Pro-MEC

Vacuum Circuit Breakers
Vacuum Interrupter

LS IS

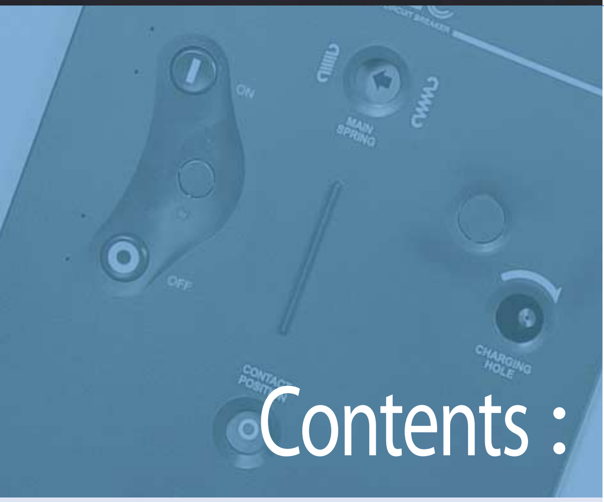
Vacuum Circuit Breaker & Vacuum Interrupter

7.2kV Draw-out (F class)

LSIS Pro-MEC VCB is user-friendly to give more convenience and safety by providing high speed interrupting time (3cycles), adopting the rapid auto-reclosing method, and having wide range of accessories.

24kV Draw-out (F class)

Pro-MEC VCB/VI



Contents :

H1

Vacuum Circuit Breaker

Vacuum Interrupter

Vacuum Circuit Breaker PRO MEC

LSIS Pro-MEC VCB is user-friendly to give more convenience and safety by providing high speed interrupting time (3cycles), adopting the rapid auto-reclosing method, and having wide range of accessories.

7.2kV Draw-out (F class)

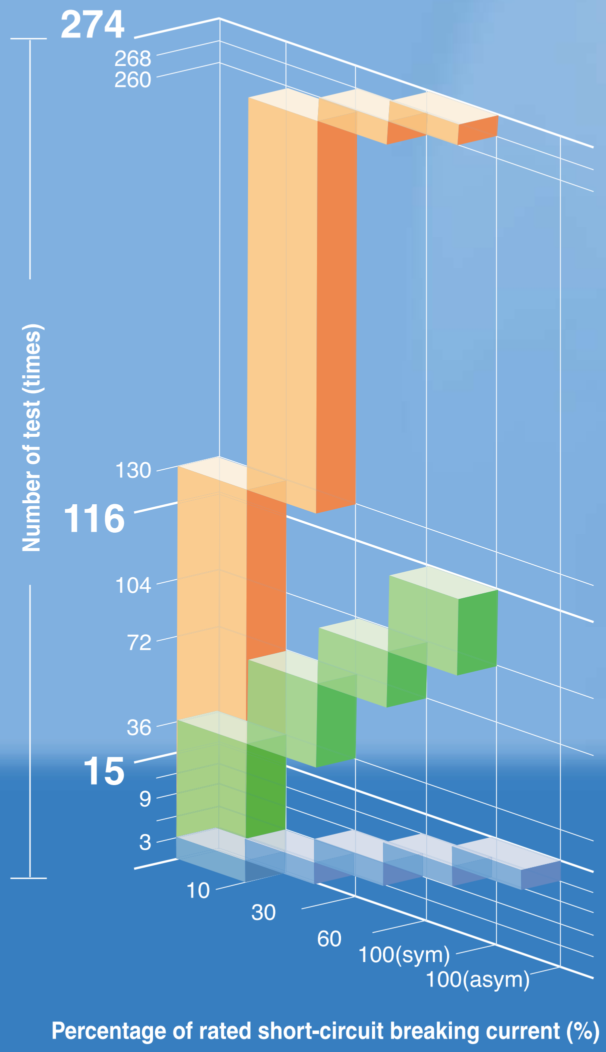
24kV Draw-out (F class)

Wide range of accessories (optional)

- Key Lock
- Padlock of earthing switch
- Button padlock
- Position switch of the earthing switch
- Button cover
- Locking coil of earthing switch
- Position switch (Cell switch)
- Shutter padlock
- Preparatory trip coil (Secondary trip coil)
- MOC (Mechanically operated cell switch)
- Latch checking switch
- TOC (Truck operated cell switch)
- Charge indicator
- Code plate (Miss insertion prevention)
- Position padlock
- Capacitor trip device
- Earthing switch Note 1)
- Rectifier

Note 1) The earthing switch is not available for 17.5kV VCB.

[Compasion table for VCB (Short circuit test)]



Compasion table for VCB (Short circuit test)

- IEC 62271-100 E2[List 1] PRO MEC
- IEC 62271-100 E2[List 2]
- IEC 60056 / 62271-100 E1

• List 1 is preferred.
List 2 may be used as an alternative for circuit-breakers used for solidly earthed systems.

High reliability of the operating mechanism

- Separate design of the main circuit from the operating mechanism.
- Adopt the toggle link method.
- Improved the reliability of electric circuit.
- Adopt the rapid auto-reclosing method as a standard option. (O-0.3sec.-CO-3min.-CO)

High interrupting performance

- Make short of the interrupting time. (3cycles)
- Increase the rated short-circuit withstand characteristics. (1sec. to 3sec.)

Great operational safety

- Reinforce the insulation in the conduct, by adopting the molded housing in each phase.
- Built in the device making the contacts open first when draw in and out.
- Adopt the tulip-shape connection between the cradle and the VCB.

Vacuum Circuit Breaker

Ratings

Type		LVB-06□-32D			LVB-06□-40D		
Rated voltage	(kV)	7.2			7.2		
Rated normal current	(A)	1250	2000	3150	1250	2000	3150
Rated frequency	(Hz)	50/60			50/60		
Rated short-circuit breaking current	(kA)	31.5			40		
Rated short-circuit breaking capacity	(MVA)	390			500		
Rated short-time withstand current	(kA/3sec)	31.5			40		
Rated short-circuit making current	(kAp)	82			104		
Rated breaking time	(Cycle)	3			3		
Rated opening time	(sec)	≤ 0.04			≤ 0.04		
No-load closing time	(sec)	≤ 0.06			≤ 0.06		
Withstand voltage – Power frequency	(kV/min)	20			20		
Withstand voltage – Impulse	(kV/1.2 × 50 μs)	60			60		
Rated operating sequence		O-0.3s-CO-3min-CO			O-0.3s-CO-3min-CO		
Type test – Mechanical		M2 (10,000 times)			M2 (10,000 times)		
Type test – Electrical		E2 (List1)			E2 (List1)		
Type test – Capacitive current switching Note 1)		C2			C2		
Lifetime – Mechanical – Without maintenance	(Time)	20000			20000		
Lifetime – Mechanical – Maintenance	(Time)	30000			30000		
Lifetime – Electrical – Without maintenance	(Time)	20000			20000		
Lifetime – Electrical – Maintenance	(Time)	30000			30000		
Auxiliary switch		4a4b, 10a10b			4a4b, 10a10b		
Installing method – Fixed		Visible, Fixed		Visible, Fixed	Visible, Fixed		Visible, Fixed
Installing method – Draw-out type – E-type		Visible, Tulip		Visible, Clip	Visible, Tulip		Visible, Tulip
Installing method – Draw-out type – F-type		Visible, Tulip		Visible, Tulip	Visible, Tulip		Visible, Tulip
Installing method – Draw-out type – G-type Note 2)	-	Visible, Tulip		Visible, Tulip	Visible, Tulip		Visible, Tulip
Installing method – Draw-out type – G-type Note 2)	T	Enclosed, Tulip		-	Enclosed, Tulip		-
Installing method – Draw-out type – M-type		Enclosed, Tulip -			Enclosed, Tulip		-
Weight Note 3) – VCB – E-type	(kg)	131.5	134.5	210	135	138	210
Weight Note 3) – VCB – F-type	(kg)	132.5	135.5	211	136	139	211
Weight Note 3) – VCB – G, M-type	(kg)	132.5(159)	135.5(160)	220	136(162.5)	139(163.5)	220
Weight Note 3) – Cradle – E-type	(kg)	52 60		131	52	60	131
Weight Note 3) – Cradle – F-type	(kg)	54.5 62.5		135	54.5	62.5	135
Weight Note 3) – Cradle – G-type	(kg)	62.5(110)	135(117) 155		62.5(110)	135(117)	155
Applied standard		IEC 62271-100			IEC 62271-100		
Test laboratory – KERI Note 4)		■			■		

Note 1) Applied cable-charging current switching test
2) In the event of ordering Enclosed Tulip type for G class VCB, please add "T" in the end of type name. (Ex: LVB-06G-20D/06-1A2B-T)
3) ( )* indicates the weight of Enclosed Tulip installing method VCB.
4) KERI: Korea Electrotechnology Research Institute

▲ Enclosed VCB
(Draw-out type, G-type)

▲ G-type Cradle
(Enclosed, Tulip contact)

▲ Visible, Clip contact

▲ Visible, Tulip contact

▲ Enclosed, Tulip contact

Type			LVB-12□-32D/12, 20-T, 30			LVB-12□-40D/12, 20, 30			LVB-17□-40D/12, 20, 30		
Rated voltage (kV)			12			12			17.5		
Rated normal current (A)			1250	2000	3150	1250	2000	3150	1250	2000	3150
Rated frequency (Hz)			60(E1,E2,C2: PT & T)			50(E1,C2:KEMA), 60(M2,E2,C2: PT & T)			60		
Rated short-circuit breaking current (kA)			31.5			40			40		
Rated short-circuit breaking capacity (MVA)			650			831			1200		
Rated short-time withstand current (kA/3sec)			31.5			40			40		
Rated short-circuit making current (kAp)			81.9			104			104		
Rated breaking time (Cycle)			3			3			3		
Rated opening time (sec)			0.04			0.04			≤0.04		
No-load closing time (sec)			0.06			0.06			≤0.06		
Withstand voltage	Power frequency (kV/min)		28			28			38		
	Impulse (kV/1.2×50㎲)		75			75			95		
Rated operating sequence			O-0.3s-CO-3min-CO			O-0.3s-CO-3min-CO			O-0.3s-CO-3min-CO		
Type test	Mechanical		M2 (10,000 times)			M2 (10,000 times)			M2 (10,000 times)		
	Electrical		E2 (List 1)			E2 (List 1)			E2 (List 1)		
	Capacitive current switching Note)		C2			C2			C2		
Lifetime	Mechanical	Without maintenance (Time)	20,000			20,000			20,000		
		Maintenance (Time)	30,000			30,000			30,000		
	Electrical	Without maintenance (Time)	20,000			20,000			20,000		
		Maintenance (Time)	30,000			30,000			30,000		
Auxiliary switch			4a4b, 10a10b			4a4b, 10a10b			4a4b, 10a10b		
Installing Method	Fixed		-			-			-		
	Draw-out type	E-TYPE	-			-			-		
		F-TYPE	-			-			-		
		G-TYPE	Enclosed, Tulip		Visible, Tulip	Enclosed, Tulip		Visible, Tulip	Visible, Tulip		
		M-TYPE	Enclosed, Tulip		-	-			-		
Weight	VCB	E-TYPE (kg)	-			-			-		
		F-TYPE (kg)	-			-			-		
		G, M-TYPE (kg)	159	160	220	162	163	220	200	205	260
	Cradle	E-TYPE (kg)	-	-	-	-	-	-	-	-	-
		F-TYPE (kg)	-	-	-	-	-	-	-	-	-
		G, M-TYPE (kg)	110	117	155	110	117	155	175	175	200
Applied standard			IEC 62271-100								
Test laboratory			PT & T: E1, E2, C2, M2						KEMA, PT & T		

Note) Applied cable-charging current switching test

Ratings

Type			LVB-20□-13D	LVB-20□-13D/T	LVB-20□-16D	LVB-20□-16D/T	LVB-20□-25D	LVB-20□-25D/T
Rated voltage (kV)			24		24		24	
Rated normal current (A)			630 1250		630 1250		630 1250 2000	
Rated frequency (Hz)			50/60		50/60		50/60	
Rated short-circuit breaking current (kA)			12.5		16		25	
Rated short-circuit breaking capacity (MVA)			520		665		1000	
Rated short-time withstand current (kA/3sec)			12.5		16		25	
Rated short-circuit making current (kAp)			32.5		40		65	
Rated breaking time (Cycle)			3		3		3	
Rated opening time (sec)			≤ 0.04		≤ 0.04		≤ 0.04	
No-load closing time (sec)			≤ 0.06		≤ 0.06		≤ 0.06	
Withstand voltage	Power frequency (kV/min)		50		50		50	
	Impulse (kV/1.2×50㎲)		125		125		125	
Rated operating sequence			O-0.3s-CO-3min-CO		O-0.3s-CO-3min-CO		O-0.3s-CO-3min-CO	
Type test	Mechanical		M2(10,000 times)		M2(10,000 times)		M2(10,000 times)	
	Electrical		E2 (List1)		E2 (List1)		E2 (List1)	
	Capacitive current switching Note 1)		C2		C2		C2	
Lifetime	Mechanical	Without maintenance (Time)	20000		20000		20000	
		Maintenance (Time)	30000		30000		30000	
	Electrical	Without maintenance (Time)	20000		20000		20000	
		Maintenance (Time)	30000		30000		30000	
Auxiliary switch			4a4b, 10a10b		4a4b, 10a10b		4a4b, 10a10b	
Installing method	Fixed		Visible, Fixed	-	Visible, Fixed	-	Visible, Fixed	-
	Draw-out type	E-type	Visible, Clip	Enclosed, Tulip	Visible, Clip	Enclosed, Tulip	Visible, Clip	Enclosed, Tulip
		F-type	Visible, Clip	Enclosed, Tulip	Visible, Clip	Enclosed, Tulip	Visible, Clip	Enclosed, Tulip
		G-type Note 2)	Visible, Tulip	Enclosed, Tulip	Visible, Tulip	Enclosed, Tulip	Visible, Tulip	Enclosed, Tulip
		M-type	-	Enclosed, Tulip	-	Enclosed, Tulip	-	Enclosed, Tulip
Weight	VCB	E-type (kg)	145	145	145	145	145	145
		F-type (kg)	145	145	145	145	145	145
		G, M-type (kg)	155	187	155	187	155	187/218 (2000A)
	Cradle	E-type (kg)	80	80	80	80	80	80
		F-type (kg)	82	82	82	82	82	82
		G-type (kg)	110	120	110	120	110	120
Applied standard			IEC 62271-100		IEC 62271-100		IEC 62271-100	
Test laboratory		KERI	■		-		■	
		KEMA	-		■		■	

Note 1) Applied cable-charging breaking current
2) In the event of ordering Enclosed Tulip type for G class VCB, please add "T" in the end of type name. (Ex: LVB-06G-20D/06-1A2B-T)

▲ Fixed type VCB

▲ E-type cradle

▲ F-type cradle

▲ G-type cradle (Withdrawable by lever)

▲ G-type cradle (Withdrawable by screw)

Motor

When the closing spring is charged, the control power of motor is turned off by the built-in limit s/w.

Rated voltage	The peak value of the inrush current (A)	Rated current (A)	Consumption power (W)	Charging time (Sec.)
DC 48V	21	4	350	13
DC 110V	20	3	330	12
DC 125V	20	3	330	12
DC 220V	17	2.6	374	12

Note 1) Range of the normal operating voltage: 85~110%
2) DC 24V is the underdeveloped rating.

Closing Coil (C)

The coil operated only when the power is applied continuously over 45ms. It has built-in electrically anti-pumping circuit.

Rated voltage	Rated current (A)
DC 48V	6
DC 110V	3
DC 125V	3
DC 220V	2.5

Note 1) Range of the normal operating voltage: 85~110%
2) DC 24V is the underdeveloped rating.

Shunt coil (TC)

When the VCB is 'ON' position, even though the control power of a shunt coil is 'OFF', the VCB maintains the 'ON' position.

Rated voltage	Rated current (A)
DC 48V	6
DC 110V	3
DC 125V	3
DC 220V	2.5

Note 1) Range of the normal operating voltage: 70~110%
2) DC 24V is the underdeveloped rating.

Auxiliary switch

Standard 4a4b / Optional 10a10b

Classification			General load (A)	Inductive load (A)	Contact configuration
Contact Ratings	AC	250V 10		5	4a4b 10a10b
		125V 10		5	
		250V	10	5	
	DC 125V		10	5	
		30V 10		5	

Note) The contact capacity of the following accessories are the same with that of the Aux. switch. Position switch, Closing sp ring contact, Charging complete indicating contact, Position switch of the earthing switch, Mechanically operated cell switch, Truck operated cell switch.

• **Position of the Aux.contact switch**

VCB	"a" contact	"b"contact
ON	ON	OFF
OFF	OFF	ON

Charge indicator of the closing spring

Indicating the condition of the closing spring.

Charged

Discharged

Position indicator of the main contacts

Indicating the 'Close' or the 'Open' of the main contacts.

Close position: 「ON」 Open position: 「OFF」

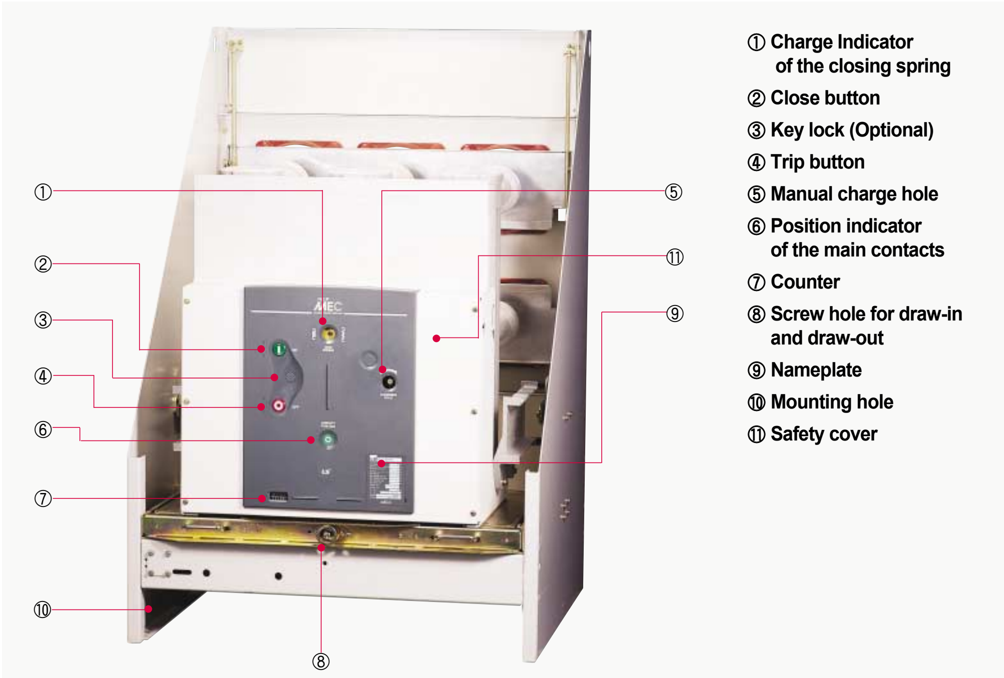
Close position

Open position

Counter

Mechanically counts the switching of the VCB by 5digits analog type counter (Standard option)

Constructional and operating characteristics



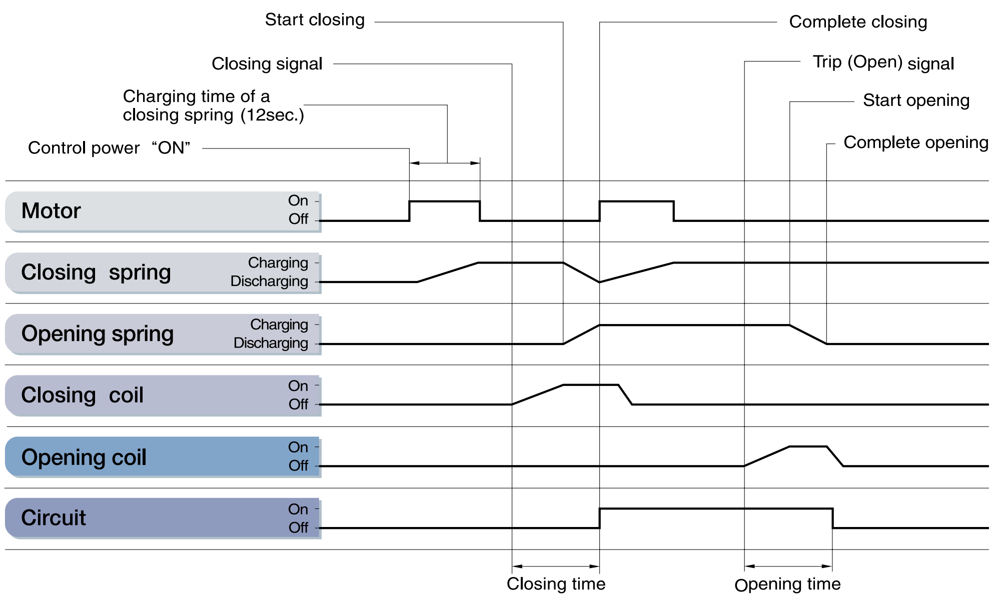
Manual charge

Insert the charge handle into the manual charge hole in the front of a VCB, and rotate it to clockwise over 40times and the charge complete with a metal sound.

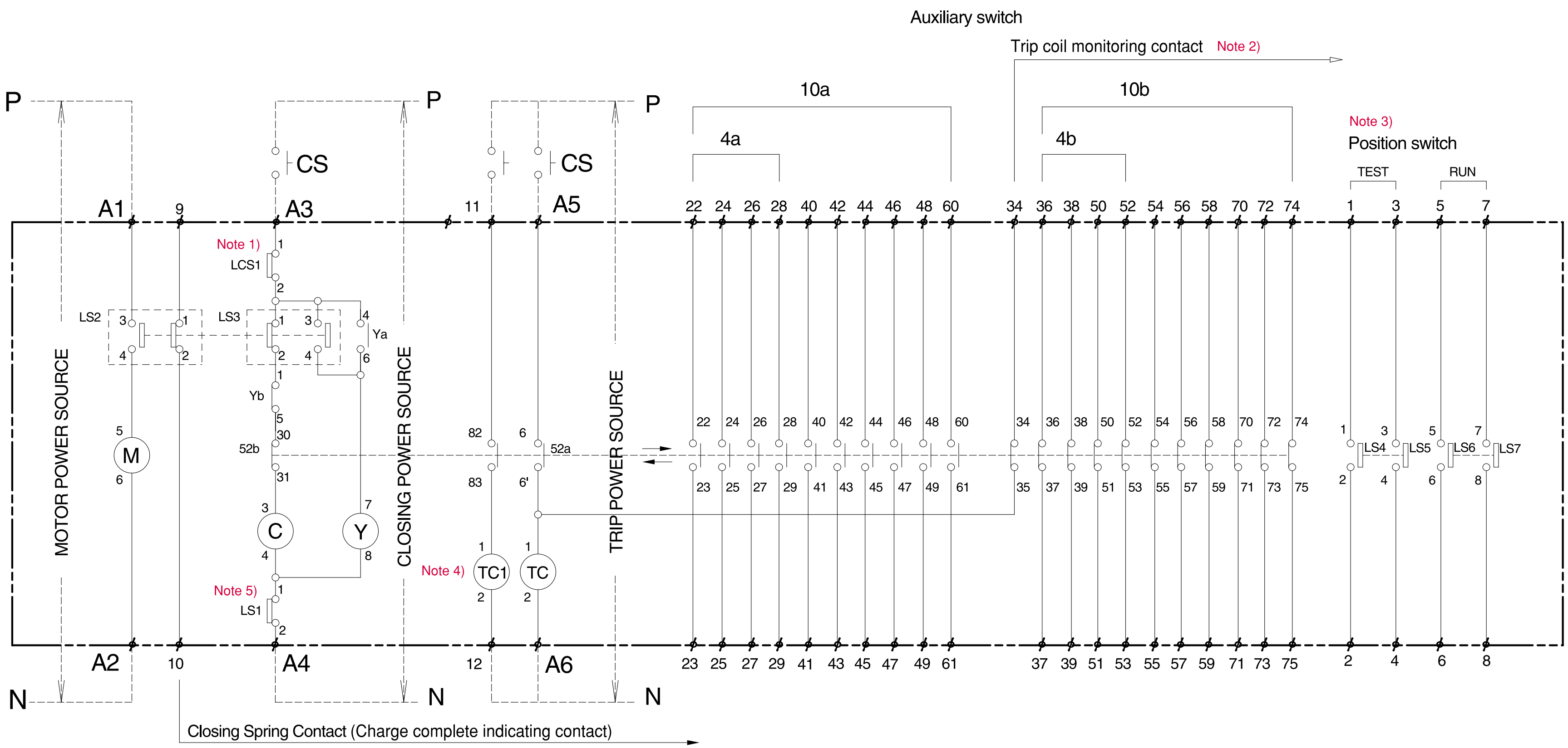
Motor charge

If you apply the control power to a VCB, the closing spring will be charged automatically by a motor and then the control power will be turned off by the built-in limit s/w. Please use the same control voltage for motor, Closing coil, Trip coil.

Sequence of the switching mechanism



Control circuit diagram



ø : External terminal of VCB
52: Vacuum circuit breaker
M: Spring charging motor
TC: Trip coil
TC1: Secondary Trip coil
C: Closing coil
Y: Anti-pump relay
52a: Auxiliary switch (NO)
52b: Auxiliary switch (NC)
LS1: Closing interlock limit switch (only withdrawable type)
LS2: Motor stopping, closing spring charged indication
LS3: Anti-closing, anti-pumping limit switch
LCS1: Opening 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 run position)

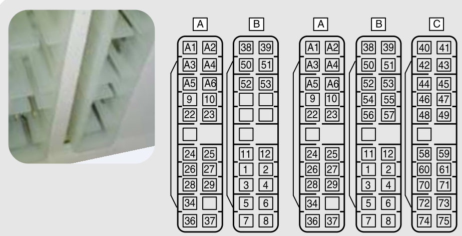
Note 1) LCS1: Latch checking switch
2) Trip coil supervision (Trip coil monitoring contact)
3) Position switch: 4a (Terminal No.: 1, 2, 3, 4, 5, 6, 7, 8)
4) TC1: Secondary trip coil (Preparatory trip coil Terminal No.: 82,83)

Optional accessories (Notes 1)–4))

5) In fixed type VCB, LS1 (Closing-coil limit switch) is not available.
※ Above circuit diagram is based on 'OFF' status of VCB. and closing spring is charged.

Connecting terminal arrangement

A Type



(4a4b)

(10a10b)

B Type

	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
A			29	28	27	26	25	24	23	22	A6	A5	A4	A3	A2	A1
B	39	38	37	36		34										
C													53	52	51	50
D	12	11	10	9					8	7	6	5	4	3	2	1

(4a4b)

	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
A	41	40	29	28	27	26	25	24	23	22	A6	A5	A4	A3	A2	A1
B	39	38	37	36		34	61	60	49	48	47	46	45	44	43	42
C	75	74	73	72	71	70	59	58	57	56	55	54	53	52	51	50
D	12	11	10	9					8	7	6	5	4	3	2	1

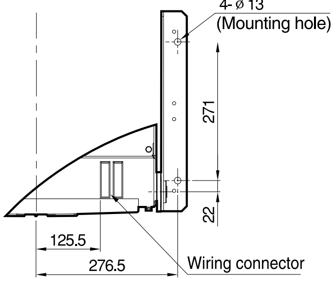
(10a10b)

7.2kV dimension (VCB)

LVB-06P-32D, 40D (Visible, Fixed) - (1250/2000A)

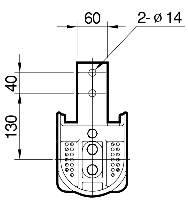
(Unit: mm)

• Top

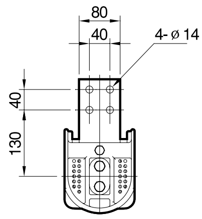


*125.5 applied to all 7.2kV VCB.

<Terminal conductor>

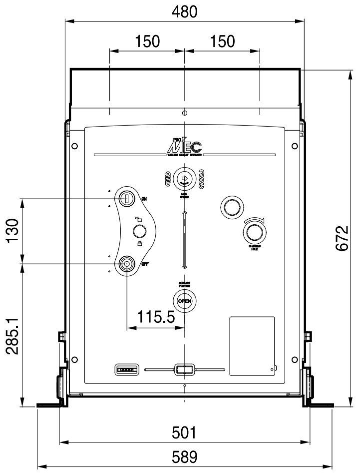


31.5/40kA 1250A

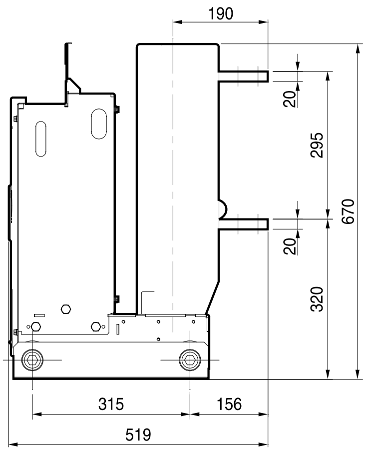


31.5/40kA 2000A

• Front



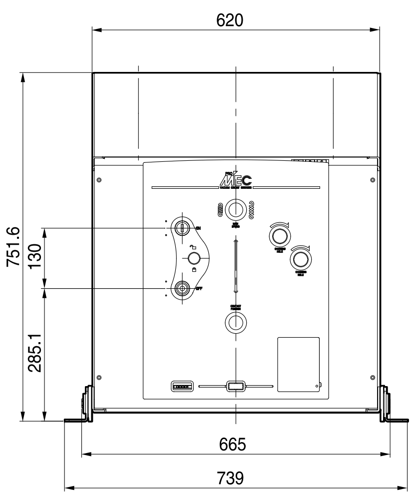
• Side



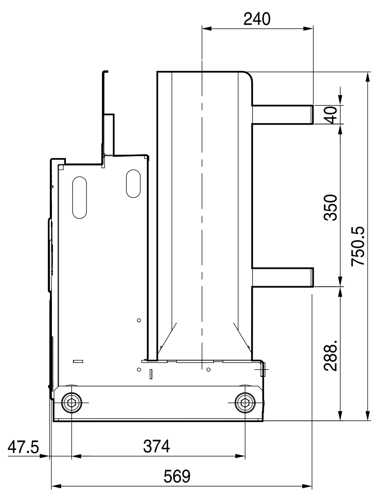
31.5/40kA 1250/2000A

LVB-06P-32D, 40D (Visible, Fixed) - (3150A)

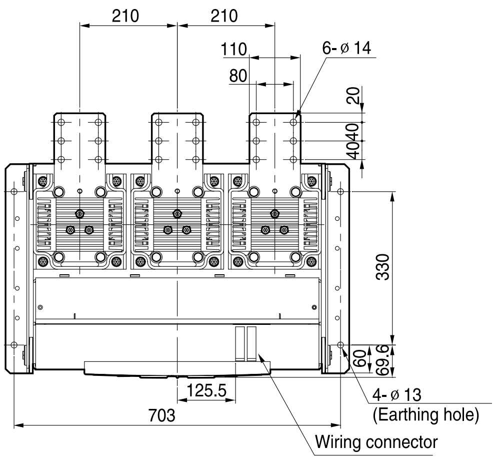
• Front



• Side



• Top

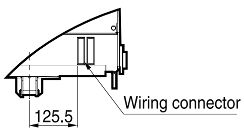


31.5/40kA 3150A

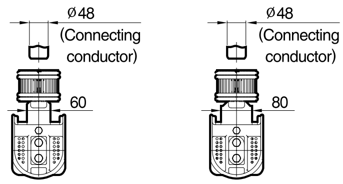
LVB-06E, F, G-32D, 40D   E, F, G class - (1250/2000A)

(Unit: mm)

• **Top**

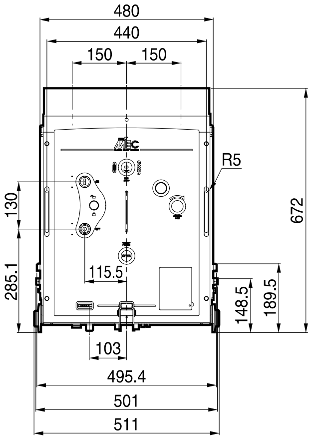


<Terminal conductor>

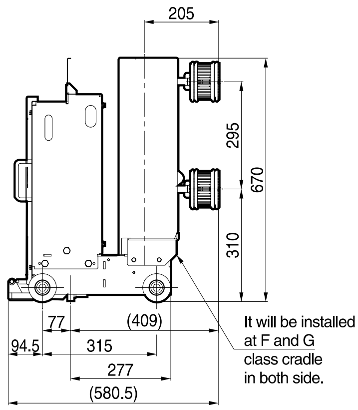


1250A **2000A**

• **Front**



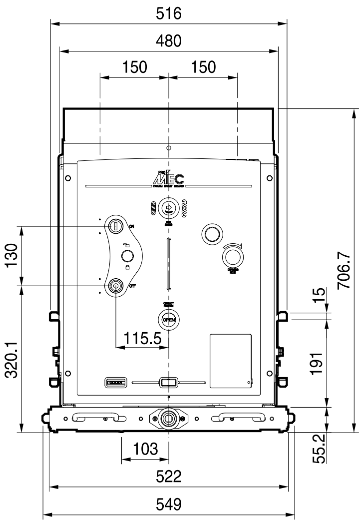
• **Side**



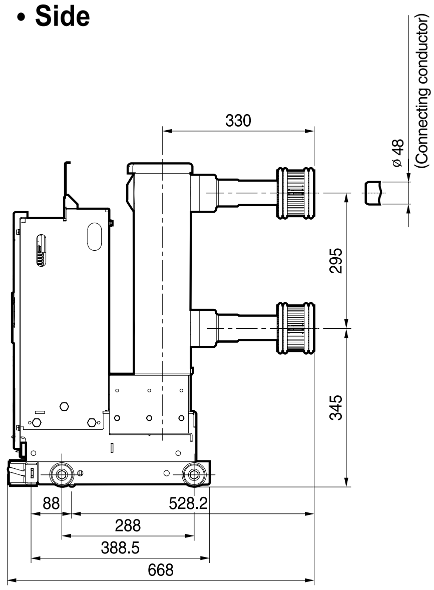
31.5/40kA 1250/2000A E, F, G class
(Enclosed, Tulip contact)

LVB-06G- 32D/T, 40D/T   G class (Enclosed, Tulip contact) - (1250/2000A)

• **Front**



• **Side**



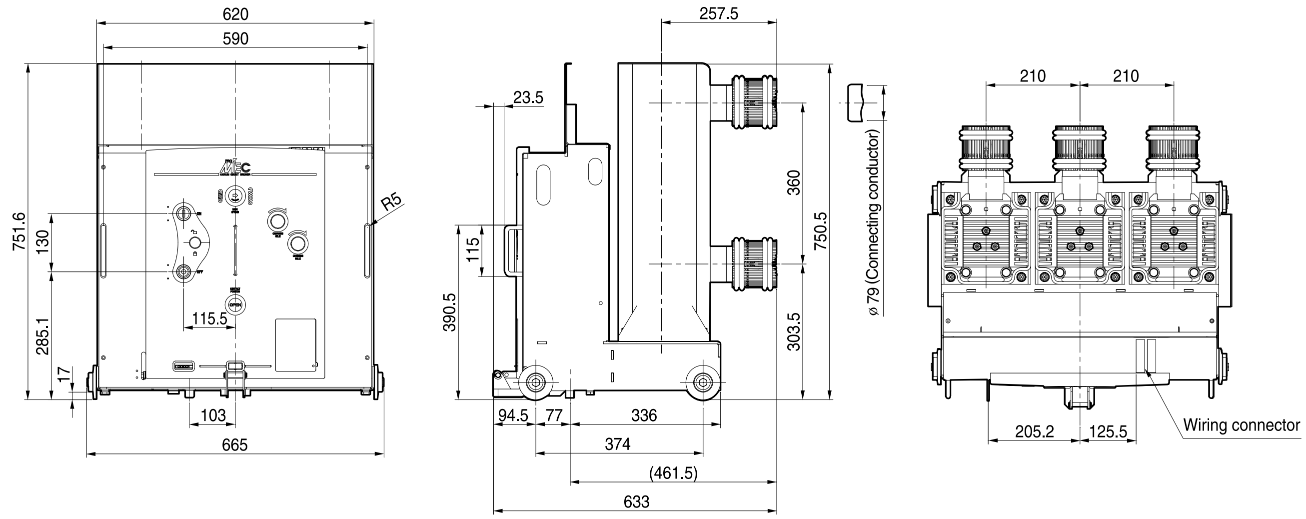
31.5/40kA 1250/2000A G class

7.2kV dimension (VCB)

LVB-06E-32D, 40D E class (Visible, Tulip contact) - (3150A)

(Unit: mm)

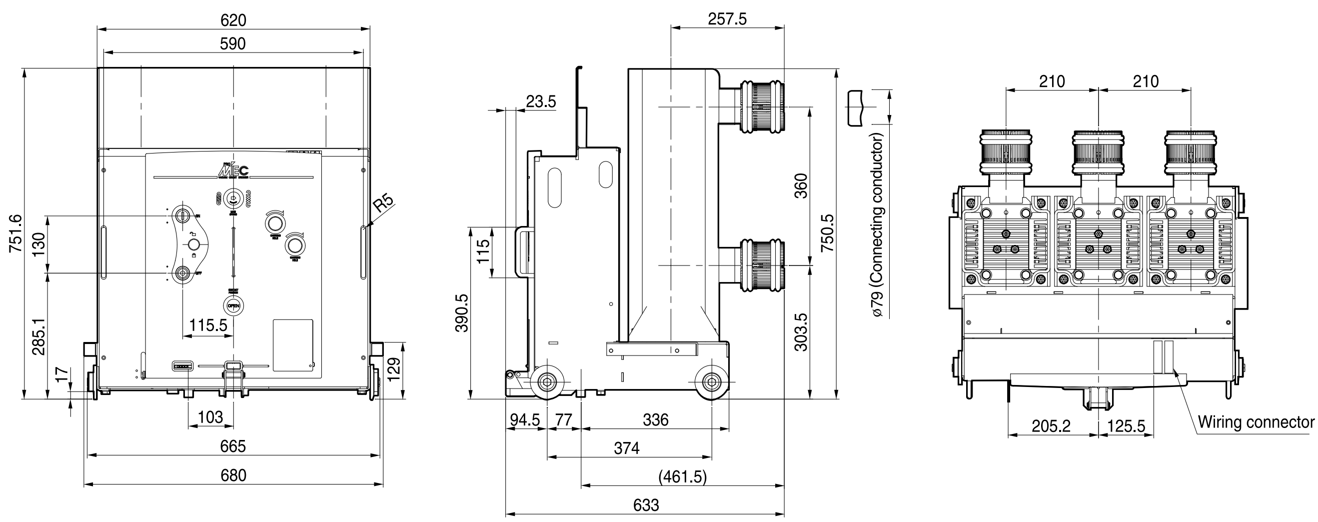
• Front • Side • Top



31.5/40kA 3150A E class

LVB-06F-32D, 40D F class (Visible, Tulip contact) - (3150A)

• Front • Side • Top

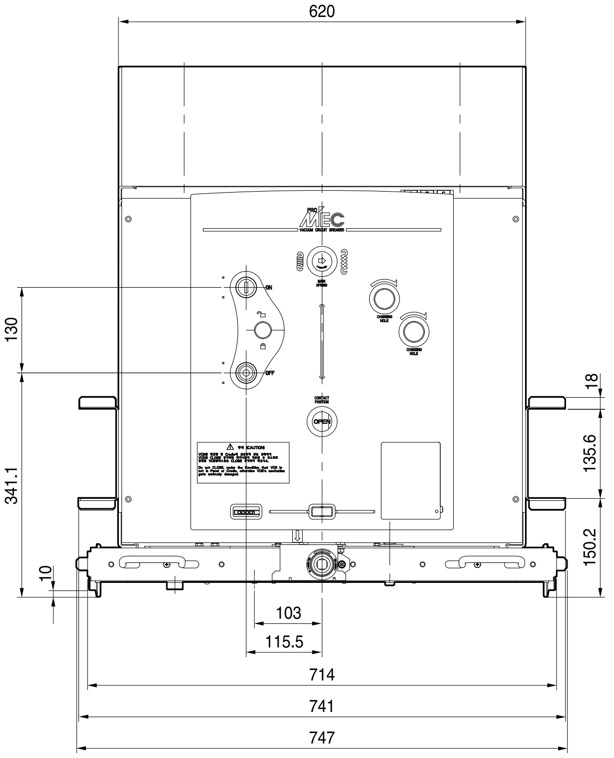


31.5/40kA 3150A F class

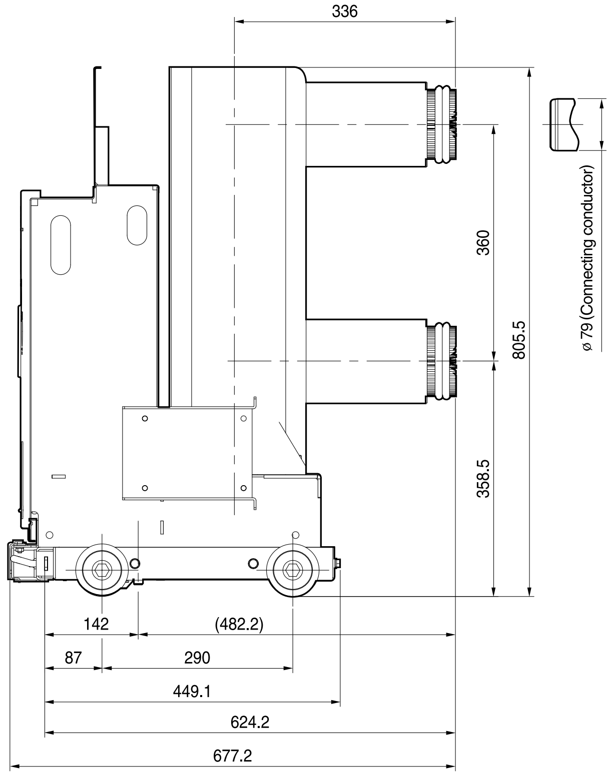
LVB-06G-32D, 40D G class (Visible, Tulip contact) - (3150A)

(Unit: mm)

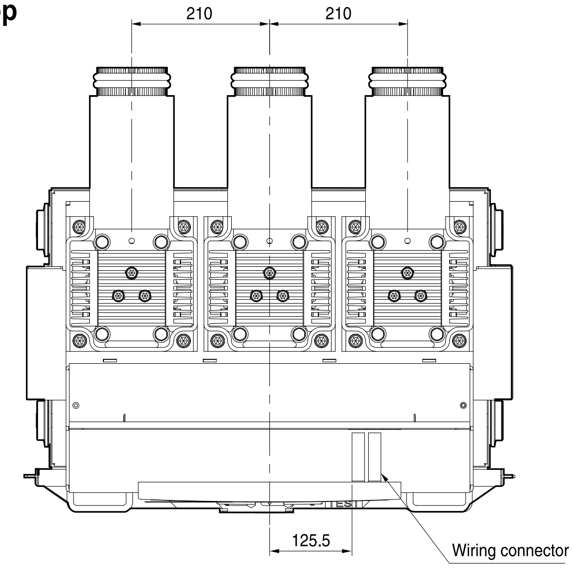
• Front



• Side



• Top



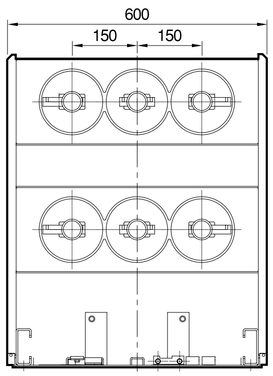
31.5/40kA 3150A G class

7.2kV dimension (Cradle)

LCL-06E-32D, 40D E class (Visible, Tulip contact)

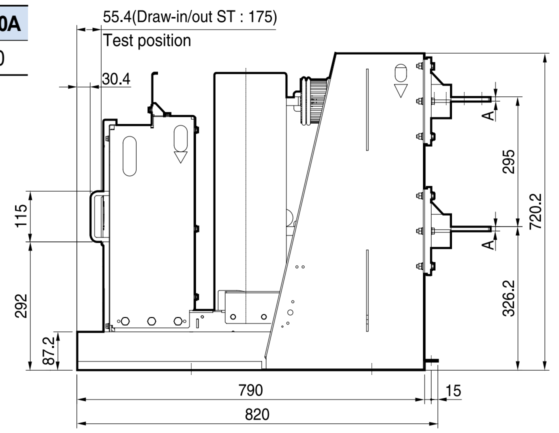
(Unit: mm)

• Front



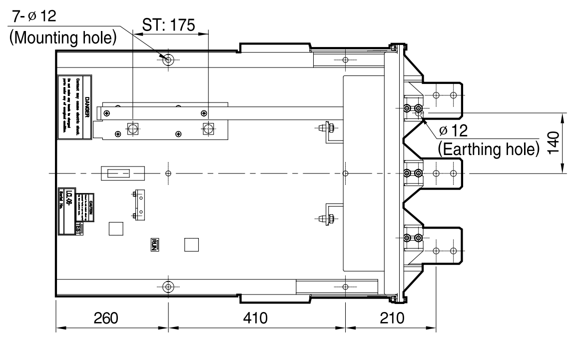
• Side

Rating	1250A	2000A
A	10	20

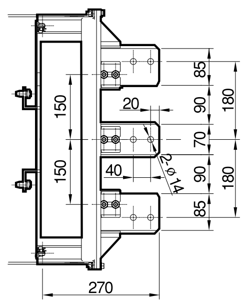


31.5/40kA 1250/2000A E class

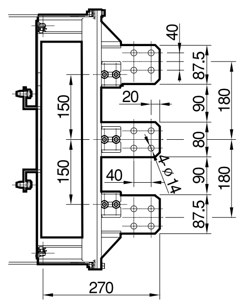
• Top



<Terminal conductor>



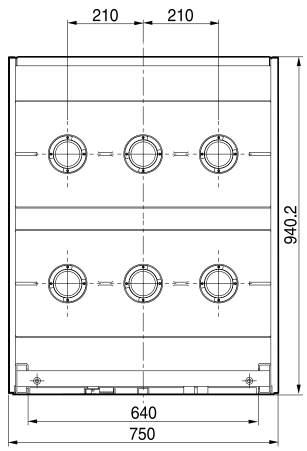
1250A



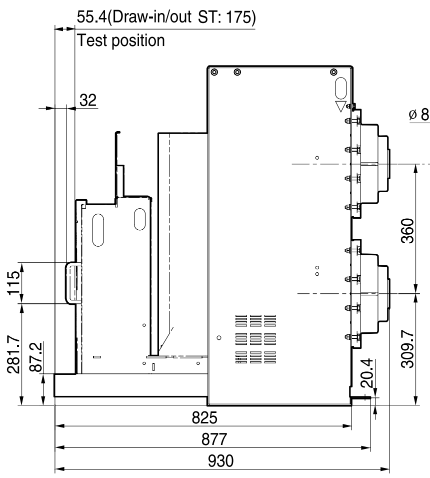
2000A

LCL-06E-32D, 40D E class (Visible, Tulip contact) - (3150A)

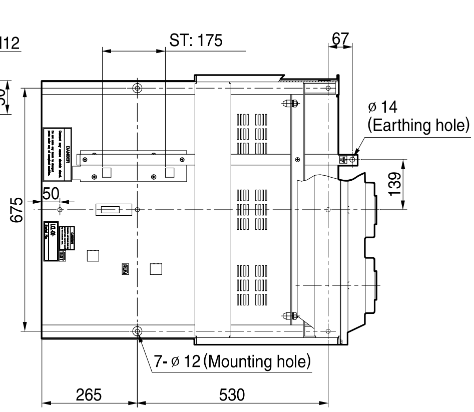
• Front



• Side



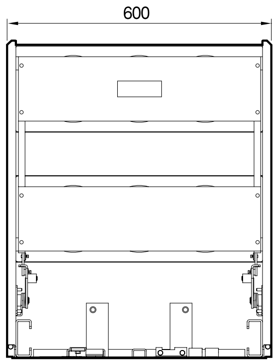
• Top



LCL-06F-32D, 40D F class (Visible, Tulip contact) - (1250/2000A)

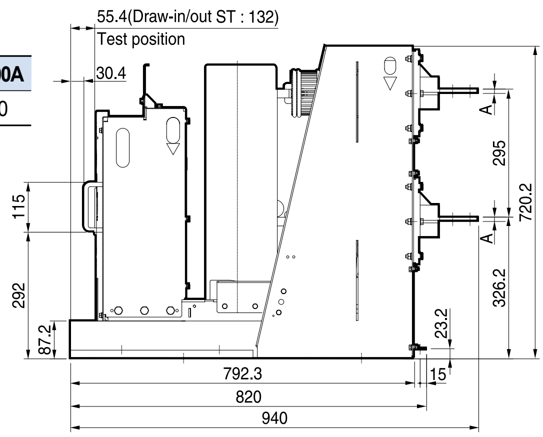
(Unit: mm)

• Front



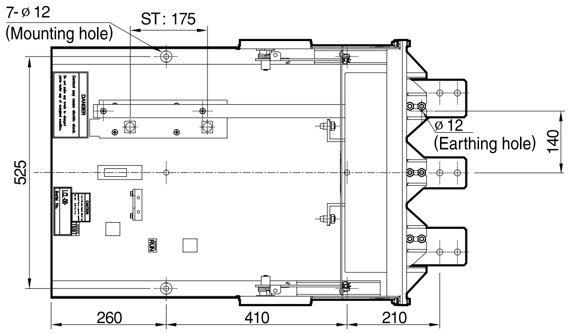
• Side

Rating	1250A	2000A
A	10	20

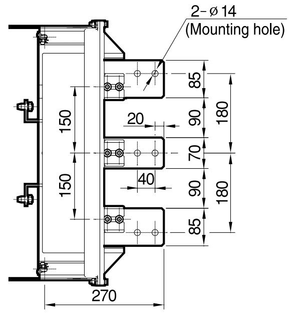


31.5/40kA 1250/2000A F class

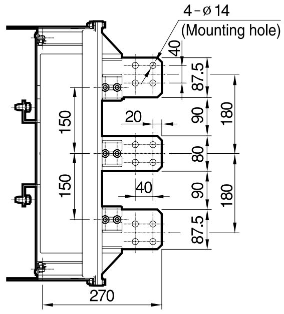
• Top



<Terminal conductor>



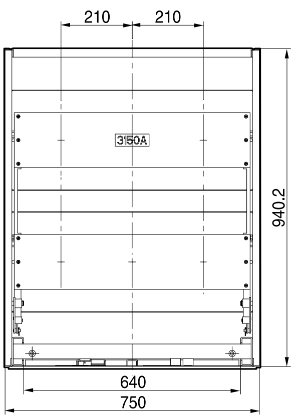
31.5/40kA 1250A F class

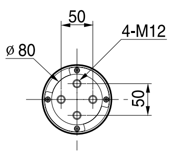


31.5/40kA 2000A F class

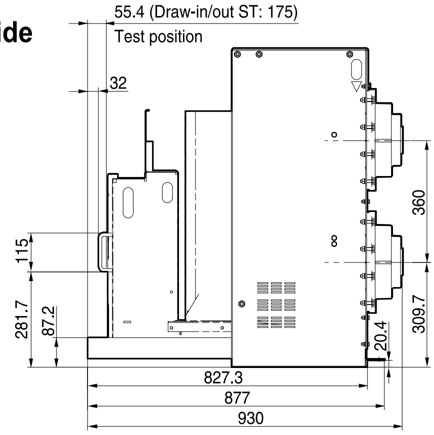
LCL-06F-32D, 40D F class (Visible, Tulip contact) - (3150A)

• Front

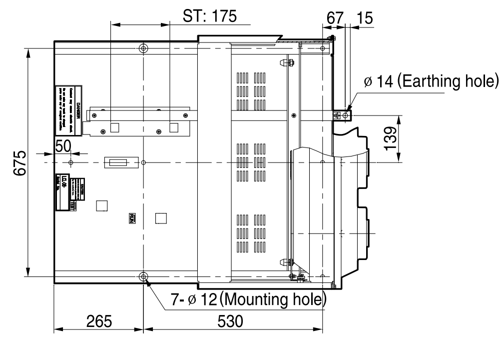




• Side



• Top



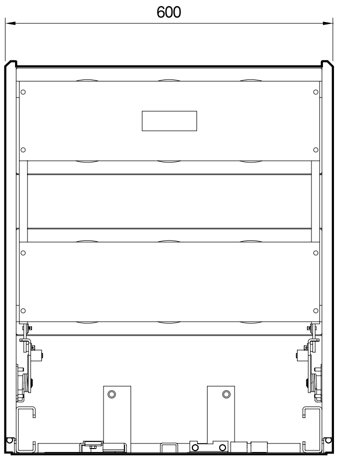
31.5/40kA 3150A F class

7.2kV dimension (Cradle)

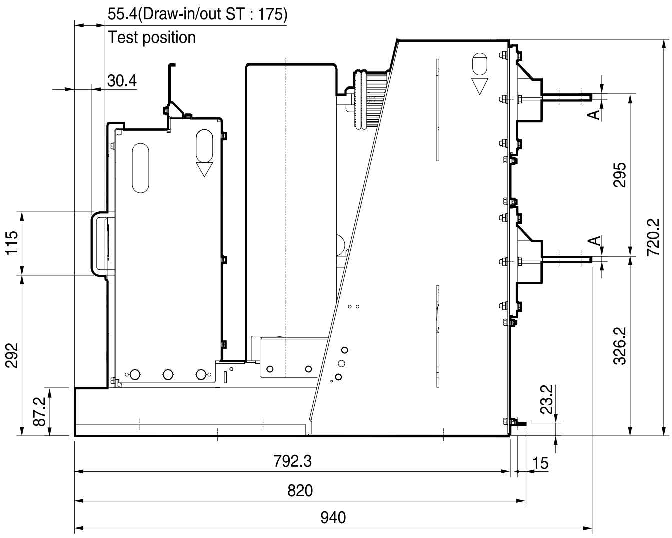
LCL-06G-32D, 40D G class(Visible, Tulip contact) - (31.5/40kA 1250/2000A)

(Unit: mm)

• Front

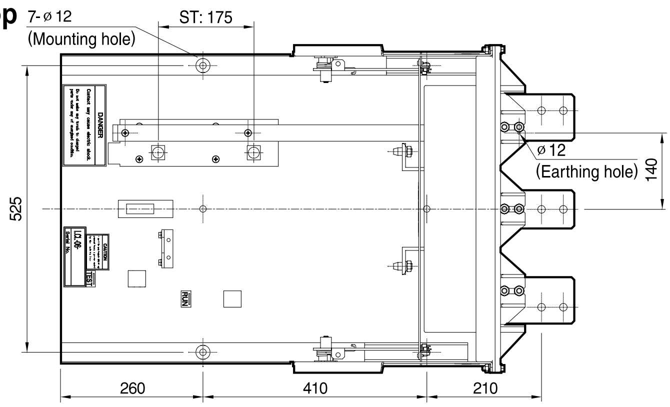


• Side



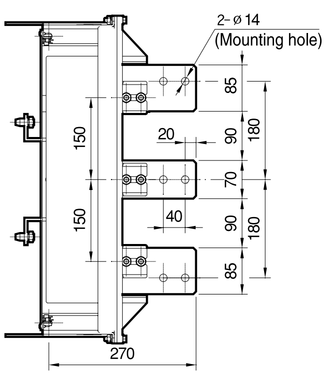
31.5/40kA 1250/2000A G class

• Top

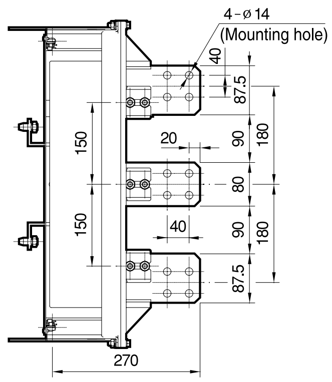


Rating	1250A	2000A
A	10	20

<Terminal conductor>



31.5/40kA 1250A G class

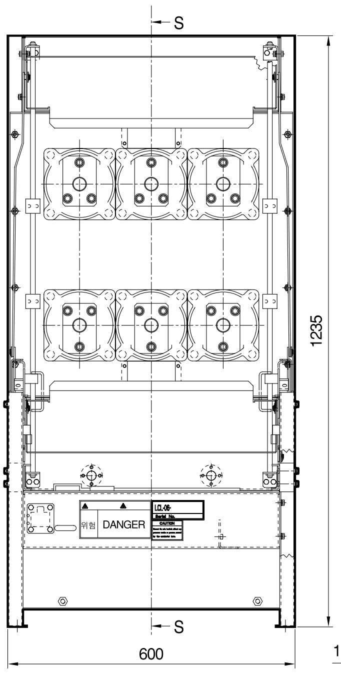


20~40kA 2000A G class

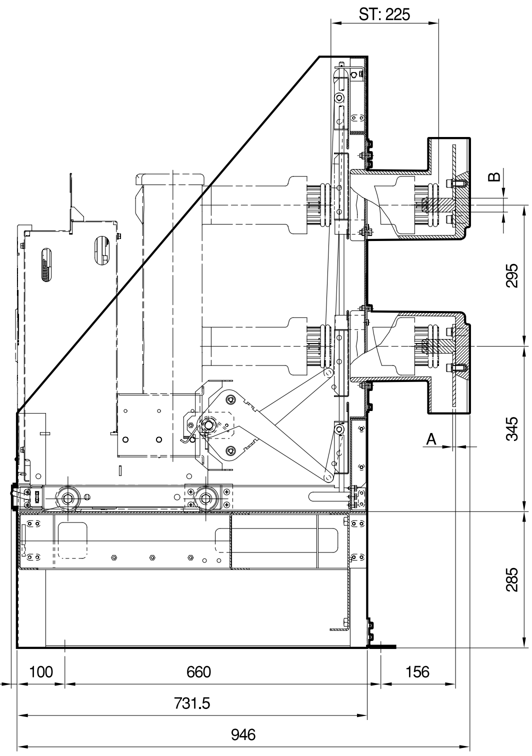
LCL-06G-20D/T, 25D/T, 32D/T, 40D/T G class (Enclosed, Tulip contact) - (630/1250/2000A)

(Unit: mm)

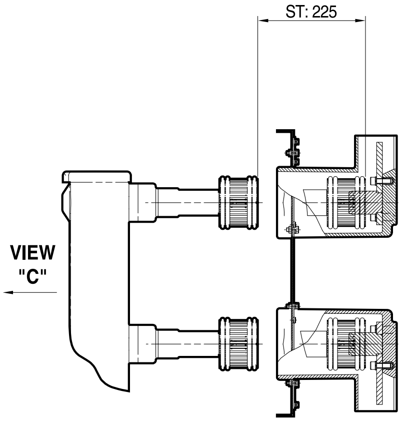
• Front



• Side

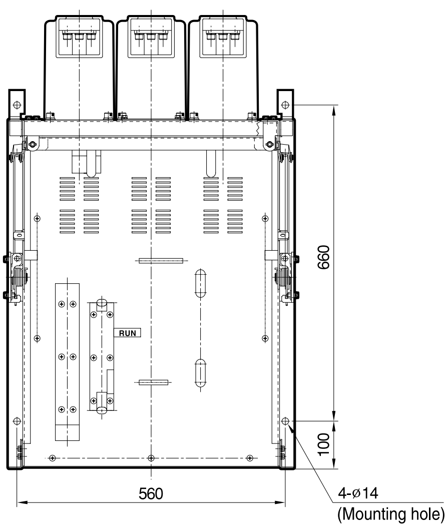


Section S-S



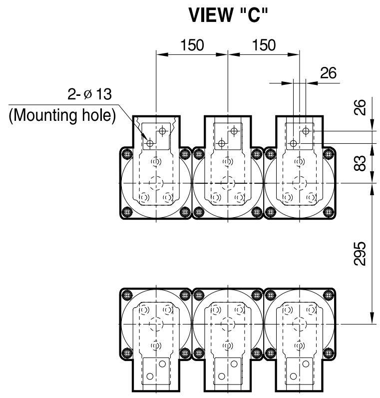
31.5/40kA 1250/2000A G class

• Top



Rating	31.5/40kA	
	1250A	2000A
A	12	25
B	ø 48	

<Terminal conductor>

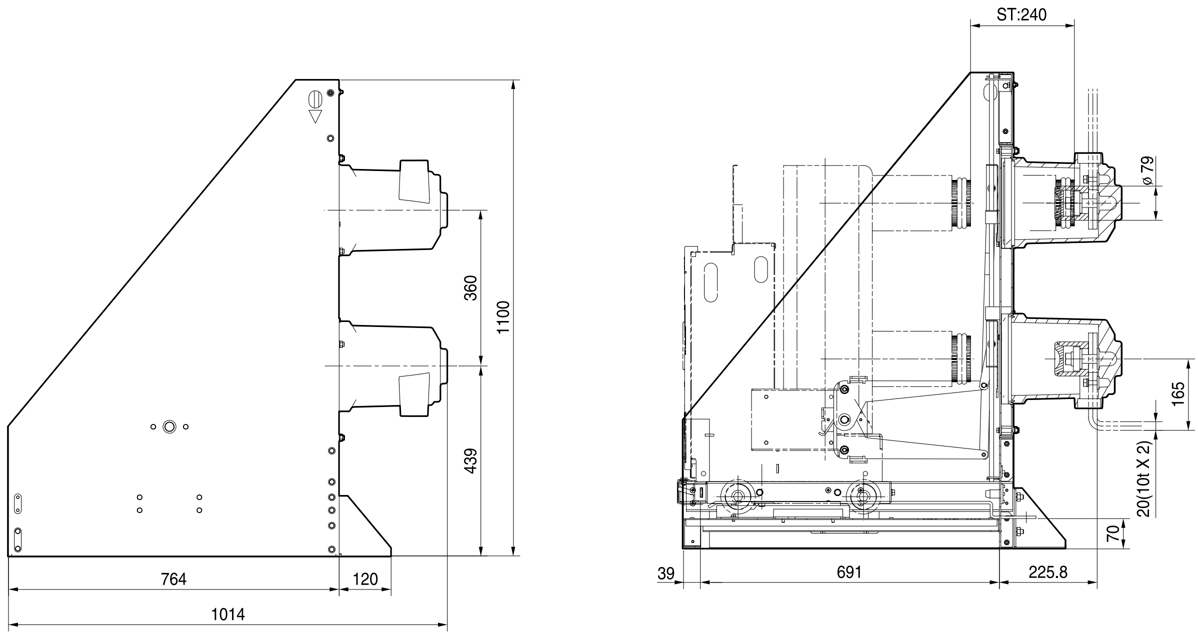


7.2kV dimension (Cradle)

LCL-06G-32D, 40D G class (Visible, Tulip contact) - (3150A)

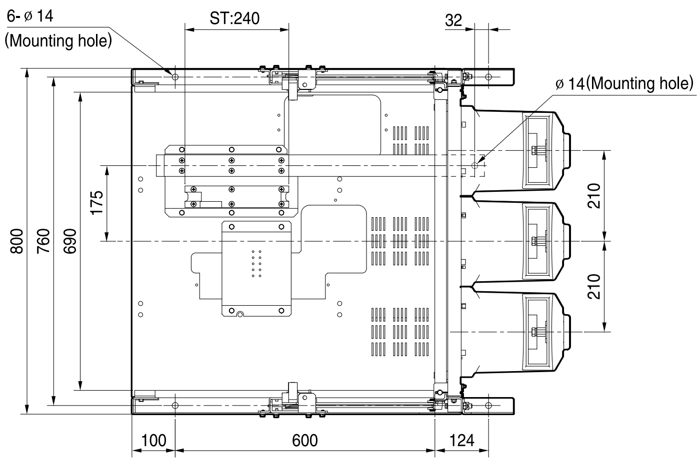
(Unit: mm)

• Side



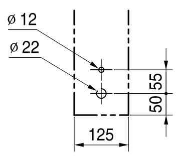
31.5/40kA 3150A G class

• Top



<User busbar reguirement>

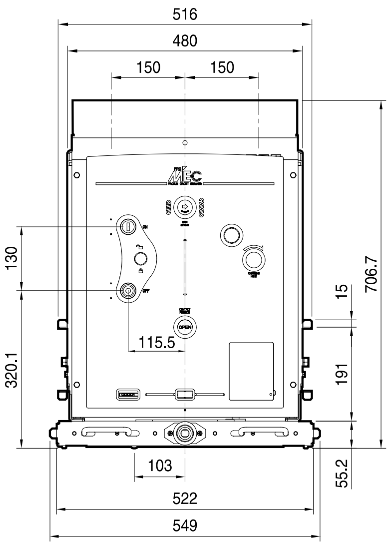
*To connect with VCB ' s bushing terminals user busbar should have below dimensions and two holes.



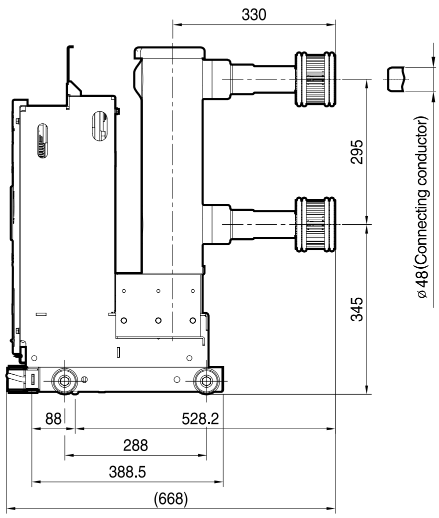
LVB-12G-32D/T G class (Enclosed, Tulip contact) - (1250/2000A)

(Unit: mm)

• **Front**



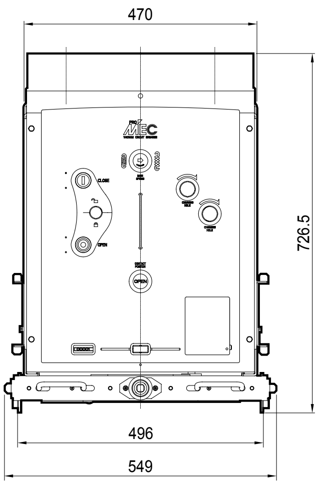
• **Side**



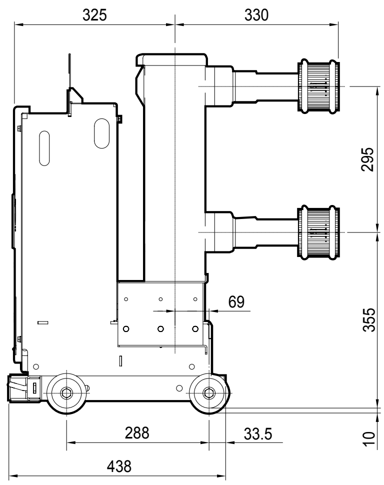
31.5kA 1250/2000A G class

LVB-12G-40D G class (Enclosed, Tulip contact) - (1250/2000A)

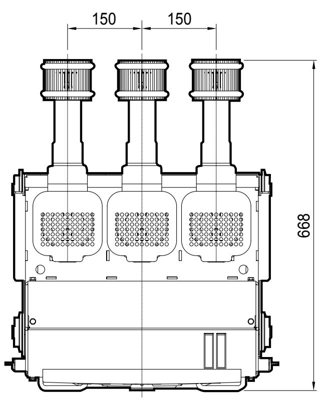
• **Front**



• **Side**



• **Top**



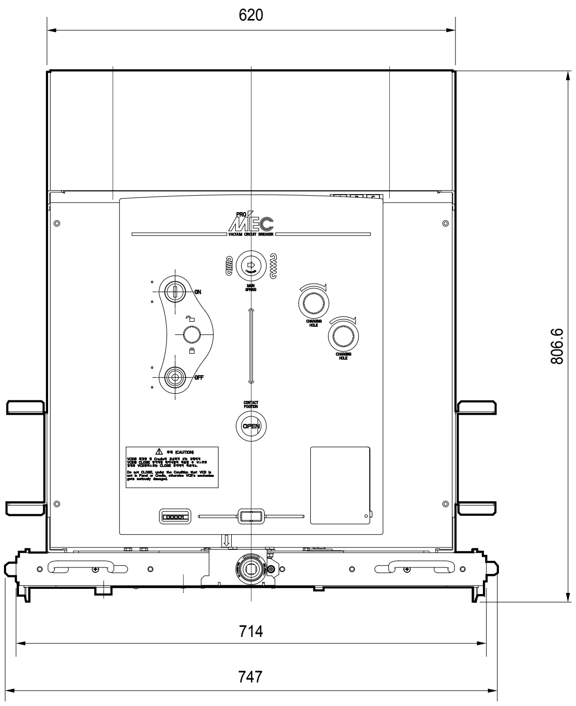
40kA 1250/2000A G class

12kV dimension (VCB)

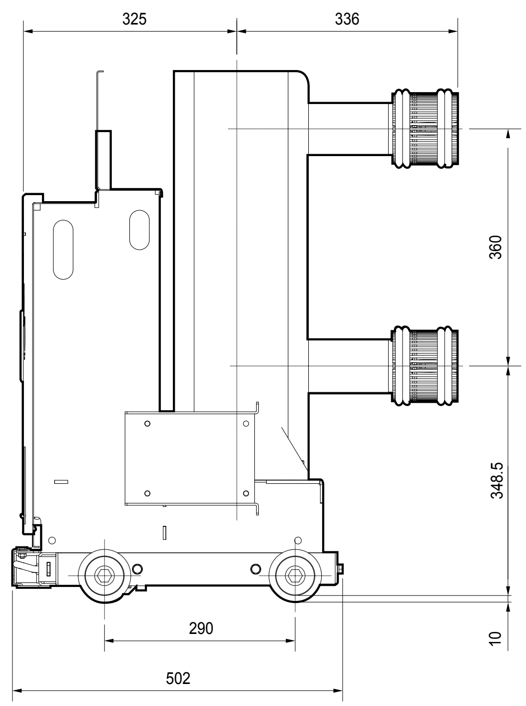
LVB-12G-40D G class (Enclosed, Tulip contact) - (3150A)

(Unit: mm)

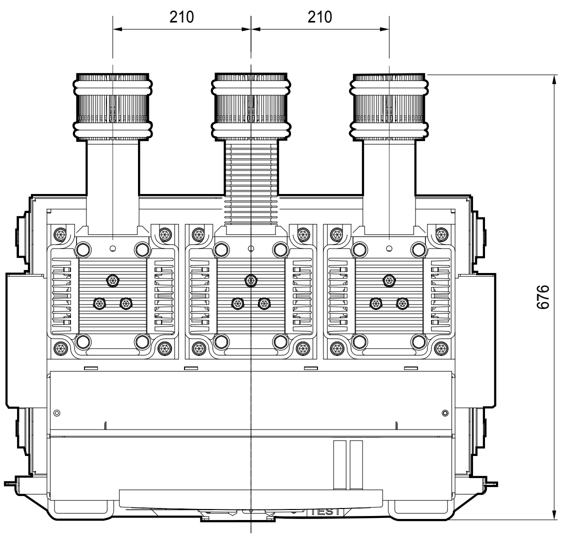
• **Front**



• **Side**



• **Top**

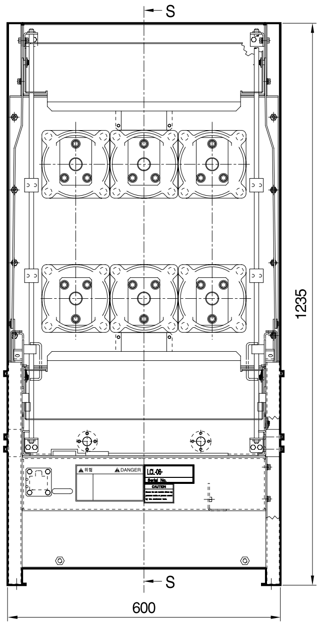


40kA 3150A G class

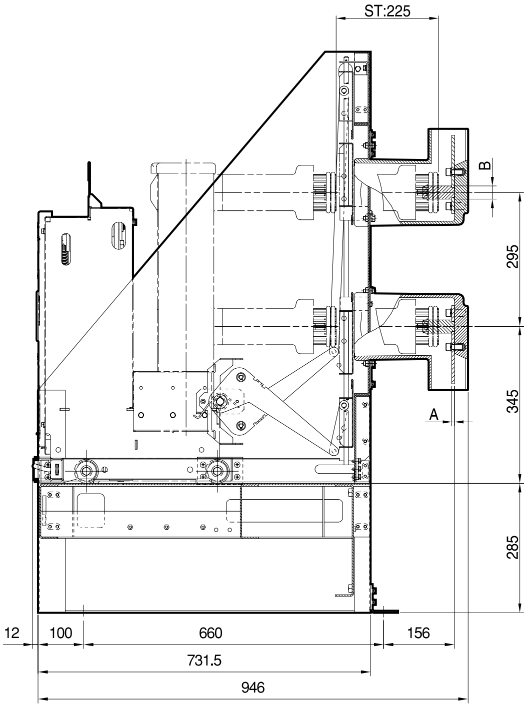
LCL-12G-25D/T, 32D/T G class (Enclosed, Tulip contact) - (630/1250/2000A)

(Unit: mm)

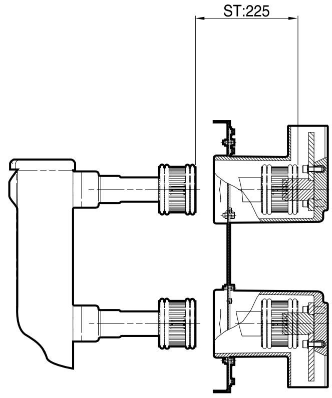
• Front



• Side

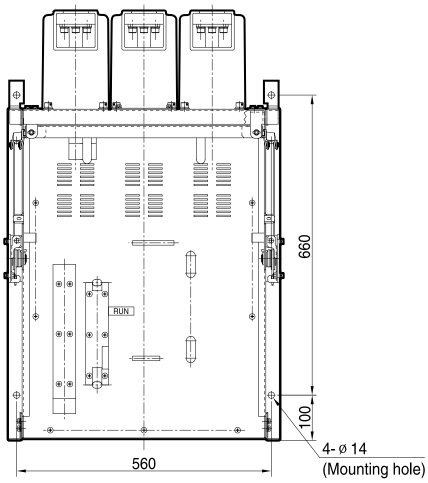


Section S-S



31.5kA 1250/2000A G class

• Top



Rating	25kA	
	1250A	2000A
A	12	25
B	ø 48	

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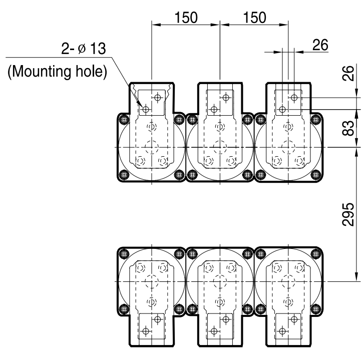


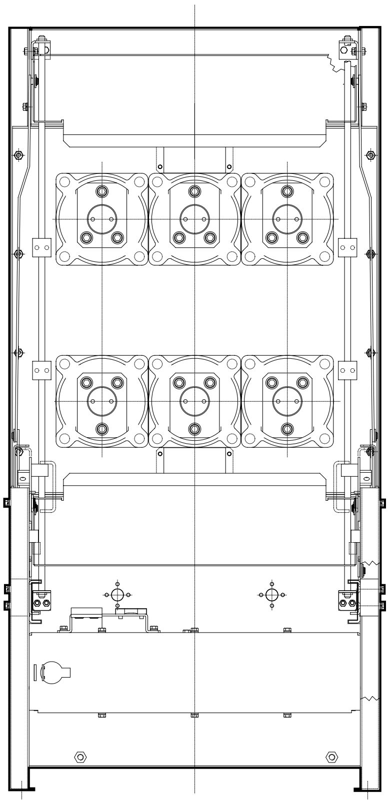
Vacuum Circuit Breaker

12kV dimension (Cradle)

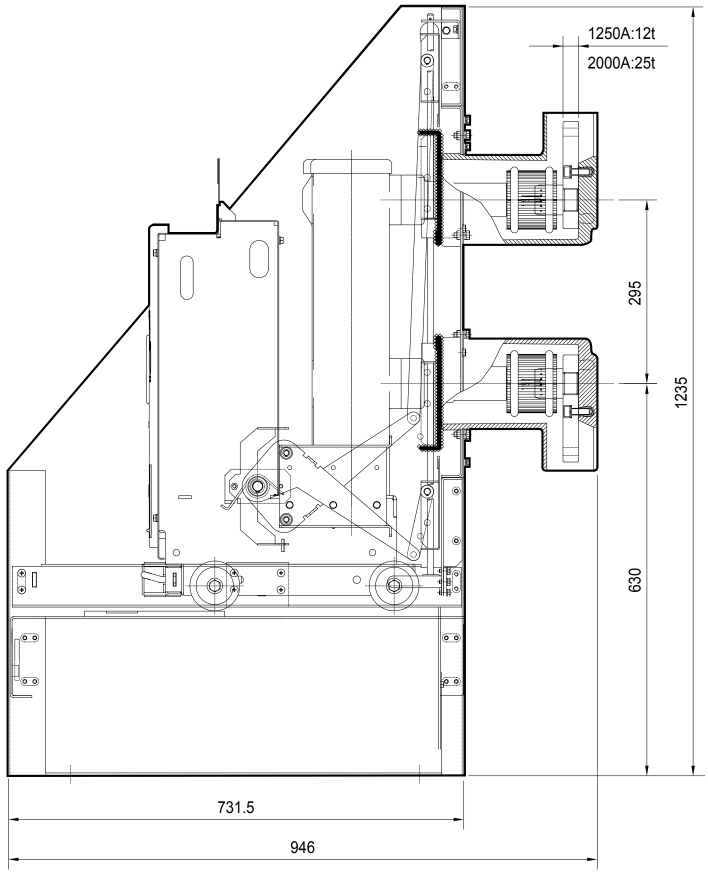
LCL-12G-40D G class (Enclosed, Tulip contact) - (1250/2000A)

(Unit: mm)

• **Front**

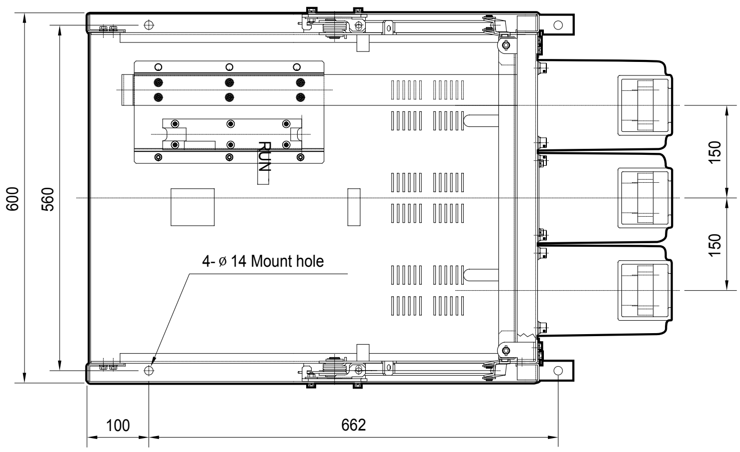


• **Side**

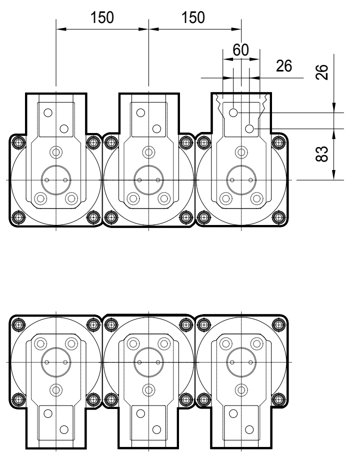


40kA 1250/2000A G class

• **Top**



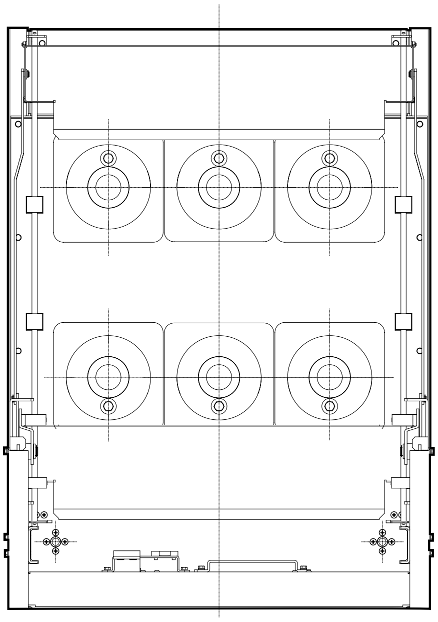
<Terminal conductor>



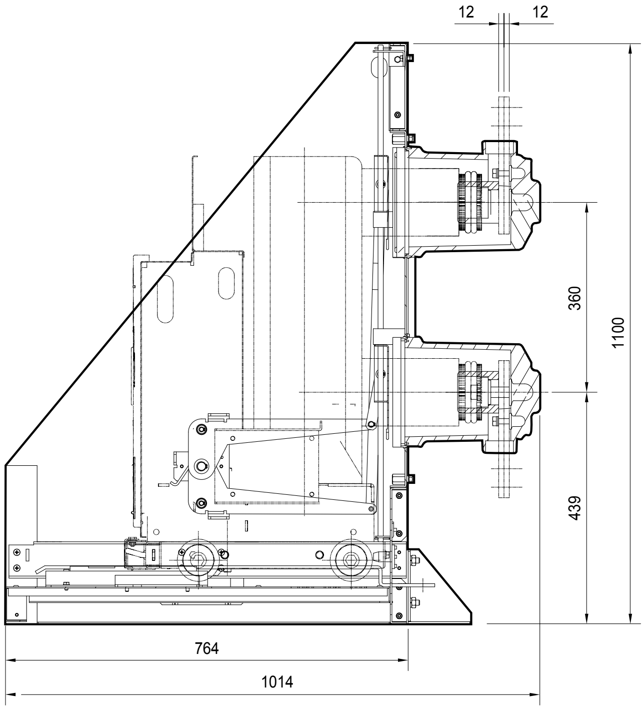
LCL-12G-32D/LCL-12G-40D G class (Enclosed, Tulip contact) - (3150A)

(Unit: mm)

• **Front**

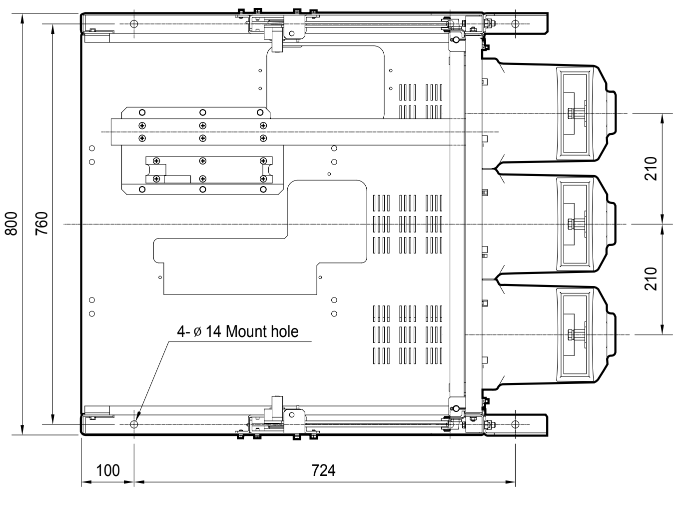


• **Side**

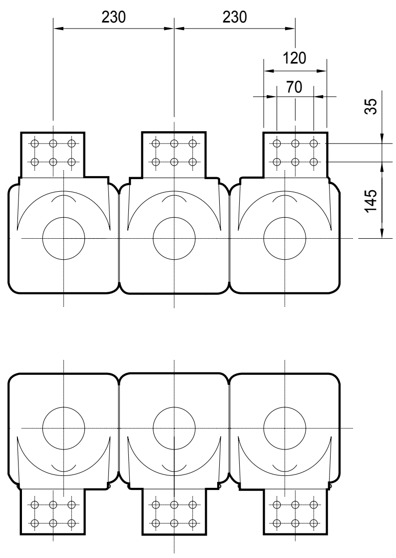


40kA 3150A G class

• **Top**



<Terminal conductor>

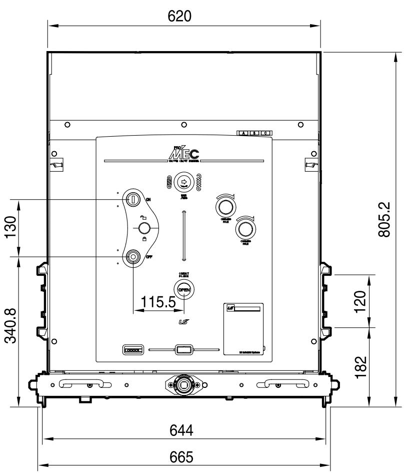


17.5kV dimension (Cradle)

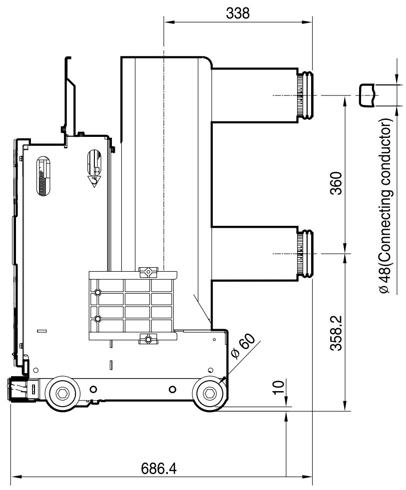
LVB-17G-40D G class (Visible, Tulip contact) - (1250/2000A)

(Unit: mm)

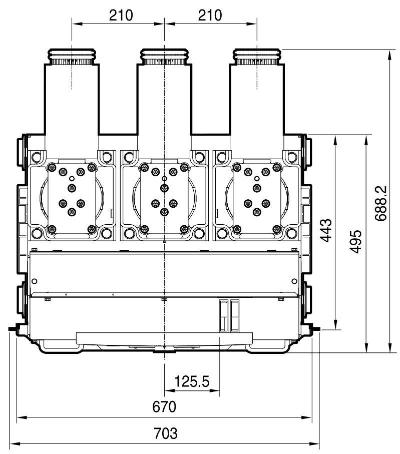
• Front



• Side



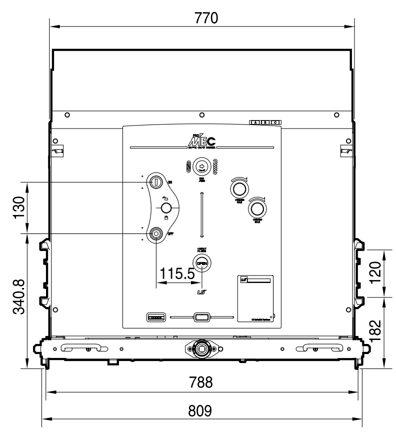
• Top



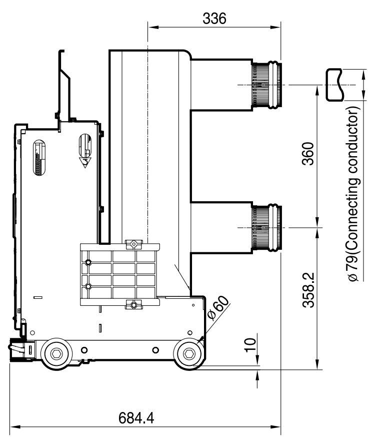
40kA1250/2000A G class

LVB-17G-40D G class (Visible, Tulip contact) - (3150A)

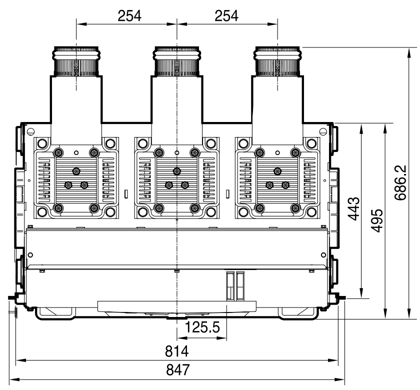
• Front



• Side



• Top

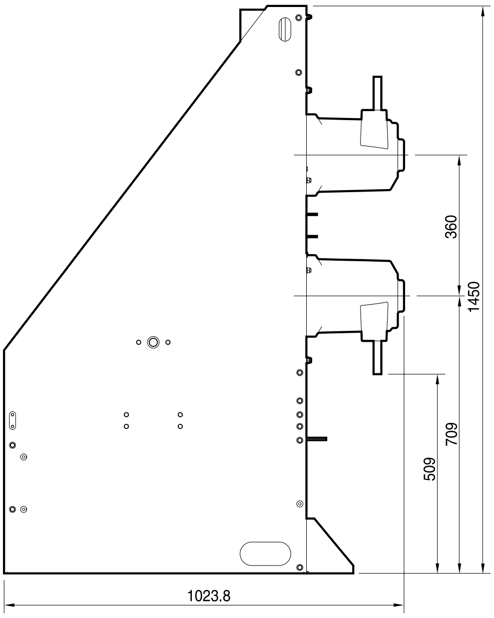


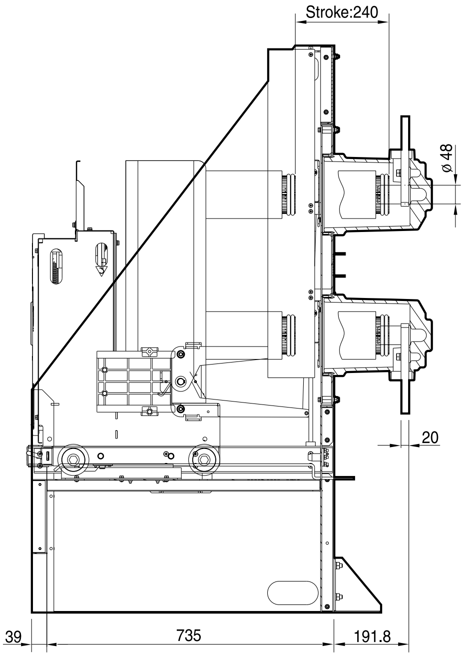
40kA 3150A G class

LCL-17G-40D G class (Visible, Tulip contact) - (1250/2000A)

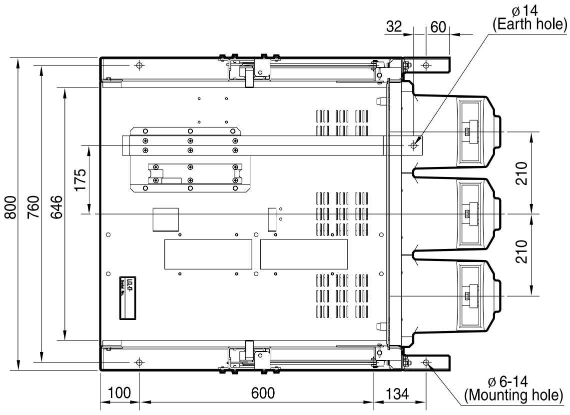
(Unit: mm)

- **Side**

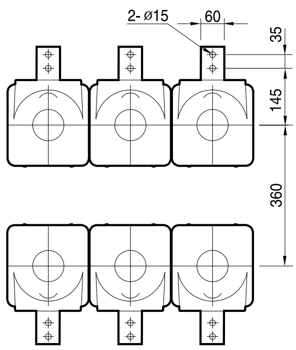


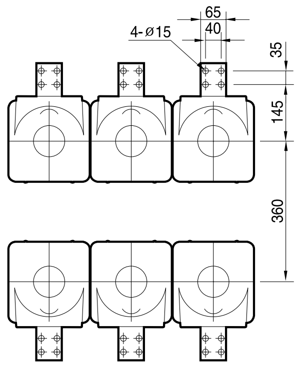


- **Top**



<Terminal conductor>



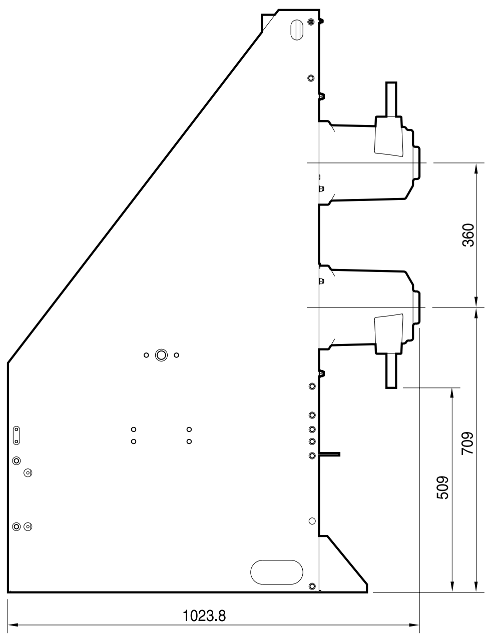


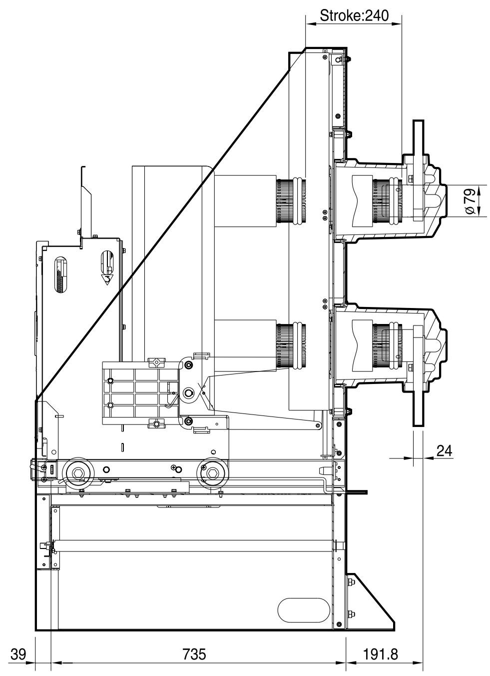
17kV dimension (VCB)

LCL-17G-40D G class (Visible, Tulip contact) - (3150A)

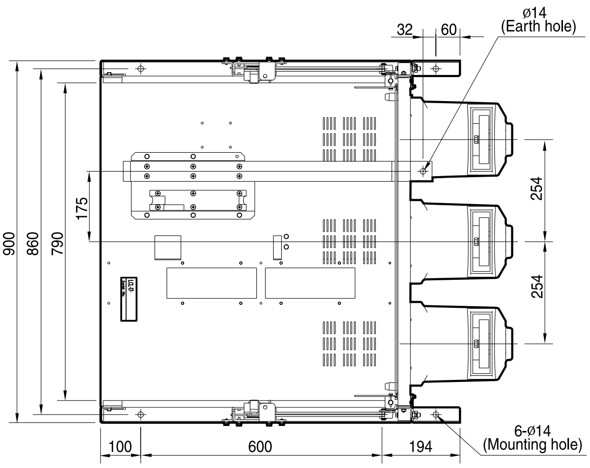
(Unit: mm)

• Side

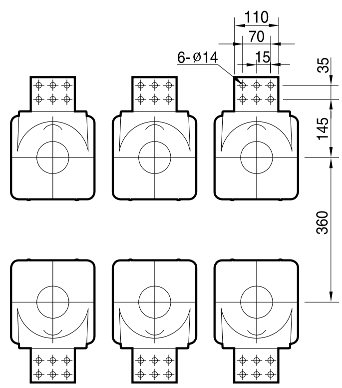




• Top



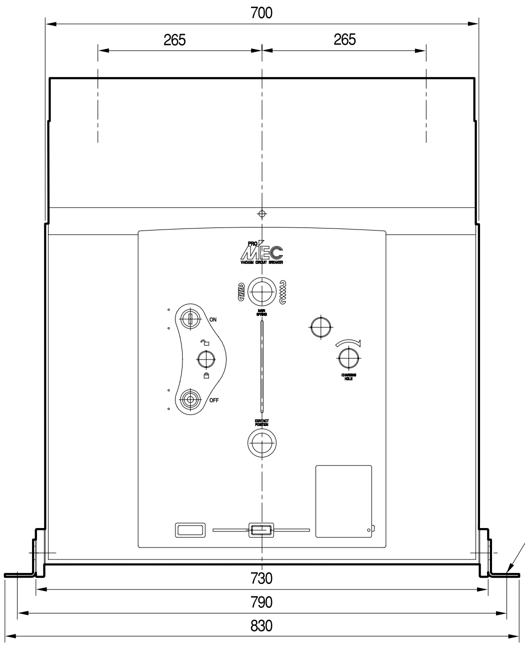
<Terminal conductor>



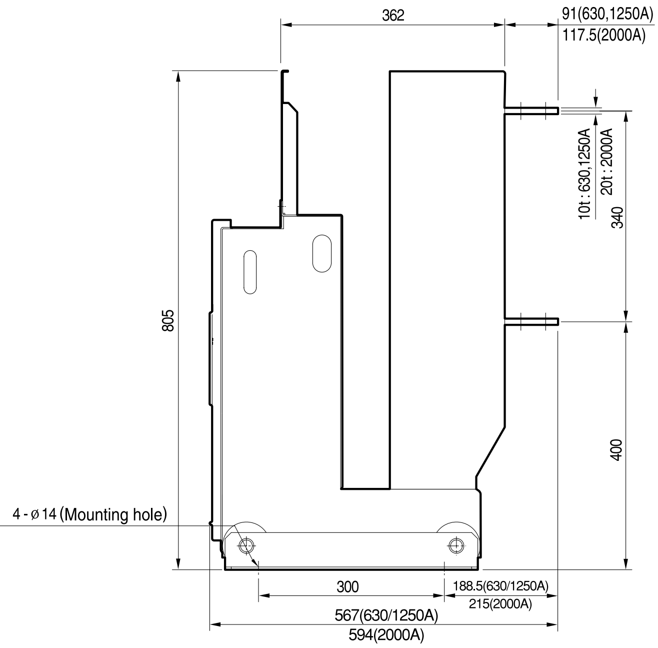
LVB-20P-13D, 16D, 25D (Visible, Fixed) - (630/1250/2000A)

(Unit: mm)

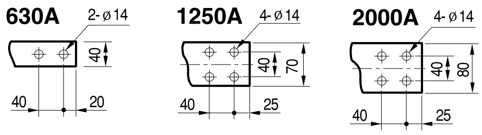
• **Front**



• **Side**

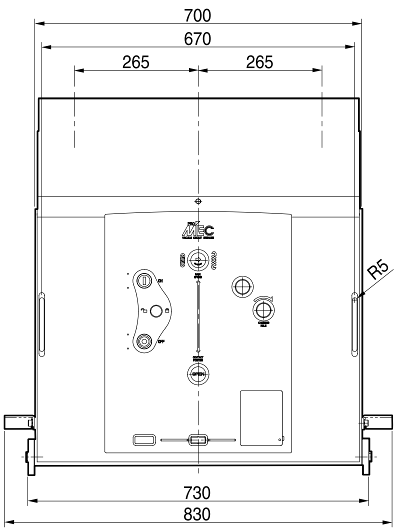


<Terminal conductor>



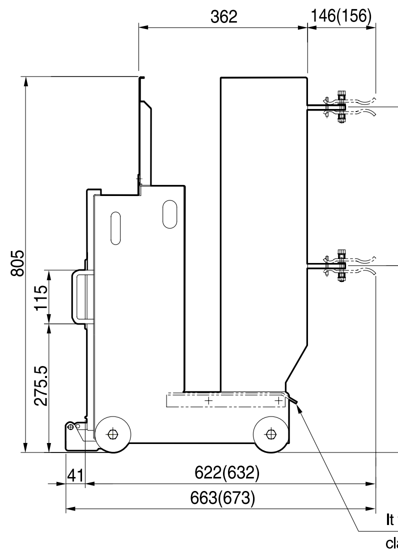
LVB-20E, F-13D/(T), 16D/(T), 25D/(T) E, F class - (630/1250/2000A)

• **Front**

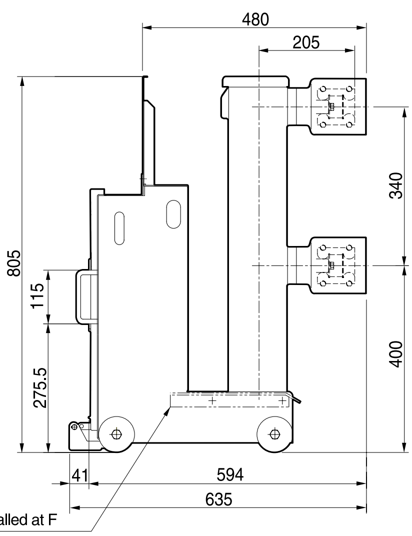


• **Side**

<Visible, Clip contact>



<Enclosed, Tulip contact>



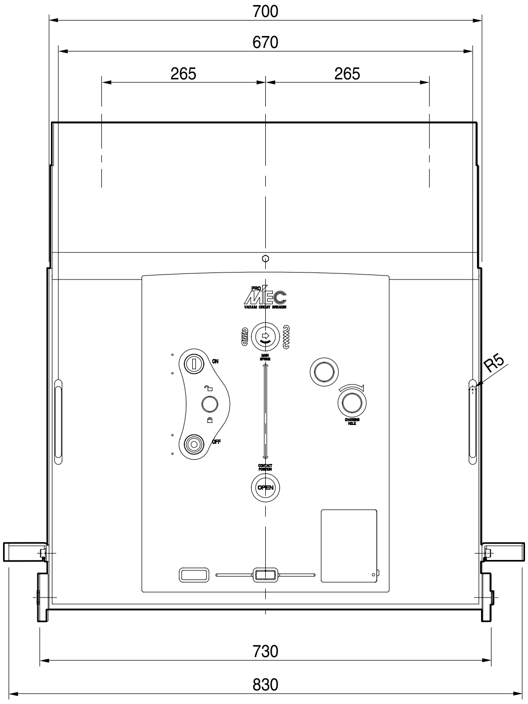
Note) In case of 12.5kA & 16kA 630A, the dimension shown in parenthesis should be applied.

24kV dimension (VCB)

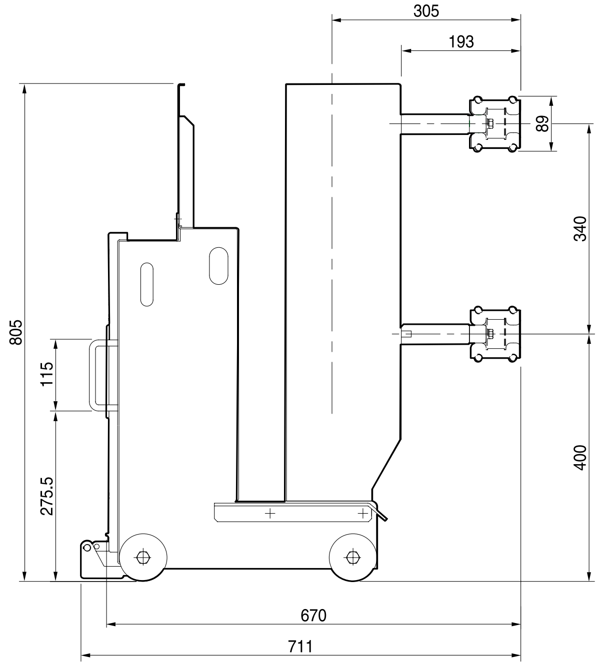
LVB-20G-13D, 16D, 25D G class (Visible, Tulip contact) - (630/1250A)

(Unit: mm)

- **Front**

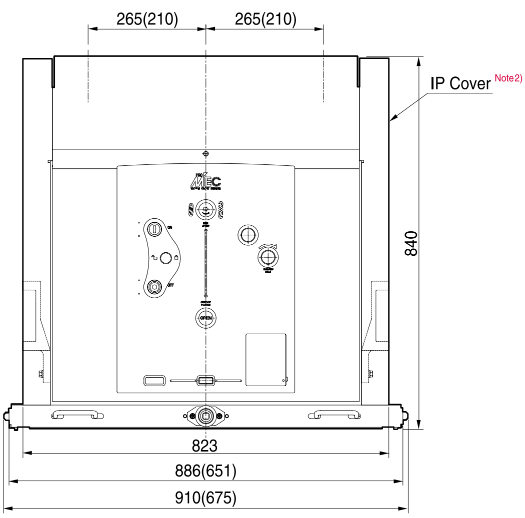


- **Side**



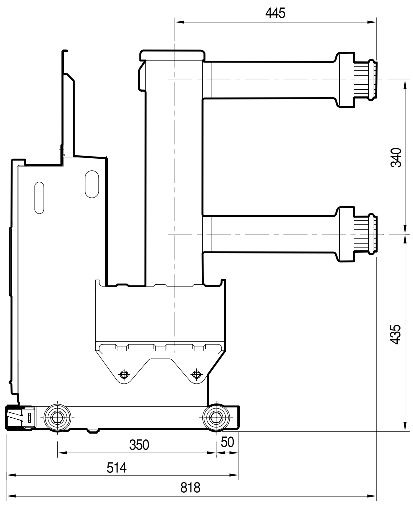
LVB-20G-13D/T, 16D/T, 25D/T G class (Enclosed, Tulip contact) - (630/1250/2000A)

- **Front**

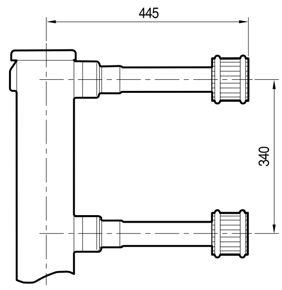


- **Side**

630/1250A



2000A



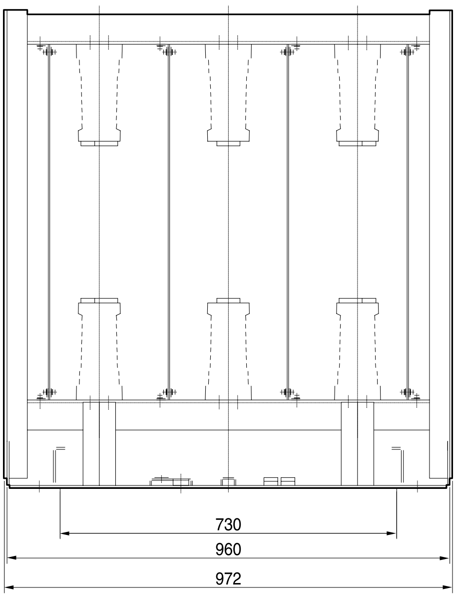
Note 1) ( ): The dimension shown in parenthesis should be applied to LVB-20G-13E/T or LVB-20G-16E/T, LVB-20G-25E/T for 630A and 1250A in case that distance between phase & phase is 210mm.
2) IP Cover applied both sides in case of 265mm phase distance.

PRO MEC

LCL-20E-13D, 16D, 25D E class (Visible, Clip contact) - (630/1250/2000A)

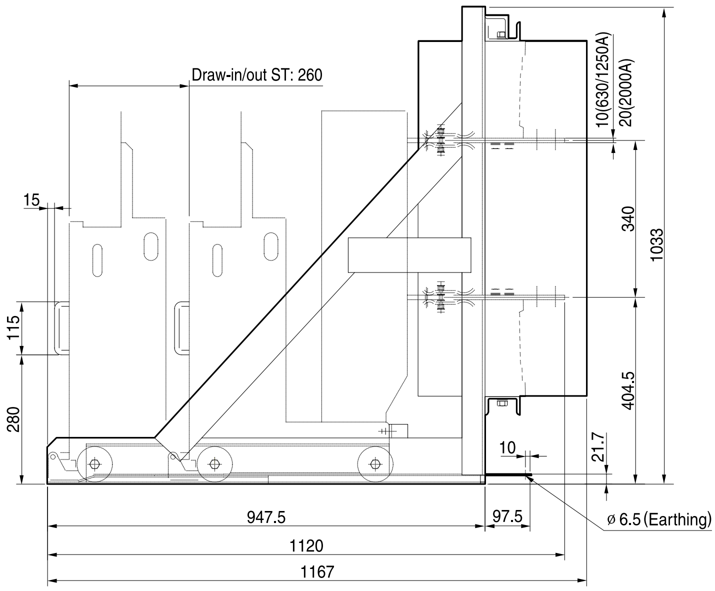
(Unit: mm)

• Front

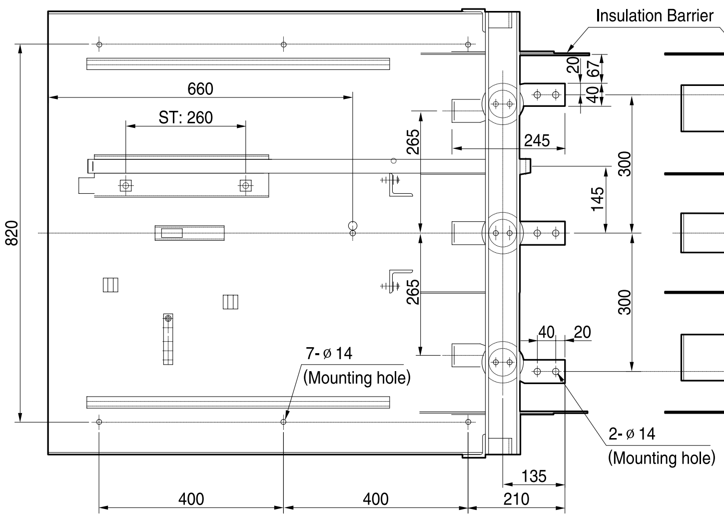


• Side

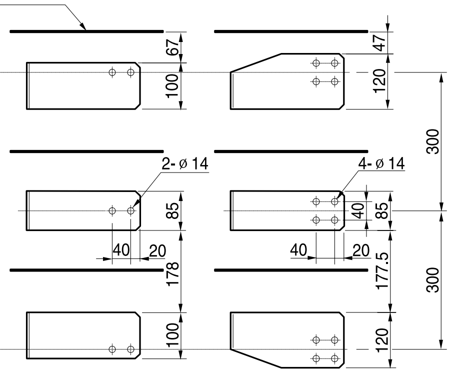
Rating	A	B	T
630, 1250A	768	190.5	10
2000A	778	185.5	20



• Top



<Terminal conductor>



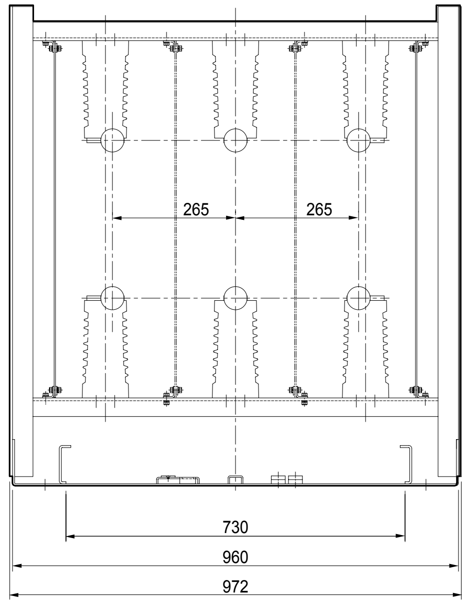
Note) Insulation barrirer is not used for rating 12.5kA 630A and 16kA 630A

24kV dimension (Cradle)

LCL-20E-13D/T, 16D/T, 25D/T E class (Enclosed, Tulip contact) - (630/1250/2000A)

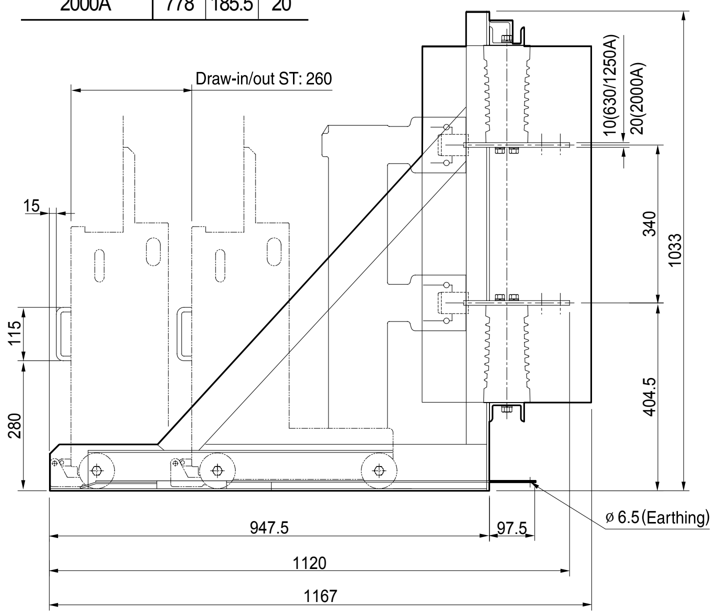
(Unit: mm)

• Front

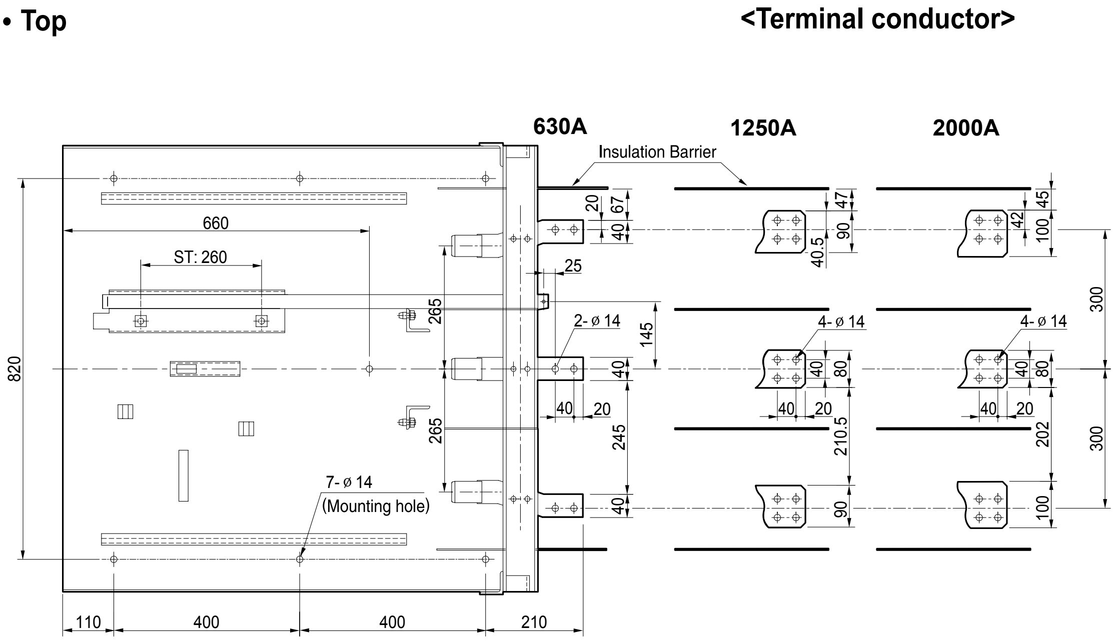


• Side

Rating	A	B	T
630, 1250A	768	190.5	10
2000A	778	185.5	20



• Top

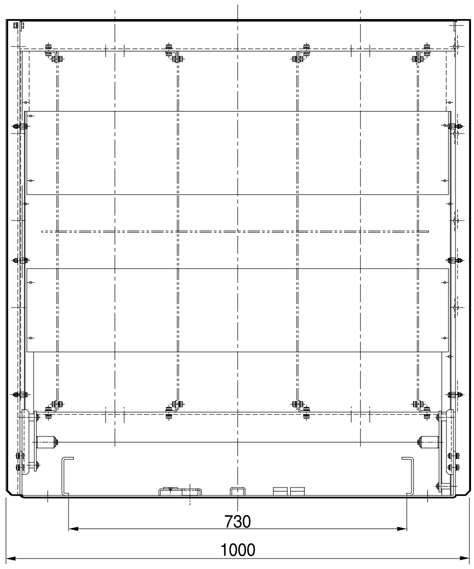


Note) Insulation barrirer is not used for rating 12.5kA 630A and 16kA 630A

LCL-20F-13D, 16D, 25D F class (Visible, Clip contact) - (630/1250/2000A)

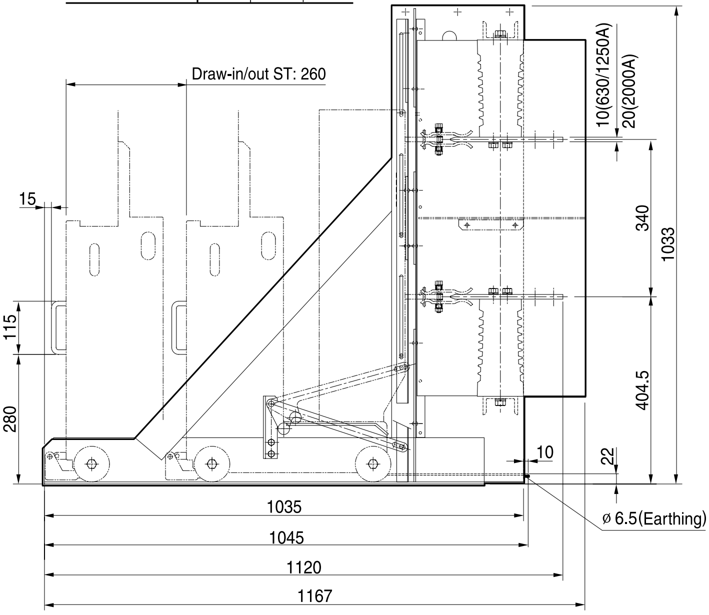
(Unit: mm)

• Front



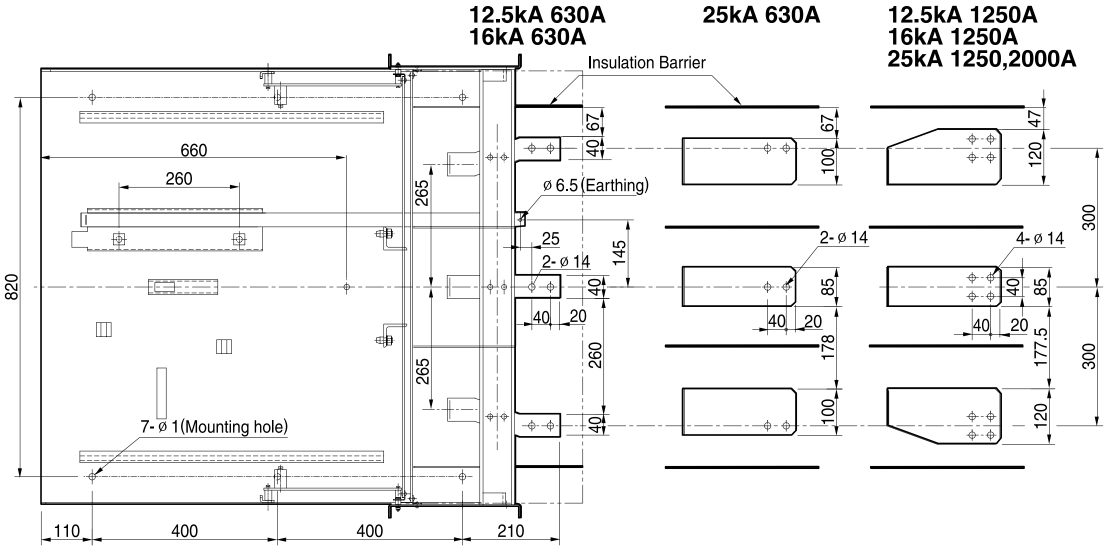
• Side

Rating	A	B	T
630, 1250A	768	190.5	10
2000A	778	185.5	20



<Terminal conductor>

• Top



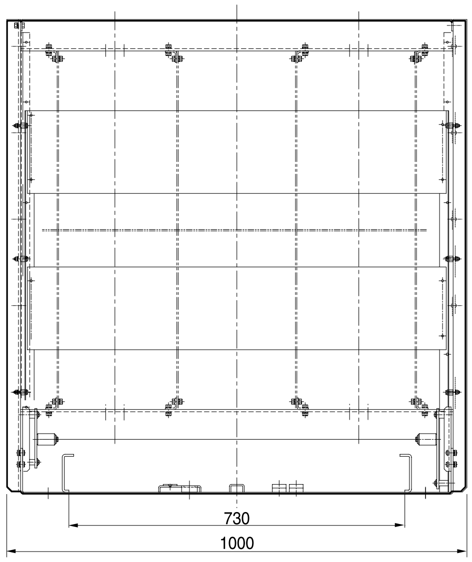
Note) Insulation barrier is not used for rating 12.5kA 630A and 16kA 630A

24kV dimension (Cradle)

LCL-20F-13D/T, 16D/T, 25D/T F class(Enclosed, Tulip contact) - (630/1250/2000A)

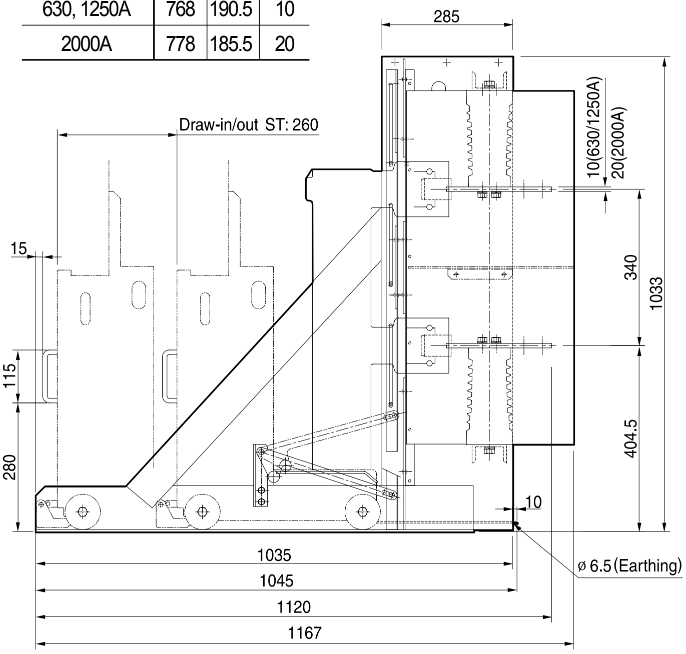
(Unit: mm)

• Front



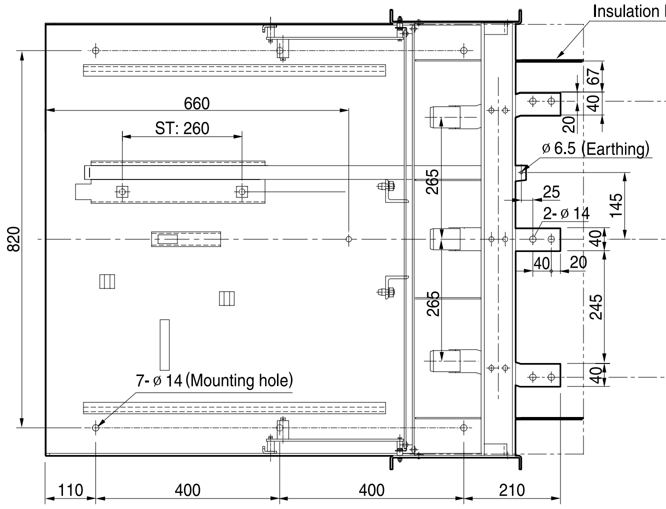
• Side

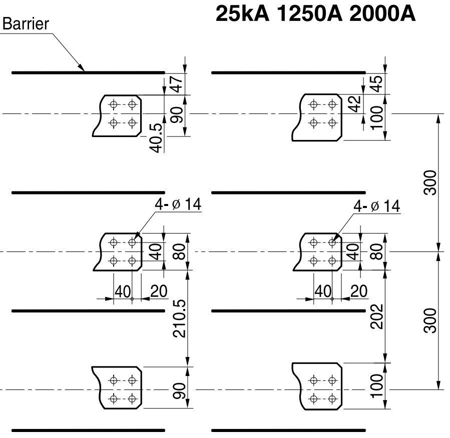
Rating	A	B	T
630, 1250A	768	190.5	10
2000A	778	185.5	20



<Terminal conductor>

• Top



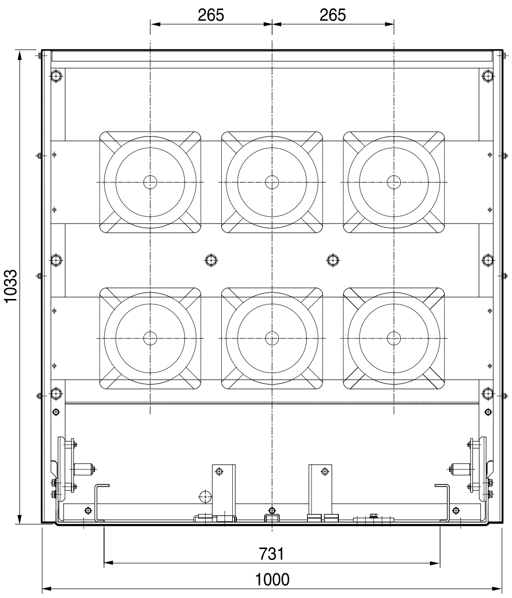


Note) Insulation barrier is not used for rating 12.5kA 630A and 16kA 630A

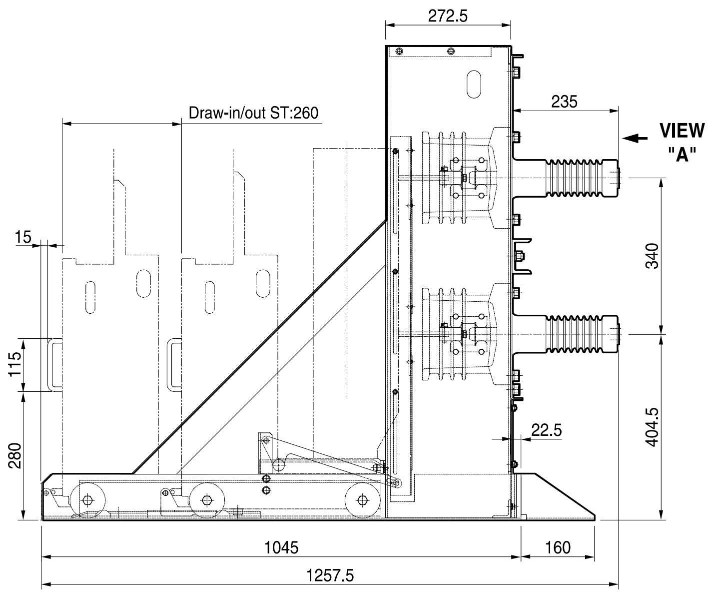
LCL-20G-13D, 16D, 25D   G class (Visible, Tulip contact) - (630/1250A)

(Unit: mm)

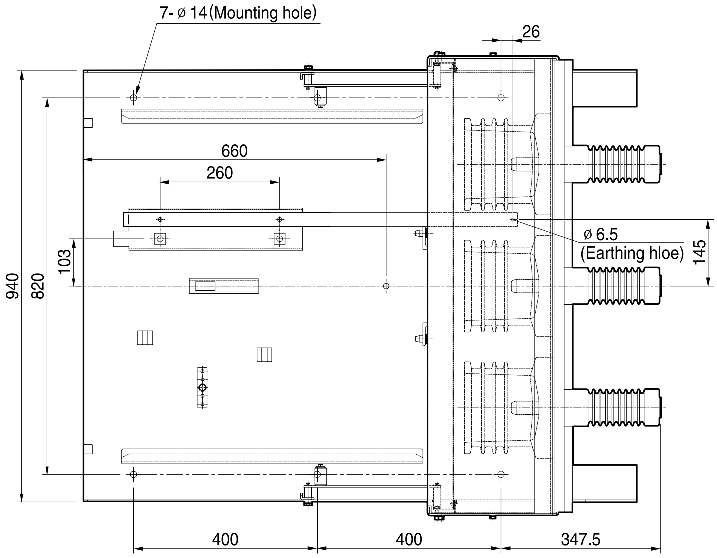
• **Front**



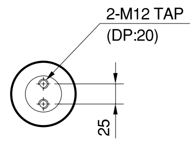
• **Side**



• **Top**



<Terminal conductor>

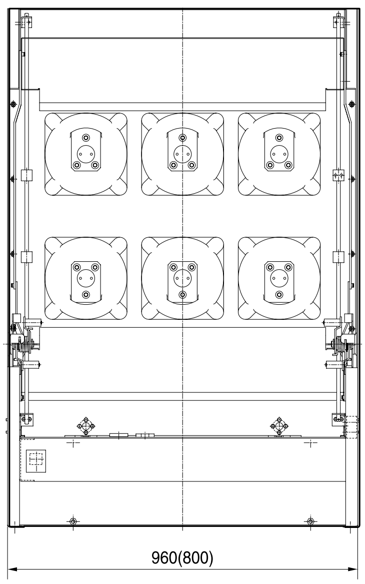


24kV dimension (Cradle)

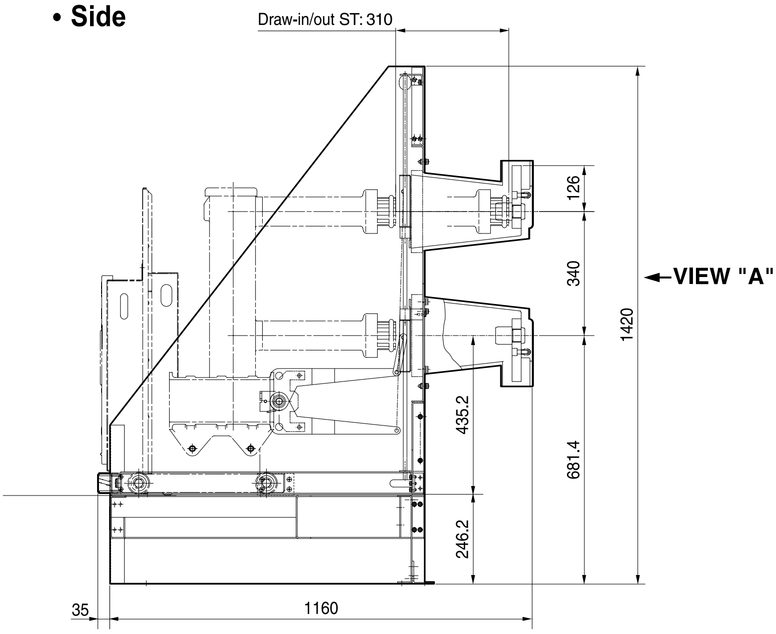
LCL-20G-13D/T, 16D/T, 25D/T   G class (Enclosed, Tulip contact) - (630/1250/2000A)

(Unit: mm)

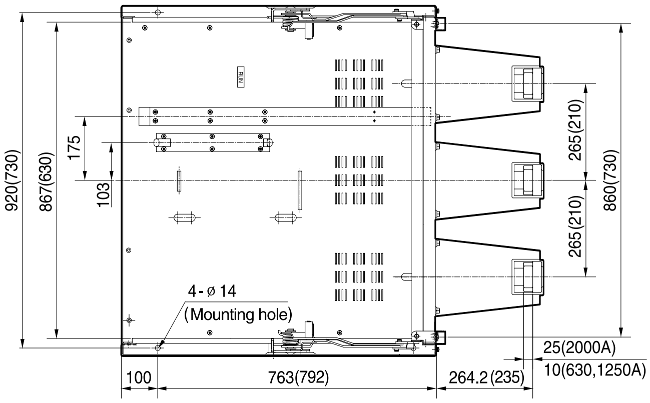
• Front



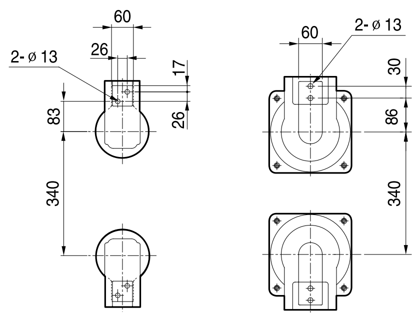
• Side



• Top



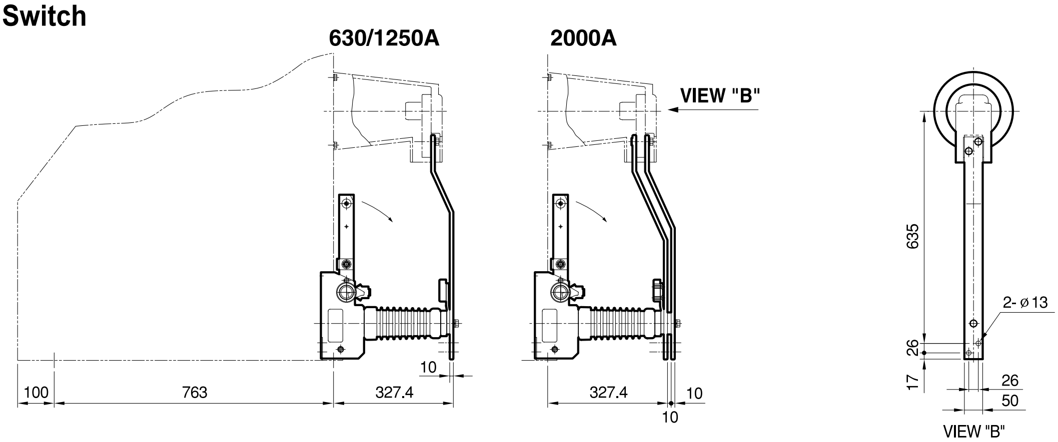
<Terminal conductor>



VIEW "A"   210mm

Note) (   ): The dimension shown in parenthesis should be applied to LVB-20G-13E/T or LVB-20G-16E/T, LVB-20G-25E/T for 630A and 1250A in case that distance between phase & phase is 210mm.

• Earthing Switch



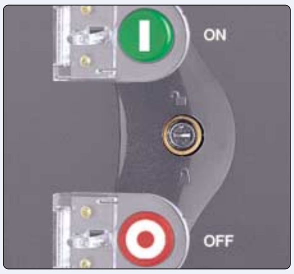
Accessories for VCB

Key lock

When it is locked by a key, the closing operation is not available (electrically and mechanically) without a Key.

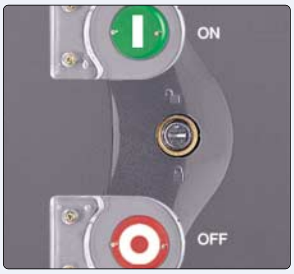
Button padlock

Button padlock protects 'ON' or 'OFF' button when accident is occurred by operation at discretion.
It is available to operate after release button padlock.



Button cover

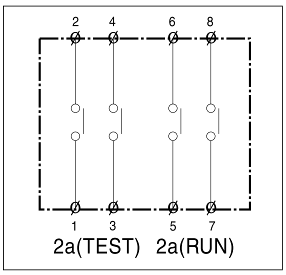
Button cover protects 'ON' of 'OFF' button when accident is occurred by operation at discretion. It is available to operate by push bar.




<Push bar>

Position switch (Cell switch)

Indicating the position (Run or Test) of a VCB, by mechanically pressing the switch when a VCB change the position.
- RUN: 2a
- TEST: 2a



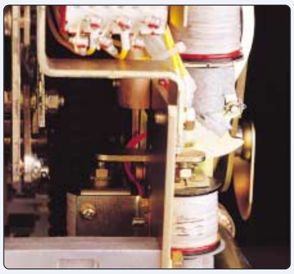
Note) In case that position of VCB changed to "Run" or "Test" position, "a" contact will be closed.


<G class>

Accessories for VCB

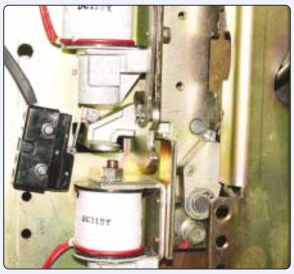
Secondary coil (Preparatory trip coil)

The main coil and the preparatory coil is connected in parallel. So even though there happens a fault in the trip coil, the VCB can be tripped by one of the two trip coils.



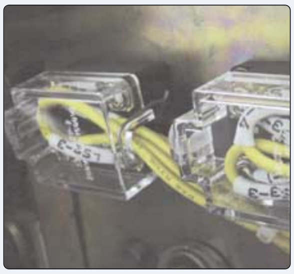
Latch checking switch

When the Latch is in abnormal position, the Latch checking switch prevents the closing operation even though there is the 'Closing' signal.



Charge indicator

Remotely indicates the charging is completed.
(Standard Feature)
- Terminal No.: 9, 10



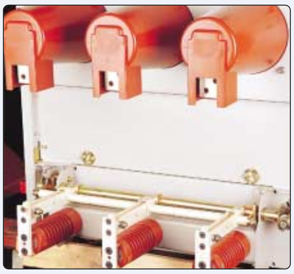
Position padlock

The hole to prevent the draw-in and out of a VCB from the present position.('Run' or 'Test')
Standard option in the interlock lever of the E, F class draw-out type VCB. (Hole size = ø 8)

Accessories for Cradle

Earthing switch (for G class draw-out type only)

For the safety during the maintenance of a VCB panel, discharge the charging current in the load side of a VCB with this earthing switch.

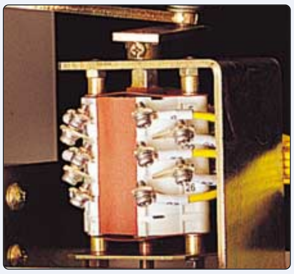


Padlock of earthing switch (for G class draw-out type only)

The hole to prevent the accident through carelessness earthing switch operation, the locking of the earthing switch is available when the switch is in 'OFF' position.
(Hole size = ø 8)

Position switch of the earthing switch (for G class draw-out type only)

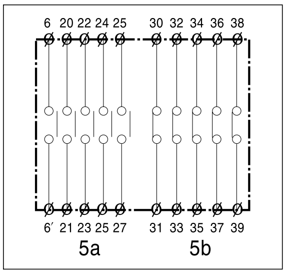
Indicates the 'ON' or 'OFF' status of the earthing switch. (5a5b)



<Earthing Switch Position Switch>

Locking coil of earthing switch (for G class draw-out type only)

To prevent the accident through carelessness earthing switch operation, the earthing switch can be changed to 'ON' position after releasing the lock by magnetizing the coils.



<Earthing Switch Locking Coil>

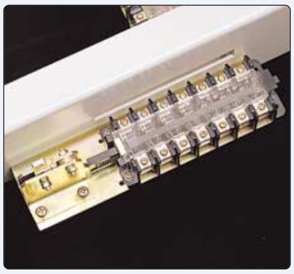
Accessories for Cradle

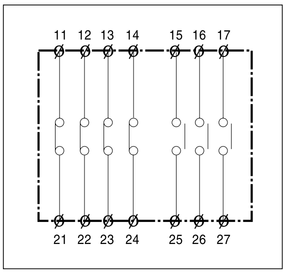
Shutter padlock

The hole to lock the shutters (load and line side) in close position, to increase the safety during the maintenance of a VCB draw-out position.
(Hole size = ø 8)

Mechanically operated cell switch (MOC) -for G class draw-out type only

The auxiliary switch (3a4b), which Indicate the 'ON' or 'OFF' condition of a VCB, but operated only when the VCB is in 'Run' state. (Installed in the bottom of a cradle)

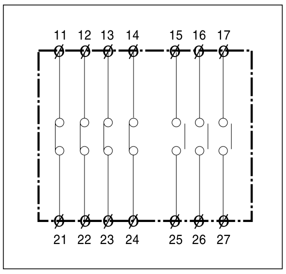




Note) #11, 21 are Early "b" contact

Truck operated cell switch (TOC) -for G class draw-out type only

The auxiliary switch (3a4b), which indicate the 'Run' state of a VCB and is operated by the movement of a VCB frame. (Installed in the bottom of a cradle)



Note) #11, 21 are Early "b" contact

Code plate (Miss insertion prevention) -for E, F class draw-out type only

To prevent the insert a VCB to a cradle, when the ratings of VCB and cradle are different.

Padlock

To prevent the insert draw-in/out handle to a screw hole by operating G class VCB temporarily

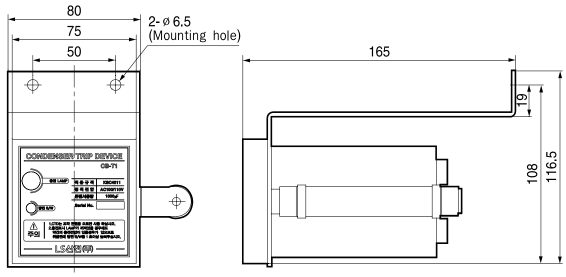
Optional accessories

Capacitor trip device (CTD)

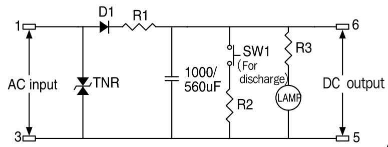
When the control power is off, the CTD supply the power for tripping a VCB.

Ratings	Specification	
Type CB-T1		CB-T2
Rated input voltage	AC100/110V	AC200/220V
Frequency (Hz)	50/60	50/60
Charging volt(V)	140/155	280/310
Charging time	Within 10 Sec. after the AC power off	
Tripping time	Within 30 Sec. after the AC power off	
Allowable Input voltage range	85% ~ 100%	85% ~ 110%
Capacitor rating(μF)	1000	560

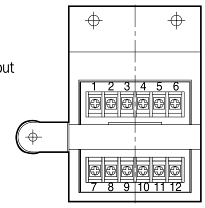
• Dimension



• Connection diagram



• CDT

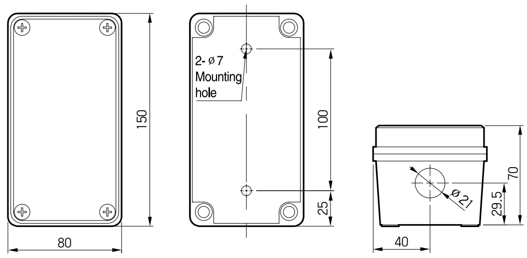


Rectifier

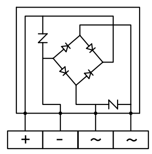
When the DC power is not available, rectify the AC power and get the DC power for closing coil.

Type	AC Input voltage	Output current	Rating time
VCB-X	1ø 100/110V 1ø 200/220V	40A DC	10 sec.

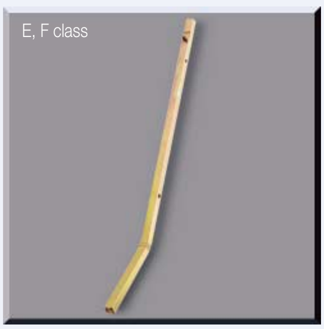
• Dimension



• Connection diagram



Standard tool



Handle for draw-in and out

Handle for draw-in and out the VCB
(Standard feature in the draw-out type)

Manual charging handle

Handle for charging the spring manually.
(Standard feature)

Types and ordering information

12kV

LVB – 12 G – 32 D / 12 – 1A 2B – B, C1, D1

LS VCB

Rated voltage	
12	12kV

Installation method	
G	G class draw-out type
M	G class draw-out type + Bushing

Breaking current	
32	31.5kA
40	40kA

Revision No.	
D	Pro-MEC

Rated current	
12	1250A
20	2000A
30	3150A

Control voltage	
1A	DC110V
1B	DC220V
1C	DC48V
1E	DC125V

Auxiliary switch	
2B	4a4b(A type connector)
2E	10a10b(A type connector)
2G	4a4b(B type connector)
2H	10a10b(B type connector)

Accessories	
B	Position Switch (RUN/TEST:2a2a)
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	Key Lock
H	Secondary Trip Coil(Preparatory trip coil)
J	Fire-endurable wiring cable ass'y
K	Opening Latch Checking Switch
S	Pad Lock (G class)
T	Enclosed type, Tulip contact

Cradle

LCL – 12 G – 32 D / 12 – A, B, C

LS Cradle

Rated voltage	
12	12kV

Installation method	
G	G class draw-out type

Breaking current	
32	31.5kA
40	40kA

Revision No.	
D	Pro-MEC

Rated current	
12	1250A
20	2000A
30	3000A

Accessories	
T	Enclosed type, Tulip contact

17.5kV

LVB – 17 G – 40 D / 12 – 1A 2B – B, C1, D1

LS VCB

Rated voltage	
17	17.5kV

Installation method	
P	Fixed type
E	E class draw-out type
F	F class draw-out type
G	G class draw-out type

Breaking current	
40	40kA

Revision No.	
D	Pro-MEC

Rated current	
12	1250A
20	2000A
30	3150A

Control voltage	
1A	DC110V
1B	DC220V
1C	DC48V
1E	DC125V

Auxiliary switch	
2B	4a4b(A type connector)
2E	10a10b(A type connector)
2G	4a4b(B type connector)
2H	10a10b(B type connector)

Accessories	
B	Position Switch (RUN/TEST:2a2a)
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	Key Lock
H	Secondary Trip Coil(Preparatory trip coil)
K	Opening Latch Checking Switch
S	Pad Lock (G class)
J	Fire-endurable wiring cable ass'y

Cradle

LCL – 17 G – 40 D / 12 – A, B, C

LS Cradle

Rated voltage	
17	17.5kV

Installation method	
E	E class draw-out type
F	F class draw-out type
G	G class draw-out type

Breaking current	

Revision No.	
D	Pro-MEC

Rated current	
12	1250A
20	2000A
30	3150A

Accessories	
A	MOC (3a4b) + TOC (3a4b)

Note) 'A' is for 'G' class only

Types and ordering information

24kV

LVB – 20 G – 13 D / 06 1A 2B B, C, D

LS VCB

Rated voltage	
20	24kV

Installation method	
P	Fixed type
E	E class draw-out type
F	F class draw-out type
G	G class draw-out type
M	G class draw-out type + Bushing

Breaking current	
13	12.5kA
16	16kA
25	25kA

Revision No.	
D	Pro-MEC
Note1) E	Pro-MEC (Minimized type)

Rated current	
06	630A
12	1250A
20	2000A

Control voltage	
00	-
1A	DC110V
1B	DC220V
1C	DC48V
1E	DC125V
1F	AC220(M), DC110(TC)
1H	AC220(M), DC220(TC)
1T	AC110(M), DC110(TC)

Auxiliary switch	
Note2) 00	-
2B	4a4b(A type connector)
2E	10a10b(A type connector)
2G	4a4b(B type connector)
2H	10a10b(B type connector)

Accessories	
B	Position Switch (RUN/TEST:2a2a)
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	Key Lock
H	Secondary Trip Coil (Preparatory trip coil)
J	Fire-endurable wiring cable ass'y
K	Opening Latch Checking Switch
P1	Dummy VCB(AMP Jack)
P2	Dummy VCB(Phoenix Jack)
Q	Earthing Truck(Lower terminal earthing)
R	Earthing Truck(Upper terminal earthing)
S	Pad Lock (G class)
T	Enclosed type, Tulip contact

Option	
N	CTD(Capacitor Trip Device)
O	Rectifier

Note) 1. Version E is available only at 24kV G class and its distance between phases is 210mm.
2. "00" is used for ordering Earthing Truck and Dummy VCB
4. Accessory only for versions D and E

Cradle

LCL – 20 G – 13 D / 06 A, B, C

LS Cradle

Rated voltage	
20	24kV

Installation method	
E	E class draw-out type
F	F class draw-out type
G	G class draw-out type

Breaking current	
13	12.5kA
16	16kA
25	25kA

Revision No.	
A	Conventional
D	Pro-MEC
Note1) E	Pro-MEC (Minimized type)

Rated current	
06	630A
12	1250A
20	2000A

Accessories	
Note2) A	MOS(3a4b)+ TOC(3a4b)
Note2) B	Earthing Switch
Note2) C	Earthing Switch Position Switch+ Earthing Switch Locking coil
T	Enclosed type, Tulip contact
PS	Position S/W Block (24kV E/F class only)

Note) 1. Version E is available only at 24kV G class and its distance between phases is 210mm.
2. Versions A, B and C are available only at G class VCB.

Features

Accumulation of more than 20 years of vacuum-related technologies

Simplified arc extinguishing system
Spiral contact structure with Radial magnetic field provides effective dispersing of the acr energy.

Simple structure and high quality
Sealing after complete removal of gas in the vacuum chamber in order to secure a long vacuum confidentiality

Small size and light weight
The new contact material used to enhance the competitiveness of the size

Wide rated coverages
Wide interrupting range from 6kV up to 40.5kV 40kA

High reliability and electrical life
Certification by KERI and KEMA according to the latest standard IEC62271-100 (2008) E2, LIST3, M2

Modeling system

LV7 | A | - | P

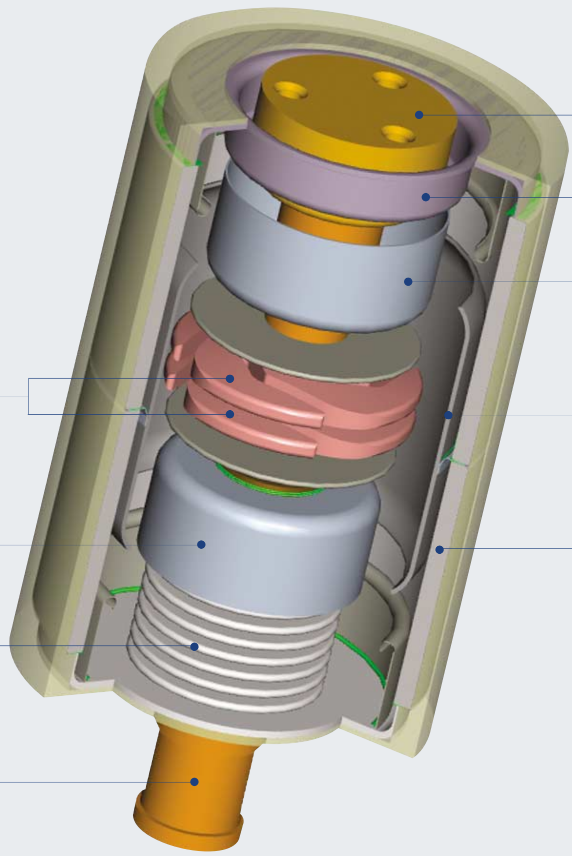
Basic type	
L	LS
V	Vacuum
7	Series No.

Revision No
A, B···

ETC.	
Null	Straight type
P	Potting type
C	Wave type
E	Embedded type
G	Gas Insulation type

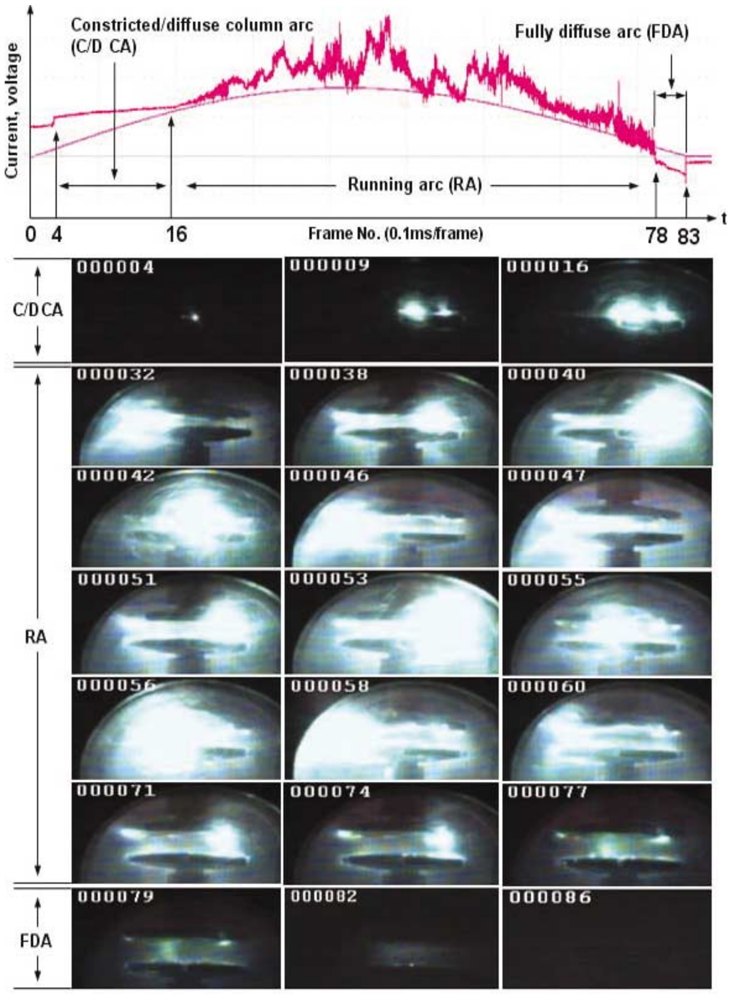
VI internal structure

Largely movable and fixed electrodes and main shield compose the Susol VI.
The main components are shown in the following.



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.

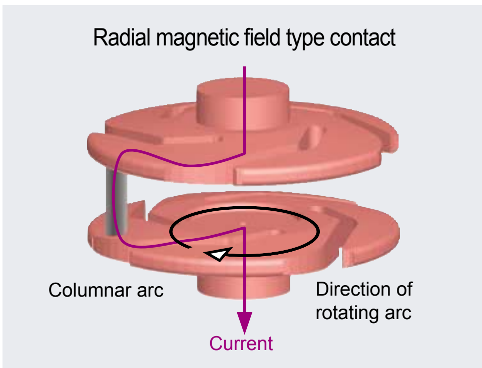
Interrupting action by VI



Arc voltage waveforms and arc image captured during arcing time

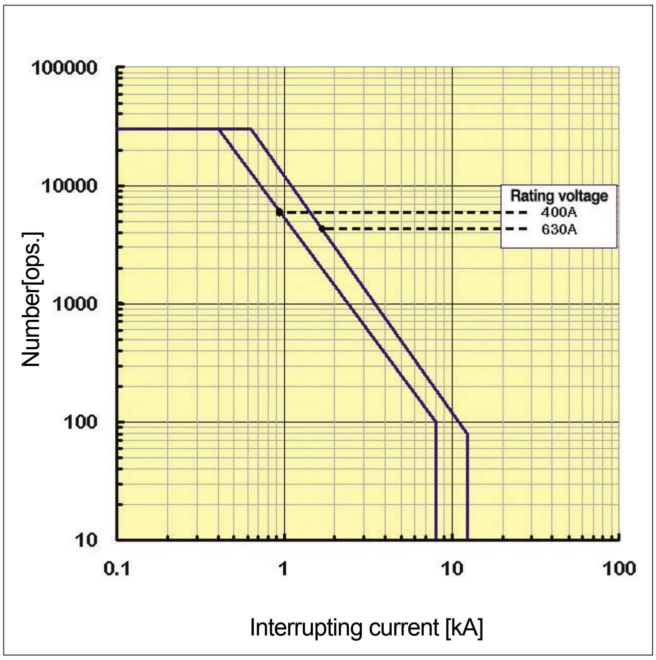
In case of using the flat contact any of the designs do not reflect on when contacts are opening the arc with high temperature is contracted and fixed in the center of the contacts, Which is called pinch effect. To prevent the effect two kinds of contact shapes are designed.
One is Axial magnetic field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

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



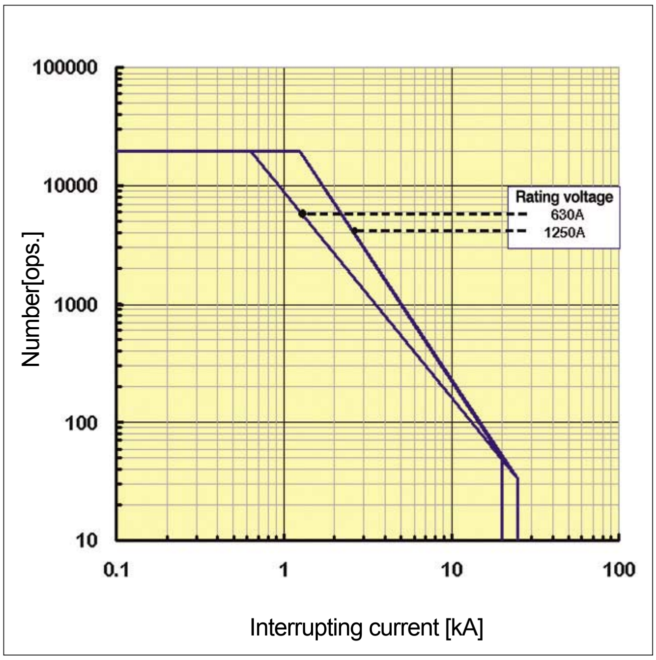
Arc driving principle in the contacts of Radial magnetic field

VI endurance by interrupting current



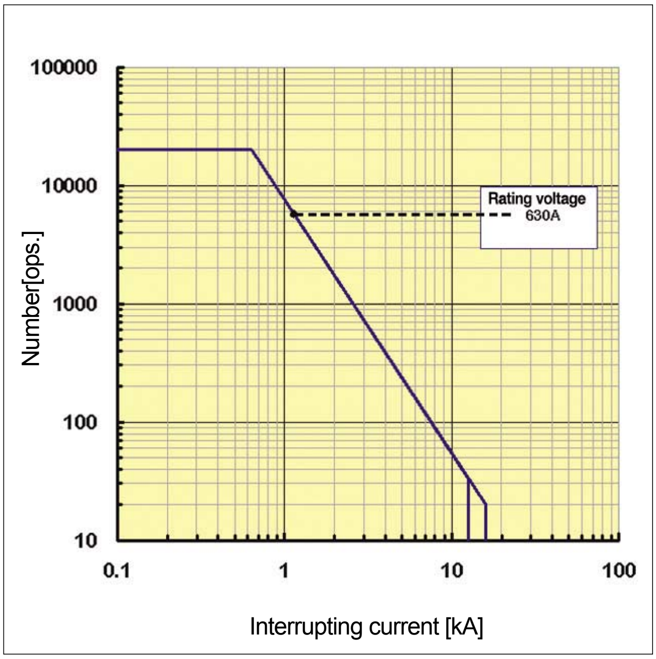
VI model LV2 at 7.2kV

- N : Operation numbers
- I : Interrupting current



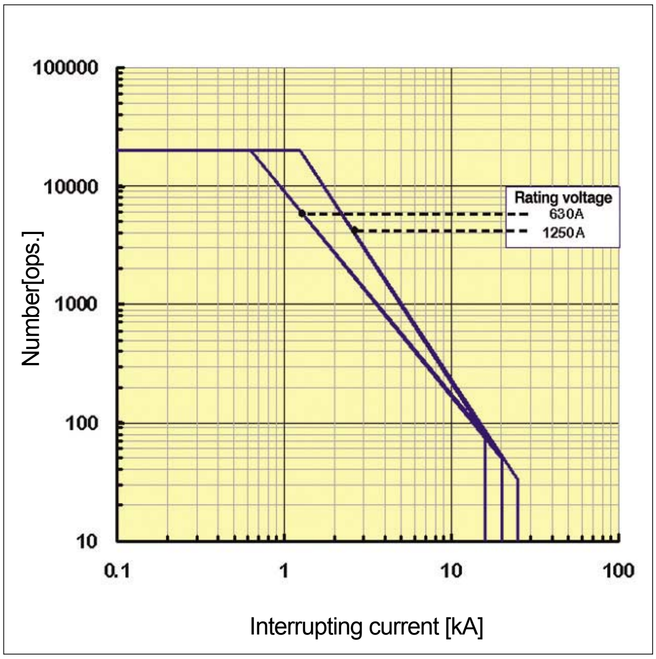
VI model LV3 at 7.2kV

- N : Operation numbers
- I : Interrupting current



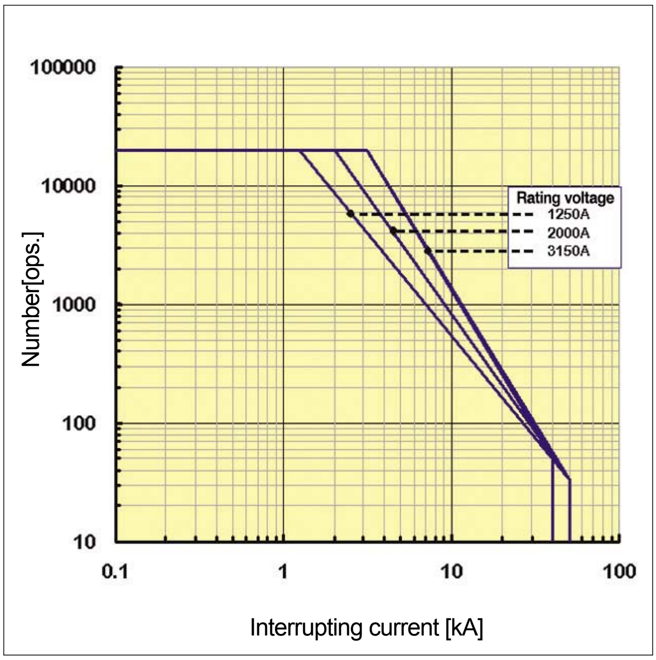
VI model LV4 at 24kV

- N : Operation numbers
- I : Interrupting current



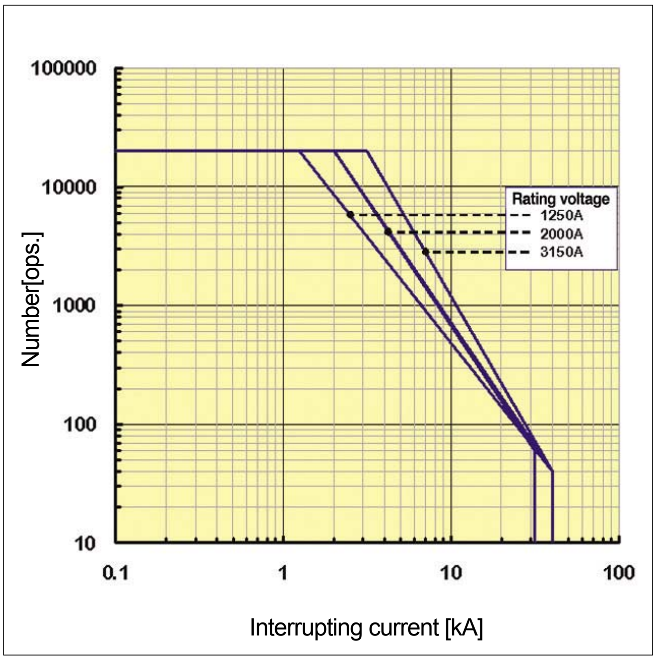
VI model LV5 at 17.5kV

- N : Operation numbers
- I : Interrupting current



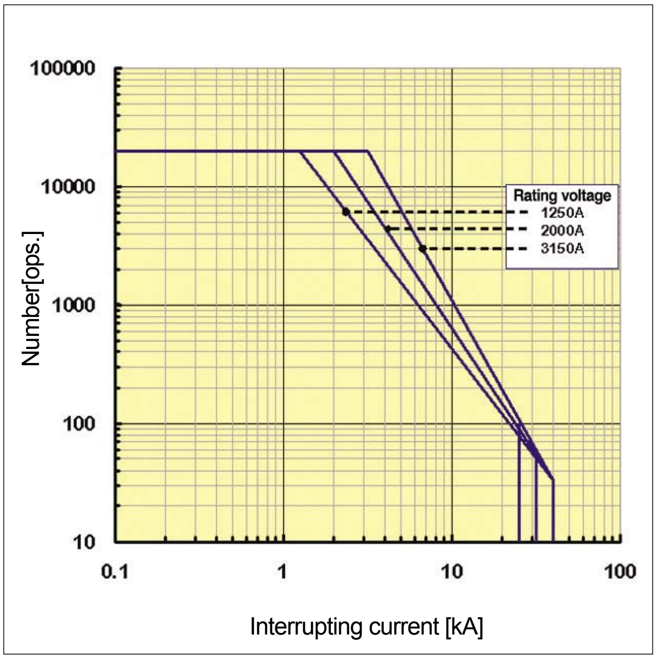
VI model LV8 at 17.5kV

- N : Operation numbers
- I : Interrupting current



VI model LV7-P1 at 24kV

- N : Operation numbers
- I : Interrupting current



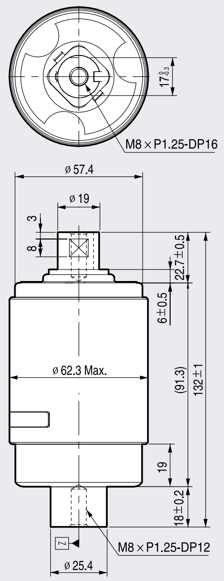
VI model LV8 at 36kV

- N : Operation numbers
- I : Interrupting current

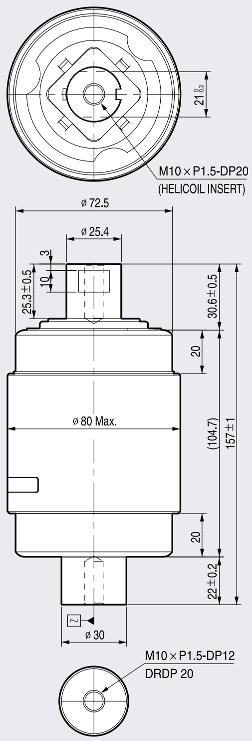
Note) 1. Above graphs represent the characteristics of the electrical life of LS Susol VCB.
2. Life characteristics of each model in each rating represents the LOG-LOG graphs.

Dimensions

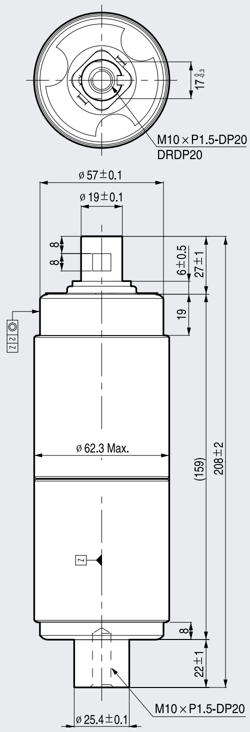
LV2



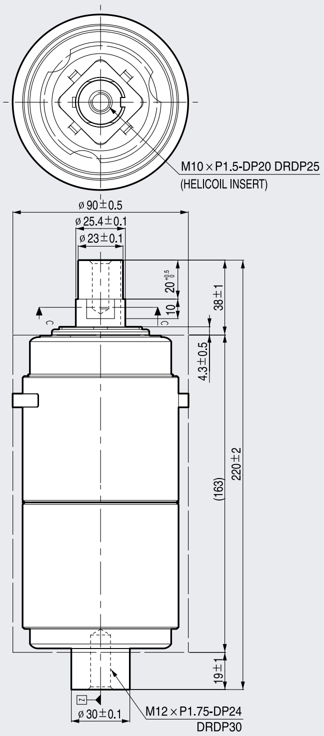
LV3



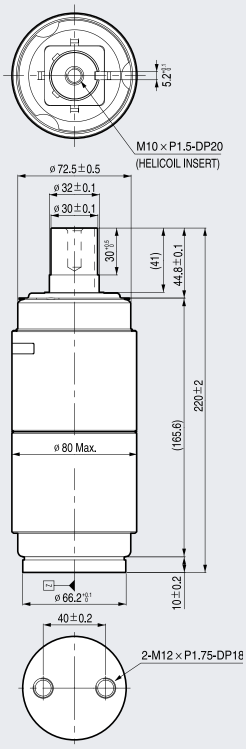
LV4



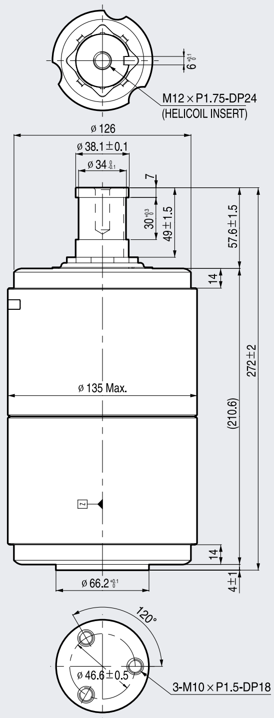
LV5-P



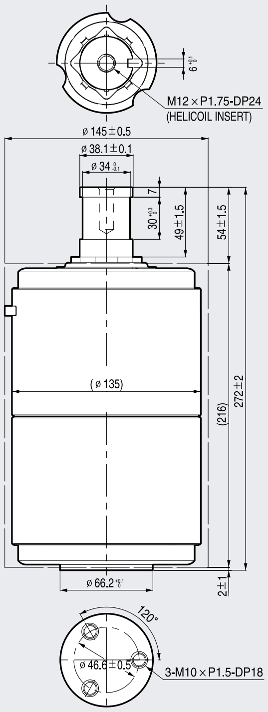
LV5A



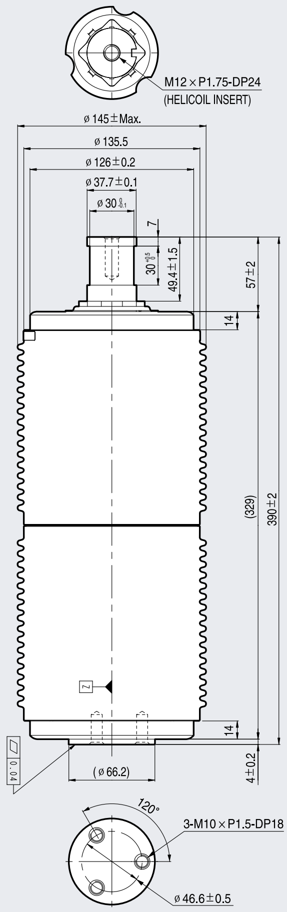
LV8



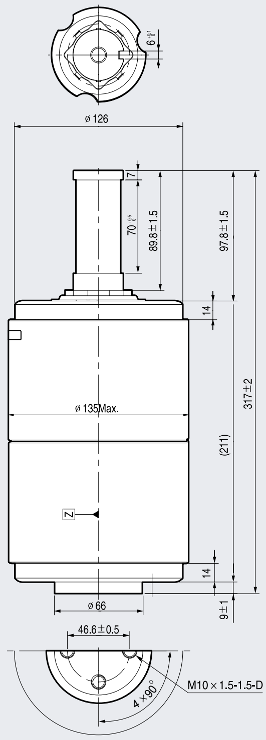
LV7-P1 / LV8-P



LV7-C

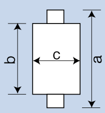


LV10404



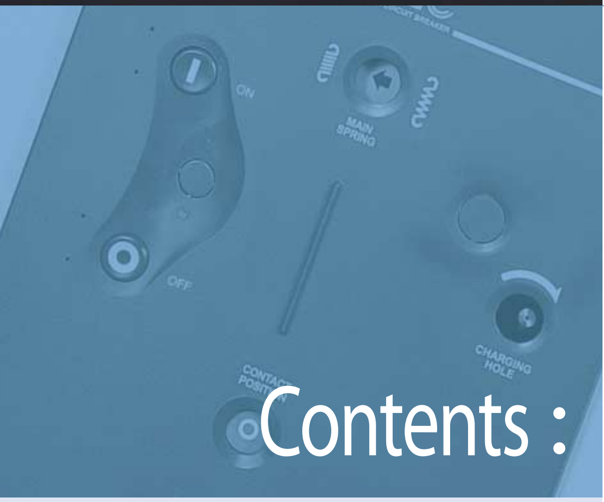
Vacuum Interrupter

Technical data

Type			LV2		LV3		LV4-E	LV5-P	
	Outer view								
Electrical ratings	Rated voltage	(kV)	7.2 7.2				24/25.8	12/17.5	
	Rated power frequency withstand voltage	(kV, rms)	20 20				50	42	
	Rated impulse withstand voltage	(kV, crest)	60 60				135	95	
	Rated frequency	(Hz)	50/60 50/60				50/60	50/60	
	Rated normal current	(Amp)	400/630 630/1250				630	630/1250	
	Rated short circuit current	(Sym.) (kA)	8	12.5 20		25	16	20	25
	Rated short circuit making current	(kA, peak)	20.8	32.5	52	65 41.6		52	65
	Rated duration of short-circuit	(sec)	3 3				3	3	
Mechanical data	Interrupter weight	(kg)	0.8		1.4 1.2			2.4	
	Moving part weight	(kg)	0.3 0.7				0.5	0.7	
	Outline dimension (mm) 	a	132 158				208	220	
		b	91 105				159	163	
		c	62 80				62	90	
Mechanical requirements	Contact stroke	(mm)	6±1 10		±1 12		±1	10±1	
	Opening speed, average 0 to 75% of full stroke	(m/s)	0 7~1.0		0 7~1.0		1.3~1.5	0.7~1.0	
	Overtravel during opening, Max.	(mm)	2 2				2	2	
	Closing speed, average last 33% of full stroke	(m/s)	0 7~1.0		0 7~1.0		0 7~1.0	0.7~1.0	
	Contact bounce duration, Max.	(sec)	2 2				2	2	
	Added force from atmospheric pressure	(kg · f)	80 154			227	120	154	227
	Contact force from atmospheric pressure	(kg · f)	8.5 12.6				9	12.6	
	Contact erosion limit	(mm)	3 3				3	3	
	Mechanical life	(×10^4, Operations)	M2 M2				M2	M2	

	LV5A	LV7-P1	LV7-C	LV8	LV8-P	LV10404
						
	12/17.5 24/25.8		40.5 17.5		36	7.2/12 25.8
	42 65		95 38		70	20/28 70
	95 125		185 95		170	60/75 150
	50/60 50/60		50/60 50/60		50/60	50/60
	2000	2500 ~3150	~3150 ~3150		~3150	4000 3150
	20 25	25 31.5 40	25 31.5	40 50	25 31.5 40	40 50 40
	52 65	65 81.9 104	65 81.9	104 130	65 81.9 104	104 130 104
	3 4		4 4		4	4 3
	3.0	7.3	9.8 6.6		7.3	8.7
	1.0	2.2	2.6 2.2		2.2	2.0
	220 272		390 272		272	317
	160	216	329 210		216	210
	80	145	145 135		145	135
	10±1 12	±1	17~19 12	±1 17~19		10±1 17 ±1
	0.7~1.0	1.0~1.3	1.3~1.5 1.0~1.3		1.3~1.5	1.0~1.3
	2 2		2 2		2	1.5
	0.7~1.0 0.7~1.0		0.7~1.0 0.7~1.0		0.7~1.0	0.7~1.0
	2 2		2 2		2	2
	154 227	227 306 367	227 306	367 460	227 306 367	367 406 367
	12.6 25.5		25.1 25.8		25	25.8
	3 3		3 3		3	3
	M2 M2		M2 M2		M2	M2

Pro-MEC MCSG VCB



Contents :

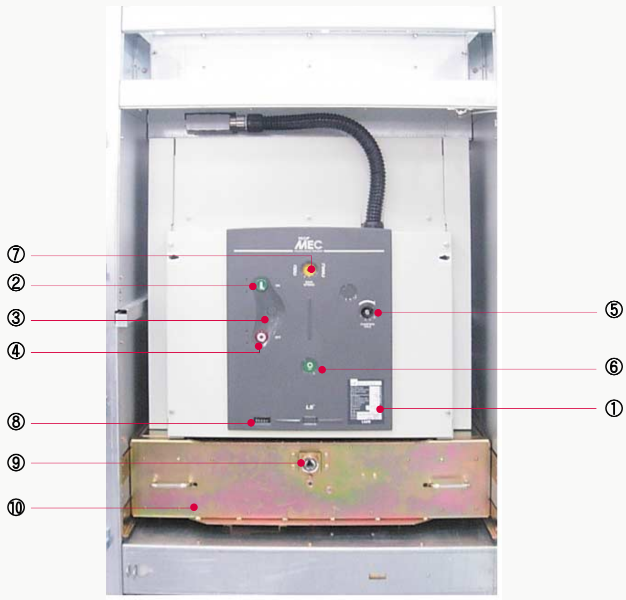
H2

Vacuum Circuit Breaker for MCSG

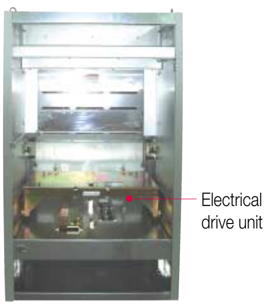
Features and Structure

Features

- **Module type VCB**
- **Convenient especially for fabricating MCSG**
  - Housing is designed like VCB compartment style
  - MCSG panel can be easily constructed if combined with Low voltage compartment, Busbar compartment and Cable compartment.
- **Convenient for maintenance and offering high safely**
  - Earthing switch can be operated from outside of the panel, and which makes earthing of 3 phases at the same time.
  - Without opening the compartment panel door, breaker can be drawn in or out electrically or manually
- **Main functions**
  - Breaker : draw- in or out electrically or manually
  - Compartment : 3-positions
- **Standard**
  - IEC 62271-100



① Name plate
② Manual closing button
③ Keylock
④ Manual trip button
⑤ Manual charging hole
⑥ Contact position indicator
⑦ Closing spring charge indicator
⑧ Operation counter
⑨ Insertion & Draw-out screw
⑩ Geared Mechanism



Compartment


Earthing switch


Bushings


Shutter

Ratings

Type		LVB – 25□-25□/06	LVB – 25□-25□/20
Rated voltage (kV)		25.8	
Rated normal current (A)		630 2000	
Rated frequency (Hz)		60	
Rated short-circuit breaking current (kA)		25	
Rated short-circuit breaking capacity (MVA)		1100	
Rated short-time withstand current (kA)		25/3s	
Rated short-circuit making current (kA)		65	
Rated breaking time (Cycles)		3	
Withstand Power	frequency (kV)	50/1min	
voltage Impulse	(kV/1.2×50㎲)	125	
TRV rising rate (kV/㎲)		0.47	
TRV max. (kV)		41	
Rated operating sequence		O-0.3s-CO-3min-CO	
Mechanical lifetime		10,000operations	
Electrical lifetime		10,000operations	
Rated control voltage (V)		DC 110V	
Rated trip voltage(V)		DC 110V	
Standard auxiliary switch		4a4b, 8a8b	
Rated opening time (s)		≤ 0.04	
No-load closing time (s)		≤ 0.06	
Rated charging motor current (A)		≤ 7	
Rated closing coil current (A)		≤ 5	
Rated trip coil current (A)		≤ 5	
Closing spring charging time (s)		≤ 12	
Draw-in/out motor voltage (V)		DC 110V	
Draw-in/out motor current (A)		≤ 5	
Distance between phases (mm)		265	
Weight (kg)	breaker	205	236.5
	compartment	281 293	
Installing		G	
Applied standard		IEC 62271-100	

• Breaker

LVB – 25 G – 25 I / 06 1A 2B B,C,D

LS VCB

Rated voltage	
25	25.8kV

Installation method	
G	Gclass draw-out

Breaking current	
25	25kA

Version

Rated current	
06	630A
20	2000A

Control voltage	
1A	DC110V
1B	DC220V
1C	DC48V
1E	DC125V
1F	AC220(M), DC110(TC)
1H	AC220(M), DC220(TC)
1T	AC110(M), DC110(TC)

Auxiliary switch	
2G	4a4b(B type connector)
2H	8a8b(B type connector)

Accessories	
B	Position Switch
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	Key Lock
H	Secondary Trip Coil

• Cradle(Compartment)

LCL – 25 C – 13 D / 06 A,B,C

LS VCB

Rated voltage	
25	25.8kV

Installation method	
C	Bushing

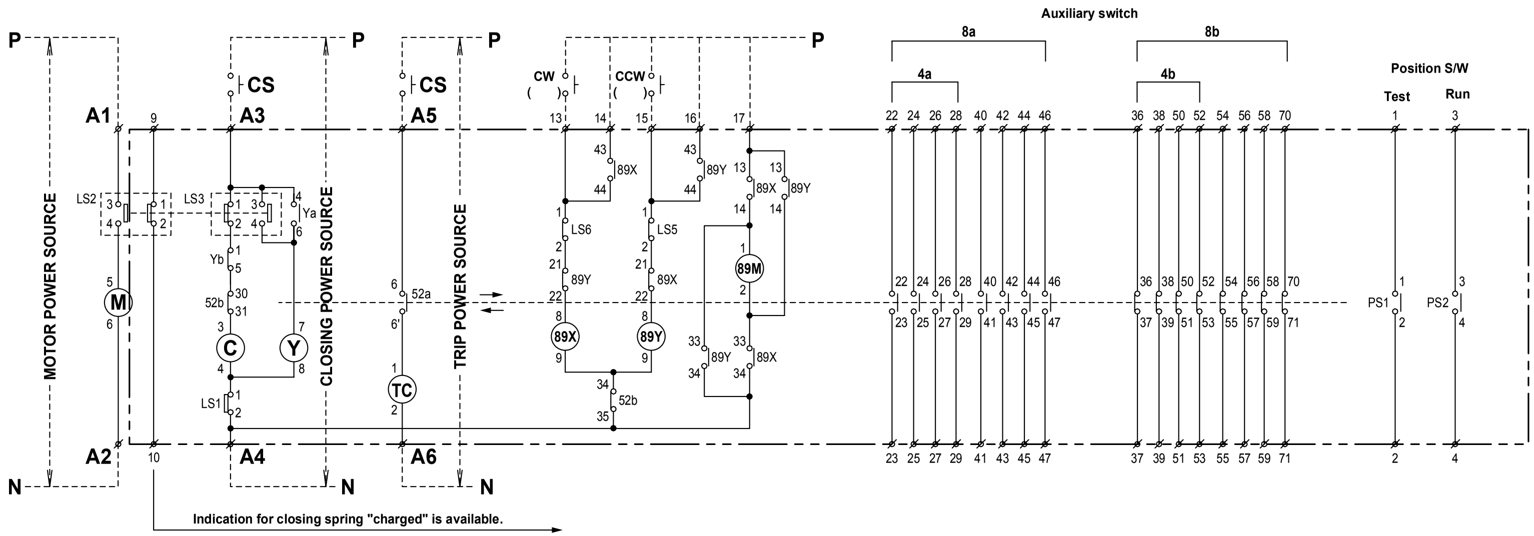
Breaking current	
25	25kA

Version

Rated current	
06	630A
20	2000A

Accessories	
B	Earthing Switch
E	Door

Control circuit diagram



Note. Diagram shows the circuit breaker in position "OFF" with closing spring "Charged"

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
D	1	2	3	4									9	10			D
C	50	51	52	53													C
B	13	14	15	16	17								36	37	38	39	B
A	A1	A2	A3	A4	A5	A6	22	23	24	25	26	27	28	29			A
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

(4a 4b)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
D	1	2	3	4									9	10			D
C	50	51	52	53	54	55	56	57	58	59	70	71					C
B	13	14	15	16	17	42	43	44	45	46	47		36	37	38	39	B
A	A1	A2	A3	A4	A5	A6	22	23	24	25	26	27	28	29	40	41	A
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

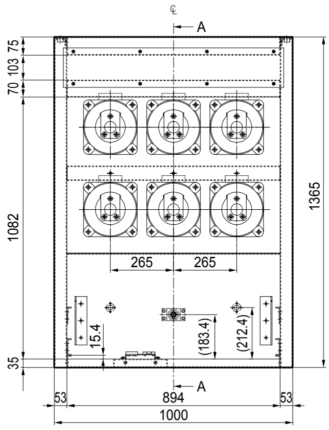
(8a 8b)

SECONDARY DISCONNECT WIRING
(TOP VIEW)

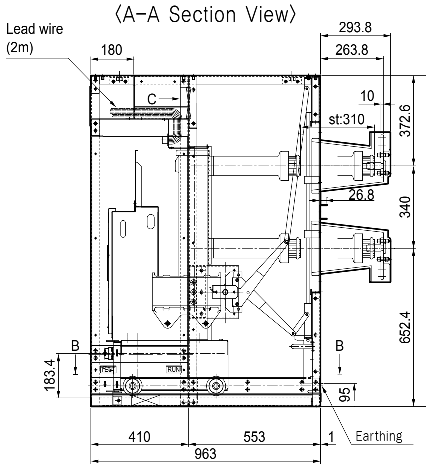
Ø : External terminal of VCB
52 : Vacuum circuit breaker
M : Spring charging motor
TC : Trip coil
TC1 : Secondary trip coil
C : Closing coil
Y : Anti-pump relay
52a : Auxiliary switch (NO)
52b : Auxiliary switch (NC)
LS1 : Closing interlock limit switch(only withdrawable type)
LS2 : Motor stopping, closing spring charged indication
LS3 : Anti-closing, Anti-pumping limit switch
LS5 : "Off" at Test Position
LS6 : "Off" at Run Position
PS1 : Position S/W("On" at Test Position)
PS2 : Position S/W("On" at Run Position)
89X : Auxiliary Relay for Inserting
89Y : Auxiliary Relay for withdrawing
89M : Motor for withdrawing and Inserting

Cradle(Compartment) - w/o Earthing Switch

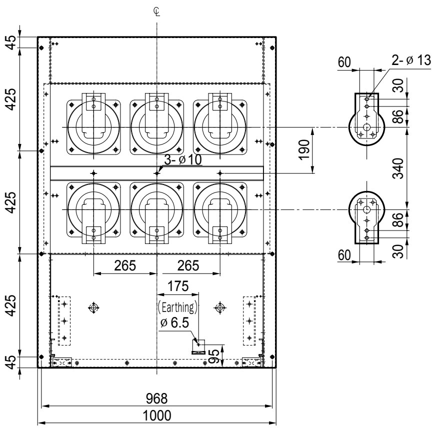
• Front



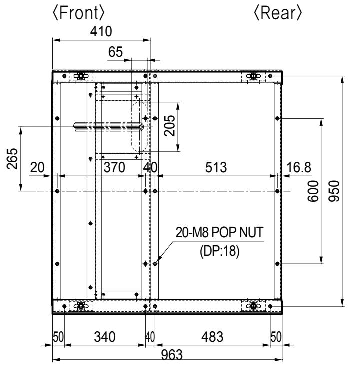
⟨A–A Section View⟩



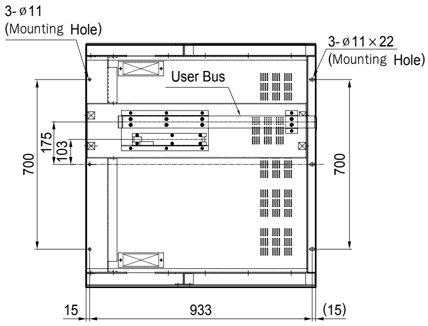
• Rear



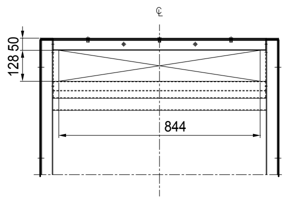
• Top



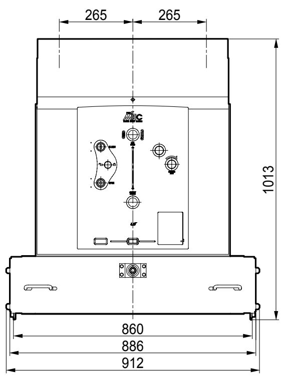
⟨B–B Section View⟩



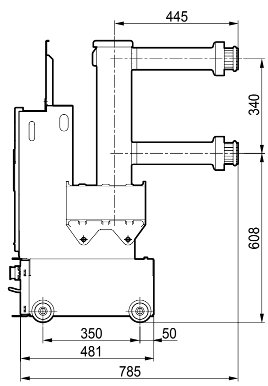
⟨C-View(Cover 2 Cutting)⟩



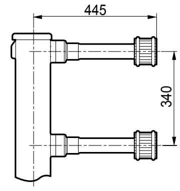
G type breaker + track(electric draw-in/out)



630A



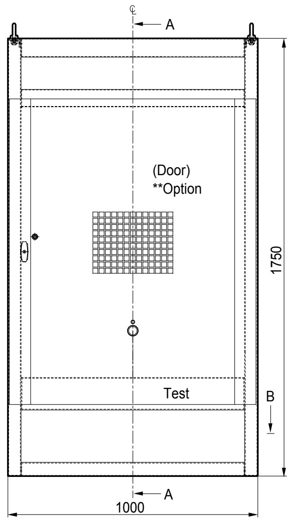
2000A



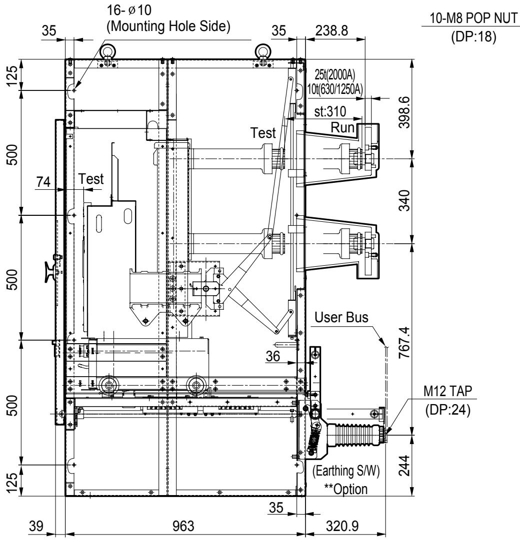
Dimensions

Cradle(Compartment) - w/ Earthing Switch

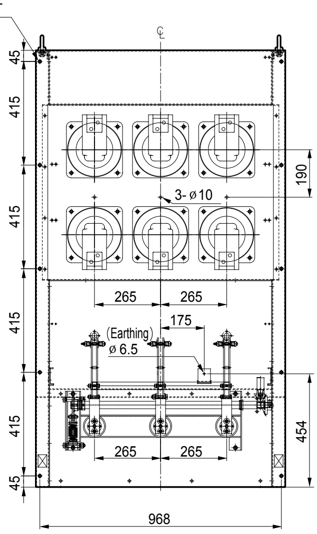
• Front



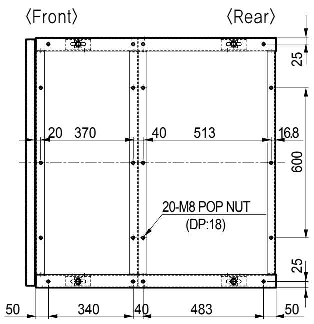
• Side



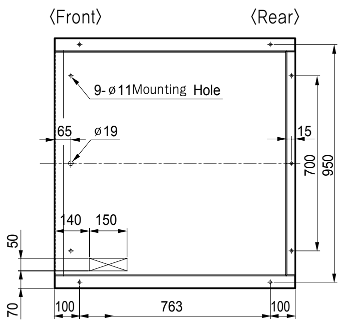
• Rear



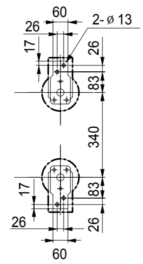
• Top



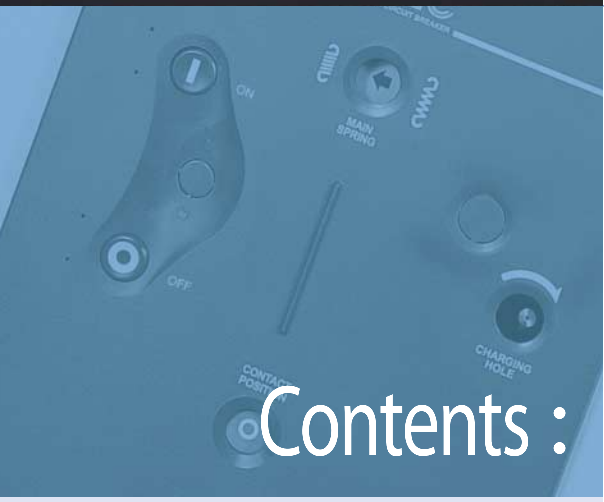
⟨B-B Section View⟩



<Terminal conductor>



Power Plants VCB



Contents :

H3

Vacuum Circuit Breaker for Power Plants

Vacuum Circuit Breaker

Power Plants

A product developed for water and thermal power plants due to the revision and application of Kepco’s standard (ES150) followed by the IEC standard revision. It has completed the high capacity (40~50kA) VCB series for power plants by securing higher breaking capacity, safety and reliability.

VCB Full Option

To prevent fatal error, property and life loss caused from operator during operation, it is equipped with safety mechanisms such as shutter padlock.

Bushing applied for Window CT adaptation

The bushing provides sufficient strength to collaborate with the internal insulation and is adaptable with CT offering safety mechanically and electrically when applying large current.

It is recognized for reliability by acquiring new IEC 62271-100 and ES150 (KEPCO standard specification on AC breakers)

Ratings

Type	LVB-06G-40H			LVB-06G-40J				LVB-06G-50J		
Rated voltage (kV)	7.2									
Rated normal current (A)	1200	2000	3000	1250	2000	2500	3150	1250	2000	3150
Rated frequency (Hz)	60									
Rated short-circuit breaking current (kA)	40							50		
Rated short-circuit breaking capacity (MVA)	500							624		
Rated short-time withstand current (kA/3sec)	40							50		
Rated short-circuit making current (kAp)	104							130		
Rated breaking time (Cycle)	3									
Rated opening time (sec)	≤ 0.04									
No-load closing time (sec)	≤ 0.06									
Withstand voltage — Power frequency (kV/min)	20									
Withstand voltage — Impulse (kV/1.2 ×50㎲)	60									
Rated operating sequence	CO-15s-CO			O-0.3s-CO-3min-CO						
Rated charging motor current (A)	5 (at DC125V)							5 (at DC110V)		
Rated closing coil current (A)	3 (at DC125V)							3 (at DC110V)		
Rated shunt coil current (A)	3 (at DC125V)							3 (at DC110V)		
Type test — Mechanical	M2									
Type test — Electrical	E2 (Maintenance free)			E2 (List1)						
Type test — Capacitive current switching	C2									
Lifetime — Mechanical — Without maintenance	10000 operations									
Lifetime — Mechanical — Maintenance	20000 operations									
Lifetime — Electrical — Without maintenance	10000 operations									
Lifetime — Electrical — Maintenance	20000 operations									
Auxiliary switch	3a3b									
Installing — Draw-out G-type	Visible, Tulip									
Weight — Breaker G-type (kg)	200		260	200		260		200		260
Weight — Cradle G-type (kg)	190		230	190		230		190		230
Applied standard	ES150 NOTE)			IEC 62271-100						
Type test laboratory	KERI									

Note) ES150: KEPCO's standard in which IEC62271-100 is applied
KERI: Korea Electrotechnology Research Institute

Motor

When the closing spring is charged, the control power of motor is turned off by the built-in limit s/w.

Rated voltage	The peak value of the inrush current (A)	Rated current (A)	Consumption power (W)	Charging time (Sec.)
DC 110V	20	3	330	12
DC 125V	20	3	330	12

Note) Range of the normal operating voltage: 85~110% of rated voltage

Closing Coil (C)

When the rated volt is applied to the coil the breaker is closed. The electrical anti-pumping circuit is built-in it.

Rated voltage	Rated current (A)
DC 110V	3
DC 125V	3

Note) Range of the normal operating voltage: 75~125% of rated voltage

Shunt coil (TC)

When the rated volt is applied to the coil the breaker is opened.

Rated voltage	Rated current (A)
DC 110V	3
DC 125V	3

Note) Range of the normal operating voltage: 60~125% of rated voltage

Auxiliary switch

Standard configuration : 3a3b1b of early-b contact function exists inside

Classification			Resistive load (A)	Inductive load (A)	Contact configuration
Contact Ratings	DC	110V	10	5	3a3b
		125V	10	5	

Note) The contact ratings of Mechanical Operated Cell Switch(MOC) are the same with that of the Aux. switch.

Truck Operated Cell Switch(TOC)

Classification			Resistive load (A)	Inductive load (A)	Contact configuration
Contact Ratings	DC	110V	10	5	3a3b
		125V	10	5	

Position of the Auxiliary switch

Switch / Breaker a		Mechanism		MOC		TOC	
			b	a	b	a	b
RUN	CLOSE	ON	OFF	ON	OFF	ON	OFF
	OPEN	OFF	ON	OFF	ON	OFF	ON
TEST	CLOSE	ON	OFF	ON *	OFF *	ON	OFF
	OPEN	OFF	ON	OFF *	ON *	OFF	ON

Note) * applied in the VCB of which MOC is operable at the TEST position.

Charge indicator of the closing spring

Indicating the condition of the closing spring.

Charged

Discharged

Position indicator of the main contacts

Indicating the 'Close' or the 'Open' of the main contacts.

Close position:「ON」 Open position:「OFF」

Close position

Open position

Counter

Mechanically counts the operation of the VCB by 5digits

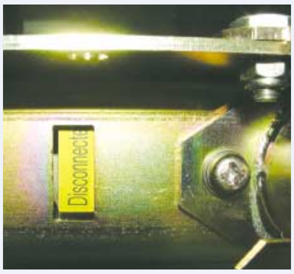
Accessories for breakers

• Position padlock

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

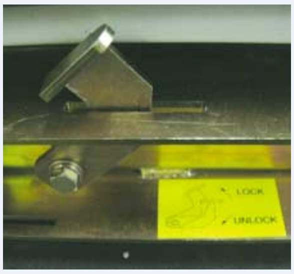
• Mechanical position indicator

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



• Position interlock

The breaker is locked in each position-Disconnected, Test or Connected, thus it is necessory to release the lock before draw-in or out of a breaker from the present position.



• Auto connection

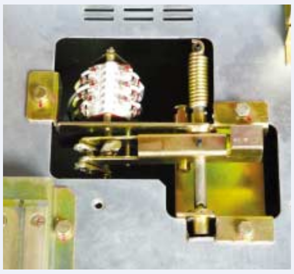
When the breaker is moved to Test position from Disconnected position the connector for control powers is automatically connected. In case of reverse moving of the breaker the connector is automatically disconnected.

• Code plate

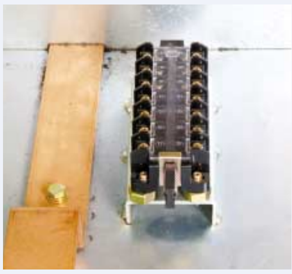
When the breaker is inserted to the cradle, if the ratings does not match with the cradle, it mechanically prevents the breaker from being inserted into the cradle.

Accessories for breakers

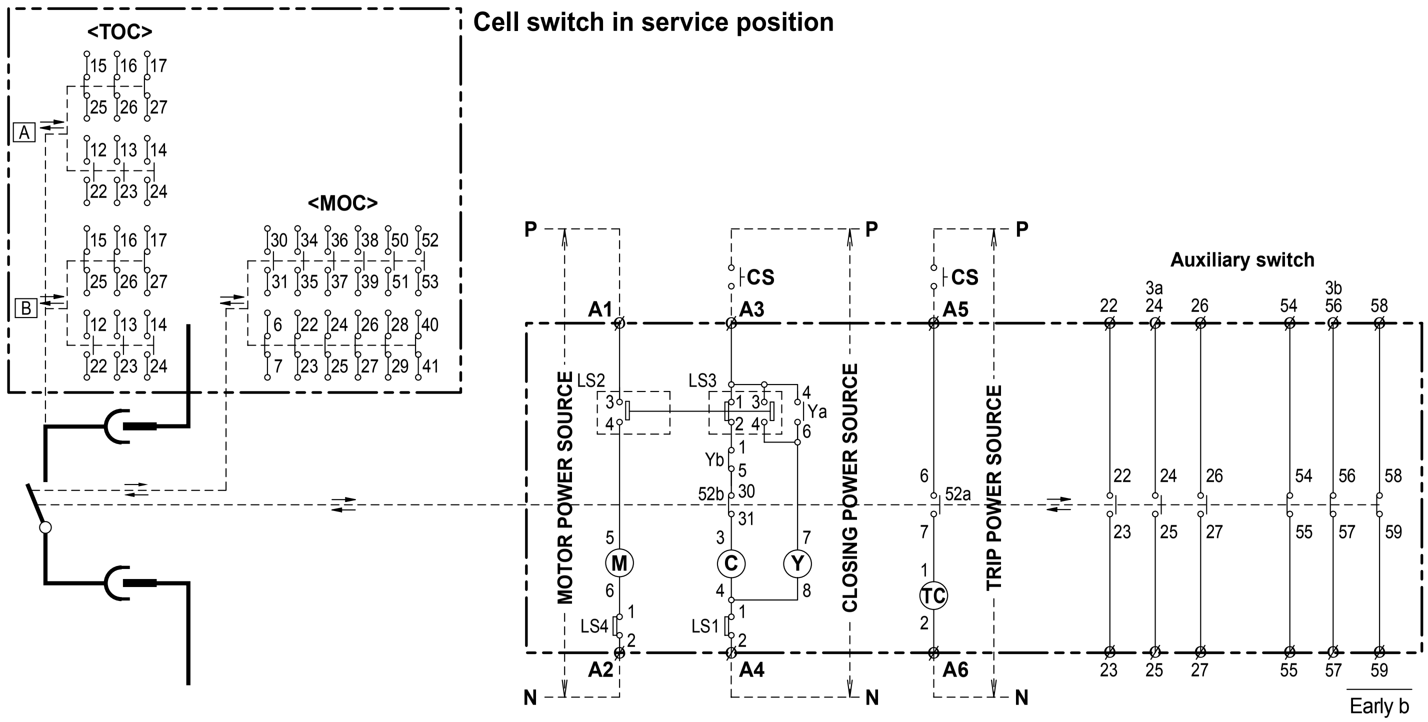
- **Mechanically operated cell switch (MOC)**
  It is auxiliary switch (6a6b), which indicates the 'ON' or 'OFF' condition of a VCB, and operated when the VCB is in 'Run' state.



- **Truck operated cell switch (TOC)**
  It is auxiliary switch (6a6b), which indicates the 'Run' state of a VCB and is operated by the movement of a VCB frame.

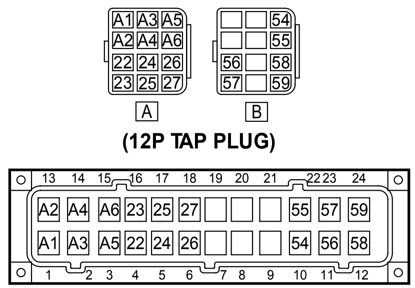


Control circuit diagram



Note) Diagram shows the circuit breaker in position "OFF" with closing spring "Charged"

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

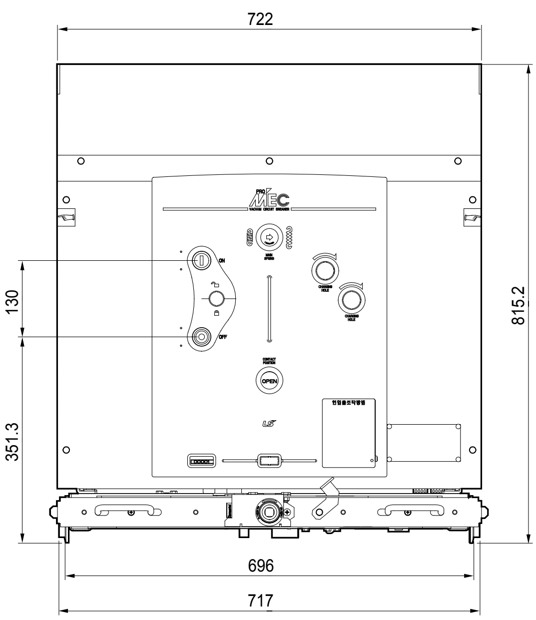


SECONDARY DISCONNECT WIRING
(FRONT VIEW OF RECEPTACLE PLUG)

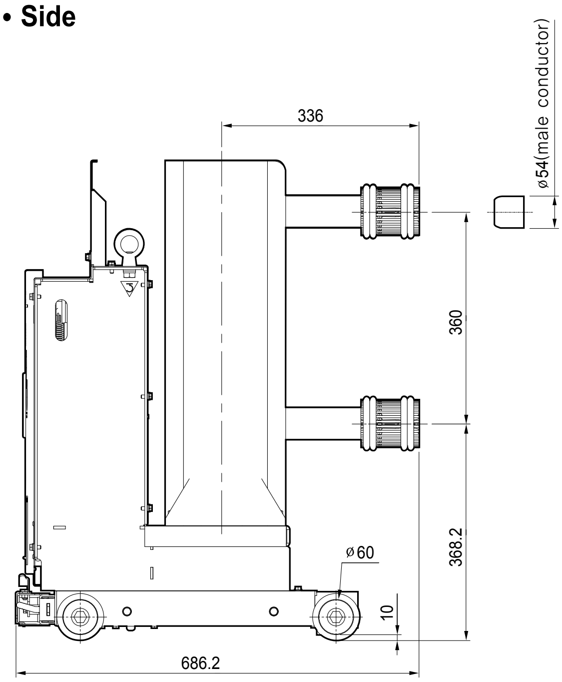
LVB-06G-40H, 40J G class (Visible, Tulip contact)-(1200, 1250, 2000A)

(unit : mm)

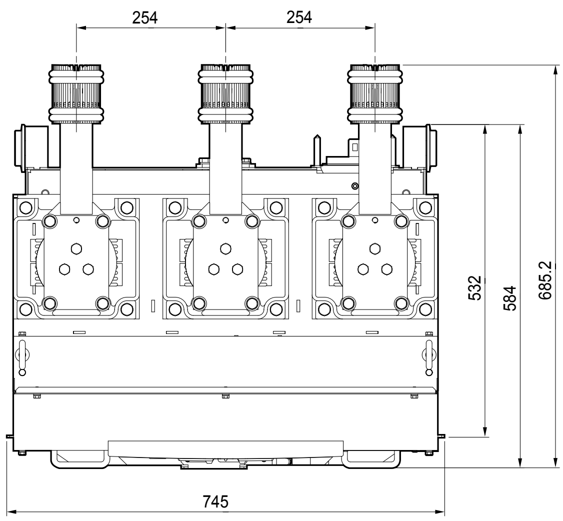
• **Front**



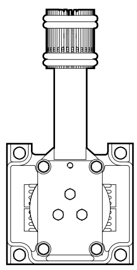
• **Side**



• **Top**



<Conductor>



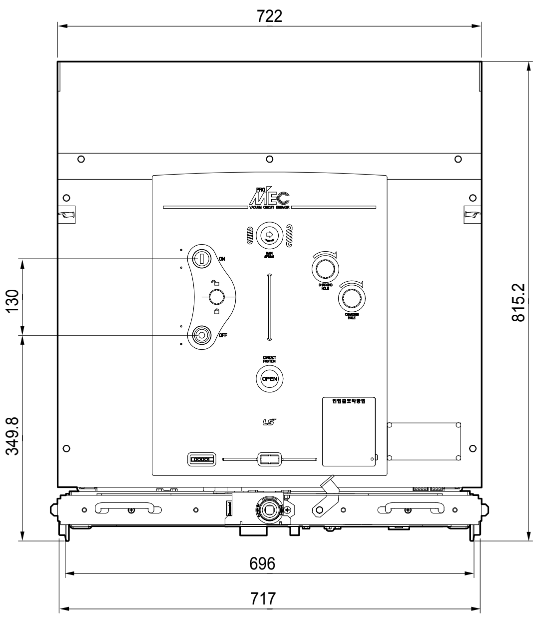
1200/1250/2000A

Dimensions - Breakers

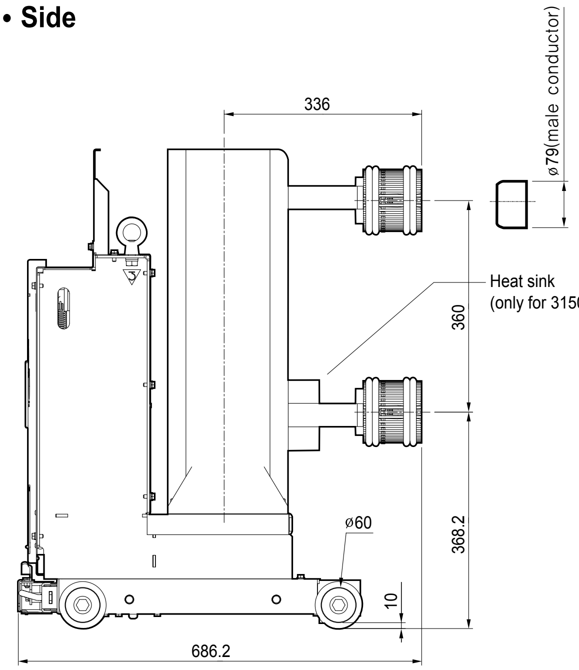
LVB-06G-40H, 40J G class (Visible, Tulip contact)-(2500, 3000, 3150A)

(unit : mm)

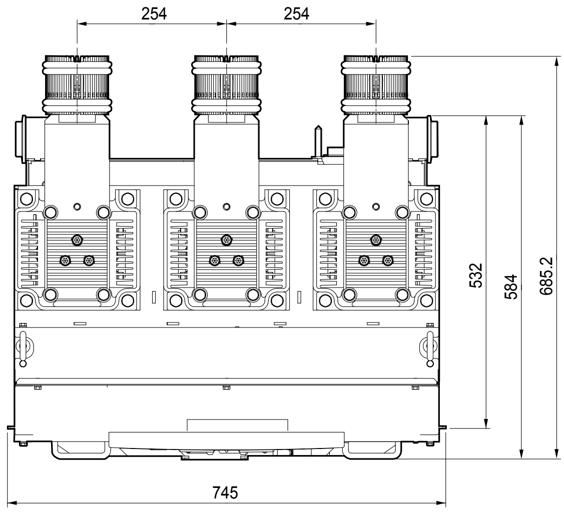
• **Front**



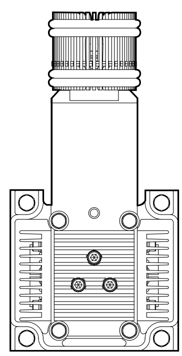
• **Side**



• **Top**



<Conductor>

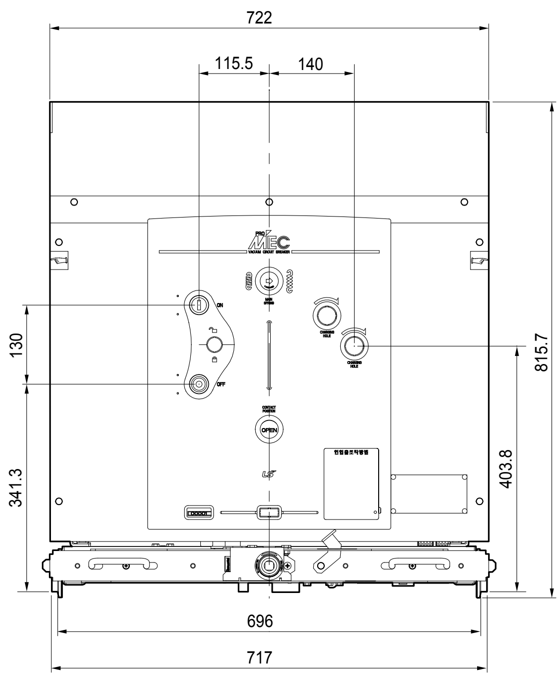


2500/3000/3150A

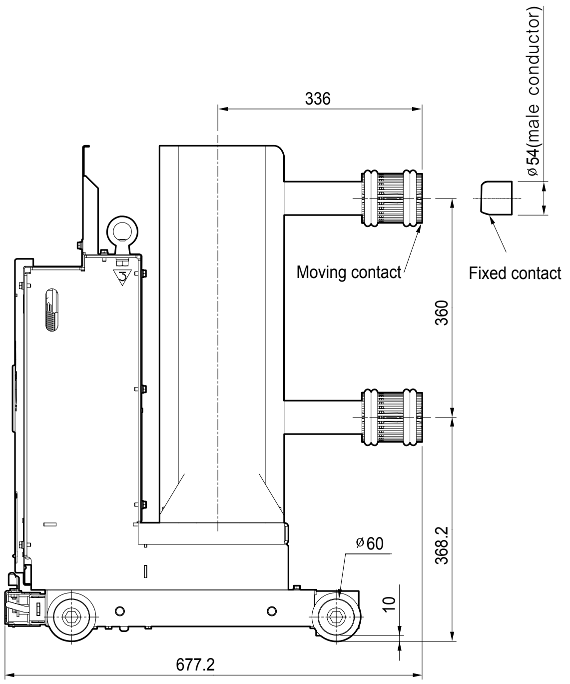
LVB-06G-50J G class (Visible, Tulip contact)-(1250, 2000A)

(unit : mm)

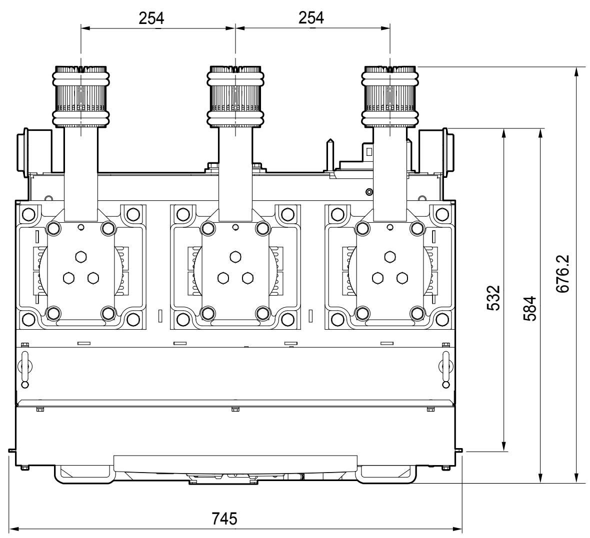
• Front



• Side



• Top

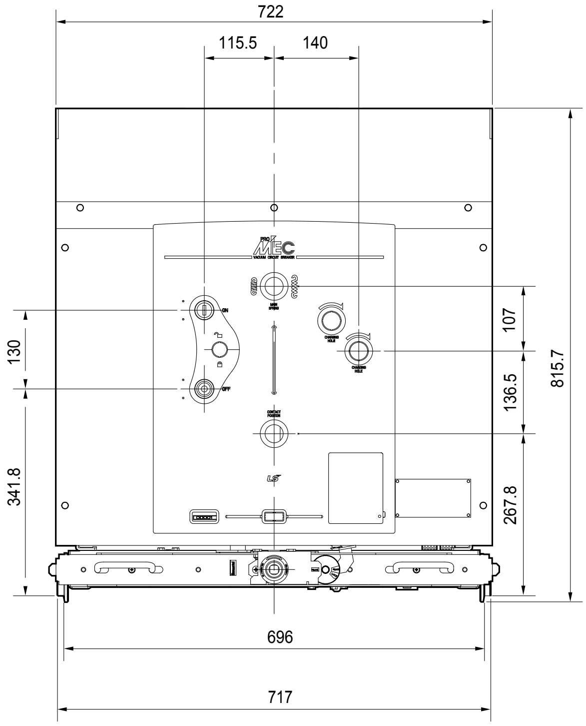


Dimensions - Breakers

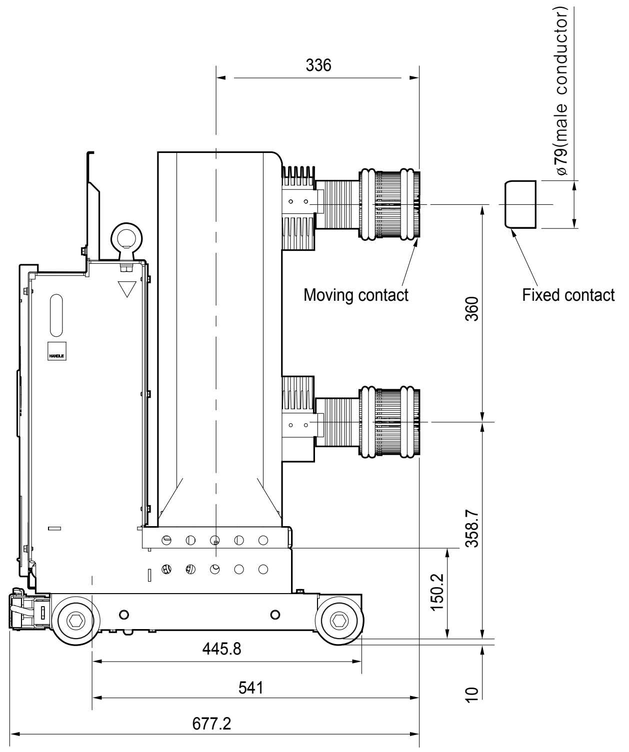
LVB-06G-50J G class (Visible, Tulip contact)-(3150A)

(unit : mm)

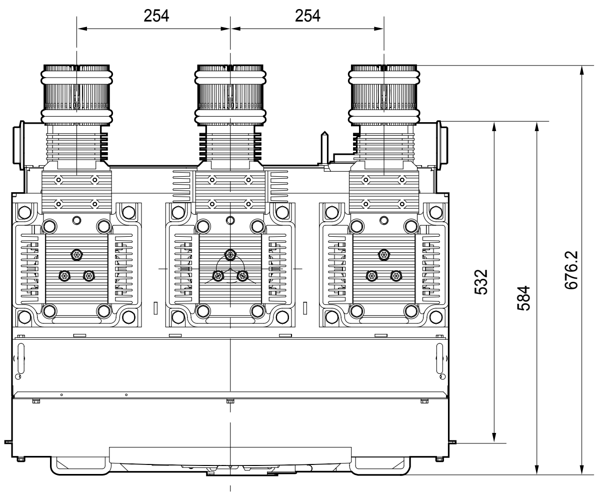
• Front



• Side

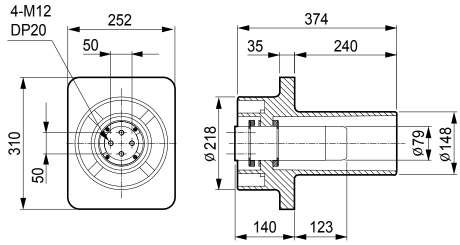


• Top

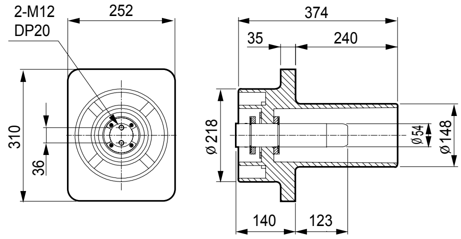


Cradles

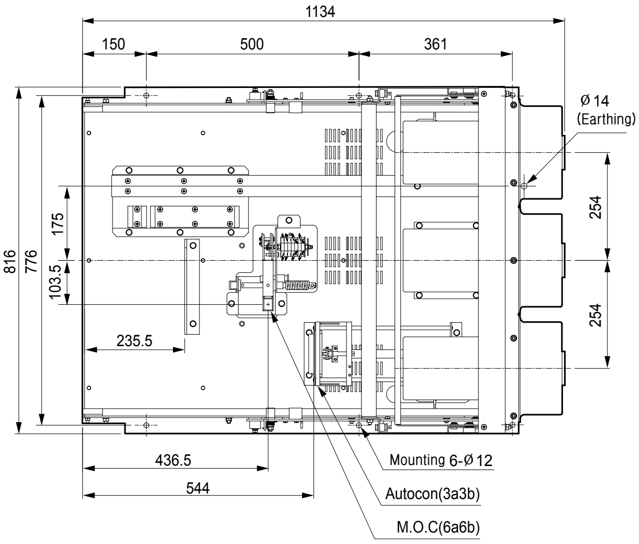
(unit : mm)

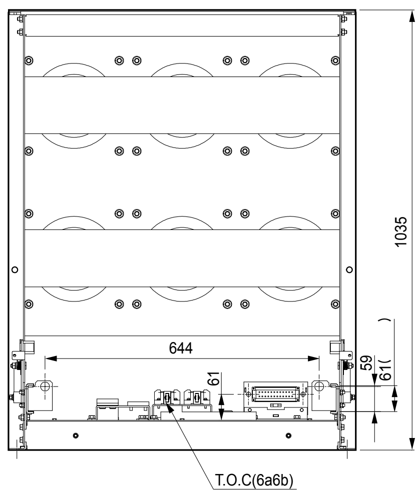


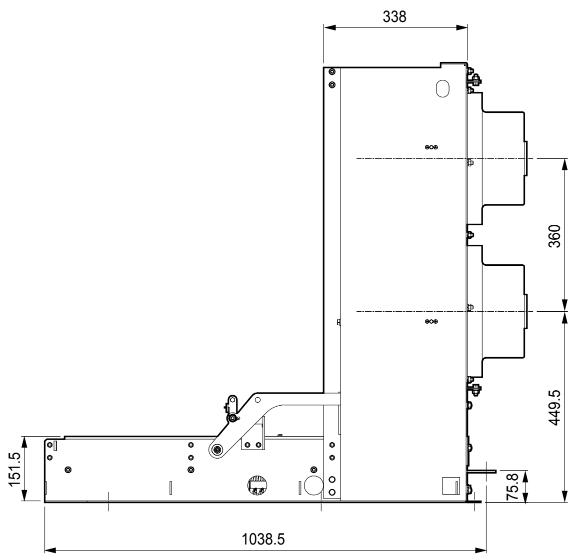
2500/3000/3150A



1200/1250/2000A







Vacuum Circuit Breaker for Power Plants

Types and ordering information

Breaker

LVB - 06 G - 40 J / 12 - 1A 2L - P3,Q,R

LS VCB

Rated voltage	
06	7.2kV

Installation method	
G	G class draw-out

Breaking current	
40	40kA
50	50kA

Standard	
H	ESB150
J	IEC

Rated current	
12	1200/1250A
20	2000A
25	2500A NOTE1)
30	3000/3150A

Control voltage	
1A	DC110V
1B	DC220V
1E	DC125V

Auxiliary switch NOTE2)	
2L	3a3b(Autocon)

Option	
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	Key Lock
P3	Dummy VCB
Q	Earthing Truck(lower terminal)
R	Earthing Truck(upper terminal)

Note) 1.Rated current 2500A is available only at 7.2kV 40kA, IEC version(J)
2.Control voltage and Auxiliary switch are not applied to Dummy VCB and Earthing Truck

Cradle

LCL - 06 G - 40 J / 12 - A1, A2

LS Cradle

Rated voltage	
06	7.2kV

Installation method	
G	G class draw-out

Breaking current	
40	40kV
50	50kV

standard	
H	ESB150
J	IEC

Rated current	
12	1200/1250A
20	2000A
25	2500A
30	3000/3150A

Option	
A1	MOC(6a6b)+TOC(6a6b) MOC active only at RUN position
A2	MOC(6a6b)+TOC(6a6b) MOC active only at TEST and RUN position

Nuclear Power Plants VCB

Contents :

H4

Vacuum Circuit Breaker for Nuclear Power Plants

Vacuum Circuit Breaker

Nuclear Power Plants

It was developed for KEPCO nuclear power stations. This breaker satisfies quality, safety measures (secure from earthquake and other environments), and surge protection class complies with "1E-CLASS" ±provisions. It is featured with high breaking technologies, safety, and reliability by applying our own vacuum interrupters (50KA) approved by ANSI standard tests.

Vacuum Circuit Breakers

VCB Full Option

To prevent fatal error, property and life loss caused from operator during operation, it is equipped with safety mechanisms such as shutter padlock.

Bushing applied for Window CT adaptation

The bushing provides sufficient strength to collaborate with the internal insulation and is adaptable with CT offering safety mechanically and electrically when applying large current.

Satisfies earthquake and other internal environment specifications

During the lifespan of power stations (40yrs), it is designed to operate its fundamental breaking functions even under the most severe conditions like earthquake, which is critical from safety perspectives. These technologies proven through tests that comply with KEPIC standard and relevant specifications are to guarantee nuclear reactor safety.

Vacuum Circuit Breaker for Nuclear Power Plants

Ratings

Type			LVB-05G-50B	LVB-15G-40B
Rated voltage		**(kV)**	4.76	15
Rated normal current		**(A)**	1200	1200
			2000	2000
			3000	-
Rated frequency		**(Hz)**	60	60
Rated short-circuit breaking current		**(kA)**	50	40
Rated short-circuit breaking capacity		**(MVA)**	410	1040
Rated short-time withstand current		**(kA/3sec)**	50	40
Rated short-circuit making current		**(kA)**	130	104
Rated breaking time		**(Cycle)**	3	3
Rated opening time		**(sec)**	$\leq$ 0.04	$\leq$ 0.04
No-load closing time		**(sec)**	$\leq$ 0.06	$\leq$ 0.06
Withstand voltage	**Power frequency**	**(kV/1min)**	19	36
	Impulse	**(kV/1.2 × 50μs)**	60	95
Rated operating sequence			0-0.3s-CO-3min-CO	
Rated charging motor current	**DC 125V**	**(A)**	5	5
Rated closing coil current	**DC 125V**	**(A)**	3	3
Rated shunt coil current	**DC 125V**	**(A)**	3	3
Lifetime	**Mechanical(w/o maintenance)**		10000 operations	10000
	Electrical(w/o maintenance)		10000 operations	10000
Auxiliary switch			5a3b	5a3b
Installing			G-type	G-type
Weight	**1200,2000A**	**(kg)**	300	300
	3000A	**(kg)**	350	-
Applied standard			ANSI C37	ANSI C37
Type test laboratory			KERI	KERI

Motor

When the closing spring is charged, the control power of motor is turned off by the built-in limit s/w.

Rated voltage	The peak value of the inrush current (A)		Ratedcurrent(A)		Range of the normal operating voltage	Consumption power (W)	Charging time (sec)
	4.76kV	15kV	4.76kV	15kV			
	50kA	40kA	50kA	40kA			
DC 125V	15	15	5	5	90~140	360	8

Closing Coil (C)

When the rated volt is applied to the coil the breaker is closed. The electrical anti-pumping circuit is built-in it.

Rated voltage	The peak value of the inrush current (A)		Range of the normal operating voltage
	4.76kV	15kV	
	50kA	40kA	
DC 125V	3	3	90 ~ 140

Shunt Coil (TC)

When the rated volt is applied to the coil the breaker is opened.

Rated voltage	The peak value of the inrush current (A)		Range of the normal operating voltage
	4.76kV	15kV	
	50kA	40kA	
DC 125V	3	3	70 ~ 140

Auxiliary switch

Standard configuration : Reversible 8C(5a3b) and 2c(2b) with early-b contact function

Classification			Resistive load(A)	Inductive load(A)	Contact configuration
Contact Ratings	**AC**	**250V**	10	5	8c
		125V	10	5	
	DC	**250V**	10	5	
		125V	10	5	
		30V	10	5	

Note) The contact ratings of Mechanical Operated Cell Switch(MOC) are the same with that of the Aux. switch.

Position of the Auxiliary switch

Breaker \ Switch		Mechanism		MOC		TOC	
		a	b	a b		a b	
RUN	**CLOSE**	ON OFF		ON	OFF	ON	OFF
	OPEN	OFF	ON	OFF ON		OFF ON	
TEST	**CLOSE**	ON	OFF	ON OFF		ON OFF	
	OPEN	OFF	ON	OFF ON		OFF ON	

Charge indicator of the closing spring

Indicating the condition of the closing spring.


Charged


Discharged

Position indicator of the main contacts

Indicating the 'Close' or the 'Open' of the main contacts.

Close position:「ON」 Open position:「OFF」


Close position


Open position

Counter

Mechanically counts the operation of the VCB by 5digits

Accessories for breakers

- **Position padlock**

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

- **Mechanical position indicator**

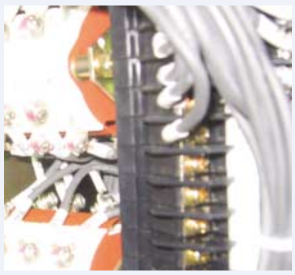
It is located in the lower part of a breaker to check the present position - Disconnected, Test or Connected- easily.

- **Auto connection**

When the breaker is moved to Test position from Disconnected position the connector for control powers is automatically connected.
In case of reverse moving of the breaker the connector is automatically disconnected.

- **Reversible contact**

10 auxiliary switches are provided. 8 of them consist of reversible 8c which can be changed from a(b) to b(a). Factory composition is 5a3b. And the other 2 switches are supplied as 2b with early-b contact function



- **Code plate**

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

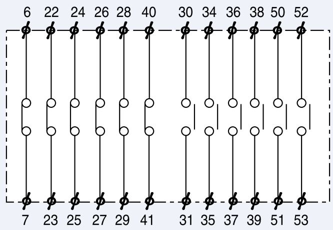
- **Auto discharge**

In case the breaker is drawn-out when the closing spring is charged in the position-Disconnected, Test or Connected, or the breaker is moved to Disconnected position from Test position the closing spring shall be automatically released.

Accessories for cradles

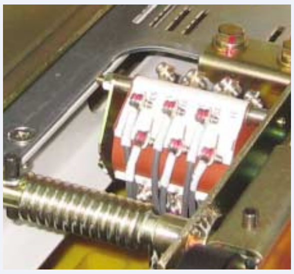
• Mechanically operated cell switch (MOC)

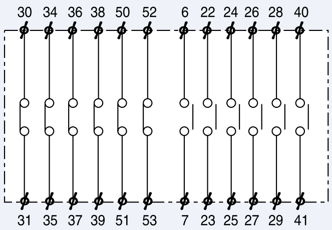
This 6a6b switch indicates the 'ON' or 'OFF' condition of a VCB and is operated in the positions of 'Run' and 'Test''..



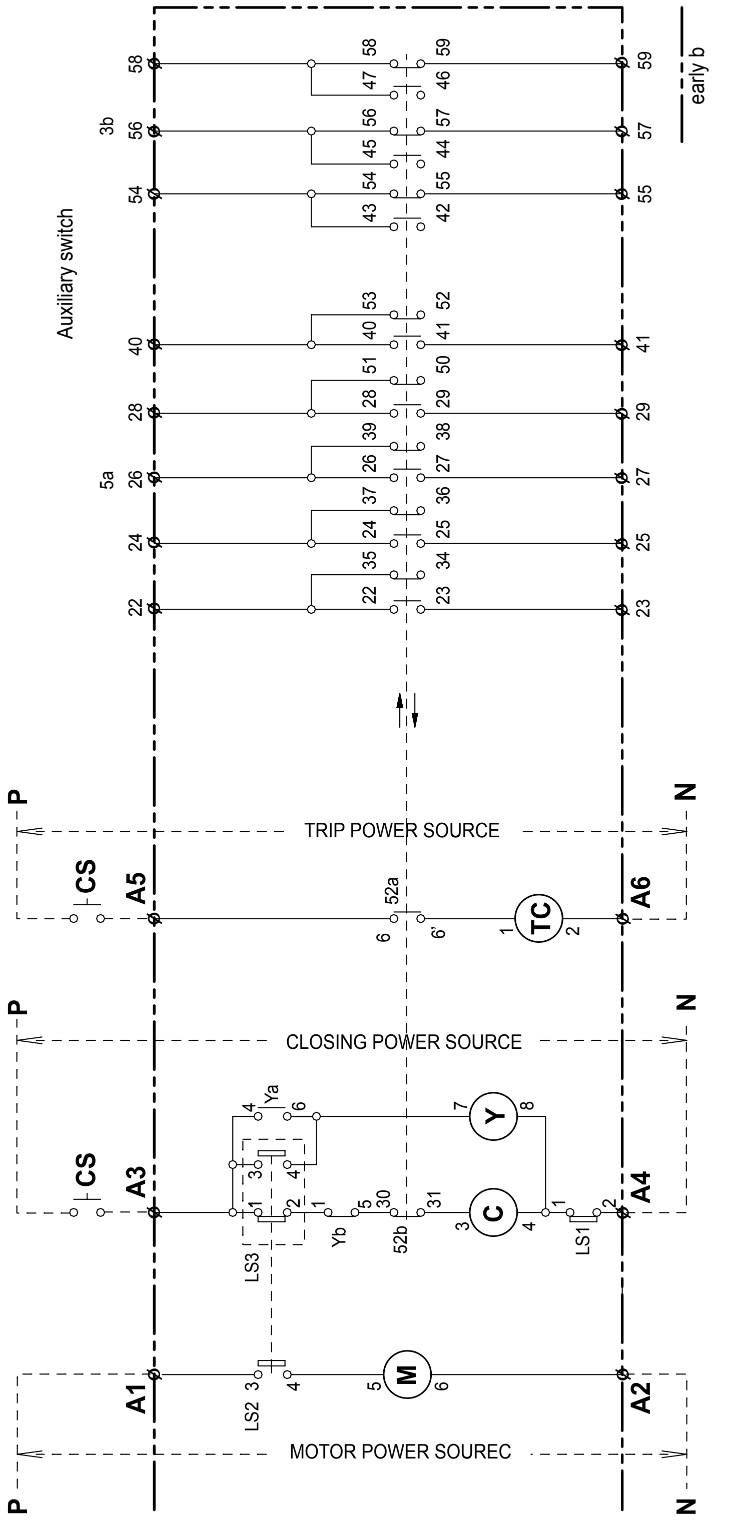
• Truck operated cell switch (TOC)

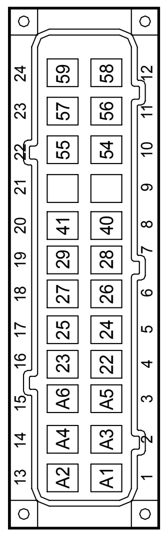
This 6a6b switch indicates the 'Run' state of a VCB and is operated by the movement of a VCB frame.





Control circuit diagram



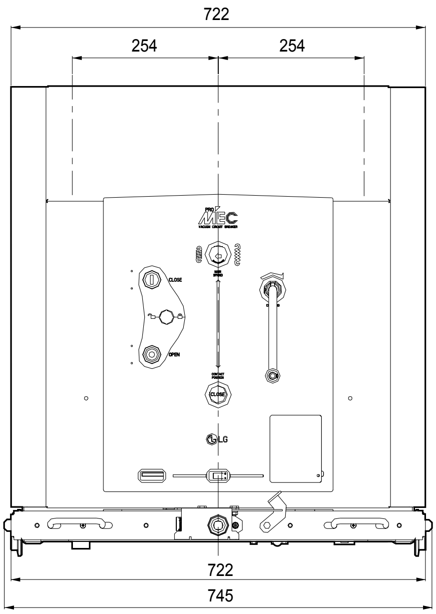


SECONDARY DISCONNECT WIRING
(FRONT VIEW OF RECEPTACLE PLUG)

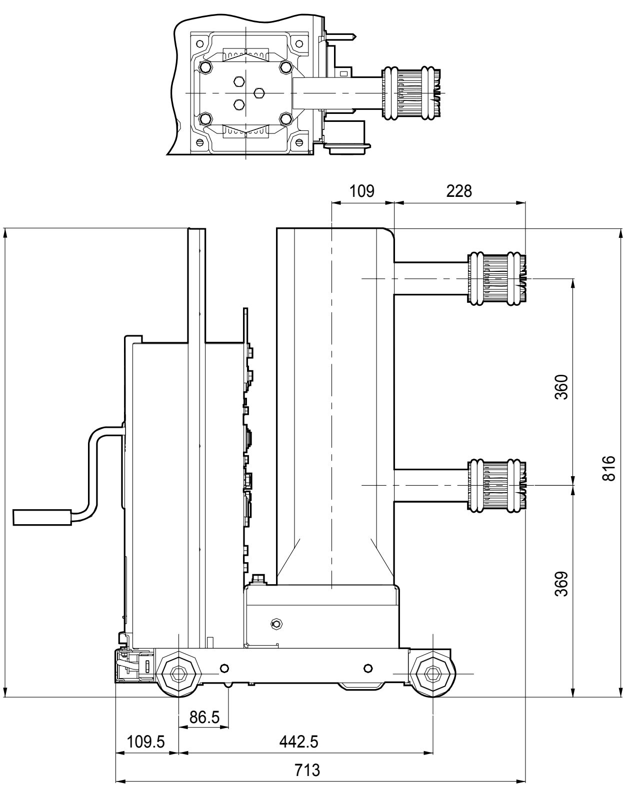
Ø : External terminal of VCB
52 : Vacuum circuit breaker
M : Spring charging motor
TC : Trip coil
C : Closing coil
Y : Anti-pump relay
52a : Auxiliary switch (NO)
52b : Auxiliary switch (NC)
LS1 : Closing interlock limit switch (only withdrawable type)
LS2 : Motor stopping, closing spring charged indication
LS3 : Anti-closing, Anti-pumping limit switch

Note) Diagram shows the circuit breaker in position "OFF" with closing spring "Charged"

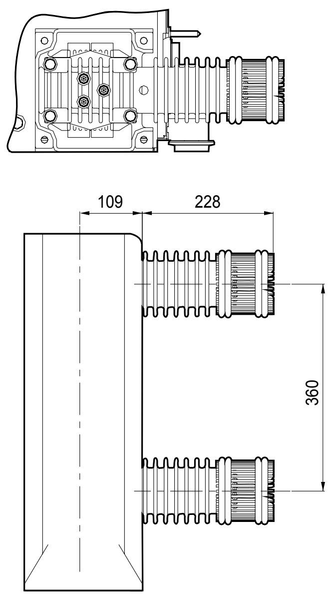
Breaker



<Front view>



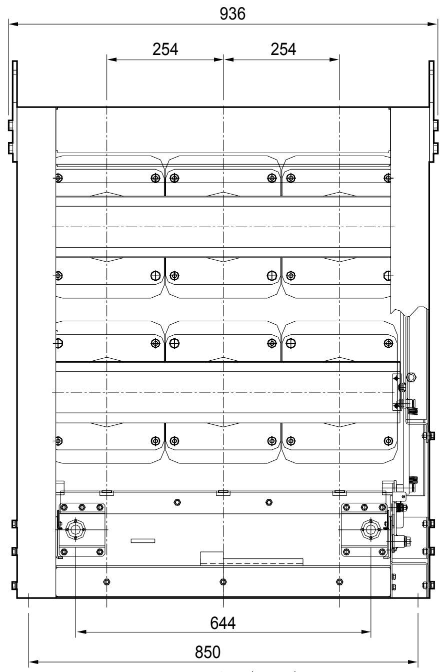
1200/2000A



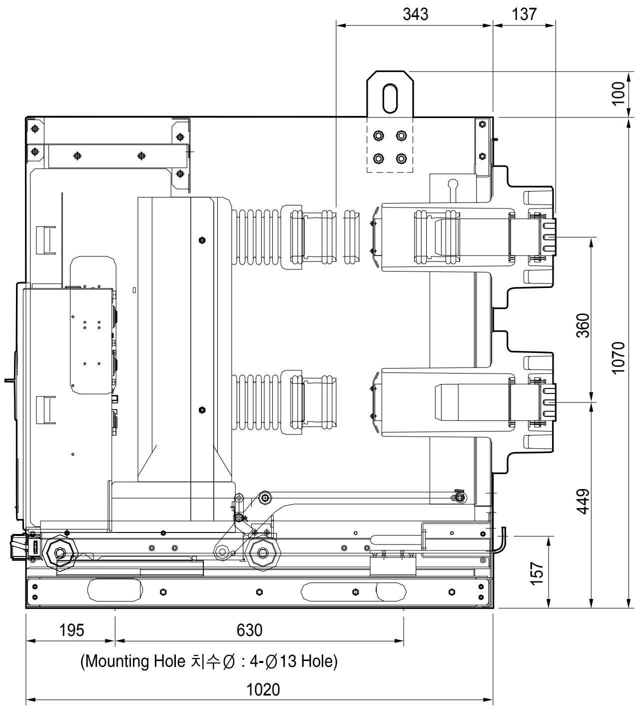
3000A

<Side view>

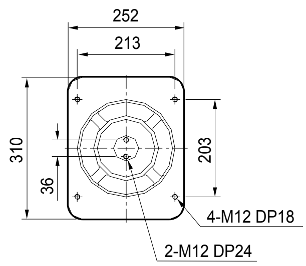
Cradle



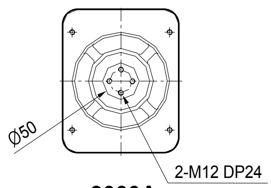
<Front view>



<Side view>



1200/2000A



3000A

Breaker

LVB - 05 G - 40 B / 20 1A 2K 1

LS VCB

Installation method	
G	G class draw-out

Version	
B	Pro-MEC

Control voltage [Note]	
1A	DC110V
1B	DC220V
1C	DC48V
1E	DC125V

Note) 1A,1B,1C are only available at 15kV class

Nuclear class	
1	1E class
2	Non 1E class

Rated voltage	
05	4.76kV
15	15kV

Breaking current	
40	40kA
50	50kA

Rated current	
12	1200A
20	2000A
30	3000A

Auxiliary switch	
2K	8c 접점

Cradle

LCL - 05 G - 40 B / 20 1

LS Cradle

Installation method	
G	G class draw-out

Version	
B	Pro-MEC

Nuclear class	
1	1E class
2	Non 1E class

Rated voltage	
05	4.76kV
15	15kV

Breaking current	
40	40kA
50	50kA

Rated current	
12	1200A
20	2000A
30	3000A

Memo

Green Innovators of Innovation

Safety Instructions

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

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CHEONG-JU PLANT

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

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