Susol Super Solution

Vacuum Circuit Breakers



LSIS



Susol VCB





Susol VCB is full line-up new VCB which has the high interrupting capacity, large current(~50kA, ~5000A), and maximized compatibility with existing products through the dual phases and compact sized models.

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Susol
MC-95
MT-95
OFF

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.

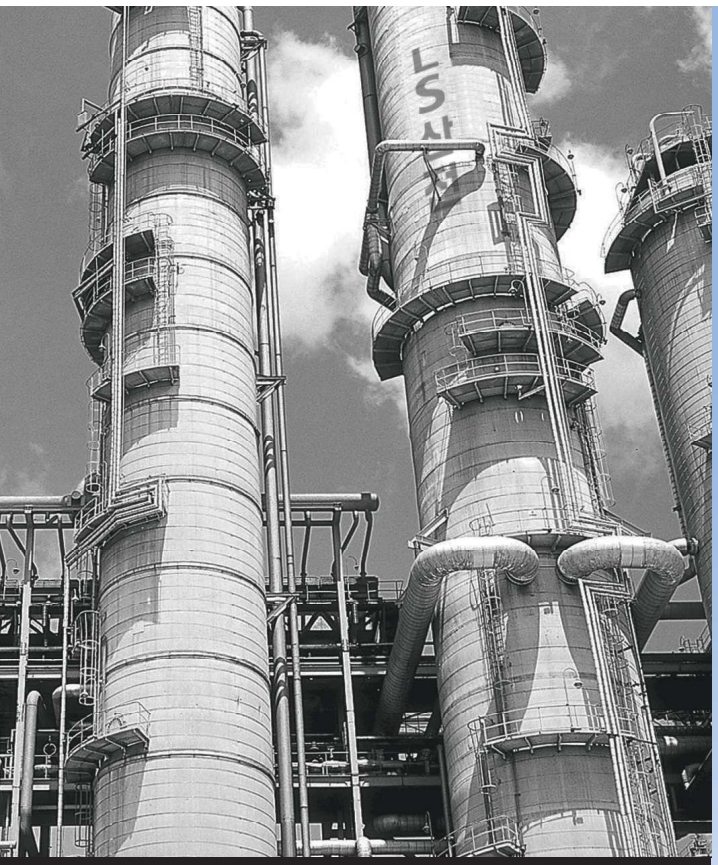
Voltage	Interrupting current	Rated current
7.2kV	8/12.5/20/25/31.5/40/50kA	400/630/1250/2000/3150/4000A
12kV	20/25/31.5/40/50kA	630/1000/1250/2000/2500/3150/4000/5000A
17.5kV	20/25/31.5/40/50kA	630/1000/1250/2000/2500/3150/4000A
24kV	12.5/25/31.5/40kA	630/1250/2000/2500/3150A
25.8kV	12.5/16/25/31.5/40kA	630/1250/2000/3150A
36kV	25/31.5/40kA	1250/2000/3150A

▶ 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.



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

7.2kV (VL-06)

- Rated short-time (for withstand current): 3sec.
- Rated operating sequence: O-0.3s-CO-15s-CO
- Type test level: M2, E2 (List1), C2
- 100% Compatibility
  - with existing fixed type breakers
  - with existing drawout type breakers
- Various cradle: E, F and G type
- 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
  - Charge switch, UVT, Secondary trip Coil, Current trip coil, Position S/W
  - Key-lock, Button lock, Button cover, Padlock, UVT, Time Delay Controller, CTD
- Anti Pumping Device
- TEST/SERVICE Automatic Position Indicator
- Standards and certification
  - IEC62271-100 (2012) [M2, C2, E2 (List1)]
  - Tested in enclosure
  - KERI type tested, V-check (KESCO) certification



Ur (kV)	Isc (kA)	Ir (A)
7.2	8	400
	12.5	630



Full line – up & Compact

Full line-up new VCB models to the high interrupting capacity and large current (~ 50kA, ~ 5000A) featuring maximization of compatibility with existing products through the dualistic deployment of phases and compact models

7.2/12/17.5/24/25.8/36kV (VL-06/12/17/20/25/36)

- Rated short-time (to withstand current): 3sec. 4sec*
- Rated operating sequence: O-0.3s-CO-15s-CO
- Type test level: M2, E2 (List3), C2
- Compatibility with existing Pro-MEC breakers
- Various cradle: E, F, G, Fs, Gs and 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, 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 & Accessories, Door, Door interlock, Door emergency button
  - Others: Racking in/out handle, UVT Time delay controller, CTD (Condensor Trip Device), Temperature module
- Anti Pumping Device
- TEST/SERVICE Automatic Position Indicator
- Standards and certification
  - IEC62271-100 (2012) [M2, C2, E2 (List3)]
  - KEMA, KERI type tested, V-check (KESCO) certification

Note) * Please contact us

Ur (kV)	Isc (kA)	Ir (A)
7.2	20	630
		1250
		2000
	25	630
		1250
		2000
	31.5	630
		1250
		2000
12	20	630
		1000
		1250
		2000
	25	630
		1000
		1250
		2000
	31.5	630
		1250
		2000
		2500
17.5	20	630
		1250
		2000
	25	630
		1250
		2000
	31.5	630
		1250
		2000
		2500
24, 25.8	12.5	630
		1250
	16	630
		1250
	25	630
		1250
		2000
		2500
36	25	630
		1250
		2000
		2500



7.2/12/17.5/24/25.8/36kV (VH-06/12/17/20/25/36)

- Rated short-time (to withstand current): 3sec. 4sec *
- Rated operating sequence: O-0.3s-CO-15s-CO, (O-0.3s-CO-3min-CO **)
- Type test level: M2, E2 (List3), C2
- Electrical and mechanical life: 20,000 operations
- Various cradle: K, Fs, Gs and 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 & Accessories, Door, Door interlock, Door emergency button
  - Others: Racking in/out handle, Lifting hook, UVT Time delay controller, CTD (Condensor Trip Device), Temperature module
- Anti Pumping Device
- Standards and certification
  - IEC62271-100 (2012) [M2, C2, E2 (List3)]
  - KEMA, KERI type tested, V-check (KESCO) certification

Note) * Please contact us
** Please refer to ratings

Ur (kV)	Isc (kA)	Ir (A)
7.2 12	31.5	1250
		2000
		3150
	40	1250
		2000
		3150
		4000
	50	1250
		2000
		2500
		3150
		4000
17.5	31.5	3150
		1250
	40	2000
		3150
	50	1250
		2000
		2500
		3150
24 25.8	25	2500
	31.5	1250
		2000
		3150
	40	1250
		2000
		3150
36	25	1250
		2000
		3150
	31.5	1250
		2000
		3150
	40	1250
		2000
		3150





E type

F type

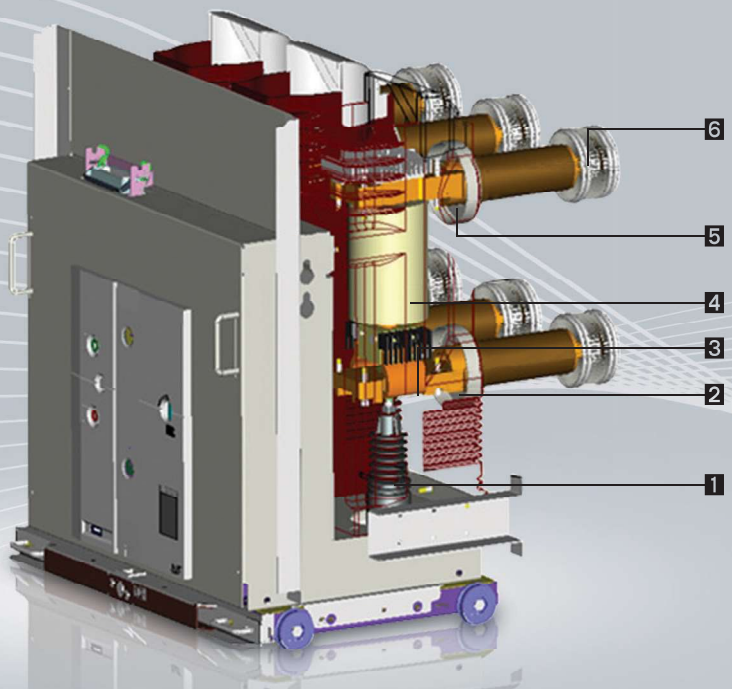


H type

VCB Cradle type

Main circuit structure with high reliability

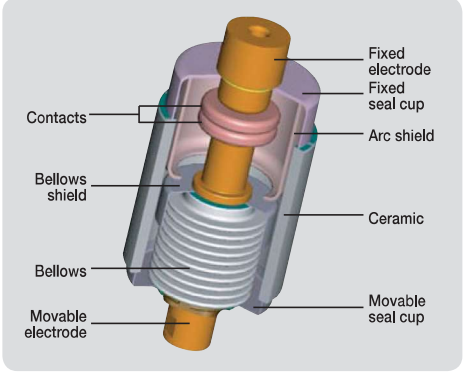
Susol VCB



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)





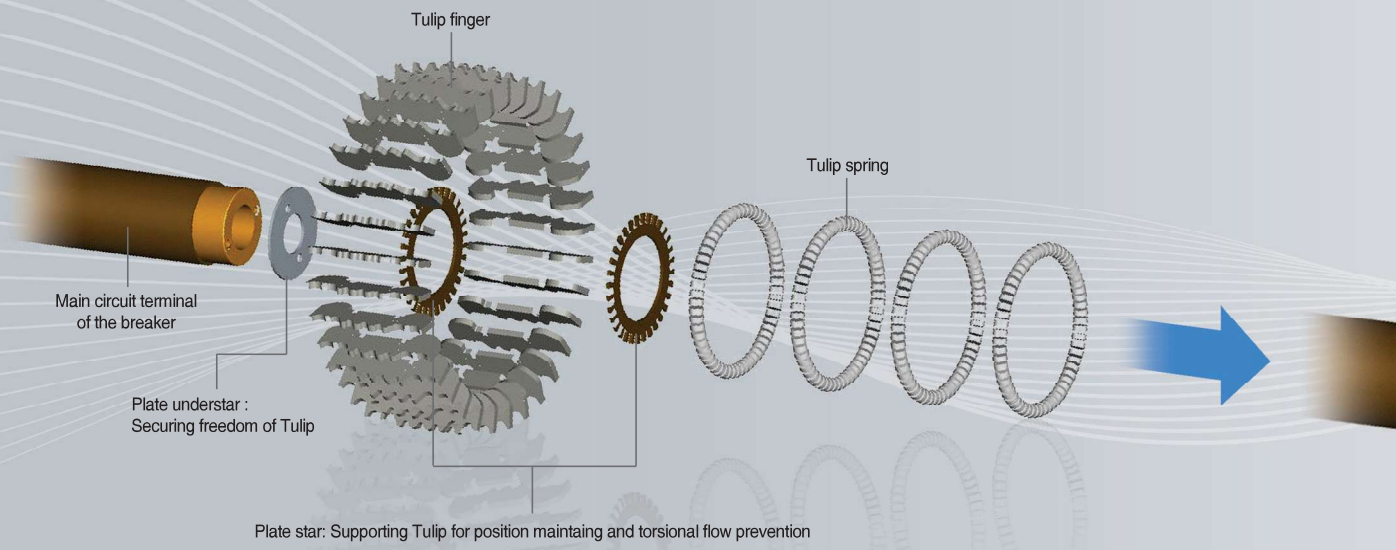




Stego Tulip

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.





Major supply records

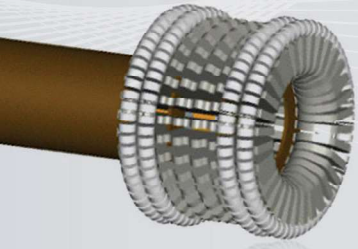
- S Electro-Mechanics, Busan plant: 12kV 40kA 4000A VCB
- P Combined cogeneration power plant: 7.2kV 50kA 4000A VCB
- K Petrochemical, Ulsan plant: 7.2kV 40kA 4000A VCB
- P Steel plant, Gwangyang: 7.2kV 50kA 4000A VCB
- P Steel plant, Pohang: 7.2kV 50kA 4000A VCB
- L Chem, Cheongju plant: 7.2kV 40kA 4000A VCB
- S Electronics, Tangjeong plant: 7.2kV 40kA 4000A VCB

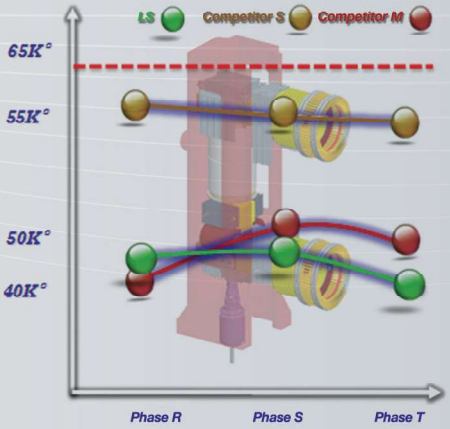
7.2/12/17.5/24/25.8/36kV...

(VH-06/12/17/20/25/36)



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









VL type Tulip contactor



VH type Tulip contactor



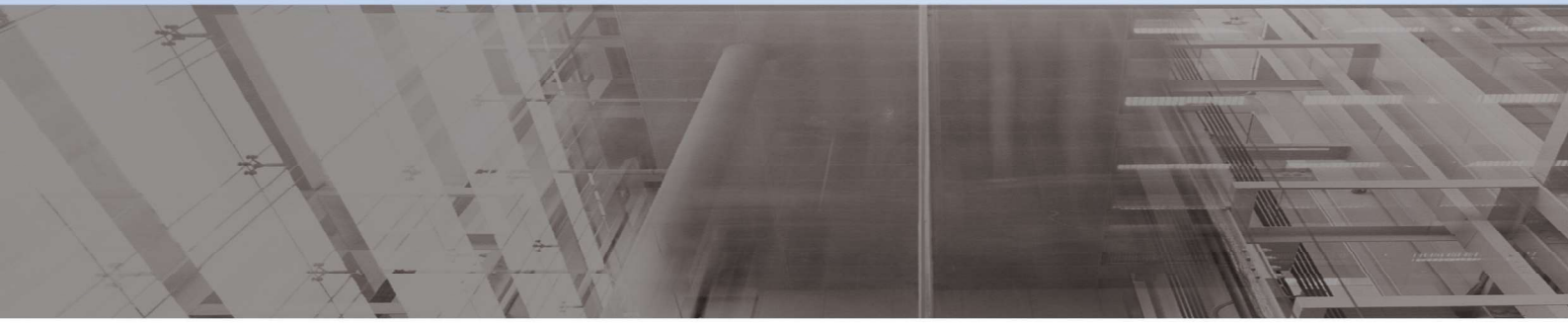
36kV Tulip contactor

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





7.2/12/17.5/24/25.8/36kV 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



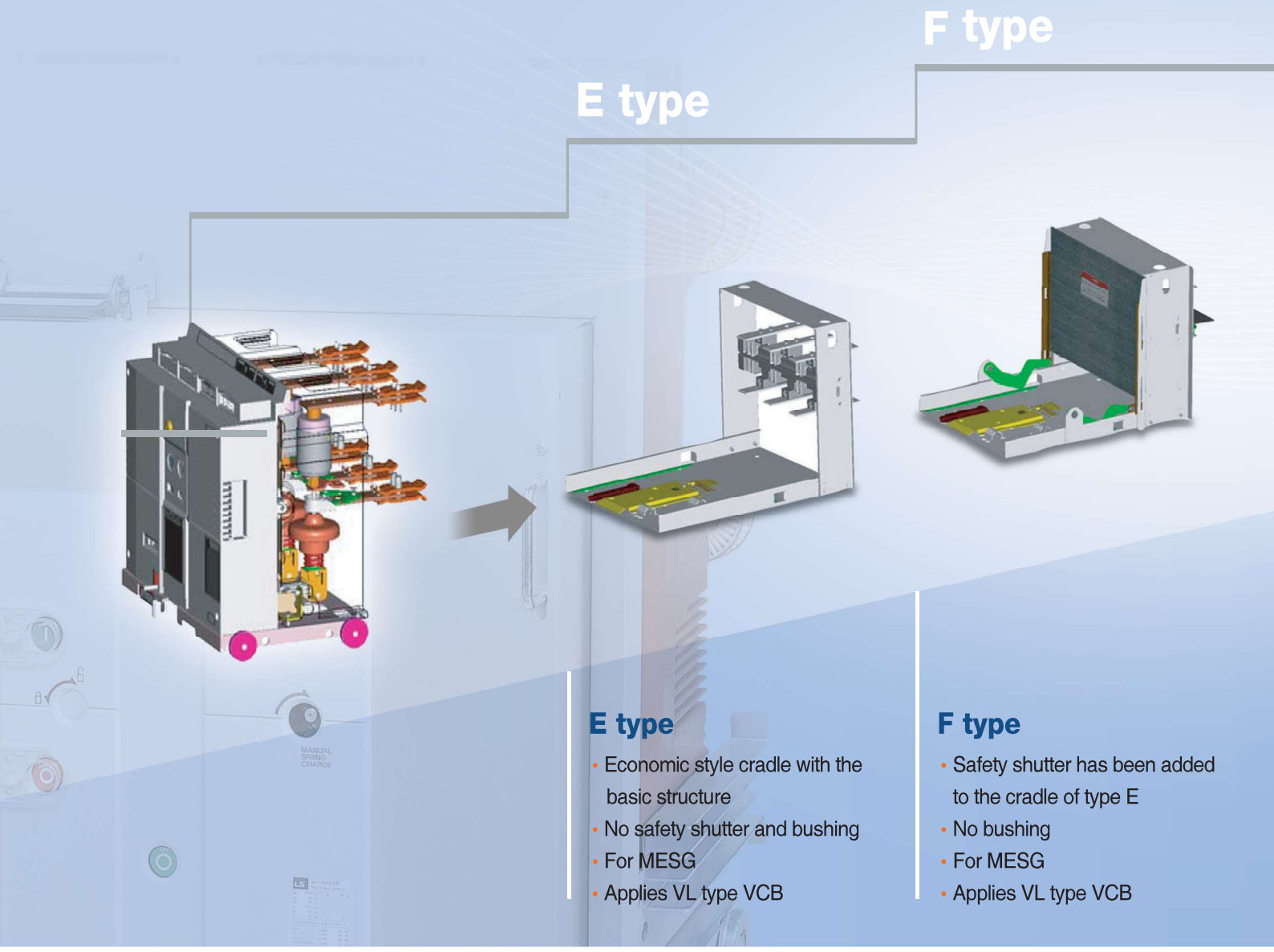


Accessories of CB compartment (H type cradle)

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

Cradles

E, F, G, K and H type... Variety of the Cradles



E type

- Economic style cradle with the basic structure
- No safety shutter and bushing
- For MESG
- Applies VL type VCB

F type

- Safety shutter has been added to the cradle of type E
- No bushing
- For MESG
- Applies VL type VCB



E type

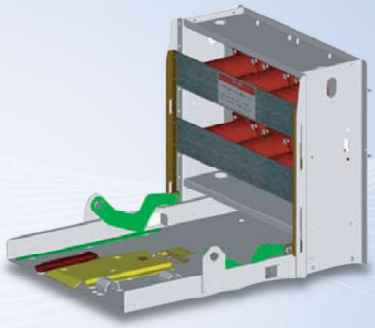


F type



H type

G type



G type

- Premium style cradle with safety shutter and bushings
- For MESG
- Applies VL type VCB

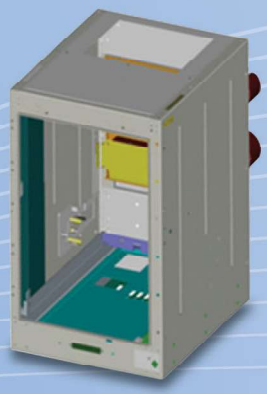
K type



K type

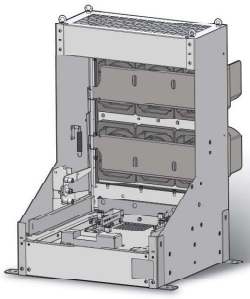
- Premium style cradle with metal safety shutter and bushings
- Metal isolated structure: To prevent spreading accident and secure safety
- More convenient by withdrawable Truck
- For MCSG
- Applied to medium capacity/ high capacity VCB

H type

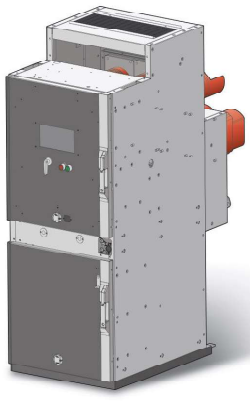


H type

- 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
  - Control power connected Interlock
- Convenience in building switchgears
  - Module assembly with CB compartment
  - Assembly with CT/PT integrated compartment
- Applies VL/VH type VCB



Ha type



Hb type



VH type

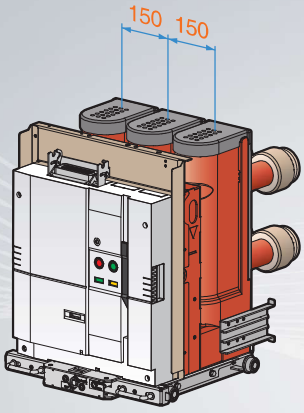
Convenience

Convenience in building switchgears

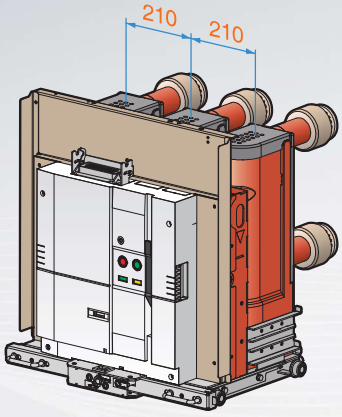
- Maximizing compatibility with existing products through the dualistic deployment of phases and compact models.

VCB rating

Ur (kV)	Isc (kA)	Ir (A)
12	20/25	630
	31.5	1000
		1250
17.5	20/25	630
	31.5	1250



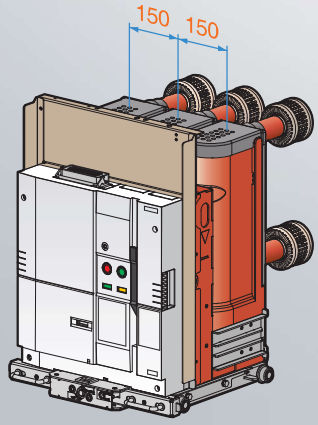
P150
(distance between phases: 150mm)



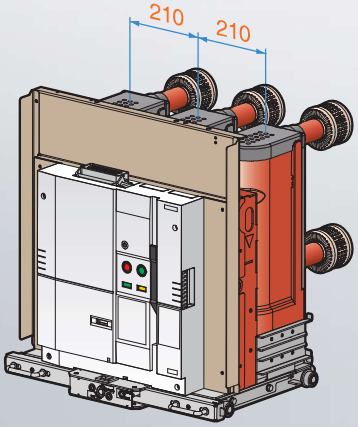
P210
(distance between phases: 210mm)

VCB rating

Ur (kV)	Isc (kA)	Ir (A)
12	20/25	2000
17.5	20/25	2000



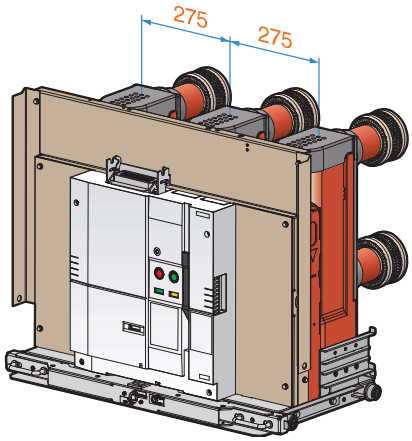
P150
(distance between phases: 150mm)



P210
(distance between phases: 210mm)

VCB rating

Ur (kV)	Isc (kA)	Ir (A)
12 17.5	31.5	2500

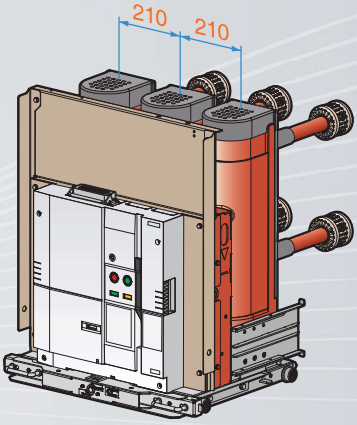


P275
(distance between phases: 275mm)

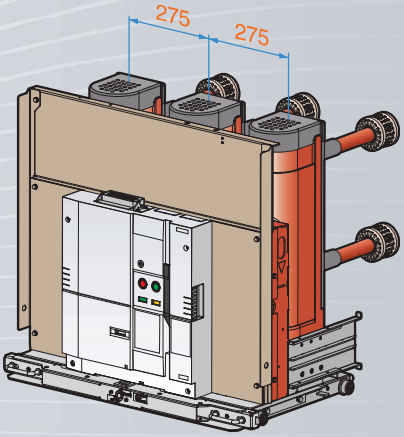
VCB rating

Ur (kV)	Isc (kA)	Ir (A)
24	12.5	630
		1250
	16/25	630
		1250
	25	2000
		2500 *
25.8	12.5	630
		1250
	16/25	630
		1250
	25	2000
		2500 *

* 2500A: phases distance 275mm only



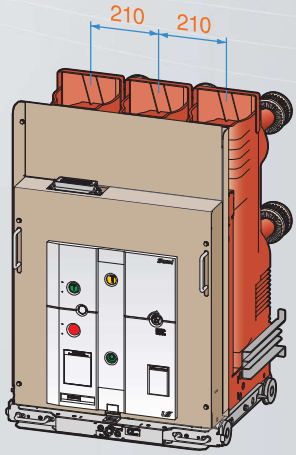
P210
(distance between phases: 210mm)



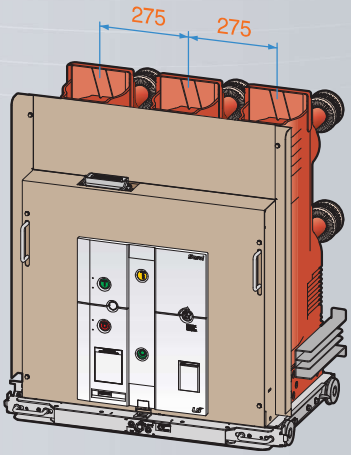
P275
(distance between phases: 275mm)

VCB rating

Ur (kV)	Isc (kA)	Ir (A)
24	31.5/40	2000
25.8	31.5/40	2000



P210
(distance between phases: 210mm)

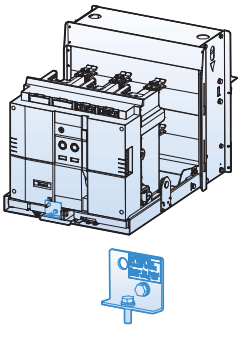


P275
(distance between phases: 275mm)

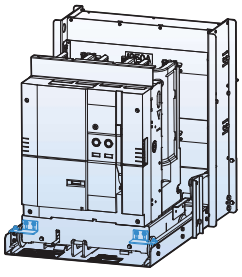
Function to locking a breaker during transport of a switchgear

- Fixed bracket must be dismantled first to rack in a breaker - interlocking system

Fix braket easily visible from the front of the breaker

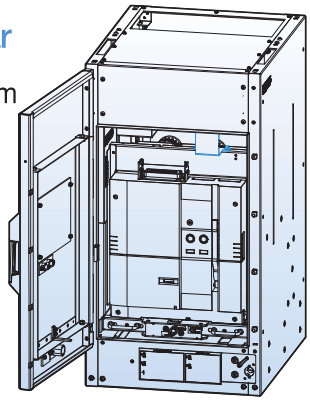


VL type VCB (VL-06)
(E/F/G type)





VL type VCB (VL-06/12/17)
(E/F/G type)



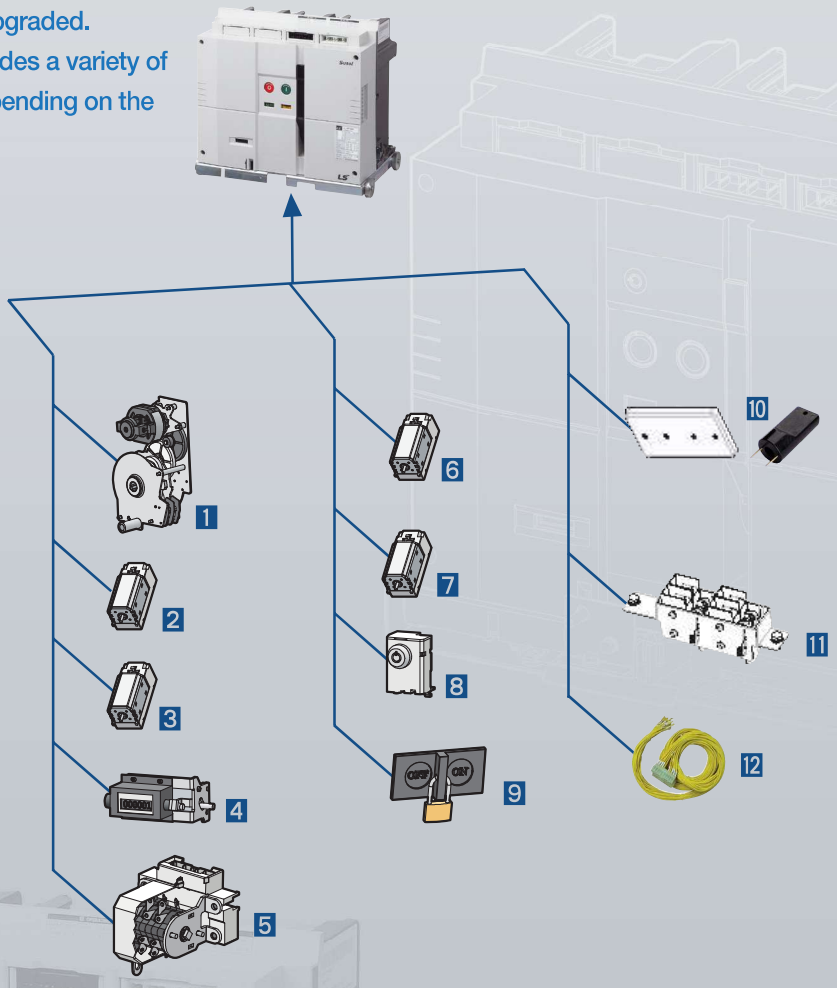


VL/VH type VCB
(H type CB compartment)

Accessories

A variety of accessories for VL-06

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.



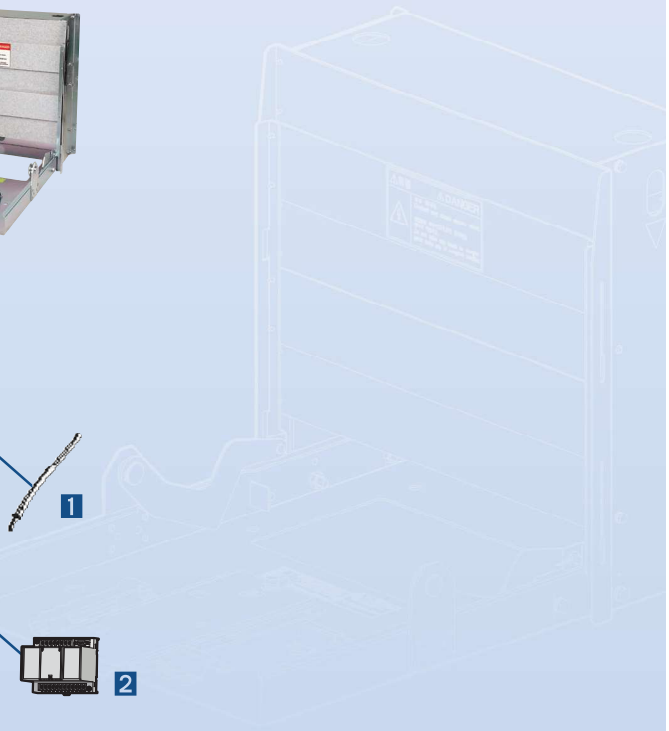
Breaker

1 Motor
2 Closing coil
3 Trip coil
4 Counter
5 Auxiliary contacts
6 UVT coil
7 Current trip coil
8 Key lock
9 Button padlock
10 Button cover
11 Position switch
12 Lead wire

A variety of accessories for VCL-06

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

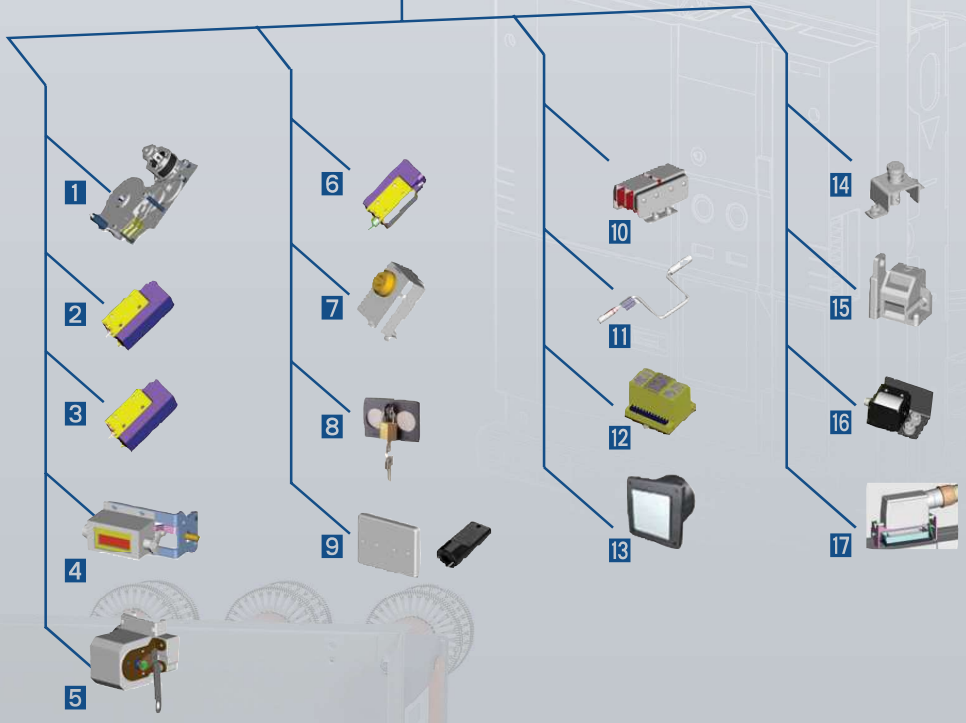
1 Handle for Racking-in and out
2 UVT time delay controller
3 Condenser trip device

Accessories

A variety of accessories for VL-06/12/17/20/25/36

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.





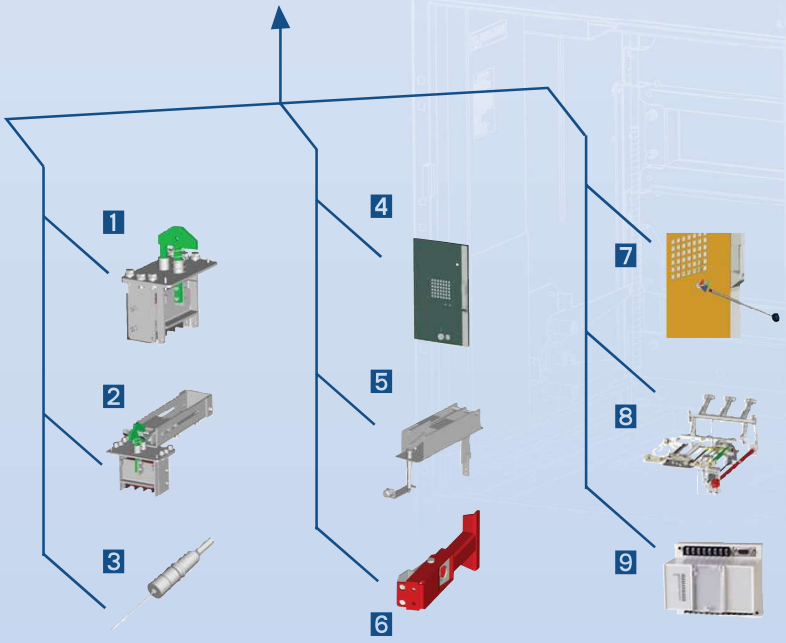
Breaker

1 Motor
2 Closing coil
3 Trip coil
4 Counter
5 Auxiliary contacts
6 UVT coil
7 Key lock
8 Button padlock
9 Button cover
10 Position switch
11 Handle for Racking-in/out
12 UVT time delay controller
13 CTD (Condenser trip device)
14 MOC (Mechanism operated cell switch)
15 Padlock (H type Door Interlock)
16 Locking magnet
17 Plug Interlock

A variety of accessories for VL-06/12/17/20/25/36

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.





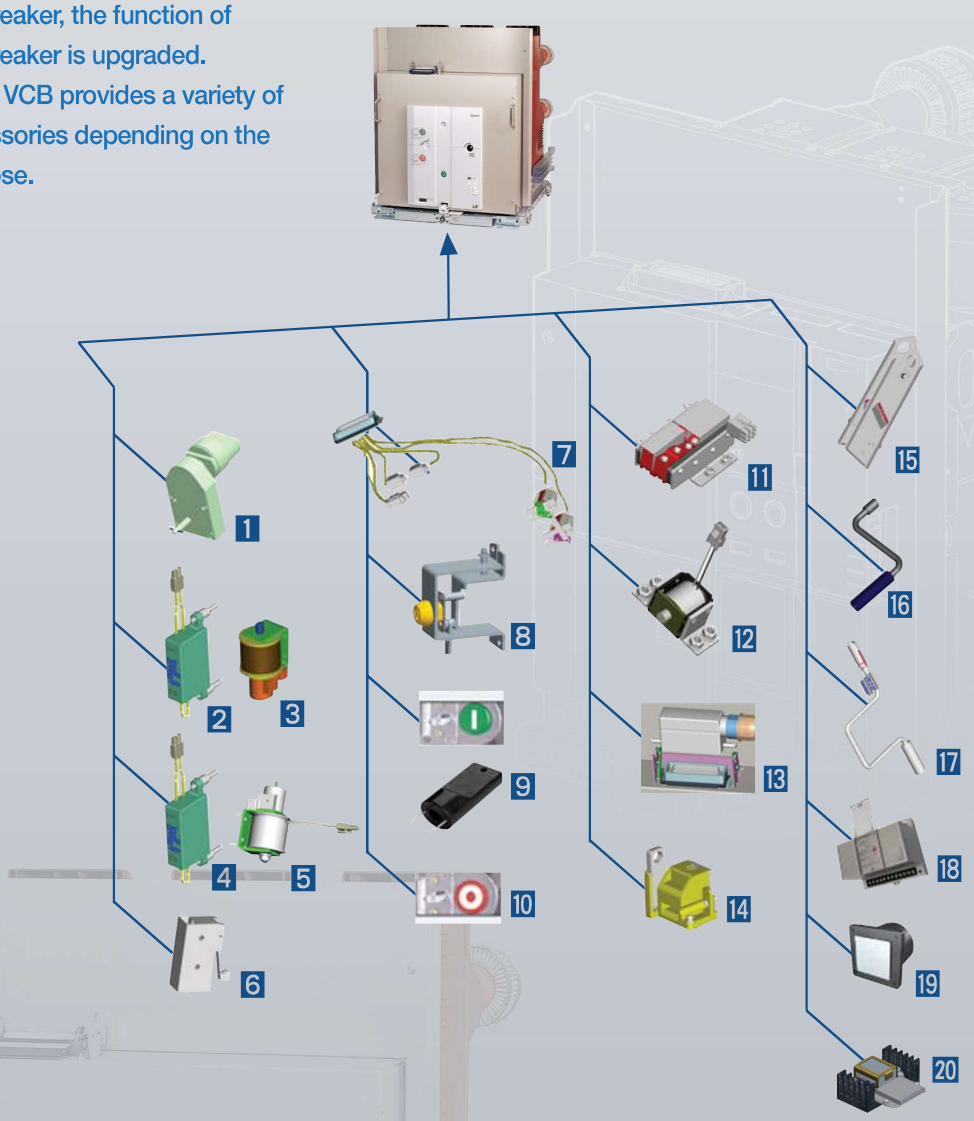
Cradle (H type)

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 & Accessory
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)

Accessories

A variety of accessories for VH-06/12/17/20/25/36

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



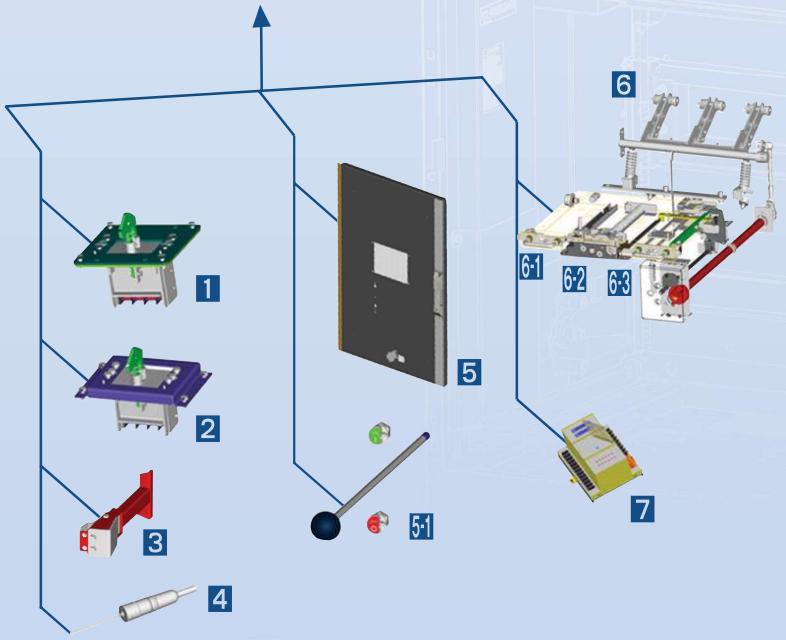
Breaker

1 Motor
2 AC/DC coil rectifier
3 Trip coil/Closing coil
Secondary trip coil
4 AC/DC UVT coil rectifier
5 UVT coil
6 Latch checking switch
7 Auxiliary contact wire
8 Key lock
9 Button cover/Push bar
10 Button padlock
11 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)
20 Wireless Temp. monitoring sensor

A variety of accessories for VH-06/12/17/20/25/36

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



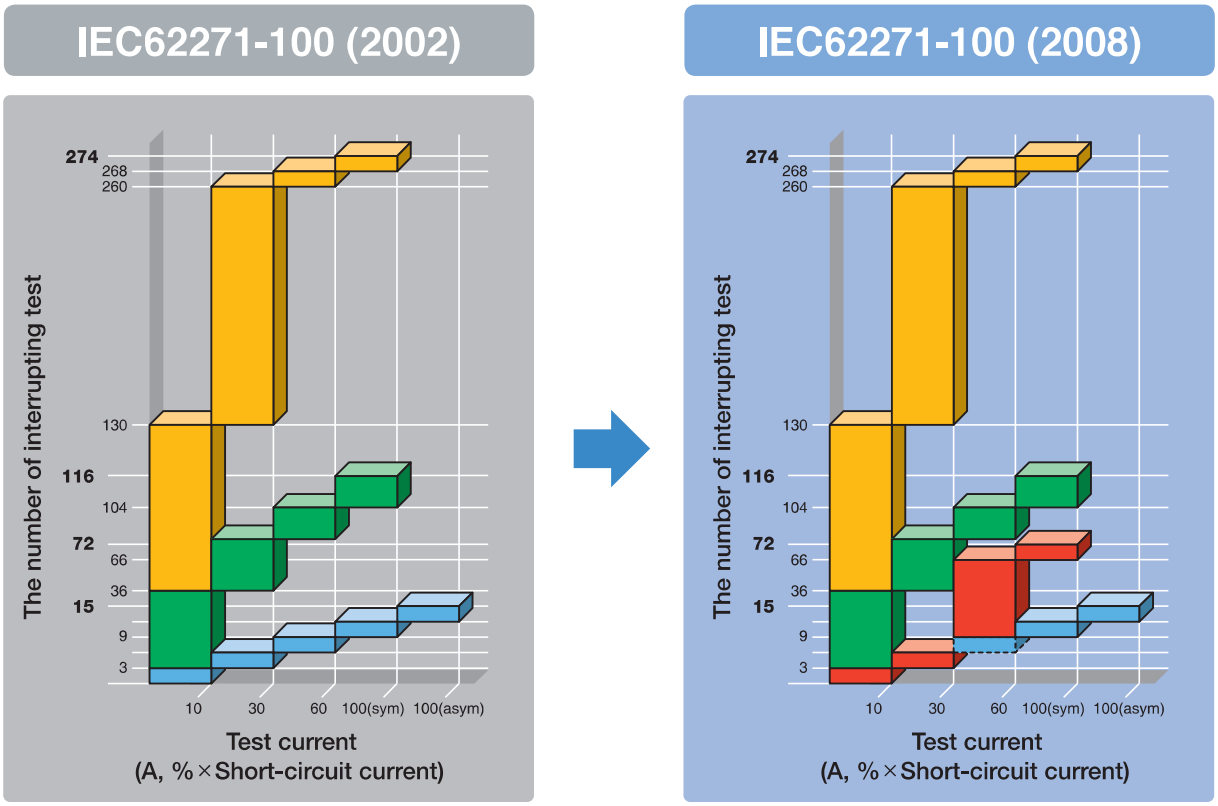


Cradle (H type)

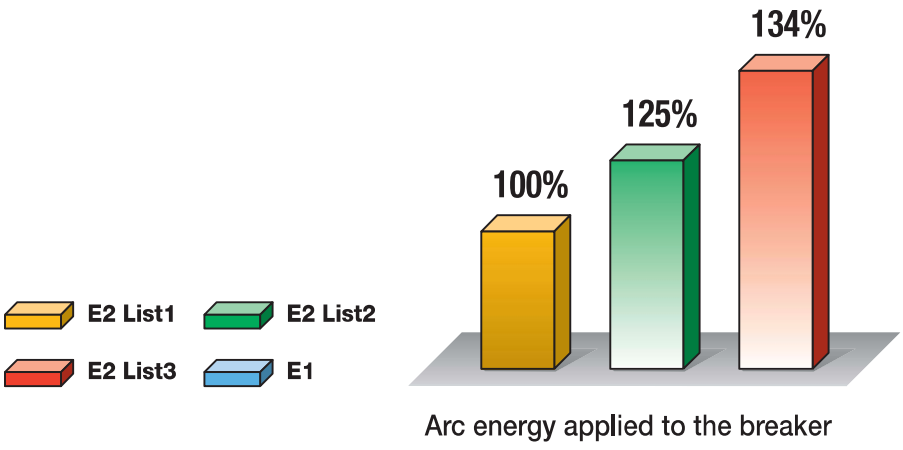
1 MOC (Mechanism operated cell switch)
2 TOC (Truck operated cell switch)
3 Shutter padlock
4 Temperature sensor
5 Door
5-1 Emergency ON/OFF button
6 Earthing switch & Accessories
6-1 Key lock for Earthing switch
6-2 Locking magnet for Earthing switch
6-3 Position switch for Earthing switch
7 TM (Temperature monitoring unit)

E2 (List 1 or List3)

E2 (List3) is first proposed in the IEC 62271-100(2008) to improve the efficiency of the interrupting test. According to it the number of interrupting test T60 is increased instead of fewer number of T10 and T30 compared to the existing List1. List3 compared with the List1 maintains the equivalent of the test but has severe test conditions because 34% higher arc energy applied to the breaker. List3 is applied to Susol VCB series.



Arc Energy: List 1 (100%) < List 2 (125%) < List 3 (134%)



Arc energy applied to the breaker

M2, C2

IEC standards to verify the relibilty of the product allows to select the quality level for the product to be tested according to its real performance and practical usage. The highest quality level of M2, C2 has been applied to Susol VCB.

M1 and M2: Test to determine the mechanical durability grade

2000 operation test		
Sequence	Control Voltage	Number of operations
C-O	85%	500
C-O	100%	500
C-O	110%	500
O-CO-C	100%	250



- Pre-test (characteristics, isolation, and temperature)
- Confirmative tests after the completion of 2000 operations (Characteristics, isolation, temperature)



- Pre-test (characteristics, isolation, and temperature)
- Confirmative tests after every 2000 operation
- Confirmative tests after the completion of 10,000 operations (Characteristics, isolation, temperature)

C1, C2: Capacitive current breaking test is to verify the probability of restriking and C2 class is secured for all Susol VCB.



2 restrikes are allowed during “O” 24 operations and “CO” 24 operations



Restrike is not allowed during “O” 24 operations and “CO” 24 operations

External structure of VCB

Breaker ... VL type



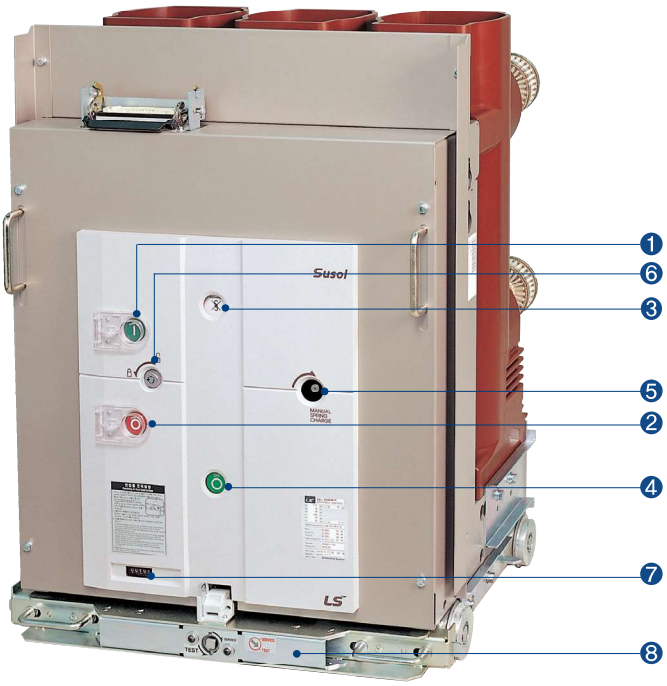
Name of each part

1. Push ON Button
2. Push OFF Button
3. Charge/Discharge Indicator
4. ON/OFF Indicator
5. Manual Charging Handle
6. Key Lock
7. Operation Counter
8. TEST/SERVICE 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/SERVICE 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 closing the closing spring is automatically charged by gear motors.

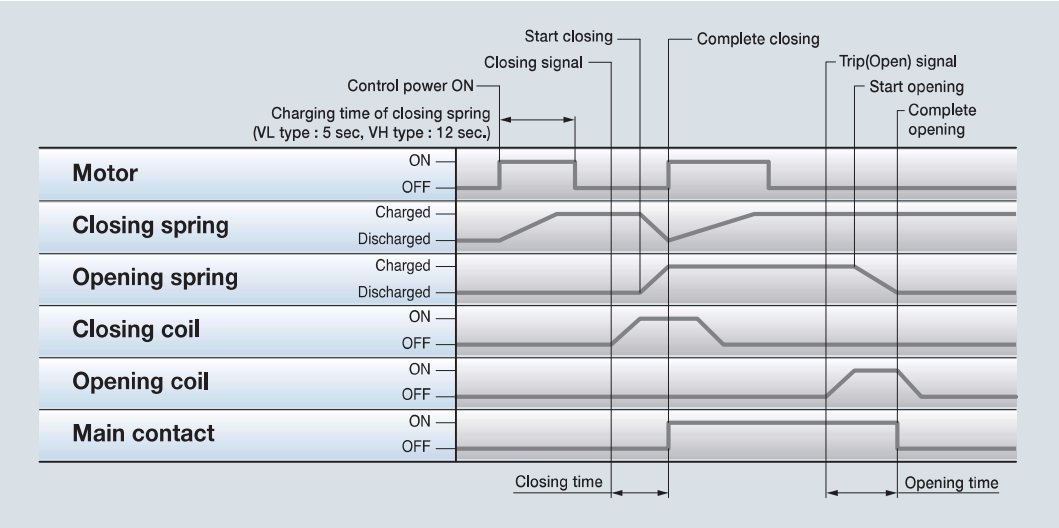
② **Electric closing**

Remote closing is operated by the closing coil.

③ **Electric trip**

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

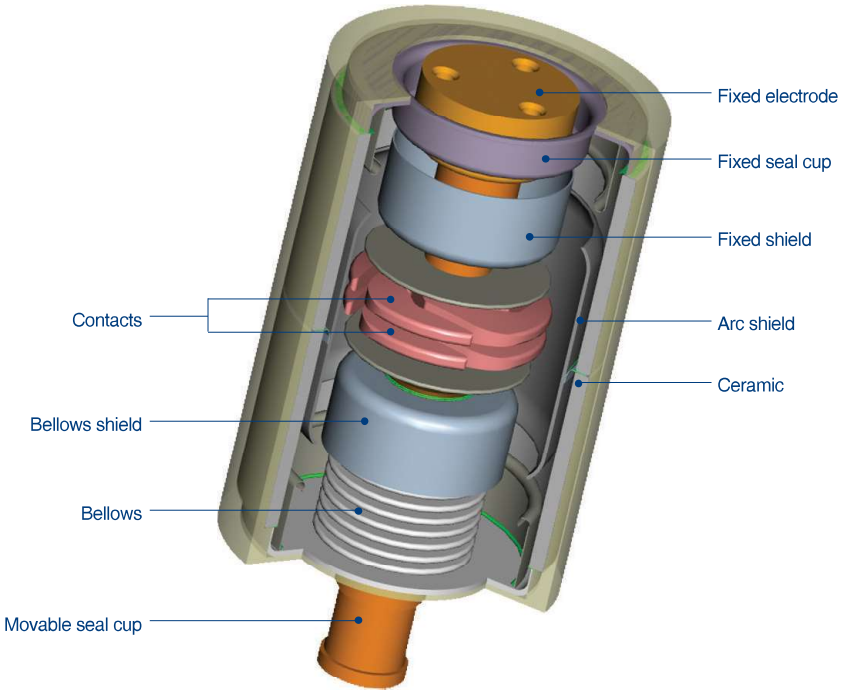
Main contacts are operated by the energy of the spring mechanism and closing spring is charged by the motor in the mechanism.
Breaker is closed by closing coil and tripped by trip coil.
These operations are repeated in VCB as shown in the below sequence chart.

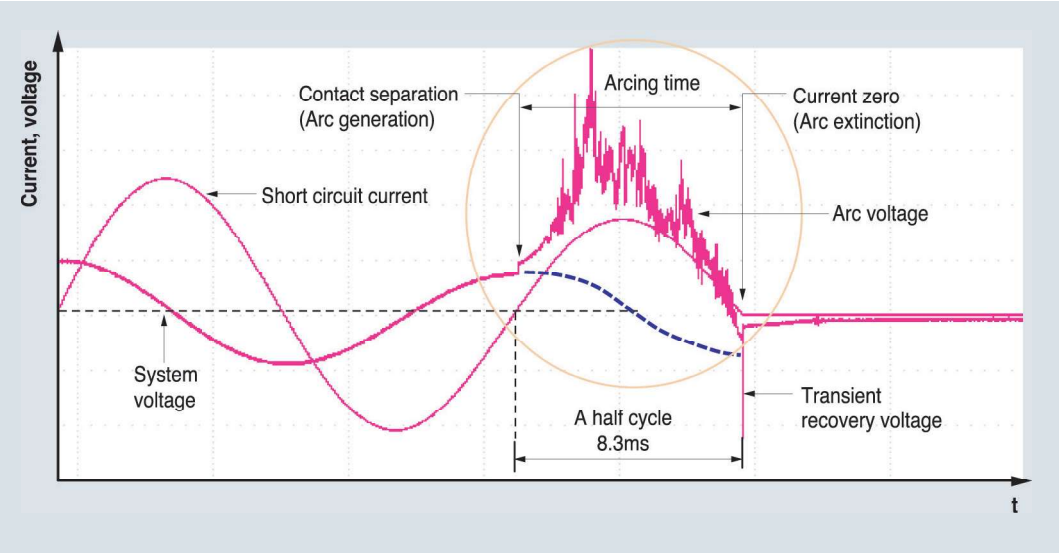


Sequence of the switching mechanism

The interruption of vacuum interrupters

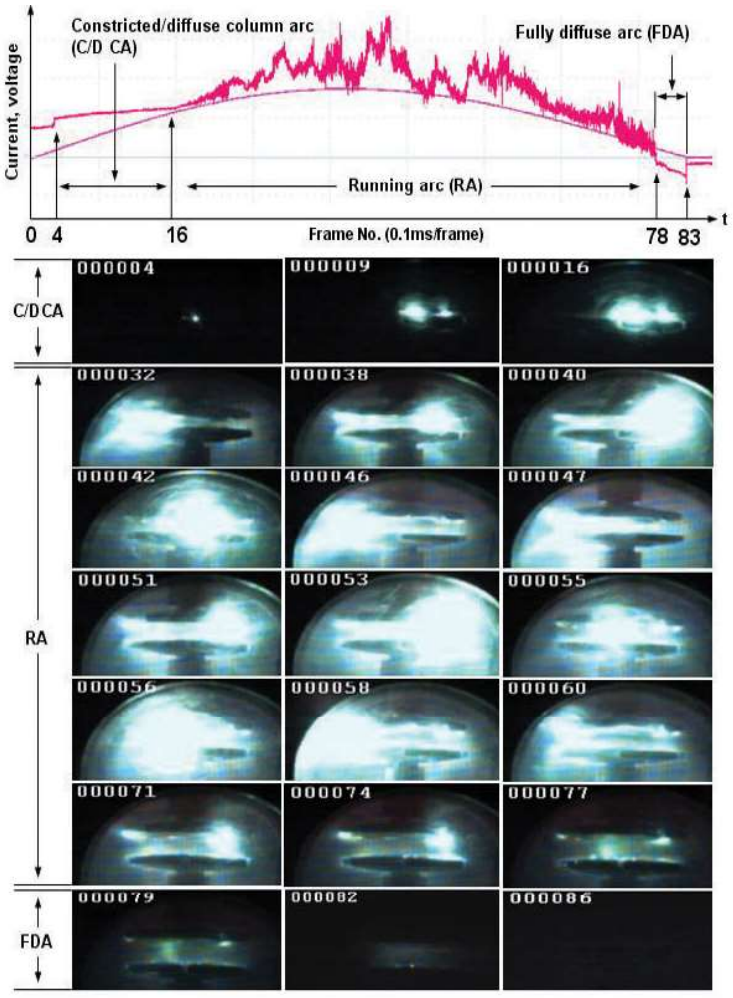
The interruption of VCB is carried out by the vacuum interrupters.
Interrupter contacts as a key part made of copper - chromium (CuCr) material with spiral shape have low contact wear characteristics and withstand voltage is excellent.
Spiral contacts make the arc generated between the surfaces of contacts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

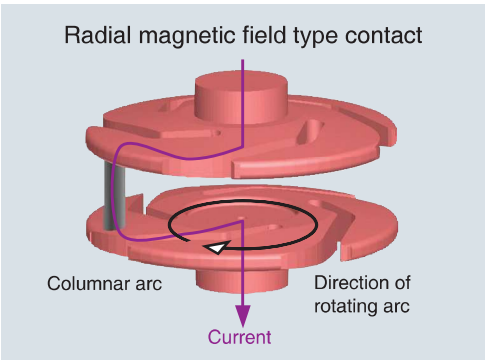
The interruption of vacuum interrupters



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. (10000FPS) 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

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**

- IEC 62271-1 (2007.10)
  High-voltage switchgear and controlgear - Part 1: Common specifications.
- IEC 62271-100 (2008.04)
  High-voltage switchgear and controlgear - Part 2: Alternating-current circuit breakers.

● **Test and certification**

- Test report (KERI)
- Test report (KEMA)



TEST REPORT 2009TS02564 1/47

CLASSIFICATION	Type Test
APPARATUS	Vacuum Circuit Breaker
DESIGNATION	VH-25□40D20
RATINGS	3 poles 25.8 kV 2 000 A 40 kA 60 Hz
APPLIED STANDARD	IEC 62271-100:2008-04
RECEIPT No.	TRD08S02808 (December 11, 2008)
APPLICANT	LS Industrial Systems Co., Ltd. Songjung-dong 1, Hungdeok-gu, Cheongju-si, 361-720, Korea
MANUFACTURER	LS Industrial Systems Co., Ltd. Songjung-dong 1, Hungdeok-gu, Cheongju-si, 361-720, Korea
DATE OF TESTS	June 30, 2008 ~ September 21, 2009
DATE OF ISSUE	December 14, 2009

The type tests have been carried out in accordance with IEC 62271-100:2008-0 applicant's specification.

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.
This document shall not be reproduced except in full, without a written approva

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-O

Approved 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

DF-

KEMA

TYPE TEST CERTIFICATE OF CAPACITIVE SWITCHING PERFORMANCE:C04136-L

APPARATUS: A three-phase withdrawable vacuum circuit breaker in a test rig (cradle)

DESIGNATION: LVB-12 -25 /06 Serial No. 20040826001
LVB-12 -25 /12 Serial No. 20040826002
LVB-12 -25 /20 Serial No. 20040826003

Rated voltage: 12 kV Rated frequency: 50/60 Hz
Rated normal current: 630, 1250,2000A Rated Short Circuit Current: 25 kA

MANUFACTURER: LG Industrial Systems Co., Ltd., Hungduk-gu, Cheongju, Korea

CLIENT: LG Industrial Systems Co., Ltd., Hungduk-gu, Cheongju, Korea

TESTED BY: KEMA-Powertest, Inc., Chalfont, PA, USA

DATE(S) OF TESTS: Sept. 14-26, 2004

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with IEC 62271-100: 2001, sub clause 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: 12/15/04

ACCREDITED

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

Types and ordering information

Susol

7.2kV (VL-06)

Breaker

VL – 06 P 08 A 04

Basic model name	
VL	Susol VCB

Rated voltage (kV)	
06	7.2

Version	
P	Fixed
E	E type drawout
F	F type drawout
G	G type drawout

Rated short time current (kA)	
08	8
13	12.5

Phase distance/Compatibility	
A	Standard
B	Compatible with existing breaker Note6)

Rated current (A)	
04	400
06	630

VL-06E08A04 – M1 C1 T1 SA1 U1 – A 1 4 7

Motor control voltage	
M1	DC 110V
M2	DC 220V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M6	AC 48V
M7	AC 100V~130V
M8	AC 200V~250V

Trip coil voltage	
T1	DC 110V
T2	DC 220V~250V
T3	DC 125V
T4	DC 24V~30V
T5	DC 48V~60V
T6	AC 48V
T7	AC 100V~130V
T8	AC 200V~250V
T9	Current trip coil

UVT Note5)	
U0	Without UVT
U1	DC 110V
U2	DC 220V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 48V
U7	AC 100V~130V
U8	AC 200V~250V

Closing coil voltage	
C1	DC 110V
C2	DC 220V~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		
SA1	Standard	A type connector, 2a2b
SA2		A type connector, 4a4b
SA3		A type connector, 6a6b Note5)
SA5	Flame retardant	A type connector, 2a2b
SA6		A type connector, 4a4b
SA7		A type connector, 6a6b Note5)

Optional	
LH	Lifting Hook
CTD1	Condenser Trip Device (AC 110V)
CTD2	Condenser Trip Device (AC 220V)
UDC1	UVT Time Delay Controller (AC/DC 110V)
UDC2	UVT Time Delay Controller (AC/DC 220V)
UDC3	UVT Time Delay Controller (AC/DC 48V)
CTU	Coil Test Unit

Other accessories Note)	
1	Secondary Trip coil Note5)
3	Position S/W (Test: 1a1b, Service: 2b)
4	Position S/W (Test: 2a, Service: 2a)
5	Position S/W (Test: 1a1b, Service: 1a1b)
7	Key lock
8	Button Padlock
9	Button cover
A	Lead wire
B	User Plug (Part)
O	Lead Wire special color (Blue)

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

Note)
1. In the case of selecting accessories such as A1(Secondary trip coil), A4(Position S/W 2a2a)and A7(Key lock), A147 is type name in the ordering.
2. Unable to select A1(Secondary Trip coil), U1~U8(UVT)and T9(Current trip coil) 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. Maximum number of Auxiliary Contacts available are 5a5b, 5a6b in the case of selecting A1(Secondary trip coil), U1~U8(UVT).
6. In case of using the existing old type cradle and replacing breaker only please order type B (Compatible with existing breaker). Compatibille busbars are required for fixed version.
7. If T9(CTC) is selected, in case of adding Secondary trip coil, CTC is also added.

Cradle

VCL – 06 E 08 A 06

Basic model name	
VCL	Susol VCB Cradle

Rated voltage (kV)	
06	7.2

Version	
E	E type drawout
F	F type drawout
G	G type drawout

Rated short time current (kA)	
08	8
13	12.5

Phase distance/Compatibility	
A	Standard
B	Compatible with existing cradle Note)

Rated current (A)	
04	400
06	630

Note) In case of replacing the existing old type VCB with Susol VCB please order type B for cradle and A for breaker.

Types and ordering information

Susol

7.2/12/17.5kV (VL-06/12/17)

Breaker

VL – 06 H 20 A 06

Basic model name	
VL	Susol VCB

Rated voltage (kV)	
06	7.2
12	12
17	17.5

Version	
P	Fixed
E	E type drawout (for MESG)
F	F type drawout (for MESG)
Fs	Fs type drawout (Screw Type)
G	G type drawout (for MESG)
Gs	Gs type drawout (Screw Type)
K	K type drawout (for MCSG compatible with Pro-MEC type)
H	H type drawout (for MCSG)

Note) 1. Breaking current 31.5kA: E/F/Fs/G type can be used only with 7.2kV
2. Gs/K type: Usable only 7.2/12kV
K type Compatible with Pro-MEC G/T(T) (for withdrawable type for MCSG)

Rated short time current (kA)	
20	20
25	25
32	31.5

Phase distance/Compatibility	
A	150mm
B	210mm
D	275mm
F	Compatible with existing products
K	compatible with K Pro-MEC G/T(T)

Note) 1. In case of 7.2kV
1) Phase distance 150mm only
2) 20/25kA: only 630/1250/2000A available (E/F/G)
3) 31.5kA: only 1250/2000A available (E/F/G)
2. K type: phase distance 150mm only
3. In case of 12/17.5kV
1) H type: phase distance 150/210/275 all available
2) P type 630/1250A: phase distance 150/210 all available
3) In case of 20/25kA: 12/17.5kV E/F type phase distance 210 available
4) K type: compatible with Pro-MEC G/T(T) (phase distance 150mm)
5) F type (compatible with existing products): Available only to 20/25kA and 630/1250A (phase distance 210mm)
4. Rated current 2500A: only available 31.5kA P/H type (phase distance 210/275mm)

Rated current (A)	
06	630
13	1250
20	2000
25	2500

VL-06H20A06 – M1 C1 T1 SB1 U1 – A 147

Motor control voltage	
M1	DC 110V
M2	DC 220V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M6	AC 48V
M7	AC 100V~130V
M8	AC 200V~250V

Trip coil voltage	
T1	DC 110V
T2	DC 220V~250V
T3	DC 125V
T4	DC 24V~30V
T5	DC 48V~60V
T6	AC 48V
T7	AC 100V~130V
T8	AC 200V~250V
T9	Current trip coil

UVT	
U0	Without UVT
U1	DC 110V
U2	DC 220V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 48V
U7	AC 100V~130V
U8	AC 200V~250V

Closing coil voltage	
C1	DC 110V
C2	DC 220V~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
SB4		B type connector, 10a10b
SA6	Flame retardant	A type connector, 4a4b
SA8		A type connector, 10a10b
SB6		B type connector, 4a4b

Other accessories Note)	
1	Secondary Trip coil
2	Secondary Trip Coil with TCM Contact
3	Position S/W (Test : 1a1b, Service : 2b)
4	Position S/W (Test : 2a, Service : 2a)
5	Position S/W (Test : 1a1b, Service : 1a1b)
7	Key lock
8	Button Padlock
9	Button Cover
A	Lead Wire
B	User Plug (Part)
C	Plug Interlock
D	Padlock (H type Door Interlock)
E	MOC (Mechanical Operating Cell S/W)
F	Locking Magnet
G	Keylock(Same key-One key for 3EA VCB)
I	Mecha Shaft Interlock Lever
J	Door Interlock
O	Lead Wire special color (Blue)
V	CT operated coil 1A
W	CT operated coil 5A

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

Optional	
CTD1	Condenser Trip Device (AC 110V)
CTD2	Condenser Trip Device (AC 220V)
UDC1	UVT Time Delay Controller (AC/DC 110V)
UDC2	UVT Time Delay Controller (AC/DC 220V)
UDC3	UVT Time Delay Controller (AC/DC 48V)
CTU	Coil Test Unit

Note)
1. If A2 (UVT), A4 (Position S/W 2a2b) and A7 (Keylock) are selected, A147 is the 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 2a2a), 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 TCM Contact) is selected the maximum available auxiliary contacts are 4a3b, 9a8b.
7. AC (Plug interlock), AD (H type Door interlock), AE (MOC) and AF (Locking magnet) are available only for H type.
8. In case of B-type connector the flame retardant wire is applicable to auxiliary contacts 4a4b, not to 10a10b.
9. A/B-type connector is applicable to P/E/F/G/K type and B-type connector to H type.
10. Lead wire special color (blue) is applicable to A-type connector.
11. When the position switch is selected from accessories, auxiliary contacts and wiring ass'y can be selected as option A/B-type (P/E/F/G/K-type) or B-type(H-type) connector
12. Locking magnet of H type breaker use the same control power supply as motor.
13. Flame retardant type blue wire is not available.
14. When current Trip Coil AV(CTC 1A) or AW(CTC 5A) is selected, A1(Secondary Trip Coil), U1~U8(UVT) cannot be selected simultaneously and the maximum auxiliary contact is 4a4b.
15. AI(Mecha Shaft Interlock Lever) is available only for 12kV, P type.

Cradle

VCL — 06 H 20 A 06 — A 157

Basic model name	
VCL	Susol VCB Cradle

Rated voltage (kV)	
06	7.2
12	12
17	17.5

Rated short time current (kA)	
20	20
25	25
32	31.5

Rated current (A)	
06	630
13	1250
20	2000
25	2500

Version	
P	Fixed
E	E type drawout (for MESG)
F	F type drawout (for MESG)
Fs	Fs type drawout (Screw Type)
G	G type drawout (for MESG)
Gs	Gs type drawout (Screw Type)
K	K type drawout (for MCSG compatible with Pro-MEC type)
H	H type drawout (for MCSG)

Note) 1. Breaking current 31.5kA: E/F/Fs/G type can be used only with 7.2kV
2. Gs/K type: Usable only 7.2/12kV
K type Compatible with Pro-MEC G/T(T) (for withdrawable type for MCSG)

Phase distance/Compatibility	
A	150mm
B	210mm
D	275mm
F	Compatible with existing products
K	compatible with K Pro-MEC G/T(T)

Note) 1. In case of 7.2kV
1) Phase distance 150mm only
2) 20/25kA: only 630/1250/2000A available (E/F/G)
3) 31.5kA: only 1250/2000A available (E/F/G)
2. K type: phase distance 150mm only
3. In case of 12/17.5kV
1) H type: phase distance 150/210/275 all available
2) P type 630/1250A: phase distance 150/210 all available
3) In case of 20/25kA: 12/17.5kV E/F type phase distance 210 available
4) K type: compatible with Pro-MEC G/T(T) (phase distance 150mm)
5) F type (compatible with existing products): Available only to 20/25kA and 630/1250A (phase distance 210mm)
4. Rated current 2500A: only available 31.5kA P/H type (phase distance 210/275mm)

Other accessories	
1	ES (Standard earthing Switch) without option
2	ES with position S/W (2a2b)
4	ES with position S/W (6a6b)
5	Key lock for ES
6	Locking magnet for ES: DC 110V
7	Locking magnet for ES: DC 220V
8	Locking magnet for ES: DC 125V
9	Locking magnet for ES: DC 24V
A	Locking magnet for ES: DC 48V
B	Locking magnet for ES: AC 48V
C	Locking magnet for ES: AC 110V
D	Locking magnet for ES: AC 220V
E	Shutter padlock
F	TOC (Truck Operating Cell S/W)
G	MOC (Mechanical Operating Cell S/W)
H	Door
J	Door Interlock
K	Door Emergency Push Button
L	Temperature Monitoring Sensor
M	H type Lead wire 4a4b (Flame retardant wire)
N	H type Lead wire 10a10b (Flame retardant wire)
O	H type Lead wire 4a4b (Rated short time current)

Optional	
TM	Temperature Monitoring

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. (When ordering TM, AL option must be selected)
2. AJ and AK can not be selected without door (AH).
3. H type lead wire - one of AM, AN or AO is required for cradle in case of H type breaker.
4. Unable to select AK at the cradle in the case of selecting A8(Button Padlock), A9(Button Cover) for body of H-type.
5. When Keylock(A5) is selected, Earthing Switch is included as standard.
6. Please contact us if you need IAC (Internal arc classification) of H type CB compartment.

Types and ordering information

Susol

24/25.8/36kV (VL-20/25/36)

Breaker

VL — 20 H 13 B 06

Basic model name	
VL	Susol VCB

Rated voltage (kV)	
20	24
25	25.8
36	36

Version	
P	Fixed
E	E type drawout (for MESG)
F	F type drawout (for MESG)
G	G type drawout (for MESG)
K	K type drawout (for MCSG compatible with Pro-MEC type)
H	H type drawout (for MCSG)

Rated short time current (kA)	
13	12.5
16	16
25	25

Phase distance/Compatibility	
B	210mm
F	265mm
D	275mm
G	Enclosed type, Tulip Contact

Rated current (A)	
06	630
13	1250
20	2000
25	2500

Note) - P, E, F type : phase distance 265mm only
- G-type: 630A and 1250A – 210mm and 265mm
2000A - phase distance 210mm only
- K-type: 630A and 1250A - , 210mm and 265mm
2000A - phase distance 265mm only
- H-type: All ratings - dual phase distance,
210mm and 275mm dual
(2500A - phase distance 275mm only)
- E, F-type: phase distance and appearance are distinguished with F and G

VL-20H13B06 — M1 C1 T1 SB1 U1 — A 147

Motor control voltage	
M1	DC 110V
M2	DC 220V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M6	AC 48V
M7	AC 100V~130V
M8	AC 200V~250V

Trip coil voltage	
T1	DC 110V
T2	DC 220V~250V
T3	DC 125V
T4	DC 24V~30V
T5	DC 48V~60V
T6	AC 48V
T7	AC 100V~130V
T8	AC 200V~250V
T9	Current trip coil

UVT	
U0	Without UVT
U1	DC 110V
U2	DC 220V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 48V
U7	AC 100V~130V
U8	AC 200V~250V

Closing coil voltage	
C1	DC 110V
C2	DC 220V~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
SB4		B type connector, 10a10b
SA6	Flame retardant	A type connector, 4a4b
SA8		A type connector, 10a10b
SB6		B type connector, 4a4b

Optional	
CTD1	Condenser Trip Device (AC 110V)
CTD2	Condenser Trip Device (AC 220V)
UDC1	UVT Time Delay Controller (AC/DC 110V)
UDC2	UVT Time Delay Controller (AC/DC 220V)
UDC3	UVT Time Delay Controller (AC/DC 48V)
CTU	Coil Test Unit

Other accessories Note)	
1	Secondary Trip coil
2	Secondary Trip Coil with TCM Contact
3	Position S/W (Test : 1a1b, Service : 2b)
4	Position S/W (Test : 2a, Service : 2a)
5	Position S/W (Test : 1a1b, Service : 1a1b)
7	Key lock
8	Button Padlock
9	Button Cover
A	Lead Wire
B	User Plug (Part)
C	Plug Interlock
D	Padlock (H type Door Interlock)
E	MOC (Mechanical Operating Cell S/W)
F	Locking Magnet
J	Door Interlock
O	Lead Wire special color (Blue)
V	CT operated coil 1A
W	CT operated coil 5A

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, A147 is the 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 2a2a), 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 TCM Contact) is selected the maximum available auxiliary contacts are 4a3b, 9a8b.
7. AC (Plug interlock), AD (H type Door interlock), AE (MOC) and AF (Locking magnet) are available only for H type.
8. In case of B-type connector the flame retardant wire is applicable to auxiliary contacts 4a4b, not to 10a10b.
9. A/B-type connector is applicable to P/E/F/G type and B-type connector to H type.
10. Lead wire special color (blue) is applicable to A-type connector.
11. When the position switch is selected from accessories, auxiliary contacts and wiring ass'y can be selected as option A/B-type (P/E/F/G/K-type) or B-type(H-type) connector
12. Locking magnet of H type breaker use the same control power supply as motor.
13. Flame retardant type blue wire is not available.
14. When current Trip Coil AV(CTC 1A) or AW(CTC 5A) is selected, A1(Secondary Trip Coil), U1~U8(UVT) cannot be selected simultaneously and the maximum auxiliary contact is 4a4b.

Cradle

VCL — 20 H 13 B 06 — A 157

Basic model name	
VCL	Susol VCB Cradle

Rated voltage (kV)	
20	24
25	25.8
36	36

Rated short time current (kA)	
13	12.5
16	16
25	25

Rated current (A)	
06	630
13	1250
20	2000
25	2500

Version	
E	E type drawout
F	F type drawout
G	G type drawout
K	K type drawout (for MCSG compatible with Pro-MEC type)
H	H type drawout (for MCSG)

Note) K-type(compatible with Pro-MEC G/T(T)) cradle for MCSG is for below product - LCL-20G-13D/T,15D/T, 25D/T

Phase distance/Compatibility	
B	210mm
F	265mm
D	275mm
G	Enclosed type, Tulip Contact

Note) - P, E, F type: phase distance 265mm only
- G-type: 630A and 1250A – 210mm and 265mm
2000A – phase distance 210mm only
- K-type: 630A and 1250A, 210mm and 265mm
2000A - phase distance 265mm only
- H-type: All ratings - dual phase distance, 210mm and 275mm dual
(2500A - phase distance 275mm only)
- E, F-type: phase distance and appearance are distinguished with F and G

Other accessories (H type)	
1	ES (Standard earthing Switch) without option
2	ES with position S/W (2a2b)
4	ES with position S/W (6a6b)
5	Key lock for ES
6	Locking magnet for ES: DC 110V
7	Locking magnet for ES: DC 220V
8	Locking magnet for ES: DC 125V
9	Locking magnet for ES: DC 24V
A	Locking magnet for ES: DC 48V
B	Locking magnet for ES: AC 48V
C	Locking magnet for ES: AC 110V
D	Locking magnet for ES: AC 220V
E	Shutter padlock
F	TOC (Truck Operating Cell S/W)
G	MOC (Mechanical Operating Cell S/W)
H	Door
J	Door Interlock
K	Door Emergency Push Button
L	Temperature Monitoring Sensor
M	H type Lead wire 4a4b (Flame retardant wire)
N	H type Lead wire 10a10b (Flame retardant wire)
O	H type Lead wire 4a4b (Rated short time current)

Optional	
TM	Temperature Monitoring

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.
5. Accessary A2~AQ is available to H-type. Exceptionally K-type is available to A1.
(Position S/W 4a4b is basic option of A1)
6. Unable to select AK at the cradle in the case of selecting A8(Button Padlock), A9(Button Cover) for body of H-type.
7. When Keylock(A5) is selected, Earthing Switch is included as standard.
8. Please contact us if you need IAC (Internal arc classification) of H type CB compartment.

Types and ordering information

7.2/12kV (LVB-06/12)

Breaker



Basic model name	
LVB	Susol VCB

Rated voltage (kV)	
06	7.2
12	12

Rated short time current (kA)	
32	31.5
40	40

Note) In case of 31.5kA, 3150A is availble only.
31.5kA 630/1250/2000/2500A: Please refer to VL Series

Rated current (A)	
12	1250A
20	2000A
30	3150A

Connector and wire	
2B	A type connector, 4a4b
2E	A type connector, 10a10b
2G	B type connector, 4a4b
2H	B type connector, 10a10b
00	Dummy VCB

Version	
P	Fixed
E	E type drawout
F	F type drawout
G	G type drawout
G	G/T type drawout (for MESG)+T2

Model version	
L	Susol

Control voltage	
1A	DC 110V
1B	DC 220V~250V
1C	DC 48V
1E	DC 125V
1L	AC 220V
1M	AC 110V
1N	AC 48V
00	Dummy VCB

Other accessories Note)	
B	Position S/W(Test : 2a, Service : 2a)
B1	Position S/W(Test : 1a1b, Service : 1a1b)
B2	Position S/W(Test : 1a1b, Service : 2b)
B6	User's Plug(Part)
C1	Button Padlock(ON)
C2	Button Padlock(OFF)
C3	Button Padlock(ON,OFF)
D1	Button Cover(ON)
D2	Button Cover(OFF)
D3	Button Cover(ON OFF)
E	Button Padlock(ON) + Button Cover(OFF)
F	Button Padlock(OFF) + Button Cover(ON)
G	Keylock
H	Secondary Trip coil
J	Flame retardant wire
K	Latch checking S/W
P1	Dummy VCB(A type connector)
P2	Dummy VCB(B type connector)
S	Padlock
T	Tulip contact, Closed type
T2	T + Earthing S/W Interlock change
V	UVT

Note)
1. H(Secondary trip coil) and V(UVT) can not be selected simultaneously.
2. B(Position S/W 2a2a), B1(Position S/W 2a2b) and B2(Position S/W 1a3b) can not be selected simultaneously.
   However, only B(Position S/W 2a2a) is available for G/T type(MCSG drawable type)
3. If V(UVT) is selected , additional K(Latch checking S/W) is not allowed.
   (Because if UVT is slected a latch checking S/W is included as standard for electrical interlocking)
4. One out of T and T2 should be selected for G/T type(MCSG drawable type).
   T2 is the standard and T (Product before Earthing S/W interlock change) is suitable for compatibility with existing products.
5. In case of T(Tulip contact, closed type) 3150A is available only for open type housing .
6. Only G/T type is available for 12kV.

Cradle



Basic model name	
LCL	Pro-MEC
	Cradle

Rated voltage (kV)	
06	7.2
12	12

Rated short time current (kA)	
32	31.5
40	40

Note) In case of 31.5kA,
3150A is availble only.
31.5kA 630/1250/2000/2500A:
Please refer to VL Series

Rated current (A)	
12	1250A
20	2000A
32	3150A

Version	
P	Fixed
E	E type drawout
F	F type drawout
G	G type drawout
G	G/T type drawout (for MESG)+T2

Model version	
D	Pro-MEC

Other accessories Note)	
B	Earthing Switch Note2)
C	Earthing Switch Position S/W(ON/OFF)
D	Earthing Switch Locking coil
T	Tulip contact, Closed type Note1)
T2	T + Earthing S/W Interlock change Note1)
T3	T2 +Earthing S/W without Conductor ass'y Note1)
U1	Reduced height type Note2)

Note) 1. One out of T, T2 and T3 should be selected for G/T type(MCSG drawable type).
T2 is the standard and T (Product before Earthing S/W interlock change)
is suitable for compatibility with existing products.
T3 is available only for 1250/2000A.
2. U1(Reduced height type) and B(Earthing S/W) can not be selected simultaneously.

Types and ordering information

Susol

7.2/12/17.5/24/25.8/36kV (VH-06/12/17/20/25/36)

Breaker

VH — **06** **H** **25** **B** **13**

Basic model name	
VH	Susol VCB

Rated voltage (kV)	
06	7.2
12	12
17	17.5
20	24
25	25.8
36	36

Version	
P	Fixed
E	E type drawout (for MESG)
F	F type drawout (for MESG)
Fs	Fs type drawout (Screw Type)
G	G type drawout (for MESG)
Gs	Gs type drawout (Screw Type)
K	K type drawout (for MCSG compatible with Pro-MEC type)
H	H type drawout (for MCSG)

Rated short time current (kA)	
25	25
32	31.5
40	40
50	50

Note)
1. 25kA is for 24/36kV
2. 31.5/40kA is for 7.2/12/17.5/24/36kV
3. 50kA is for 7.2/12/17.5kV

Phase distance/Compatibility	
A	150mm
B	210mm
D	275mm
E	300mm
K	Compatible with K Pro-MEC G/T(T)
L	320mm

Note) K can be selected for Pro-MEC G/T(T) compatible models ONLY and the phase distance is 150mm.

Rated current (A)	
12	1200A
13	1250A
20	2000A
25	2500A
32	3150A
40	4000A
50	5000A

Note) Refer to the rating table for selecting rated current.

VH-06H25B13 — **M1** **C1** **T1** **SB2** **U1** — **A** **147**

Motor control voltage	
M1	DC 110V
M2	DC 220V~250V
M3	DC 125V
M5	DC 48V
M6	AC 48V
M7	AC 110V
M8	AC 220V

Trip coil voltage	
T1	DC 110V
T2	DC 220V~250V
T3	DC 125V
T5	DC 48V
T6	AC 48V
T7	AC 110V
T8	AC 220V

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

Closing coil voltage	
C1	DC 110V
C2	DC 220V~250V
C3	DC 125V
C5	DC 48V
C6	AC 48V
C7	AC 110V
C8	AC 220V

Connector and wire		
SA2	Standard	A type connector, 4a4b
SA4		A type connector, 10a10b
SB2		B type connector, 4a4b
SB4		B type connector, 10a10b
SA6	Flame retardant	A type connector, 4a4b
SA8		A type connector, 10a10b
SB6		B type connector, 4a4b

Optional	
CTD1	Condenser Trip Device(AC 110V)
CTD2	Condenser Trip Device(AC 220V)
UDC1	UVT Time Delay Controller(AC/DC 110V)
UDC2	UVT Time Delay Controller(AC/DC 220V)
UDC3	UVT Time Delay Controller(AC/DC 48V)
CTU	Coil Test Unit

Other accessories Note)	
1	Secondary Trip coil
2	Secondary Trip Coil with TCM Contact
3	Position S/W(Test: 1a1b, Service: 2b)
4	Position S/W(Test: 2a, Service: 2a)
5	Position S/W(Test: 1a1b, Service: 1a1b)
6	Latch checking S/W
7	Keylock
8	Button Padlock
9	Button Cover
A	Lead Wire
B	User Plug(Part)
C	Plug Interlock
D	Padlock(H type Door Interlock)
E	MOC(Mechanical Operating Cell S/W)
F	Locking Magnet
G	ANSI type Charge interlock
O	Lead wire special color(Blue)
X	Wireless Temperature monitoring sensor

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

Note)
1. If A1(Secondary trip coil), A4(Position S/W 2a2a), A7(Keylock)are selected, A147 is the type name in the ordering.
2. A1(Secondary trip coil), U1~U8(UVT) can not be selected simultaneously.
3. A3(Position S/W 1a3b), A4(Position S/W 2a2a), 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. A/B-type connector is applicable to P/E/F/G/K type and B-type connector to H type.
8. Lead Wire Special Color(blue) is available only for A type connector and the flame retardant is not applicable to it.
9. Locking magnet can be applied only to H type VCB - breaker and cradle.
10. Locking magnet of H type breaker use the same control power supply as motor.
11. 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.
12. 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.
13. When A1(Secondary trip coil) is selected the maximum available auxiliary contacts are 10a10b.
14. When A2(Secondary Trip coil with TCM Contact) is selected the maximum available auxiliary contacts are 4a3b, 10a9b.

Cradle

VCH — 06 H 25 B 13 — A 157

Basic model name	
VCH	Susol VCB Cradle

Rated voltage (kV)	
06	7.2
12	12
17	17.5
20	24
25	25.8
36	36

Rated short time current (kA)	
25	25
32	31.5
40	40
50	50

Rated current (A)	
12	1200A
13	1250A
20	2000A
25	2500A
32	3150A
40	4000A
50	5000A

Version	
P	Fixed
E	E type drawout (for MESG)
F	F type drawout (for MESG)
Fs	Fs type drawout (Screw Type)
G	G type drawout (for MESG)
Gs	Gs type drawout (Screw Type)
K	K type drawout (for MCSG compatible with Pro-MEC type)
H	H type drawout (for MCSG)
Ha	MCSG Cradle type
Hb	MCSG drawout + PT lower chamber

* Only K-type cradle is available for 4000A.
* E/F/Fs/Gs/K-type (open type cradle)
* H-type (box type cradle)

Phase distance/Compatibility	
A	150mm
B	210mm
D	275mm
E	300mm
J	Rotated bushing type (210mm)
L	320mm

Other accessories (H type)	
1	ES (Standard earthing Switch) without option
2	ES with Position S/W (2a2b)
4	ES with Position S/W (6a6b)
5	Key lock for ES
6	Locking magnet for ES: DC 110V
7	Locking magnet for ES: DC 220V
8	Locking magnet for ES: DC 125V
A	Locking magnet for ES: DC 48V
B	Locking magnet for ES: AC 48V
C	Locking magnet for ES: AC 110V
D	Locking magnet for ES: AC 220V
E	Shutter padlock
F	TOC (Truck Operating Cell S/W)
G	MOC (Mechanical Operating Cell S/W)
H	Door
J	Door Interlock
K	Door Emergency Push Button
L	Temperature Sensor
M	H type Lead wire 4a4b (Flame retardant wire)
N	H type Lead wire 10a10b (Flame retardant wire)
O	H type Lead wire 4a4b (Rated short time current)
Q	ANSI type Charge interlock
T3	Earthing S/W without conductor ass'y
LC	Earthing S/W Locking coil
U1	Earthing S/W Locking coil

Note) T3, LC, U1 are options for K type cradle ONLY(Compatible with previous Pro-MEC models)

Optional	
TM	Temperature Monitoring

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

Note) 1. Cradle accessories and the option TM are available only for H type(MCSG drawable type) and Locking magnet is available in DC110V, DC125V for those three types. K, Ha, Hb types can only be applied to A1.
2. AJ and AK can not be selected without door (AH).
3. H type lead wire - one of AM, AN or AO is required for cradle in case of H type breaker.
4. If the H type breaker options A8(Button Padlock) and A9(Button Cover) are slected, the cradle option AK(Door Emergency Push Button) is not available.
5. When Keylock(A5) is selected, Earthing Switch is included as standard.
6. T3/SM/LC/U/U1 can be selected for K type ONLY.
7. When A1 is selected for 4000A, 5000A cradle, ES Position S/W with 4a4b is applied as default.
8. If TOC/MOC option is selected, cradle's height is increased (E/S equipped structure, Hb ONLY).
9. Ha type is open-type MCSG Cradle with NO door related options included.
10. Please contact us if you need IAC (Internal arc classification) of H type CB compartment.

Type of circuit breakers

Susol

7.2/12/17.5/24/25.8/36kV (VL-06/12/17/20/25/36)

Ur [kV]	Isc [kA]	Ir[A]					VCB		CRADLE		Connector
		p=130	p=150	p=210	p=265	p=275	Type	Version	Type	Version	
7.2	8	400					VL-06□08A04	P,E,F,G	VCL-06□08A04	E,F,G	A
									VCL-06□08B04	E,F,G	A
							VL-06□08B04	P,E,F,G			A
	12.5	630					VL-06□13A06	P,E,F,G	VCL-06□13A06	E,F,G	A
									VCL-06□13B06	E,F,G	A
							VL-06□13B06	P,E,F,G			A
	20		630				VL-06□20A(K)06	P,E,F,G,H	VCL-06□20A(K)06	E,F,G,K,H	P,E,F,G,K:A/B, H:B
			1250				VL-06□20A(K)13	P,E,F,G,H	VCL-06□20A(K)13	E,F,G,K,H	P,E,F,G,K:A/B, H:B
			2000				VL-06□20A20	P,E,F,G,H	VCL-06□20A20	E,F,G,H	P,E,F,G:A/B, H:B
	25		630				VL-06□25A(K)06	P,E,F,G,K,H	VCL-06□25A06	E,F,G,K,H	P,E,F,G,K:A/B, H:B
			1250				VL-06□25A(K)13	P,E,F,G,K,H	VCL-06□25A13	E,F,G,K,H	P,E,F,G,K:A/B, H:B
			2000				VL-06□25A(K)20	P,E,F,G,K,H	VCL-06□25A20	E,F,G,K,H	P,E,F,G,K:A/B, H:B
	31.5		630				VL-06□32A06	P,H	VCL-06H32A06	H	B
			1250				VL-06□32A(K)13	P,E,F,Fs,G,Gs,K,H	VCL-06□32A13	E,F,Fs,G,Gs,K,H	P,E,F,Fs,G,Gs,K:A/B,H:B
			2000				VL-06□32A(K)20	P,E,F,Fs,G,Gs,K,H	VCL-06□32A20	E,F,Fs,G,Gs,K,H	P,E,F,Fs,G,Gs,K:A/B,H:B
12	20		630				VL-12□20A(K)06	P,K,H	VCL-12□20A06	K,H	K:A/B, H:B
			1250				VL-12□20A(K)13	P,K,H	VCL-12□20A13	K,H	K:A/B, H:B
			2000				VL-12H20A20	H	VCL-12H20A20	H	B
				630			VL-12□20B06	P,E,F,H	VCL-12□20B06	E,F,H	P,E,F:A/B, H:B
				1250			VL-12□20B13	P,E,F,H	VCL-12□20B13	E,F,H	P,E,F:A/B, H:B
				2000			VL-12□20B20	P,E,F,H	VCL-12□20B20	E,F,H	P,E,F:A/B, H:B
				630			VL-12□20F06	E,F	VCL-12□20F06	E,F	A/B
				1250			VL-12□20F13	E,F	VCL-12□20F13	E,F	A/B
	25		630				VL-12□25A(K)06	P,K,H	VCL-12□25A06	K,H	K:A/B, H:B
			1250				VL-12□25A(K)13	P,K,H	VCL-12□25A13	K,H	K:A/B, H:B
			2000				VL-12□25A(K)20	K,H	VCL-12□25A20	K,H	K:A/B, H:B
				630			VL-12□25B06	P,E,F,H	VCL-12□25B06	E,F,H	P,E,F:A/B, H:B
				1250			VL-12□25B13	P,E,F,H	VCL-12□25B13	E,F,H	P,E,F:A/B, H:B
				2000			VL-12□25B20	P,E,F,H	VCL-12□25B20	E,F,H	P,E,F:A/B, H:B
				630			VL-12□25F06	E,F	VCL-12□25F06	E,F	A/B
				1250			VL-12□25F13	E,F	VCL-12□25F13	E,F	A/B
	31.5		630				VL-12□32A06	P,H	VCL-12H32A06	H	B
			1250				VL-12□32A(K)13	P,Gs,K,H	VCL-12□32A13	Gs,K,H	Gs,K:A/B, H:B
			2000				VL-12□32A(K)20	Gs,K,H	VCL-12□32A20	Gs,K,H	Gs,K:A/B, H:B
				630			VL-12□32B06	P,H	VCL-12H32B06	H	B
				1250			VL-12□32B13	P,H	VCL-12H32B13	H	B
				2000			VL-12□32B20	P,H	VCL-12H32B20	H	B
				2500			VL-12□32B25	P,H	VCL-12H32B25	H	B
						2500	VL-12□32D25	P,H	VCL-12H32D25	H	B
17.5	20		630				VL-17H20A06	H	VCL-17H20A06	H	B
			1250				VL-17H20A13	H	VCL-17H20A13	H	B
			2000				VL-17H20A20	H	VCL-17H20A20	H	B
				630			VL-17□20B06	P,E,F,H	VCL-17□20B06	E,F,H	P,E,F:A/B, H:B
				1250			VL-17□20B13	P,E,F,H	VCL-17□20B13	E,F,H	P,E,F:A/B, H:B
				2000			VL-17□20B20	P,E,F,H	VCL-17□20B20	E,F,H	P,E,F:A/B, H:B
				630			VL-17□20F06	E,F	VCL-17□20F06	E,F	A/B
				1250			VL-17□20F13	E,F	VCL-17□20F13	E,F	A/B
	25		630				VL-17H25A06	H	VCL-17H25A06	H	B
			1250				VL-17H25A13	H	VCL-17H25A13	H	B
			2000				VL-17H25A20	H	VCL-17H25A20	H	B
				630			VL-17□25B06	P,E,F,H	VCL-17□25B06	E,F,H	P,E,F:A/B, H:B
				1250			VL-17□25B13	P,E,F,H	VCL-17□25B13	E,F,H	P,E,F:A/B, H:B
				2000			VL-17□25B20	P,E,F,H	VCL-17□25B20	E,F,H	P,E,F:A/B, H:B
				630			VL-17□25F06	E,F	VCL-17□25F06	E,F	A/B
				1250			VL-17□25F13	E,F	VCL-17□25F13	E,F	A/B
	31.5		630				VL-17□32A06	P,H	VCL-17H32A06	H	B
			1250				VL-17□32A13	P,H	VCL-17H32A13	H	B
			2000				VL-17□32A20	H	VCL-17H32A20	H	B
				630			VL-17□32B06	P,H	VCL-17H32B06	H	B
				1250			VL-17□32B13	P,H	VCL-17H32B13	H	B
				2000			VL-17□32B20	P,H	VCL-17H32B20	H	B
				2500			VL-17□32B25	P,H	VCL-17H32B25	H	B
						2500	VL-17□32D25	P,H	VCL-17H32D25	H	B

Ur [kV]	Isc [kA]	Ir[A]					VCB		CRADLE		Connector
		p=130	p=150	p=210	p=265	p=275	Type	Version	Type	Version	
24	12.5			630			VL-20□13B06	G,K,H	VCL-20□13B06	G,K,H	G,K:A/B, H:B
				1250			VL-20□13B13	G,K,H	VCL-20□13B13	G,K,H	G,K:A/B, H:B
					630		VL-20□13F06	P,E,F,G,K	VCL-20□13F06	E,F,G,K	A/B
					630		VL-20□13G06	E,F	VCL-20□13G06	E,F	A/B
					1250		VL-20□13F13	P,E,F,G,K	VCL-20□13F13	E,F,G,K	A/B
					1250		VL-20□13G13	E,F	VCL-20□13G13	E,F	A/B
						630	VL-20H13D06	H	VCL-20H13D06	H	B
						1250	VL-20H13D13	H	VCL-20H13D13	H	B
	16			630			VL-20□16B06	G,K,H	VCL-20□16B06	G,K,H	G,K:A/B, H:B
				1250			VL-20□16B13	G,K,H	VCL-20□16B13	G,K,H	G,K:A/B, H:B
					630		VL-20□16F06	P,E,F,G,K	VCL-20□16F06	E,F,G,K	A/B
					630		VL-20□16G06	E,F	VCL-20□16G06	E,F	A/B
					1250		VL-20□16F13	P,E,F,G,K	VCL-20□16F13	E,F,G,K	A/B
					1250		VL-20□16G13	E,F	VCL-20□16G13	E,F	A/B
						630	VL-20H16D06	H	VCL-20H16D06	H	B
						1250	VL-20H16D13	H	VCL-20H16D13	H	B
	25			630			VL-20□25B06	G,K,H	VCL-20□25B06	G,K,H	G,K:A/B, H:B
				1250			VL-20□25B13	G,K,H	VCL-20□25B13	G,K,H	G,K:A/B, H:B
				2000			VL-20□25B20	G,H	VCL-20□25B20	G,H	G:A/B, H:B
					630		VL-20□25F06	P,E,F,G,K	VCL-20□25F06	E,F,G,K	A/B
					630		VL-20□25G06	E,F	VCL-20□25G06	E,F	A/B
					1250		VL-20□25F13	P,E,F,G,K	VCL-20□25F13	E,F,G,K	A/B
					1250		VL-20□25G13	E,F	VCL-20□25G13	E,F	A/B
					2000		VL-20□25F20	P,E,F,K	VCL-20□25F20	E,F,K	A/B
					2000		VL-20□25G20	E,F	VCL-20□25G20	E,F	A/B
						630	VL-20H25D06	H	VCL-20H25D06	H	B
						1250	VL-20H25D13	H	VCL-20H25D13	H	B
						2000	VL-20H25D20	H	VCL-20H25D20	H	B
						2500	VL-20H25D25	H	VCL-20H25D25-AS	H	B
25.8	12.5			630			VL-25□13B06	G,K,H	VCL-25□13B06	G,K,H	G,K:A/B, H:B
				1250			VL-25□13B13	G,K,H	VCL-25□13B13	G,K,H	G,K:A/B, H:B
					630		VL-25□13F06	P,E,F,G,K	VCL-25□13F06	E,F,G,K	A/B
					630		VL-25□13G06	E,F	VCL-25□13G06	E,F	A/B
					1250		VL-25□13F13	P,E,F,G,K	VCL-25□13F13	E,F,G,K	A/B
					1250		VL-25□13G13	E,F	VCL-25□13G13	E,F	A/B
						630	VL-25H13D06	H	VCL-25H13D06	H	B
						1250	VL-25H13D13	H	VCL-25H13D13	H	B
	16			630			VL-25□16B06	G,K,H	VCL-25□16B06	G,K,H	G,K:A/B, H:B
				1250			VL-25□16B13	G,K,H	VCL-25□16B13	G,K,H	G,K:A/B, H:B
					630		VL-25□16F06	P,E,F,G,K	VCL-25□16F06	E,F,G,K	A/B
					630		VL-25□16G06	E,F	VCL-25□16G06	E,F	A/B
					1250		VL-25□16F13	P,E,F,G,K	VCL-25□16F13	E,F,G,K	A/B
					1250		VL-25□16G13	E,F	VCL-25□16G13	E,F	A/B
						630	VL-25H16D06	H	VCL-25H16D06	H	B
						1250	VL-25H16D13	H	VCL-25H16D13	H	B
	25			630			VL-25□25B06	G,K,H	VCL-25□25B06	G,K,H	G,K:A/B, H:B
				1250			VL-25□25B13	G,K,H	VCL-25□25B13	G,K,H	G,K:A/B, H:B
				2000			VL-25□25B20	G,H	VCL-25□25B20	G,H	G:A/B, H:B
					630		VL-25□25F06	P,E,F,G,K	VCL-25□25F06	E,F,G,K	A/B
					630		VL-25□25G06	E,F	VCL-25□25G06	E,F	A/B
					1250		VL-25□25F13	P,E,F,G,K	VCL-25□25F13	E,F,G,K	A/B
					1250		VL-25□25G13	E,F	VCL-25□25G13	E,F	A/B
					2000		VL-25□25F20	P,E,F,K	VCL-25□25F20	E,F,K	A/B
					2000		VL-25□25G20	E,F	VCL-20□25G20	E,F	A/B
						630	VL-25H25D06	H	VCL-25H25D06	H	B
						1250	VL-25H25D13	H	VCL-25H25D13	H	B
						2000	VL-25H25D20	H	VCL-25H25D20	H	B
						2500	VL-25H25D25	H	VCL-25H25D25-AS	H	B
36	25					630	VL-36□25D06	P,H	VCL-36□25D06	H	P:A/B, H:B
						1250	VL-36□25D13	P,H	VCL-36□25D13	H	P:A/B, H:B
						2000	VL-36□25D20	P,H	VCL-36□25D20	H	P:A/B, H:B
						2500	VL-36□25D25	P,H	VCL-36□25D25	H	P:A/B, H:B

Note) 1. Ur = Rated voltage
2. Isc = Rated short-circuit current
3. Ir = Rated normal current
4. p = Phase distance
5. E,F and G types are cradles for MESG(Metal Enclosed Switchgear) and H type for MCSG(Metal Clad Switchgear)
6. For the partial replacement of 7.2kV 8/12.5kA VCB, in case of using the existing old type cradle and replacing breaker only, please order type B (Compatible with existing breaker). Compatibille busbars are required for fixed version. To replace VCB fully(breaker and cradle) please order type A for breaker and compatible cradle B.

Type of circuit breakers

Susol

7.2/12/17.5/24/25.8/36kV (VH-06/12/17/20/25/36)

Ur [kV]	Isc [kA]	Ir[A]					VCB		CRADLE		Connector
		p=150	p=210	p=254	p=275	p=320	Type	Version	Type	Version	
7.2	31.5	1250					LVB-06□-32L/12	P,E,F,G,G/T	LCL-06□-32D/12	E,F,G,G/T	A/B
		2000					LVB-06□-32L/20	P,E,F,G,G/T	LCL-06□-32D/20	E,F,G,G/T	A/B
			3150				VH-06□32B32	Fs,Gs,K,H	VCH-06□32B32	Fs,Gs,K,H	K:A/B, Fs,Gs,H:B
							LVB-06□-32L/30	P,E,F,G/T	LCL-06□-32D/30	E,F,G,G/T	
	40	1250	1250				VH-06□40A13	P,E,F,Fs,G,Gs,K,H	VCH-06□40A13	E,F,Fs,G,Gs,K,H	P,E,F,Fs,G, Gs,K:A/B,H:B
							LVB-06□-40L/12	P,E,F,G,G/T	LCL-06□-40D/12	E,F,G,G/T	
		2000	2000				VH-06□40A20	P,E,F,Fs,G,Gs,K,H	VCH-06□40A20	E,F,Fs,G,Gs,K,H	P,E,F,Fs,G, Gs,K:A/B,H:B
							LVB-06□-40L/20	P,E,F,G,G/T	LCL-06□-40D/20	E,F,G,G/T	
			3150				VH-06□40B32	Fs,Gs,K,H	VCH-06□40B32	Fs,Gs,K,H	K:A/B, Fs,Gs,H:B
							LVB-06□-40L/30	P,E,F,G/T	LCL-06□-40D/30	E,F,G,G/T	
					3150		VH-06□40D32	K,H	VCH-06□40D32	K,H	K:A/B, H:B
					4000		VH-06□40D40	P,K,H	VCH-06□40D40	K,Ha,Hb	B
						5000	VH-06H40L50	H	VCH-06Ha40L50	Ha	B
	50		1250				VH-06□50B13	P,H	VCH-06H50B13	H	B
			2000				VH-06□50B20	P,H	VCH-06H50B20	H	B
					2500		VH-06□50D25	P,H	VCH-06H50D25	H	B
					3150		VH-06□50D32	P,H	VCH-06H50D32	H	B
					4000		VH-06□50D40	P,K,H	VCH-06□50D40	K,Ha,Hb	B
						5000	VH-06H50L50	H	VCH-06Ha50L50	Ha	B
12	31.5	1250	1250				LVB-12G-32L/12-T2	G/T	LCL-12G-32D/12-T2	G/T	A/B
		2000					LVB-12G-32L/20-T2	G/T	LCL-12G-32D/20-T2	G/T	A/B
			3150				VH-12□32B32	Gs,K,H	VCH-12□32B32	Gs,K,H	K:A/B, Gs,H:B
							LVB-12G-32L/30-T2	G/T	LCL-12G-32D/30-T2	G/T	A/B
	40	1250	1250				VH-12□40A(K)13	Gs,K,H	VCH-12□40A(K)13	Gs,K,H	Gs,K:A/B, H:B
							LVB-12G-40L/12-T2	G/T	LCL-12G-40D/12-T2	G/T	A/B
		2000	2000				VH-12□40A(K)20	Gs,K,H	VCH-12□40A(K)20	Gs,K,H	K:A/B, Gs, H:B
							LVB-12G-40L/20-T2	G/T	LCL-12G-40D/20-T2	G/T	A/B
			1250				VH-12□40B13	K,H	VCH-12□40B13	K,H	B
			2000				VH-12□40B20	K,H	VCH-12□40B20	K,H	B
			3150				VH-12□40B32	Gs,K,H	VCH-12□40B32	Gs,K,H	K:A/B, Gs,H:B
							LVB-12G-40L/30-T2	G/T	LCL-12G-40D/30-T2	G/T	A/B
					3150		VH-12H40D32	H	VCH-12H40D32	H	B
					4000		VH-12□40D40	P,K,H	VCH-12□40D40	K,Ha,Hb	B
						5000	VH-12H40L50	H	VCH-12Ha40L50	Ha	B
	50		1250				VH-12□50B13	P,H	VCH-12H50B13	H	B
			2000				VH-12□50B20	P,H	VCH-12H50B20	H	B
					2500		VH-12□50D25	P,H	VCH-12H50D25	H	B
					3150		VH-12□50D32	P,H	VCH-12H50D32	H	B
					4000		VH-12□50D40	P,K,H	VCH-12□50D40	K,Ha,Hb	B
						5000	VH-12H50L50	H	VCH-12Ha50L50	Ha	B
17.5	31.5		3150				VH-17H32B32	H	VCH-17H32B32	H	B
					3150		VH-17H32D32	H	VCH-17H32D32	H	B
	40		1250				VH-17□40B13	K,H	VCH-17□40B13	K,H	K:A/B, H:B
			2000				VH-17□40B20	K,H	VCH-17□40B20	K,H	K:A/B, H:B
			3150				VH-17H40B32	H	VCH-17H40B32	H	B
				3150			VH-17K40C32	K	VCH-17K40C32	K	A/B
					3150		VH-17H40D32	H	VCH-17H40D32	H	B
					4000		VH-17□40D40	P,K,H	VCH-17□40D40	Ha,Hb	B

Ur [kV]	Isc [kA]	Ir[A]				VCB		CRADLE		Connector
		p=150	p=210	p=275	p=300	Type	Version	Type	Version	
17.5	50		1250			VH-17□50B13	P,H	VCH-17H50B13	H	B
			2000			VH-17□50B20	P,H	VCH-17H50B20	H	B
				2500		VH-17□50D25	P,H	VCH-17H50D25	H	B
				3150		VH-17□50D32	P,H	VCH-17H50D32	H	B
				4000		VH-17□50D40	P,H	VCH-17□50D40	Ha,Hb	B
24	25			2500		VH-20□25D25	P,H	VCH-20H25D25	H	B
	31.5		1250			VH-20□32B13	P,H	VCH-20H32B13	H	B
								VCH-20H32F13	H	B
			2000			VH-20□32B20	P,H	VCH-20H32B20	H	B
								VCH-20H32F20	H	B
				1250		VH-20□32D13	P,H	VCH-20H32D13	H	B
				2000		VH-20□32D20	P,H	VCH-20H32D20	H	B
				3150		VH-20□32D32	P,H	VCH-20H32D32	H	B
	40		1250			VH-20□40B13	P,H	VCH-20H40B13	H	B
								VCH-20H40F13	H	B
			2000			VH-20□40B20	P,H	VCH-20H40B20	H	B
								VCH-20H40F20	H	B
				1250		VH-20□40D13	P,H	VCH-20H40D13	H	B
				2000		VH-20□40D20	P,H	VCH-20H40D20	H	B
				3150		VH-20□40D32	P,H	VCH-20H40D32	H	B
25.8	25			2500		VH-25□25D25	P,H	VCH-25H25D25	H	B
	31.5		1250			VH-25□32B13	P,H	VCH-25H32B13	H	B
								VCH-25H32F13	H	B
			2000			VH-25□32B20	P,H	VCH-25H32B20	H	B
								VCH-25H32F20	H	B
				1250		VH-25□32D13	P,H	VCH-25H32D13	H	B
				2000		VH-25□32D20	P,H	VCH-25H32D20	H	B
				3150		VH-25□32D32	P,H	VCH-25H32D32	H	B
	40		1250			VH-25□40B13	P,H	VCH-25H40B13	H	B
								VCH-25H40F13	H	B
			2000			VH-25□40B20	P,H	VCH-25H40B20	H	B
								VCH-25H40F20	H	B
				1250		VH-25□40D13	P,H	VCH-25H40D13	H	B
				2000		VH-25□40D20	P,H	VCH-25H40D20	H	B
				3150		VH-25□40D32	P,H	VCH-25H40D32	H	B
36	25				1250	VH-36□25E13	P,H	VCH-36H25E13	H	B
					2000	VH-36□25E20	P,H	VCH-36H25E20	H	B
					3150	VH-36□25E32	P,H	VCH-36H25E32	H	B
	31.5				1250	VH-36□32E13	P,H	VCH-36H32E13	H	B
					2000	VH-36□32E20	P,H	VCH-36H32E20	H	B
					3150	VH-36□32E32	P,H	VCH-36H32E32	H	B
	40				1250	VH-36□40E13	P,H	VCH-36H40E13	H	B
					2000	VH-36□40E20	P,H	VCH-36H40E20	H	B
					3150	VH-36□40E32	P,H	VCH-36H40E32	H	B

Note) 1. Ur = Rated voltage
2. Isc = Rated short-circuit current
3. Ir = Rated normal current
4. p = Phase distance
5. H type is MCSG style drawable type with a box type cradle for CB compartment construction.
6. G/T types are MCSG style drawable types with a cradle for builting in the switchgear , not a box type. (K of VCL type name indicates 4000A)
Example of G/T type : LVB-06G-32L/12-T2, LCL-06G-32D/12-T2
7. G/T types use LVB and LCL names.
8. E, F and G types provide cradles for MESG(Metal Enclosed Switchgear) and H, G/T types for MCSG(Metal Clad Switchgear).
9. In case of 7.2/12kV, 31.5kA/40kA H type: Please contact us.

Ratings - 7.2kV 8/12.5kA 400/630A

Susol

VL-06



Item			VL-06□08□04	VL-06□13□06
Rated voltage		Ur (kV)	7.2	
Rated normal current		Ir (A)	400	630
Rated frequency		fr (Hz)	50/60	
Rated short-circuit current		Isc (kA)	8	12.5
Rated short-time withstand current		Ik/tk (kA/s)	8/3	12.5/3
Rated short-circuit breaking capacity		(MVA)	100	160
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)	20	
	Impulse (1.2×50μs)	Up (kV)	60	
Rated operating sequence			O-0.3s-CO-15s-CO	
Control voltage	Closing coil	(V)	AC/DC 100~130, AC/DC 200~250, DC 125, DC 24~30, DC 48~60, AC 48	
	Trip coil	(V)	AC/DC 100~130, AC/DC 200~250, DC 125, DC 24~30, DC 48~60, AC 48	
Auxiliary contacts			2a2b, 4a4b, 6a6b	
Rated opening time		(sec)	≤ 0.04	
No-load closing time		(sec)	≤ 0.06	
Type test class	Mechanical		M2	
	Electrical		E2 (List1)	
	Capacitive current switching		C2	
Installation version	Fixed		P type	
	Drawout		E, F, G type (for MESG)	
Phase distance		(mm)	130	
Weight	Breaker (E, F, G type)	(kg)	37	37
	Cradle (E, F, G type)	(kg)	18, 25, 32	19, 26, 33
Dimensions	Breaker (E, F, G type)		Page 97~98	
	Cradle (E, F, G type)		Page 98~99	
Standards			IEC 62271-100, JEC 2300/JIS C 4603, V-check (KESCO)	

Ratings - 7.2/12/17.5kV 20/25kA 630/1250/2000A

Susol

VL-06/12/17



Item			VL-06□20/25□06/13/20			VL-12□20/25□06/13/20			VL-17□20/25□06/13/20		
Rated voltage		Ur (kV)	7.2			12			17.5		
Rated normal current		Ir (A)	630	1250	2000	630	1250	2000	630	1250	2000
Rated frequency		fr (Hz)	50/60								
Rated short-circuit current		Isc (kA)	20, 25								
Rated short-time withstand current		Ik/tk (kA/s)	20/3, 25/3								
Rated short-circuit breaking capacity		(MVA)	250/310			410/520			600/750		
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)	20			28			38		
	Impulse (1.2×50㎲)	Up (kV)	60			75			95		
Rated operating sequence			O-0.3s-CO-15s-CO								
Control voltage	Closing coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220~250, AC 48, AC 100~130, AC 220~250								
	Trip coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220~250, AC 48, AC 100~130, AC 220~250								
Auxiliary contacts			4a4b, 10a10b								
Rated opening time		(sec)	≤ 0.04								
No-load closing time		(sec)	≤ 0.06								
Type test class	Mechanical		M2								
	Electrical		E2 (List3)								
	Capacitive current switching		C2								
Installation version *	Fixed		P type								
	Drawout		E, F, G type (for MESG), H type (for MCSG)			E, F type (for MESG), H type (for MCSG)					
Phase distance **		(mm)	150			150 (210)			150 (210)		
Weight	Breaker (E, F, G, K type)	(kg)	100	100	130	115 (120)	115 (120)	130 (140)	115 (120)	115 (120)	130 (140)
	Cradle (E, F, G, K type)	(kg)	170	170	180	170 (200)	170 (200)	180 (200)	170 (200)	170 (200)	180 (200)
Dimensions	Breaker (P, E, F, G, K, H type)		Page 100~111			Page 100~111			Page 100~111		
	Cradle (E, F, G, K type)		Page 100~111			Page 100~111			Page 100~111		
	Cradle (K, H type)		Page 100~111			Page 100~111			Page 100~111		
Standards			IEC 62271-100, KERI/KEMA, V-check (KESCO)								

* H type is a box type cradle with CB compartment style structure.
** ( ) displays option of phase distance.

Ratings - 7.2/12/17.5kV 31.5kA 630/1250/2000/2500A

Susol

VL-06/12/17



Item			VL-06□32□06/13/20			VL-12□32□06/13/20/25				VL-17□32□06/13/20/25			
Rated voltage		Ur (kV)	7.2			12				17.5			
Rated normal current		Ir (A)	630	1250	2000	630	1250	2000	2500	630	1250	2000	2500
Rated frequency		fr (Hz)	50/60										
Rated short-circuit current		Isc (kA)	31.5										
Rated short-time withstand current		Ik/tk (kA/s)	31.5/3 (4 Note1))										
Rated short-circuit breaking capacity		(MVA)	393			655				955			
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)	20			28				38			
	Impulse (1.2×50μs)	Up (kV)	60			75				95			
Rated operating sequence			O-0.3s-CO-15s-CO										
Control voltage	Closing coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220~250, AC 48, AC 100~130, AC 220~250										
	Trip coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220~250, AC 48, AC 100~130, AC 220~250										
Auxiliary contacts			4a4b, 10a10b										
Rated opening time		(sec)	≤ 0.04										
No-load closing time		(sec)	≤ 0.06										
Type test class	Mechanical		M2										
	Electrical		E2 (List 3)										
	Capacitive current switching		C2										
Installation version *	Fixed		P type										
	Drawout		H type (for MCSG)	E, F, Fs, G, Gs, K type (for MESG) H type (for MCSG)		H type (for MCSG)	Gs, K type (for MESG) H type (for MCSG)		H type (for MCSG)	H type (for MCSG)			
Phase distance **		(mm)	150			150 (210)			210 (275)	150 (210)			210 (275)
Weight	Breaker (H type)	(kg)	100	100	130	115/120	115/120	130/140	160/175	115/120	115/120	130/140	165/175
	Cradle (H type)	(kg)	170	170	200	170/200	170/200	170/200	260/290	170/200	170/200	170/200	260/290
	Breaker (P, E, F, G, K type)	(kg)	85	85	100	85/100	85/100	100/115	120/135	85/100	85/100	100/115	120/135
Dimensions	Breaker (P, E, F, Fs, G, Gs, K, H type)		Page 112~128			Page 129~161							
	Cradle (E, F, Fs, G, Gs, K, H type)		Page 112~128			Page 129~161							
Standards			IEC 62271-100, KERI, V-check (KESCO)										

* H type is a box type cradle with CB compartment style structure.
** ( ) displays option of phase distance.
Note1) For Icw 4s, please contact us.

Ratings - 24/25.8kV 12.5/16/25kA 630/1250/2000/2500A

Susol

VL-20/25



Item			VL-20,25□13□06/13		VL-20,25□16□06/13		VL-20,25□25□06/13/20/25			
Rated voltage		Ur (kV)	24/25.8							
Rated normal current		Ir (A)	630	1250	630	1250	630	1250	2000	2500
Rated frequency		fr (Hz)	50/60 Note1)							
Rated short-circuit current		Isc (kA)	12.5		16		25			
Rated short-time withstand current		Ik/tk (kA/s)	12,5/3 Note2)		16/3 Note2)		25/3 Note2)			
Rated short-circuit breaking capacity		(MVA)	520/560		665/715		1040/1120			
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)	50/60							
	Impulse (1.2×50㎲)	Up (kV)	125							
Rated operating sequence			O-0.3s-CO-15s-CO							
Control voltage	Closing coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220~250, AC 48, AC 100~130, AC 220~250							
	Trip coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220~250, AC 48, AC 100~130, AC 220~250							
Auxiliary contacts			4a4b, 10a10b							
Rated opening time		(sec)	≤ 0.04							
No-load closing time		(sec)	≤ 0.06							
Type test class	Mechanical		M2							
	Electrical		E2 (List 3)							
	Capacitive current switching		C2							
Installation version *	Fixed		P type							-
	Drawout		E,F,G type (for MESG) / K, H type (for MCSG)							H type (for MCSG)
Phase distance **		(mm)	210/265/275							275
Weight	Breaker (H type)	(kg)	120 (130)		130 (140)				150 (160)	
	Cradle (H type)	(kg)	200 (220)		200 (220)				200 (220)	
	Breaker (P, E, F, G, K type)	(kg)	110	115	120				135	-
Dimensions	Breaker (P, E, F, G, K, H type)		Page 162~171		Page 172~178				Page 178~182	
	Cradle (E, F, G, K type)		Page 183~185		Page 183~185				Page 183~185	
	Cradle (H type)		Page 186~190		Page 186~190				Page 186~190	
Standards			IEC 62271-100, KERI, V-check (KESCO)							

* H type is a box type cradle with CB compartment style structure.
** ( ) displays option of phase distance.
Note1) 24/25.8kV 25kA 2000A(Phase distance 210mm): 60Hz available only
2) For Icw 4s, please contact us.

Ratings - 36kV 25kA 630/1250/2000/2500A

Susol

VL-36



Item			VL-36□25□06	VL-36□25□13	VL-36□25□20	VL-36□25□25
Rated voltage		Ur (kV)	36			
Rated normal current		Ir (A)	630	1250	2000	2500
Rated frequency		fr (Hz)	50/60			
Rated short-circuit current		Isc (kA)	25			
Rated short-time withstand current		Ik/tk (kA/s)	25/3(4 Note1))			
Rated short-circuit breaking capacity		(MVA)	1560			
Rated short-circuit making current		Ip (kA)	62.5/65			
Rated breaking time		(Cycle)	3			
Rated withstand voltage	Power frequency (1 min)	Ud (kV)	70			
	Impulse (1.2×50㎲)	Up (kV)	170			
Rated operating sequence			O-0.3s-CO-15s-CO			
Control voltage	Closing coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220, AC 48, AC 100~130, AC 220~250			
	Trip coil	(V)	DC 24~30, DC 48~60, DC 110, DC 125, DC 220, AC 48, AC 100~130, AC 220~250			
Auxiliary contacts			4a4b, 10a10b			
Rated opening time		(sec)	≤ 0.04			
No-load closing time		(sec)	≤ 0.07			
Type test class	Mechanical		M2			
	Electrical		E2 (List 3)			
	Capacitive current switching		C2			
Installation version	Fixed		P type			
	Drawout		H type (for MCSG)			
Phase distance		(mm)	275			
Weight	Breaker (H type)	(kg)	260	260	280	300
	Cradle (H type)	(kg)	440	440	450	460
Dimensions	Breaker (H type)		Page 191~196			
	Cradle (H type)		Page 191~196			
Standards			IEC 62271-100			

Note1) For Icw 4s, please contact us.

Ratings - 7.2/12kV 31.5/40kA 1250/2000/3150A

Susol

LVB-06/12



Item			LVB-06□-32□32	LVB-06□-40□12, 20, 32			LVB-12□-32□32	LVB-12□-40□12, 20, 32		
Rated voltage		Ur (kV)	7.2	7.2			12	12		
Rated normal current		Ir (A)	3150 *	1250	2000	3150 *	3150 *	1250	2000	3150 *
Rated frequency		fr (Hz)	50/60							
Rated short-circuit current		Isc (kA)	31.5	40			31.5	40		
Rated short-time withstand current		Ik/tk (kA/s)	31.5/3	40/3			31.5/3	40/3		
Rated short-circuit breaking capacity		(MVA)	393	499			655	831		
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)	20				28			
	Impulse (1.2×50μs)	Up (kV)	60				75			
Rated operating sequence			O-0.3s-CO-3min-CO							
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220							
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220							
Auxiliary contacts			4a4b, 10a10b							
Rated opening time		(sec)	≤ 0.04							
No-load closing time		(sec)	≤ 0.06							
Type test class	Mechanical		M2							
	Electrical		E2 (List1)							
	Capacitive current switching		C2							
Installation version	Fixed		P type				-			
	Drawout *		E,F,G type (for MESG), MCSG Cradle				MCSG Cradle			
Phase distance		(mm)	210	150		210	210	150		210
Weight	Breaker (MESG, MCSG)	(kg)	210, 220	135, 160	135, 160	210, 220	220	164	165	220
	Cradle (MESG, MCSG)	(kg)	135, 155	55, 110	63, 117	135, 155	155	110	117	155
Dimensions	Breaker (MESG, MCSG)		Page 201~202	Page 197~198		Page 201~202	Page 201~202	Page 197~198		Page 201~202
	Cradle (MESG, MCSG)		Page 203~204	Page 199~200		Page 203~204	Page 203~205	Page 199~200		Page 203~205
Standards			IEC 62271-100, KERI/KEMA, V-check(KESCO)							

* MCSG style drawable type provide a cradle for builting in the switchgear, not a box type for CB compartment. Ordering type is LVB.
Note 1) H type that is a box type cradle for enabling a CB compartment in MCSG is under development. Consult us for ordering.
2) Some LVB is the ordering name of the switchboard for export

Ratings - 7.2/12/17.5kV 40kA 1250/2000A

Susol

VH-06/12/17



Item			VH-06/12□40□13/20				VH-06/12/17□40□13/20					
Rated voltage		Ur (kV)	7.2		12		7.2		12		17.5	
Rated normal current		Ir (A)	1250	2000	1250	2000	1250	2000	1250	2000	1250	2000
Rated frequency		fr (Hz)	50/60									
Rated short-circuit current		Isc (kA)	40									
Rated short-time withstand current		Ik/tk (kA/s)	40/4									
Rated short-circuit breaking capacity		(MVA)	499		831		499		831		1212	
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)	20		28 (42)		20		28 (42)		38	
	Impulse (1.2×50㎲)	Up (kV)	60		75		60		75		95	
Rated operating sequence			O-0.3s-CO-3min-CO				O-0.3s-CO-15s-CO					
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220									
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220									
Auxiliary contacts			4a4b, 10a10b									
Rated opening time		(sec)	≤ 0.04									
No-load closing time		(sec)	≤ 0.06									
Type test class	Mechanical		M2									
	Electrical		E2 (List 3)									
	Capacitive current switching		C2									
Installation version	Drawout		Fs, Gs, K, H type				K, H type					
Phase distance		(mm)	150				210					
Weight	Breaker (H type)	(kg)	165				215					
	Cradle (H type)	(kg)	205				226					
Dimensions	Breaker (Fs, Gs, K, H type)		Page 206~221				Page 206~221					
	Cradle (Fs, Gs, K, H type)		Page 206~221				Page 206~221					
Standards			IEC 62271-100									

Ratings - 7.2/12/17.5kV 31.5/40kA 3150A

Susol

VH-06/12/17



Item			VH-06/12/17□32/40□32				
Rated voltage		Ur (kV)	7.2	12	17.5		
Rated normal current		Ir (A)	3150				
Rated frequency		fr (Hz)	50/60				
Rated short-circuit current		Isc (kA)	31.5/40				
Rated short-time withstand current		Ik/tk (kA/s)	40/4				
Rated short-circuit breaking capacity		(MVA)	393/499	655/831	955/1212		
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)	20	28 (42)	38		
	Impulse (1.2×50μs)	Up (kV)	60	75	95		
Rated operating sequence			O-0.3s-CO-15s-CO				
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220				
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220				
Auxiliary contacts			4a4b, 10a10b				
Rated opening time		(sec)	≤ 0.04				
No-load closing time		(sec)	≤ 0.06				
Type test class	Mechanical		M2				
	Electrical		E2 (List 3)				
	Capacitive current switching		C2				
Installation version	Drawout		Fs, Gs, K, H type	Gs, K, H type	K, H type	K type	H type
Phase distance		(mm)	210	210	210	254	275
Weight	Breaker (H type)	(kg)	240	240	240	280	280
	Cradle (H type)	(kg)	235	235	235	250	250
Dimensions	Breaker (Fs, Gs, K, H type)		Page 206~221				
	Cradle (Fs, Gs, K, H type)		Page 206~221				
Standards			IEC 62271-100				

Ratings - 7.2/12/17.5kV 50kA 1250/2000/2500/3150A

Susol

VH-06/12/17



Item			VH-06□50□13/20/25/32				VH-12□50□13/20/25/32				VH-17□50□13/20/25/32			
Rated voltage		Ur (kV)	7.2				12				17.5			
Rated normal current		Ir (A)	1250	2000	2500	3150	1250	2000	2500	3150	1250	2000	2500	3150
Rated frequency		fr (Hz)	50/60											
Rated short-circuit current		Isc (kA)	50											
Rated short-time withstand current		Ik/tk (kA/s)	50/3											
Rated short-circuit breaking capacity		(MVA)	623				1039				1515			
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)	20				28 (42) Note1)				38			
	Impulse (1.2×50㎲)	Up (kV)	60				75 (82) Note1)				95			
Rated operating sequence			O-0.3s-CO-15s-CO / O-0.3s-CO-3min-CO											
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220											
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220											
Auxiliary contacts			4a4b, 10a10b											
Rated opening time		(sec)	≤ 0.04											
No-load closing time		(sec)	≤ 0.06											
Type test class	Mechanical		M2											
	Electrical		E2 (List3)											
	Capacitive current switching		C2											
Installation version *	Fixed		P type											
	Drawout		H type (for MCSG)											
Phase distance		(mm)	210		275		210		275		210		275	
Weight	Breaker (H type)	(kg)	230		287	290	230		287	290	230		287	290
	Cradle (H type)	(kg)	175		320	320	175		320	320	175		320	320
Dimensions	Breaker (H type)		Page 222		Page 224		Page 222		Page 224		Page 222		Page 224	
	Cradle (H type)		Page 223		Page 225		Page 223		Page 225		Page 23		Page 225	
Standards			IEC 62271-100, KERI/KEMA, V-check(KESCO)											

* H type is a box type cradle with CB compartment style structure.
Note1) Contact us.

Ratings - 7.2/12/17kV 40/50kA 4000A

Susol

VH-06/12/17



Item			VH-06/12/17□40□40			VH-06/12/17□50□40		
Rated voltage		Ur (kV)	7.2	12	17.5	7.2	12	17.5
Rated normal current		Ir (A)	4000					
Rated frequency		fr (Hz)	50/60					
Rated short-circuit current		Isc (kA)	40			50		
Rated short-time withstand current		Ik/tk (kA/s)	40/4			50/4		
Rated short-circuit breaking capacity		(MVA)	499	831	1212	624	1040	1515
Rated short-circuit making current		Ip (kA)	104			130		
Rated breaking time		(cycle)	3					
Rated withstand voltage	Power frequency (1 min)	Ud (kV)	20	28(42)	38	20	28(42)	38
	Impulse (1.2×50㎲)	Up (kV)	60	75	95	60	75	95
Rated operating sequence			O-0.3s-CO-15s-CO					
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220					
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220					
Auxiliary contacts			4a4b, 10a10b					
Rated opening time		(sec)	≤ 0.04					
No-load closing time		(sec)	≤ 0.06					
Type test class	Mechanical		M2					
	Electrical		E2 (List3)					
	Capacitive current switching		C2					
Installation version	Fixed		-	-	P type	-	-	P type
	Drawout		H type	H type	H type	H type	H type	H type
Phase distance		(mm)	275					
Weight	Breaker (H type)	(kg)	395					
	Cradle (Ha, Hb type)	(kg)	200					
Dimensions	Breaker (P, H type)		Page 226~231					
	Cradle (Ha, Hb type)		Page 226~231					
Standards			IEC 62271-100					

Ratings - 7.2/12kV 40/50kA 4000A

Susol

VH-06/12



Item			VH-06H40,50L50	VH-12H40,50L50
Rated voltage		Ur (kV)	7.2	12
Rated normal current		Ir (A)	5000	
Rated frequency		fr (Hz)	50/60	
Rated short-circuit current		Isc (kA)	40/50	
Rated short-time withstand current		Ik /tk (kA/s)	50/4	
Rated short-circuit breaking capacity		(MVA)	624	1040
Rated short-circuit making current		Ip (kA)	130	
Rated breaking time		(Cycle)	3	
Rated withstand voltage	Power frequency (1 min)	Ud (kV)	20	20
	Impulse (1.2×50μs)	Up (kV)	60	75
Rated operating sequence			O-0.3s-CO-15s-CO	
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220~250	
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220~250	
Auxiliary contacts			4a4b, 10a10b	
Rated opening time		(sec)	≤ 0.04	
No-load closing time		(sec)	≤ 0.06	
Type test class	Mechanical		M2	
	Electrical		E2 (List 3)	
	Capacitive current switching		C2	
Installation version	Drawout		H type (for MCSG)	
Phase distance		(mm)	320	
Weight	Breaker (H type)	(kg)	430	
	Cradle (Ha type)	(kg)	200	
Dimensions	Breaker (H type)		Page 226~229	
	Cradle (Ha type)		Page 226~229	
Standards			IEC 62271-100	

Ratings - 24/25.8kV 25/31.5/40kA 1250/2000/2500/3150A

Susol

VH-20/25



Item			VH-20,25□25□25	VH-20,25□32□13/20/32			VH-20,25□40□13/20/32		
Rated voltage		Ur (kV)	24/25.8						
Rated normal current		Ir (A)	2500	1250	2000	3150	1250	2000	3150
Rated frequency ***		fr (Hz)	50/60	60			50/60		
Rated short-circuit current		Isc (kA)	25	31.5			40		
Rated short-time withstand current		Ik/tk (kA/s)	25/3	31,5/3			40/3		
Rated short-circuit breaking capacity		(MVA)	1039/1117	1309/1407			1662/1787		
Rated short-circuit making current		Ip (kA)	2.5×Isc (50Hz)/2.6×Isc (60Hz)	2.6×Isc (60Hz)			2.5×Isc (50Hz)/2.6×Isc (60Hz)		
Rated breaking time		(cycle)	3						
Rated withstand voltage	Power frequency (1 min)	Ud (kV)	50 (65) Note1)						
	Impulse (1.2×50㎲)	Up (kV)	125						
Rated operating sequence ****			O-0.3s-CO-15s-CO / O-0.3s-CO-3min-CO						
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220						
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220						
Auxiliary contacts			4a4b, 10a10b						
Rated opening time		(sec)	≤ 0.04						
No-load closing time		(sec)	≤ 0.06						
Type test class	Mechanical		M2						
	Electrical		E2 (List3)						
	Capacitive current switching		C2						
Installation version *	Fixed		P type						
	Drawout		H type (for MCSG)						
Phase distance **		(mm)	275	210 (275)	210 (275)	275	210 (275)	210 (275)	275
Weight	Breaker (H type)	(kg)	295	256 (273)	256 (273)	318	256 (273)	256 (273)	318
	Cradle (H type)	(kg)	316	257 (284)	257 (284)	316	257 (284)	257 (284)	316
Dimensions	Breaker (H type)		Page 232	Page 234~237		Page 239	Page 234~237		Page 239
	Cradle (H type)		Page 233	Page 235, 238		Page 240	Page 235, 238		Page 240
Standards			IEC 62271-100, KERI/KEMA, V-check (KESCO)						

* H type is a box type cradle with CB compartment style structure.
** ( ) displays option of phase distance.
*** Rated frequency(fr) 50Hz is certified only to 24kV.
**** Rated operating sequence O-0.3s-CO-15s-CO is certified only to 24kV 40kA.
Note1) Contact us.

Ratings - 36kV 25/31.5/40kA 1250/2000/3150A

Susol

VH-36



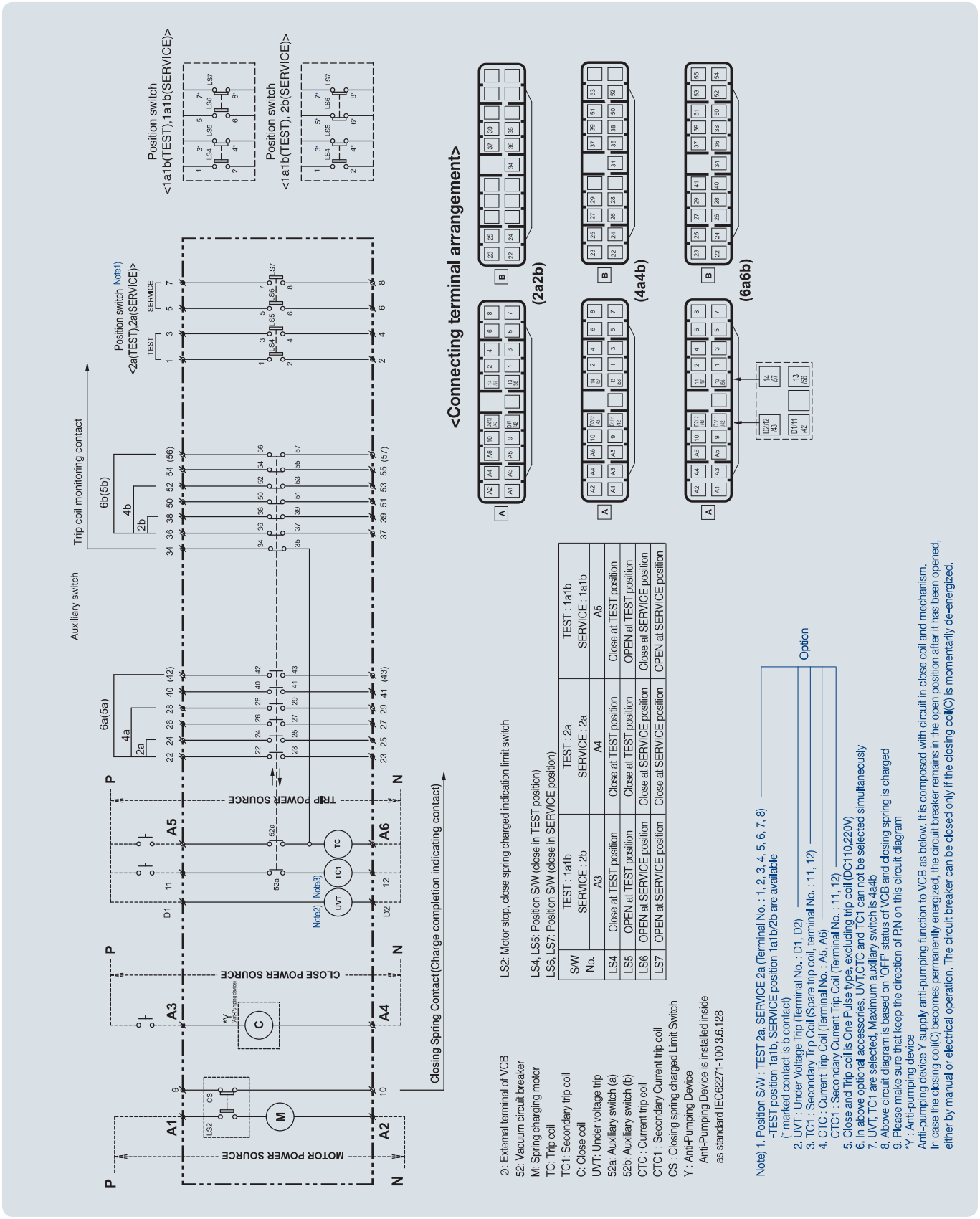
Item			VH-36□25□13/20/32			VH-36□32□13/20/32			VH-36□40□13/20/32		
Rated voltage		Ur (kV)	36								
Rated normal current		Ir (A)	1250	2000	3150	1250	2000	3150	1250	2000	3150
Rated frequency		fr (Hz)	50/60								
Rated short-circuit current		Isc (kA)	25			31.5			40		
Rated short-time withstand current		Ik/tk (kA/s)	25/3			31.5/3			40/3		
Rated short-circuit breaking capacity		(MVA)	1559			1964			2494		
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)	70 (95) Note1)								
	Impulse (1.2×50μs)	Up (kV)	170								
Rated operating sequence			O-0.3s-CO-3min-CO								
Control voltage	Closing coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220								
	Trip coil	(V)	DC 48, DC 110, DC 125, DC 220~250, AC 48, AC 110, AC 220								
Auxiliary contacts			4a4b, 10a10b								
Rated opening time		(sec)	≤ 0.04								
No-load closing time		(sec)	≤ 0.06								
Type test class	Mechanical		M2								
	Electrical		E2 (List3)								
	Capacitive current switching		C2								
Installation version *	Fixed		P type								
	Drawout		H type (for MCSG)								
Phase distance		(mm)	300								
Weight	Breaker (H type)	(kg)	400		490	400		490	400		490
	Cradle (H type)	(kg)	700		750	700		750	700		750
Dimensions	Breaker (H type)		Page 241		Page 243	Page 241		Page 243	Page 241		Page 243
	Cradle (H type)		Page 242		Page 244	Page 242		Page 244	Page 242		Page 244
Standards			IEC 62271-100, KERI/KEMA, V-check (KESCO)								

* H type is a box type cradle with CB compartment style structure.
Note1) Contact us.

Control circuit diagram - VL type

Susol

VL-06



Ø: External terminal of VCB
52: Vacuum circuit breaker
M: Spring charging motor
TC: Trip coil
TC1: Secondary trip coil
C: Close coil
UVT: Under voltage trip
52a: Auxiliary switch (a)
52b: Auxiliary switch (b)
CTC : Current trip coil
CTC1 : Secondary Current trip coil
CS : Closing spring charged Limit Switch
Y : Anti-Pumping Device
Anti-Pumping Device is installed inside as standard IEC62271-100 3.6.128

LS2: Motor stop, close spring charged indication limit switch
LS4, LS5: Position S/W (close in TEST position)
LS6, LS7: Position S/W (close in SERVICE position)

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

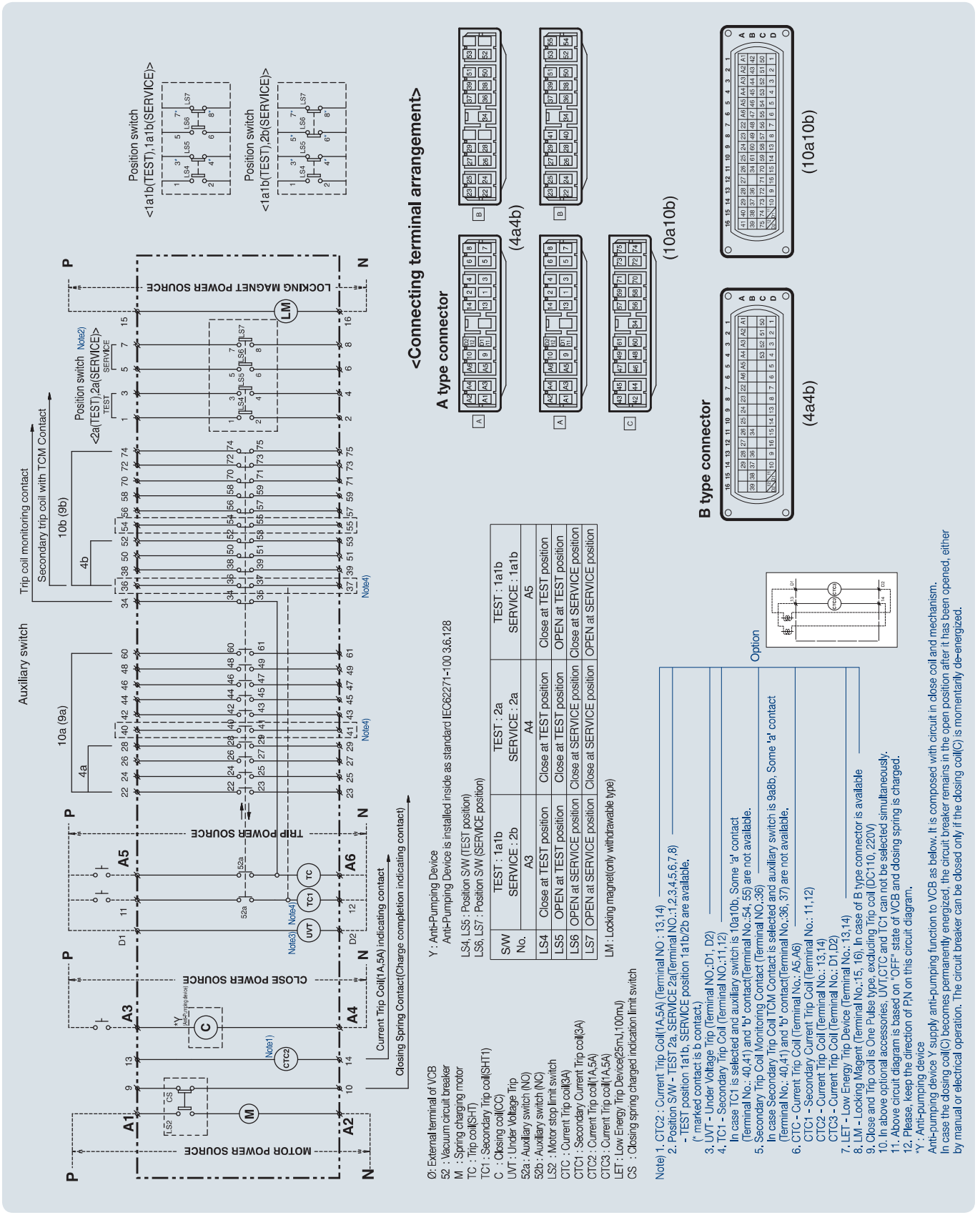
Note) 1. Position S/W : TEST 2a, SERVICE 2a (Terminal No. : 1, 2, 3, 4, 5, 6, 7, 8)
-TEST position 1a1b, SERVICE position 1a1b/2b are available
(* marked contact is b contact)
2. UVT : Under Voltage Trip (Terminal No. : D1, D2)
3. TC1 : Secondary Trip Coil (Spare trip coil, terminal No. : 11, 12)
4. CTC : Current Trip Coil (Terminal No. : A5, A6)
CTC1 : Secondary Current Trip Coil (Terminal No. : 11, 12)
5. Close and Trip coil is One Pulse type, excluding trip coil (DC110,220V)
6. In above optional accessories, UVT,CTC and TC1 can not be selected simultaneously
7. UVT, TC1 are selected, Maximum auxiliary switch is 4a4b
8. Above circuit diagram is based on 'OFF' status of VCB and closing spring is charged
9. Please make sure that keep the direction of P,N on this circuit diagram
*Y : Anti-pumping device
Anti-pumping device Y supply anti-pumping function to VCB as below. It is composed with circuit in close coil and mechanism.
In case the closing coil(C) becomes permanently energized, the circuit breaker remains in the open position after it has been opened, either by manual or electrical operation. The circuit breaker can be closed only if the closing coil(C) is momentarily de-energized.

Option

Control circuit diagram - VL type

Susol

VL-06/12/17/20/25/36



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

Ø: External terminal of VCB
52 : Vacuum circuit breaker
M : Spring charging motor
TC : Trip coil(SHT)
TC1 : Secondary Trip coil(SHT1)
C : Closing coil(CC)
UVT : Under Voltage Trip
52a : Auxiliary switch (NO)
52b : Auxiliary switch (NC)
LS2 : Motor stop limit switch
CTC : Current Trip coil(3A)
CTC1 : Secondary Current Trip coil(3A)
CTC2 : Current Trip coil(1A,5A)
CTC3 : Current Trip coil(1A,5A)
LET : Low Energy Trip Device(25mJ,100mJ)
CS : Closing spring charged indication limit switch

Y : Anti-Pumping Device
Anti-Pumping Device is installed inside as standard IEC62271-100 3.6.128

LS4, LS5 : Position S/W (TEST position)
LS6, LS7 : Position S/W (SERVICE position)

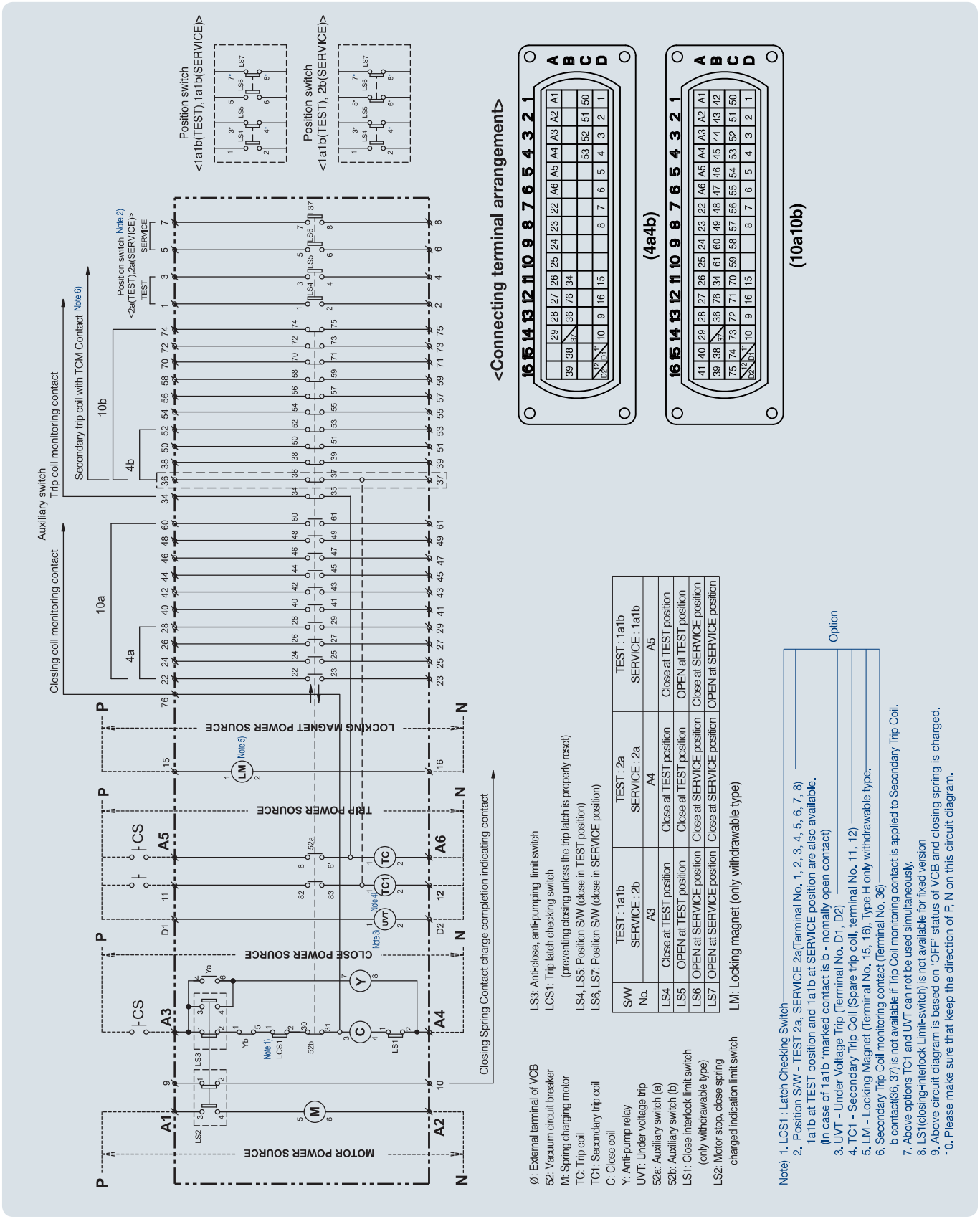
LM : Locking magnet(only withdrawable type)

Note) 1. CTC2 : Current Trip Coil(1A,5A) (Terminal NO : 13,14)
2. Position S/W - TEST 2a, SERVICE 2a(Terminal NO.:1,2,3,4,5,6,7,8)
- TEST position 1a1b, SERVICE position 1a1b/2b are available.
(* marked contact is b contact.)
3. UVT - Under Voltage Trip (Terminal NO.:D1, D2)
4. TC1 - Secondary Trip Coil (Terminal 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. CTC - Current Trip Coil (Terminal No.: A5,A6)
CTC1 - Secondary Current Trip Coil (Terminal No.: 11,12)
CTC2 - Current Trip Coil (Terminal No.: 13,14)
CTC3 - Current Trip Coil (Terminal No.: D1,D2)
7. LET - Low Energy Trip Device (Terminal No.: 13,14)
8. LM - Locking Magent (Terminal No.:15, 16). In case of B type connector is available
9. Close and Trip coil is One Pulse type, excluding Trip coil (DC110, 220V)
10. In above optional accessories, UVT,CTC and TC1 can not be selected simultaneously.
11. Above circuit diagram is based on "OFF" state of VCB and closing spring is charged.
12. Please, keep the direction of P,N on this circuit diagram.
*Y : Anti-pumping device
Anti-pumping device Y supply anti-pumping function to VCB as below. It is composed with circuit in close coil and mechanism.
In case the closing coil(C) becomes permanently energized, the circuit breaker remains in the open position after it has been opened, either by manual or electrical operation. The circuit breaker can be closed only if the closing coil(C) is momentarily de-energized.

Control circuit diagram - VH type

Susol

VH-06/12/17/20/25/36



Ø: External terminal of VCB
52: Vacuum circuit breaker
M: Spring charging motor
TC: Trip coil
TC1: Secondary trip coil
C: Close coil
Y: Anti-pump relay
UVT: Under voltage trip
52a: Auxiliary switch (a)
52b: Auxiliary switch (b)
LS1: Close interlock limit switch (only withdrawable type)
LS2: Motor stop, close spring charged indication limit switch
LS3: Anti-close, anti-pumping limit switch
LCS1: Trip latch checking switch (preventing closing unless the trip latch is properly reset)
LS4, LS5: Position S/W (close in TEST position)
LS6, LS7: Position S/W (close in SERVICE position)

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

LM: Locking magnet (only withdrawable type)

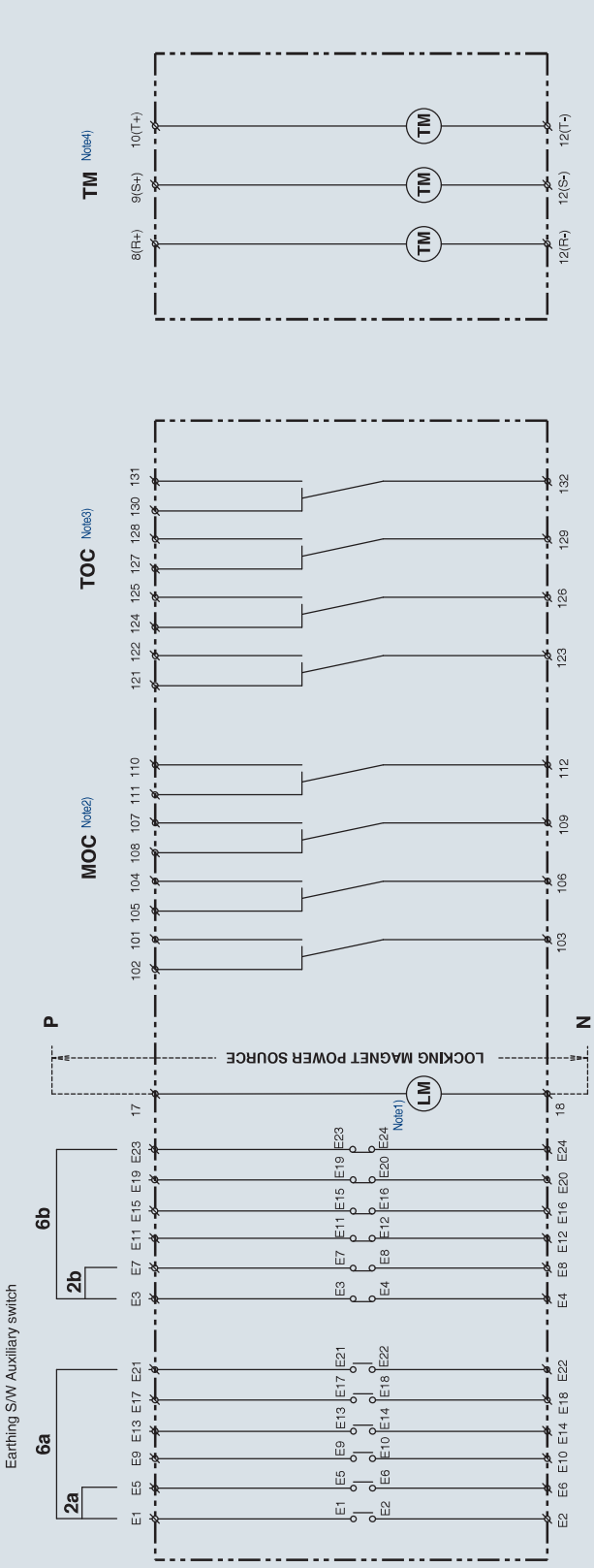
Note) 1. LCS1 : Latch Checking Switch
2. Position S/W - TEST 2a, SERVICE 2a(Terminal No. 1, 2, 3, 4, 5, 6, 7, 8)
1a1b at TEST position and 1a1b at SERVICE position are also available.
(In case of 1a1b "marked contact is b - nomally open contact)
3. UVT - Under Voltage Trip (Terminal No. D1, D2)
4. TC1 - 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

Control circuit diagram - VH type

Susol

Compartment



Ø: External terminals for auxiliary contacts and locking magnet
LM : Locking magnet for earthing swtich
MOC : Mechanism operated cell switch (for H type cradle)
TOC : Truck operated cell switch (for H type cradle)
TM : Temperature alarm (for H type cradle)

Note) 1. LM - If it is energized with the rated power the earthing switch can be closed or opened (for H type cradle)
2. MOC - This auxiliary switch is used to indicate the Close/Open of VCB (for H type cradle)
It is composed of 4 cell switches with 4 changeover contacts.
3. TOC - This auxiliary switch is used to indicate the 'SERVICE' position of VCB (for H type cradle) — Option
It is composed of 4 cell switches with 4 changeover contacts.
4. TM - Temperature Alarm Unit displays the input temperature detected through the temperature sensor installed in H-type cradle. Temperature sensor can be installed in each phase and can be connected with the temperature module.
5. Please make sure that keep the direction of P, N on this circuit diagram.

* Above circuit diagram is based on the status that the earthing S/W is Open and the breaker is at Test or between Test and Service position. MOC indicates the Open of the breaker. If the breaker is Closed from Service, the contacts configuration is displayed on the contrary.

Side-Mount type VCB

Susol

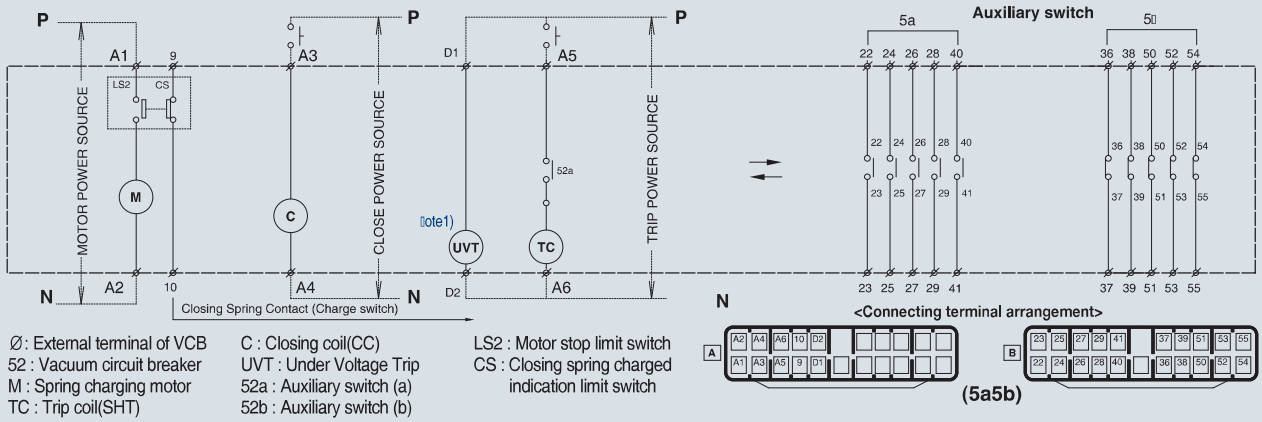
25.8kV 16kA 630A



Item			VL-25□16B 06
Rated voltage		Ur (kV)	25.8
Rated normal current		Ir (A)	630
Rated frequency		fr (Hz)	50/60
Rated short-circuit breaking current		Isc (kA)	16
Rated short-time withstand current (3 sec)		Ik (kA)	16
Rated short-circuit breaking capacity		(MVA)	665/715
Rated short-circuit making current		Ip (kA)	40/41.6
Rated breaking time		(cycle)	3
Rated withstand voltage	Power frequency (1 min)	Ud (kV)	60
	Impulse (1.2×50㎲)	Up (kV)	125
Rated operating sequence			O-0.3s-CO-3min-CO
Control voltage	Closing coil	(V)	DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V, AC 48V, AC 100~130V, AC 200~250V
	Trip coil	(V)	DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V, AC 48V, AC 100~130V, AC 200~250V
Auxiliary contact			5a5b
Rated opening time		(sec)	≤ 0.04
No-load closing time		(sec)	≤ 0.06
Type test class	Mechanical		M1
	Electrical		E1
	Capacitive current switching		C1
Lifetime *	Mechanical	(time)	2,000
	Electrical	(time)	2,000
Installation	Fixed	Right	R type
		Left	L type
Pole centre distance		(mm)	210
Weight	CB	(kg)	95
Standards			IEC 62271-100

* Lifetime with maintenance

Control circuit diagram



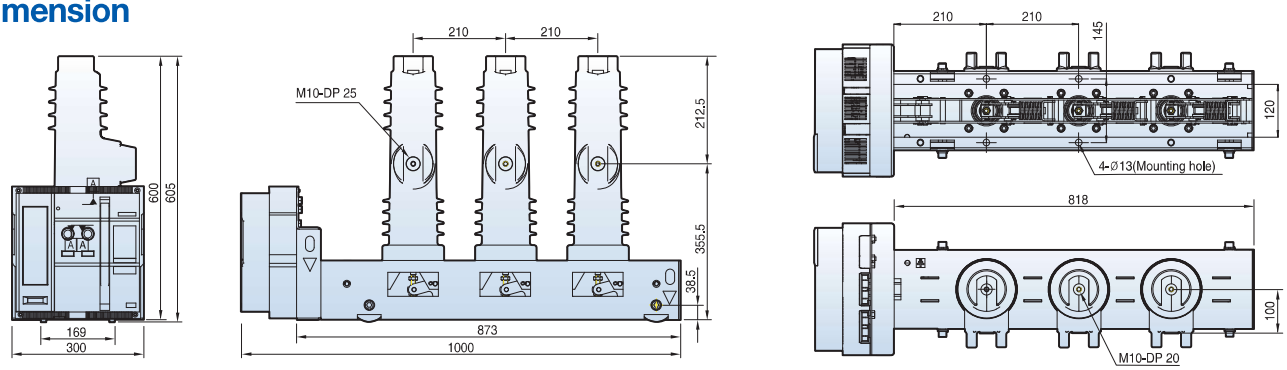
Ø : External terminal of VCB
52 : Vacuum circuit breaker
M : Spring charging motor
TC : Trip coil(SHT)

C : Closing coil(CC)
UVT : Under Voltage Trip
52a : Auxiliary switch (a)
52b : Auxiliary switch (b)

LS2 : Motor stop limit switch
CS : Closing spring charged indication limit switch

Note) 1. UVT : Under Voltage Trip (No. D1, D2) ——————— Option
* Closing and Trip coil : One Pulse type
* This circuit diagram is based on 'OFF' status of CB and Closing spring is charged.

Dimension



Note) This external shape is based on "R" Type (Installation type)

Ordering information

VL	—	25	R	16	B	06
Basic model name		Rated voltage (kV)	Installation type	Breaking	Phase distance/Compatibility	Rated current (A)

Basic model name	
e-VCB	

Rated voltage (kV)	
25	25.8

Installation type	
R	On the right (Fixed type)
L	On the left (Fixed type)

Breaking	
16	16

Phase distance/Compatibility	
B	210mm

Rated current (A)	
06	680

VL-25□16B06 — M1 C1 T1 SA5 U1 AAB

Motor control voltage	
M0	Without Motor
M1	DC 110V
M2	DC 220V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M6	AC 48V
M7	AC 100V~130V
M8	AC 200V~250V

Closing coil voltage	
C0	Without Closing coil
C1	DC 110V
C2	DC 220V
C3	DC 125V
C4	DC 24V~30V
C5	DC 48V~60V
C6	AC 48V
C7	AC 100V~130V
C8	AC 200V~250V

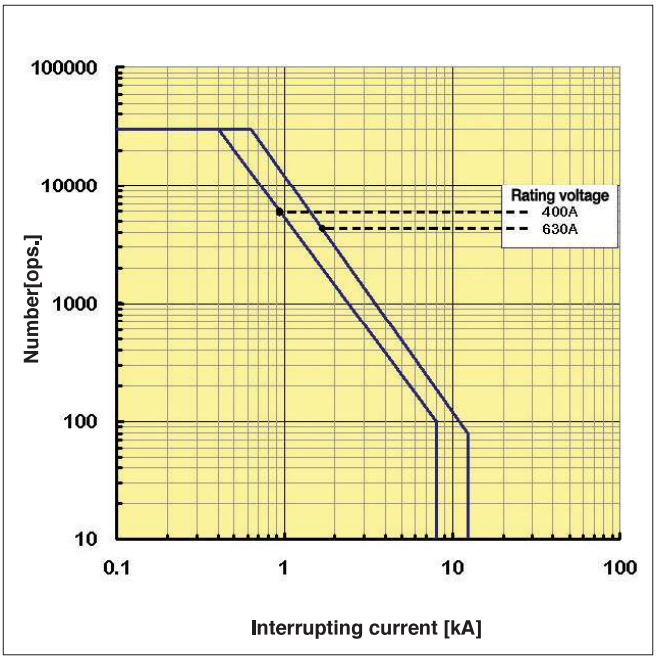
Trip coil voltage	
T0	Without Trip coil
T1	DC 110V
T2	DC 220V
T3	DC 125V
T4	DC 24V~30V
T5	DC 48V~60V
T6	AC 48V
T7	AC 100V~130V
T8	AC 200V~250V

Aux. contact & wire ass'y	
SA5	A type connector, 5a5b

UVT	
U0	Without UVT
U1	DC 110V
U2	DC 220V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 48V
U7	AC 100V~130V
U8	AC 200V~250V

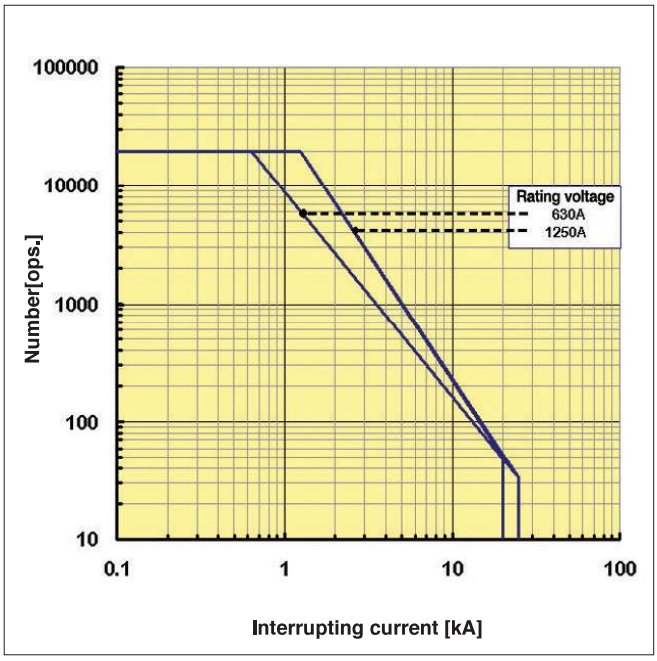
Other accessories	
AA	Lead Wire
AB	User Plug(Part)

Electrical endurance by interrupting current



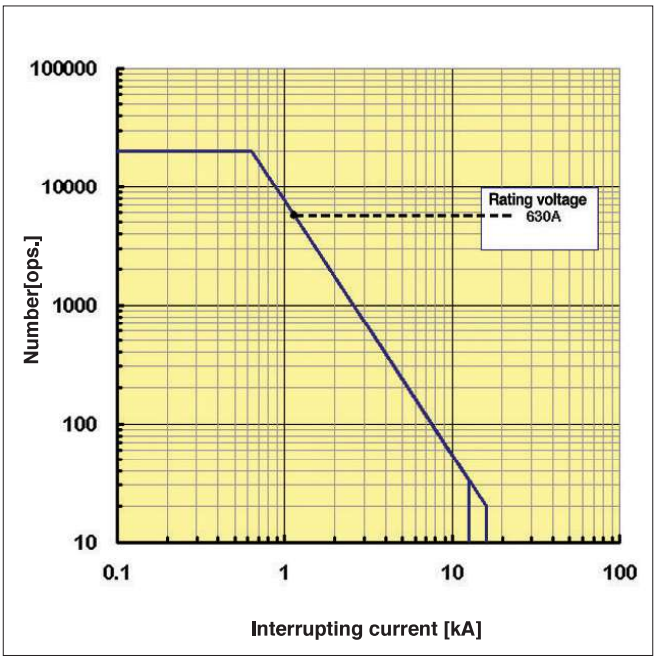
VI model LV2 at 7.2kV

- N : Operation numbers
- I : Interrupting current



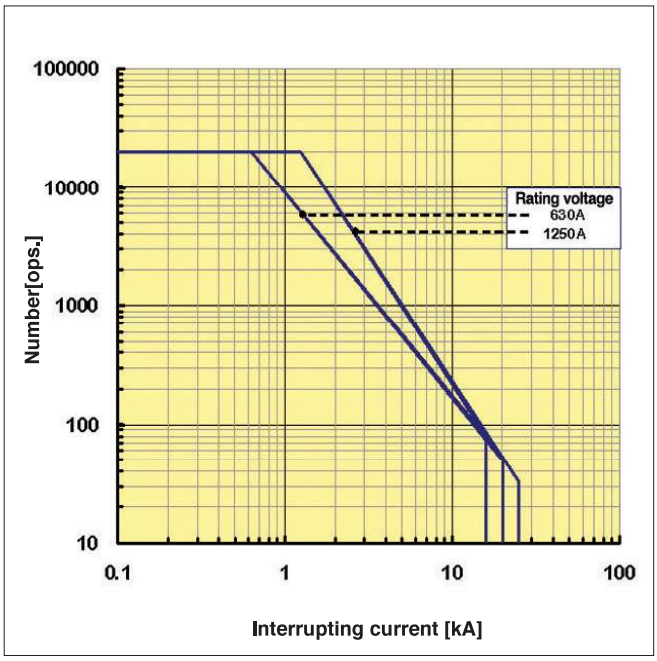
VI model LV3 at 7.2kV

- N : Operation numbers
- I : Interrupting current



VI model LV4 at 24kV

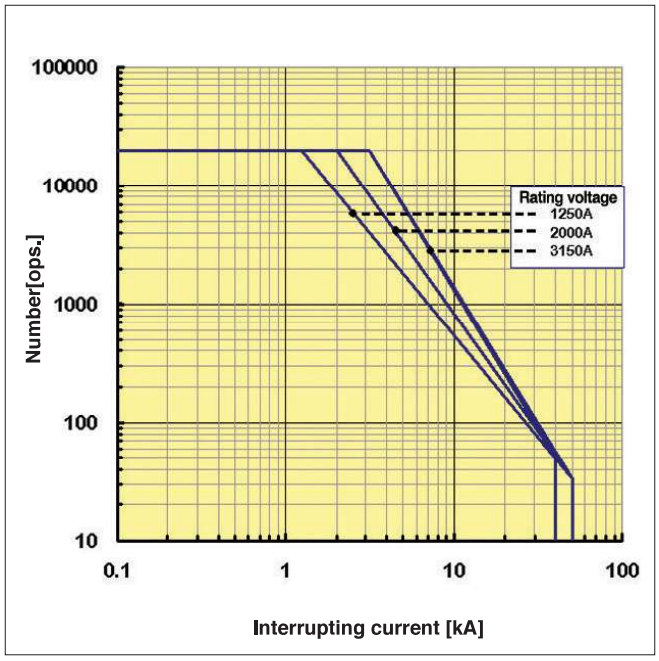
- N : Operation numbers
- I : Interrupting current



VI model LV5 at 17.5kV

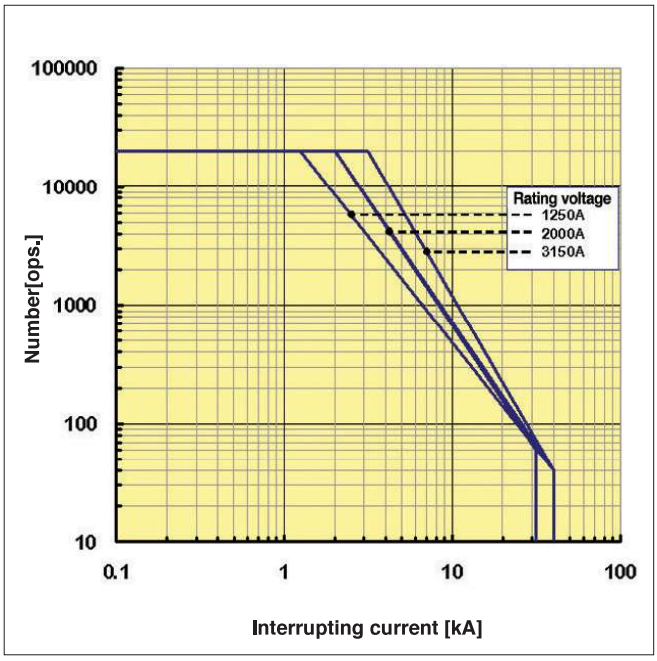
- N : Operation numbers
- I : Interrupting current

Electrical endurance by interrupting current



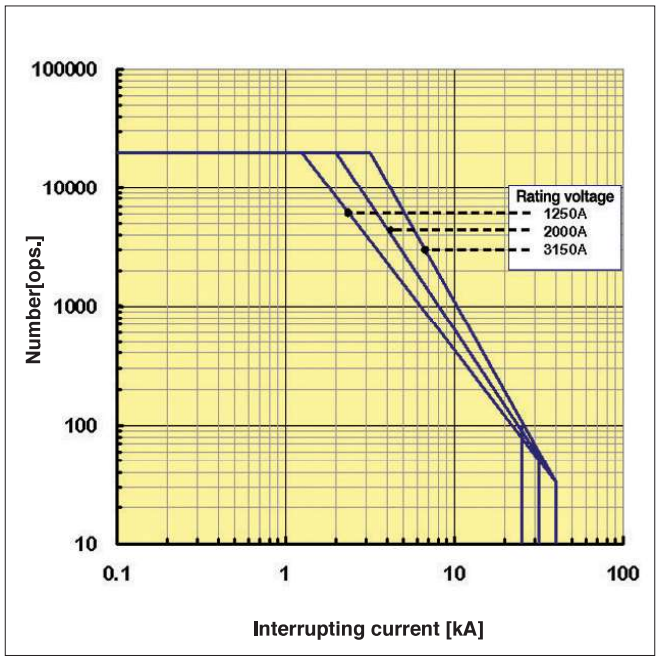
VI model LV8 at 17.5kV

- 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

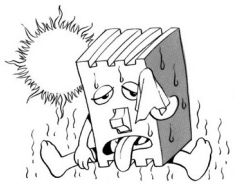
- maximum temperature: +40℃
- 24-hour average maximum temperature: +35℃
- minimum temperature: -5℃

Altitude

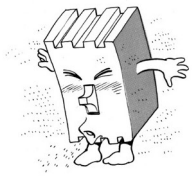
- 1000m or less above sea level

Relative Humidity

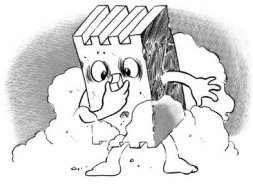
- 24 hours average value: 95% or less
- One month average: 90% or less



- 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.

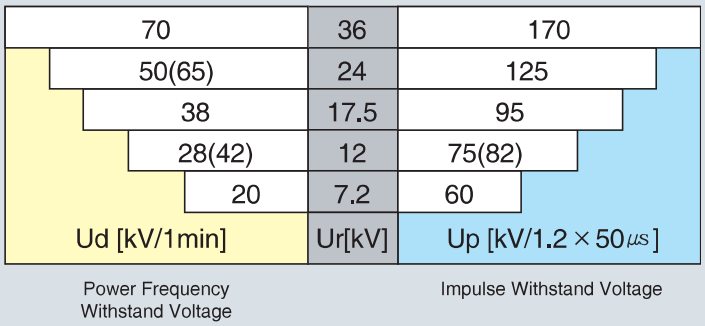
Special Use Environment

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

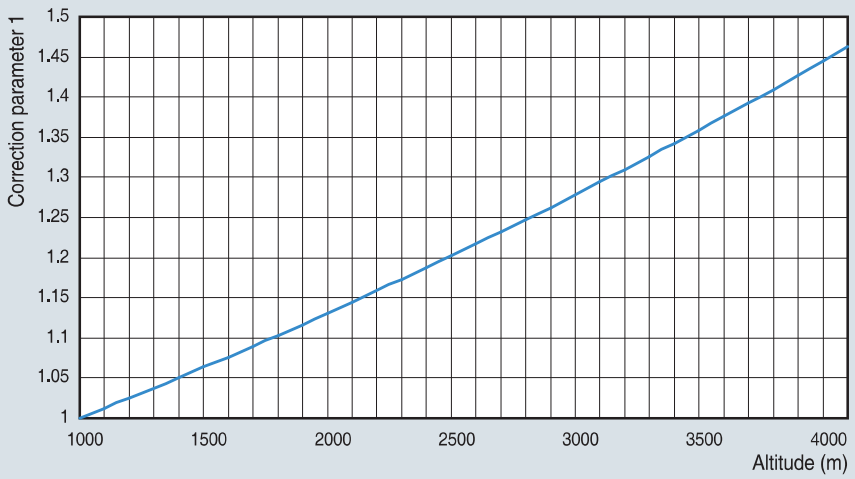
Withstand voltage compensation according to altitude

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

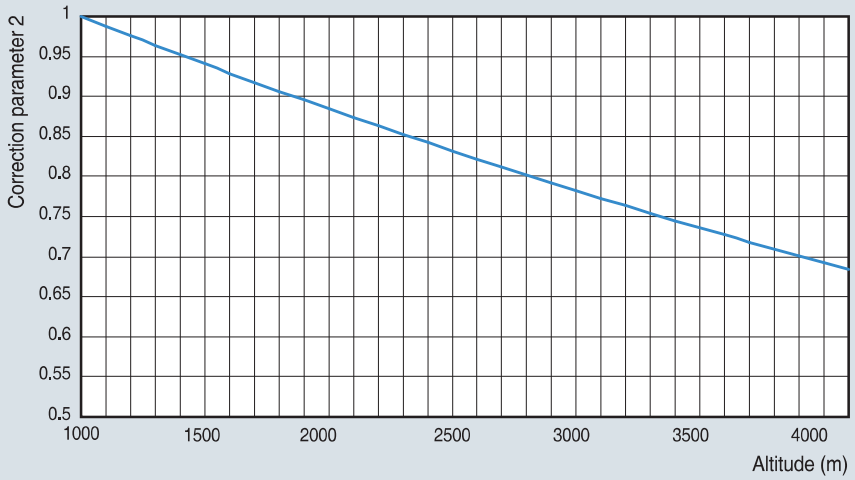


<Table 1> Criteria of withstand voltages by rated voltages specified in IEC62271-1

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.

Special Use Environment

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.

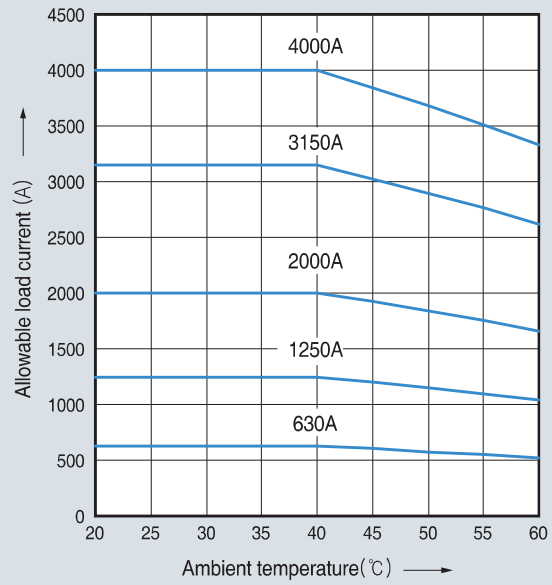
$$Ia = Ir\left(\left(\Theta_{max} - \Theta_a\right)/\Theta_r\right)^{1/2}$$

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

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

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

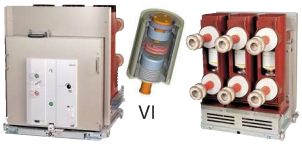
<Table 2> Allowable load current by ambient temperature



<Figure 3> Allowable load current by ambient temperature

Comparison of GCB & VCB

In the system of medium voltage lines VCB uses a vacuum which is an eco friendly medium for arc extinguishing.
It also offers excellent interrupting properties and ease of maintenance and has expanded the area to the scope of the GCB as the overlap increases.

Items	GCB	VCB	Comparison results	Remarks
Images		 VI		
Arc extinguish medium and characteristics	SF_6 gas - Greenhouse gas that causes global warming. - The toxic gas generated by chemical reactions due to arc energy. - 5kgf/㎟ high pressure required.	Vacuum - Green clean medium. - 5×10^{-5} Torr vacuum rate to maintain.	VCB is better than GCB	
Maintenance of the arc media	- Periodic check and supplement the gas pressure required. - Automatic locking if gas pressure falls below the certain value. In the event of an accident while the gas valve is locked trip is disable and the load equipment can not be protected.	- Available until the product life. - Always keep trip-first feature. When an accident occurs the trip-first feature functions to protect the equipment.	VCB is better than GCB	
Rated voltage range (kV)	3.6~550	3.6~36	GCB is better than VCB	VCB has been increasing rapidly in the medium voltage systems.
Applicable rate of transient recovery voltage (RRRV)	Low	High	VCB is better than GCB	IEC62271-100 Annex M applied/ Interrupting performance verified.
Development and trends	Decline - Company M discontinued producing GCB. - Company A manufactures VCB in medium voltage GCB production factory. - GCB Maker S started the production of VCB.	Increasing - Companies A and S have developed new VCBs. - Development trend that the voltage coverage of VCB expands. - VI increased coverage. (GIS, DAIS, SIS, etc.)	VCB is better than GCB	

Memo

FUTURING SMART ENERGY

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



Safety Instructions

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



- According to The WEEE Directive, please do not discard the device with your household waste.

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