FUTURING SMART ENERGY

c UL us

Susol
Super Solution

Vacuum Circuit Breakers

ANSI Type

LS IS

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
MC-05
MT-05
UTE-250L
UTE-100N
ATU
250A
40°C
3P
100A
4P

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.

LSIS' Super Solution, 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	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

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

4.76/15kV (VL-05/15)

- Rated short-time (to withstand current): 2sec
- Rated operating sequence: O-0.3s-CO-3min-CO
- Various cradle: P, H 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
- TEST/CONNECT Automatic Position Indicator
- Standards and certification
  - IEEE Std C37.09, IEEE Std C37.20.2, ANSI C37.54, ANSI C37.55
  - KEMA, KERI type tested certification

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

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

27kV (VH-27)

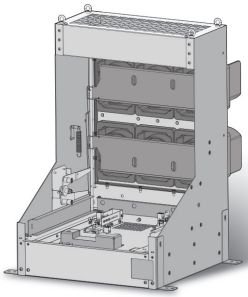
- Rated short-time (to withstand current): 2sec
- Rated operating sequence: O-0.3s-CO-3min-CO)
- Various cradle: P, H type
- CB Compartment for MCSG available
- A variety of control power
  - DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V
  - AC 48V, AC 100~130V, AC 220~250V
- A variety of accessories
  - 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
- TEST/CONNECT Automatic Position Indicator
- Standards and certification

4.76/15kV (VH-05/15)

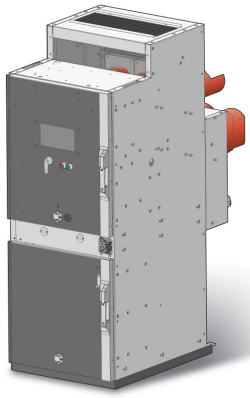
- Rated short-time (to withstand current): 2sec
- Rated operating sequence: O-0.3s-CO-3min-CO
- Electrical and mechanical life: 20,000 operations
- Various cradle: P, H type
- CB Compartment for MCSG available
- A variety of control power
  - DC 48V, DC 110V, DC 125V, DC 220V
  - AC 48V, AC 110V, AC 220V
- A variety of accessories
  - VCB part: 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, Lifting hook, UVT Time delay controller, CTD (Condensor Trip Device), Temperature module
- Standards and certification
  - ANSI/IEEE Std. C37.09, KEPIC EED 1100
  - KEMA, KERI type tested certification

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

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



Ha type

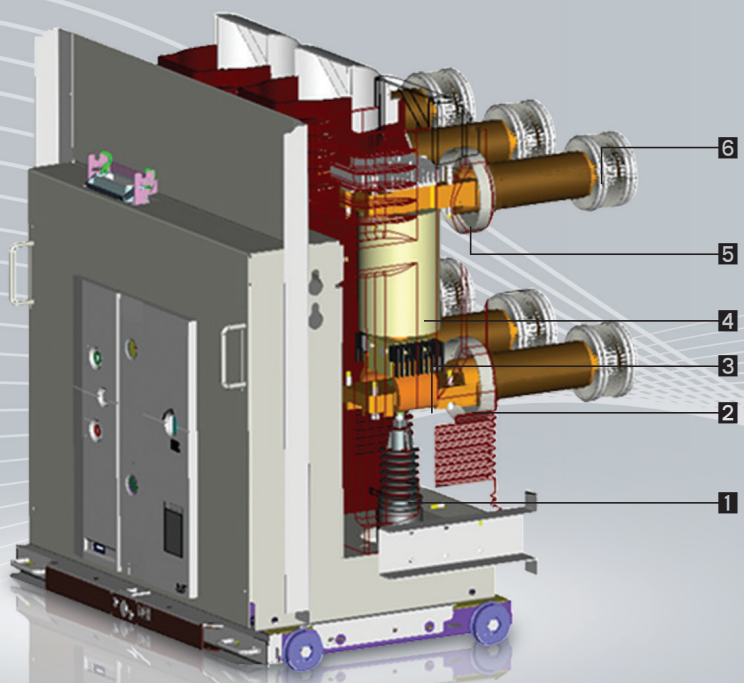


Hb type

VH type

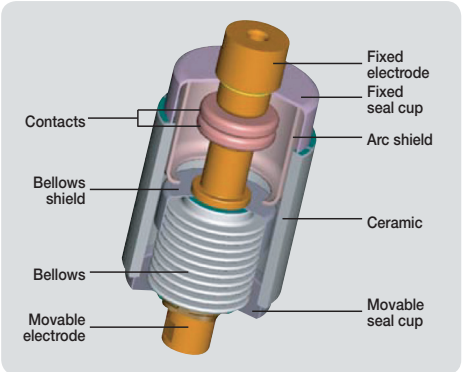
Main circuit structure with high reliability

Susol VCB



Breaker

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



Vacuum Interrupter, VI

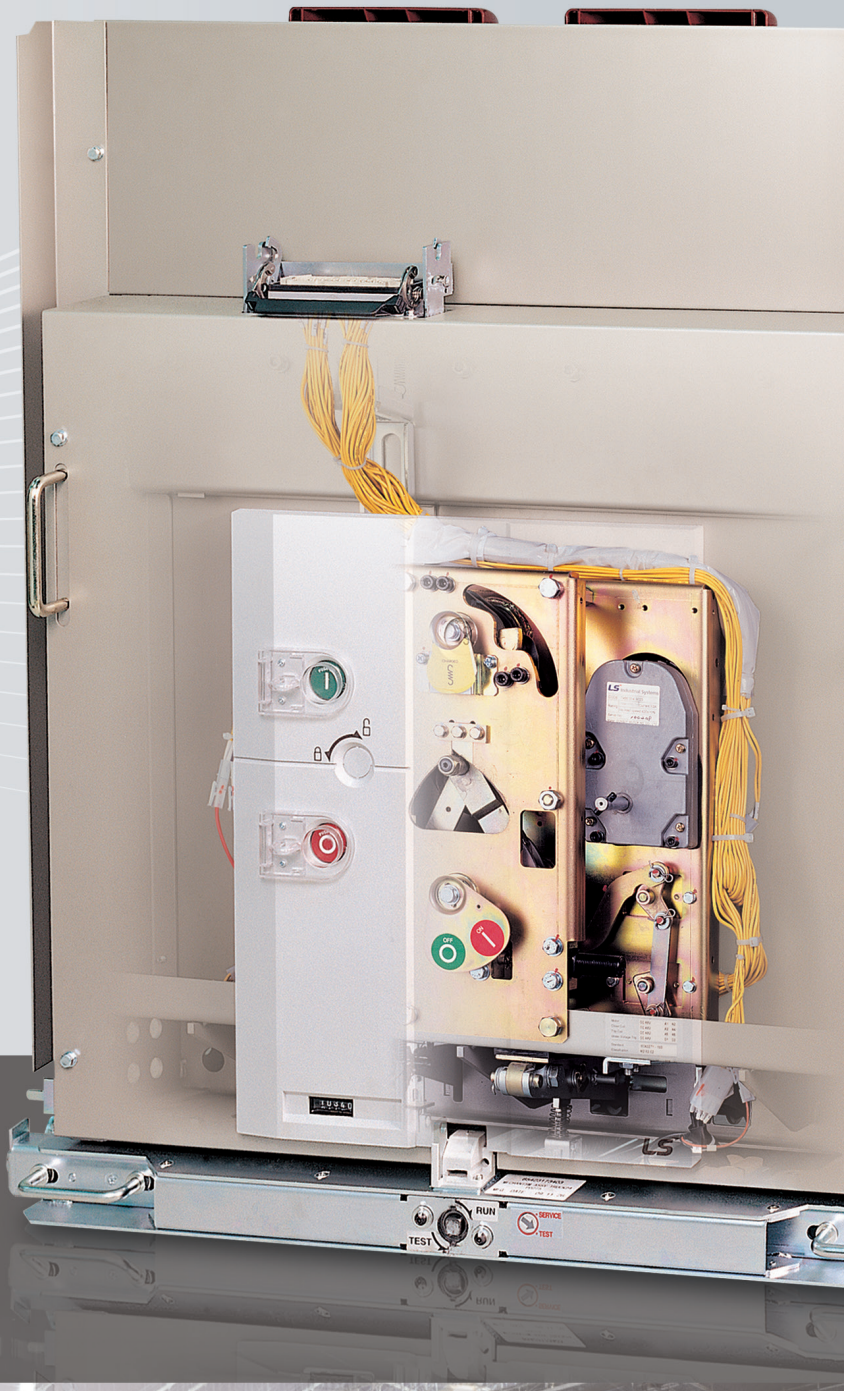
The vacuum rate within the VI is very high (approximately $5x10^{-5}$ Torr) and the spacing between fixed contact and movable contact is about 6~20mm, depending on the voltage.

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

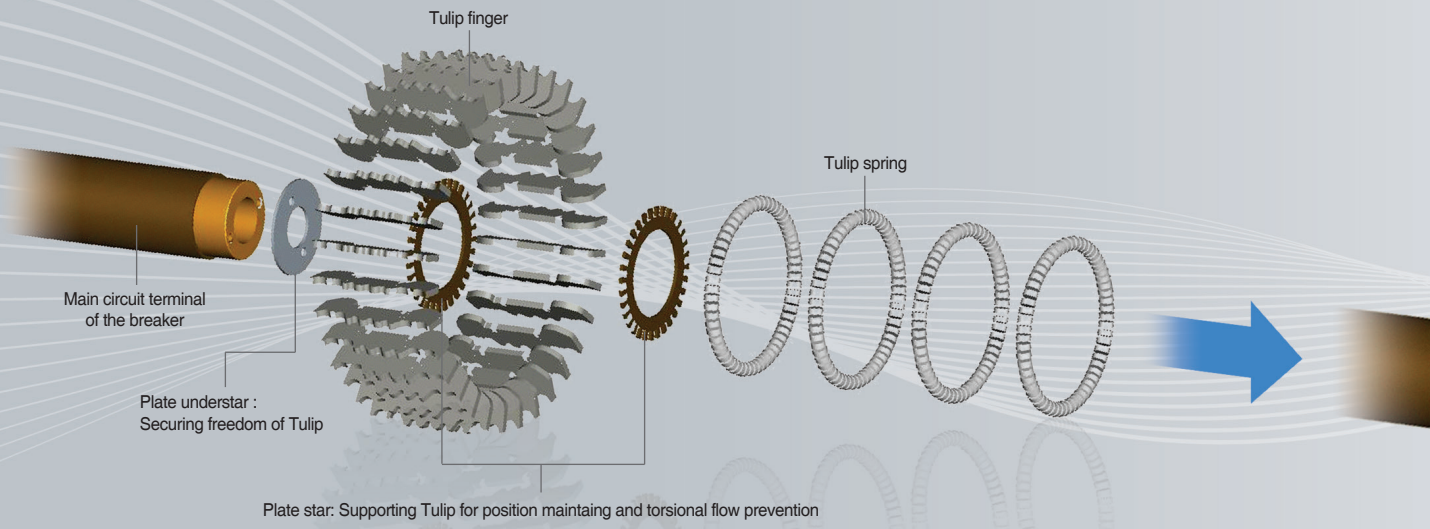
- Maximizing the durability and reliability of the main circuit contactors (Stego Tulip contactor)
- Strong structure for the temperature rise (Natural cooling system)



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)



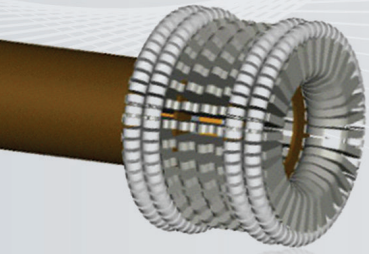
Structure of Stego Tulip Terminal

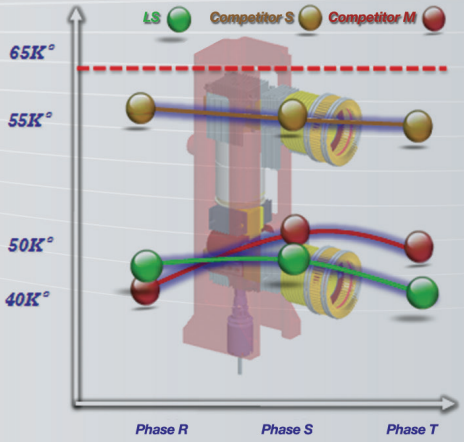
- Maintaining the connection between breaker and cradle for the optimum current path through securing freedom of Tulip.
- Increasing the heat dissipation area of the contactors and minimizing aging.

4.76/15/27kV ...

(VH-05/15/27)

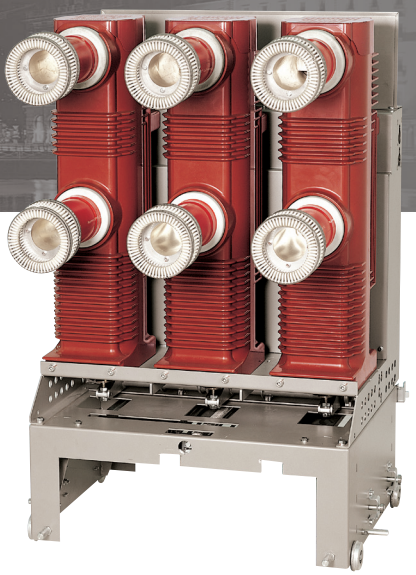
- Drawout / natural cooling system
- Improved temperature characteristics and ensured high reliability





VL type Tulip contactor

VH type Tulip contactor

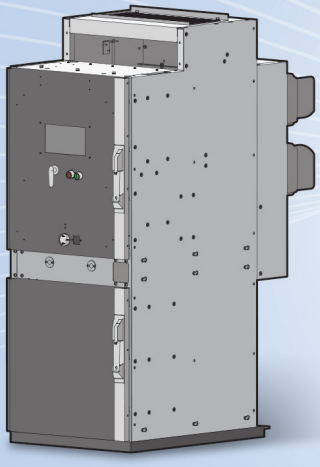


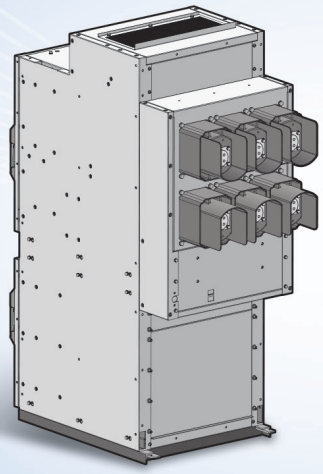
27kV Tulip contactor

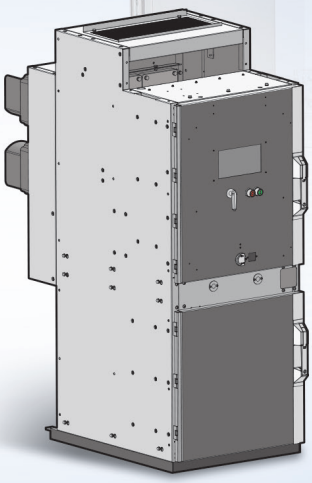
CB Compartment

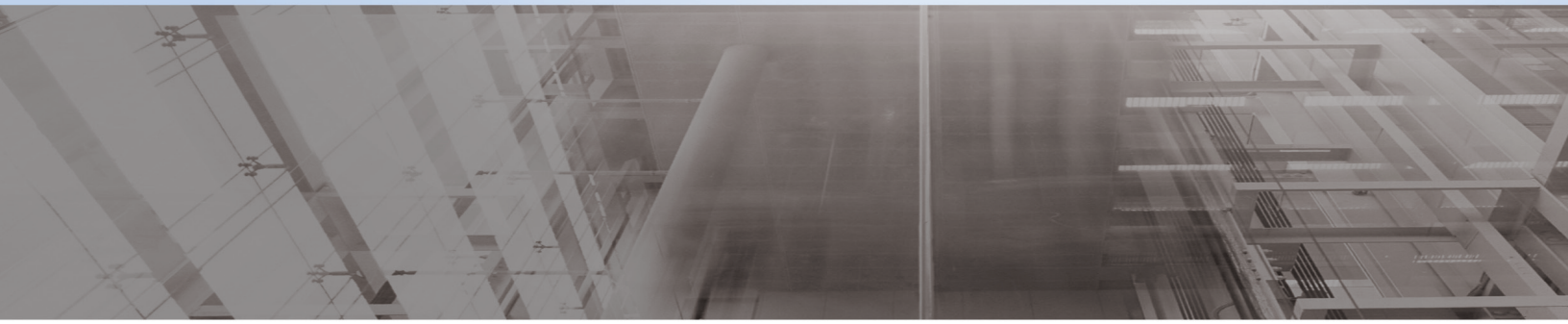
Convenience in building switchgears

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









4.76/15/27kV 20/25/31.5/40/50kA

- 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

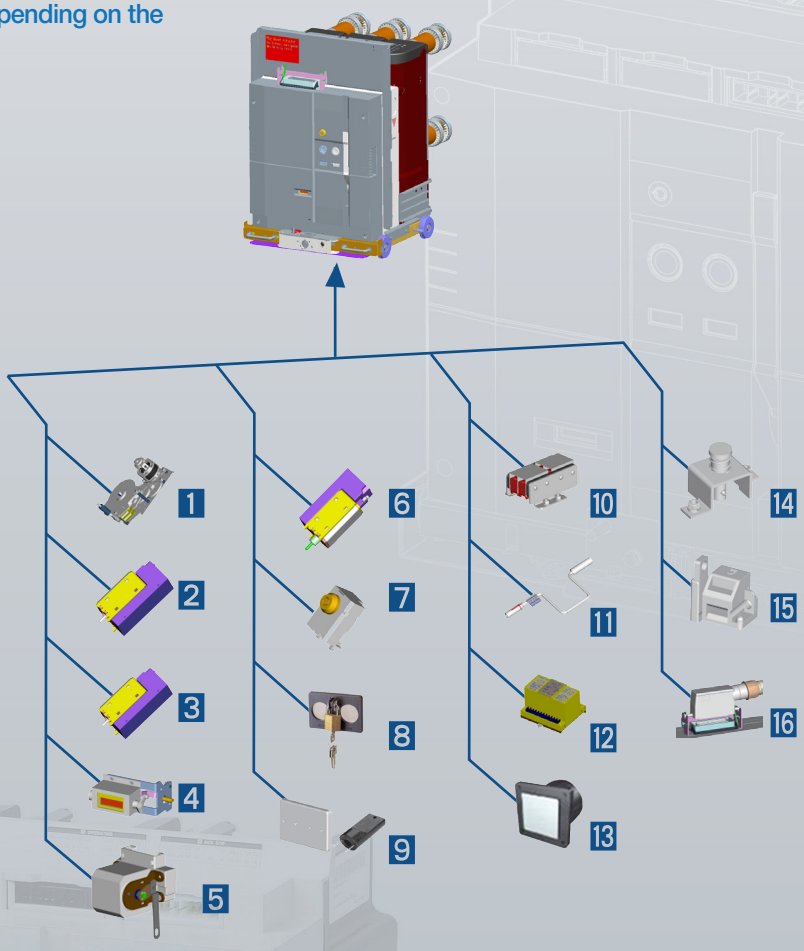
Accessories of CB compartment (H type cradle)

- 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 VL-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.

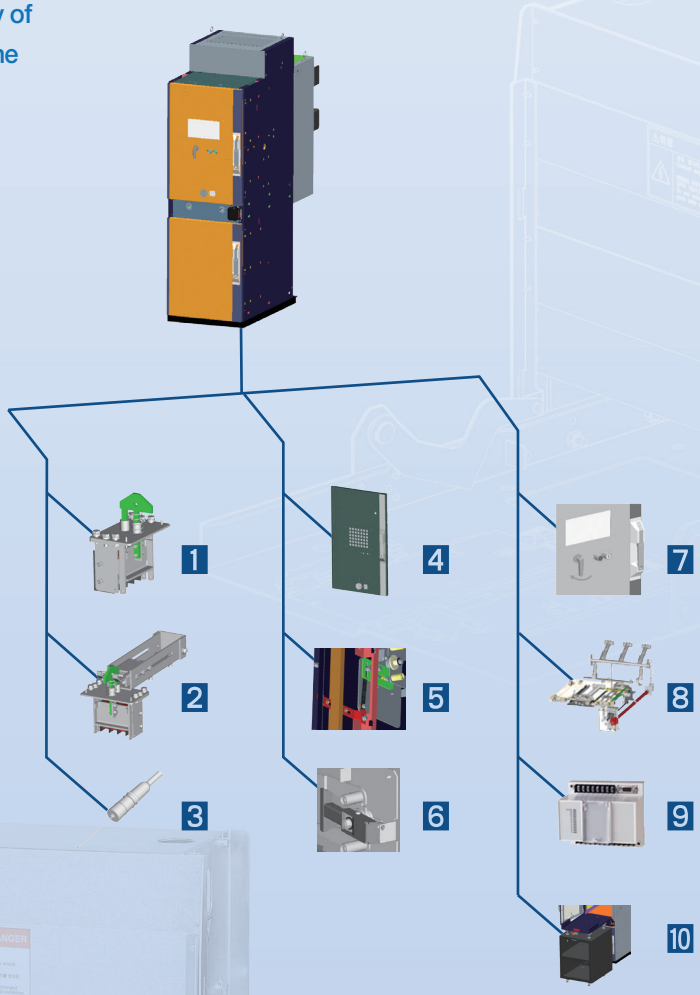


Breaker

1 Motor
2 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 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 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 Earthing switch & Accessary
8-1 Key lock for Earthing switch
8-2 Locking Magnet for Earthing switch
8-3 Position s/w for Earthing switch
9 TM (Temperature monitoring unit)
10 Lift Interlock

Accessories

A variety of accessories for VH-27

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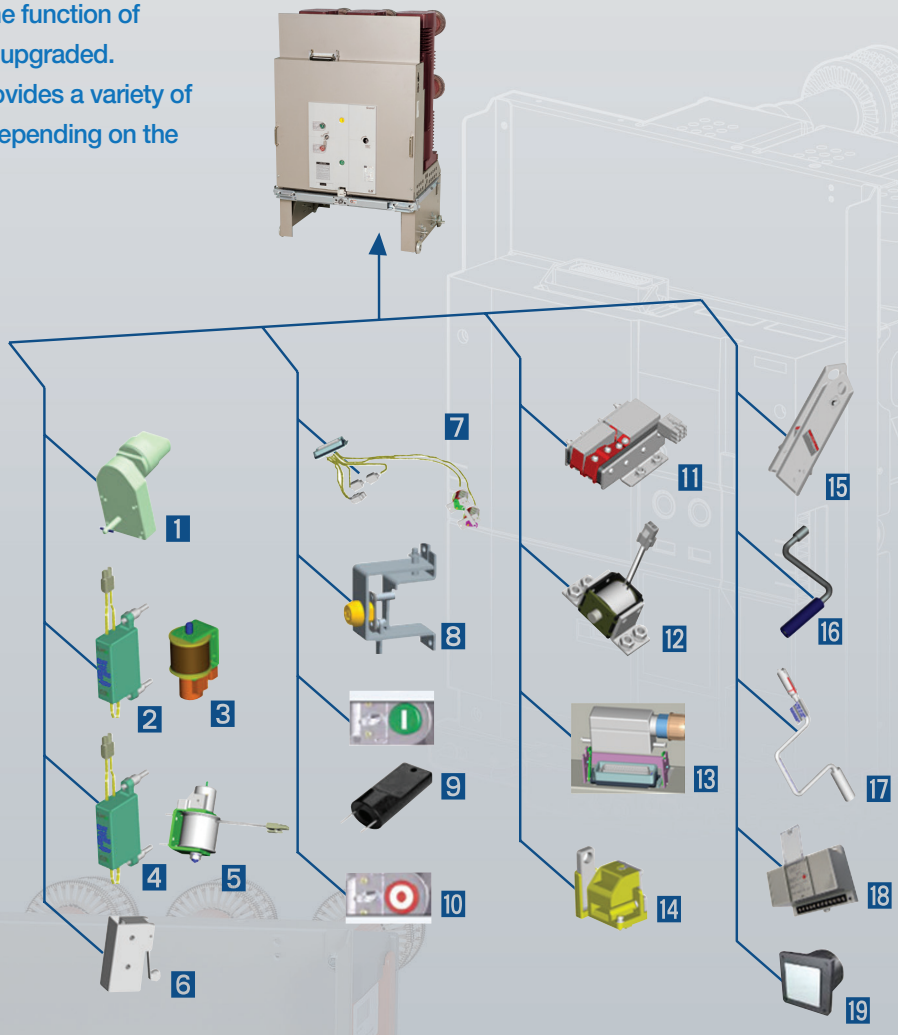

Breaker

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 Position switch
12 Locking magnet
13 Plug interlock
14 Door Interlock for withdrawable type
15 Lifting hook
16 Charge handle
17 Racking in/out handle
18 UVT Time delay controller
19 CTD (Condenser trip device)

A variety of accessories for VCL-27

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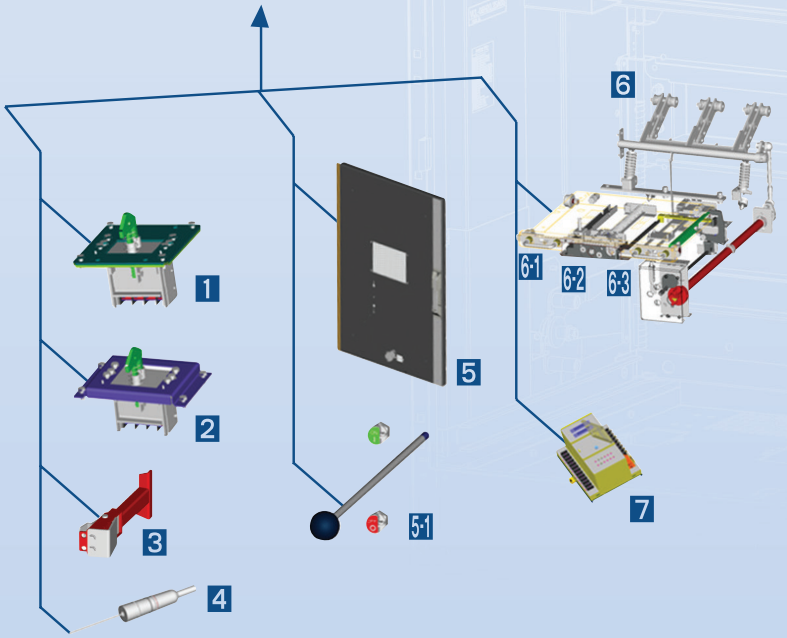

Cradle (H type)

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
6 Earthing switch & Accessaries
6-1 Key lock for Earthing switch
6-2 Locking magnet for Earthing switch
6-3 Position switch for Earthing switch
7 TM (Temperature monitoring unit)

Accessories

A variety of accessories for VH-05/15

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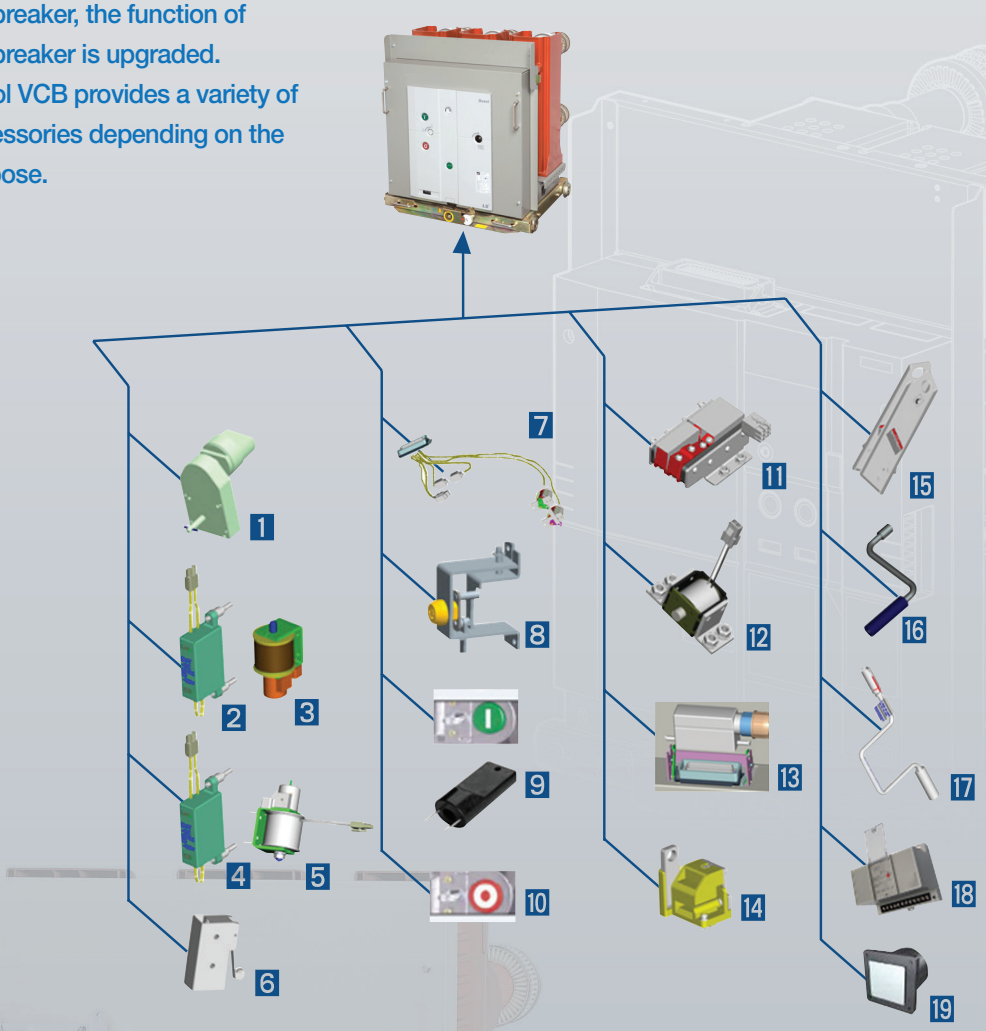

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A variety of accessories for VCL-05/15

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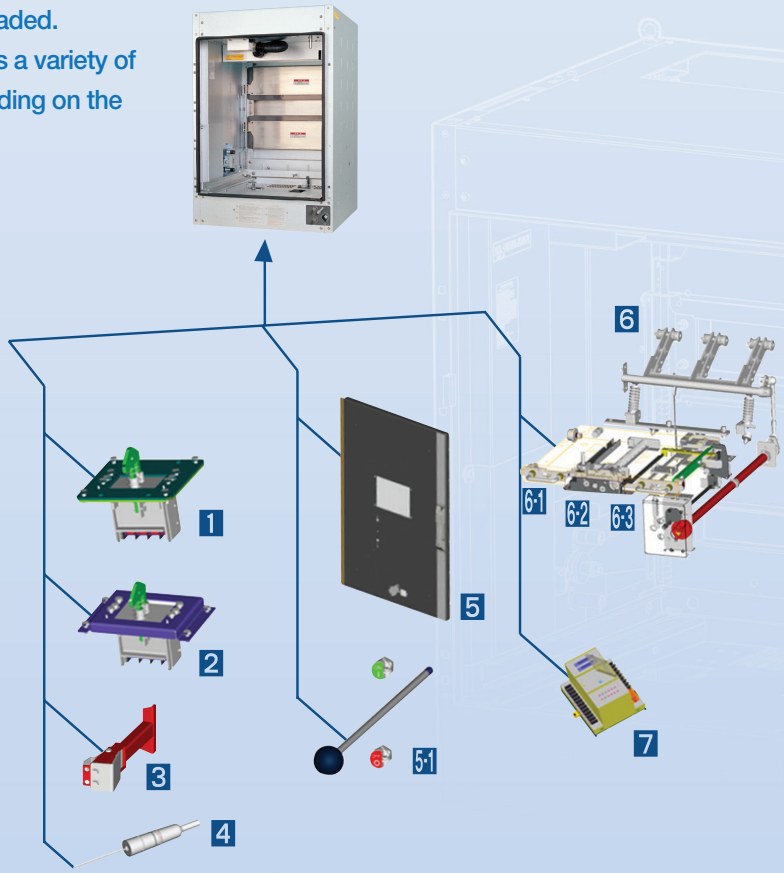


Cradle (H type)

- 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
- 6 Earthing switch & Accessaries
- 6-1 Key lock for Earthing switch
- 6-2 Locking magnet for Earthing switch
- 6-3 Position switch for Earthing switch
- 7 TM (Temperature monitoring unit)

External structure of VCB

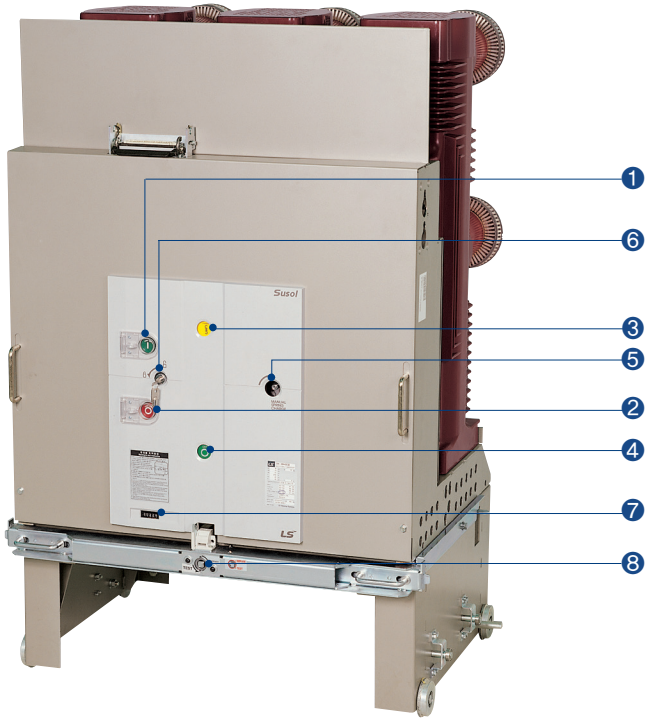
Breaker ... VL type

Name of each part

1. Push ON Button
2. Push OFF Button
3. Charge/Discharge Indicator
4. ON/OFF Indicator
5. Manual Charging Handle
6. Operation Counter
7. TEST/Connect Position Indicator

Back side

Breaker ... VH type



Name of each part

1. Push ON Button
2. Push OFF Button
3. Charge/Discharge Indicator
4. ON/OFF Indicator
5. Manual Charging Handle
6. Key Lock
7. Operation Counter
8. TEST/Connect Position Indicator

Back side

Basic functions

Manual operation

① **Manual Charge**

a) VL type: operate the charge handle 7-8 times as a fully stroke.
b) VH 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 ON button the breaker is closed.
b) With the closing of the breaker "ON" is displayed at Close/Trip indicator and "DISCHARGED" at the charge indicator.

③ **Manual trip**

a) Pressing the OFF button the breaker is opened.
b) "OFF" is displayed at Close/Trip 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.

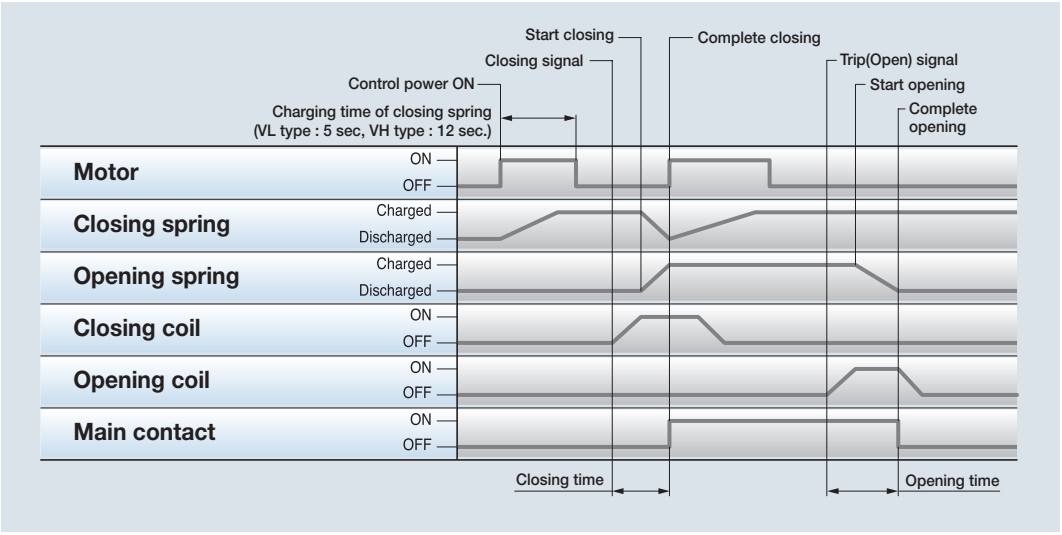
② **Electric closing**

Remote closing is operated by the closing coil.

③ **Electric trip**

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

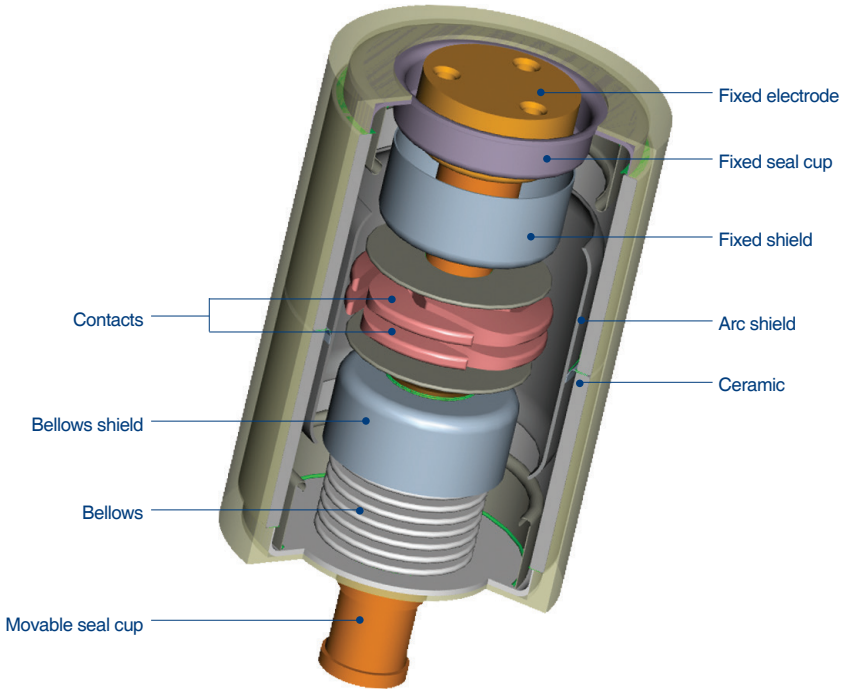
Main contacts are operated by the energy of the spring mechanism and closing spring is charged by the motor in the mechanism.
Breaker is closed by closing coil and tripped by trip coil.
These operations are repeated in VCB as shown in the below sequence chart.

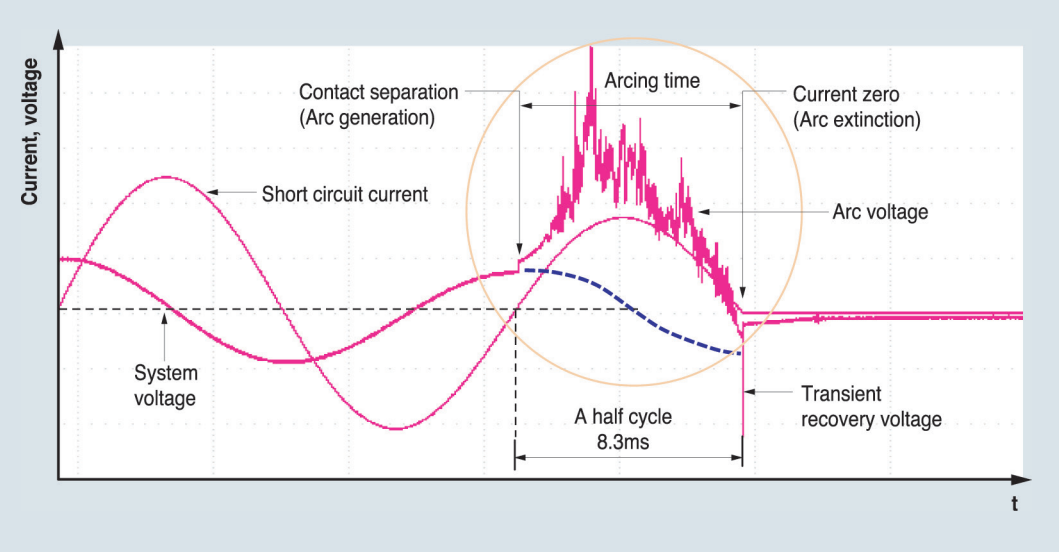


Sequence of the switching mechanism

The interruption of vacuum interrupters

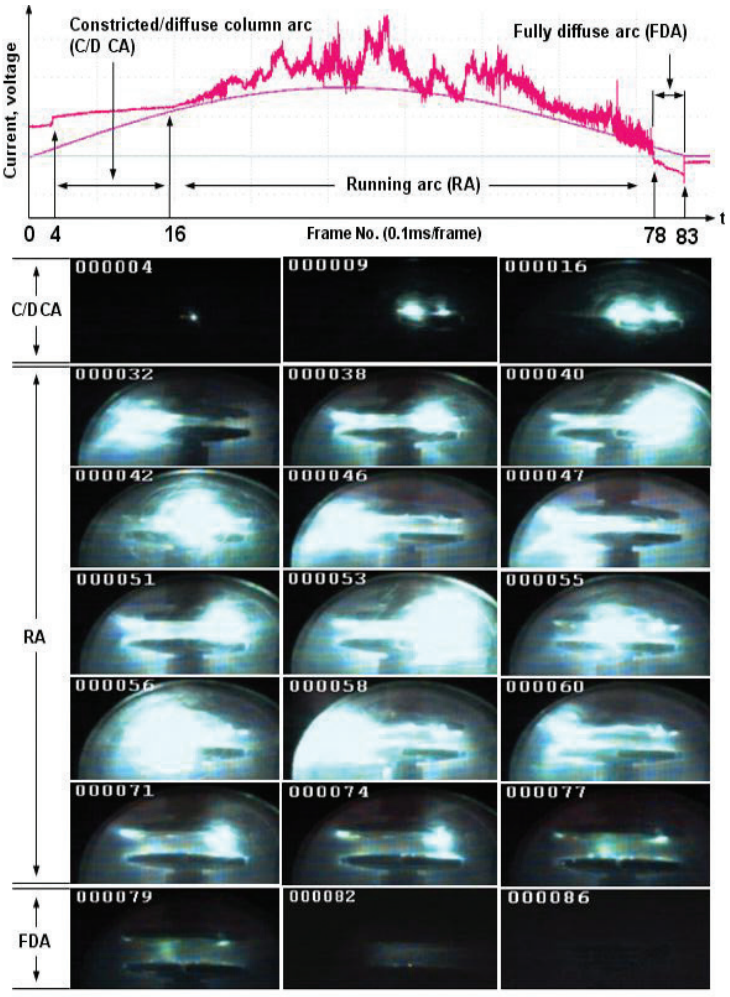
The interruption of VCB is carried out by the vacuum interrupters.
Interrupter contacts as a key part made of copper - chromium (CuCr) material with spiral shape have low contact wear characteristics and withstand voltage is excellent.
Spiral contacts make the arc generated between the surfaces of contacts 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

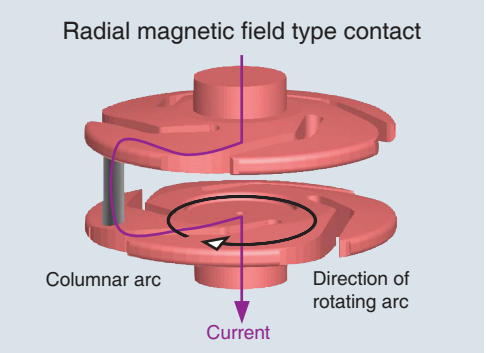
The interruption of vacuum interrupters



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.



Arc driving principle in the contacts of Radial magnetic field

Standards and certification

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, IEEE Std C37.20.2, ANSI C37.54, ANSI C37.55

● **Test and certification**

・Test report (KERI)
・Test report (KEMA)

CERTIFICATE OF COMPLIANCE

Certificate Number 20141230-E468323
Report Reference E468323-20141226
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-D
KOREA

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

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

Standard(s) for Safety: ANSI/NEMA C37.55-2002 -Medium Voltage M
Assemblies – Conformance Test Procedures,
C37.54-2002-Indoor Alternate-Current Mediu
Circuit Breakers Applied as Removable Elem
Enclosed Switchgear Assemblies - Conforma
Procedures and CAN/CSA-C22.2 No. 31-14-S
Assemblies

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

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

Look for the UL Certification Mark on the product.

Page 1 of 2

CERTIFICATE OF COMPLIANCE

Certificate Number 20141230-E468323
Report Reference E468323-20141229
Issued 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

CLASSIFICATION
APPARATUS
DESIGNATION
RATINGS
APPLIED STANDARD
RECEIPT No.
APPLICANT
MANUFACTURER
DATE OF TESTS
DATE OF ISSUE

The type tests have bee
applicant's specificatio

The test results are presented in the records of tests with the performance of th
apparatus and the observations made during the tests. The oscillograms are at
hereto.

The obtained values and the general performances are considered to comply w
requirements of the above standard for the performed type tests.

The test results apply only to the tested specific samples.
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No. OF PAGES INCORPORATED records (47), photographs (4), circuit diagrams (4), oscillogra
drawings & descriptions (5), attachments (0)

Prepared by Won , Ho-Sun
Verified by Park , Nam-
Aporoved by (Technical manager) Park, Sung-

Power Apparatus Testing & Evaluation D

KERI KOREA ELECTROTECHNOLOGY RESEARCH INSTITUTE
Sa 1-dong 1271-19, Sangnok-gu, Ansan-si, Gyeonggi-do, Korea, 426-1
Tel : +82-31-8040-4114, Fax : +82-31-8040-4499, www.keri.re.kr
KERI Laboratories are accredited by KOLAS (Korea Laboratory Accreditation

Rated voltage:
Rated normal curre

MANUFACTURER: LG Ind
CLIENT: LG Ind
TESTED BY: KEMA-
DATE(S) OF TESTS: Se

The apparatus, constructed in
Certificate, has been subjected
6.111.

THE RESULTS ARE SHOWN IN THE RECORD OF PROVING TESTS AND THE OSCILLOGRAMS ATTACHED HERETO. THE VALUES OBTAINED AND THE GENERAL PERFORMANCE ARE CONSIDERED TO COMPLY WITH THE ABOVE STANDARD AND TO JUSTIFY THE RATINGS ASSIGNED BY THE MANUFACTURER AS LISTED ON PAGE 1.

This Certificate and Record of Proving Tests applies only to the specific piece of apparatus tested from the particular place of manufacture. The responsibility for conformity of any apparatus having the same designation with that tested rests with the manufacturer at the place of manufacture of that apparatus.

This Certificate consists of 80 pages in total.

Only reproduction of the complete Certificate, or reproductions of this page accompanied by the page(s) on which are stated the tests performed and the assigned rated characteristics of the apparatus tested, are permitted without permission from KEMA-Powertest.

KEMA-POWERTEST
M. F. Schacker
Date:

ACCREDITED

Form: CDSCP R2 Certificate Number: 0553-01 Rev.#0 12/15/2004

VL-05/15

Breaker

VL — 15 H 32 A 20

Basic model name	
UVL	Susol VCB

Rated voltage (kV)	
05	4.76
15	15

Version	
P	Fixed
H	H type drawout (for MESG)

Interrupting current (kA)	
25	25
32	31.5

Phase distance/Compatibility	
A	150mm
B	210mm

Rated current (A)	
12	1200A
20	2000A

* - In case of 1200A VCB, only 150mm is applicable.
- In case of 2000A VCB, only 210mm is applicable.

M1 C1 T1 SB2 U1 A 1 4 7

Motor control voltage	
M0	motor none
M1	DC 110V
M2	DC200~250V
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	Trip Coil none
T1	DC 110V
T2	DC200~250V
T3	DC 125V
T4	DC 24V~30V
T5	AC 48V~60V
T6	AC 48V
T7	AC 100V~130V
T8	AC 200V~250V

UVT	
U0	UVT none
U1	DC 110V
U2	DC200~250V
U3	DC 125V
U4	DC 24V~30V
U5	AC 48V~60V
U6	AC 48V
U7	AC 100V~130V
U8	AC 200V~250V

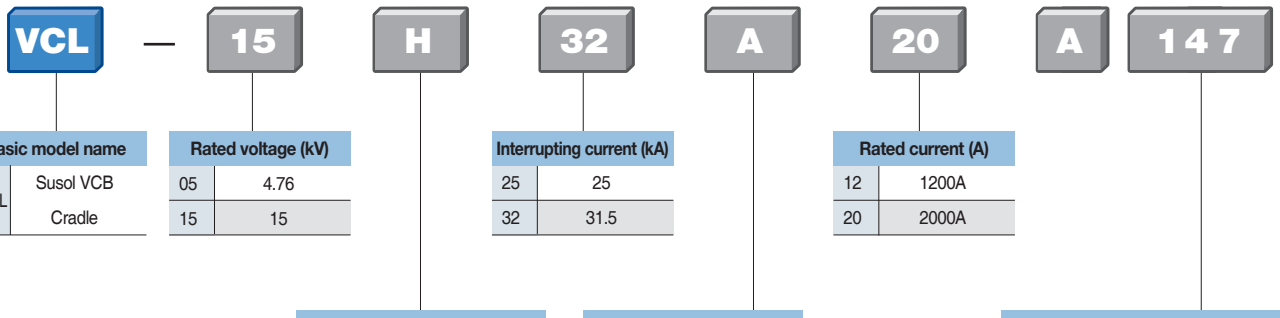
Other accessories Note)	
A1	Secondary Trip coil
A2	Secondary Trip Coil with TCS Contact
A3	Position s/w (Test: 1a1b,Connect: 2b)
A4	Position s/w (Test: 2a,Connect: 2a)
A5	Position s/w (Test: 1a1b,Connect: 1a1b)
A7	Keylock
A8	Button Padlock
A9	Button cover
AA	Lead Wire
AB	User Plug(Part)
AC	Plug Interlock
AD	Padlock(H type)
AE	MOC
AV	T operated coil 1A
AW	T operated coil 5A

Closing coil voltage	
C0	Without closing coil
C1	DC 110V
C2	DC200~250V
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 the 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. A8(Button Padlock) and A9(Button Cover) can not be selected simultaneously.
5. When A1(Secondary Trip Coil) is selected the maximum available auxiliary contacts are 9a9b.
6. When A2(Secondary Trip Coil with TCS Contact) is selected the maximum available auxiliary contacts are 4a3b, 9a8b.
7. The flame retardant wire is applicable to auxiliary contacts 4a4b, not to 10a10b.
8. Locking magnet of breaker use the same control power supply as motor.
9. In case of UL Type, AC(Plug Interlock), AD(Padlock(H type)) and AE(MOC) are included as standard.

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	H type drawout (for MESG)
Hb	Hb type drawout (for MESG) +Lower PT room added

Phase distance/Compatibility	
A	150mm
B	210mm
M	150mm
N	210mm

* In case of 1200A VCB, only 150mm is applicable, and the phase distance of 2000A VCB is only 210mm.

Ha has A, B, M and N type
- A type : 150mm phase distance, it is impossible to use busing CT
- M type : 150mm phase distance, it is possible to use busing CT
- B type : 210mm phase distance, it is impossible to use busing CT
- N type : 210mm phase distance, it is impossible to use busing CT

Hb has A, B, and N type
- A type : 150mm phase distance, only 1200A VCB has A type
- B type : 210mm phase distance. Using 3 busing CTs. It is available in case of 2000A only
- N type : 210mm phase distance. Using 6 busing CTs. It is available in case of 2000A only

Other accessories	
A1	ES(Earthing Switch) without option
A2	ES(Earthing Switch) with position S/W(2a2b)
A4	ES(Earthing Switch) with position S/W(6a6b)
A5	ES(Earthing Switch) with Keylock
A6	ES with Locking magnet: DC110V
A7	ES with Locking magnet: DC220V
A8	ES with Locking magnet: DC125V
A9	ES with Locking magnet: DC24V
AA	ES with Locking magnet: DC48V
AB	ES with Locking magnet: AC48V
AC	ES with Locking magnet: AC110V
AD	ES with Locking magnet: AC220V
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 Hb 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) are selected the cradle option AK (Door Emergency Push Button) is not available.
6. Earthing Switch (A1) includes Keylock (A5) as standard.
7. H type breaker includes options such as AE (Shutter padlock), AE (TOC, AG (MOC), AH (Door), AJ (Door Interlock) as standard.

VH-27

Breaker

VH — 27 H 25 E 12

Basic model name	
VH	Susol VCB

Rated voltage (kV)	
27	27

Version	
H	H type drawout (for MCSG)

Interrupting current (kA)	
25	25

Phase distance/Compatibility	
E	300mm

Rated current (A)	
12	1200A

VH-06H50B32 — M1 C1 T1 SB2 U1 A 1 4 7

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

Trip coil voltage	
T0	Without trip coil
T1	DC110V
T2	DC220V
T3	DC125V
T5	DC48V
T6	AC 48V
T7	AC 110V
T8	AC 220V

UVT	
U0	Without UVT
U1	DC 110V
U2	DC 220V
U3	DC 125V
U5	DC 48~60V
U6	AC 48V
U7	AC 110V
U8	AC 220

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

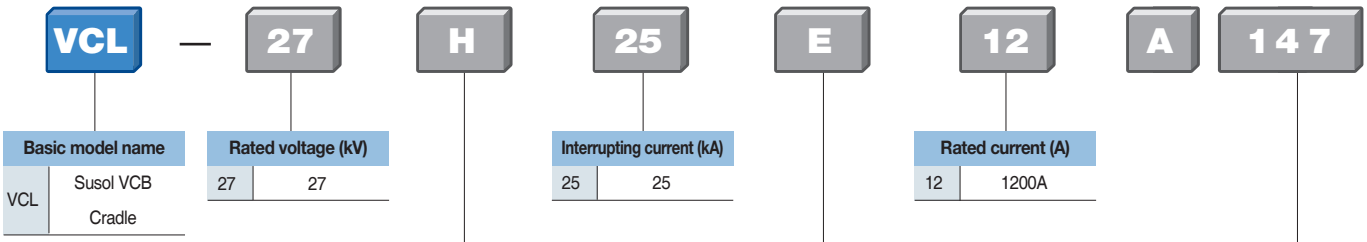
Connector and wire		
SB2	Standard	B type connector, 4a4b
SB4	Standard	B type connector, 10a10b
SB6	Flame retardant	B type connector, 4a4b

Other accessories Note)	
A1	Secondary Trip coil
A4	Position s/w(2a2a)
A5	Position s/w(2a2b)
A6	Latch checking s/w
A7	Keylock
A8	Button Padlock
A9	Button cover
AA	Lead Wire
AB	User Plug(Part)
AC	Plug Interlock
AD	Padlock(H type Door Interlock)
AE	MOC
AF	Locking Magnet
AG	ANSI type Charge interlock
AP	Trip Coil Monitoring Contact

Note) A is written only once in case of more than one.

Note)
1. If A2 (UVT), A4 (Position S/W 2a2b) and A7 (Keylock) are selected, A247 is the type name in the ordering.
2. A1 (Secondary Trip Coil) and A2 (UVT) can not be selected simultaneously.
3. A4 (Position S/W 2a2a) and A5 (Position S/W 2a2b) can not be selected simultaneously.
4. A8 (Button Padlock) and A9 (Button Cover) can not be selected simultaneously.
5. AC (Plug interlock),AD (H type Door interlock), AE (MOC) and AF (Locking magnet) are available only for H type.
6. In case of B-type connector the flame retardant wire is applicable to auxiliary contacts 4a4b, not to 10a10b.
7. Locking magnet can be applied only to H type VCB - breaker and cradle.
8. Locking magnet of H type breaker use the same control power supply as motor.
8. A-type connector is applicable to P/E/F/G type and B-type connector to H type.
9. 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.
10. Lead wire is enclosed in the breaker in case of ordering fixed type or H type breaker without cradle, installed of cradle in case of ordering the breaker with cradle. If user plug is selected it will be enclosed in the breaker.

Cradle



Basic model name	
VCL	Susol VCB Cradle

Rated voltage (kV)	
27	27

Interrupting current (kA)	
25	25

Rated current (A)	
12	1200A

Version	
H	H type drawout (for MCSG)

Phase distance/Compatibility	
E	300mm

Other accessories (H type)	
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 (Flame retardant wire)
AN	H type Lead Wire 10a10b (Flame retardant wire)
AO	H type Lead Wire 4a4b (Rated short time current)
AQ	ANSI type Charge interlock

Note) A is written only once in case of more than one.

Note) 1.These accessories for cradle and TM can be applied only to H type.
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 - one of AM, AN or AO is required for cradle in case of H type breaker.

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	MCSG type drawout

Interrupting current (kA)	
40	40
50	50

Note) 4.76kV is for 50kA

Phase distance/Compatibility	
C	254mm

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

VH-15H50C30 — M3 C3 T3 SC1 U0 — N 1 2 3 4 5

Motor control voltage	
M0	Without motor
M3	DC125V

Closing coil voltage	
C0	Without closing coil
C3	DC125V

Trip coil voltage	
T0	Without trip coil
T3	DC125V

Connector and wire	
SC1	Standard, 3a3b
DC0	Dummy
EC0	Earthing truck

UVT	
U0	Without UVT

Other accessories Note)	
N1	Non-1E Class
N2	1E Class
N3	Dummy
N4	Earthing truck (Upper)
N5	Earthing truck (Lower)

Note) In the case ordering Dummy, Earthing truck, only please select M0(Without motor), C0(Without closing coil) and T0(Without trip coil).

Cradle

VCL — 15 H 50 C 30 — N 1 2 3 4 5

Basic model name	
VCL	Susol VCB
	Cradle

Rated voltage (kV)	
05	4.76
15	15

Version	
H	MCSG type drawout

Interrupting current (kA)	
40	40
50	50

Note) 4.76kV is for 50kA

Phase distance/Compatibility	
C	254mm

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

Other accessories	
N1	Non-1E
N2	1E (RED)
N3	1E (GREEN)
N4	1E (YELLOW)
N5	1E (BLUE)

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

Susol

VL-05/15

Item			VL-05□25, 32□12, 20				VL-15□25, 32□12, 20			
Rated voltage		Ur (kV)	4.76				15			
Rated current		Ir (A)	1200	2000	1200	2000	1200	2000	1200	2000
Pole distance		(mm)	150	210	150	210	150	210	150	210
Weight(H, Cradle)		(kg)	430	510	430	510	430	510	430	510
Weight(H, Circuit Cradle)		(kg)	115	140	115	140	115	140	115	140
Weight(P, Circuit Cradle)		(kg)	85	130	85	130	85	130	85	130
Rated frequency		fr (Hz)	60							
Rated interrupting current		Ik (kA)	25	31.5	25	31.5	25	31.5	25	31.5
Rated interrupting capacity		(MVA)	207	260	207	260	650	820	650	820
Rated short-time current		Ik/tk (kA)	31.5/2s							
Rated making current		Ip (kA)	81.9							
Rated interrupting time		(cycle)	3							
Withstand Voltage	Frequency	Ud (kV)	19				95			
	Impulse	Ud (kV/1.2×50μs)	60				95			
Operating duty			O-0.3s-CO-3min-CO							
Rated Closing Control voltage		(V)	DC 24~30V, DC 48~60V, DC110V, DC125V, DC220V, AC 48V, AC100~130V, AC220~250V							
Rated Trip Control voltage		(V)	DC 24~30V, DC 48~60V, DC110V, DC125V, DC220V, AC 48V, AC100~130V, AC220~250V							
Standard aux. contacts			4a4b, 10a10b							
Rated opening time		(s)	0.04							
No-load closing time		(s)	0.06							
Mechanical Endurance		(Operations)	10,000							
Electrical Endurance			Reference Standard							
Capacitive current switching			C2							
Life time	Electrical	(Operations)	Reference Electrical Life Graph							
Installation	Fixed		P Type							
	Draw-out		H Type							
Applicable standard			IEEE Std C37.09, IEEE Std C37.20.2, ANSI C37.54, ANSI C37.55							

* Lifetime with maintenance.
** H type is a box type cradle with CB compartment style structure.

Ratings - 27kV 25kA 1200/2000A

Susol

VH-27

Item			VH-27□25□12	VH-27□25□20
Rated voltage		Ur (kV)	27	
Rated short-circuit current		Isc (kA)	25	
Rated normal current		Ir (A)	1200	2000
Rated withstand voltage	Power frequency (1 min)	(kg)	60	
	Impulse (1.2×50㎲)	Up (kV)	150	
Rated frequency		fr (Hz)	60	
Rated short-circuit making current		Ip (kA)	65	
Rated short-time withstand current		Ik/tk (kA/s)	25/2	
Rated breaking time		(cycle)	3	
Rated operating sequence			O-0.3s-CO-3min-CO	
Control voltage	Closing coil	(V)	DC 125V	
	Trip coil	(V)	DC 125V	
Auxiliary contacts	Point of contacter		4a4b, 10a10b	
	Class		Class 1	
Trip coil resistance		(Ω)	37±10%	
Closing coil resistance		(Ω)	37±10%	
Rated short-circuit breaking capacity		(MVA)	1169	
Rated opening time		(sec)	≤ 40	
No-load closing time		(sec)	≤ 60	
VI stroke		(mm)	17~18	
Weight	Breaker	(kg)	400	
	Cradle	(kg)	400	

* Lifetime with maintenance.
** H type is a box type cradle with CB compartment style structure.

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

Susol

VH-05/15

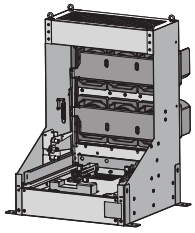
Item			VH-05H50C12/20/30			VH-15H40,50C12/20/30		
Rated voltage		Ur (kV)	4.76			15		
Rated normal current		Ir (A)	1200	2000	3300	1200	2000	3000
Rated frequency		fr (Hz)	50/60					
Rated short-circuit current		Isc (kA)	50			40, 50		
Rated short-time withstand current		Ik/tk (kA/s)	50/2			40/2, 50/2		
Rated short-circuit breaking capacity		(MVA)	412			1039, 1299		
Rated short-circuit making current		Ip (kA)	2.5 ×Isc (50Hz)/2.6×Isc (60Hz)					
Rated breaking time		(Cycle)	3					
Rated withstand voltage	Power frequency (1 min)	Ud (kV)	19			36		
	Impulse (1.2×50μs)	Up (kV)	60			95		
Rated operating sequence			O-0.3s-CO-3min-CO					
Control voltage	Closing coil	(V)	DC 125V					
	Trip coil	(V)	DC 125V					
Auxiliary contacts *			3a3b					
Rated opening time		(sec)	≤ 0.04					
No-load closing time		(sec)	≤ 0.06					
Lifetime	Mechanical		10,000					
	Electrical		See graph					
Installation version	Drawout		H type (for MESG)					
Phase distance		(mm)	254					
Weight	Breaker (MESG, MCSG)	(kg)	230	230	265	230	230	265
	Cradle (MESG, MCSG)	(kg)	248	248	286	248	248	286
Applicable standard			ANSI/IEEE Std. C37.09, KEPIC EED 1100					

* Two(2) “Early b” auxiliary contact is provided.

Mounting Position	Type	Accessory	Supplied as		Remarks	page
			VL	VH		
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	Attached at the factory	39
	T9	Current Trip Coil	Option	-	Attached at the factory	40
	SA (SB)	Auxiliary Contact 2a2b	-	-	Attached at the factory	41
		Auxiliary Contact 4a4b	●	●		
		Auxiliary Contact 6a6b	-	-		
		Auxiliary Contact 10a10b	Option	Option		
	U	Under Voltage Trip Coil	Option	Option	Attached at the factory	42
	A3	Position S/W(Test: 1a1b, Connect: 2b)	Option	Option	Attached at the factory	43
	A4	Position S/W(Test: 2a, Connect: 2a)	Option	Option	Attached at the factory	43
	A5	Position S/W(Test: 1a1b, Connect: 1a1b)	Option	Option	Attached at the factory	43
	A6	Latch Checking Switch	-	Option	Attached at the factory	44
	C	Counter	●	●	Attached at the factory	44
	A7	Keylock	Option	Option	Attached at the factory	45
	A8	Button Padlock	Option	Option	Attached at the factory	46
	A9	Button cover	Option	Option	Attached at the factory	47
	AA	Lead Wire: A/B type connector	Option	Option	Attached at the factory	48
	AB	Plug/Terminal for Lead Wire	Option	Option	Attached at the factory	48
	AC	Plug Interlock	Option	Option	Attached at the factory	49
	AD	Padlock (H type)	Option	Option	Attached at the factory	49
	AE	MOC(Mechanical Operated Cell Switch	Option	Option	Attached at the factory	50
	AF	Locking Magnet	Option	Option	Attached at the factory	51
	AJ	Door Interlock	Option	Option	Attached at the factory	61
	AO	Lead Wire: A type connector (Special Color: Blue)	Option	-	Attached at the factory	63
	AP	Trip Coil Monitoring Contact	●	●	Attached at the factory	52
Breaker (External)	CTD1	Condenser Trip Device(AC110V)	Option	Option	-	54
	CTD2	Condenser Trip Device(AC220V)	Option	Option	-	54
	UDC1	UVT Time Delay Controller(AD110V)	Option	Option	-	55
	UDC2	UVT Time Delay Controller(AD220V)	Option	Option	-	55
	UDC3	UVT Time Delay Controller(AD48V)	Option	Option	-	55
	CTU	Coil Test Unit	Option	Option	-	54
	TM	Temperature Monitoring	Option	Option	-	56

* ●: Basic Installation

Mounting Position	Type	Accessory	Supplied as		Remarks	page
			VL	VH		
Cradle	A1	ES(Earthing Switch)\ without Option	Option	Option	Attached at the factory	57
	A2	ES(Earthing Switch) with Position Switch(2a2b)	Option	Option	Attached at the factory	57
	A4	ES(Earthing Switch) with Position Switch(6a6b)	Option	Option	Attached at the factory	57
	A5	ES(Earthing Switch) with Keylock	Option	Option	Attached at the factory	58
	A6	ES(Earthing Switch) with Locking magnet: DC110V	Option	Option	Attached at the factory	58
	A7	ES(Earthing Switch) with Locking magnet: DC220V	Option	Option	Attached at the factory	58
	A8	ES(Earthing Switch) with Locking magnet: DC125V	Option	Option	Attached at the factory	58
	A9	ES(Earthing Switch) with Locking magnet: DC24V	Option	Option	Attached at the factory	58
	AA	ES(Earthing Switch) with Locking magnet: DC48V	Option	Option	Attached at the factory	58
	AB	ES(Earthing Switch) with Locking magnet: AC48V	Option	Option	Attached at the factory	58
	AC	ES(Earthing Switch) with Locking magnet: AC110V	Option	Option	Attached at the factory	58
	AD	ES(Earthing Switch) with Locking magnet: AC220V	Option	Option	Attached at the factory	58
	AE	Shutter padlock	Option	Option	Attached at the factory	59
	AF	TOC(Truck Operated Cell Switch)	Option	Option	Attached at the factory	59
	AG	MOC(Mechanical Operated Cell Switch)	Option	Option	Attached at the factory	60
	AH	Door	Option	Option	Attached at the factory	60
	AJ	Door Interlock	Option	Option	Attached at the factory	61
	AK	Door Emergency Push Button	Option	Option	Attached at the factory	61
	AL	Temperature Sensor	Option	Option	Attached at the factory	62
	AM	Type H Lead Wire 4a4b (Normal cable)	Option	Option	Attached at the factory	63
	AN	Type H Lead Wire 10a10b (Normal cable)	Option	Option	Attached at the factory	63
	AO	Type H Lead Wire 4a4b) (Flame retardant cable)	Option	Option	Attached at the factory	63
		Door padlock	Option	Option	Attached at the factory	63



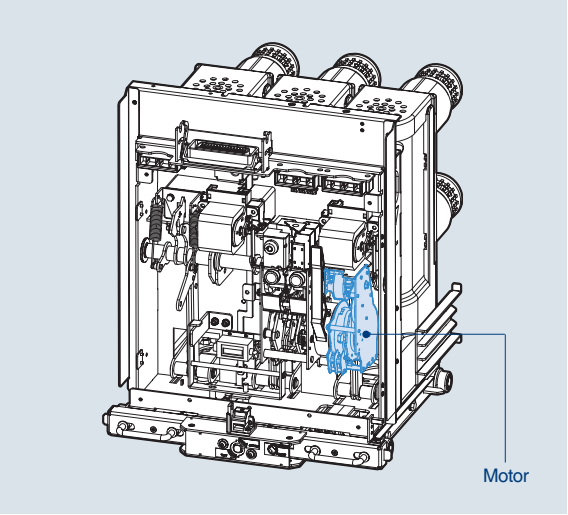
Motor: M

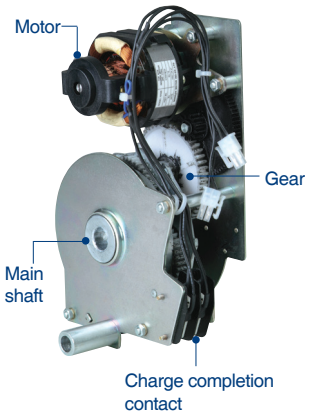
Installed inside of a breaker as standard

VL 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.

  Operating voltage range (IEC 60947)
  85%~110%Vn

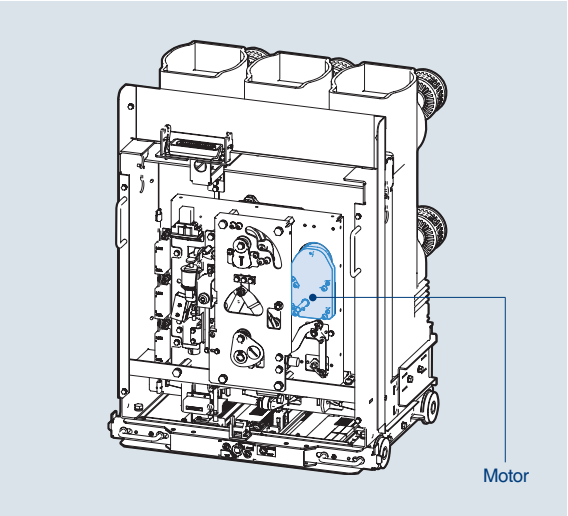


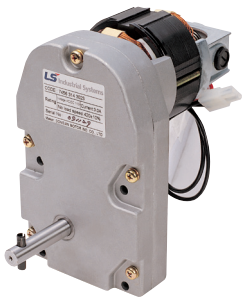


	VL type							
Input voltage (Vn)	DC 24~30V	DC 48~60V	DC 110V	DC 125V	DC 220V	AC 48V	AC 100~130	AC 200~250V
Load current (A)	≤ 5	≤ 3	≤ 1	≤ 1	≤ 0.5	≤ 3	≤ 1	≤ 0.5
Starting current (A)	5 times of load current							
Charge time	Within 5 sec.							

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

VH type





	VH Type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220V	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.						

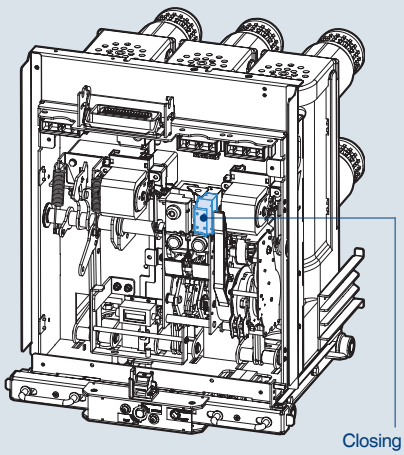
Note) Rated operation and control voltage range, see page 40.

Closing Coil: C

Installed inside of a breaker as standard

VL type

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

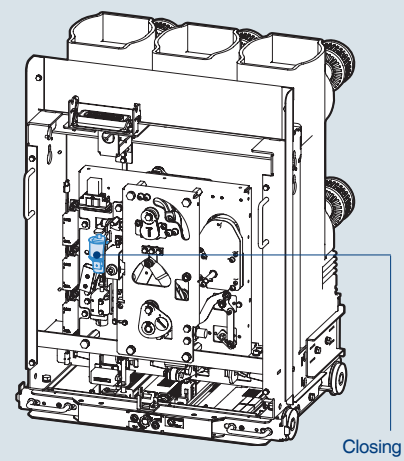


	VL type							
Input voltage (Vn)	DC 24~ 30V	DC 48~ 60V	DC 110V	DC 125V	DC 220V	AC 48V	AC 100~ 130	AC 200~ 250V
Power consumption (inrush, W)	200							
Power consumption (steady, W)	≤ 5							

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

VH 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 Type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220V	AC 48V	AC 110V	AC 220V
Rated current (A)	≤ 8	≤ 3	≤ 3	≤ 2.5	≤ 8	≤ 3	≤ 2.5

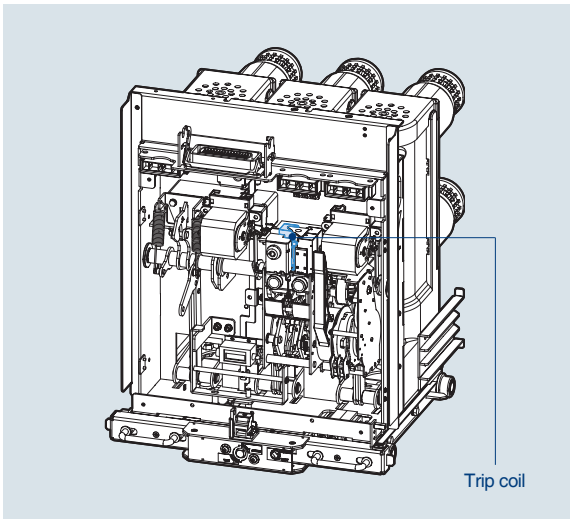
Note) Rated operation and control voltage range, see page 40.

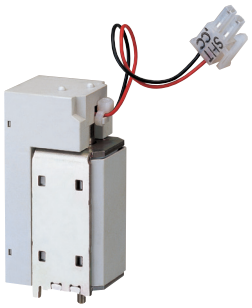
Trip Coil: T

Installed inside of a breaker as standard

VL 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.



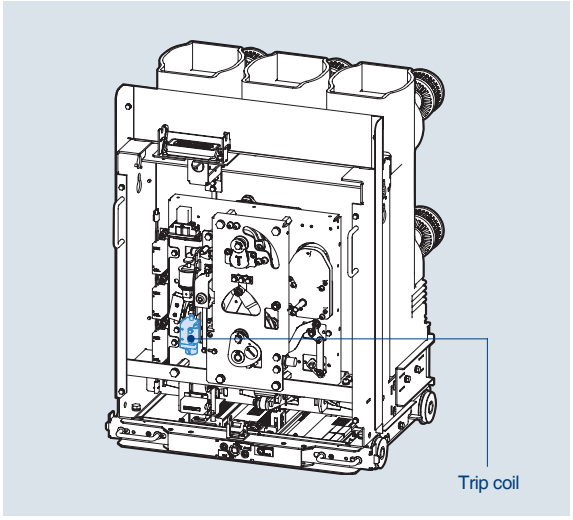


	VL type							
Input voltage (Vn)	DC 24~ 30V	DC 48~ 60V	DC 110V	DC 125V	DC 220V	AC 48V	AC 100~ 130	AC 200~ 250V
Power consumption (inrush, W)	200							
Power consumption (steady, W)	≤ 5							

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

VH 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 Type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220V	AC 48V	AC 110V	AC 220V
Rated current (A)	≤ 8	≤ 3	≤ 3	≤ 2.5	≤ 8	≤ 3	≤ 2.5

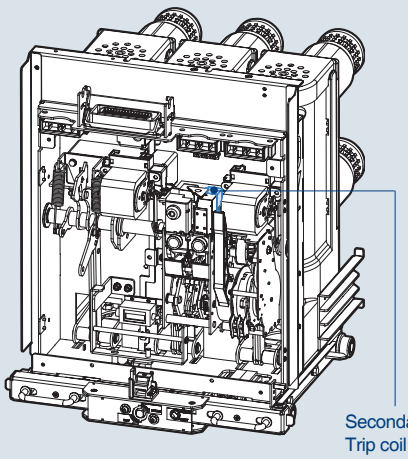
Note) Rated operation and control voltage range, see page 40 .

Secondary Trip Coil: A1

Installed inside of a breaker as an option

VL type

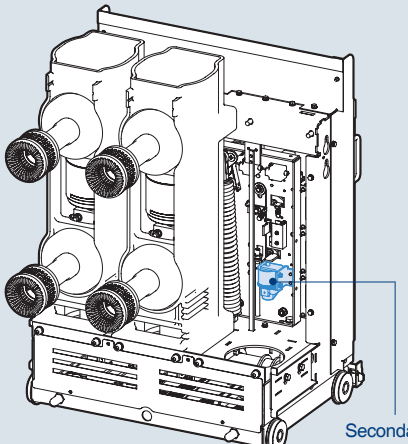
- It is a control device which trips a circuit breaker doubly from the outside. If the trip coil (T) fails, it can trip a circuit breaker safely.
- Trip coil: Install it at existing location.
- Secondary trip coil: Install it on the right side of the trip coil.
- It is not available with UVT coil when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



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

VH 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 Type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220V	AC 48V	AC 110V	AC 220V
Rated current (A)	≤ 8	≤ 3	≤ 3	≤ 2.5	≤ 8	≤ 3	≤ 2.5

Rated operation and control voltage range

Item		Susol VCB			Remarks
		VL: 7.2kV 8/12.5kA	VL: 20/25kA	VH	
Motor	AC	85~110%	85~110%	85~110%	
	DC	75~110%	85~110%	85~110%	
Closing	AC	85~110%	85~110%	85~110%	
	DC	75~125%	85~110%	85~110%	
Trip	AC	60~125%	85~110%	85~110%	
	DC	60~125%	70~110%	70~110%	
Applied standards		IEC62271-100 (2008) KSC4611	IEC62271-100 (2008)	IEC62271-100 (2008)	

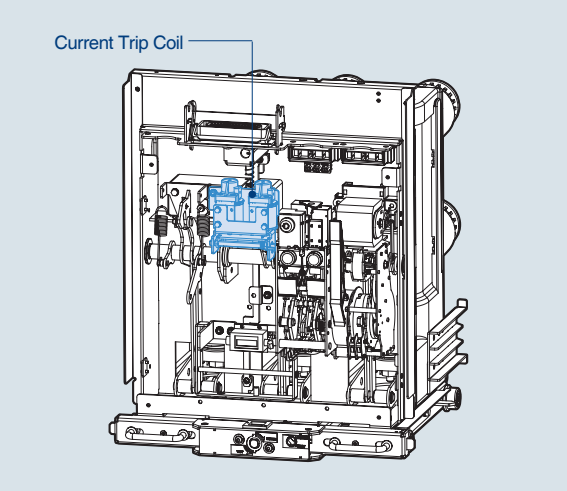
Current Trip Coil

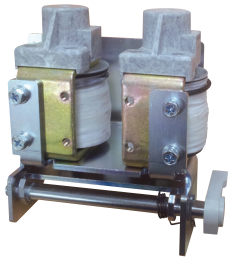
Installed inside of a breaker as an option

VL 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.





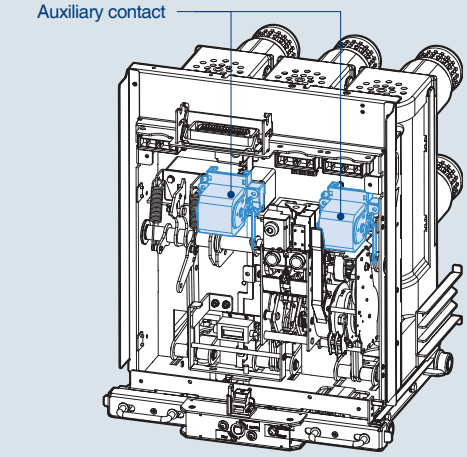
Auxiliary Contact: SA

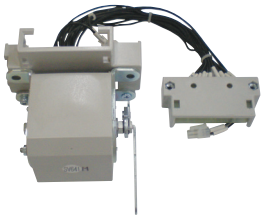
Installed inside of a breaker as an option

VL type

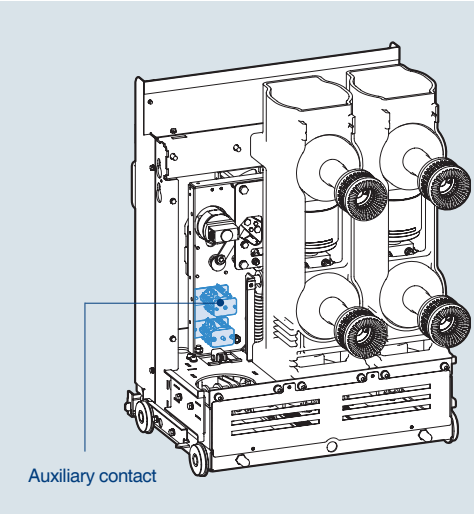
- It is a contact used to monitor ON/OFF status of a breaker from remote place.
- The auxiliary contacts supplied as standard configuration is 4a4b. 10a10b is also available on request.
- For 7.2kV 8/12.5kA VCB standard configuration is 2a2b. 4a4b and 6a6b are optional.

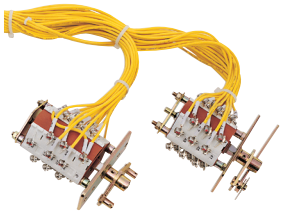
Item	VL: 7.2kV 8/12.5kA	VL: 20/25kA, VH
Standard	2a2b	4a4b
Optional	4a4b, 6a6b	10a10b





VH type



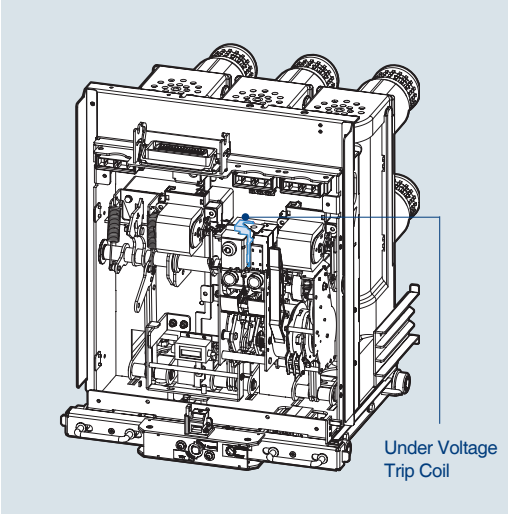


VL/VH Type					
Item			Resistive load (A)	Inductive load (A)	Remarks
Contact configuration	AC	250V	10	5	For all models
		125V	10	5	
	DC	250V	10	5	
		125V	10	5	
		30V	10	5	

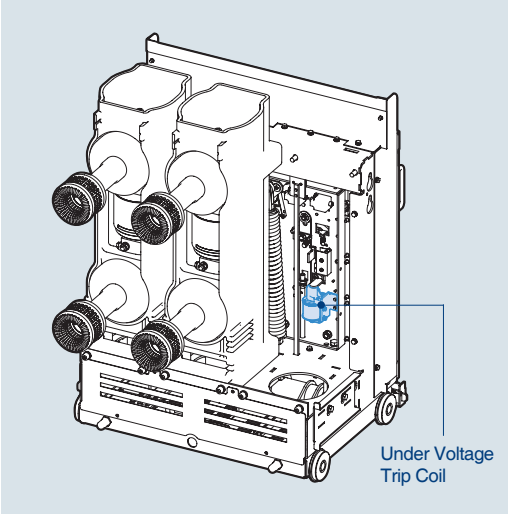
Under Voltage Trip Coil: U

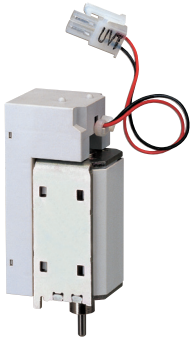
Installed inside of a breaker as an option

VL type



VH type





VL type

VH 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.

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)

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

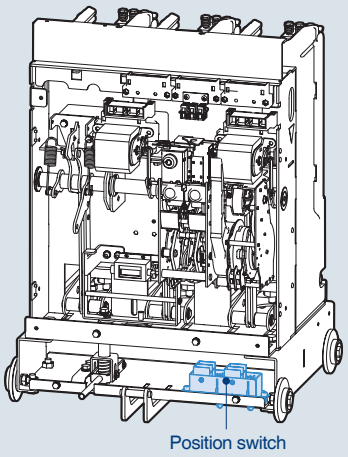
	VH Type						
Input voltage (Vn)	DC 48V	DC 110V	DC 125V	DC 220V	AC 48V	AC 110V	AC 220V
Power consumption (inrush, W)	350						
Power consumption (steady, W)	≤ 10						

Position Switch: A3, A4, A5

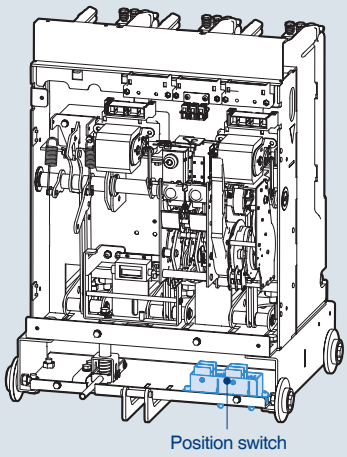
Installed inside of a breaker as an option

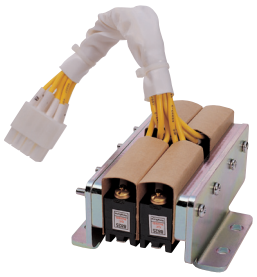
VL/VH type - H Cradle

VL



VH



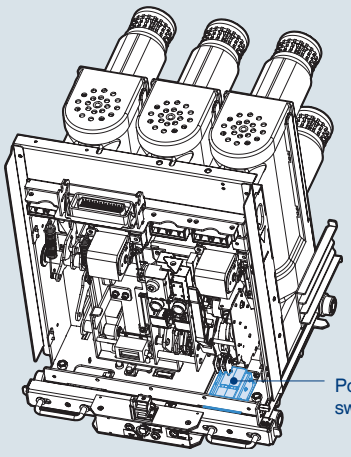


Large model (VH)

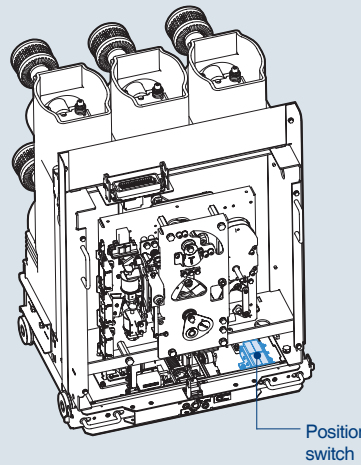
- This switch is used to indicate the breaker position (CONNECT, TEST), and contact configuration is 2a2a or 2a2b, 1a3b.

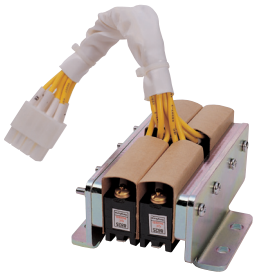
VL/VH type - H Cradle

VL



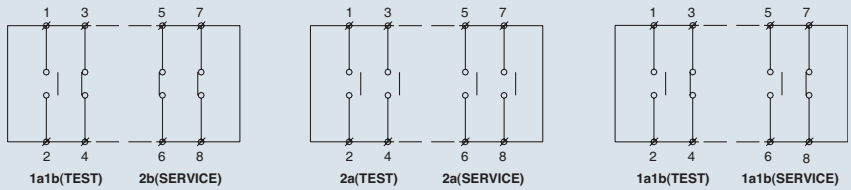
VH





Large model (VH)

Contact configuration

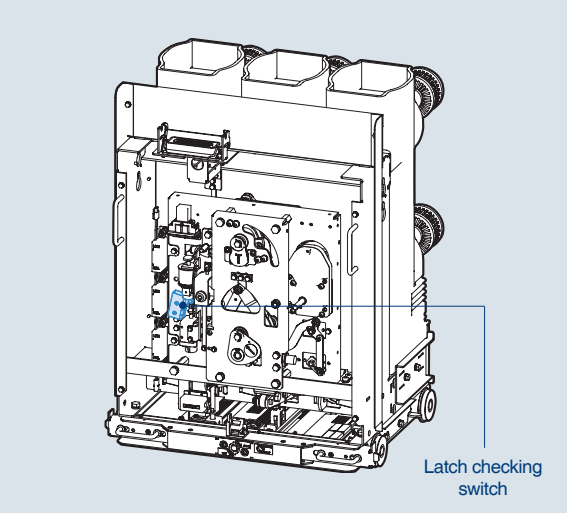


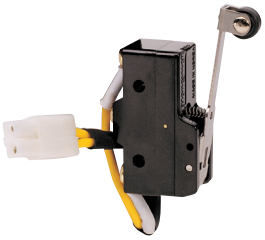
Latch checking switch: A6

Installed inside of a breaker as an option

VH 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.





Counter: C

Installed inside of a breaker as standard

VL/VH type

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

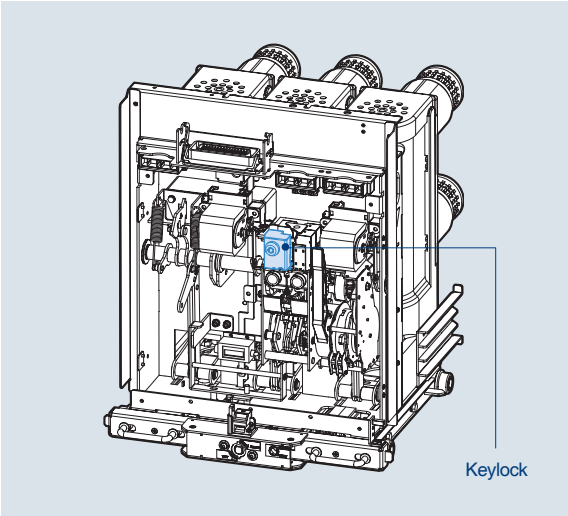
Keylock: A7

Installed inside of a breaker as an option

VL type

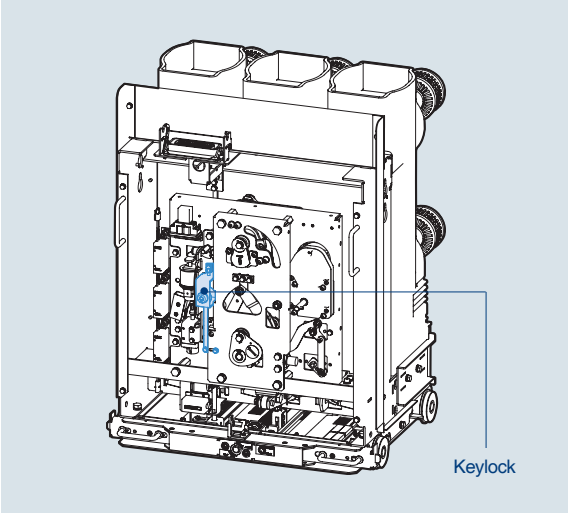
・The key is to unlock the locking device first to close the breaker electrically and mechanically.

*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.



VH 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.



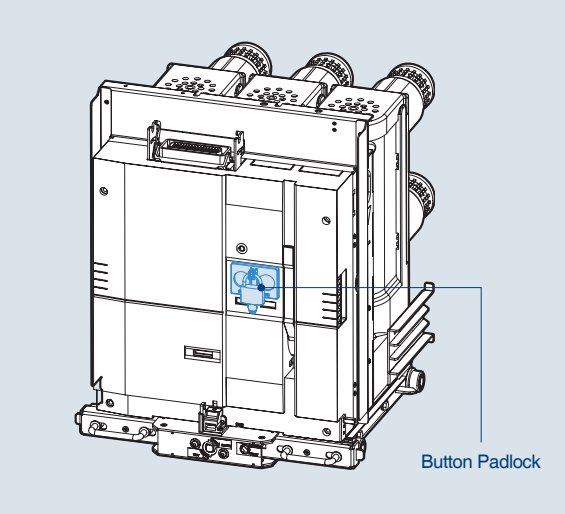
Button Padlock: A8

Installed outside of a breaker as an option

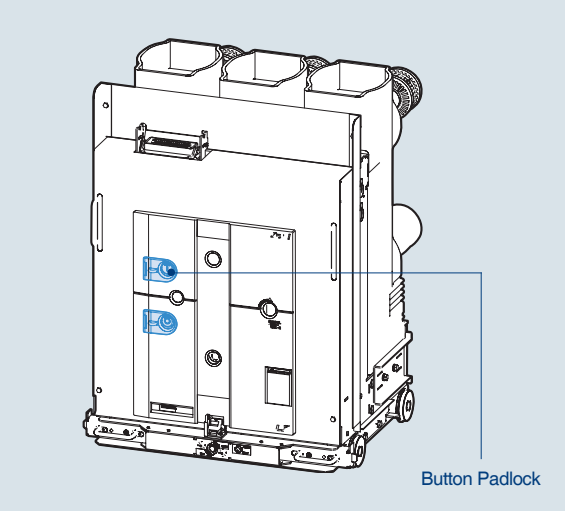
VL type

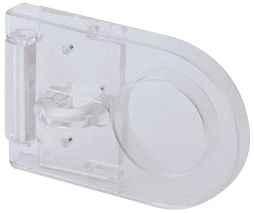
- It is to prevent manual operation of ON/OFF button due to user's wrong handling.
- It is not possible to handle ON/OFF operation under the "Button lock" status.

* Key lock is not supplied.



VH type



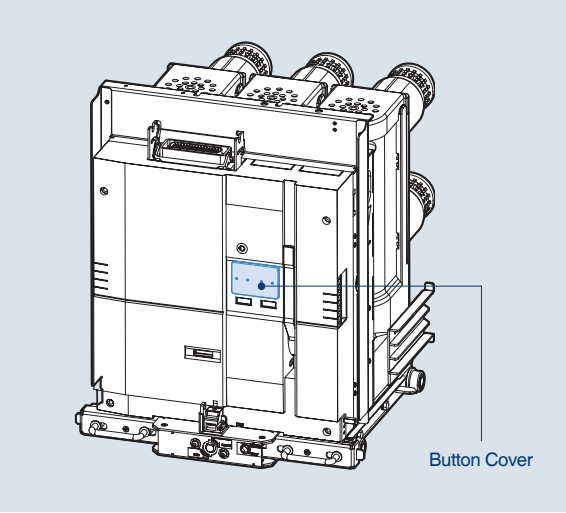


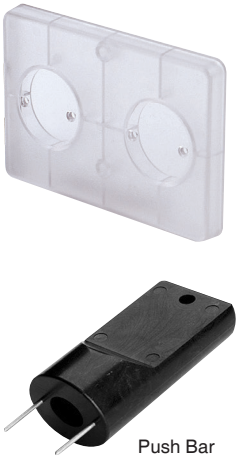
Button Cover: A9

Installed outside of a breaker as an option

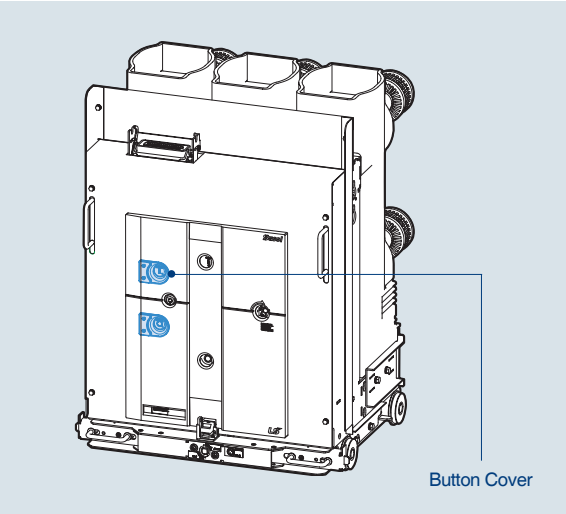
VL type

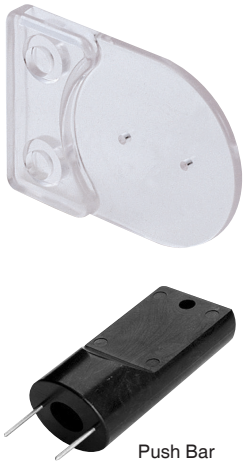
- It is a protection cover to prevent an accident due to unintended operation of ON/OFF button.
- Use the push-bar to operate the ON/OFF button.





VH type



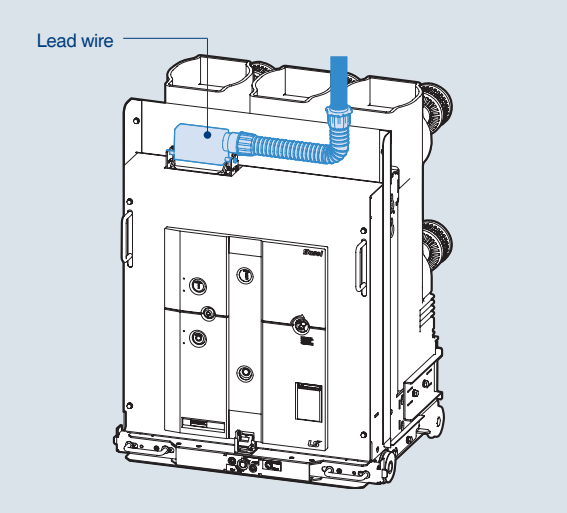


Lead wire: AA

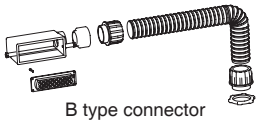
Supplied separately from a breaker as an option

VL/VH type

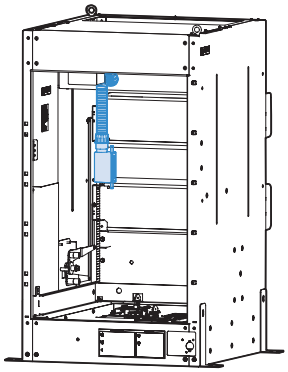
- It is to connect with the control circuit of a breaker from outside. (supply wire length: 2m)
- A type connector is supplied for P/E/F/G type of VL VCB.
- B type connector is supplied for P type of VH VCB.
- In case of H type breaker of VL and VH models the Lead wire is installed in the cradle when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



A type connector



B type connector



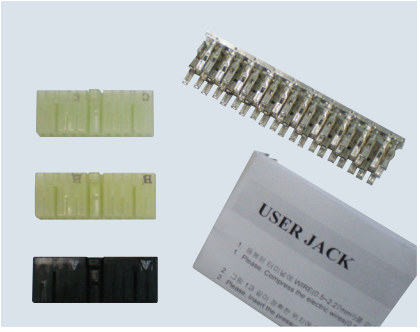
Supply ways of Lead wires by VCB model

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

VL/VH type



A type connector

B type connector

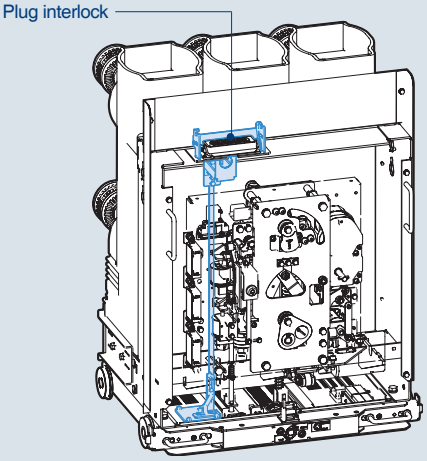
- It is connector to connect with the connector installed in the breaker. (supply connectors and terminal only for lead wire)
- Type of connector is depends on the type of connector installed in the breaker- A or B.

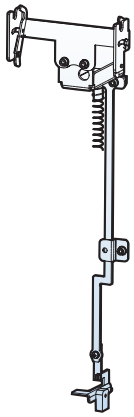
Plug interlock: AC

Installed inside of a breaker as an option

VL/VH 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.



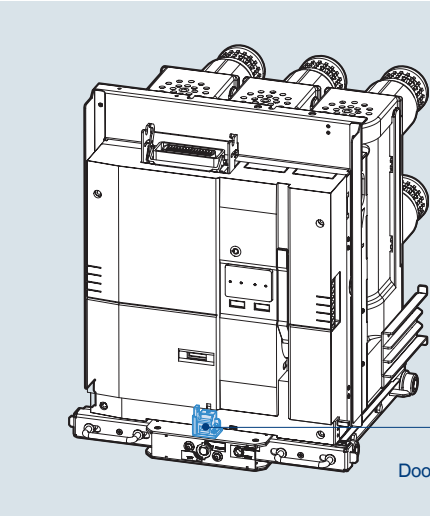


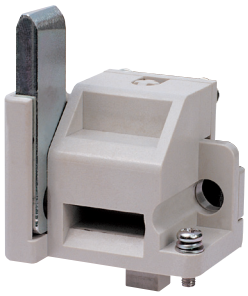
Padlock/Door racking interlock: AD

Installed outside of a breaker as an option

VL/VH 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.



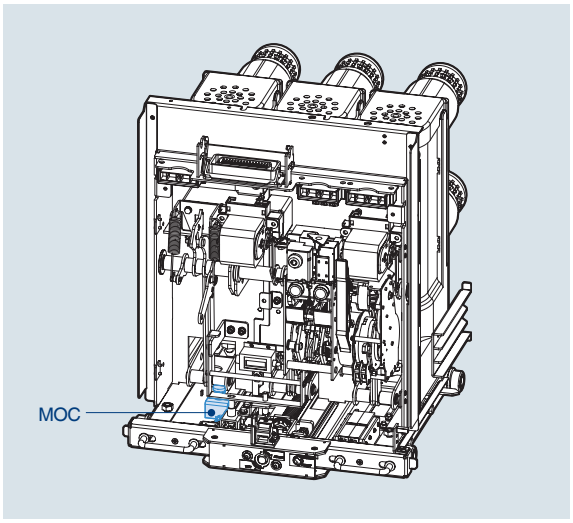


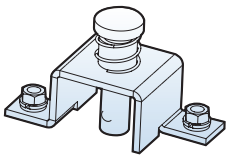
MOC drive device: AE

Installed inside of a breaker as an option

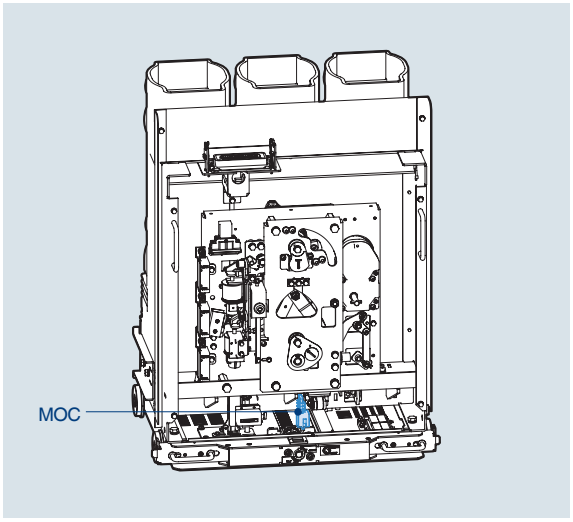
VL type

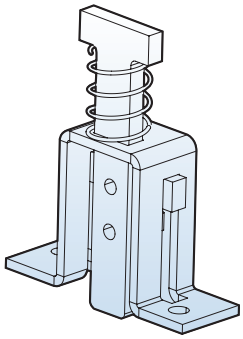
- It must be installed in the breaker to drive the MOC installed in H type cradle.
- MOC, Mechanically operated cell switch is the device to indicates the Closed/Trip status of VCB in 'CONNECT' position only.
- This MOC drive device in the breaker should be installed when MOC in the cradle is used.





VH type





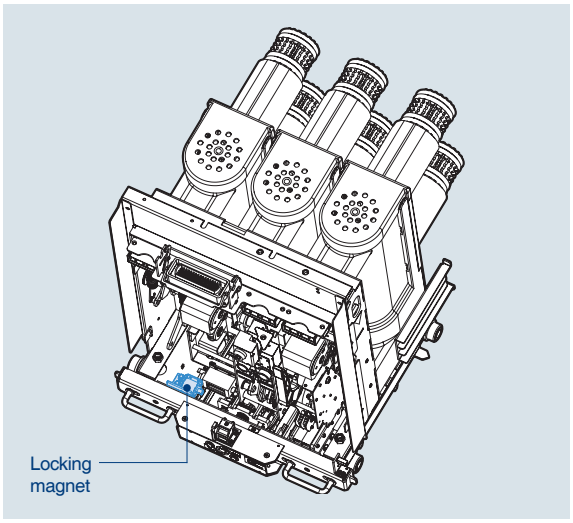
Locking magnet: AF

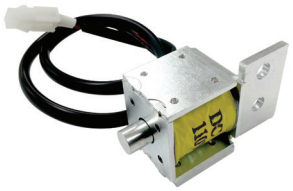
Installed inside of a breaker as an option

VL type

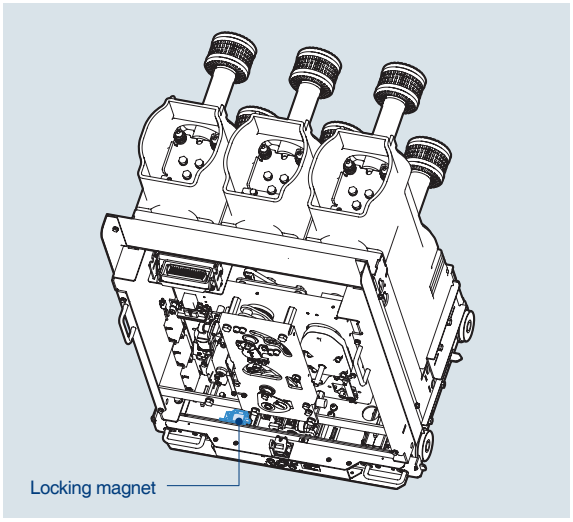
- It allows the drawing-in of the breaker in the TEST position under the condition that the control power connector on the cradle (H type) is connected with the connecting terminal of the breaker and the power is supplied.
- During the drawing-in or in the CONNECT position draw-in/out is allowed without supplying power.

* Control power rating is the same as that of a motor.





VH type

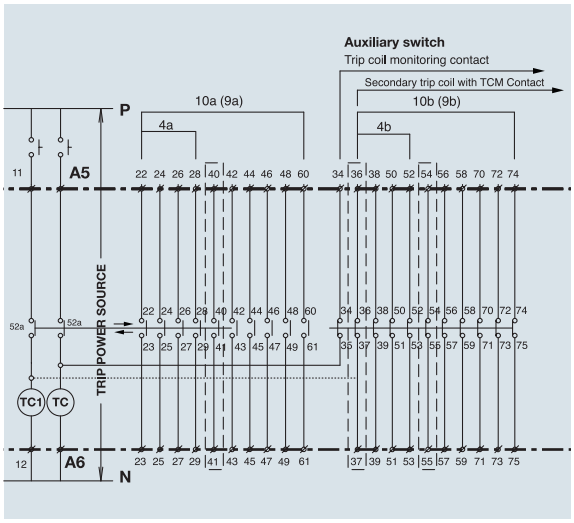


Trip coil monitoring contact: AP

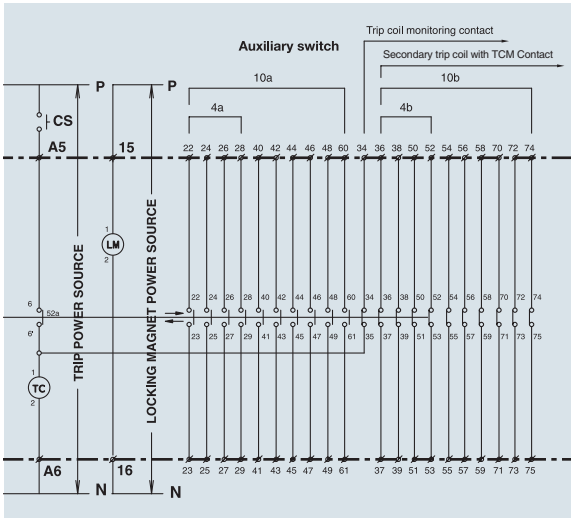
Installed inside of a breaker as an option

VL 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 Secondary Trip Coil Monitoring contact, Trip Coil T1,T2,T3 are available.

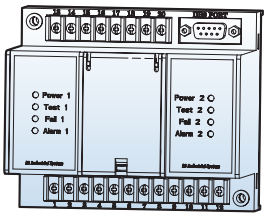


VH type



Coil Test Unit: CTU

Installed outside of a breaker as an option



・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

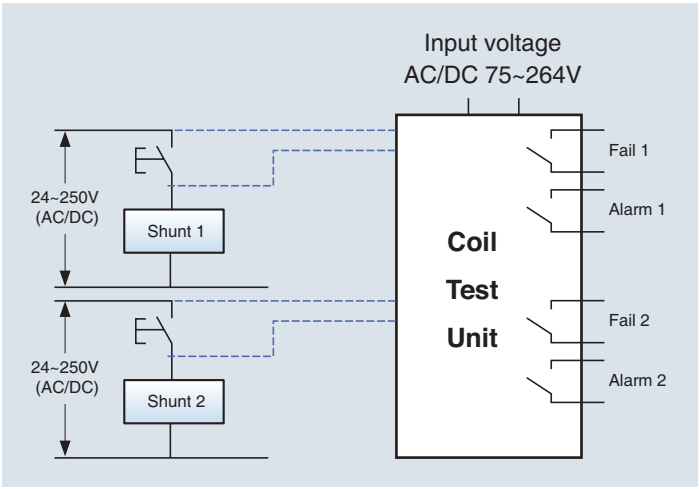
※ **As it is connected in parallel with the control part of the coil the normal operation of the coil is not affected.**
※ **Monitoring of the running coils is not possible.**
※ **One test unit can monitor up to two coils.**

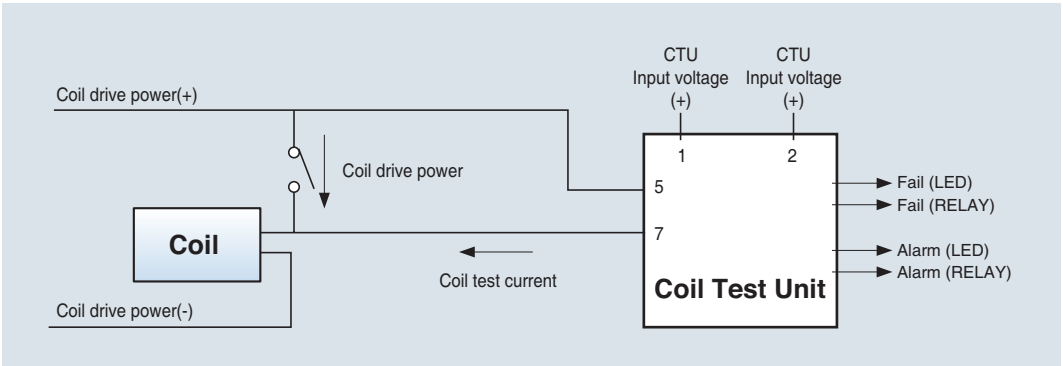
1. Input voltage: AC/DC 75V~264V

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

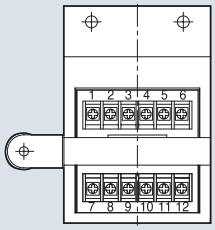
Installed outside of a breaker as an option

Ratings

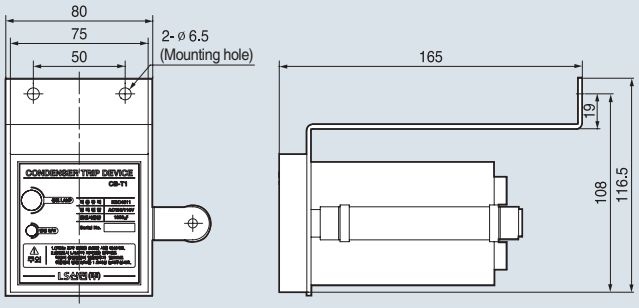
Ratings	Specification	
Model	CB - T1	CB - T2
Rated input voltage (V)	AC 100/110	AC 200/220
Frequency (Hz)	50/60	50/60
Rated charge voltage (V)	140/155	280/310
Charging time	Within 10sec.	Within 10sec.
Trip possible time	Within 30sec.	Within 30sec.
Range of Input voltage	85%~110%	85%~110%
Condenser capacity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

- 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.

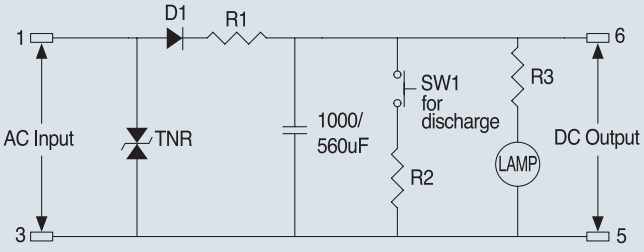
Terminal arrangement



External dimension

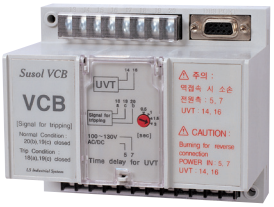


Circuit diagram



UVT Time delay: UDC

Installed outside of a breaker as an option



- 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

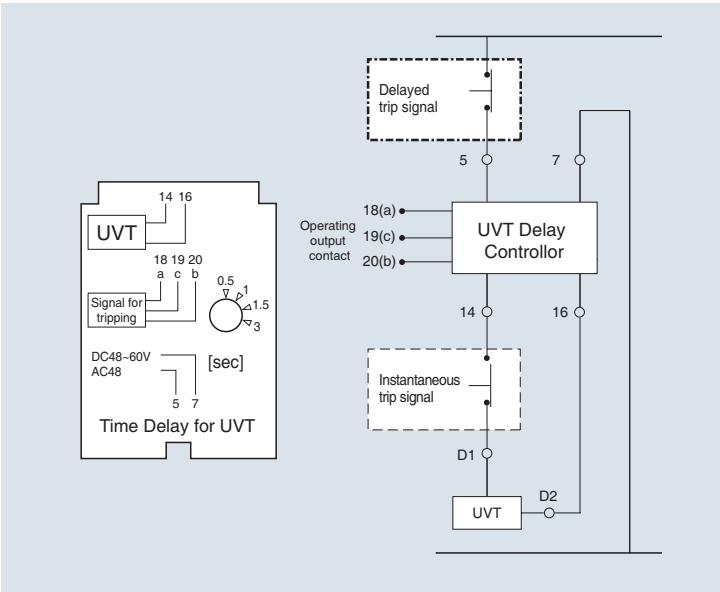
Rated voltage (Vn)		Opration voltage range (V)		Consumption (VA or W)		Time delay (ms)
DC (V)	AC (V)	Pick up	Drop out	Inrush	Steady - state	
48~60	48	0.65~0.85 Vn	0.4~0.65 Vn	200	≤ 5	0.5, 1, 1.5, 3
100~130	100~130					
200~250	200~250					

- 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

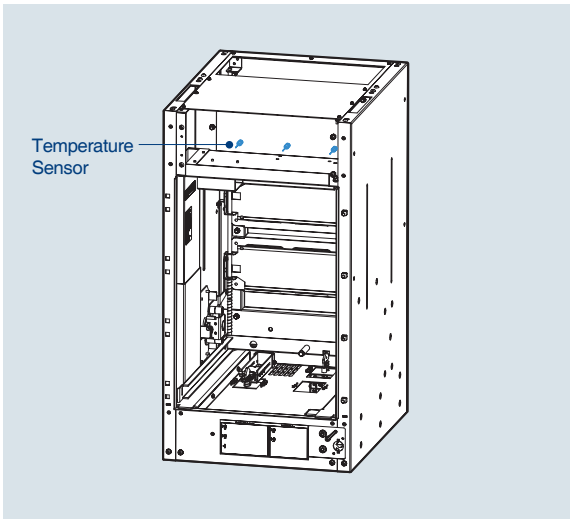


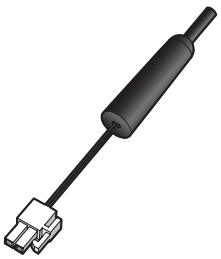
Temperature sensor and monitoring unit: TM

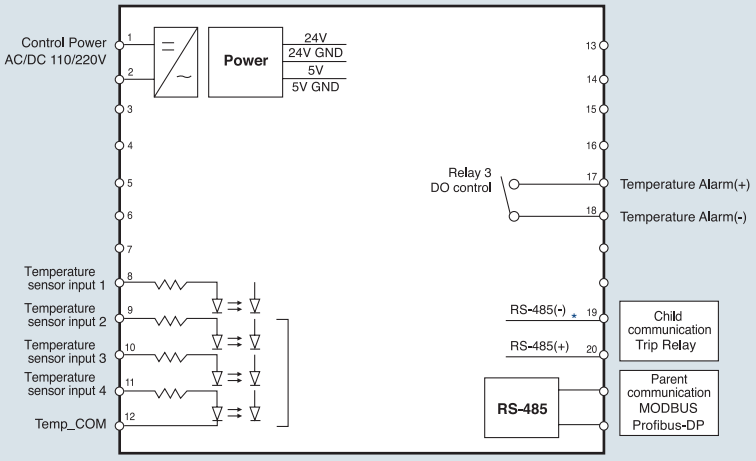
Installed outside of a breaker as an option

VL/VH type

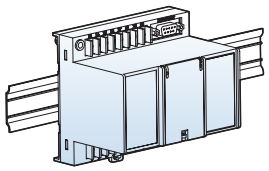
- Temperature Alarm Unit displays the input temperature detected through the temperature sensor installed in H-type cradle.
- Temperature sensor can be installed up to three (R, S, T phase).
- Temperature Alarm Unit converts the temperatures detected from the senser in the cradle and displays the maximum 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.



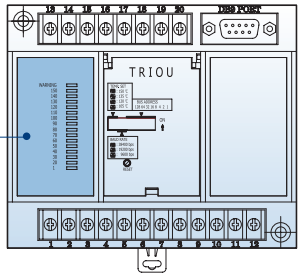


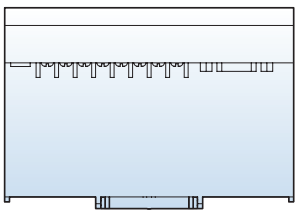


Temperature sensor and monitoring unit



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





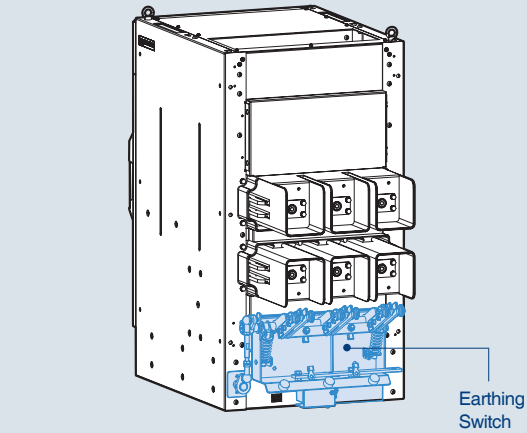
Earthing Switch: A1

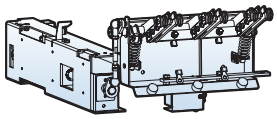
Built-in a cradle as an option

VL/VH type

- For the safety during the maintenance of switchgear in the position of TEST/Drawout discharge the charging current in the load side of a VCB with this earthing switch.
  It is available onlt for H type drawout breaker.

* Regarding the operations of earthing switch and related accessories see the instruction manual.
* Applicable Standards: IEC 62271-102



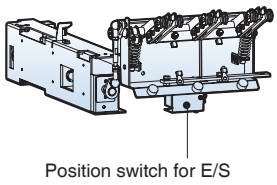


Position switch for Earthing Switch: A2, A4

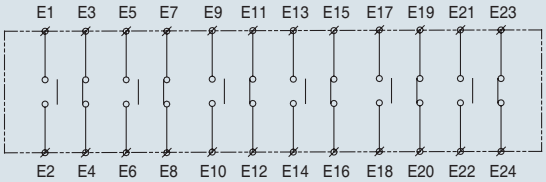
Built-in a cradle as an option

- In case of using earthing switch it can be added to indicate the ON / OFF status of the earthing switch.

** Contact configuration: 2a2b, 6a6b



Circuit diagram



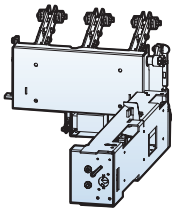
Keylock for Earthing Switch: A5

Built-in a cradle as an option

- In case of using earthing switch it can be added for two types of interlocking.

  1) Interlock to keep opening

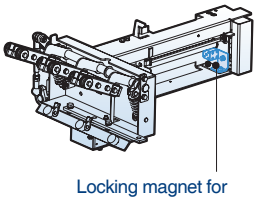
  2) Interlock to keep earthing



Locking magnet for Earthing Switch: A6~AD

Built-in a cradle as an option

- In case of using earthing switch it can be added to prevent the earthing switch from opening or earthing before it is energized.
- Verify if the locking magnet is energized before opening or earthing the earthing switch.
- Control voltage
  - DC 24V / DC 48V / DC 110V / DC 125V / DC 220V
  - AC 48V / AC 110V / AC 220V

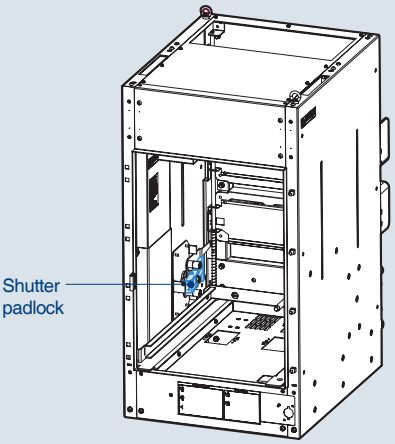


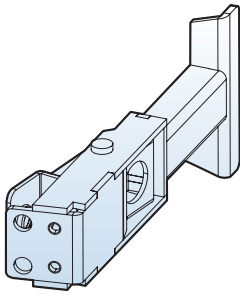
Shutter padlock: AE

Built-in a cradle as an option

VL/VH 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.





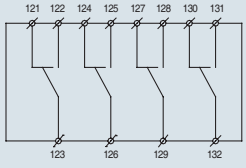
Truck operated cell switch (TOC: AF)

Built-in a cradle as an option

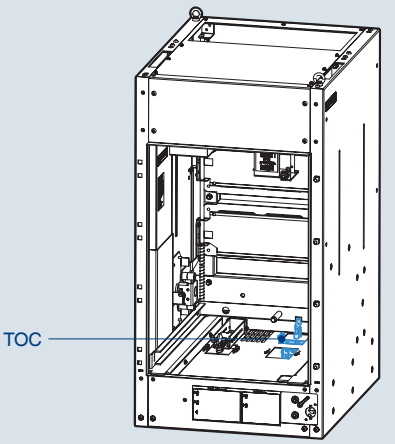
VL/VH type

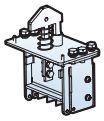
- This auxiliary switch is used to indicate the 'CONNECT' position of VCB. It is installed in the bottom of a H type cradle and operated by the frame of a breaker.
- TOC is consisted of 4 cell switches with changeover contacts as below diagram.

Circuit diagram

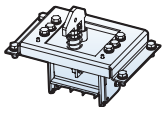


a Contact: 122-123, 125-126, 128-129, 131-132,
b Contact: 121-123, 124-126, 127-129, 130-132





VL type



VH Type

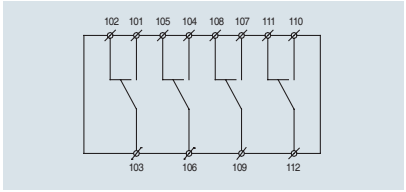
Mechanical Operated Cell Switch (MOC: AG)

Built-in a cradle as an option

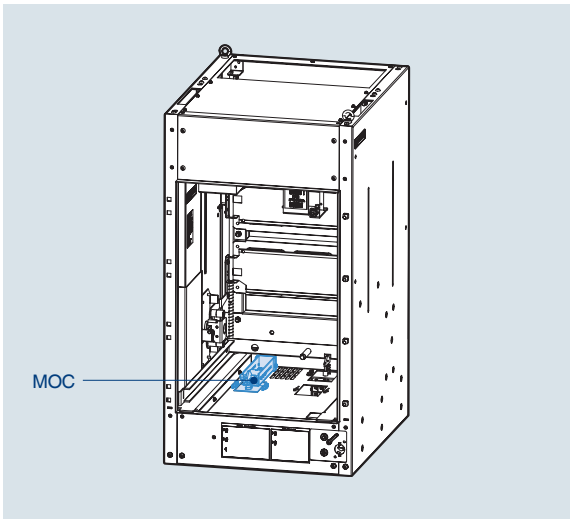
VL/VH type

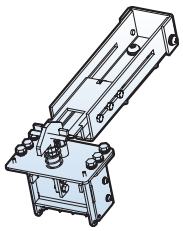
- This auxiliary switch is used to indicate the Close/Trip of VCB. It is operated mechanically at the CONNECT position and installed in the bottom of a H type cradle and operated by the frame of a breaker.
- MOC is consisted of 4 cell switches with changeover contacts as below diagram.

Circuit diagram

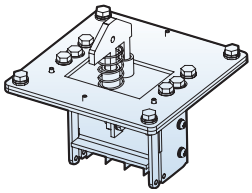


a Contact: 101-103, 104-106, 107-109, 110-112,
b Contact: 102-103, 105-106, 108-109, 111-112





VL type



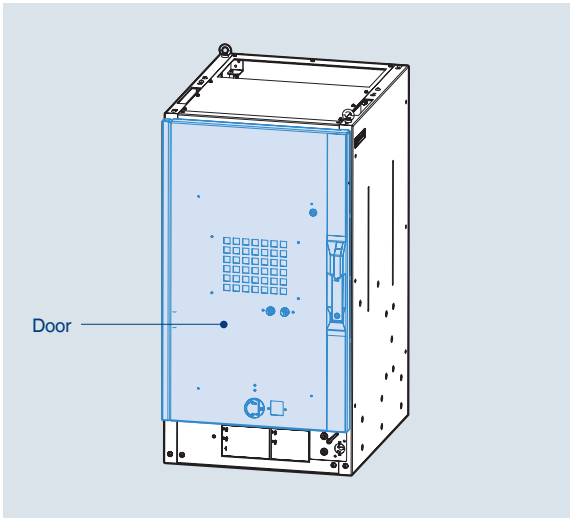
VH Type

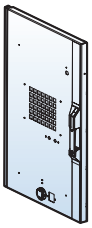
Door: AH

Built-in a cradle as an option

VL/VH type

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



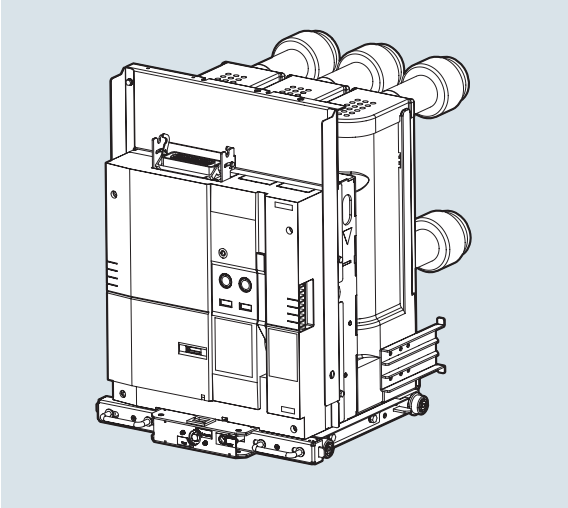


Door Interlock: AJ

Built-in a cradle as an option

VL/VH type

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

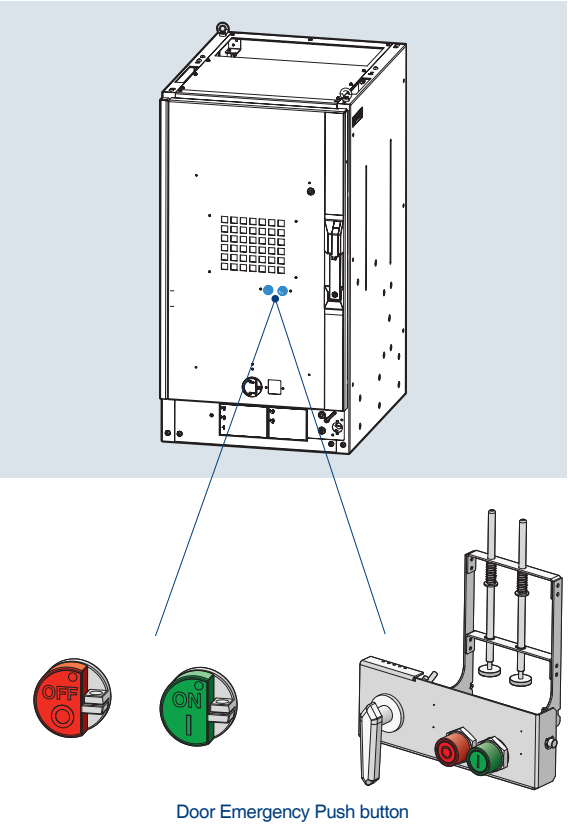


Door Emergency Push button: AK

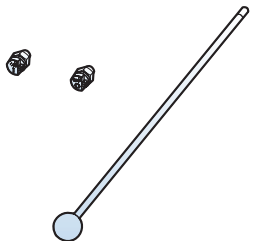
Built-in a cradle as an option

VL/VH 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

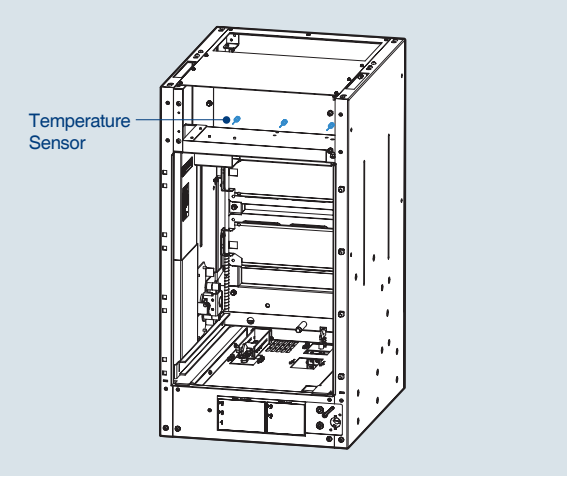


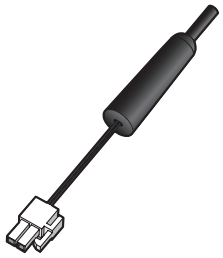
Temperature Sensor: AC

Built-in a cradle as an option

VL/VH 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).



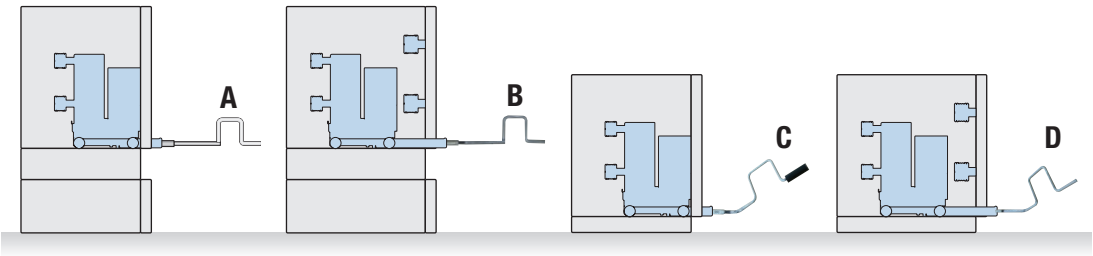


Racking In/Out handle

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	Operating handle for earthing S/W
VL	H K	A	55223172407 	Not required	
		B	55223172403 		
VH		C	55223172405 	55213143006 	
		D	55223172406 		

Racking in/out handle for H, K cradle

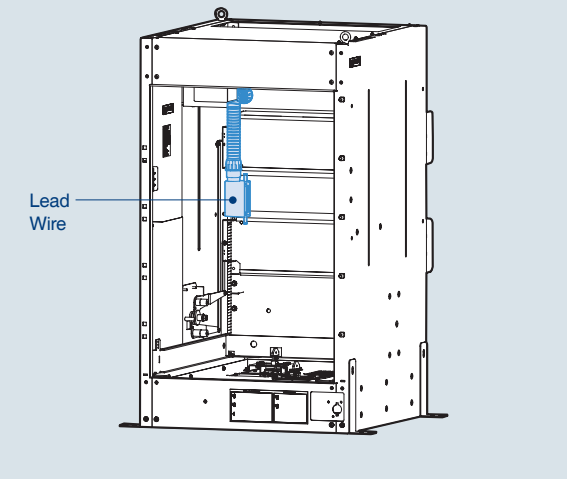


Type H Cradle Lead Wire: AM~AO

Built-in a cradle as an option

VL/VH type

- In case of H type breaker of VL and VH 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.

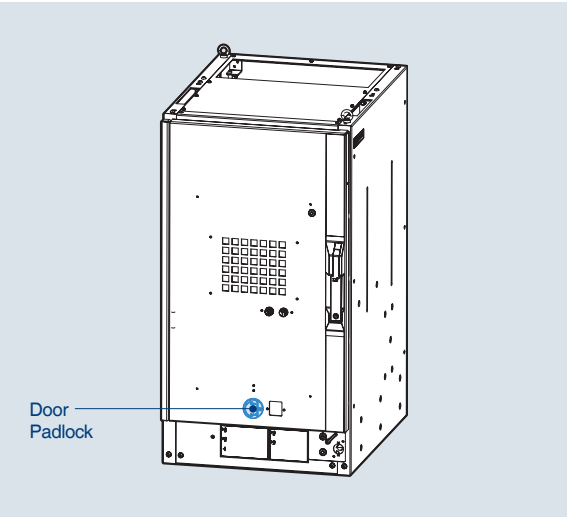


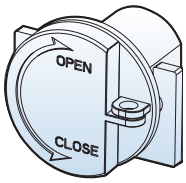
Door Padlock

Built-in a cradle as an option

VL/VH 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.

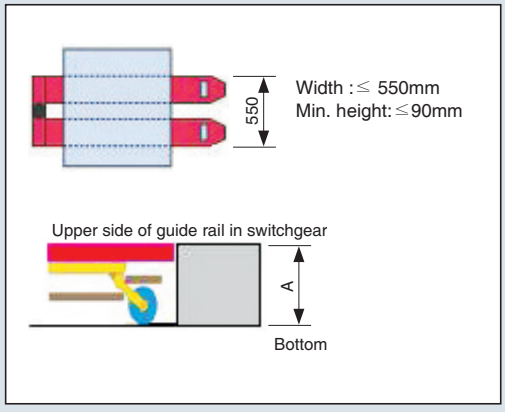




Auxiliary guide frame

- 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



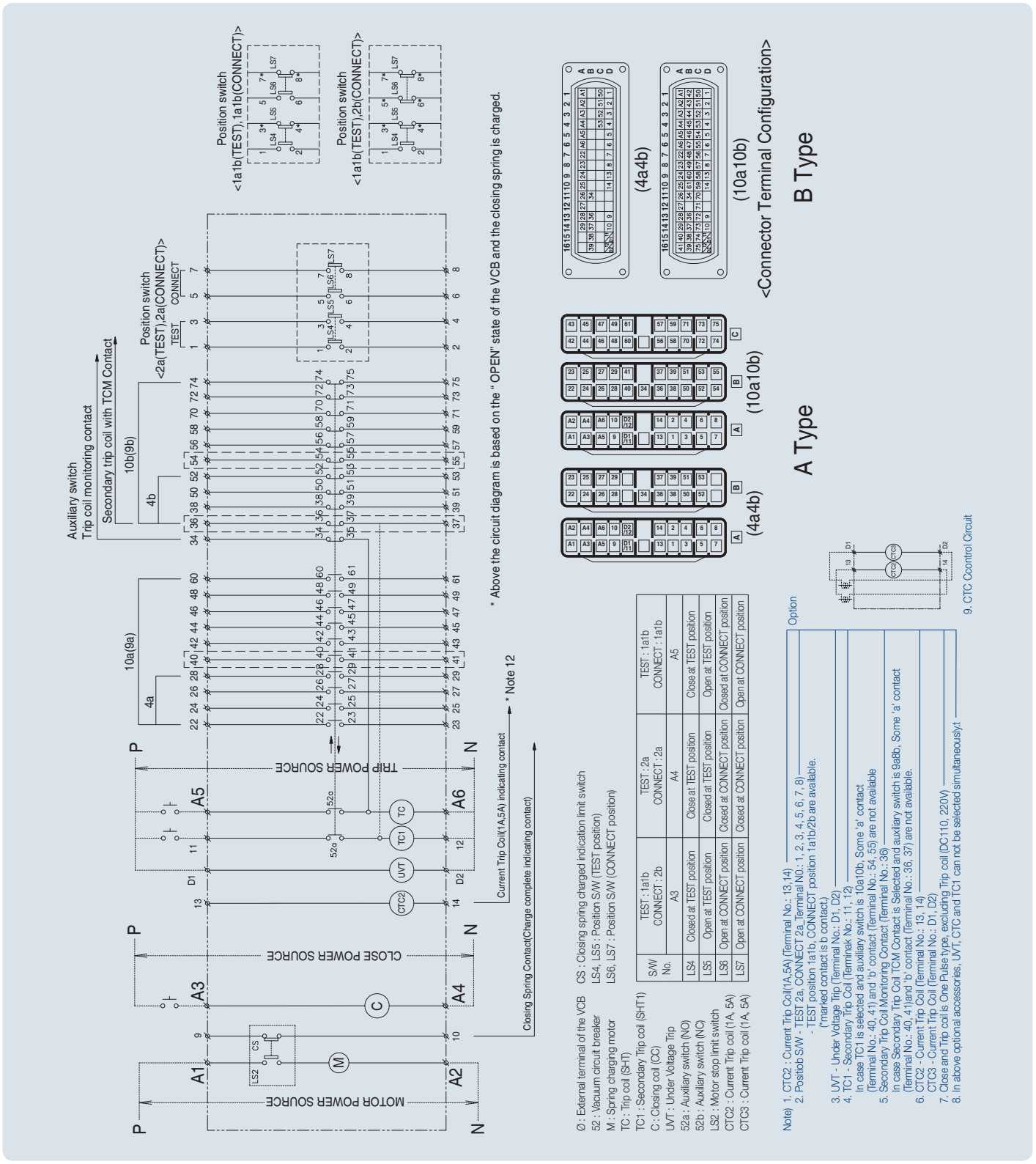
<Fig 1>

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

VL-05/15



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)

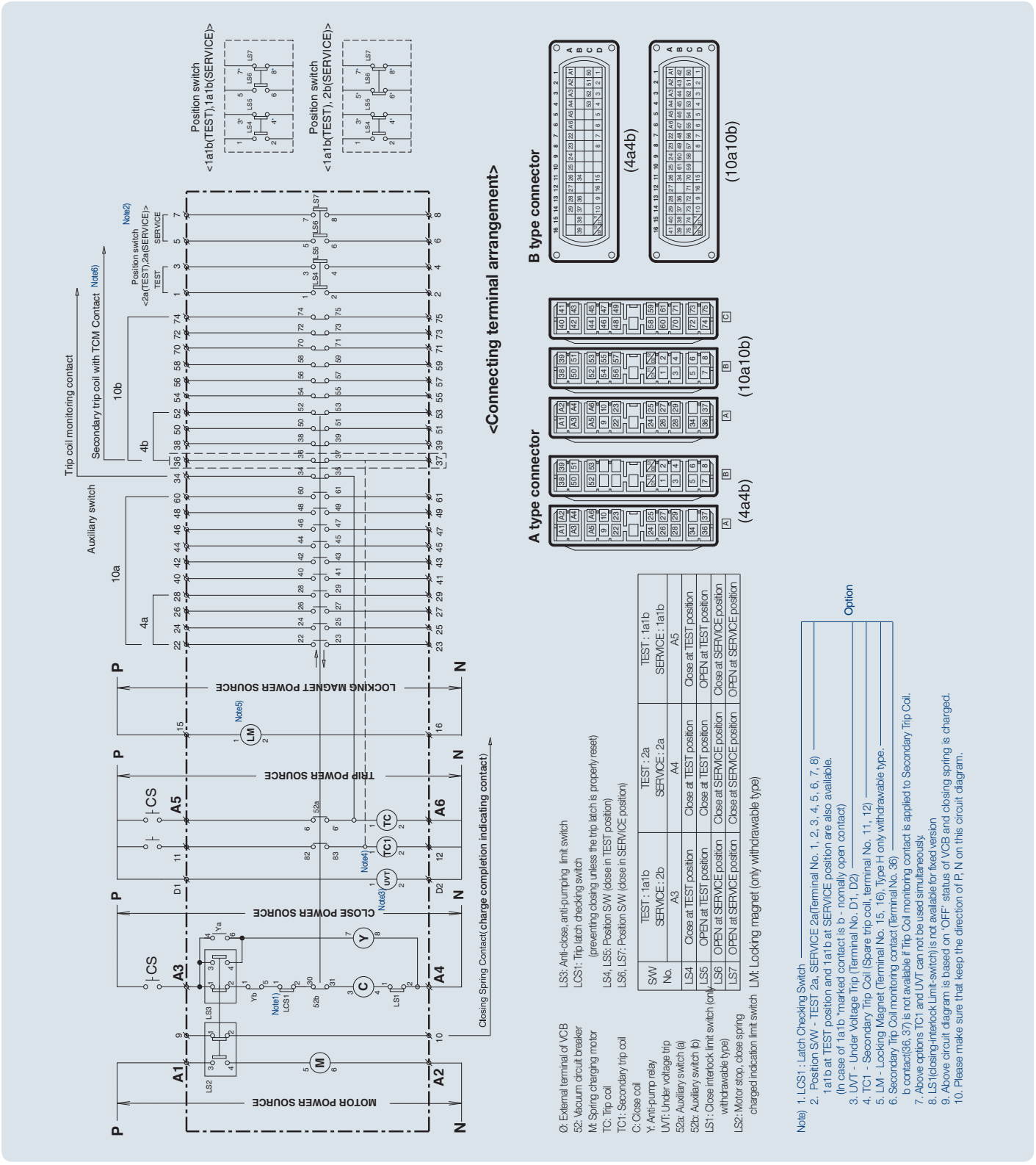
S/W No.	TEST : 1a1b CONNECT : 2b	TEST : 2a CONNECT : 2a	TEST : 1a1b CONNECT : 1a1b
	A3	A4	A5
LS4	Closed at TEST position	Close at TEST position	Close at TEST position
LS5	Open at TEST position	Closed at TEST position	Open at TEST position
LS6	Open at CONNECT position	Closed at CONNECT position	Closed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

Control circuit diagram

VH-27



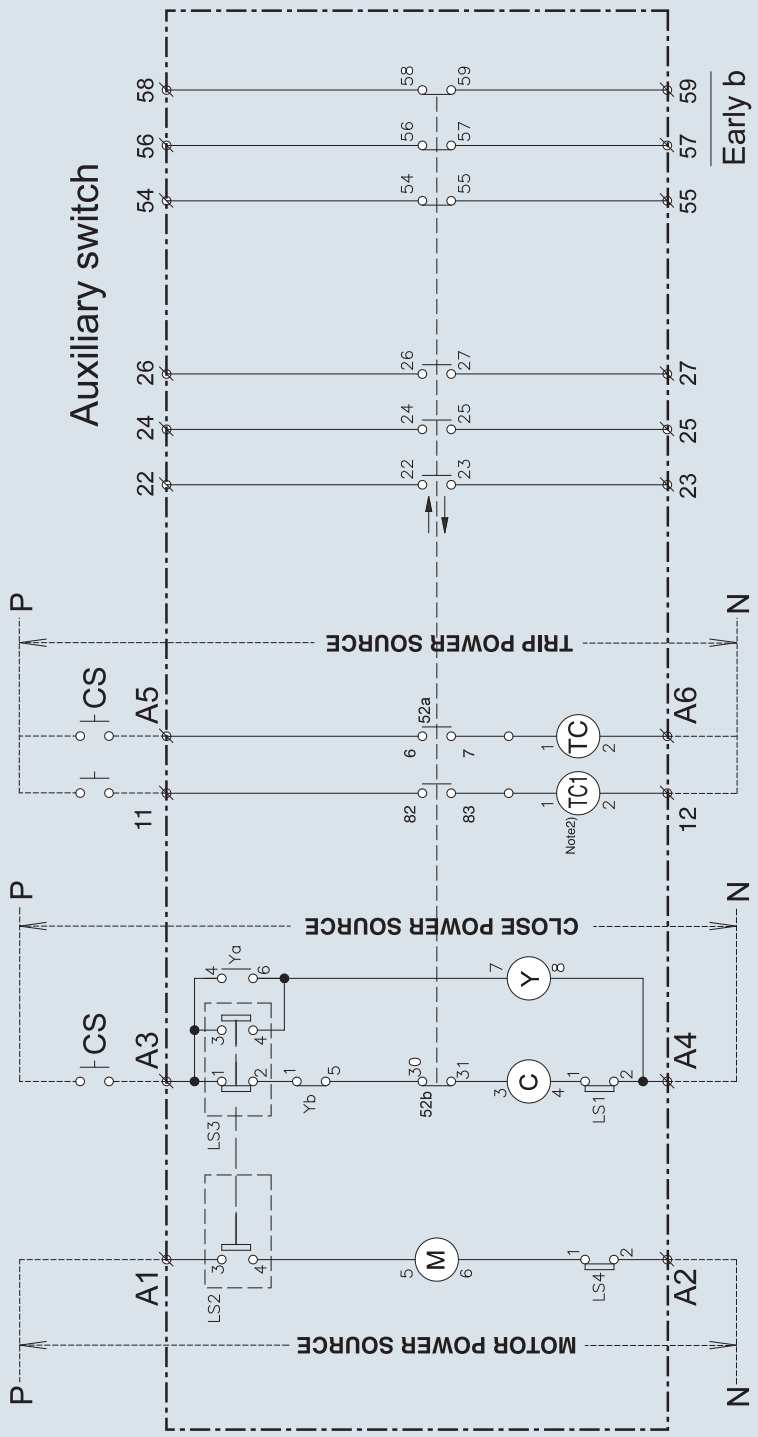
Ø: External terminal of VCB
52: Vacuum circuit breaker
M: Spring charging motor
TC: Trip coil
TC1: Secondary trip coil
C: Close coil
Y: Anti-pump relay
UVT: Under voltage trip
52a: Auxiliary switch (a)
52b: Auxiliary switch (b)
LS1: Close interlock limit switch (only withdrawable type)
LS2: Motor stop, 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)
LM: Locking magnet (only withdrawable type)

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

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 - nomally 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.

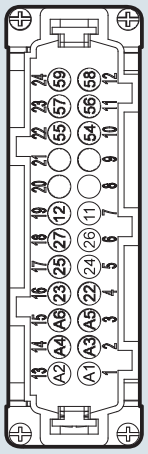
Option

VH-05/15

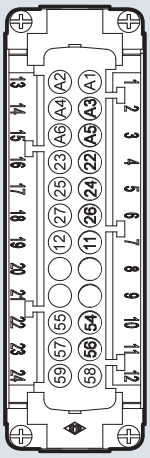


Ø : External terminal of VCB
52 : Vacuum circuit breaker
M : Spring charging motor
TC : Trip coil
TC1 : Secondary trip coil(Option)
C : Closing coil
Y : Anti-pump relay
52a : Auxiliary switch (NO)
52b : Auxiliary switch (NC)
LS1 : Close interlock limit switch
LS2 : Motor stopping limit switch
LS3 : Anti-closing, 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. Please follow direction of P,N marked in the above circuit diagram.



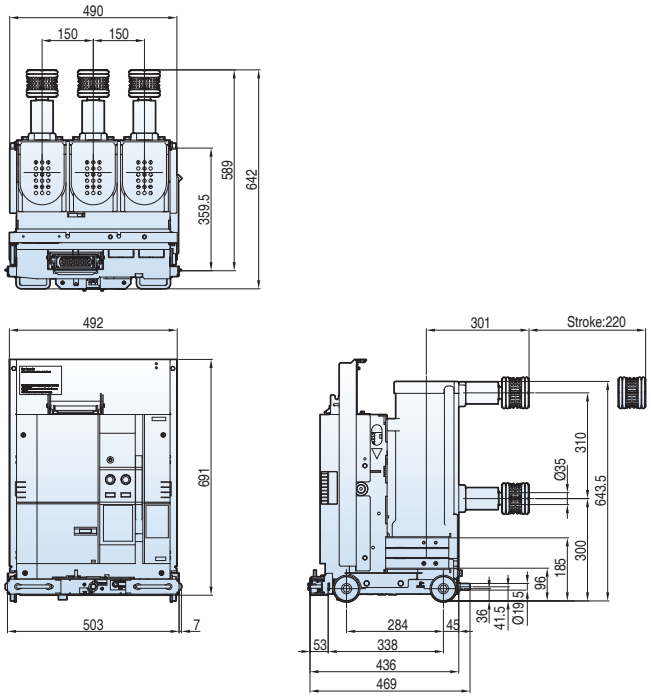
SECONDARY DISCONNECT WIRING
(FRONT VIEW OF RECEPTACLE PLUG, VCB)



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

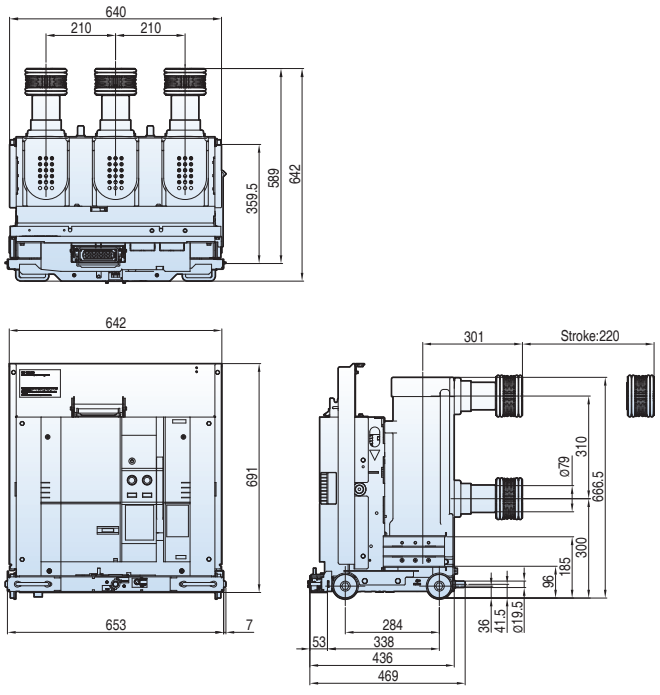
4.76/15kV, 25/31.5kA, 1200A

Phase distance 150, H Type



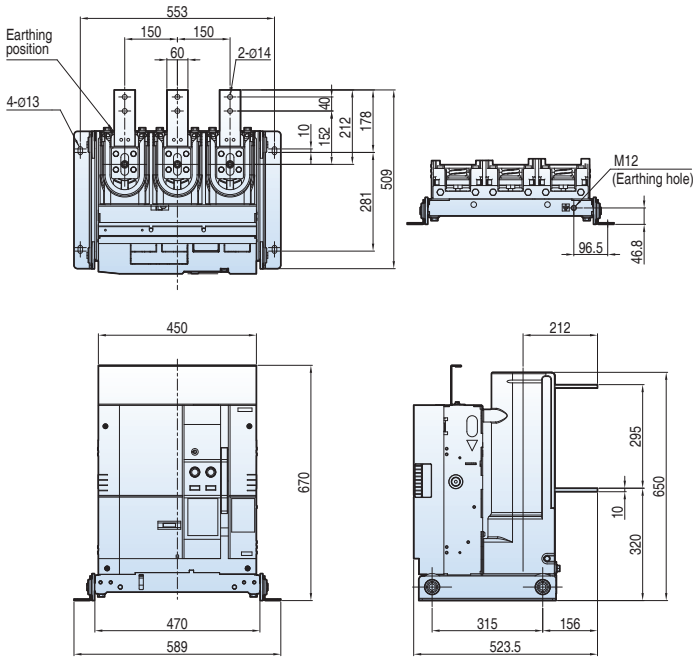
4.76/15kV, 25/31.5kA, 2000A

Phase distance 210, H Type



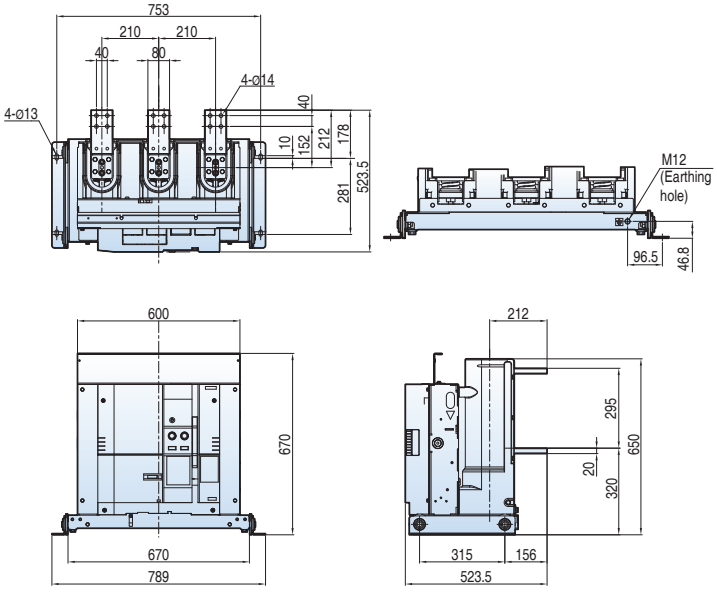
4.76kV, 25/31.5kA, 1200A

Phase distance 150, P Type



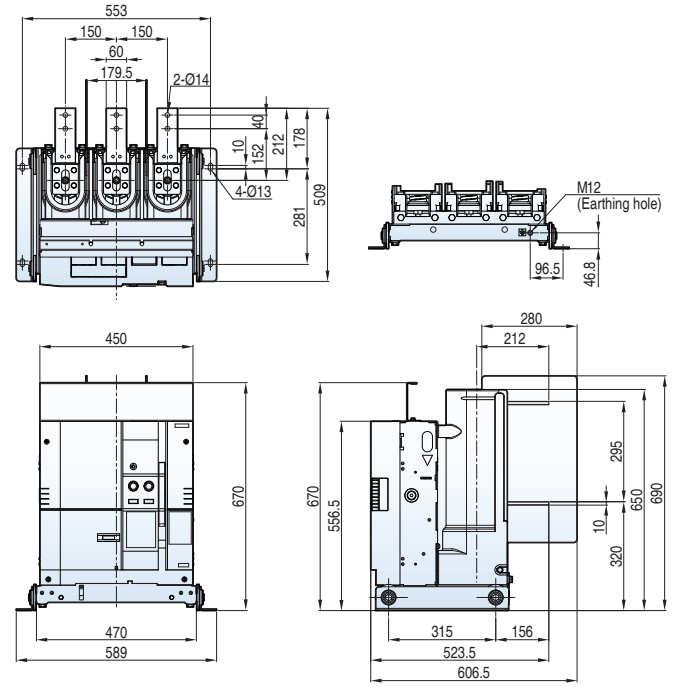
4.76kV, 25/31.5kA, 2000A

Phase distance 150, P Type



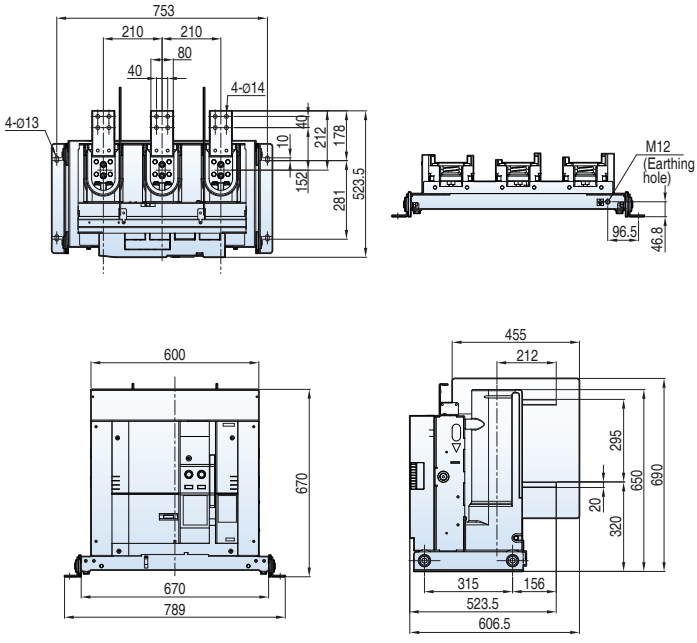
15kV, 25/31.5kA, 1200A

Phase distance 150, P Type



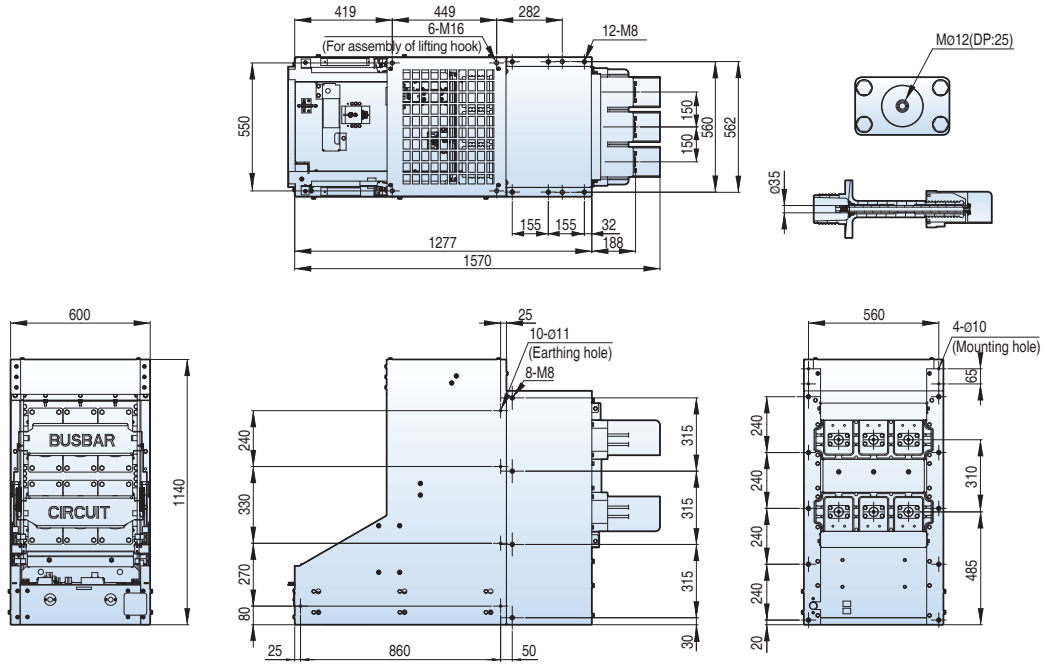
15kV, 25/31.5kA, 2000A

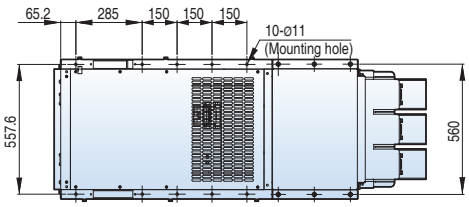
Phase distance 210, P Type

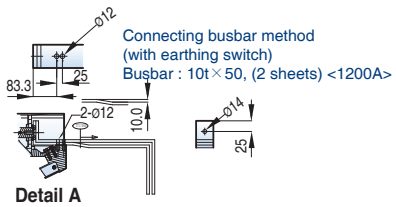


4.76/15kV, 25/31.5kA, 1200A

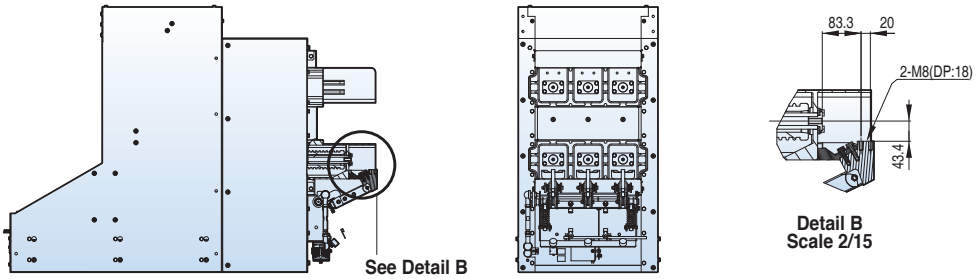
Withdrawable (Ha type cradle Bushing CT, phase distance 150mm)







Detail A

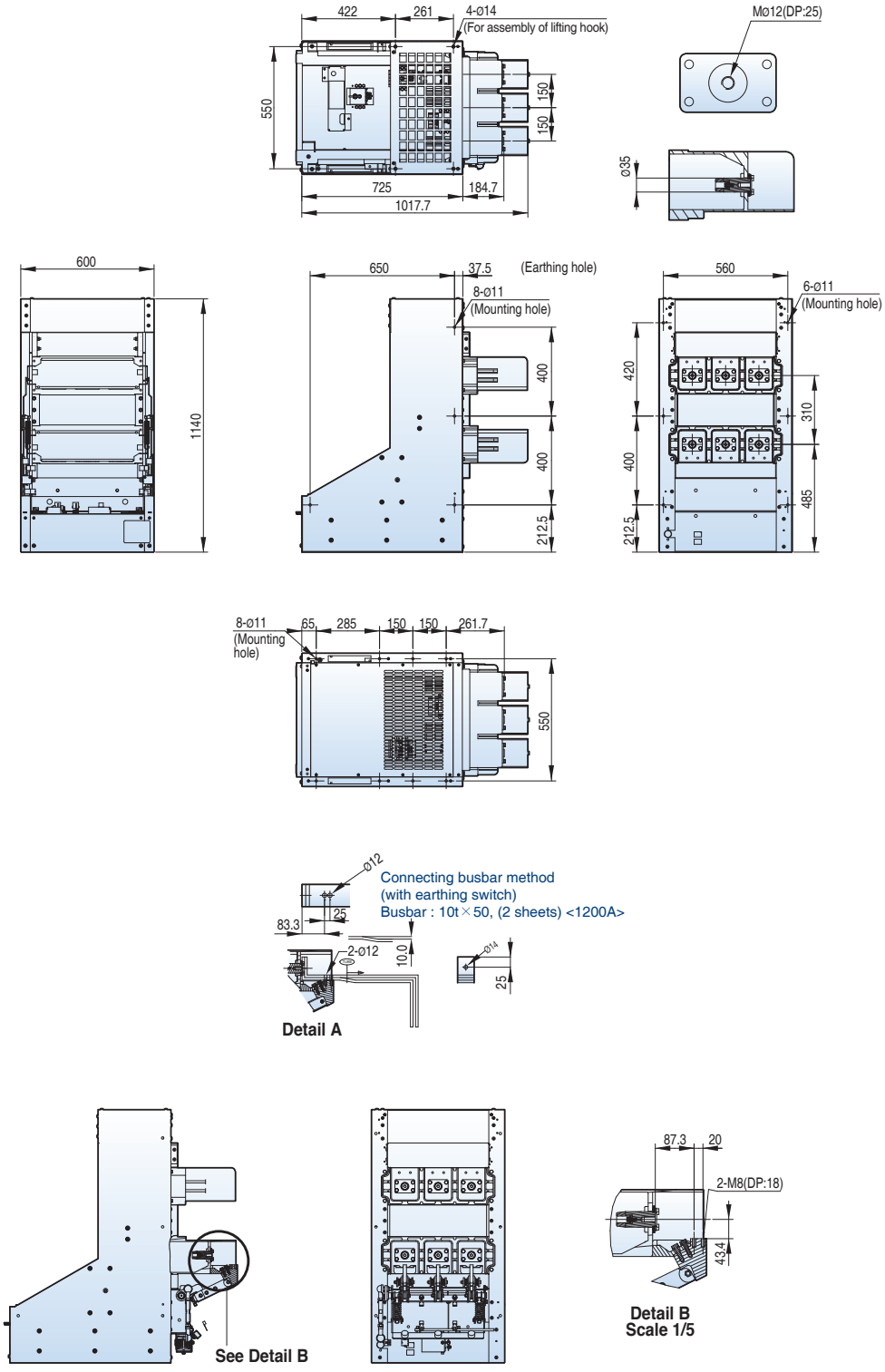


Section XSEC-XSEC

Detail B
Scale 2/15

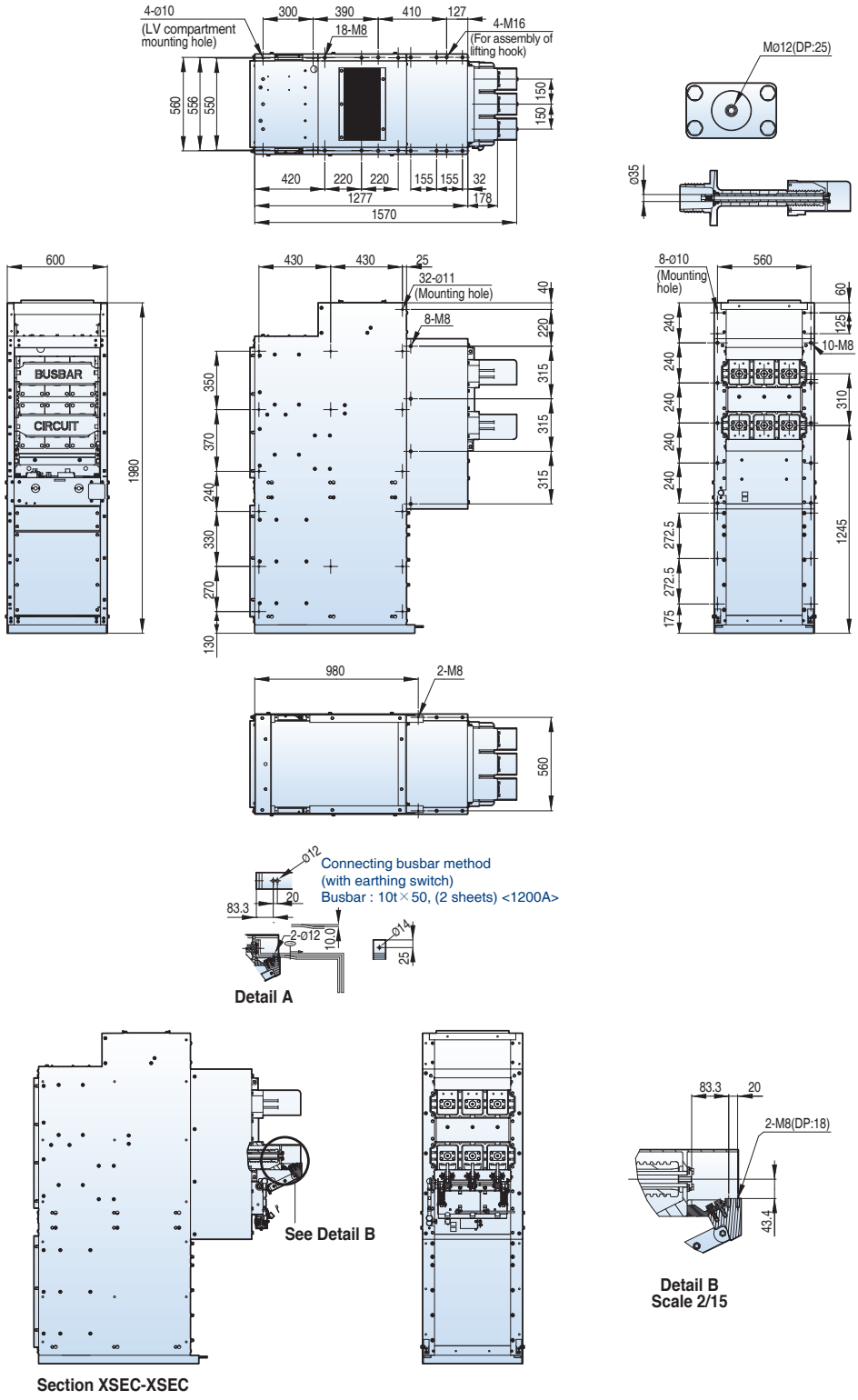
4.76/15kV, 25/31.5kA, 1200A

Withdrawable (Ha type cradle, phase distance 150mm)



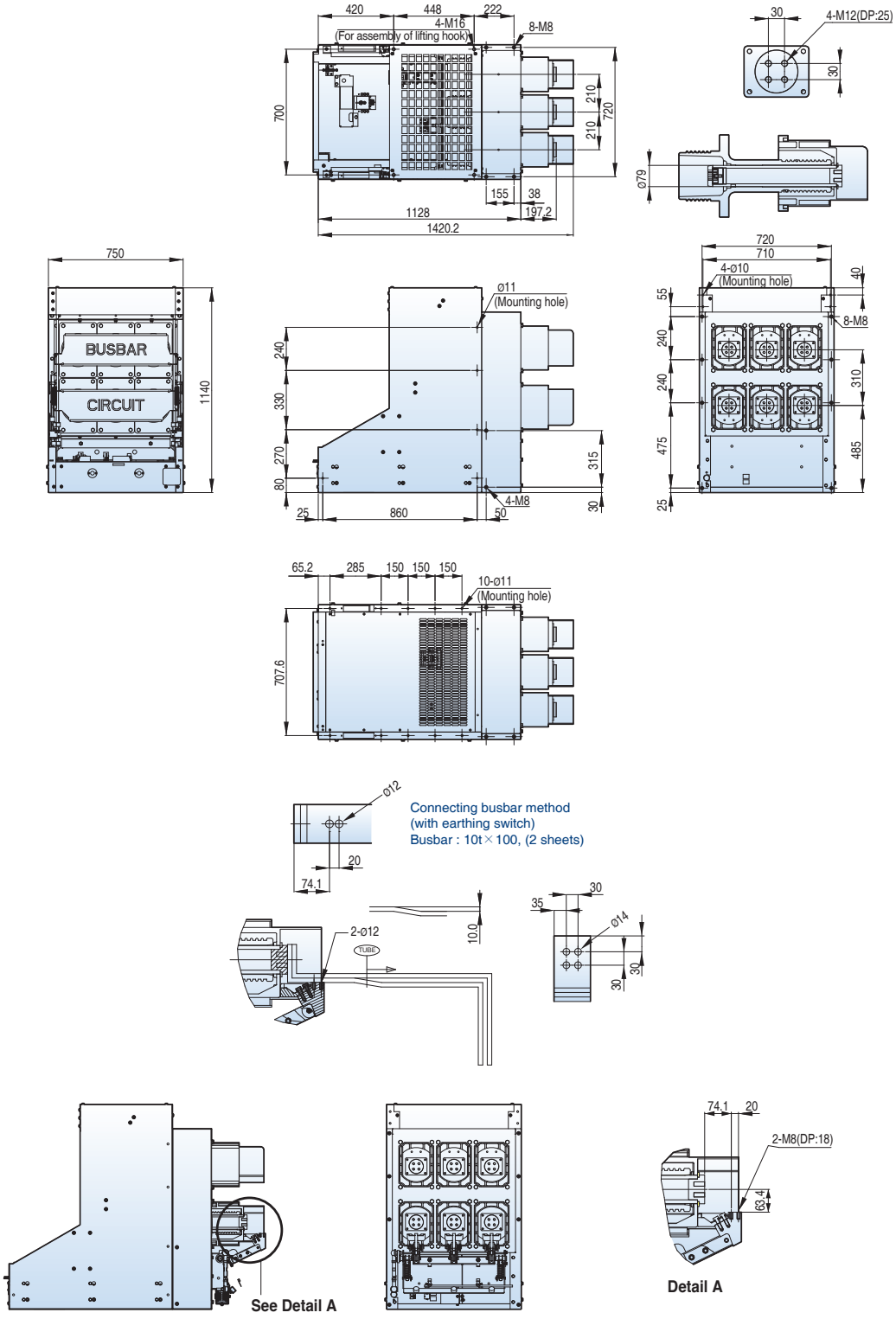
4.76/15kV, 25/31.5kA, 1200A

Withdrawable (Hb type cradle Bushing CT, phase distance 150mm)



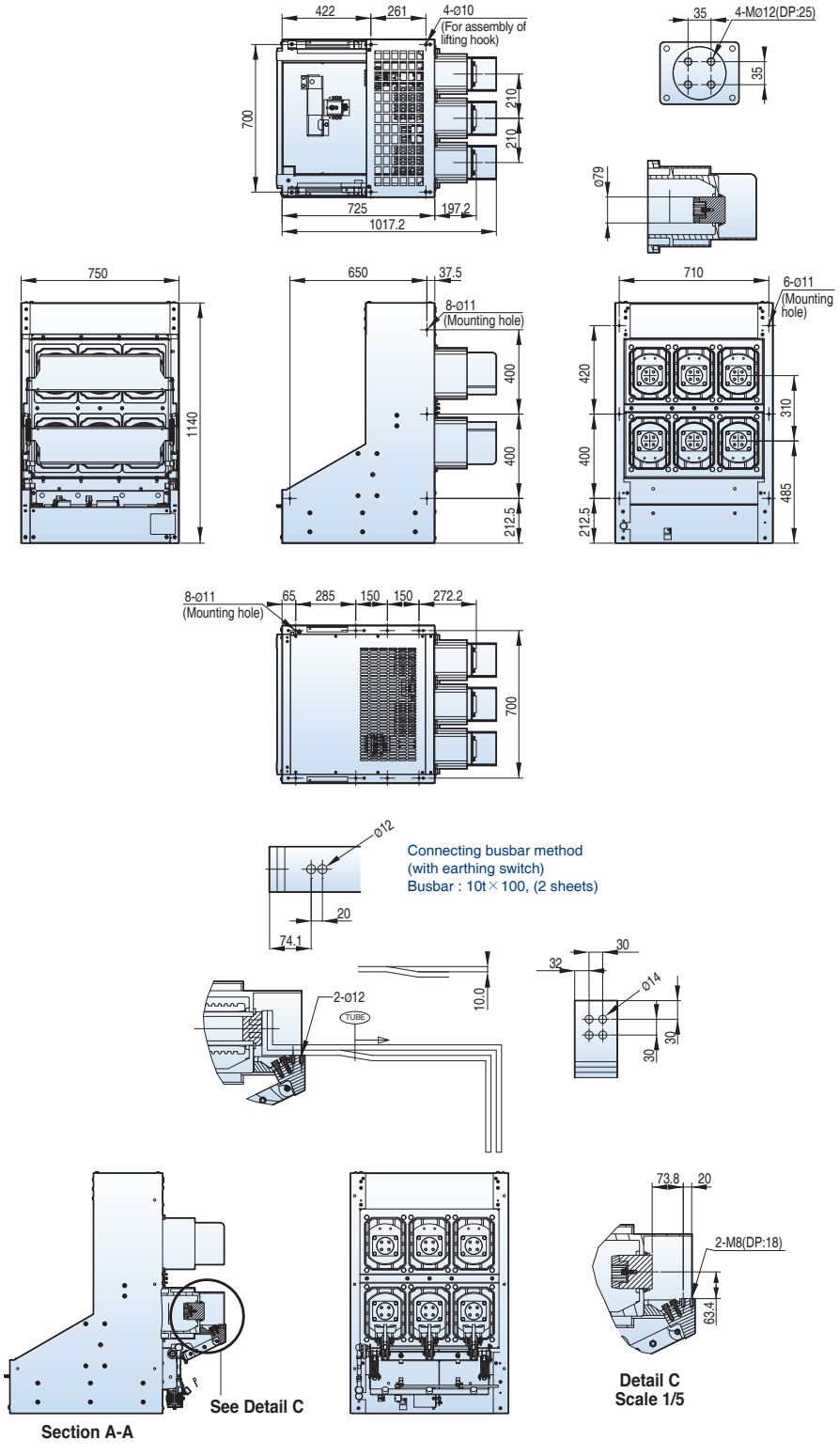
4.76/15kV, 25/31.5kA, 2000A

Withdrawable (Ha type cradle Bushing CT, phase distance 210mm)



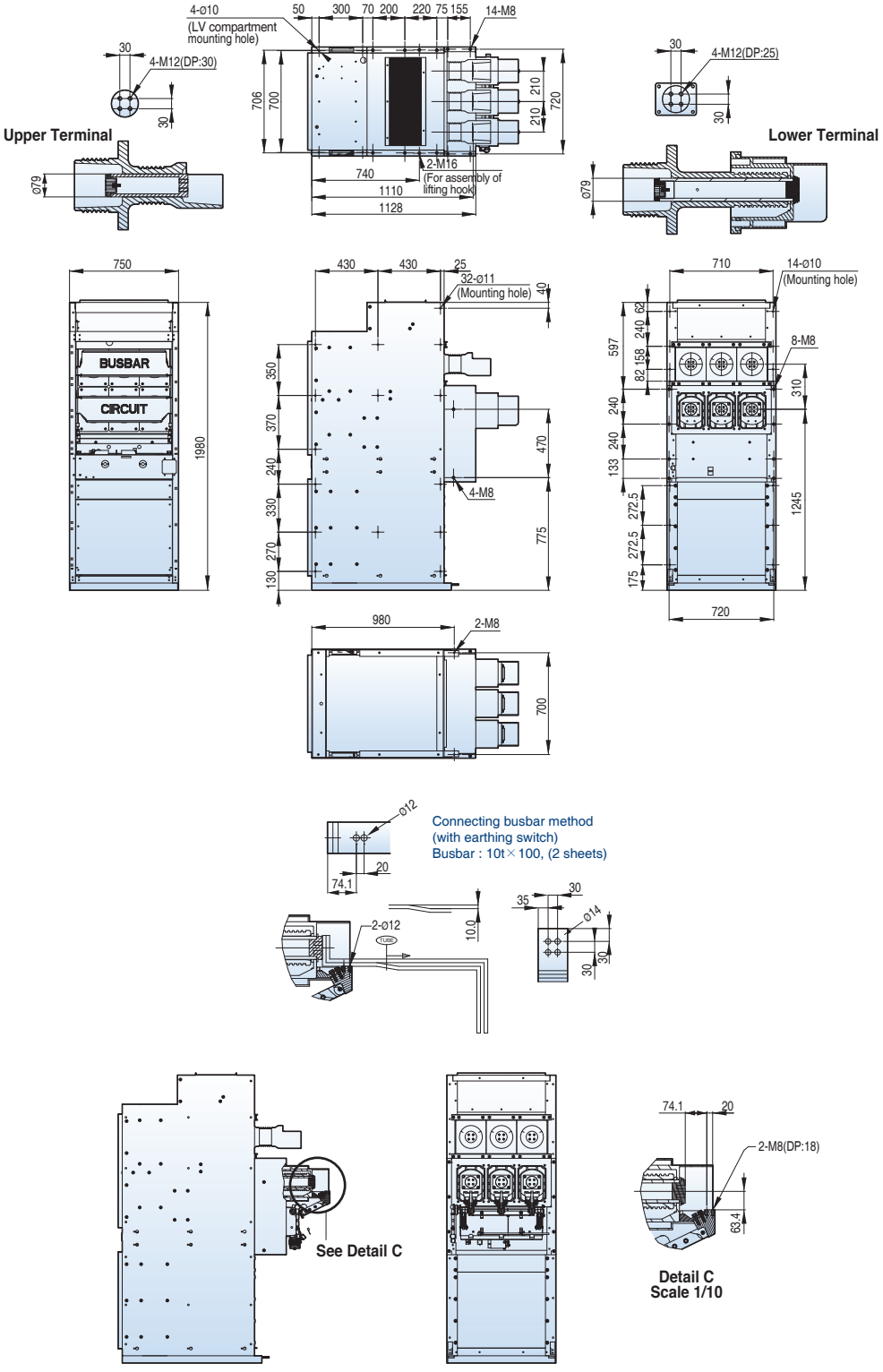
4.76/15kV, 25/31.5kA, 2000A

Withdrawable (Ha type cradle, phase distance 210mm)



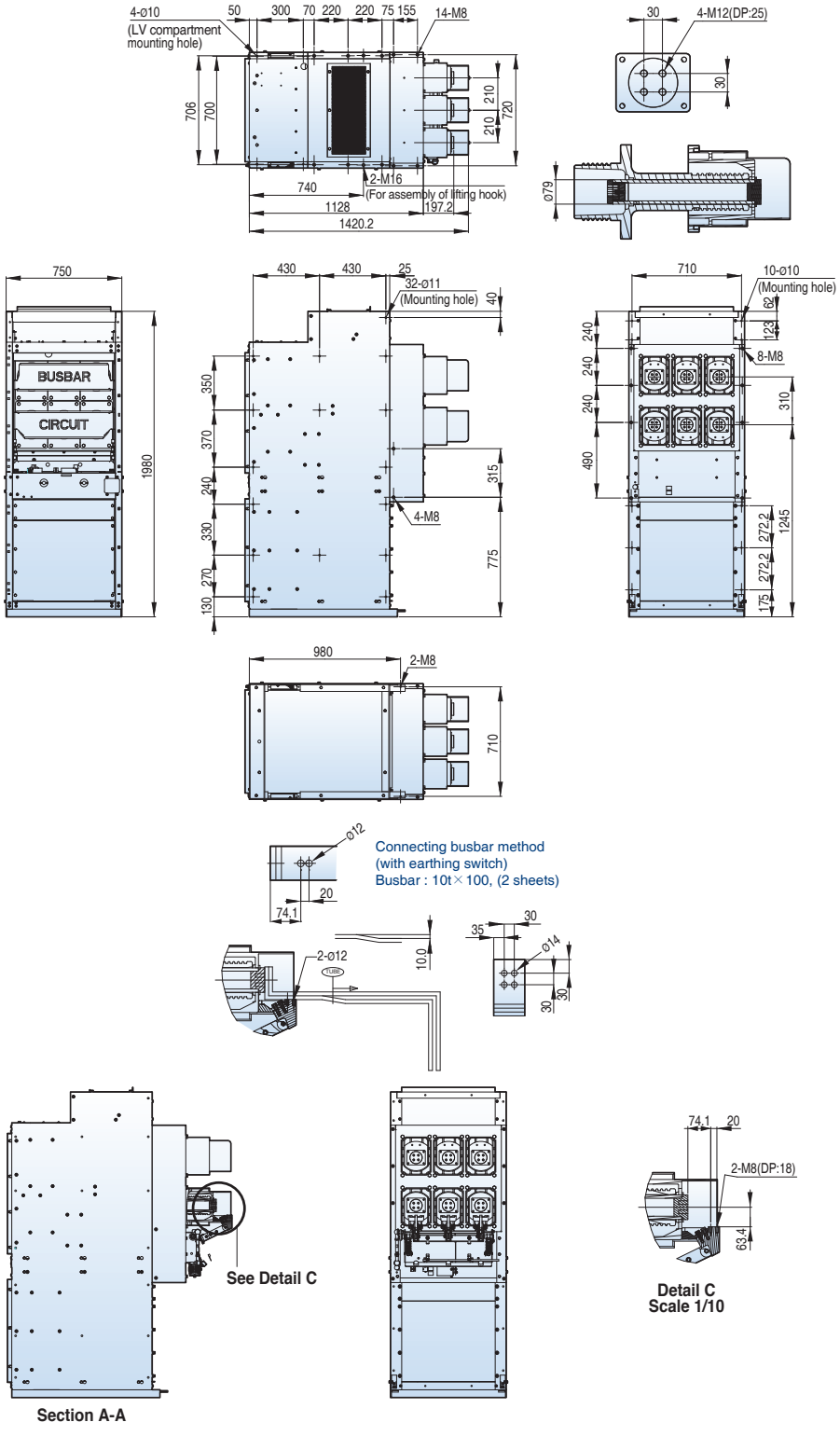
4.76/15kV, 25/31.5kA, 2000A

Withdrawable (Hb type cradle Bushing CT, phase distance 210mm)



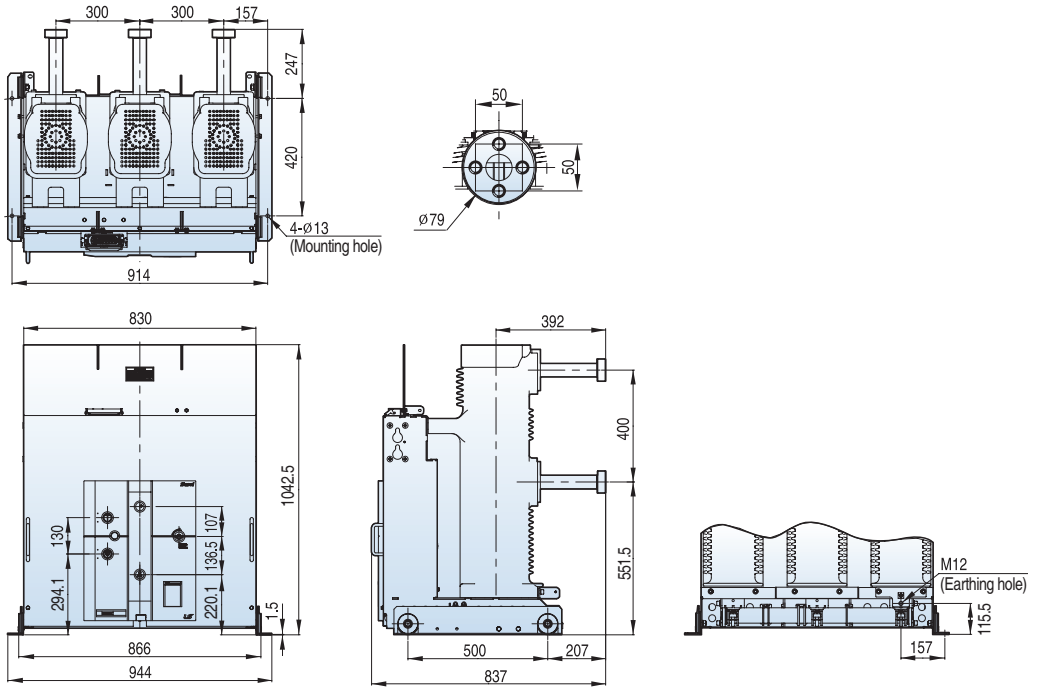
4.76/15kV, 25/31.5kA, 2000A

Withdrawable (Hb type cradle Bushing CT, phase distance 210mm)

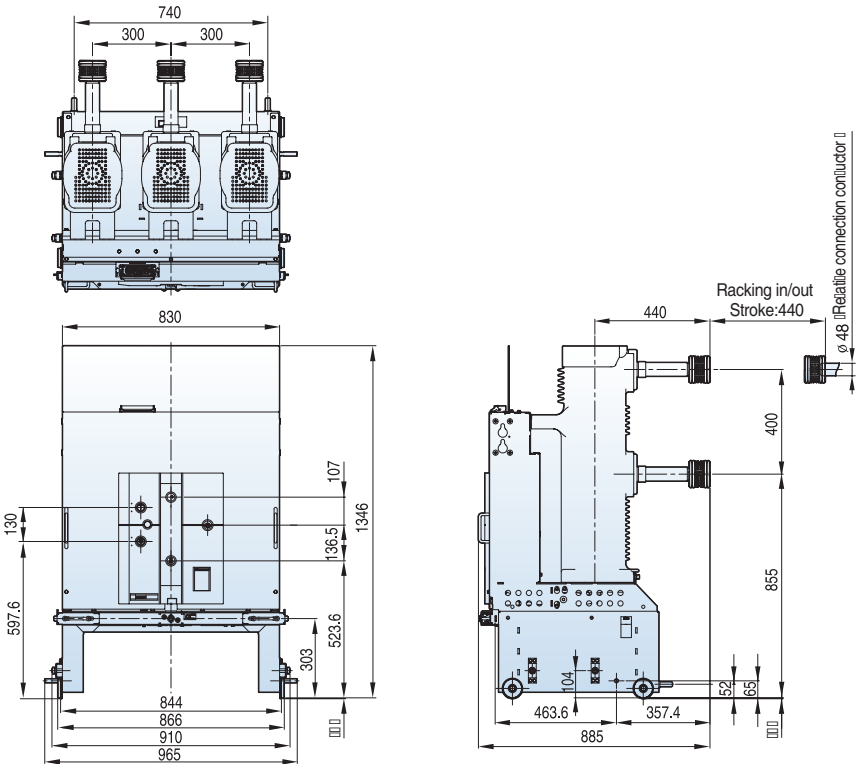


27kV, 25kA, 1200/2000A

Fixed (P type)

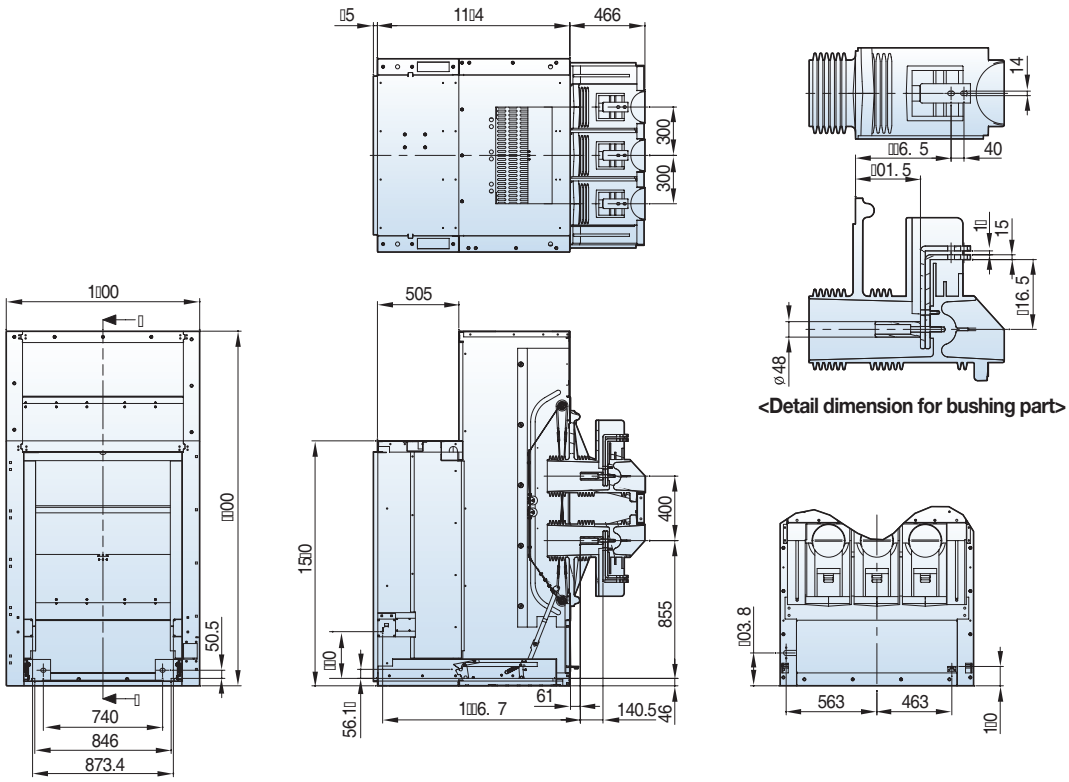


Withdrawable (H type unit)



27kV, 25kA, 1200/2000A

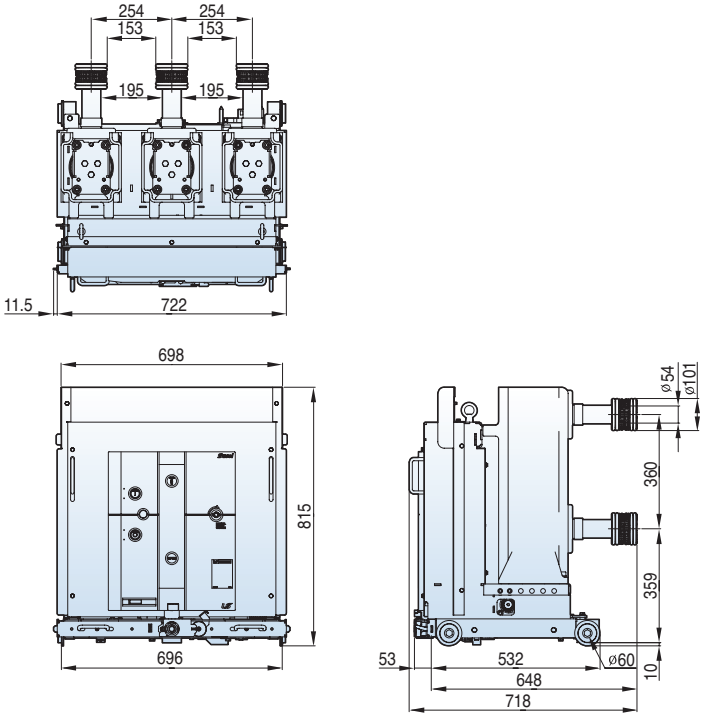
Withdrawable (H type cradle)



<Detail dimension for bushing part>

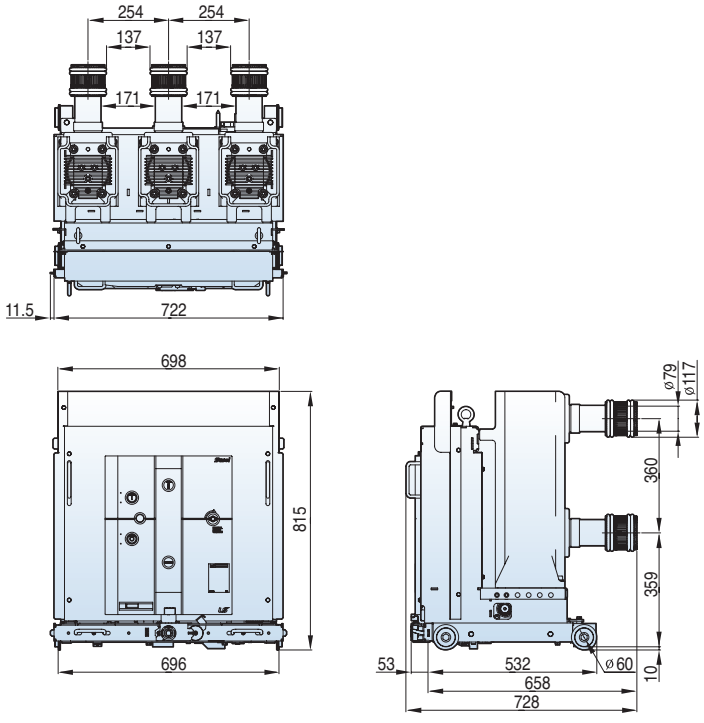
4.76kV, 50kA, 1200/2000A I 15kV, 40/50kA, 1200/2000A

Withdrawable (H type unit)



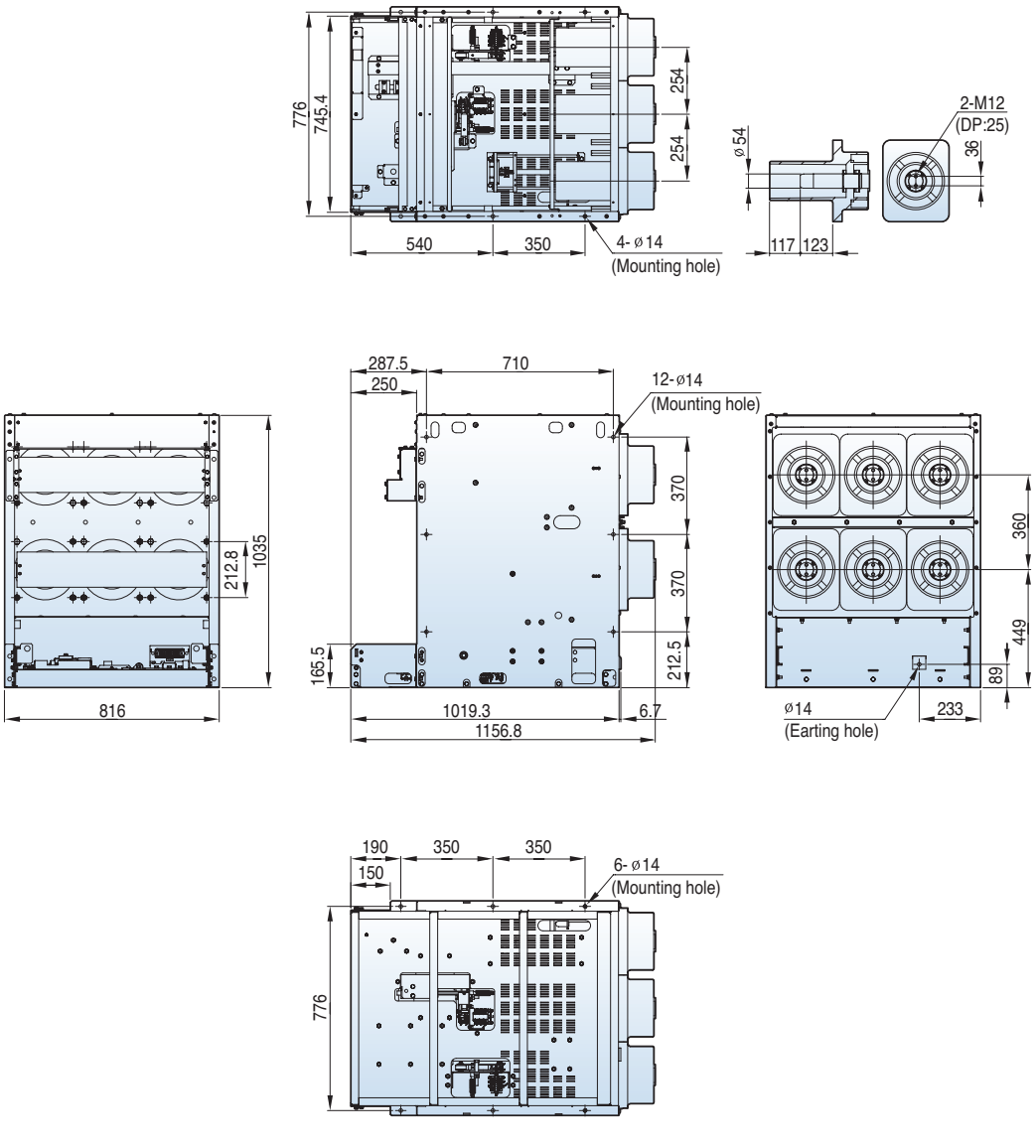
4.76kV, 50kA, 3000A I 15kV, 40/50kA, 3000A

Withdrawable (H type unit)



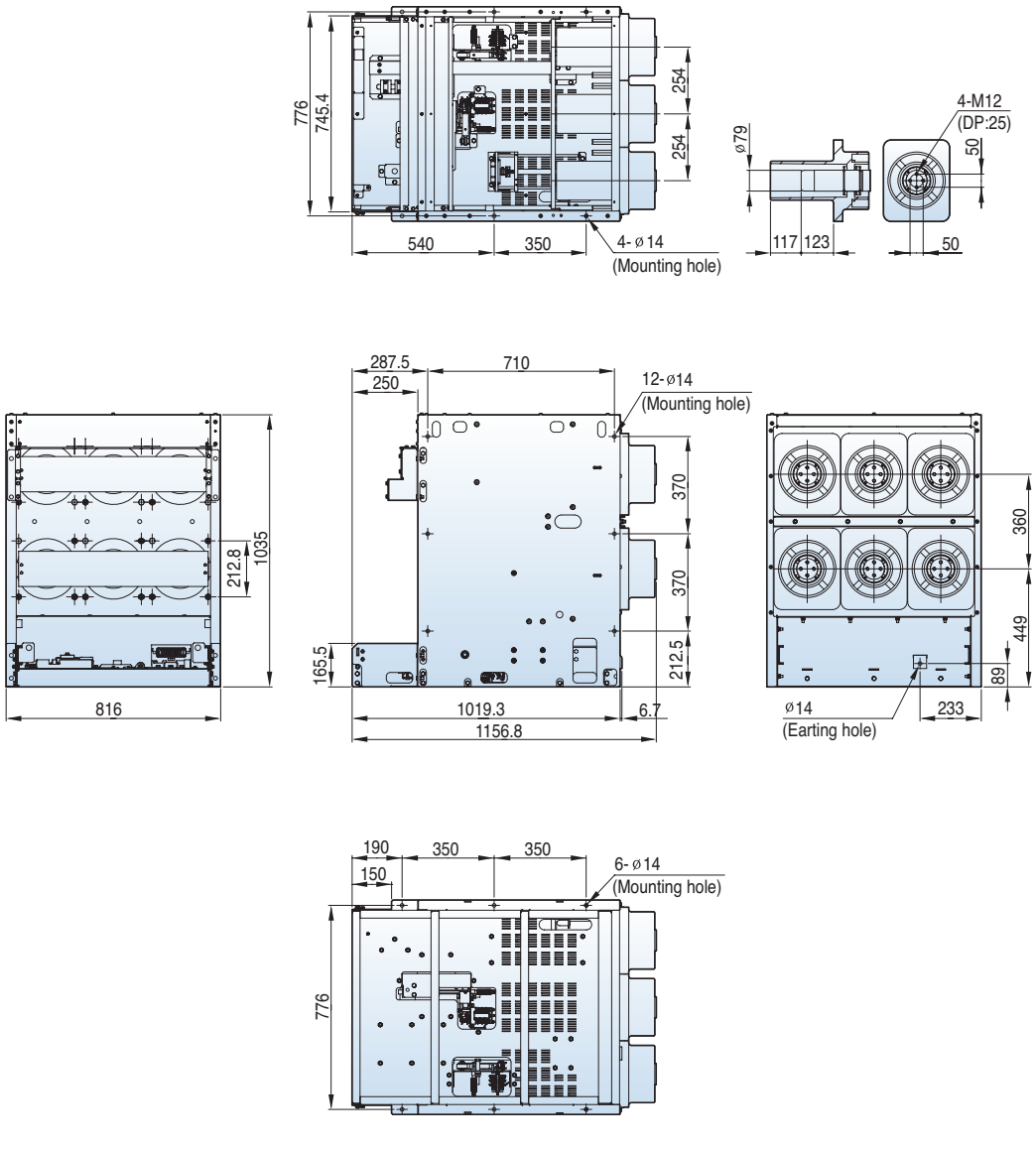
4.76kV, 50kA, 1200/2000A I 15kV, 40/50kA, 1200/2000A

Withdrawable (H type cradle)



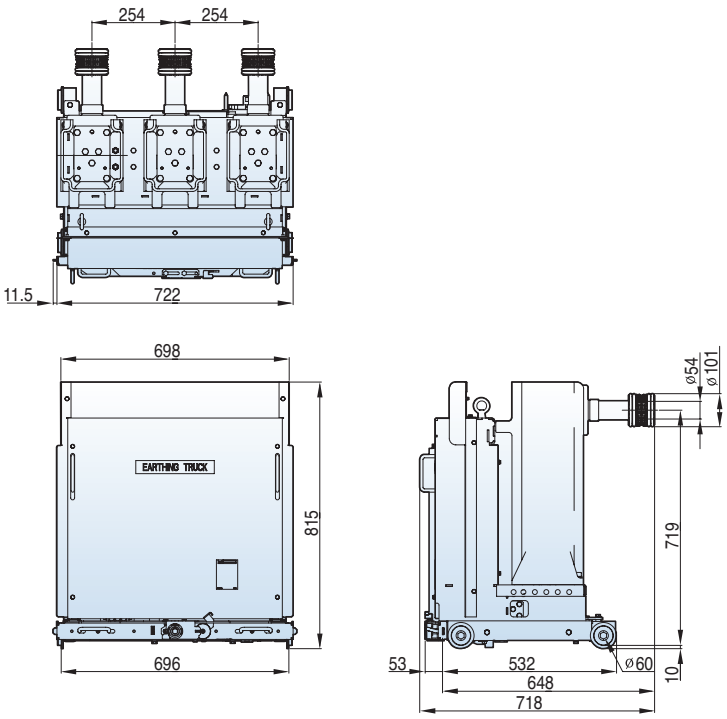
4.76kV, 50kA, 3000A I 15kV, 40/50kA, 3000A

Withdrawable (H type cradle)

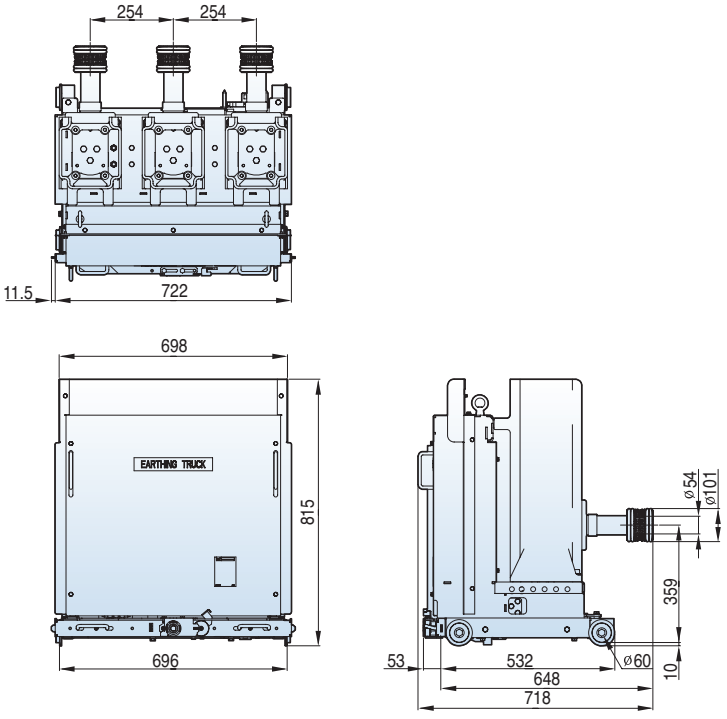


4.76kV, 50kA, 1200/2000A I 15kV, 40/50kA, 1200/2000A

Earthing truck(Upper)

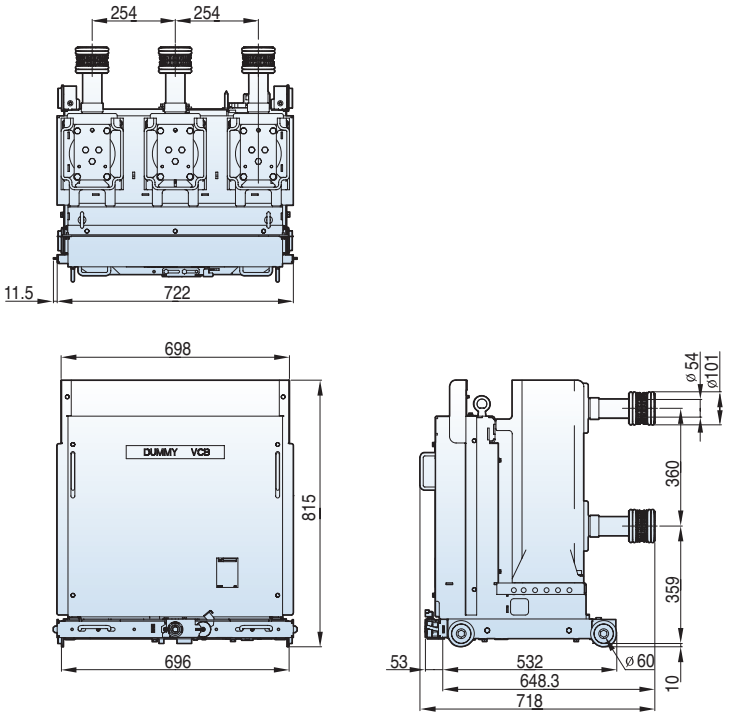


Earthing truck(Lower)



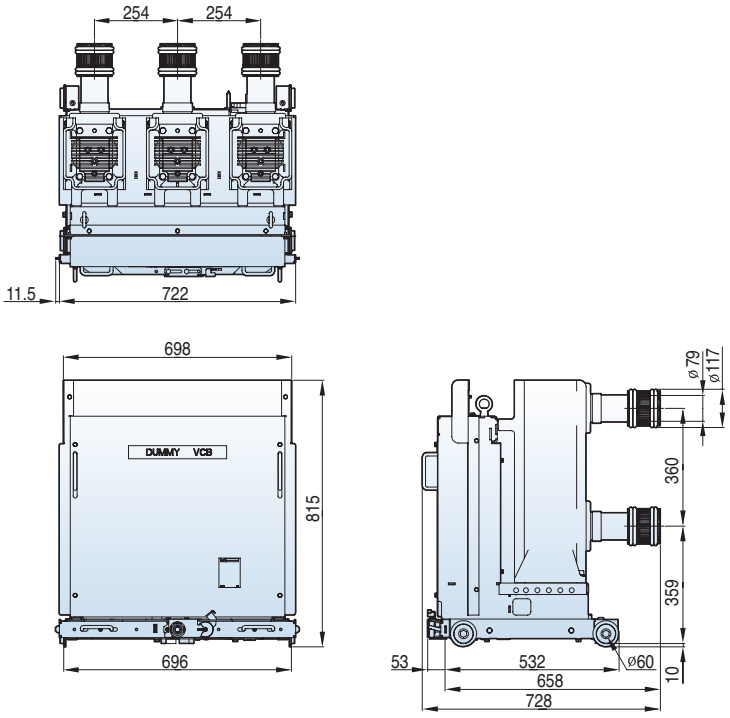
4.76kV, 50kA, 1200/2000A I 15kV, 40/50kA, 1200/2000A

Dummy

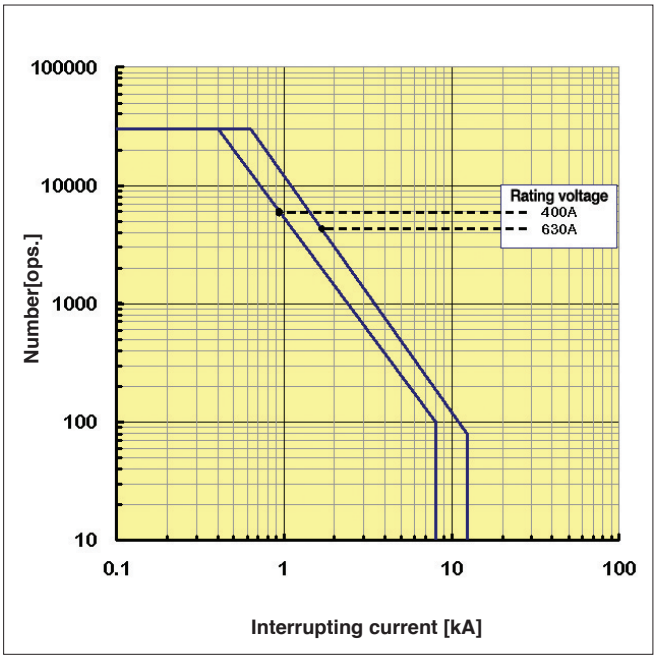


4.76kV, 50kA, 3000A I 15kV, 40/50kA, 3000A

Dummy

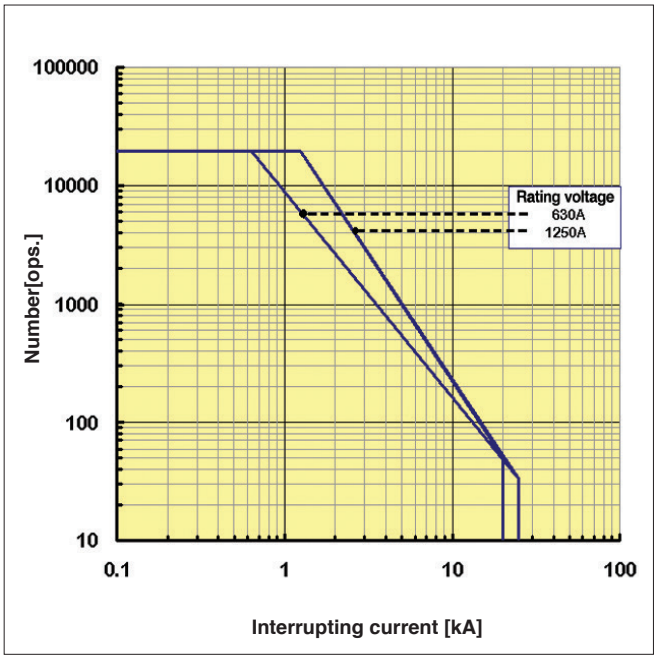


Electrical endurance by interrupting current



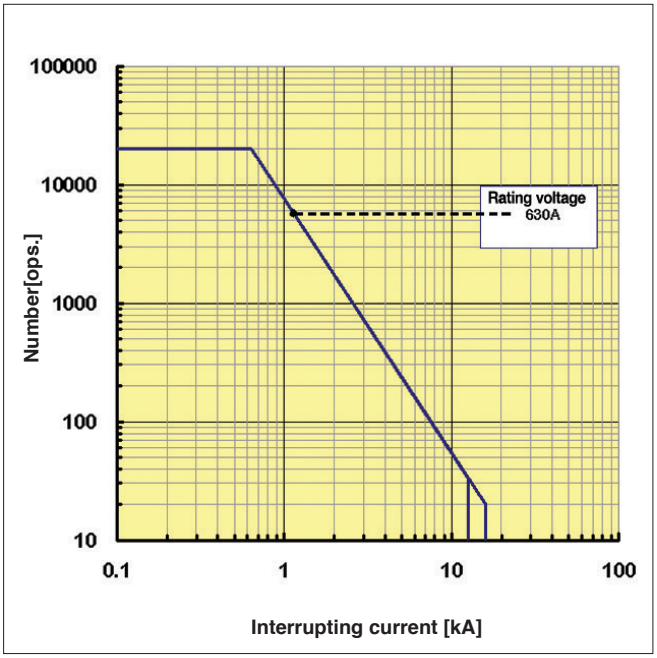
VI model LV2 at 7.2kV

- N : Operation numbers
- I : Interrupting current



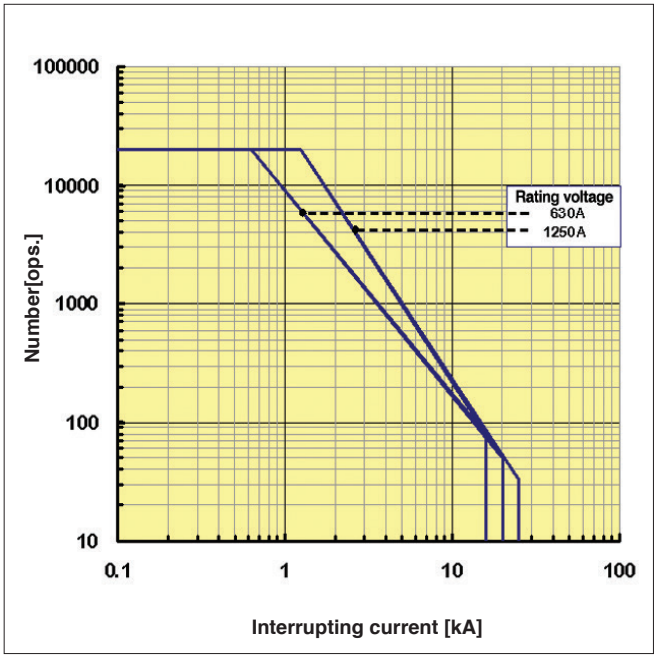
VI model LV3 at 7.2kV

- N : Operation numbers
- I : Interrupting current



VI model LV4 at 24kV

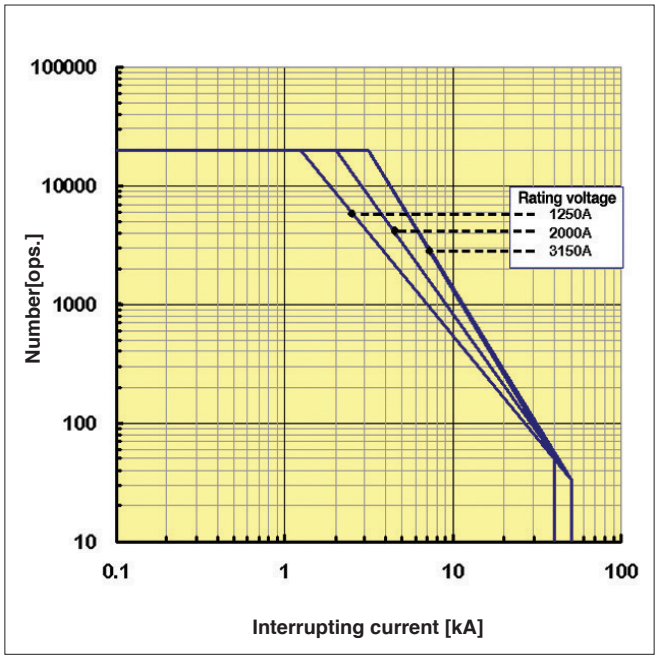
- N : Operation numbers
- I : Interrupting current



VI model LV5 at 17.5kV

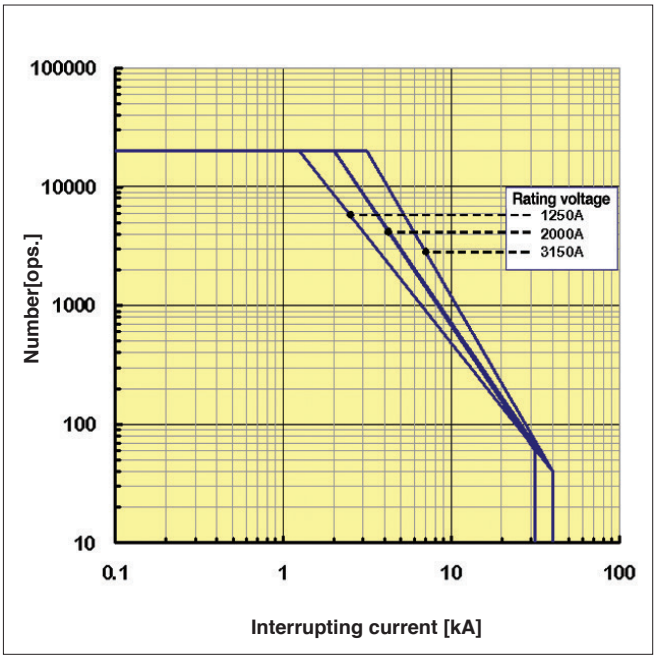
- N : Operation numbers
- I : Interrupting current

Electrical endurance by interrupting current



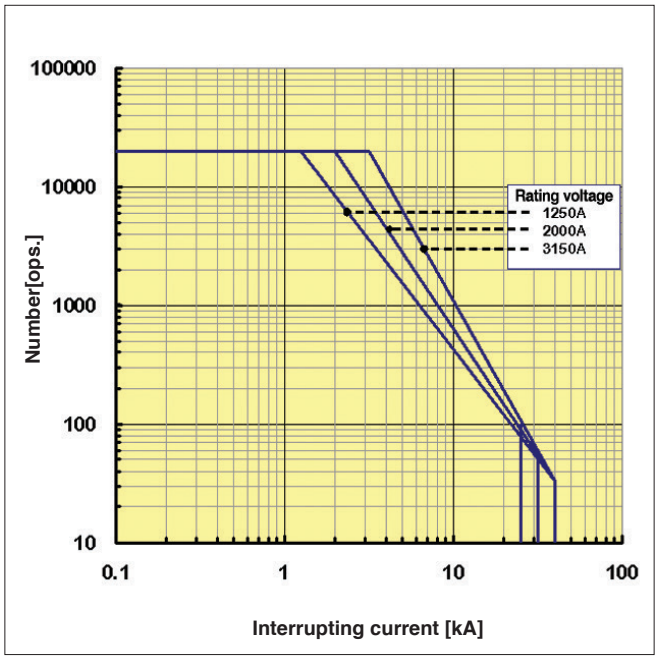
VI model LV8 at 17.5kV

- N : Operation numbers
- I : Interrupting current



VI model LV7-P1 at 24kV

- N : Operation numbers
- I : Interrupting current



VI model LV8 at 36kV

- 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

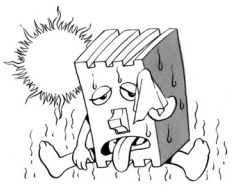
- maximum temperature: +40℃
- 24-hour average maximum temperature: +35℃
- minimum temperature: -5℃

Altitude

- 1000m or less above sea level

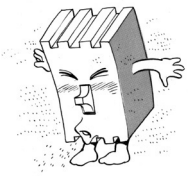
Relative Humidity

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



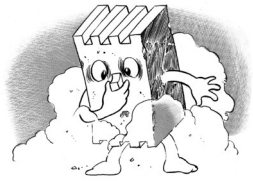
■ If a standard circuit breaker is used in high temperature exceeding 40℃, you are advised to use it according to the current corrected for each level of ambient temperature in catalog.

■ 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

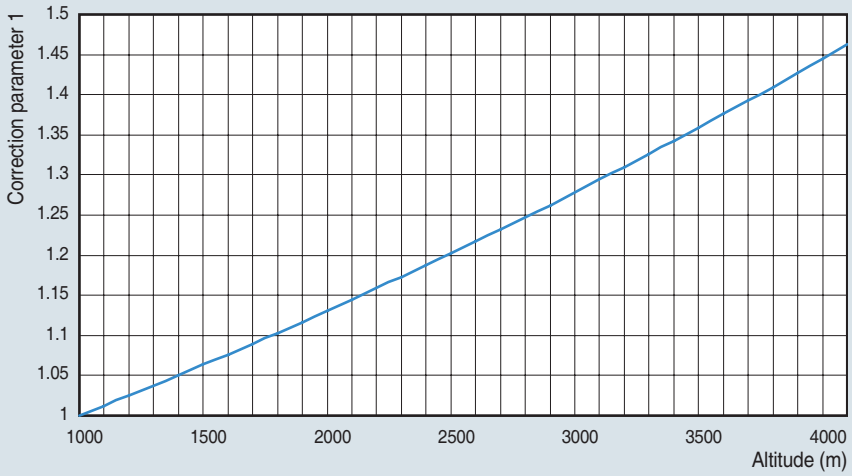
If the breaker is used in areas of sea level higher than 1000m the degradation of insulation performance should be taken into consideration.

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

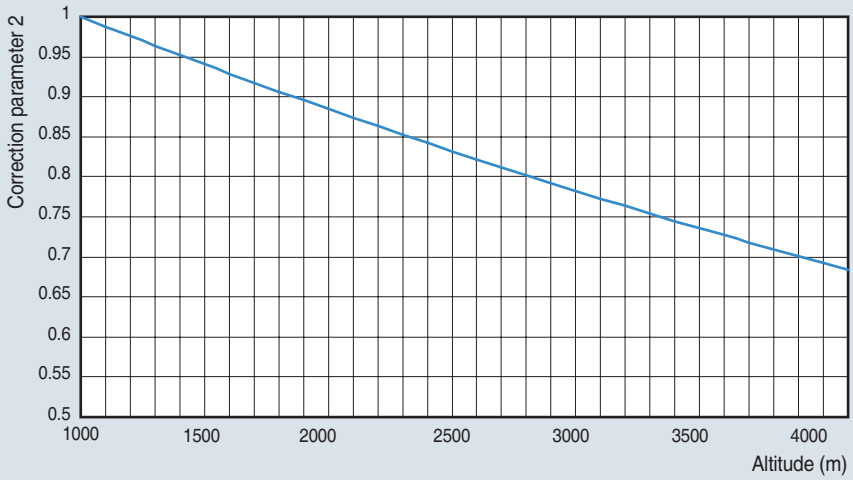
<Table 1> Criteria of withstand voltages by rated voltages specified in IEC62271-1

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.

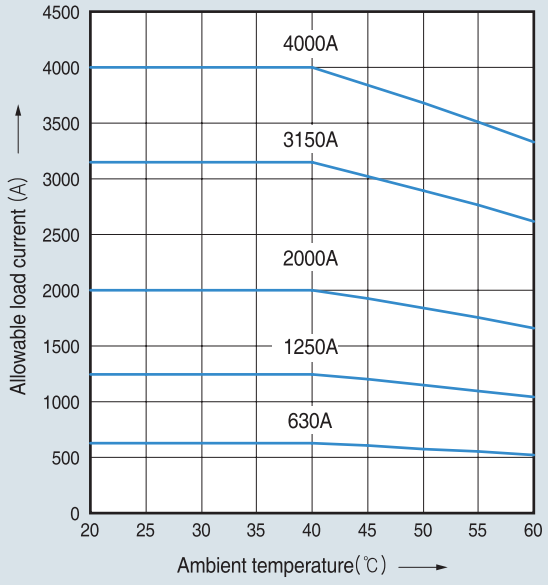
$$Ia = Ir\left((\Theta max - \Theta a)/\Theta r \right)^{1/2}$$

Ia: allowable continuous current in the actual ambient temperature Θa
Ir: rated current at 40℃ ambient temperature
Θmax: acceptable overall temperature of the hottest spot
Θa: the actual ambient temperature expected at -30℃ and 60℃
Θr: 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
4000	4000	4000	4000	4000	4000	3843	3679	3508	3328
3150	3150	3150	3150	3150	3150	3026	2898	2763	2621
2000	2000	2000	2000	2000	2000	1922	1840	1754	1664
1250	1250	1250	1250	1250	1250	1201	1150	1096	1040
630	630	630	630	630	630	605	580	553	524

<Table 2> Allowable load current by ambient temperature



<Figure 3> Allowable load current by ambient temperature

FUTURING SMART ENERGY

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 a 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 IS

www.lsis.com/usa

LSIS USA Inc. Chicago Branch

2000 Millbrook Drive Lincolnshire, IL 60069

Tel: 847-941-8240~59 sales.us@lsis.com Fax: 847-941-8259

HEAD OFFICE

LS-ro 127 (Hogye-dong) Dongan-gu, Anyang-si,
Gyeonggi-Do Korea

Tel. 82-2-2034-4902, 4684, 4429 Fax: 82-2-2034-4555

Specifications in this catalog are subject to change without notice due to continuous product development and improvement.

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Overseas Subsidiaries

- **LSIS USA Inc. ›› Chicago, America**
  2000Millbrook Drive,Lincolnshire,Chicago,IL60069,United States of America
  Tel: 1-847-941-8240 / Fax: 1-847-941-8259 / E-mail: seungheonc@lsis.com
- **LSIS (Middle East)FZE ›› Dubai, U.A.E**
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  Tel: 971-4-886-5360 / Fax: 971-4-886-5361 / E-mail: hschoib@lsis.com
- **LSIS Europe B.V. ›› Schiphol-Rijk, Netherlands**
  1st Floor,Tupoleviaan 48, 1119NZ, Schiphol-Rijk,The Netherlands
  Tel: 31-20-654-1420 / Fax: 31-20-654-1429 / E-mail: junshickp@lsis.com
- **LSIS Japan Co.,Ltd ›› Tokyo, Japan**
  Tokyo Club Building 13F, 2-6, Kasumigaseki 3-chome, Chiyoda-ku, Tokyo, 100-0013
  Tel: 81-3-6268-8241 / Fax: 81-3-6268-8240 / E-mail: jschuna@lsis.com
- **LSIS Dalian Co.,Ltd. ›› Dalian, China**
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  Tel: 86-411-8273-7777 / Fax: 86-411-8730-7560 / E-mail: tangyh@lsis.com
- **LSIS Wuxi Co.,Ltd. ›› WUxi, China**
  102-A, National High & New Tech Industrial Development Area, Wuxi, Jiangsu, 214028, P.R.China
  Tel: 86-510-8534-6666 / Fax: 86-510-522-4078 / E-mail: wangzy@lsis.com
- **LS-VINA Industrial Systems Co.,Ltd. ›› Hanoi, Vietnam**
  Nguyen Khe, Dong Anh, Hanoi, Vietnam
  Tel: 84-4-6275-8055 / Fax: 84-4-3882-0220 / E-mail: sjbaik@lsis.com

Overseas Branches

- **LSIS Co.,Ltd. Rep.Office, Vietnam**
  Gema Dept Tower 18F,6 Le Thanh Ton,District 1,HCM,Vietnam
  Tel: 84-8-3823-7890 / E-mail: hwyim@lsis.com
- **LSIS Moscow Office, Russia**
  123610,Krasnopresnenskaya,nab,12,building1,office No.1005,Moscow,Russia
  Tel: 7-495-258-1466,1467 / Fax: 7-495-258-1466,1467 / E-mail: jdpark1@lsis.com

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