



Susol Super Solution

Vacuum Contactor



LSIS

Susol *Super Solution*

Vacuum Contactor

**Customer satisfaction through quality and services,
Susol Vacuum Contactor**

Susol Vacuum Contactor applied with a self-produced Vacuum Interrupter (VI), a device widely recognized for its innovative technology, has passed the authorized agency's development testing, proving their high quality.



Contents

- 04 Characteristics
- 10 Rating
- 12 Model classification
- 16 External structure
- 17 Internal structure
- 18 Auxiliary devices
- 25 Racking-in/out operation
- 26 Control circuit diagram
- 30 Dimensions
- 38 Technical data
- 39 Current limiting power fuse (PF)
- 40 List of current limiting PFs
- 42 Protection coordination
- 43 Characteristic curve



12kV

GB/T 14808 Standard - Performance verification within a short time (4sec)



- Rated short time : 4 seconds
- Standard duty cycle : CO
- Compatible with existing product (Tri-MEC)
- Equipped with a wide range of cradles: M and H-class
- CB compartment for MCSG (Phase-to-phase 150mm VCS)
 - Box-type cradle available

Diverse control power

- DC 110, 125, 220V - AC 110, 125, 220V

Various auxiliary devices

- VCS Part: locking magnet, key lock, button cover, button padlock, padlock (H-type door interlock) and fuse checker
- Cradle part: Position switch, earthing switch & Accessories, door and door interlock
- Others: Racking in/out handle and lifting hook

Automatic racking-in/out display

Applied standards & certification

- IEC62271-106

Authorized agency's development testing & certification

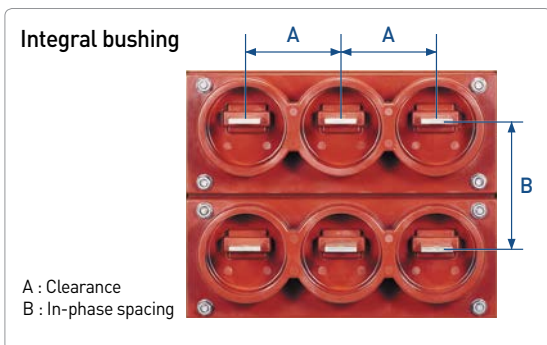
- Authorized development testing agency based on IEC62271-106
- Verification for PF-40kA short circuit protection coordination
 - Breaking test: 40kA short-circuit breaking successful
 - Making test: 40kA short-circuit making successful



Compatible with domestic/overseas VCS manufacturers' models



Note) Please refer to the contact information for retrofit products.



Compatibility

It is a customer-oriented product considering its easy maintenance and economic feasibility. In particular, it is easy to replace the product because the new/old model's body, distance between the racking-in/out rails of cradles, clearance and in-phase spacing are the same.

High-performance, high-reliability and long life

The vacuum interrupter (VI) complies with international standards, including IEC, ANSI and NEMA; and it is highly reliable as it collectively performs brazing at the vacuum furnace.

Outstanding mechanical strength and degassing

It uses a high alumina ceramic tube for better mechanical strength. With superb degassing at high temperature, it demonstrates excellent durability and frequency in switching.

High-speed breaking and arc discharge in a short time

Because of the fast vacuum insulation recovery characteristic, the current is cut off at the initial current zero point after contact opening, so contact damage and losses are minimal.

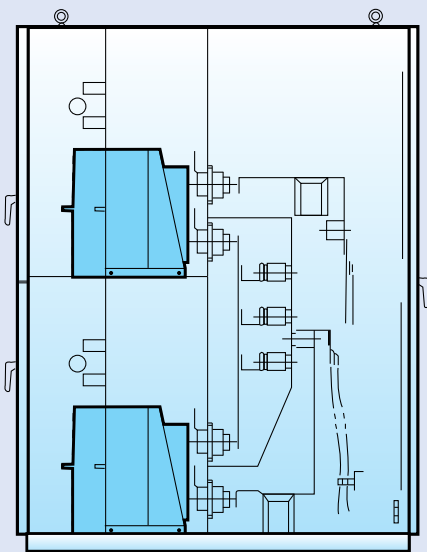
Various safety devices for users



- Racking-in/out interlock device
- Truck for external racking-in/out
- One-mold fuse holder
- A wide range of dual protective devices
- Power fuse operation indicator (fuse checker) and micro-switch



Metal Clad Switchgear



Metal Clad Switchgear applied

An integral cradle bushing (Class B) and fuse holder are structured in one mold, which can be applied to the metal clad switchgear.

Interlock device

An interlock device is basically built-in for the user's safety when racking in/out.

Mechanical interlock type

2 VC units are connected with the mechanical interlock device for stable and convenient motor (reverse) driving and commercial/back-up power transfer.

Truck for external racking-out and lever device

It is a device that may rack in/out the VC units without opening the door outside the panel, minimizing the risk of electric shock.

Body & Cradle

Fixed type (3.6/7.2/12kV)

- Fixed type is divided into a standard type and fuse-combined type.



3.6 / 7.2kV



3.6 / 7.2kV (Fuse-combined)



12kV

Lever type (3.6/7.2kV)

- Lever type is divided into a standard type and fuse-combined type.
- E/F/G-Class cradles are applicable.



3.6 / 7.2kV



3.6 / 7.2kV (Fuse-combined)

Cradle

- **E-Class Cradle:** An economical cradle in a basic structure.
- **F-Class Cradle:** An E-class cradle attached with an insulating shutter.
- **G-Class Cradle:** A premium E-class cradle with an insulating shutter and bushing.



E-Class cradle



F-Class cradle



G-Class cradle

Screw type (3.6/7.2kV)

- Screw type is divided into a standard type and fuse-combined type.
- B/M/H-Class cradles are applicable.



3.6 / 7.2kV



3.6 / 7.2kV (Fuse-combined)

Cradle

- **B-Class Cradle:** A premium E-class cradle with an insulating shutter and bushing.
- **M-Class Cradle:** A premium cradle with a metal shutter and bushing.
- **H-Class Cradle:** A premium cradle with an insulating shutter, bushing and earthing switch.



B-Class cradle



M-Class cradle



H-Class cradle

Screw type (12kV)

- 12kV VCS screw type is divided into a standard type and fuse-combined type.
- M/H (12kV)-class cradles are applicable.



12kV

Cradle

- **M-Class Cradle:** A premium cradle with a metal shutter and bushing.
- **H-Class Cradle:** A premium cradle with an insulating shutter, bushing and earthing switch.



M-Class cradle



H-Class cradle

Susol Vacuum Contactor

Rating



Type		Fixed type (Z)				Non-fuse lever type (D)				Non-fuse screw type (K)			
Model	Continuous excitation type [E]	VC-3Z	VC-6Z	VC-3Z	VC-6Z	VC-3D	VC-6D	VC-3D	VC-6D	VC-3K	VC-6K	VC-3K	VC-6K
	Latch type [L]	-42□E	-42□E	-44□E	-44□E	-42□E	-42□E	-44□E	-44□E	-42□E	-42□E	-44□E	-44□E
Rated voltage (kV)		3.3	6.6	3.3	6.6	3.3	6.6	3.3	6.6	3.3	6.6	3.3	6.6
Rated insulation voltage Ur(kV)		3.6	7.2	3.6	7.2	3.6	7.2	3.6	7.2	3.6	7.2	3.6	7.2
Rated current Ie(A)		200		400		200		400		200		400	
Rated frequency fr(Hz)		50/60											
Rated breaking current (kA, 0-3min-CO-2min-CO)		4											
Rated short time withstand current (kA-sec)		2.4kA-30s, 4kA-10s, 6kA-2s, 6.3kA-1s											
Rates short time peak current (kApeak-0.5Cycle)		60											
Operating frequency (AC3) (op./hour)		E: Continuous excitation 1200, L: Latch 300											
Life	Mechanical (10,000times)	E: Continuous excitation 100, L: Latch 30											
	Electrical (10,000times)	30											
Lightning impulse Up (kV)		60											
Power frequency withstand voltage Ud (kV/1min)		20											
Operating power excitation		E: Continuous excitation, L: Latch											
Operating voltage		DC/AC 110V, 125V, 220V											
Auxiliary contact	Current-carrying capacity [A]	10(AC)											
	Applied voltage [V]	600max ~ 48min											
	Number of contacts	Continuous excitation 3a3b, Latch 2a2b				2a2b							
Maximum capacity (Three-phase)	Motor (kW)	750	1,500	1,500	3,000	750	1,500	1,500	3,000	750	1,500	1,500	3,000
	Transformer (kVA)	1,000	2,000	2,000	4,000	1,000	2,000	2,000	4,000	1,000	2,000	2,000	4,000
	Condenser (kVA)	750	1,500	1,200	2,000	750	1,500	1,200	2,000	750	1,500	1,200	2,000
Certification	Lloyd's register of shipping	○				○				○			
	Nippon Kaiji Kyokai	○				○				○			
Weight (kg)		24				41				56			



Type		Combination lever type (G)				Combination screw type (B)				Combination fixed type (F)			
Model	Continuous excitation type [E]	VC-3G	VC-6G	VC-3G	VC-6G	VC-3B	VC-6B	VC-6B	VC-3F	VC-6F	VC-3F	VC-3F	VC-6F
	Latch type [L]	-42□E	-42□E	-44□E	-44□E	-42□E	-42□E	-44□E	-42□E	-42□E	-44□E	-44□E	-44□E
Rated voltage (kV)		3.3	6.6	3.3	6.6	3.3	6.6	3.3	6.6	3.3	6.6	3.3	6.6
Rated insulation voltage Ur(kV)		3.6	7.2	3.6	7.2	3.6	7.2	3.6	7.2	3.6	7.2	3.6	7.2
Rated current Ie(A)		200		400		200		400		200		400	
Rated frequency fr(Hz)		50/60											
PF Combination	Short-circuit making Making	4kA (40kA with fuse)											
	Short-circuit breaking Breaking	40kA											
	Transfer-current [0-3min-breaking 0-3min-O]	40kA											
Rated breaking current (kA, 0-3min-CO-2min-CO)		40kA											
Rated short time withstand current (kA-sec)		2.4kA-30s, 4kA-10s, 6kA-2s, 6.3kA-1s											
Rates short time peak current (kApeak-0.5Cycle)		60											
Operating frequency (AC3) (op./hour)		E: Continuous excitation 1200, L: Latch 300											
Life	Mechanical (10,000times)	E: Continuous excitation 100, L: Latch 30											
	Electrical (10,000times)	30											
Lightning impulse Up (kV)		60											
Power frequency withstand voltage Ud (kV/1min)		20											
Operating power excitation		E: Continuous excitation, L: Latch											
Operating voltage		DC/AC 110V, 125V, 220V											
Auxiliary contact	Current-carrying capacity [A]	10(AC)											
	Applied voltage [V]	600max ~ 48min											
	Number of contacts	2a2b											
Certification	Lloyd's register of shipping	○				○				○			
	Nippon Kaiji Kyokai	○				○				○			
Weight (kg)		46				62				46			

Note) Weight of the combination lever type excludes the PT weight.
 *Applied load capacity varies according to the PT rating.



Type	Fixed type (Z)	Non-fuse screw type (K)	Combination screw type (B)
Model	VC-12Z-44□E	VC-12K-44□E	VC-12B-44□E
Rated voltage (kV)	11		
Rated insulation voltage Ur(kV)	12		
Rated current Ie(A)	400		
Rated frequency fr(Hz)	50/60		
Rated breaking current (kA, 0-3min-CO-2min-CD)	4		
Rated short time withstand current (kA-sec)	2.4kA-30s, 4kA-10s, 6kA-2s, 6.3kA-4s		
Rates short time peak current (kApeak-0.5Cycle)	60		
Operating frequency (AC4) (op./hour)	E: Continuous excitation 1200, L: Latch 300		
Life	E: Continuous excitation 100, L: Latch 30		
Life Mechanical (10,000times)			
Life Electrical (10,000times)	30		
Lightning impulse Up (kV)	75		
Power frequency withstand voltage Ud (kV/1min)	42		
Operating power excitation	E : Continuous excitation, L : Latch		
Operating voltage	Continuous excitation : DC/AC 110V,125V,220V Latch : DC 110V,125V,220V		
Auxiliary contact	10(AC)		
Current-carrying capacity (A)			
Applied voltage (V)	600max ~ 48min		
Number of contacts	Continuous excitation 3a3b, Latch 2a2b	2a2b	
Maximum capacity (Three-phase)	Motor (kW)	6,000	
	Transformer (kVA)	8,000	
	Condenser (kVA)	4,000	
Weight (kg)	30	60	60



Power Fuse Rating

Type	Model	Rated voltage (kV)	Rated current (A)	External diameter (mm)	Length (mm)	
DIN type	LFL-3/6G-□B	3.6/7.2	5, 10, 20, 30, 40, 50, 63, 75, 100	45	192	
	LFL-3/6G-□B	3.6/7.2	125		292	
	LFL-3G-□B	3.6	160, 200		292	
	LFL-6G-□B	7.2	160, 200		292	
KS type	For general loading	LFL-3/6G-□	3.6/7.2	5(T1.5), 10(T3), 20(T7.5), 30(T15), 40(T20), 50(T30), 60(T30)	50	261
				75(T50), 100(T75)	60	311
		LFL-3G-□	3.6	150(T100), 200(T150)	60	311
				300(T250), 400(T300)	77	311
	LFL-6G-□	7.2	150(T100), 200(T150)	77	311	
		For motor protection	LFL-3M-□	3.6	M20, M50, M100	60
	M150, M200				77	200
	M300, (M400)				87	250
LFL-6M-□	7.2		M20, M50	60	311	
M100, M150, M200		77	350			
		M300, (M400)	87	450		

* LFL-6G-300, 400 cannot be combined with VCS.

* Our 12kV VCS has been tested for short circuit protection (SCPD: Short Circuit Protective Devices) and completed verification for fuse combination. (Test fuse : 12kV,200A)

Susol Vacuum Contactor

Model classification

3.6/7.2kV body

VC	03	G	4	2	E	E	D1
Unique identifier	Rated voltage (kV)	Connection type	Breaking current (kA)	Rated current (A)	Operating method	Measurement No.	Operating voltage
VC Vacuum Contactor	03 3.6 06 7.2	Z Fixed type D Non-fuse lever type G PF-combined lever type F PF-combined fixed type K Non-fuse screw type B PF-combined screw type	4 4	2 200 4 400	E Continuous excitation L Latch	E SUSOL	D1 DC 110V D2 DC 220V D3 DC 125V A1 AC 110V A2 AC 220V A3 AC 125V

Note)
 1. C0, P0, T0, F00 is the default setting for Z and D types.
 2. C0, P0, F00 is the default setting for K type.
 3. P0, T0 is the default setting for F type.

C1	P2	T1	F01	B1																																																																																							
Fuse Checker	PT	Truck	Fuse	Accessory																																																																																							
C0 None C1 Standard type C2 SBA type	P0 None P1 100Var, 1EA P2 100Var, 2EA P3 200Var, 1EA P4 200Var, 2EA	T0 Standard type T1 Earthing switch T2 Metal shutter	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> <th>External diameter</th> <th>Assembled length</th> <th>VC rating (Voltage/Current)</th> </tr> </thead> <tbody> <tr> <td>F00</td> <td>When Z, D or K type is selected</td> <td></td> <td></td> <td></td> </tr> <tr> <td>F01</td> <td>LFL-3/6G-5-60</td> <td>φ50</td> <td>261mm</td> <td>3.3/6.6kV 200/400A ; for common use</td> </tr> <tr> <td>F02</td> <td>LFL-3M-20-100</td> <td>φ60</td> <td>200mm</td> <td>3.3kV 200/400A</td> </tr> <tr> <td rowspan="3">F03</td> <td>LFL-3/6G-75-100</td> <td rowspan="3">φ60</td> <td rowspan="3">310mm</td> <td rowspan="3">3.3/6.6kV 200/400A ; for common use</td> </tr> <tr> <td>LFL-3G-150-200</td> </tr> <tr> <td>LFL-6M-20-50</td> </tr> <tr> <td>F04</td> <td>LFL-3M-150-200</td> <td>φ77</td> <td>202mm</td> <td>3.3kV 200/400A</td> </tr> <tr> <td rowspan="2">F05</td> <td>LFL-3G-300-400</td> <td rowspan="2">φ77</td> <td rowspan="2">307mm</td> <td rowspan="2">3.3/6.6kV 200/400A ; for common use</td> </tr> <tr> <td>LFL-6G-150-200</td> </tr> <tr> <td>F06</td> <td>LFL-6M-100-200</td> <td>φ77</td> <td>344mm</td> <td>6.6kV 200/400A</td> </tr> <tr> <td>F07</td> <td>LFL-3M-300-400</td> <td>φ87</td> <td>252mm</td> <td>3.3kV 400A ; for exclusive use</td> </tr> <tr> <td>F08</td> <td>LFL-6M-300-400</td> <td>φ87</td> <td>450mm</td> <td>6.6kV 400A ; for exclusive use</td> </tr> <tr> <td>F09</td> <td>LFL-3/6G-5-100B</td> <td>φ45</td> <td>258mm</td> <td>3.3/6.6kV 200/400A ; for common use</td> </tr> <tr> <td>F10</td> <td>LFL-3/6G-125B-200B</td> <td>φ45</td> <td>358mm</td> <td>3.3/6.6kV 200/400A ; for common use</td> </tr> </tbody> </table>	Code	Description	External diameter	Assembled length	VC rating (Voltage/Current)	F00	When Z, D or K type is selected				F01	LFL-3/6G-5-60	φ50	261mm	3.3/6.6kV 200/400A ; for common use	F02	LFL-3M-20-100	φ60	200mm	3.3kV 200/400A	F03	LFL-3/6G-75-100	φ60	310mm	3.3/6.6kV 200/400A ; for common use	LFL-3G-150-200	LFL-6M-20-50	F04	LFL-3M-150-200	φ77	202mm	3.3kV 200/400A	F05	LFL-3G-300-400	φ77	307mm	3.3/6.6kV 200/400A ; for common use	LFL-6G-150-200	F06	LFL-6M-100-200	φ77	344mm	6.6kV 200/400A	F07	LFL-3M-300-400	φ87	252mm	3.3kV 400A ; for exclusive use	F08	LFL-6M-300-400	φ87	450mm	6.6kV 400A ; for exclusive use	F09	LFL-3/6G-5-100B	φ45	258mm	3.3/6.6kV 200/400A ; for common use	F10	LFL-3/6G-125B-200B	φ45	358mm	3.3/6.6kV 200/400A ; for common use	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Padlock</td> </tr> <tr> <td>B</td> <td>Button padlock</td> </tr> <tr> <td>C</td> <td>Button cover</td> </tr> <tr> <td>D</td> <td>Lead Wire(3M)</td> </tr> <tr> <td>E</td> <td>Plug, Pin(21Pin)</td> </tr> <tr> <td>G</td> <td>Blue, flame-retardant wire (Lead Wire)</td> </tr> <tr> <td>H</td> <td>Yellow, flame-retardant wire (Lead Wire)</td> </tr> <tr> <td>I</td> <td>Position S/W</td> </tr> <tr> <td>J</td> <td>Additional 3a3b auxiliary contact</td> </tr> <tr> <td>K</td> <td>3Position S/W</td> </tr> <tr> <td>L</td> <td>CTD</td> </tr> </tbody> </table>	Code	Description	A	Padlock	B	Button padlock	C	Button cover	D	Lead Wire(3M)	E	Plug, Pin(21Pin)	G	Blue, flame-retardant wire (Lead Wire)	H	Yellow, flame-retardant wire (Lead Wire)	I	Position S/W	J	Additional 3a3b auxiliary contact	K	3Position S/W	L	CTD
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Note)
 T (Truck) is available only for K and B types. (T0 is available for D and G types.)
 PT is available only for G Type at the operating AC.

Accessory option table

Type	VC Type						Remarks
	Z	D	G	F	K	B	
A							
B	●	●	●	●	●	●	Latch type
C	●	●	●	●	●	●	Latch type
D	●	●	●	●	●	●	
E	●	●	●	●	●	●	
F	●	●	●	●	●	●	
G	●	●	●	●	●	●	
H	●	●	●	●	●	●	
I	●	●	●	●	●	●	
J	●	●	●	●	●	●	
K	●	●	●	●	●	●	
L	●	●	●	●	●	●	Latch type AC

- Note)
- Accessory 'B' and 'C' are not available at the same time.
 - When accessory 'I' is applied, cradle accessory PS-related items should be added. ('A, B, Q, R, S and T')
 - When accessory 'J' is applied, the auxiliary contact is 6a6b for the fixed type continuous excitation and it is 5a5b for the fixed type latch and lever type.
 - Accessory 'L' is the default setting only for 3.6/7.2kV VCS latch type with the operating voltage AC.
 - Accessory 'J' and 'L' are not available at the same time.
 - Accessory 'K' is available for 3.6/7.2kV G type and cradle accessory 'C' should be selected.
 - Accessory 'D', 'E', 'G' and 'H' are lead wire for users. When not selected, a basic wire (1.5m) is applied.



12kV body

VC	12	B	4	4	E	E	D1
Unique identifier	Rated voltage (kV)	Connection type	Breaking current (kA)	Rated current (A)	Operating method	Measurement No.	Operating voltage
VC Vacuum Contactor	12 12	Z Fixed type K Non-fuse screw type B PF-combined screw type	4 4	4 400	E Continuous excitation L Latch	E SUSOL	D1 DC 110V D2 DC 220V D3 DC 125V A1 AC 110V A2 AC 220V A3 AC 125V

Note)
1. C0, P0, T0, F00 is the default setting for type Z.
2. C0, P0, F00 is the default setting for type K.

Note)
12kV latch type is available only at the operating voltage DC.

C3	P0	T1	F11	BJ																																														
Fuse Checker	PT	Truck	Fuse	Accessory																																														
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Note)
T (Truck) is available only for K and B types.

Accessory option table

Type	VC Type			Remarks
	Z	K	B	
A		●	●	-
B	●	●	●	Latch type
C	●	●	●	Latch type
D	●	●	●	-
E	●	●	●	-
G	●	●	●	-
H	●	●	●	-
J	●	●	●	-
M		●	●	-
N		●	●	-
O		●	●	-

Note)
1. Accessory 'B' and 'C' are not available at the same time
2. When accessory 'J' is applied, the auxiliary contact is 6a6b for the fixed type continuous excitation and it is 5a5b for the fixed type latch and lever type.
3. Accessory 'D', 'E', 'G' and 'H' are lead wire for users. When not selected, a basic wire (1.5m) is applied.



Susol Vacuum Contactor

Model classification

3.6/7.2kV cradle

VCL

Unique identifier

VCL	VCS cradle
-----	------------

3/6

Rated voltage (kV)

3/6	3.6/7.2
-----	---------

42/44

Breaking current & rated current

42/44	Breaking current 4kA
	Rated current 200/400A

E

Cradle type

E	E-class (body:D,G)
F	F-class (body:D,G)
G	G-class (body:D,G)
M	Metal Shutter Screw type (body:K,B)
B	Screw type (body:K,B)
H	Earthing S/W Combination type (body:K,B)

A

Accessory

A	PS1 : 1a1b
B	PS2: 2a2b
C	3 Position S/W
D	ES(Earthing S/W)without option
E	Earthing aux S/W (2a2b)
F	Earthing aux S/W (4a4b)
G	Earthing S/W With Keylock
H	ES with locking magnet (DC 110V)
I	ES with locking magnet (DC 220V)
J	ES with locking magnet (DC 125V)
K	ES with locking magnet (AC 110V)
L	ES with locking magnet (AC 220V)
M	ES with locking magnet (AC 125V)
N	ES with locking magnet (DC 24V)
O	ES with locking magnet (DC 48V)
Q	PS1 : 1a1b (Flame-resisting, blue)
R	PS1 : 1a1b (Flame-resisting, yellow)
S	PS2 : 2a2b (Flame-resisting, blue)
T	PS2 : 2a2b (Flame-resisting, yellow)

Accessory option table

Type	Cradle					
	E	F	G	M	B	H
A	•	•	•	•	•	•
B	•	•	•	•	•	•
C			•			
D						•
E						•
F						•
G						•
H						•
I						•
J						•
K						•
L						•
M						•
N						•
O						•
Q	•	•	•	•	•	•
R	•	•	•	•	•	•
S	•	•	•	•	•	•
T	•	•	•	•	•	•

Note

1. When applying accessories 'A, B, Q, R, S, T', body accessory 'T' should be selected.
2. Accessory 'C' is available only for G-class cradle and body accessory 'K' should be selected.
3. Accessory 'D - O' is available only for H-type cradle.
4. When H-class is chosen, one of the accessories, 'D', 'E' or 'F' should be selected.
5. When M-Class is chosen, the body truck option should be T2.

Flowchart on Ordering MI Models for 7.2kV VC

VC

Unique identifier

VC	VC
----	----

MI

Product name

MI	VC type MI
----	------------

62E

Vacuum contactor (VC1)

32E	VC-3Z-42EE
34E	VC-3Z-44EE
62E	VC-6Z-42EE
64E	VC-6Z-44EE
32L	VC-3Z-42LE
34L	VC-3Z-44LE
62L	VC-6Z-42LE
64L	VC-6Z-44LE

D1

Operating voltage

D1	DC 110V
D2	DC 220V
D3	DC 125V
A1	AC 110V
A2	AC 220V
A3	AC 125V

62E

Vacuum contactor (VC2)

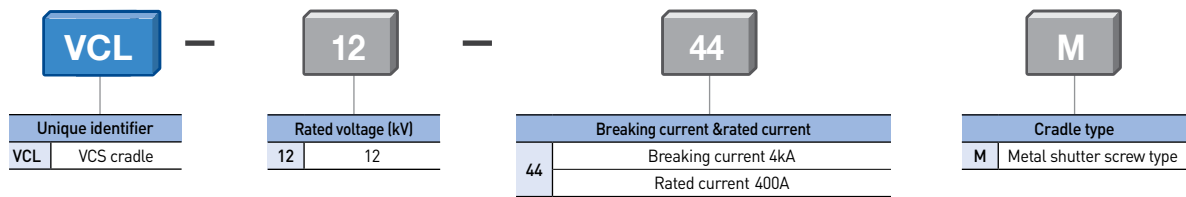
32E	VC-3Z-42EE
34E	VC-3Z-44EE
62E	VC-6Z-42EE
64E	VC-6Z-44EE
32L	VC-3Z-42LE
34L	VC-3Z-44LE
62L	VC-6Z-42LE
64L	VC-6Z-44LE

D1

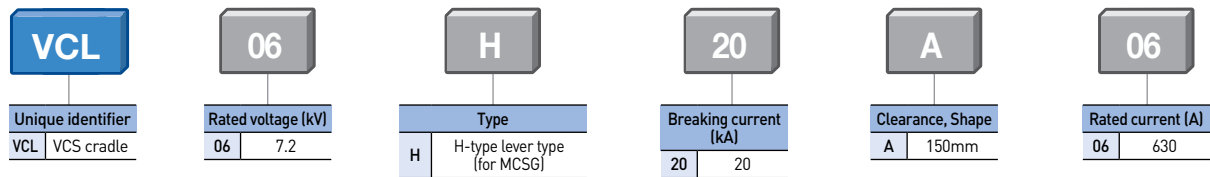
Operating voltage

D1	DC 110V
D2	DC 220V
D3	DC 125V
A1	AC 110V
A2	AC 220V
A3	AC 125V

12kV cradle



VCB Cradle for 12kV VCS Compatibility



Note]
 12kV VCS is compatible with VCB 06H cradle.
 When ordering VCS H-type cradles, please refer to the VCB catalogue for accessories or auxiliary devices.

Susol Vacuum Contactor
External structure

3.6/7.2kV lever type

- ① Cradle
- ② Fuse case
- ③ Fuse checker
- ④ Front cover
- ⑤ Aux switch
- ⑥ ON/OFF display
- ⑦ Counter
- ⑧ Manual trip button
- ⑨ Interlock lever
- ⑩ Standard racking-in/out truck



12kV Screw type

- ① Fuse case
- ② Front cover
- ③ ON/OFF display
- ④ Counter
- ⑤ Manual trip button
- ⑥ Racking-in/out handle
- ⑦ Racking-in/out handle mounting hole
- ⑧ Test/run position checker
- ⑨ Truck for external racking-in/out



Internal structure

Main circuit

The main circuit part supports the VI main circuit terminal and shunt inside the three-phase, integral insulating mold, and the VI's operating part is connected to the operating equipment with the insulating rod. The VI's operating part is switched on and off by the operating devices in the lower section based on the insulating rod.

Operating equipment

The operating equipment is a simple structure taking into account its frequent use and long life. A link equipment is not used and an electromagnet, operating mainly the core rotates the cross bar and the lever fixed to the axis moves up and down, in order to switch (make and break) the contact based on an appropriate level of pressure, stabilizing its operation.

Operating method

Continuous Excitation

The operating core is suctioned into the fixed core only when the operating coil is under excitation so as to turn ON the contactor. When the excitation ends, the operating coil rotates based on the cross bar (spring) to open and the contactor turns OFF.

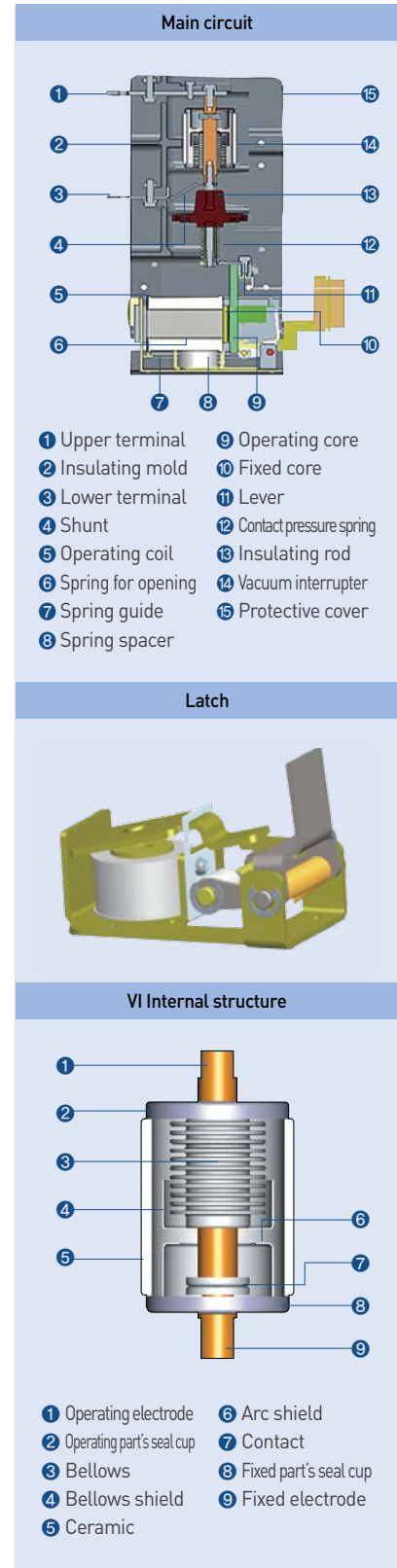
Latch type

This method has a latch to disconnect the coil current and to mechanically hold the equipment after closing (making) is completed. The trip coil is excited and the latch is mechanically disconnected to turn OFF the contactor. In case of manual tripping, the manual trip button should be turned ON to disconnect the latch and trip the contactor.

Model	Operating method	Control voltage (V)	Making current (A)/ Making time (ms)	Trip current (A)/ Trip Time (ms)	Holding current (A)/ Holding time (ms)
VC-3/6□-42/44 E/L E	Continuous excitation type (E)	DC/AC 110V	3/100	-	0.6/40
		DC/AC 125V	3/100	-	0.6/40
		DC/AC 220V	2/100	-	0.6/40
	Latch type (L)	DC 110V	5/100	3/35	-
		DC 125V	5/100	3/35	-
		DC 220V	10/100	6/35	-
Latch type (L) (With CTD)	AC 110V	5/100	5/35	-	
	AC 125V	5/100	5/35	-	
	AC 220V	10/100	10/35	-	
VC-12□-44 E/L E	Continuous excitation type (E)	DC/AC 110V	4.5/120	-	1.2/40
		DC/AC 125V	4.5/120	-	1.2/40
		DC/AC 220V	4.5/120	-	1.2/40
	Latch type (L)	DC 110V	4.5/145	3/40	-
		DC 125V	4.5/145	3/40	-
		DC 220V	4.5/145	6/40	-

VI: Vacuum interrupter

- The arc generated between the contact surfaces diffuses on the plate-shaped contact to prevent the contact from being locally heated and damaged.
- The metal vapor that forms the arc condenses on the shield and the arc disappears at current zero, stopping the metal vapor to occur. The generated metal vapor quickly condenses and the contact restores insulation, enduring the recovery voltage (Transient recovery voltage).



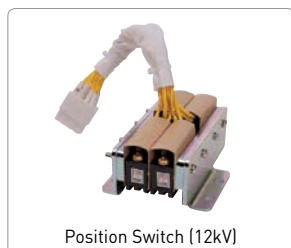
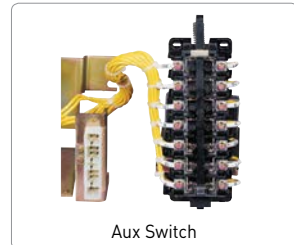
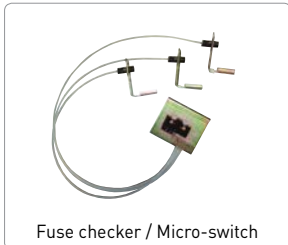
Susol Vacuum Contactor
Auxiliary devices (Body)

3.6/7.2/12kV

Susol VC (Vacuum contactor) offers a wide range of auxiliary devices depending on your preferences. The auxiliary devices attached the VCS body will upgrade its functions.



Auxiliary Devices



Note| PT and CTD are only available for 3.6/7.2kV.

Auxiliary devices (Cradle)

3.6/7.2/12kV

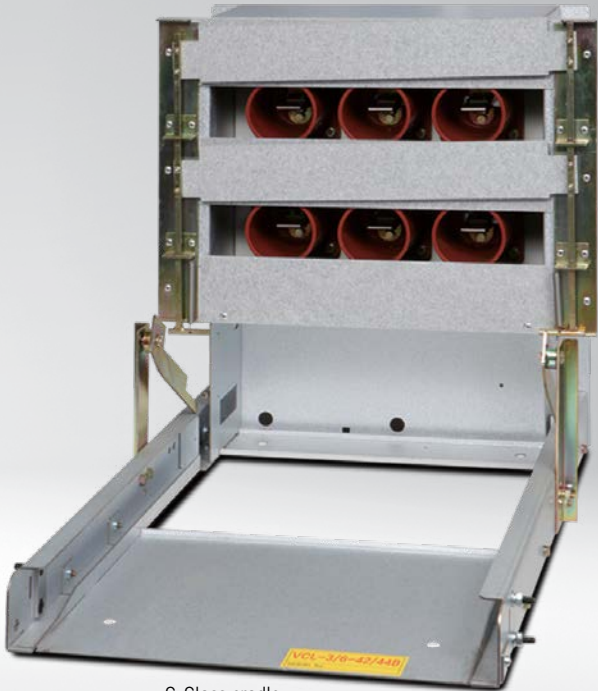
The auxiliary devices attached to the cradle will upgrade its function. Susol VC (Vacuum Contactor) offers a wide range of auxiliary devices depending on your preference.



E-Class cradle

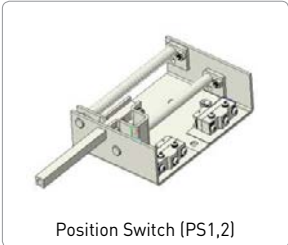


F-Class cradle

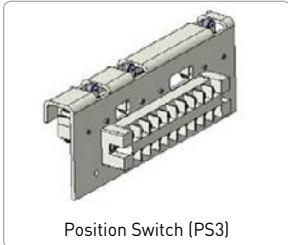


G-Class cradle

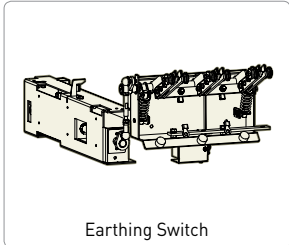
Auxiliary Devices



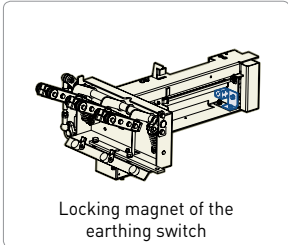
Position Switch (PS1,2)



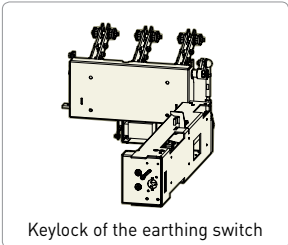
Position Switch (PS3)



Earthing Switch



Locking magnet of the earthing switch



Keylock of the earthing switch

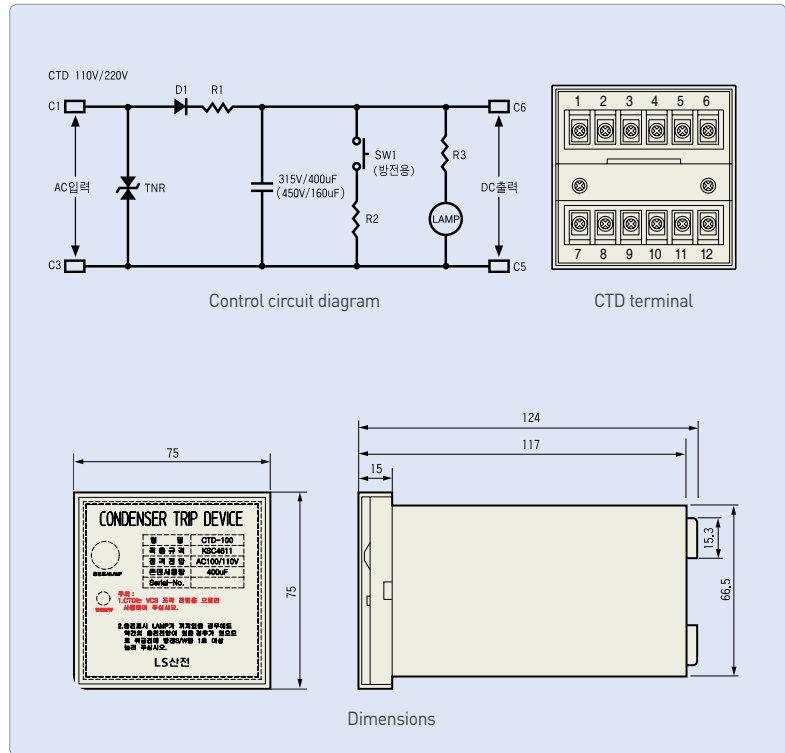
Note)
 1. The position switch can be only assembled with 3.6/7.2kV cradles. (PS3 only with G-class cradles.)
 2. The auxiliary devices related to the earthing switch can be only assembled with H-class cradles.

CTD (Condenser trip device)



For latch type AC operation, the CTD is built in so that tripping is possible within 30 seconds even under instantaneous interruption. However, after interruption, an automatic trip circuit should be arranged separately on the panel.

Rating	Specifications	
Model	CTD - 100	CTD - 200
Rated input voltage [V]	AC 100/110	AC 200/220
Frequency [Hz]	50/60	50/60
Rated impulse voltage [V]	140/155	280/310
Charging time	5second Within	5second Within
Available trip time	30second Within	30second Within
Input voltage regulation	85%~110%	85%~110%
Condenser capacity [μ F]	400	160



Fuse case

It is made of BMC for 3.6/7.2kV models and nylon for 12kV models. Safety has been improved with its excellent dielectric strength.

Note) Available for fuse-combined types



Counter

It is a device that mechanically displays the number of ON/OFF operations in 5-digit display.



Bushing

It is a mono-block bushing that is applied to lever-type cradles. It demonstrates a superb performance with its improved dielectric strength.

Note) Available for G, B, M and H-Class cradles.



Test/run position checker

Position of the body racking in and out is visually displayed on this device.

Note) Available for external racking-in/out



Truck for external racking-in/out

It is a screw-type racking-out device for the user safety. It allows the user to rack in and out outside the panel. It is only available for the single lever and power fuse-combined types.

Note) Available for K and B types.



ON/OFF display

Power ON/OFF status is visually displayed.



Racking-in/out handle

It is a refraction-type rack-in/out handle applied to the truck for external racking-in/out. When K or B-type VCS is used, the screws are turned for racking in and out.



Check display

The fuse appearance and state may be checked from 3.6/7.2kV fuse-combined types (G, B and F types).

Padlock & door racking interlock

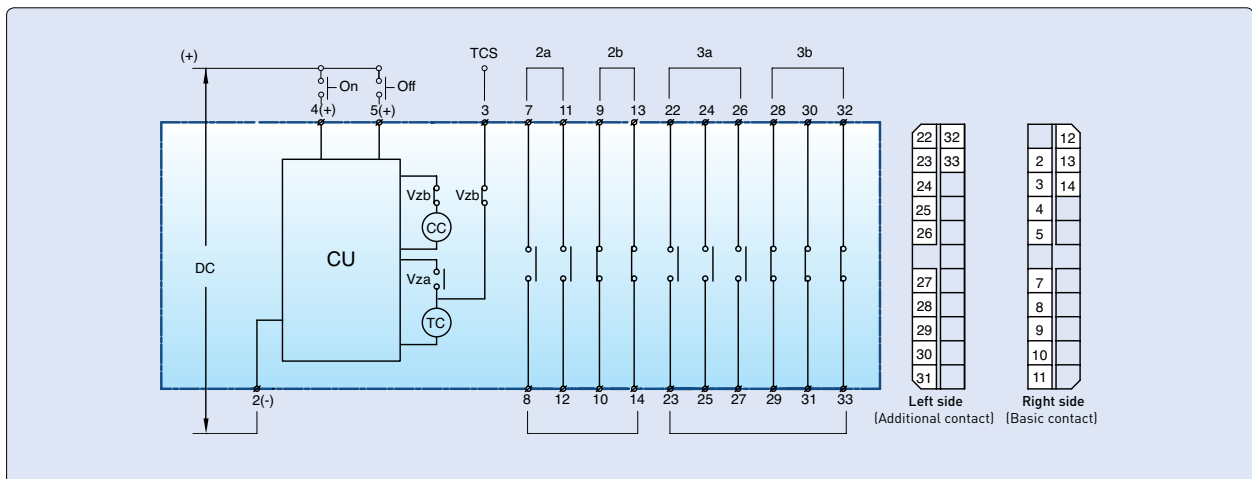


- When the door-option is chosen for the cradle, racking in and out is possible only when the door is completely closed.
- When racking-in/out is needed with the door open, a handy lever mounted on the body's handle insertion part should be inserted to the hole at the lower section of door lock.
- There is a locking padlock device that prevents racking-in/out at the test and service modes using a key.



Trip coil monitoring contact

- It is a contact that monitors the trip coil.
- The trip coil monitoring contact display terminal is connected to the trip coil monitoring relay to monitor the trip coil status.
 - When the trip coil is normal: Closed circuit
 - When the trip coil is damaged: Open circuit
- 1) Monitoring the trip coil at the closing state
- 2) Monitoring the trip coil at the trip state
- The coil test unit is also available for coil testing. It is parallel-connected to the trip coil operating switch.
- No power should be applied to the trip coil monitoring contact.



Button cover



Push Bar

- It is a cover that protects the ON/OFF button to prevent accidents that may occur during VC operation.
- Operates only with the push bar.

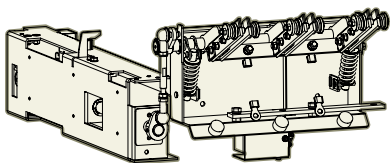
Button padlock



- It is a device that prevents the ON/OFF button be manually pushed by user's mistake.
- At the button lock mode, manual closing/tripping is not possible.



Earthing switch



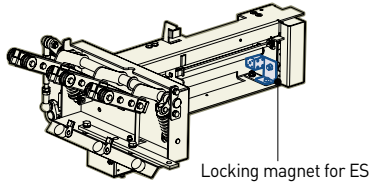
- It is a safety device to discharge the load part's charging current upon maintenance of the switchgear at the VC's test and racking-out states. It can only be installed on the earthing truck of the K and B types.

*Please refer to the User Manual for further details on operation of the earthing switch and related auxiliary devices.
*Applied standard: IEC 62271-102



Earthing Switch

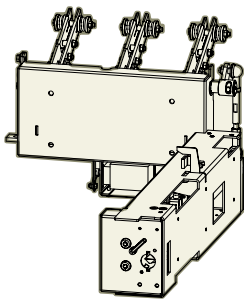
Locking magnet of earthing switch



- It applies only when the earthing switch is used. It is an auxiliary device that allows the earthing switch to open and earth itself after the control power is applied to its locking magnet.
- Please check whether the control power is input or not before opening or earthing the earthing switch installed with the locking magnet.
- Applicable control voltage
 - DC 24, 48, 110, 125, 220V
 - AC 48, 110, 220V



Keylock of earthing switch



- It is a standard auxiliary device applied only when the earthing switch is used. It has two interlock functions.
 - 1) Interlock maintaining the open state
 - 2) Interlock maintaining the earthing state



Racking-in/out operation

Lever (D, G) type

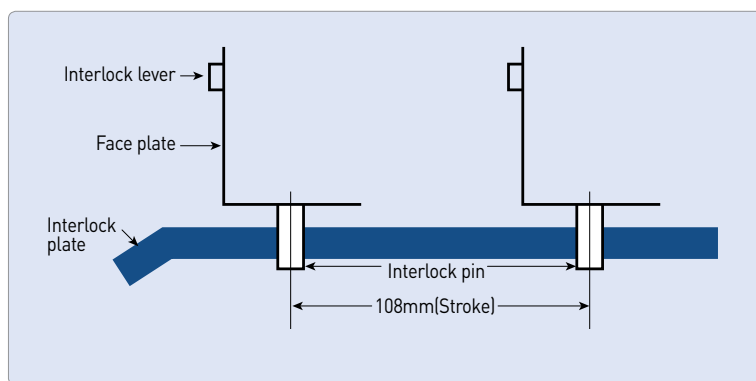
Racking in

1. Check whether the contactor is at the trip mode (Open). (Test position)
2. Lift the interlock lever and rack in about 50mm.
3. After racking in, rack in the body until it reaches the run position without lifting the interlock lever.

Racking out

1. Check whether the contactor is at the trip mode (Open). (Run position)
2. Lift the interlock lever. (The interlock will be cancelled when the lever is lifted.)
3. Rack out the body until it reaches the test position.

Cross-sectional drawing of test/run position



Screw (K, B) type

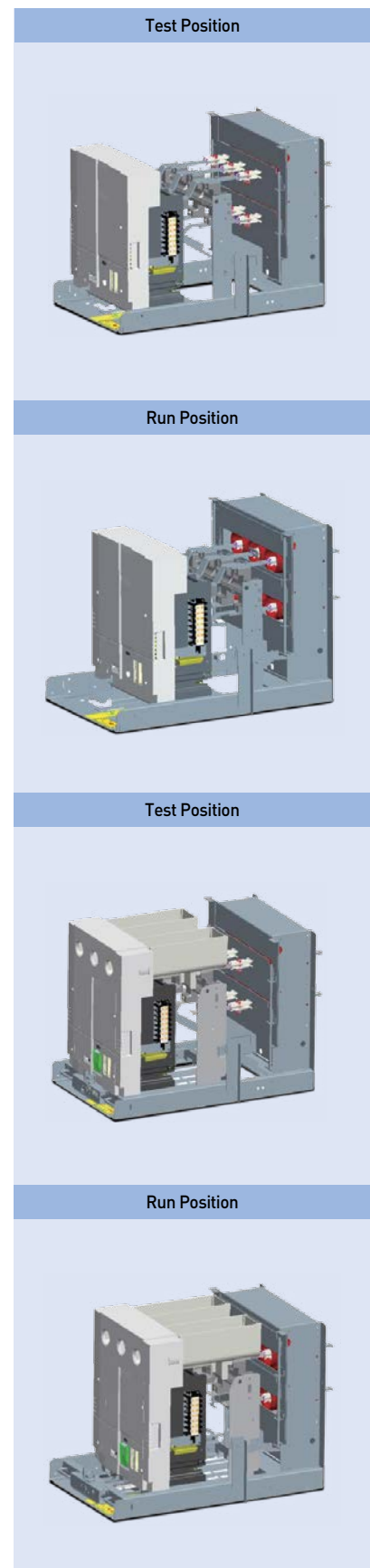
Racking in

1. Hold both levers at the lower section of the contactor with two hands.
2. Pull the levers and then push them forward.
3. Install the handle.
4. Turn the handle clockwise to move forward. (About 11 turns)
5. When it reaches the access point, the racking-in/out handle idles and the contactor no longer racks in.

Racking out

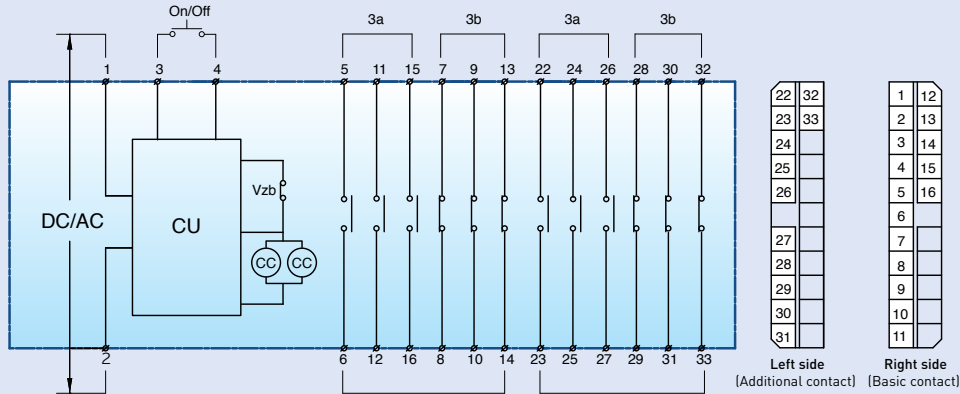
1. Check whether the contactor is at the trip mode (Open). (Run position)
2. Insert the racking-in/out handle in the handle mounting hole.
3. Turn the handle counterclockwise to rack out to the test position.
4. When it reaches the test position, the racking-in/out handle idles.

Note Please check the power status when racking in and out.



Control circuit diagram(3.6/7.2/12kV)

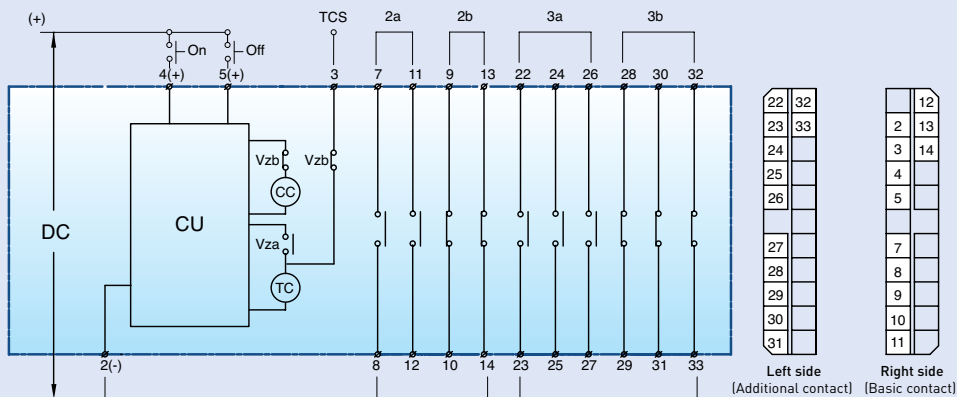
Continuous excitation(DC/AC 110~220V): Fixed type



Apply power to terminals #1 and #2.
Make and break using #3 and #4 terminal contacts.

Do not perform insulation testing on power supply terminals.
Continuously fixed: 1, 2, 3 and 4

Latch type(DC 110~220V) : Fixed type

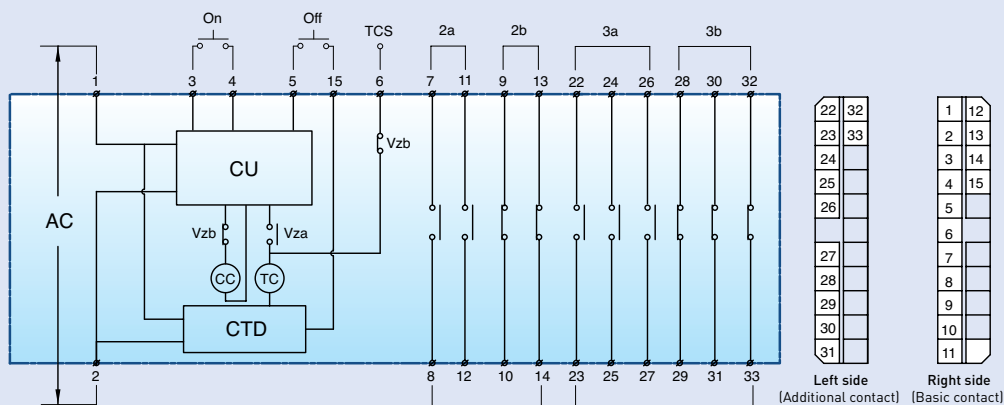


When closing: Make and break using terminals #4(+) and #2(-).
When tripping: Make and break using terminals #5(+) and #2(-).

Do not perform insulation testing on power supply terminals.
Instantaneously (latch) fixed: 2, 4 and 5

Do not apply power to the TCS line.

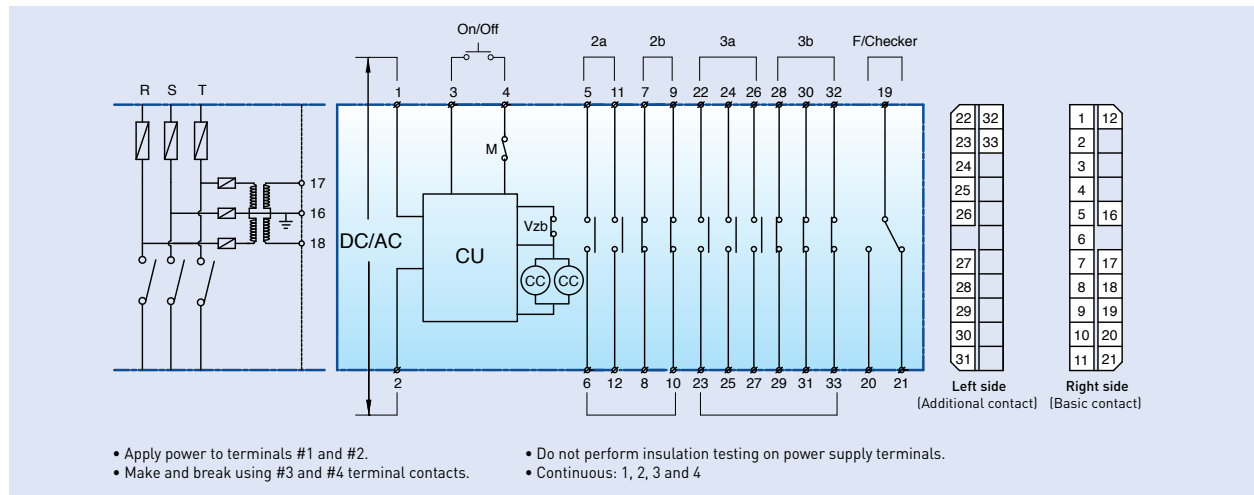
Latch type CTD(AC 110~220V) : Fixed type(Only for 3.6/7.2kV models)



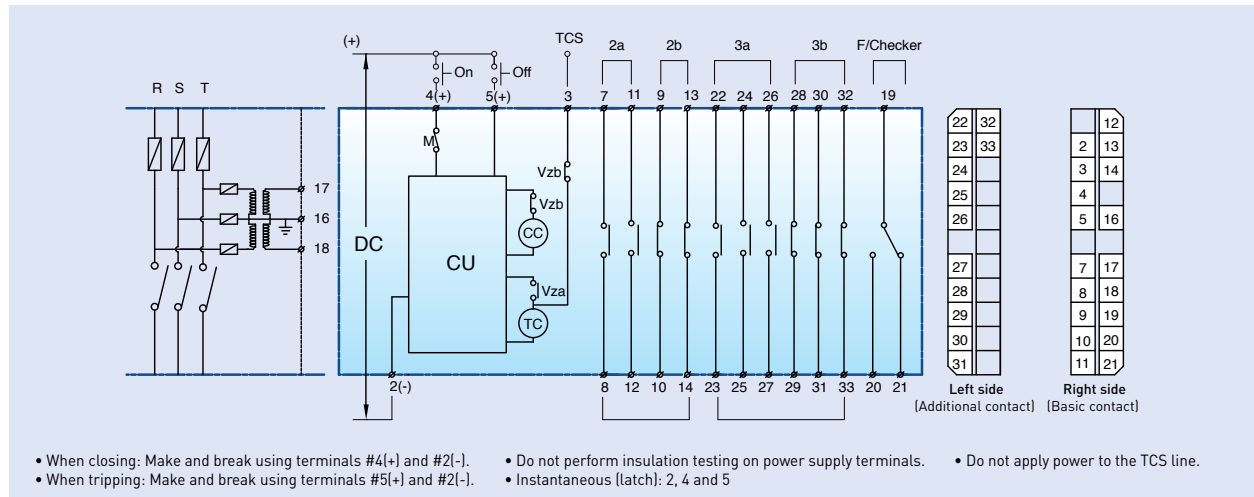
Apply power to terminals #1 and #2.
When closing: Make and break using #3 and #4 terminal contacts.
When tripping: Make and break using #5 and #15 terminal contacts.

Do not perform insulation testing on power supply terminals.
Instantaneous CTD: 1, 2, 3, 4, 5 and 15
Do not apply power to the TCS line.

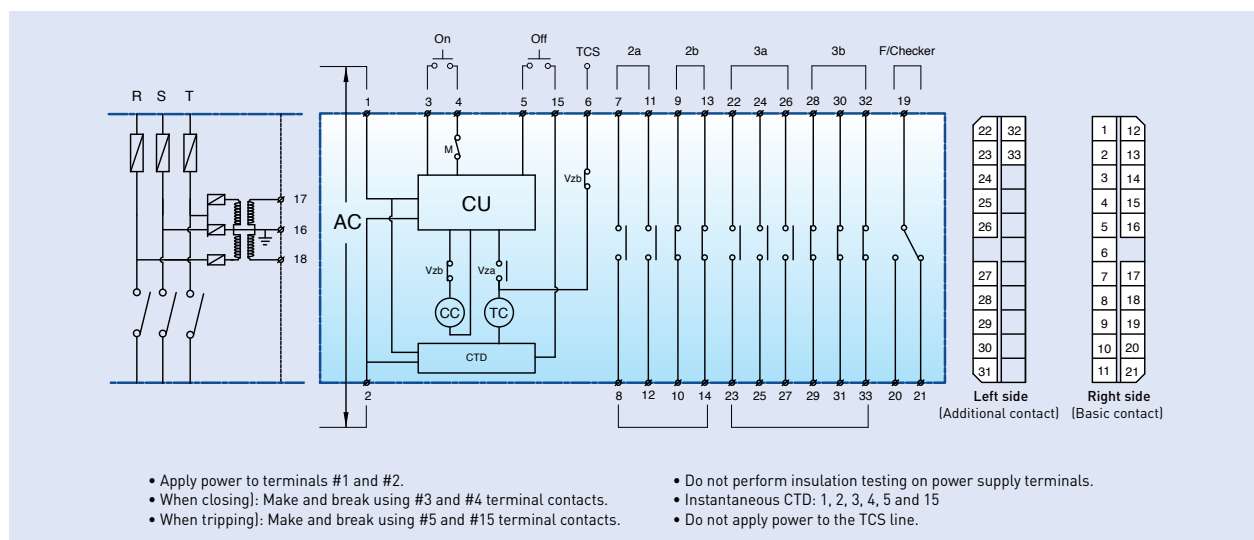
Continuous excitation(DC/AC 110~220V): Lever type



Latch type(DC 110~220V): Lever type

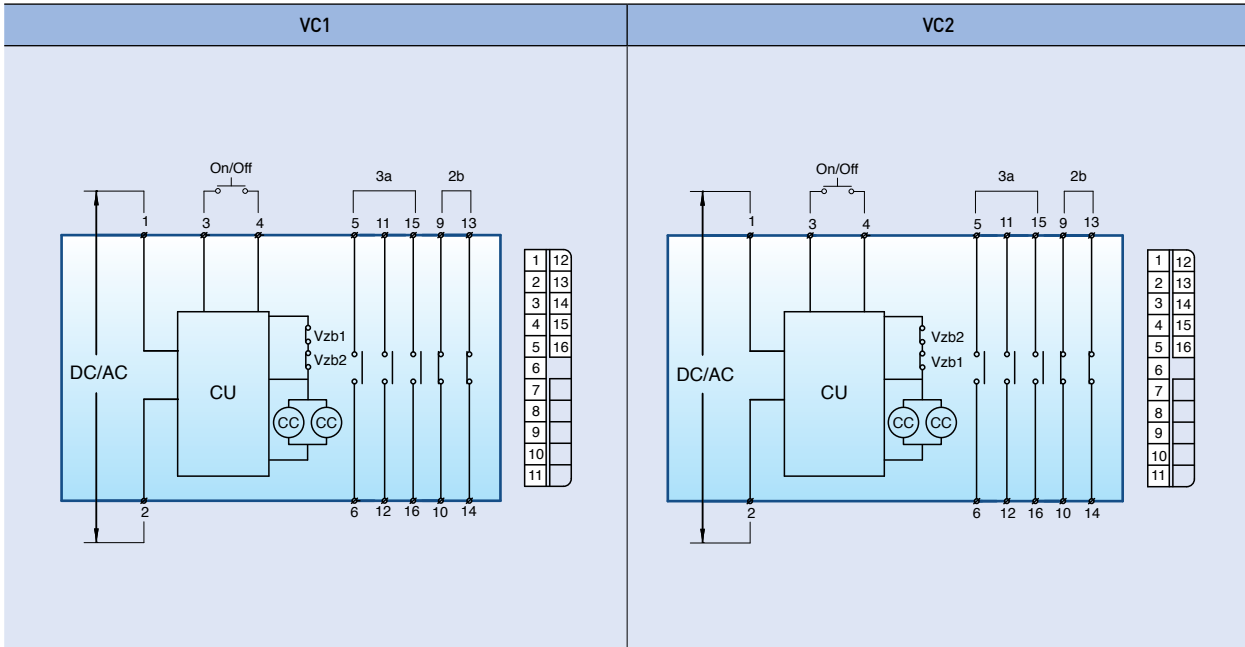


Latch type CTD(AC 110~220V): (Only for 3.6/7.2kV models)

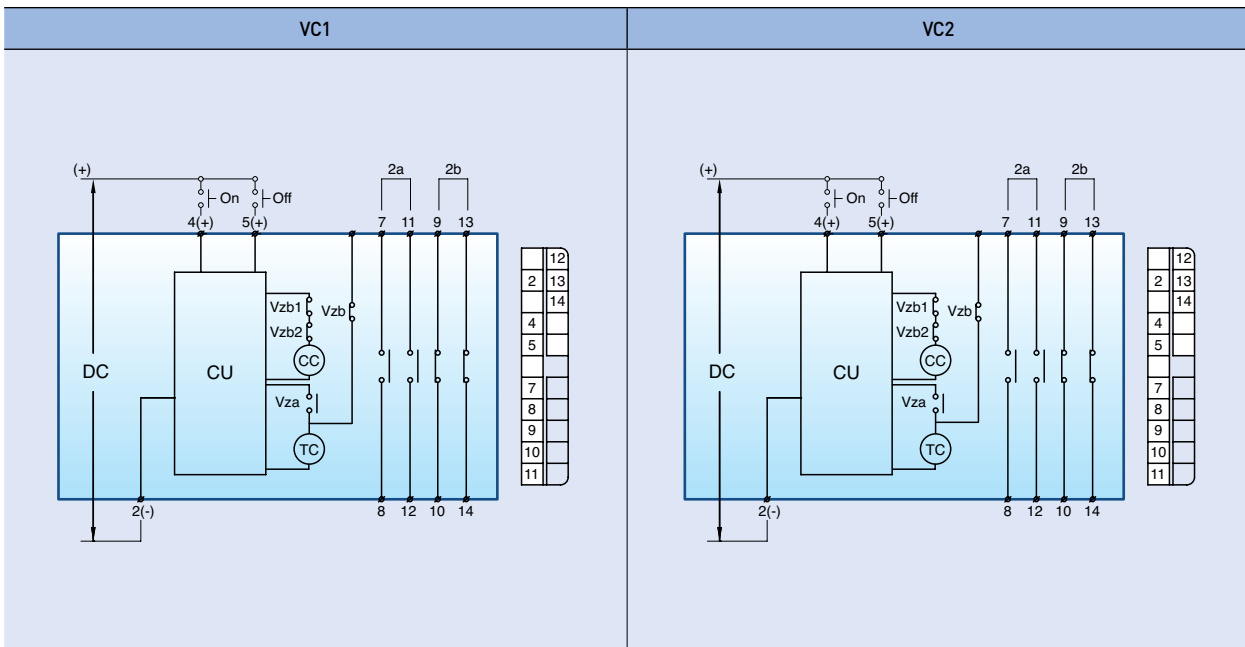


Control circuit diagram(3.6/7.2kV Mechanical interlock type)

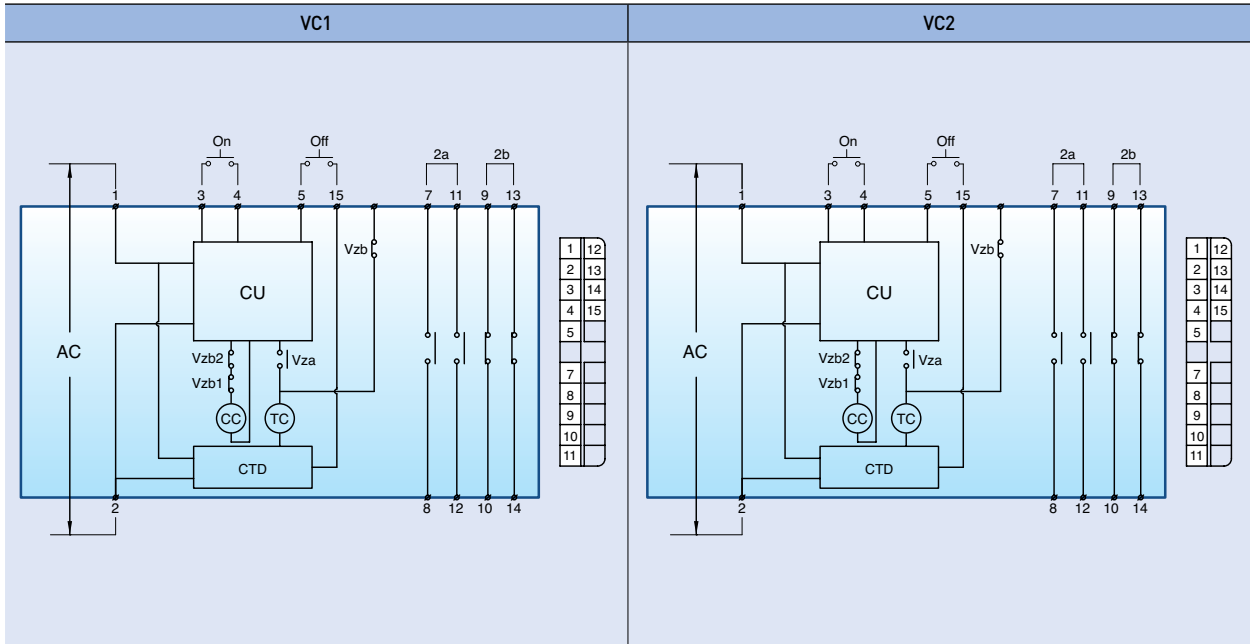
Continuous excitation(DC/AC 110~220V) : Fixed type



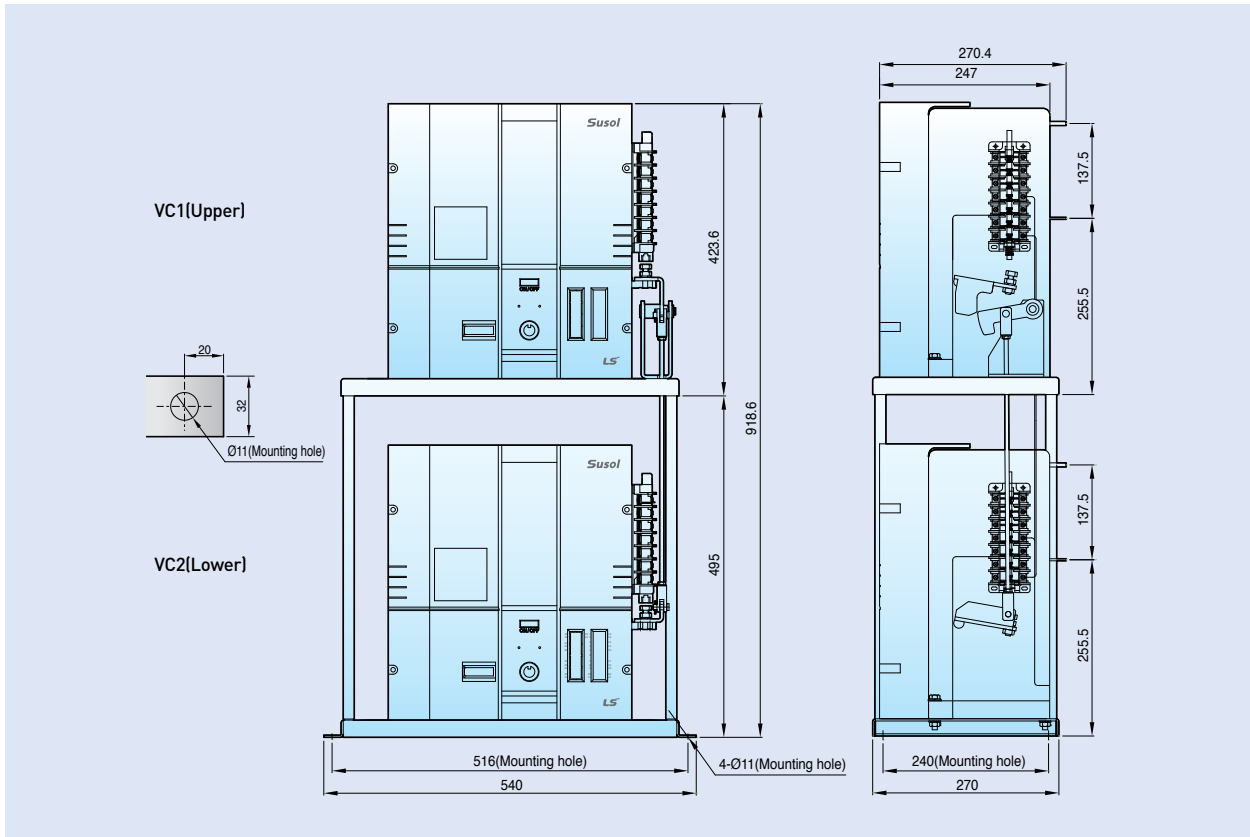
Latch type(DC 110~220V) : Fixed type



Latch type CTD(AC 110~220V) : Fixed type



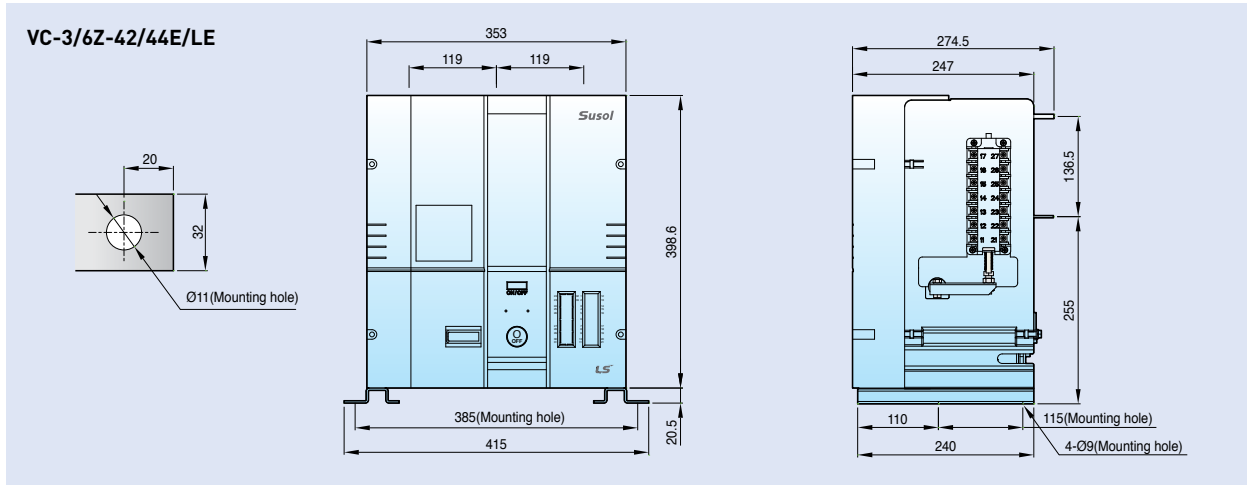
Outside drawing on mechanical interlock type



3.6/7.2kV body – dimensions

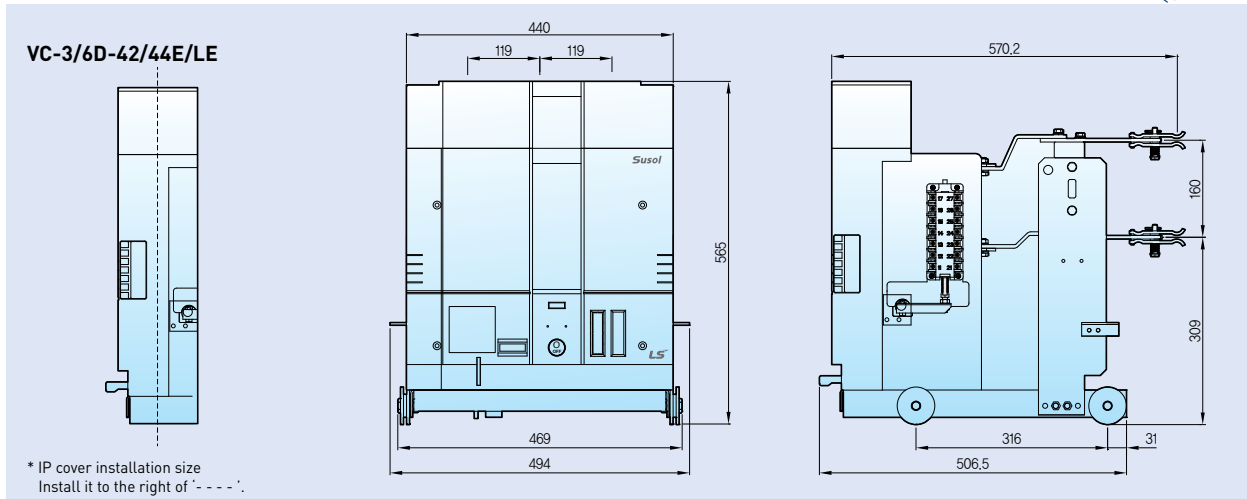
Fixed type

(Unit: mm)



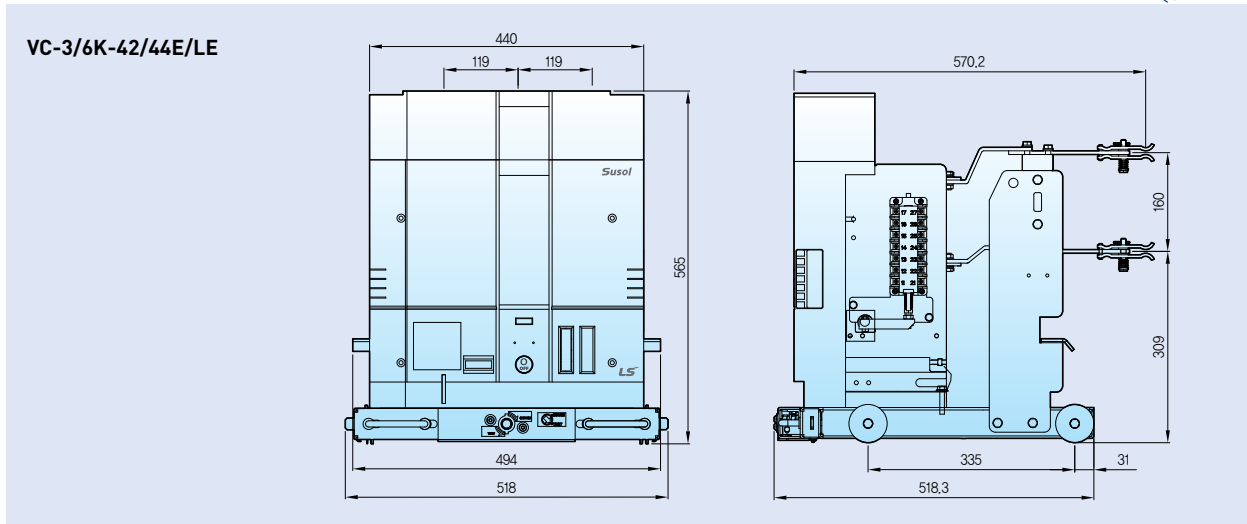
Non-fuse lever type

(Unit: mm)



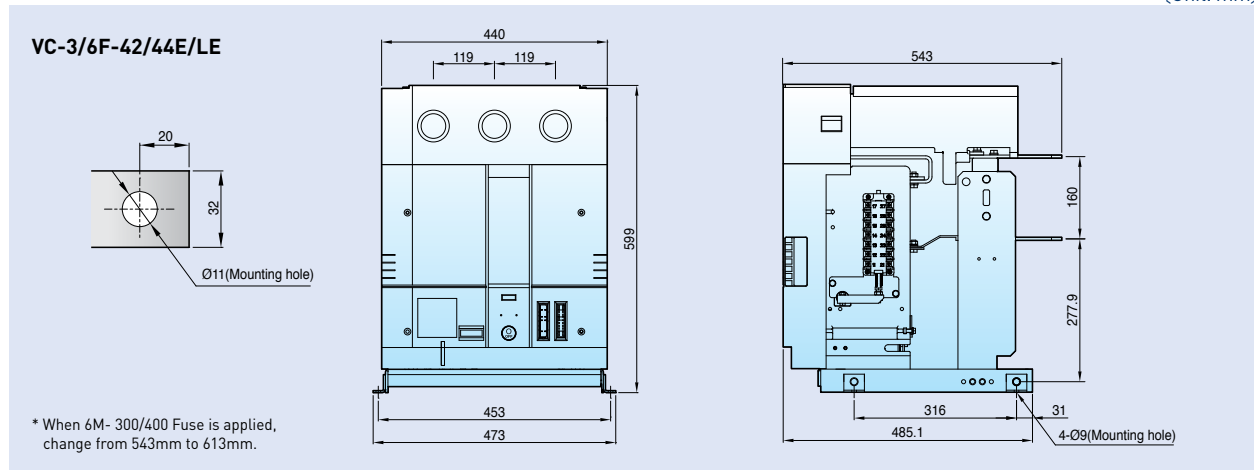
Non-fuse screw type

(Unit: mm)



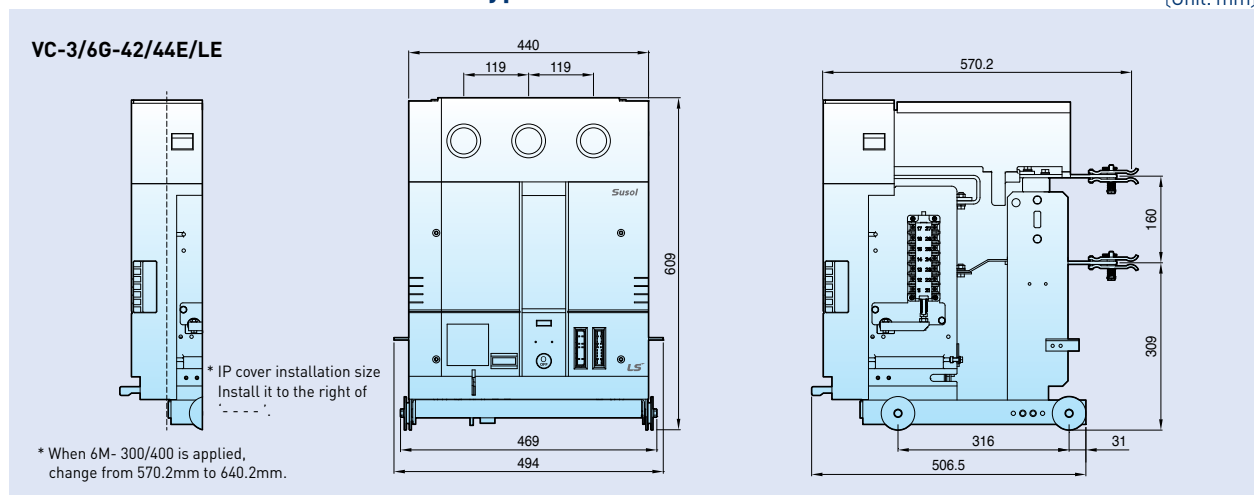
Fuse-combined (combination) fixed type

(Unit: mm)



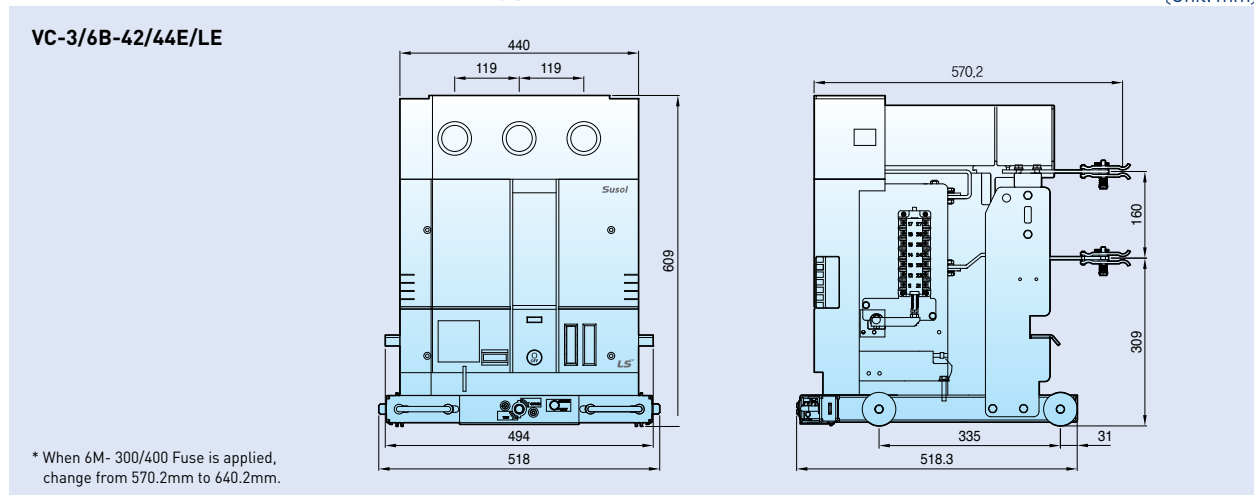
Fuse-combined (combination) lever type

(Unit: mm)



Fuse-combined (combination) screw type

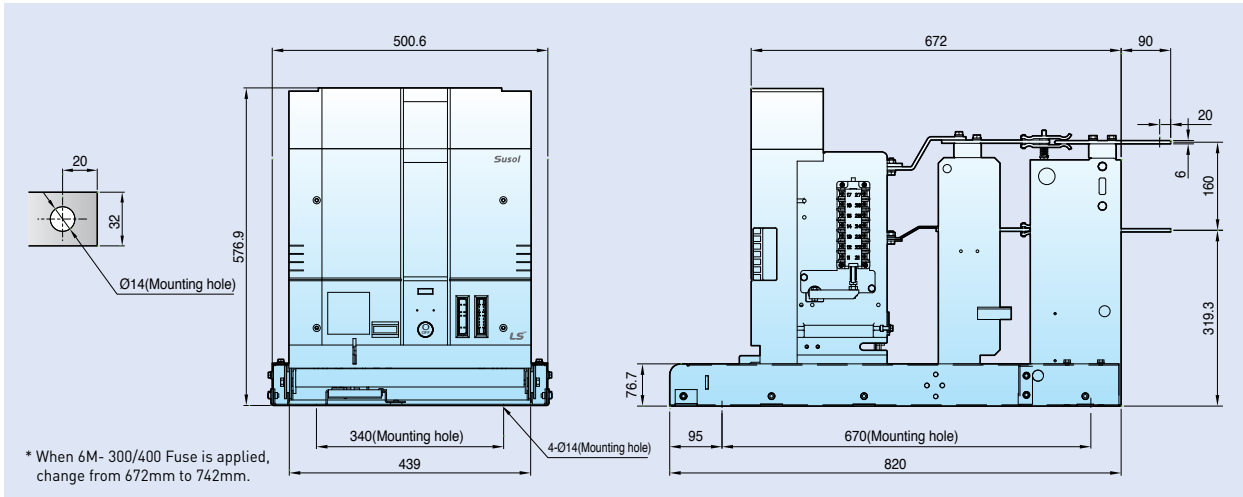
(Unit: mm)



3.6/7.2kV cradle – dimensions

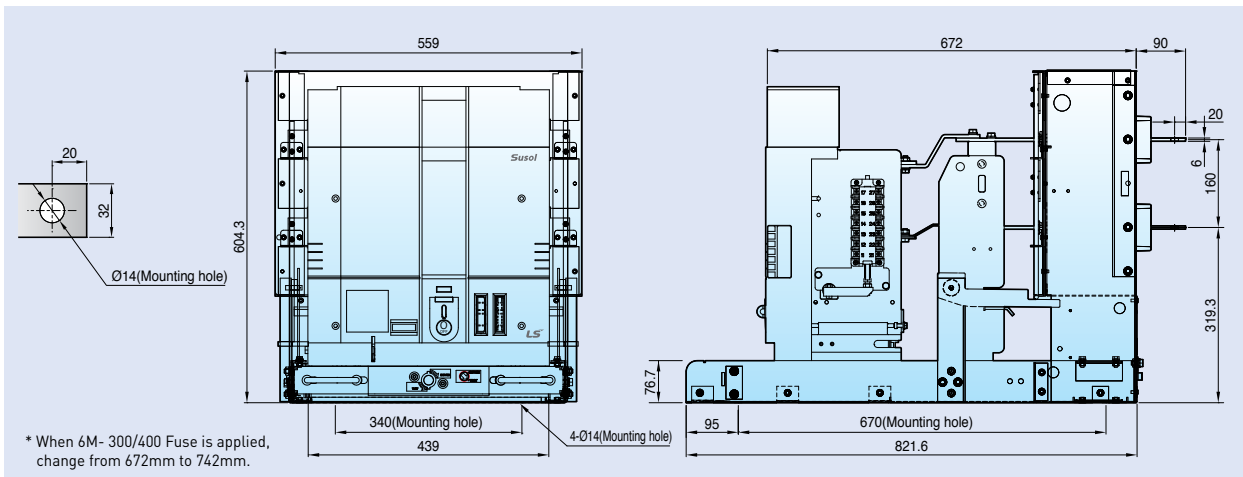
E-class cradle type (Non-fuse lever type)

(Unit: mm)



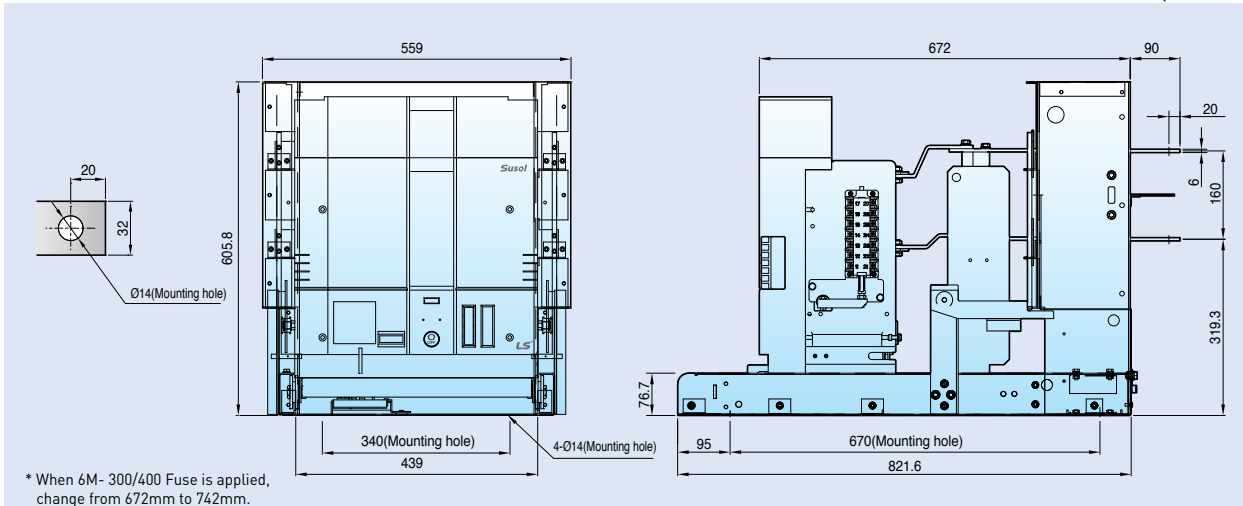
B-class cradle type (Non-fuse screw type)

(Unit: mm)



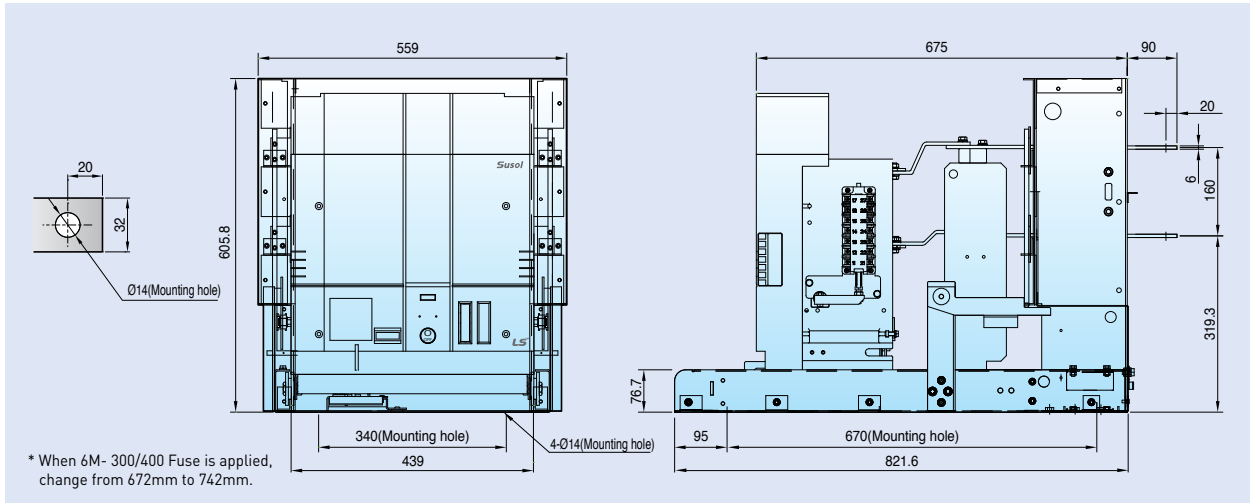
F-class cradle type (Non-fuse lever type)

(Unit: mm)



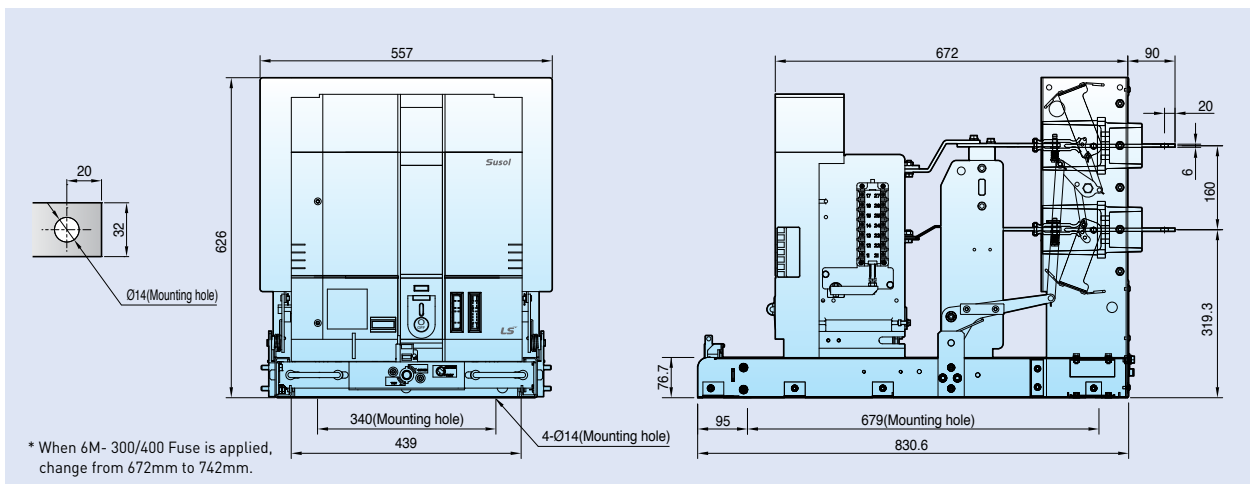
G-class cradle type (Non-fuse lever type)

(Unit: mm)



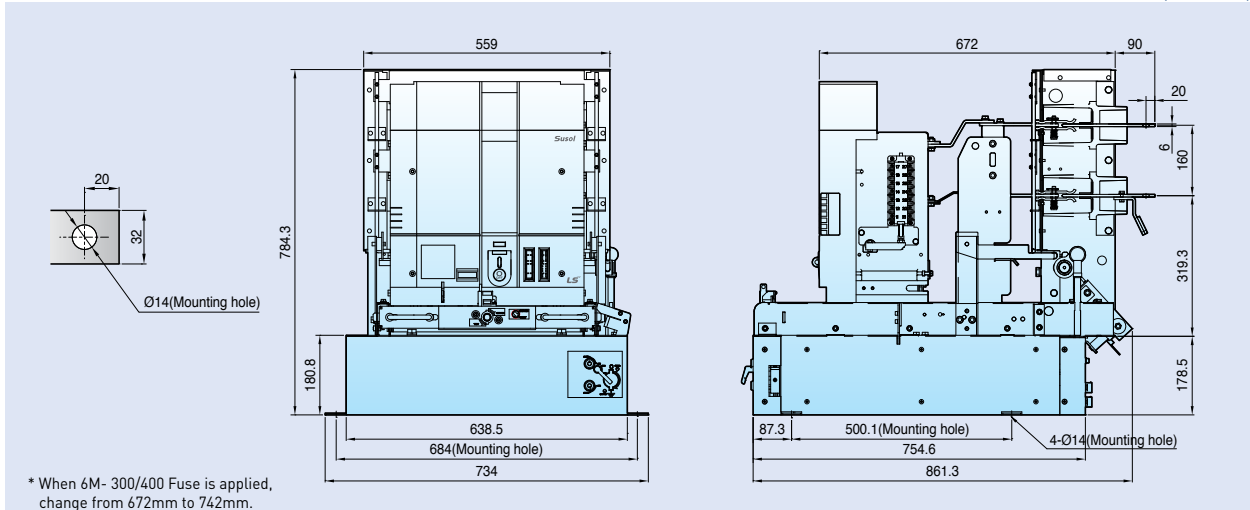
M-class cradle type (Non-fuse screw type)

(Unit: mm)



H-class cradle type (Non-fuse screw type)

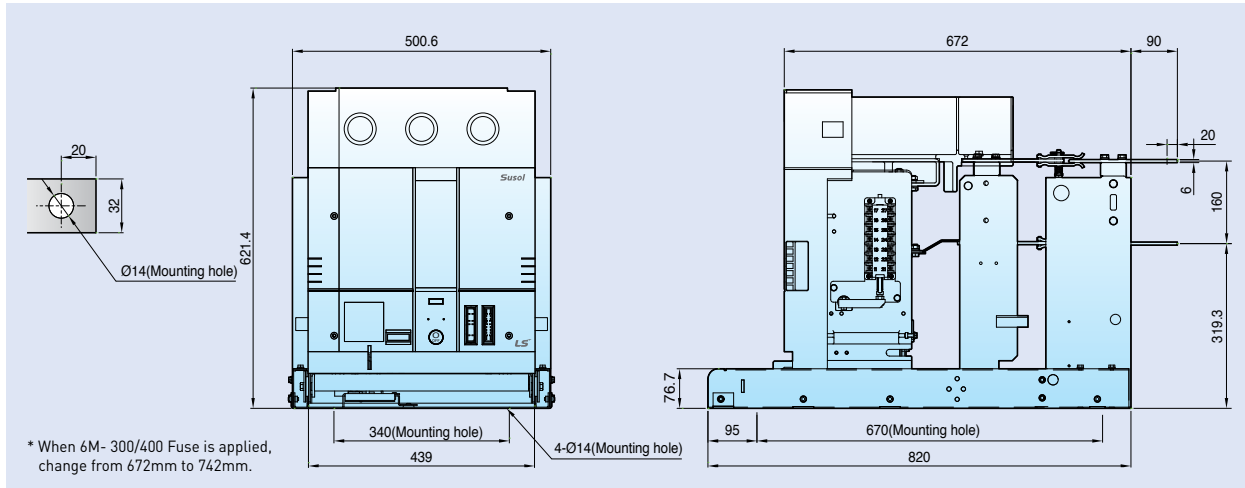
(Unit: mm)



3.6/7.2kV cradle – dimensions

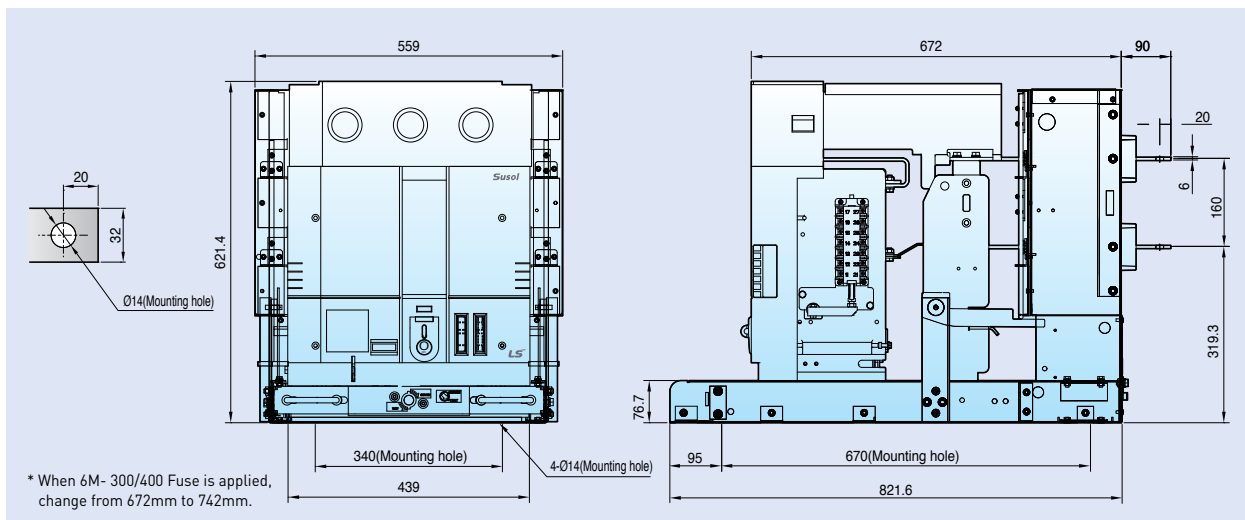
E-class cradle type (combination lever type)

(Unit: mm)



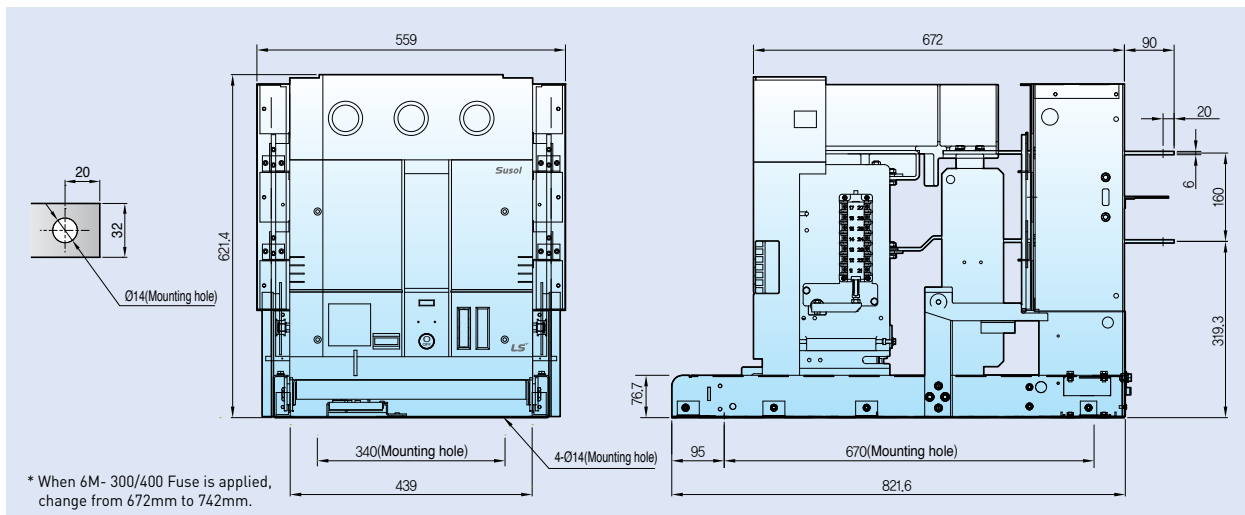
B-class cradle type (combination screw type)

(Unit: mm)



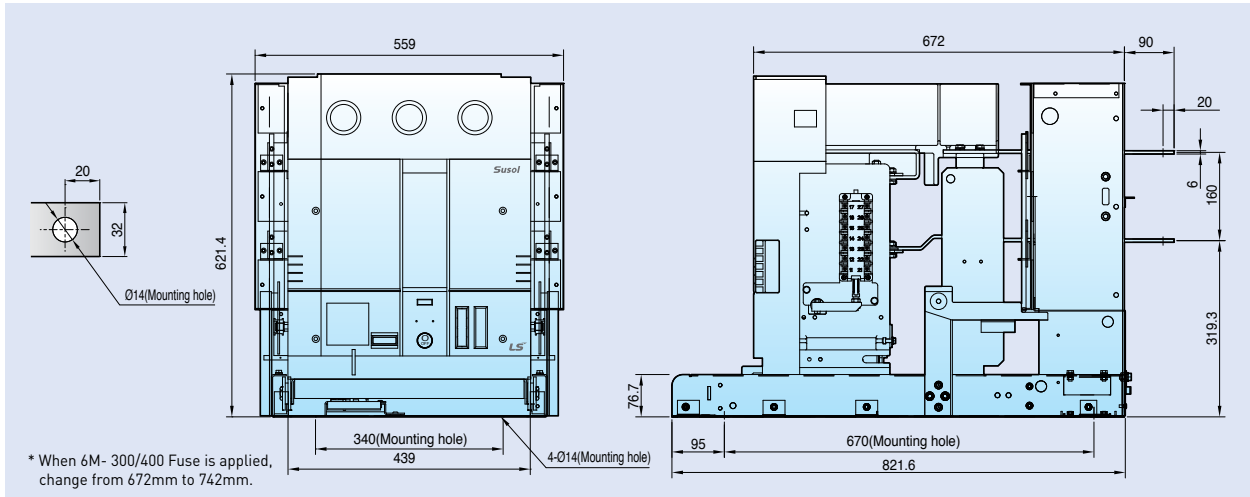
F-class cradle type (combination lever type)

(Unit: mm)



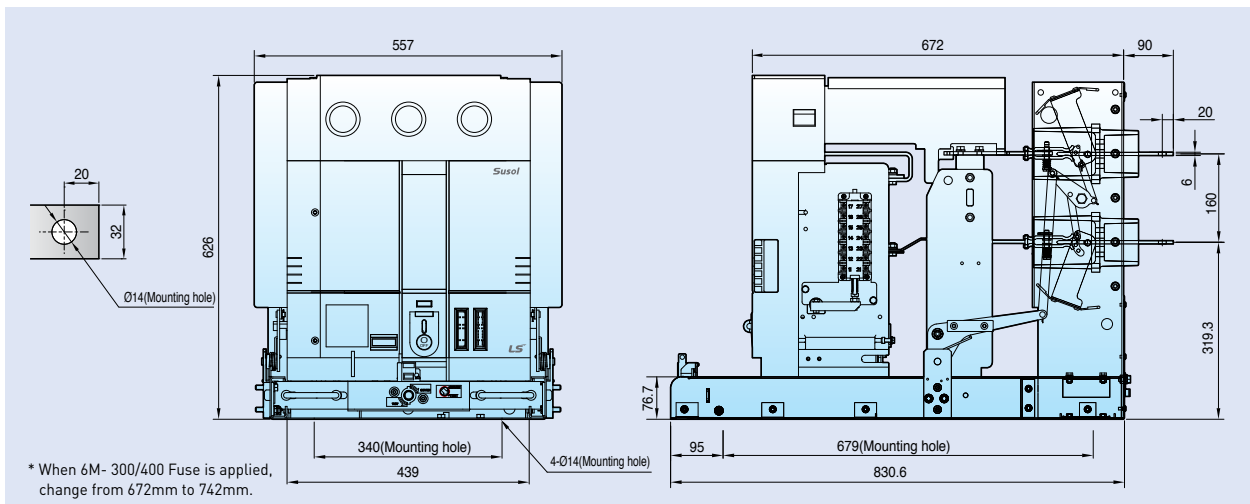
G-class cradle type (combination lever type)

(Unit: mm)



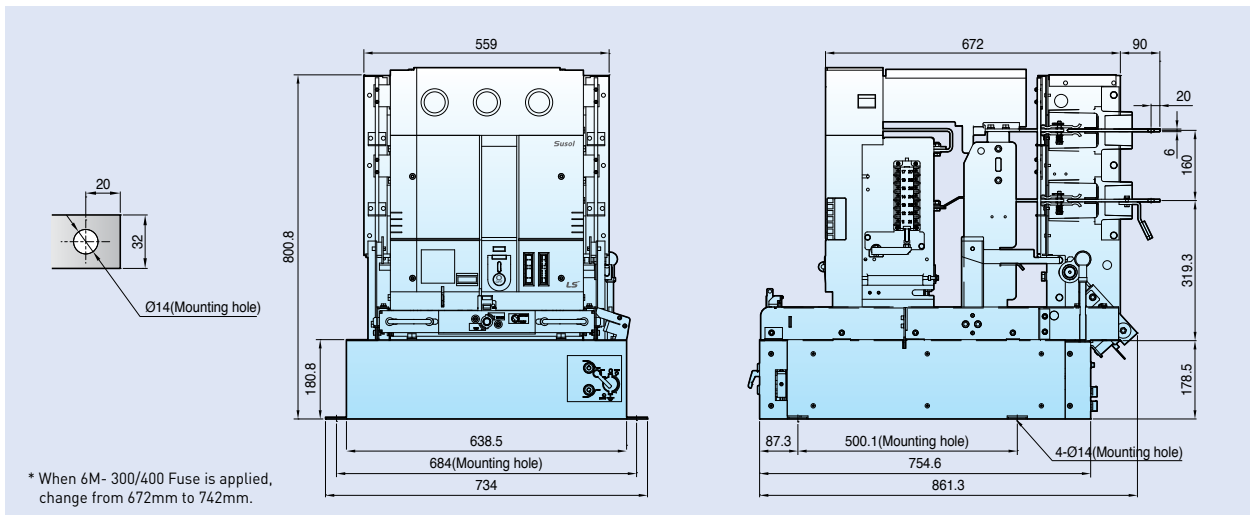
M-class cradle type (combination screw type)

(Unit: mm)



H-class cradle type (combination screw type)

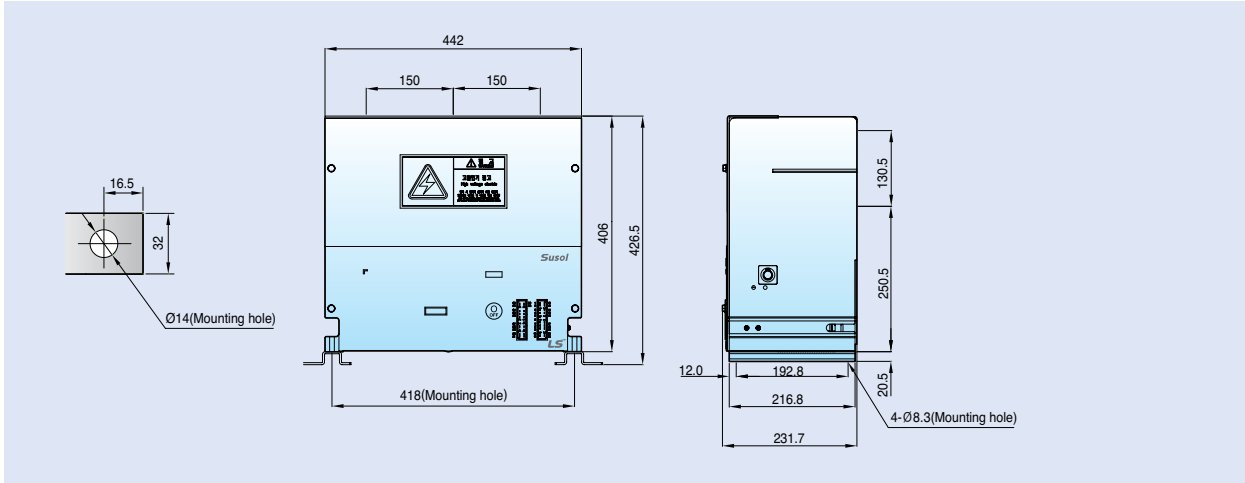
(Unit: mm)



Susol Vacuum Contactor
12kV body – dimensions

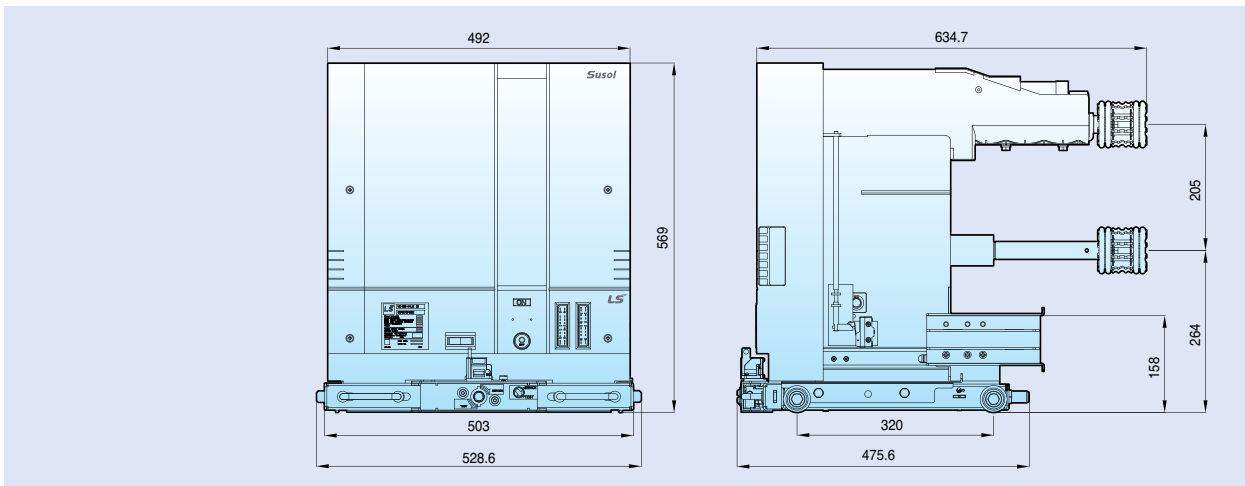
Fixed type

(Unit: mm)



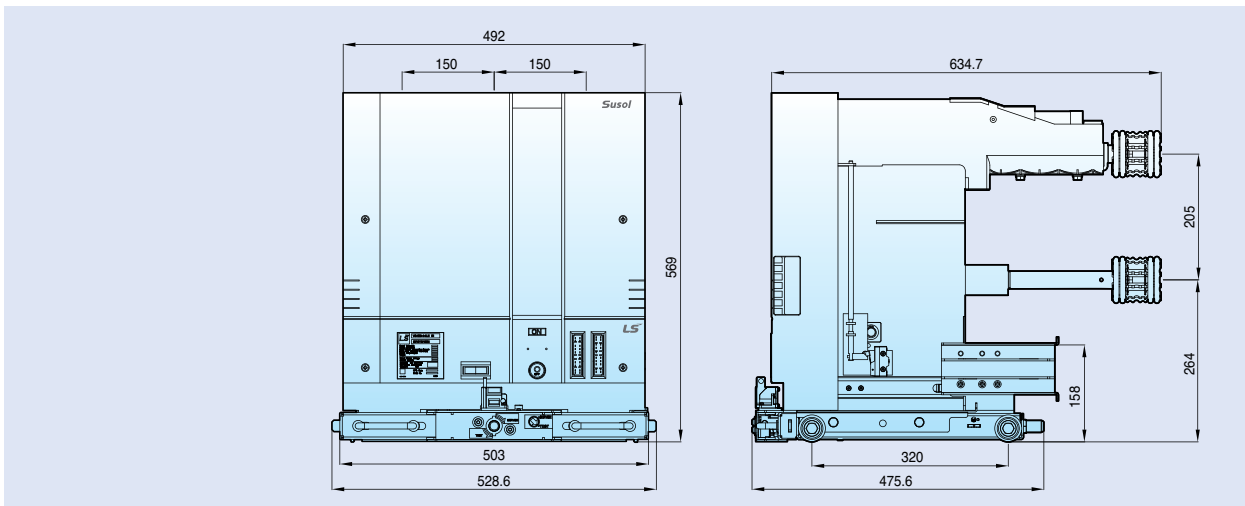
Non-fuse screw type

(Unit: mm)



Fuse-combined (combination) screw type

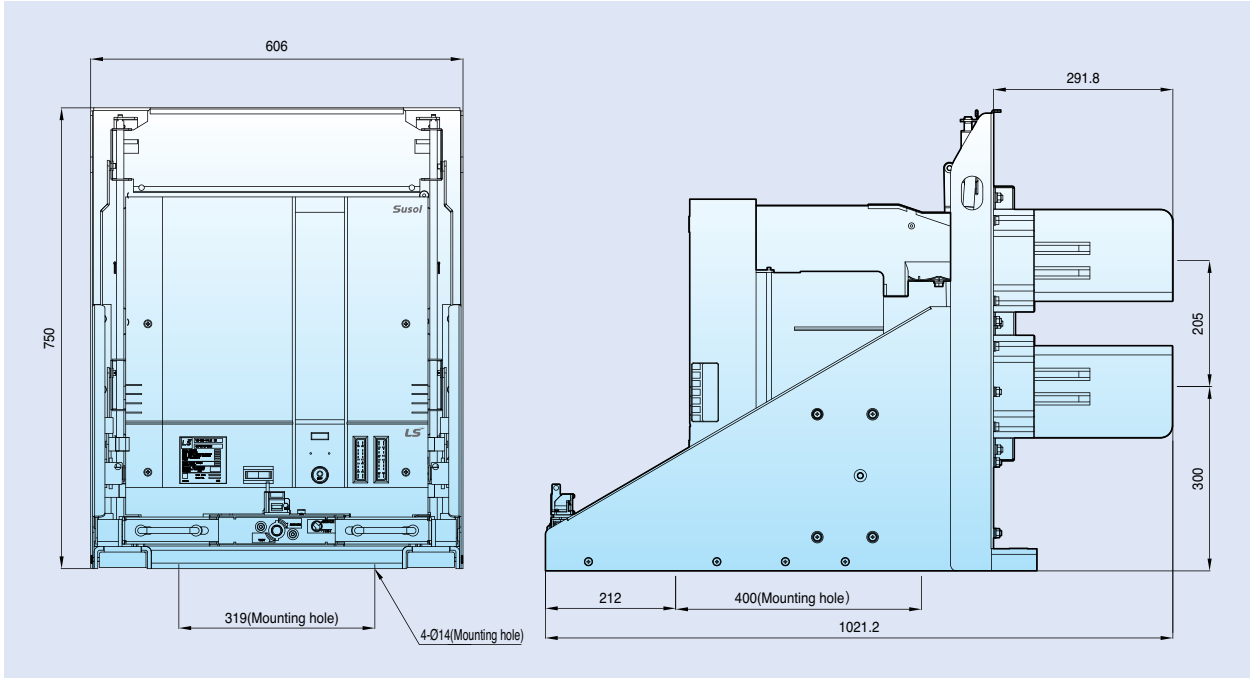
(Unit: mm)



12kV cradle - dimensions

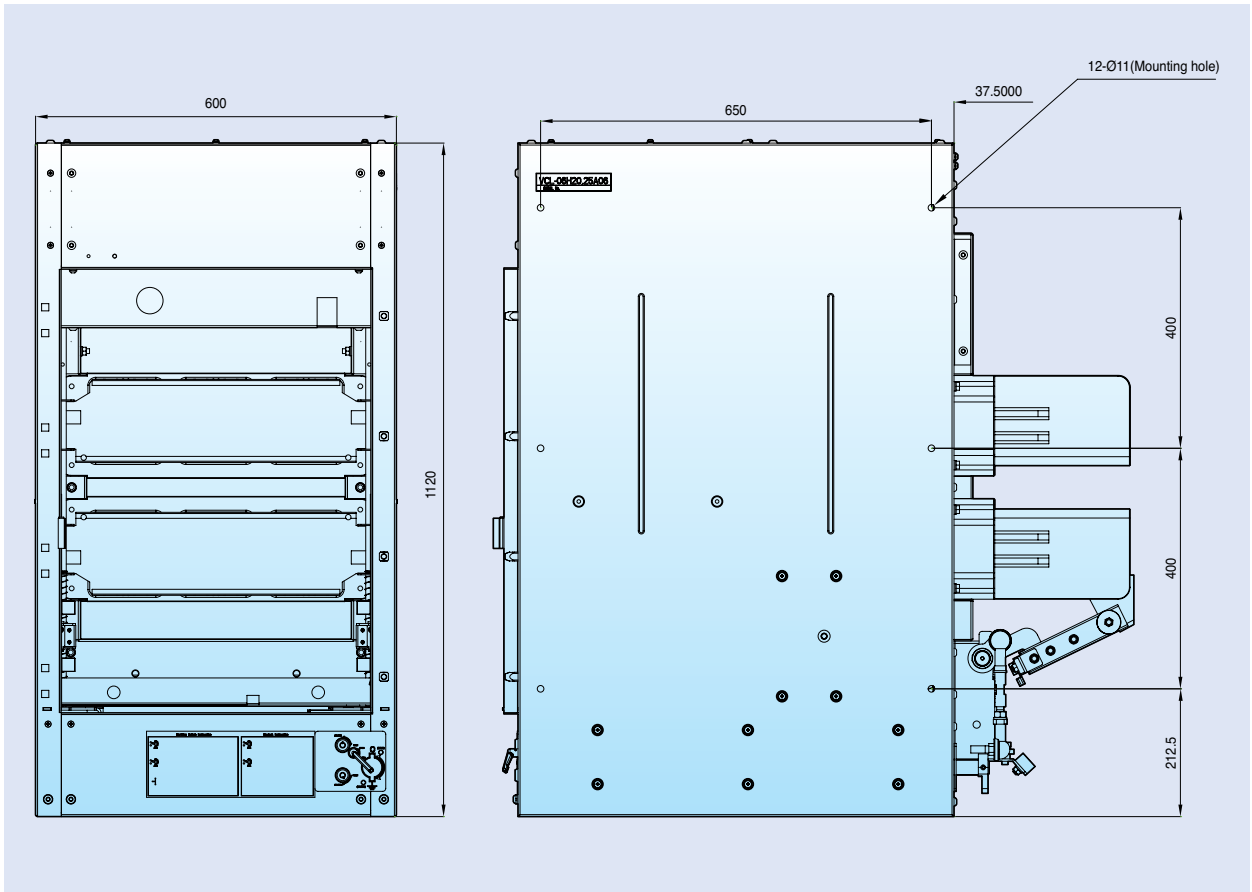
M-class cradle type (combination screw type)

(Unit: mm)



H-class cradle type - VCB H-class cradle

(Unit: mm)



Rated current calibration based on the ambient temperature

When the ambient temperature exceeds the normal setting temperature, the equation below may be used to estimate the applicable current value.

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

I_a : Allowable, constant transport current at the actual ambient temperature θ_a

I_r : Rated current at the ambient temperature 40°C

Θ_{max} : Total temperature at the available hottest spot

Θ_a : Ambient temperature expected at -30°C and 60°C

Θ_r : Allowable temperature at the hottest spot from rated current

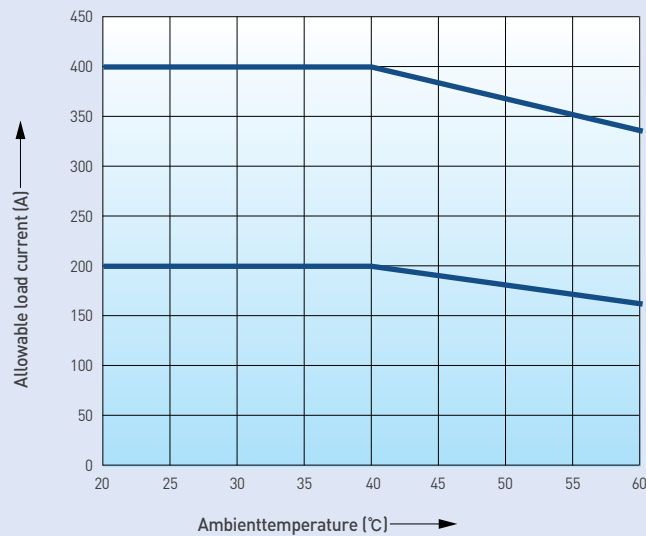
Ex) Estimating the load current that may be applied at the contactor (rated current: 400A)'s ambient temperature 55°C

$$I_a = 400 \times ((105 - 55) / 65)^{1/2} = 400 \times 0.87 = 351A$$

Applicable load current according to changes in the ambient temperature

Rated current (A)	Ambient temperature (°C)								
	20	25	30	35	40	45	50	55	60
400	400	400	400	400	400	384	368	351	333
200	200	200	200	200	200	192	184	175	166

Applicable load current according to changes in the ambient temperature



Current limiting power fuse (PF)

LS Current Limiting PF is used to protect circuits and electric power systems from fault current. It is used to protect condenser circuits, motor circuits, transformers and cables.

* LSIS Current limiting PF applied for 3.6/7.2kV models is KS-certified.

Precautions for use

- PF should be used for short-circuit protection.
- PF cannot be re-closed after it operates.
- Establish an appropriate level of rated current so that transient current does not operate or degrade the PF.
- The PF operating characteristics are fixed, so the most suitable PF should be chosen considering its use and circuit characteristics.
- Protection coordination with other devices should be established for protection at the minimum breaking current or below.
- All phases should be replaced when fused.

Selection by power fuse usage

1. PF for transformer

- Select PF with the appropriate level of rated current considering the PF deterioration caused by the transformer's allowable overload.
- Make sure that the transformer's magnetizing inrush current-time is within the PF's permissible time-current characteristics. Rated current of PF for transformer \geq Transformer's rated current
- For collective protection of two or more transformers:
- After setting the maximum rated current for each phase, PF with the maximum rated current is applied to all 3 phases.
- Secondary short-circuit of transformer
PF's minimum breaking current $<$ Current at the primary short-circuit
- PF for potential transformer (PT)
- PF for PT is selected to prevent transformer breakdown, or for the primary short-circuit protection without considering the secondary short-circuit protection.
- Make sure that the operating characteristic of PF is below the over-current characteristic of protected devices and circuits.
- Make sure that it is smaller than the electromagnetic force based on PF's current limit and the short-circuit strength of circuits or devices based on operation 12t.

2. PF for Motor

- Select PF with an appropriate level of rated current considering the PF deterioration caused by the motor's starting current.
- Make sure that the starting current-time characteristic is within the PF's permissible time-current characteristics. (Rated current of PF for motor \geq Motor's full load current)
- The intersection point of the PF's permissible time-current characteristic and contactor's operating characteristic should be above the minimum breaking current of PF, and the intersection point of the PF's operating characteristic and contactor's minimum operating (contact parting) characteristic should be below the rated breaking current of contactor.
- Check protection coordination of PF-contactor.ad.

3. PF for Condenser

- Select PF with an appropriate rating considering the PF deterioration caused by the condenser's allowable overload.
- Make sure that the condenser's inrush current-time is within the PF's permissible time-current characteristic. Rated current of PF for condenser \geq Condenser's rated current
- When there is a shunt capacitor, the PF that is capable of enduring the inrush current from the capacitor upon closing should be chosen.

KS Certificate



Power Fuse for Transformer



Power Fuse for Motor



List of current limiting PFs

Selection criteria & precautions for use

Selection criteria on transformer protection

1. Inrush current that is 10 times the rating may be applied for 0.1 sec.
2. Current that is 1.5 times the transformer's rating may be continuously applied. Here, the *list shows current that is 1.3 times.
3. Breaking of the current that is 25 times of the transformer's rated current is possible within 2 seconds.

Selection criteria on motor protection

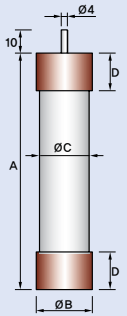
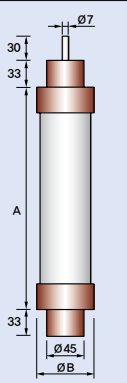
1. Starting current that is 5 times the rated current may be applied for 10 seconds.
2. A separate relay is needed for short-circuit protection in coordination with VC.

Selection criteria on condenser protection

1. Inrush current that is 71 times the rating may be applied for 0.002 sec.
2. Current that is 1.43 times the condenser's rating may be continuously applied.
3. A list of M-type PFs is applied when repeated breaking-making is 1,000 times or more.

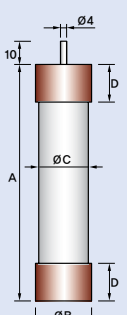
※ [] : The value in the parenthesis is for the 7.2kV model.

The conditions described above are based on the KS standard, and may change according to load conditions.

G-type PF	Applied Model name	Rated voltage	Rated current	Rated breaking current	Minimum breaking current
		(kV)	(A)	(kV)	(A)
 <p>KS Size</p>	LFL - 3/6G - 5	3.6 (7.2)	5	40	5In
	LFL - 3/6G - 10		10		
	LFL - 3/6G - 20		20		
	LFL - 3/6G - 30		30		
	LFL - 3/6G - 40		40		
	LFL - 3/6G - 50		50		
	LFL - 3/6G - 60	63	40	5In	
	LFL - 3/6G - 75	75			
	LFL - 3/6G - 100	100			
	LFL - 3G - 150	150			
	LFL - 3G - 200	200			
	LFL - 3G - 300	300			
	LFL - 3G - 400	400	40	5In	
	LFL - 6G - 150	150			
	LFL - 6G - 200	200			
	LFL - 6G - 300	300			
LFL - 6G - 400	400	40	5In		
LFL - 6G - 400	400				
 <p>DIN Size</p>	LFL - 3/6G - 5B	3.6 (7.2)	5	40	4In
	LFL - 3/6G - 10B		10		
	LFL - 3/6G - 20B		20		
	LFL - 3/6G - 30B		30		
	LFL - 3/6G - 40B		40		
	LFL - 3/6G - 50B		50		
	LFL - 3/6G - 60B	63	40	4In	
	LFL - 3/6G - 75B	75			
	LFL - 3/6G - 100B	100			
	LFL - 3/6G - 125B	125			
	LFL - 3G - 160B	160			
	LFL - 3G - 200B	200			
	LFL - 6G - 160B	160	40	4In	
	LFL - 6G - 200B	200			

※ [] The number in the parenthesis is for the 7.2kV model.
G-type PFs may be applied for motor load, but M-type PFs are recommended for use.



M-type PF	Applied Model name	Rated voltage	Rated current	Rated breaking current	Minimum breaking current
		(kV)	(A)	(kV)	(A)
 <p>KS Size</p>	LFL - 3M - 20	3.6	20	40	7In
	LFL - 3M - 50		50		
	LFL - 3M - 100		100		
	LFL - 3M - 150		150		
	LFL - 3M - 200		200		
	LFL - 3M - 300		300		
	LFL - 3M - 400	400	7.2	40	7In
	LFL - 6M - 20	20			
	LFL - 6M - 50	50			
	LFL - 6M - 100	100			
	LFL - 6M - 150	150			
	LFL - 6M - 200	200			
	LFL - 6M - 300	300			
	LFL - 6M - 400	400			

	Transformer load (kVA)		Condenser load (kVA)	Dimensions (mm)				Applied holder
	Single-phase	Three-phase	Three-phase	A	B	C	D	
	- ※(5or under)	15or under ※(15or under)	- ※(-)	261	50	47	25	LFH-6G-D60
	10or under (15or under)	15or under (30or under)	10or under (25or under)					
	20or under (50or under)	30or under (75or under)	30or under (50or under)					
	30or under (75or under)	75or under (150or under)	50or under (100or under)					
	50or under (100or under)	100or under (200or under)	75or under (150or under)					
	75or under (150or under)	150or under (300or under)	100or under (200or under)					
	- (-)	- (-)	- (-)	311	60	57	30	LFH-6G-D1H
	150or under (200or under)	200or under (400or under)	200or under (400or under)					
	200or under (400or under)	375or under (750or under)	300or under (600or under)					
	300or under (-)	500or under (-)	400or under (-)	311	77	73	43	LFH-6G-D2H
	400or under (-)	750or under (-)	600or under (-)					
	625or under (-)	1,000or under (-)	1,000or under (-)					
	750or under (-)	1,500or under (-)	- (-)	350	110	108	55	LFH-6G-D4H
	- (500or under)	- (1,000or under)	- (800or under)					
	- (750or under)	- (1,500or under)	- (1,200or under)					
	- (1,250or under)	- (2,000or under)	- (-)	195	55	-	-	LFH-6G-D1HB
	- (-)	- (2,500or under)	- (-)					
	4 ~ 8 ※(8 ~ 16)	6.7 ~ 14 ※(13 ~ 28)	9.8or under ※(9.8or under)	192	77	-	-	LFH-6G-D1HB
	6 ~ 13(13 ~ 25)	11 ~ 22(21 ~ 44)	9.8 ~ 12(19 ~ 24)					
	15 ~ 31(30 ~ 62)	25 ~ 53(51 ~ 107)	12 ~ 31(24 ~ 61)					
	21 ~ 42(40 ~ 84)	35 ~ 73(70 ~ 145)	31 ~ 46(61 ~ 92)					
	40 ~ 82(80 ~ 165)	69 ~ 143(137 ~ 286)	46 ~ 64(92 ~ 128)					
	49 ~ 102(98 ~ 204)	85 ~ 117(170 ~ 354)	64 ~ 81(128 ~ 163)					
	66 ~ 137(132 ~ 275)	114 ~ 238(229 ~ 476)	181 ~ 105(163 ~ 210)					
	68 ~ 165(134 ~ 330)	117 ~ 285(233 ~ 571)	105 ~ 150(210 ~ 300)					
	128 ~ 220(256 ~ 440)	222 ~ 381(443 ~ 762)	150 ~ 222(300 ~ 445)	292	77	-	-	LFH-6G-D2HB
	151 ~ 275(302 ~ 550)	261 ~ 476(522 ~ 952)	222 ~ 275(445 ~ 550)					
	211 ~ 352(-)	365 ~ 610(-)	275 ~ 370(-)					
	265 ~ 440(-)	495 ~ 762(-)	370 ~ 550(-)					
	- (425 ~ 704)	- (735 ~ 1,220)	- (550 ~ 742)					
	- (437 ~ 880)	- *(755 ~ 1,520)	- (742 ~ 1,000)					

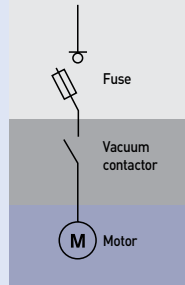
	Motor load(kW)	Condenser load (kVA)	Dimensions (mm)				Applied holder
	Three-phase	Three-phase	A	B	C	D	
	37 ~ 75	50or under	200	60	58	30	LFH-3M-100
	90 ~ 200	150or under					
	220 ~ 400	300or under					
	450 ~ 630	400or under	200	77	73	43	LFH-3M-200
	710 ~ 800	800or under					
	900 ~ 1,250	1,000or under	250	87	84	50	LFH-3M-400
	1,500	-					
	75 ~ 160	100or under	311	60	58	30	LFH-6M-50
	185 ~ 400	300or under					
	450 ~ 800	600or under					
	900 ~ 1,250	800or under	350	77	73	43	LFH-6M-200
	1,500	-					
	2,500	-	450	87	84	50	LFH-6M-400
	3,000	-					

Current-time relation of PF for motor protection

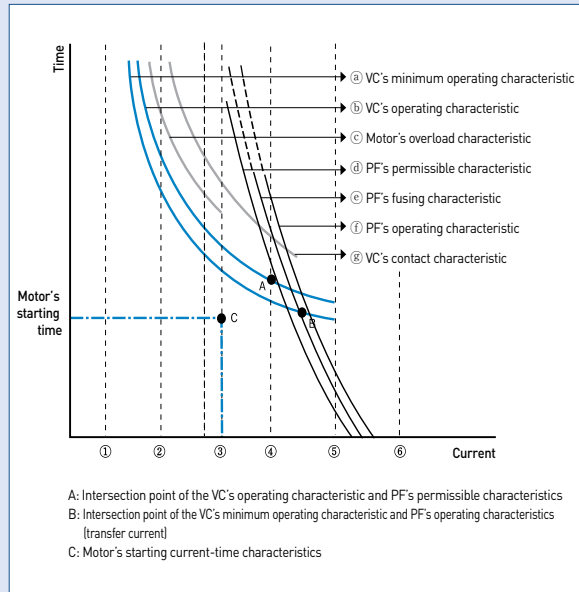
- Motor's full load current (①) ≤ PF's rated current (②)
- The operating characteristic of VC (⑥) should be under (on the left) the motor's load characteristic (③).
- The 'A' point should be on the right side of the PF's minimum breaking current (④) and the 'B' point should be on the left side of the VC's rated breaking current (⑤).

Note)

The current range larger than the 'B' point is protected by PF.



- ① Motor's full load current
- ② PF's rated current
- ③ Motor's starting current
- ④ PF's minimum breaking current
- ⑤ VC's rated breaking current
- ⑥ Short-circuit current



Current-time relation of the PF for transformer protection

When the secondary protective devices are not taken into consideration

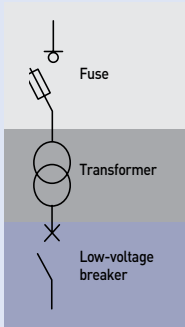
- The transformer's allowable overload current (③) should be on the left side of the PF's permissible time-current characteristic (⑥); the transformer's full load current (①) ≤ PF's rated current (④)
- The 'C' point should be on the left side of the PF's permissible time-current characteristic.
- Secondary short-circuit current (⑧) > PF's minimum breaking current (⑥)

When a breaker is used for the secondary short-circuit protection

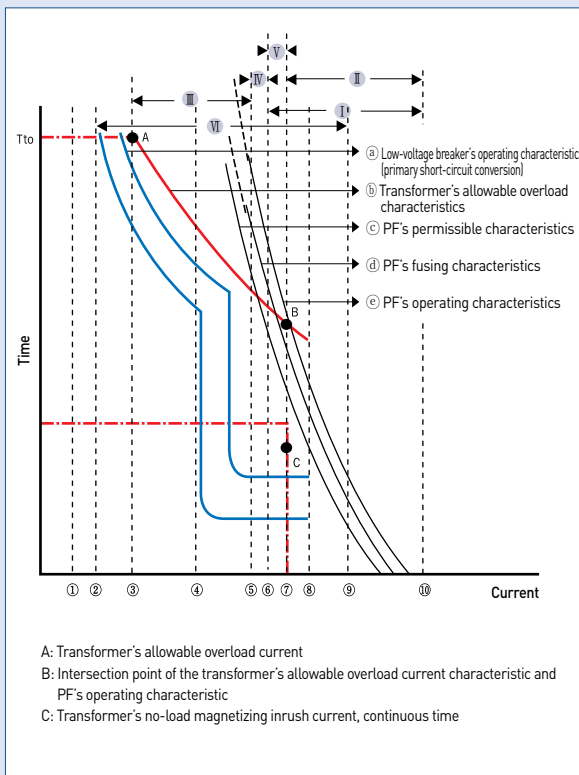
- It should satisfy the conditions specified in clause 1
- The operating characteristics of a breaker for the secondary short-circuit protection (Ⓐ) should be on the left side (under) of the transformer's allowable overload current characteristic (Ⓒ) at the current that is smaller than the 'B' point.
- The operating characteristic of a low-voltage breaker(Ⓐ) should be on the left side (under) of the PF's permissible time-current characteristic(Ⓒ) at the current that is smaller than the secondary short-circuit current (Ⓒ).

※ Protecting relationship in a drawing

- I range: PF protects the power system from short circuits.
 - II range: PF protects the transformer.
 - III range: PF does not operate.
 - IV range: Fusing occurs, but breaking is not guaranteed.
 - V range: Breaking is guaranteed, but the transformer is not protected.
 - III+IV+V: Transformer is not protected.
- [Backup measure: A breaker is used for coordination of the secondary short-circuit protection.]

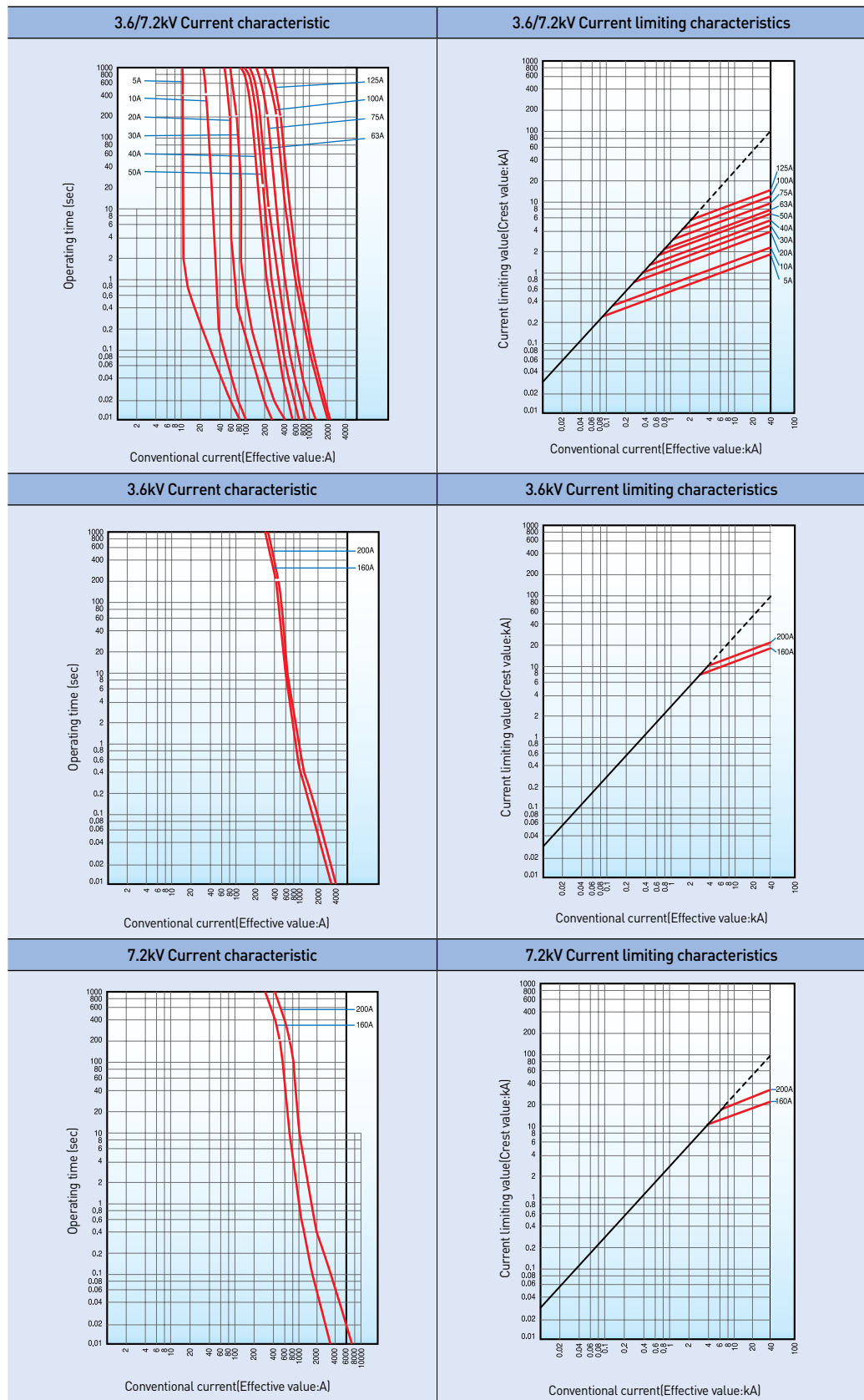


- ① Transformer's full load current
- ② Low-voltage breaker's minimum breaking current
- ③ Transformer's allowable overload current
- ④ PF's rated current
- ⑤ PF's minimum fusing current
- ⑥ PF's minimum breaking current
- ⑦ Transformer's no-load magnetizing inrush current
- ⑧ Secondary short-circuit current
- ⑨ Low-voltage breaker's rated breaking current
- ⑩ Primary short-circuit current



Characteristic curve

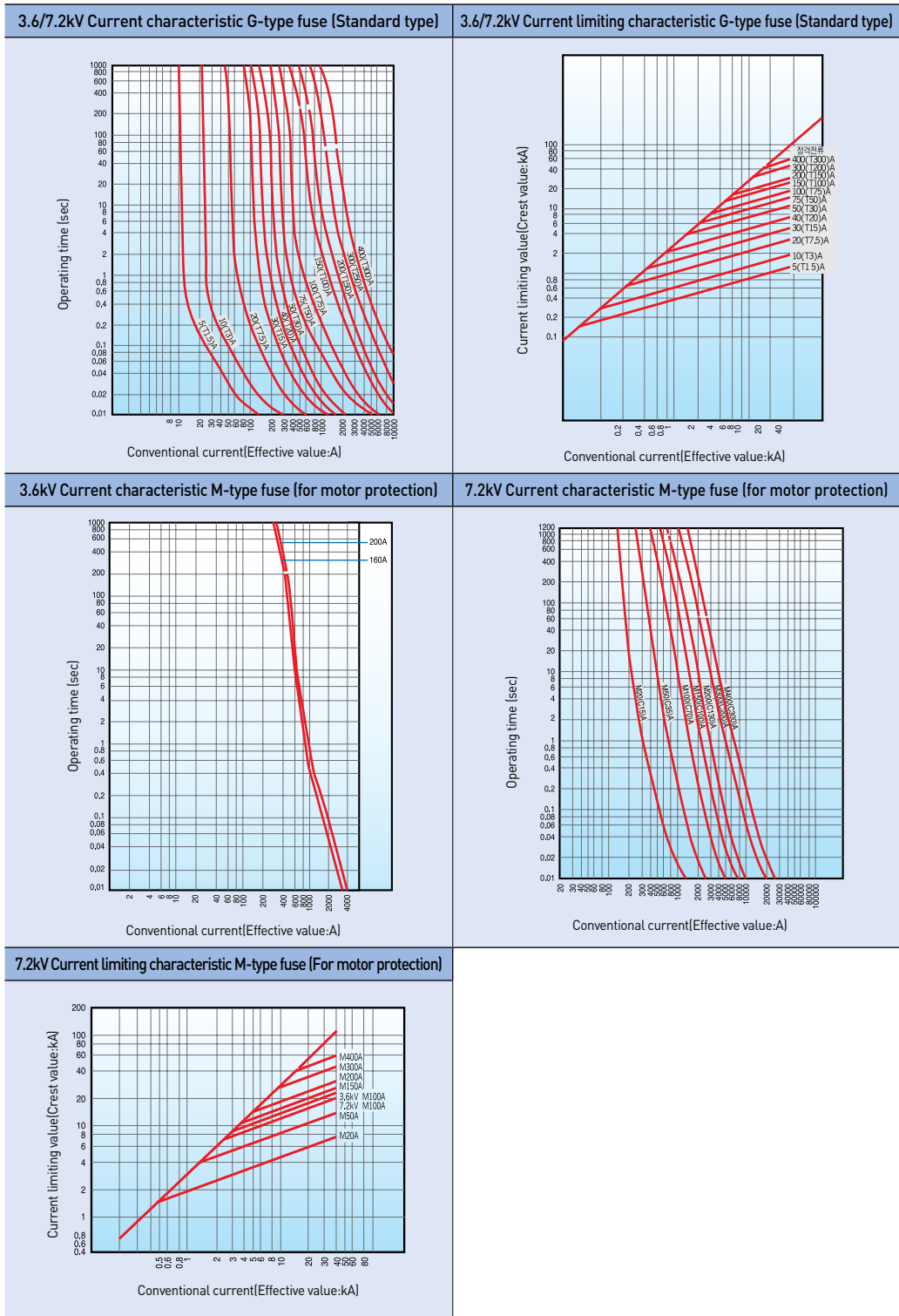
Din type



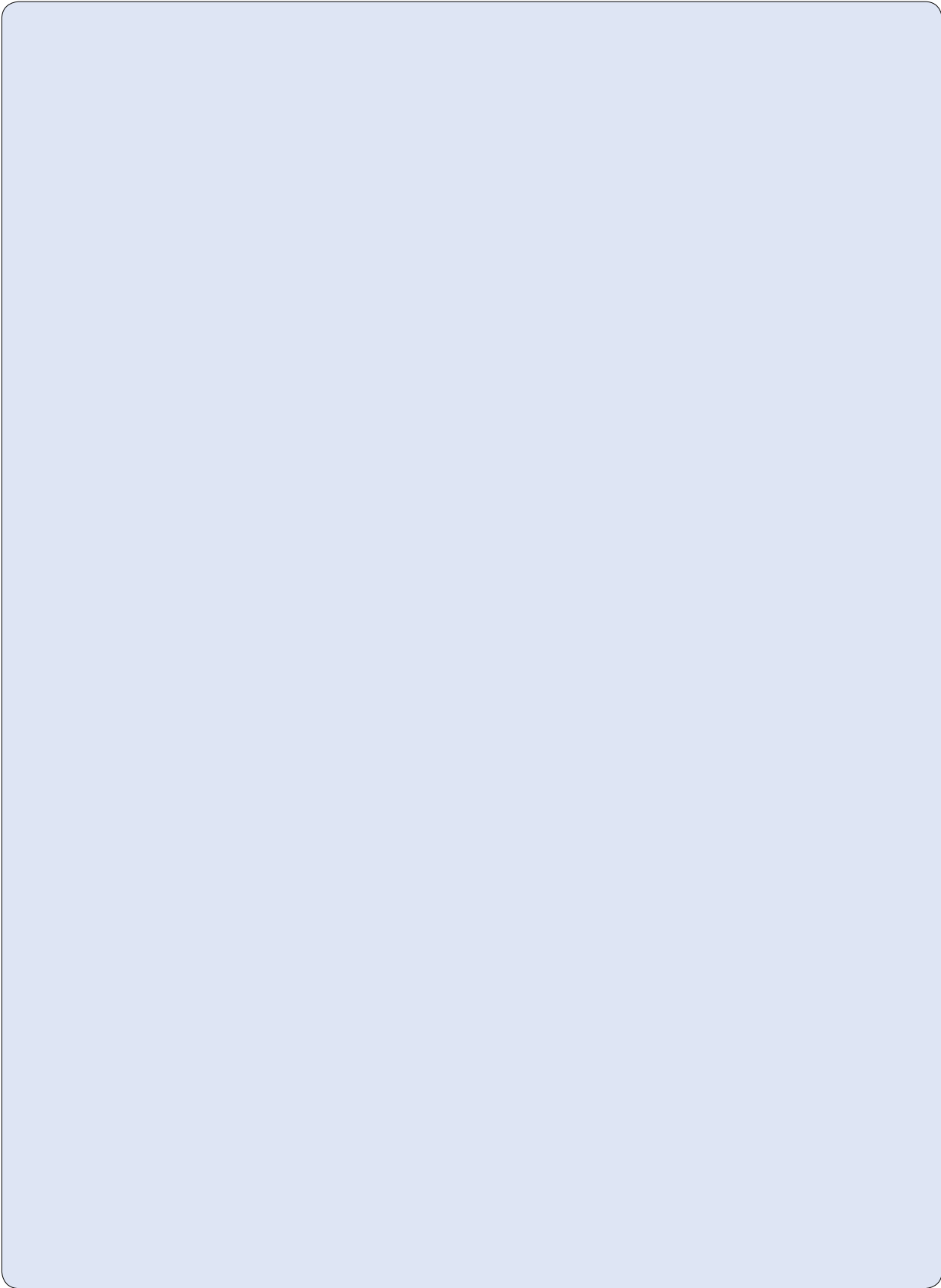
Susol Vacuum Contactor

Characteristic curve

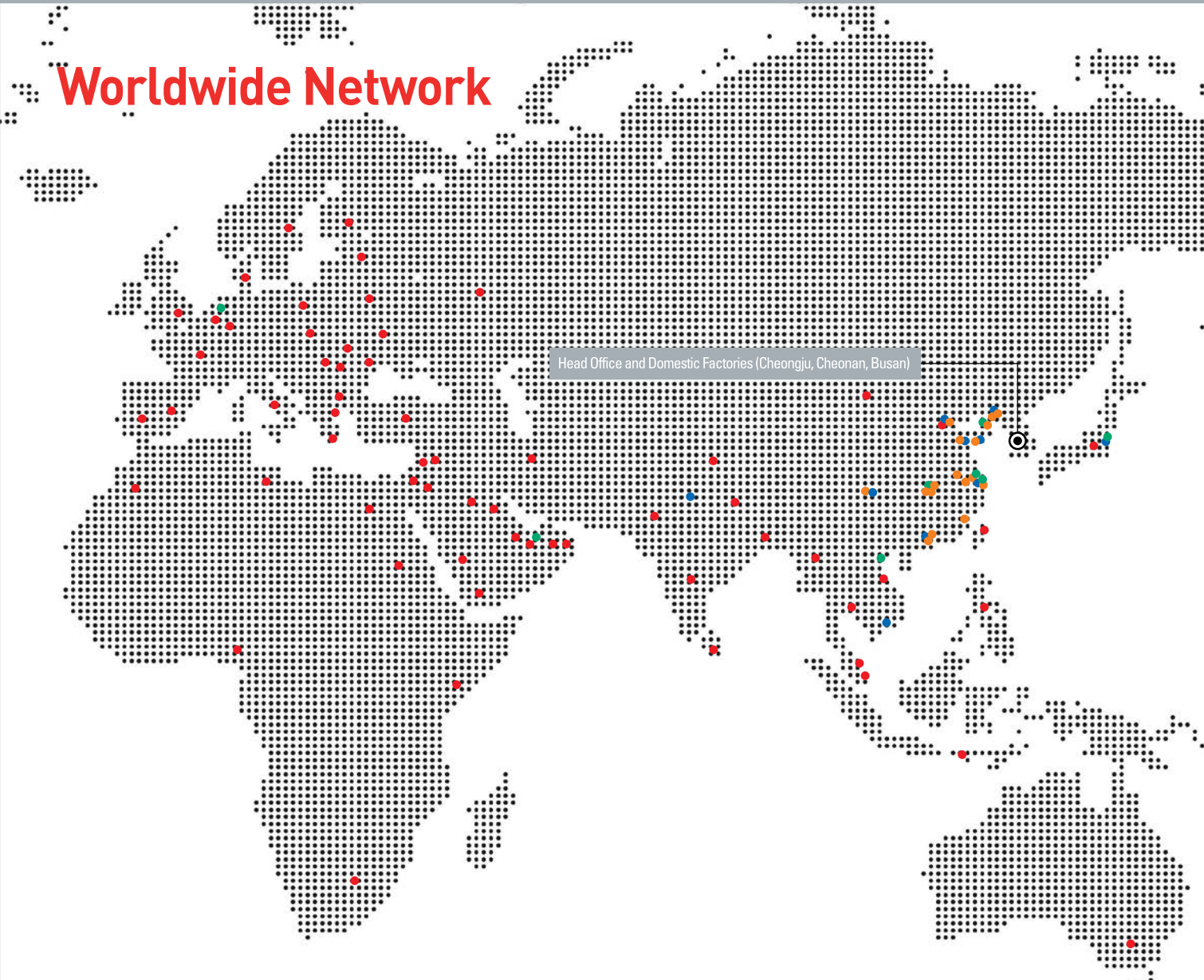
KS type



MEMO



Worldwide Network



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- **Busan Factory**
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Tel : 82-51-795-6114 Fax : 82-51-795-6169

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- **Hanoi Factory, VIETNAM**
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R&D Center

- **R&D Campus in Anyang**
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Tel: 82-31-8090-7011
- **Electric Technology R&D Center in Cheongju**
95, Baekbong-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, 28439, Korea
Tel: 82-43-261-6114
- **Automation R&D Center in Cheonan**
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- **Power Testing & Technology Institute in Cheongju**
95, Baekbong-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, 28439, Korea
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Cheongju Factory



Wuxi Factory (China)



Cheonan Factory



Dalian Factory (China)

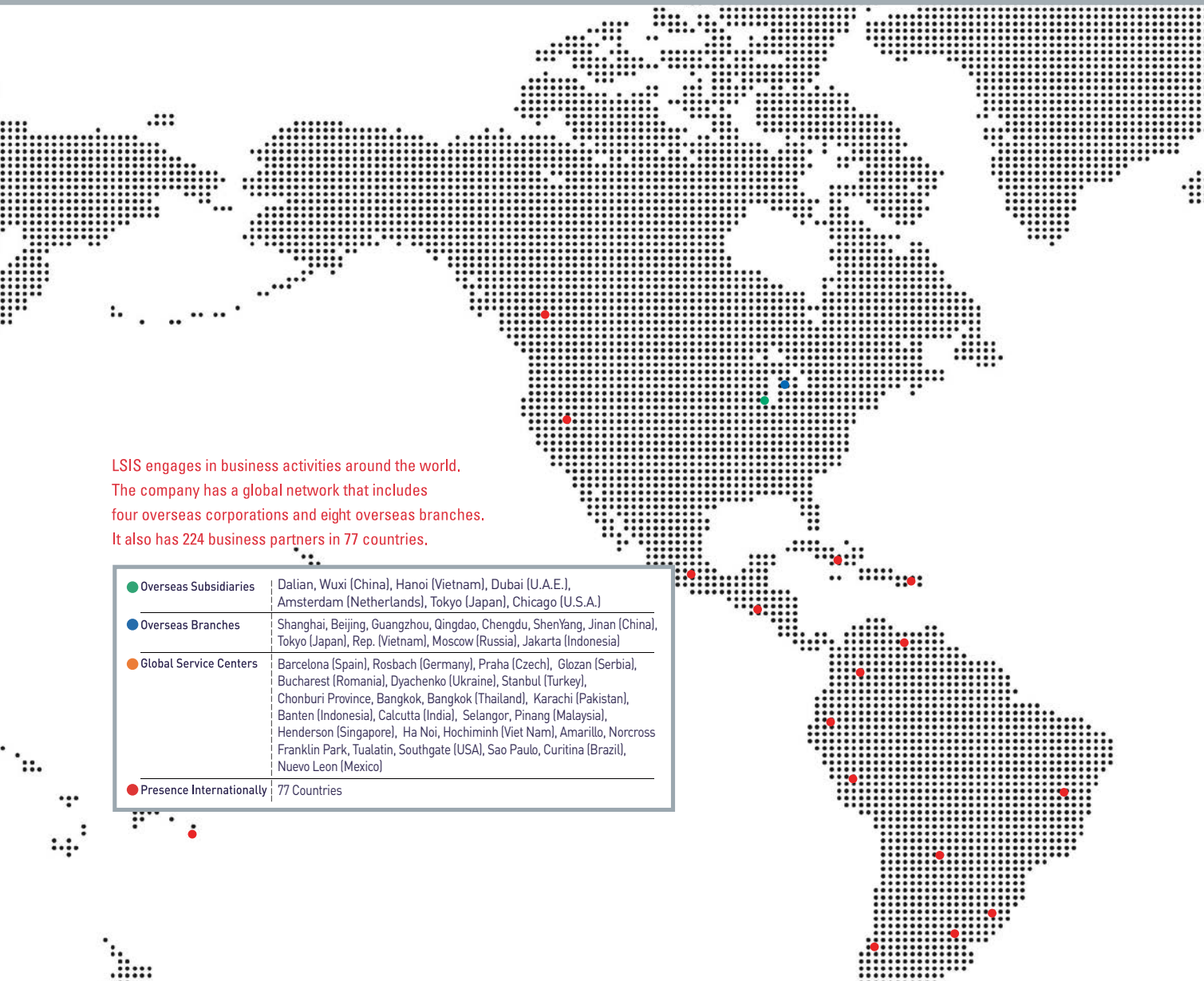


Busan Factory



Hanoi Factory (Vietnam)





LSIS engages in business activities around the world.
 The company has a global network that includes
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 It also has 224 business partners in 77 countries.

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● Presence Internationally	77 Countries

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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.



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