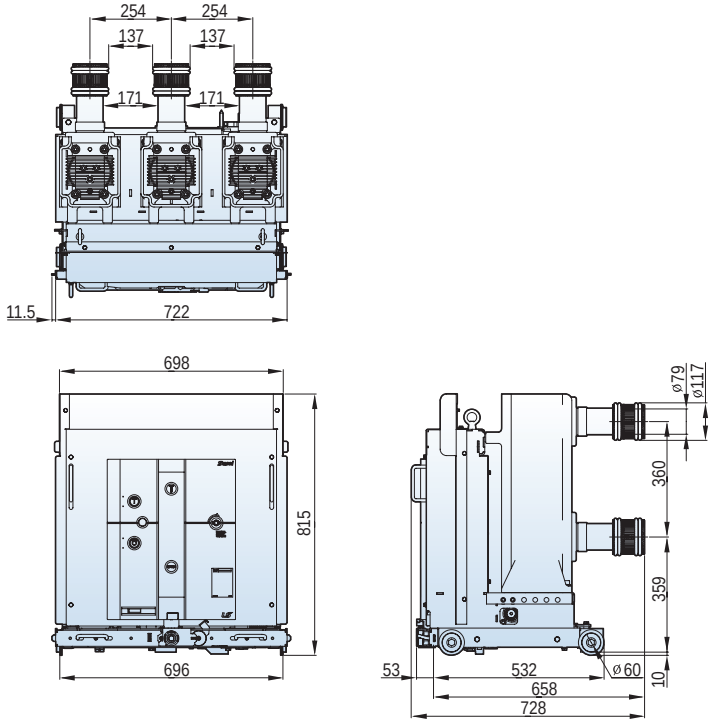
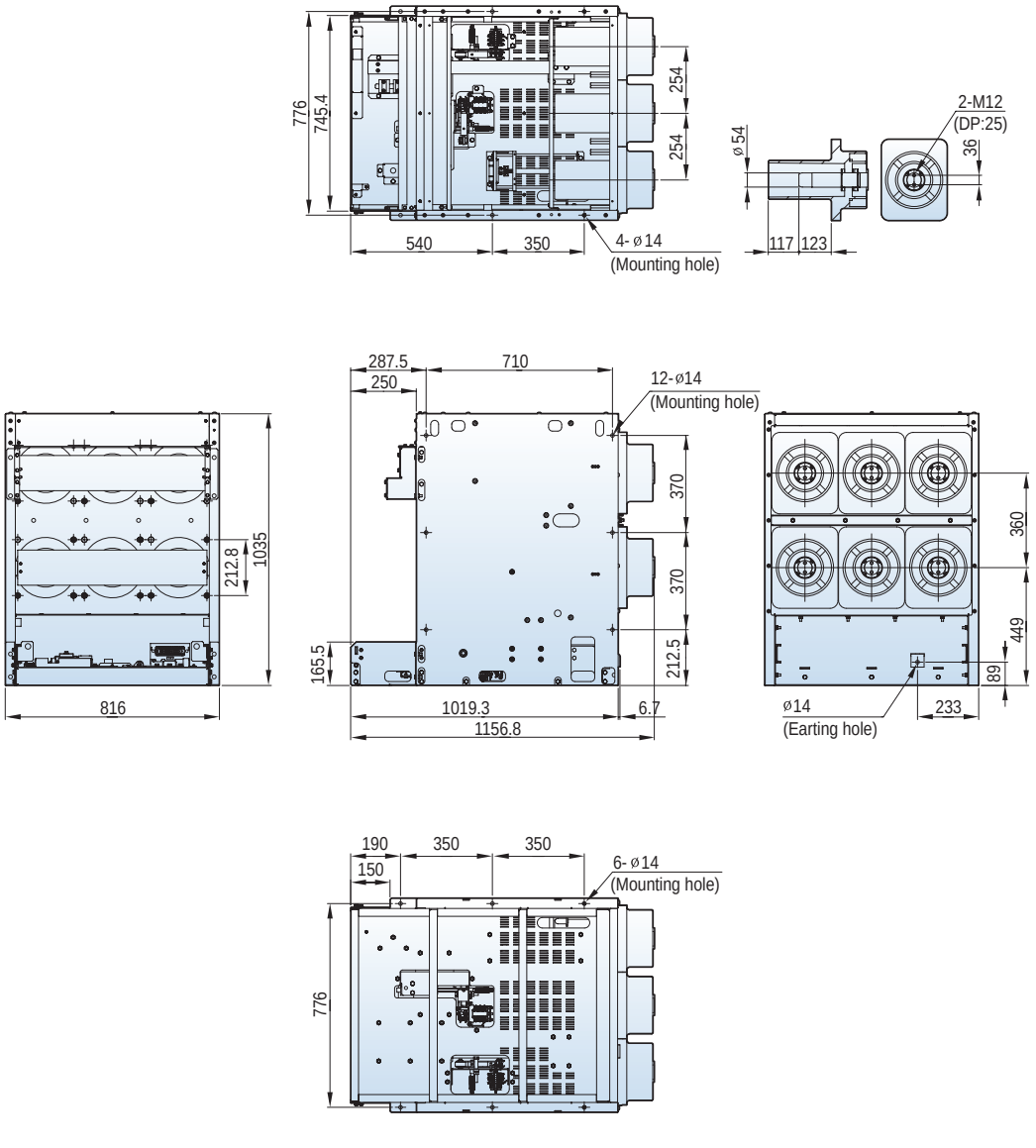


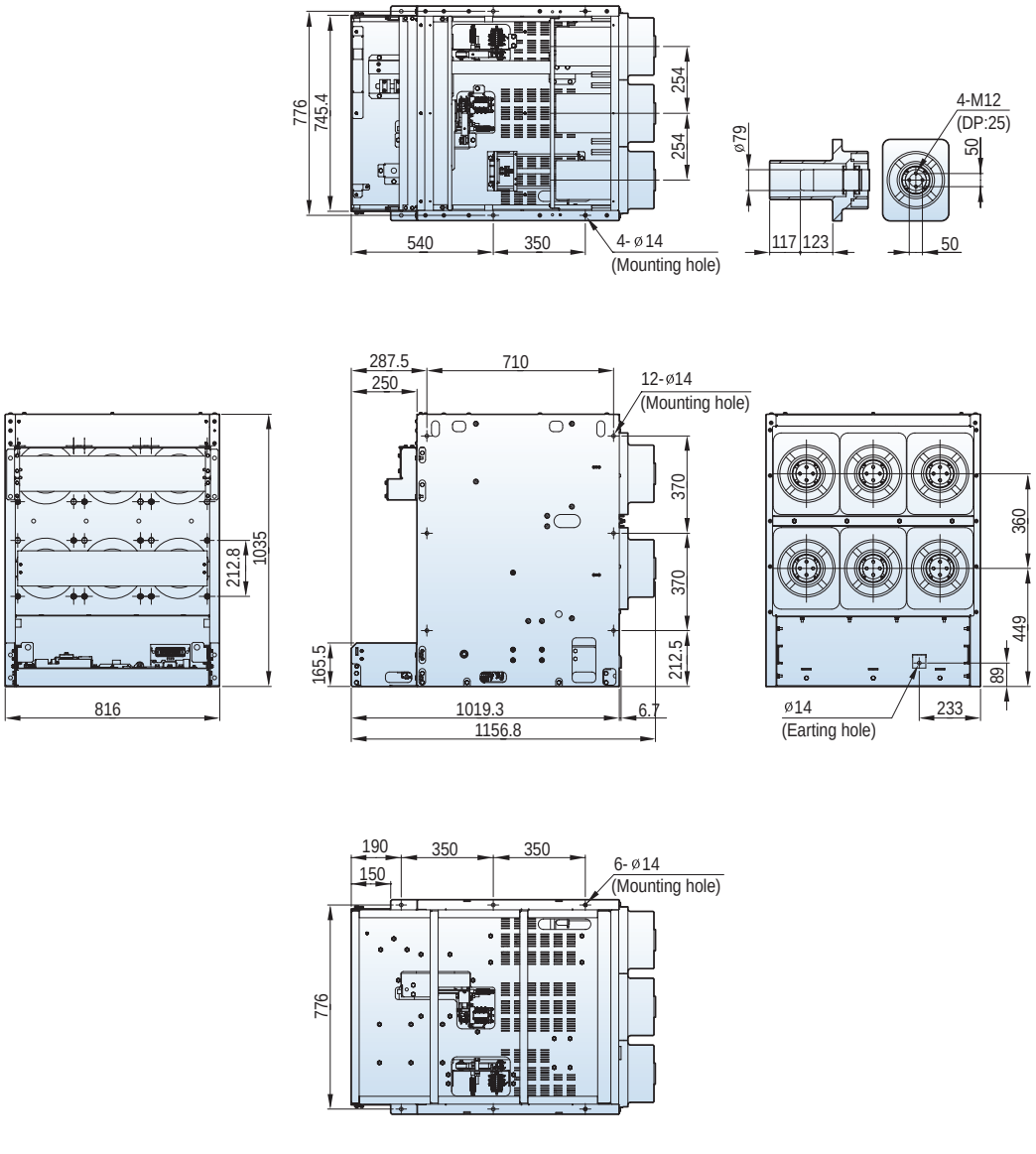
4.76/15kV, 40/50kA, 1200/2000A

Withdrawable (Ha type cradle, phase distance 254mm)

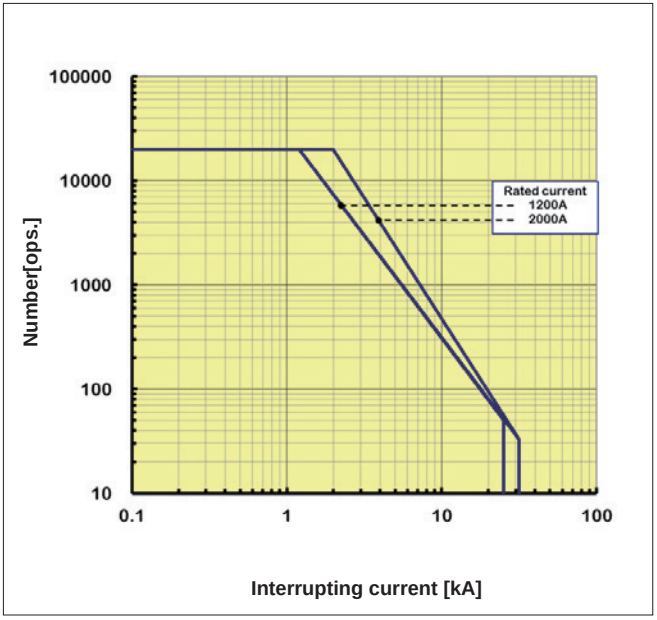


4.76/15kV, 40/50kA, 3000A

Withdrawable (Ha type cradle, phase distance 254 mm)

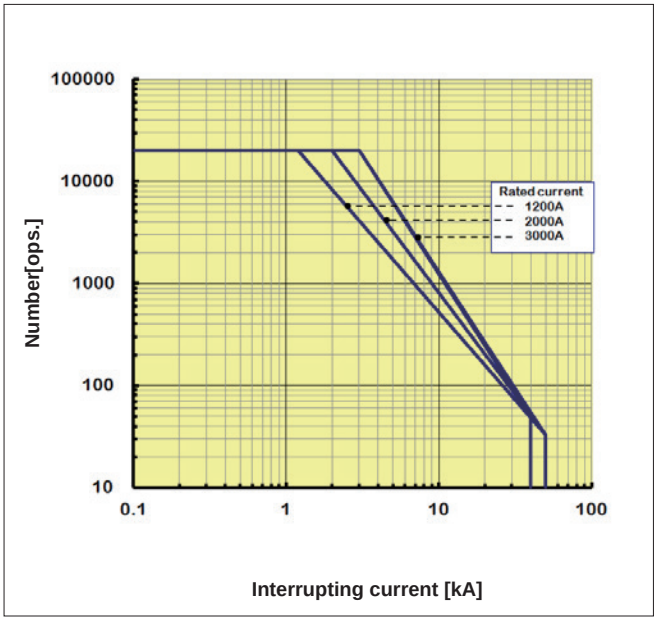


Electrical endurance by interrupting current



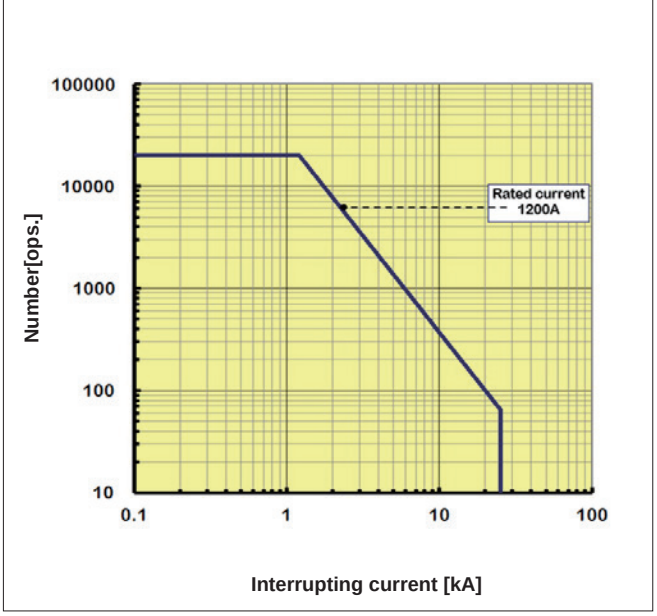
VI model LV6□ at 5/15kV

- N : Operation numbers
- I : Interrupting current



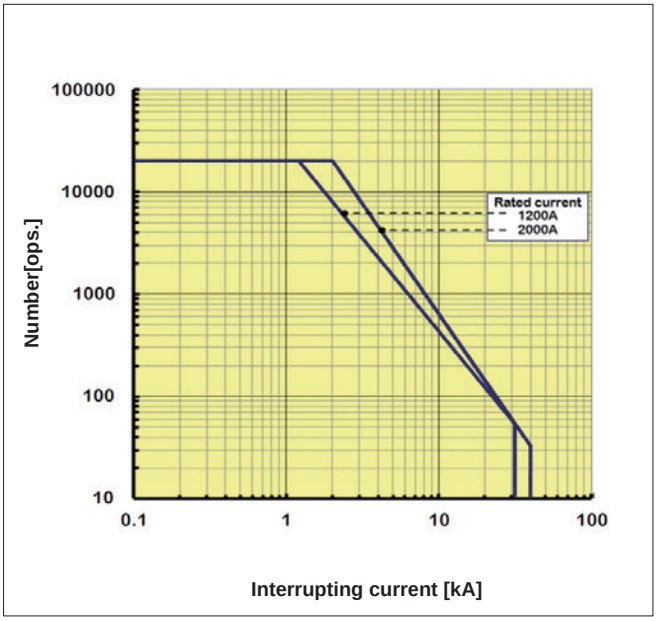
VI model LV8 at 5/15kV

- N : Operation numbers
- I : Interrupting current



VI model LV14-P1 at 27kV

- N : Operation numbers
- I : Interrupting current



VI model LV8-P at 38kV

- N : Operation numbers
- I : Interrupting current

Note) 1. Above graphs represent the characteristics of the electrical life of LS Susol VCB.
2. Life characteristics of each model in each rating represents the LOG-LOG graphs.

Standard Use Environment for Susol VCB

The operation characteristic of Vacuum Circuit Breaker such as insulation and endurance is often influenced largely by external environment and thus should be applied appropriately with conditions of the place where it is used taken into consideration.

The following values are the limits have been set in accordance with IEC 62271-100 (IEC 62271-1)

Ambient Temperature

- maximum temperature: +40℃
- 24-hour average maximum temperature: +35℃
- minimum temperature: -5℃

Altitude

- 1000m or less above sea level

Relative Humidity

- 24 hours average value: 95% or less
- One month average: 90% or less

■ If a standard circuit breaker is used in high temperature exceeding 40℃, you are advised to use it according to the current corrected for each level of ambient temperature in catalog.

■ If used in conditions of high humidity, the dielectric strength or electric performance may be degraded.

■ It is highly recommended to use a dust cover or anti-humid agent if it is used in dusty and humid conditions.

■ Excessive vibration may cause a trip breaker such as connection fault or flaw on mechanical parts.

■ If it is left ON or OFF for a long time, it is recommended to switch load current on a regular basis.

■ It is recommend to put it in the sealed protection if corrosive gas is prevalent.

Special Use Environment

The circuit breaker is designed for use in standard use environment specified in Section 2. 1 of IEC62271-1. Concerning the special use environments as below the special use conditions are required to be considered, thus please contact us in advance.

- where altitude and ambient temperature are out of standard use environment.(-40℃)
- where a strong sea breeze blows
- when usually used in a humid place
- where a lot of steam or oil steam exists
- where explosive, flammable and other harmful gases might permeate the breaker
- In a dusty place
- where abnormal vibration or shock exists
- where a lot of ice and snow exist
- other special conditions

Withstand voltage compensation according to altitude

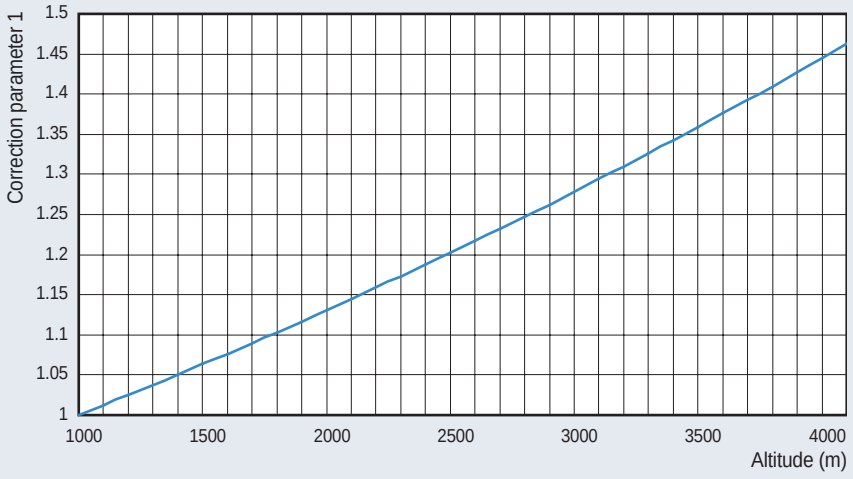
If the breaker is used in areas of sea level higher than 1000m the degradation of insulation performance should be taken into consideration.

Ud [kV/1min]	Ur[kV]	Up [kV/1.2 × 50㎲]
70	36	170
50(65)	24	125
38	17.5	95
28(42)	12	75(82)
20	7.2	60
Power Frequency Withstand Voltage		Impulse Withstand Voltage

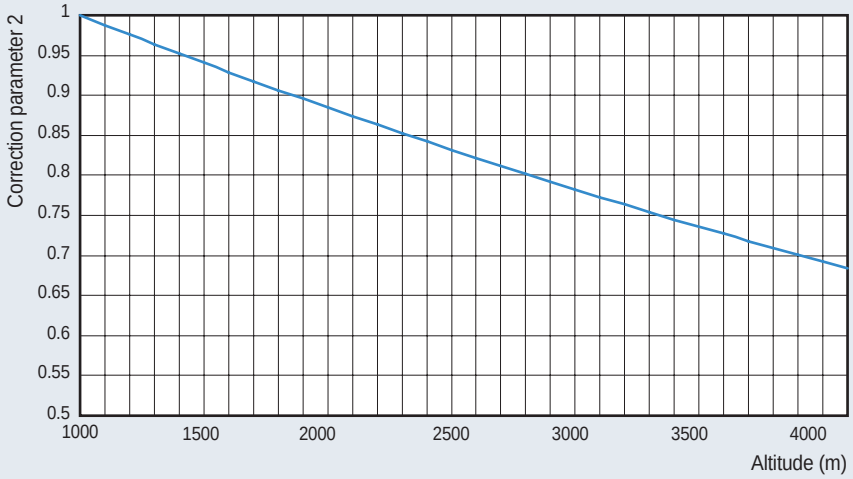
<Table 1> Criteria of withstand voltages by rated voltages specified in IEC62271-1

Special Use Environment

Withstand voltage compensation according to altitude



<Fig.1 > withstand voltage correction parameter 1 by altitude (based on a required withstand voltage)



<Fig.2 > withstand voltage correction parameter 2 by altitude (based on a applicable withstand voltage)

Ex) Selecting a breaker to be used in a place of 2500m above sea level with a rated voltage 7.2kV (correction parameter 1 applied)

- correction parameter at 2500m is 1.2
- criteria of withstand voltage by rated voltage:
  Power Frequency Withstand Voltage (Ud) = 20kV, Impulse Withstand Voltage (Up) = 60kV
- requirements withstand voltage criteria:
  Power Frequency Withstand Voltage (Ud) = 20×1.2 = 24kV, Impulse Withstand Voltage (Up) = 72kV
  Therefore rated voltage 12kV breaker shall apply to satisfy the required withstand voltage.

Ex) To apply a breaker with a rated voltage 12kV to the place of 2,500m above sea level (correction parameter 2 applied)

- correction parameter at 2500m is 0.825
- dielectric strength of VCB : Power Frequency Withstand Voltage (Ud) = 28×0.825 = 23.1kV,
  Impulse Withstand Voltage (Up) = 75×0.825 = 62kV/1.2×50 μs
  Therefore above breaker with rated voltage 12kV shall apply to rated voltage system 7.2kV at the altitude.

Rated current compensation in accordance with ambient temperature

When normal ambient temperature exceeds the temperature specified in the environment the following formula help to select the applicable current.

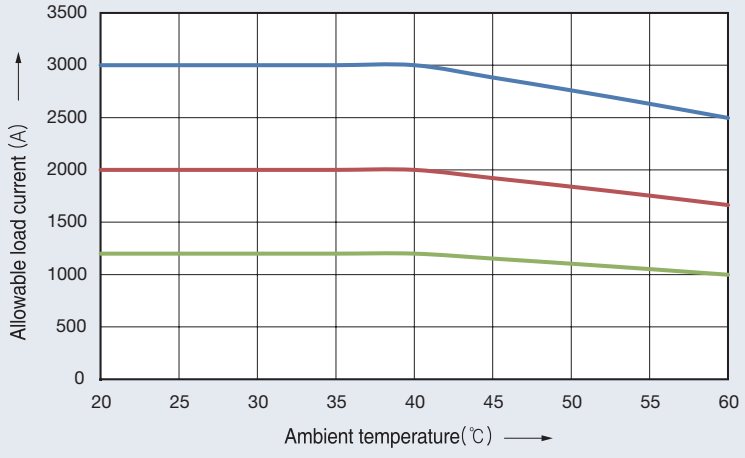
$$I_a = I_r \left((\Theta_{max} - \Theta_a) / \Theta_r \right)^{1/2}$$

Ia: allowable continuous current in the actual ambient temperature Θ_a
Ir: rated current at 40℃ ambient temperature
Θ_{max}: acceptable overall temperature of the hottest spot
Θ_a: the actual ambient temperature expected at -30℃ and 60℃
Θ_r: allowable temperature in the hottest place at rated current

Ex) The calculation of the applicable load current value when a breaker with rated current 2000A is used at 55 ℃ ambient temperature
Ia = 2000 × ((105-55)/65)$^{1/2}$ = 2000 × 0.87 = 1754A

Rated current (A)	Ambient temperature (℃)								
	20	25	30	35	40	45	50	55	60
3000	3000	3000	3000	3000	3000	2882	2760	2631	2496
2000	2000	2000	2000	2000	2000	1922	1840	1754	1664
1200	1200	1200	1200	1200	1200	1153	1104	1052	998

<Table 2> Allowable load current by ambient temperature



<Figure 3> Allowable load current by ambient temperature

Memo

FUTURING SMART ENERGY

We open up a brighter future through
efficient and convenient energy solutions.

Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
  Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

LS ELECTRIC

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2020. 05

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