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2020

Metasol *Meta Solution*

VCB

Vacuum Circuit Breakers (7.2/12/17.5kV)



LS *ELECTRIC*

Metasol VCB

Features

- **Rating:** 7.2/12/17.5kV 16/20/25/31.5kA
630/1000/1250/2000/2500
- **Rated breaking time:** 3 cycle
- **Rated short-circuit withstand characteristics:** 4sec
- **Rated operating sequence:** O-0.3s-CO-15s-CO
- **Type test level(Electrical / Mechanical life):** M2, E2(List3), C2
- **CB Compartment type cradle:** Implementation of all kinds
- **Various cradle:** E, F, H type
- **Control voltage**
 - DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V
 - AC 48V, AC 100~130V, AC 220~250V
- **Various accessories**
 - VCB part : UVT, Second coil, Position S/W, Keylock, Button padlock, Button cover, Padlock(H type), MOC, Locking magnet,

- Kelock, Mecha shaft interlock lever, Low energy trip device, CTC, Manual(rotatry) Charge geared ass'y
- Cradle part: Earthing S/W & accessory, Shutter padlock, TOC(Truck operating cell S/W), MOC(Mechanism operating cell S/W), Door interlock, Door emergency push button, Temperature sensor
- Others: Draw-in/out handle, Manual(rotatry) charging handle, UVT Time delay controller, CTD(Condensor trip device), TM
- **Automatic Draw-in/out display**

Standards and Test

- IEC 62271-100 [M2, C2, E2(List3)]
- KERI [M2, C2, E2(List3)]

Type		MVL-06□20,25□06,10,13			MVL-06□32□06,10,13				
Rated voltage		[kV]		7.2					
Rated current		[A]		630		1000		1250	
Rated frequency		[Hz]		50 / 60					
Rated interrupting current		[kA]		20, 25		31.5			
Rated interrupting capacity		[MVA]		250, 312		393			
Rated short-time current		[kA]		20/4sec, 25/4sec		31.5/4sec			
Rated making current		[kA]		65		81.9			
Rated interrupting time		[cycle]		3					
Withstand voltage	Frequency	[kV]		20					
	Impulse	[kV/1.2×50μs]		60					
TRV increasing rate		[kV/μs]		0.24					
TRV MAX Value		[kV]		12.3					
Operating duty		O-0.3s-CO-15s-CO							
Control voltage		[V]		DC 24~30V		DC 48~60V, AC 48V		AC/DC 100~130V	
Control current for closing		[A]		≤ 8		≤ 4		≤ 2	
Control current for opening		[A]		≤ 8		≤ 4		≤ 2	
Current of motor operation (steady current/Inrush current)		[A]		≤ 5 / ≤ 25		≤ 3 / ≤ 15		≤ 2 / ≤ 10	
Standard aux contacts		4a4b, 10a10b							
Rated opening time		[s]		≤ 0.04					
No-load closing time		[s]		≤ 0.06					
Motor charging time		[s]		≤ 5					
Pole distance	P, B, H	[mm]		150		150			
	E, F	[mm]		-					
Weight	E, F, H	[kg]		83.5		91			
	Cradle (H-Type)	[kg]		150					
	P, B	[kg]		52		55			
Installation type		P, B, H							



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MVL-12□16,20,25□06,10,13				MVL-12□32□06,10,13			MVL-17□16,20,25□06,10,13			MVL-17□32□06,10,13,20,25				
12										17.5				
630	1000	1250		630	1000	1250	630	1000	1250	630	1000	1250	2000	2500
50 / 60										50 / 60				
16, 20, 25				31.5			16, 20, 25			31.5				
333, 416, 520				655			485, 607, 758			955				
16/4sec, 20/4sec, 25/4sec				31.5/4sec			16/4sec, 20/4sec, 25/4sec			31.5/4sec				
65				81.9			65			81.9				
3										3				
28										38				
75										95				
0.34										0.42				
20.6										30.0				
O-0.3s-CO-15s-CO										O-0.3s-CO-15s-CO				
DC 24~30V	DC 48~60V, AC 48V	AC/DC 100~130V	AC/DC 200~250V	DC 24~30V	DC 48~60V, AC 48V	AC/DC 100~130V	DC 24~30V	DC 48~60V, AC 48V	AC/DC 100~130V	AC/DC 200~250V	DC 24~30V	DC 48~60V, AC 48V	AC/DC 100~130V	AC/DC 200~250V
≤ 8	≤ 4	≤ 2	≤ 1	≤ 8	≤ 4	≤ 2	≤ 8	≤ 4	≤ 2	≤ 1	≤ 8	≤ 4	≤ 2	≤ 1
≤ 8	≤ 4	≤ 4	≤ 2	≤ 8	≤ 4	≤ 4	≤ 8	≤ 4	≤ 4	≤ 2	≤ 8	≤ 4	≤ 4	≤ 2
≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 1 / ≤ 5	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 1 / ≤ 5	≤ 5 / ≤ 25	≤ 3 / ≤ 15	≤ 2 / ≤ 10	≤ 1 / ≤ 5
4a4b, 10a10b										4a4b, 10a10b				
≤ 0.04										≤ 0.04				
≤ 0.06										≤ 0.06				
≤ 5										≤ 5				
150			150				150				150			230
210			-								-			
83.5			91				83.5			91				215
150							170							260
52			55				52			55				170
P, E, F, B, H							P, B, H			P, H				

Ordering information

■ Breaker

Basic model name		Rated voltage (kV)		Version		Interrupting current (kA)		Phase distance/Compatibility		Rated current (A)	
MVL	VL Mecha.	06	7.2	P	Fixed	16	16 (7.2 kV is absent)	A	150	06	630
		12	12	E	E type drawout (for MESH)	20	20	B	210	10	1000
		17	17.5	F	F type drawout (for MESH)	25	25	H	230	13	1250
				H	H type drawout (for MESH)	32	31.5	P	150 (Tulip contact)	20	2000
				B	Box type drawout			Q	210 (Tulip contact)	25	2500
								T	150 (compatible with compact type)		

Note) 1. P/H/B type is available for 150mm only, E/F type is available for 210mm only.
 2. In case of E/F type, only 12kV, 20/25kA, 630/1250A are available.
 3. In case of 7.2kV, only 630/1250A are available.
 4. In case of 31.5kA, only 630/1250A, tulip type(P) are available.
 5. In case of T type, only H type, 12kV, 20/25kA are available.

Motor control voltage		Trip coil voltage		UVT		Other accessories	
M0	Motor none	T0	T.C none	U0	UVT none	A1	Secondary trip coil
M1	DC 110V	T1	DC 110V	U1	DC 110V	A2	Secondary trip coil with TCS contact
M2	DC 220V~250V	T2	DC 220V~250V	U2	DC 220V~250V	A3	Position S/W (Test : 1a1b, Service : 2b)
M3	DC 125V	T3	DC 125V	U3	DC 125V	A4	Position S/W (Test : 2a, Service : 2a)
M4	DC 24V~30V	T4	DC 24V~30V	U4	DC 24V~30V	A5	Position S/W (Test : 1a1b, Service : 1a1b)
M5	DC 48V~60V	T5	DC 48V~60V	U5	DC 48V~60V	A7	Keylock
M6	AC 48V	T6	AC 48V	U6	AC 48V	A8	Button padlock
M7	AC 100V~130V	T7	AC 100V~130V	U7	AC 100V~130V	A9	Button cover
M8	AC 200V~250V	T8	AC 200V~250V	U8	AC 200V~250V	AA	Lead wire
						AB	User type plug (Part)
						AC	Plug interlock
						AD	Padlock (H type)
						AE	MOC
						AF	Locking magnet
						AG	Keylock (Same key-One key for 3EA VCB)
						AI	Mecha shaft interlock lever
						AO	Lead wire special color (blue)
						AT	Low energy trip device 25mJ
						AU	Low energy trip device 100mJ
						AV	CT operated coil 1A
						AW	CT operated coil 5A
						AZ	Manual(rotary) charge geared ass'y

Note) 1. Replace suffix "A12" with "A147" for A1, A4 and A7.

2. Unable to install A1 and U1~U8(UVT) simultaneously.

3. Unable to install A3, A4 and A5 simultaneously.

4. Unable to install A8 and A9 simultaneously.

5. When A1 is selected the maximum available auxiliary contacts are 9a3b.

6. When A2 is selected the maximum available auxiliary contacts are 4a3b and 9a8b.

7. AC, AD, AE and AF apply only to H type.

8. In case of B-type connector the flame retardant wire is applicable to auxiliary contacts 4a4b, not to 10a10b.

9. A/B-type connectors apply to P/E/F/G/K type and B-type connector only to H type.

10. Lead wire special color (blue) is for A-type connector only.

11. If a position switch is selected, A/B-type (P/E/F/G/K-type) or B-type(H-type) connector can be selected as an option for auxiliary contacts and wiring ass'y.

12. The control power of the locking magnet of H type breaker is the same as the motor control power.

13. Flame retardant type blue wire is not available.

14. Unable to install A1 and U1~U8(UVT) simultaneously if AV and AW is installed.

The maximum auxiliary contact is 4a4b with AV and AW.

Accessories	
CTD1	Condenser trip device (AC 110V)
CTD2	Condenser trip device (AC 220V)
UDC1	UVT time delay controller (ADC 110V)
UDC2	UVT time delay controller (ADC 220V)
UDC3	UVT time delay controller (ADC 48V)
CTU	Coil test unit

■ Cradle

Basic model name		Rated voltage (kV)		Interrupting current (kA)		Rated current (A)		Accessories	
MVCL	Metasol VCB cradle	06	7.2	16	16	06	630	A1	ES(Earthing switch) without option
		12	12	20	20	10	1000	A2	ES(Earthing switch) with Position S/W (2a2b)
		17	17.5	25	25	13	1250	A4	ES(Earthing switch) with Position S/W (6a6b)
				32	31.5	20	2000	A5	ES(Earthing switch) with Keylock
						25	2500	A6	ES with locking magnet : DC110V
								A7	ES with locking magnet : DC220V
								A8	ES with locking magnet : DC125V
								A9	ES with locking magnet : DC24V
								AA	ES with locking magnet : DC48V
								AB	ES with locking magnet : AC48V
								AC	ES with locking magnet : AC110V
								AD	ES with locking magnet : AC220V
								AE	Shutter padlock
								AF	TOC
								AG	MOC
								AH	Door
								AJ	Door interlock
								AK	Door emergency push button
								AL	Temperature sensor
								AM	H type lead wire 4a4b (Standard)
								AN	H type lead wire 10a10b (Standard)
								AO	H type lead wire 4a4b (Flame retardant)
								AP	ES(Earthing switch) with making
								AZ	Manual charging

Note) 1. In case of E/F type, only 12kV, 210mm(B,Q) are available.
 2. In case of H type,
 - Aa is for compartment W600.
 - Aq is for compartment W550.
 - Pa is for compartment W600,(Tulip type)
 - Pq is for compartment W550,(Tulip type)
 3. In case of Aq, Pq cradle, only 7.2/12kV are available

Note) 1. Accessories and TM for the cradle apply only to H type.
 2. AJ and AK apply only when the door (AH) is present.
 3. TM is for use with AL in H type cradle.
 4. H type lead wire - one of AM, AN or AO is required for cradle in case of H type breaker.
 5. Unable to install AK at the cradle if A8, A9 is present in the H type breaker
 6. A1 is selected, A5 is included as standard.

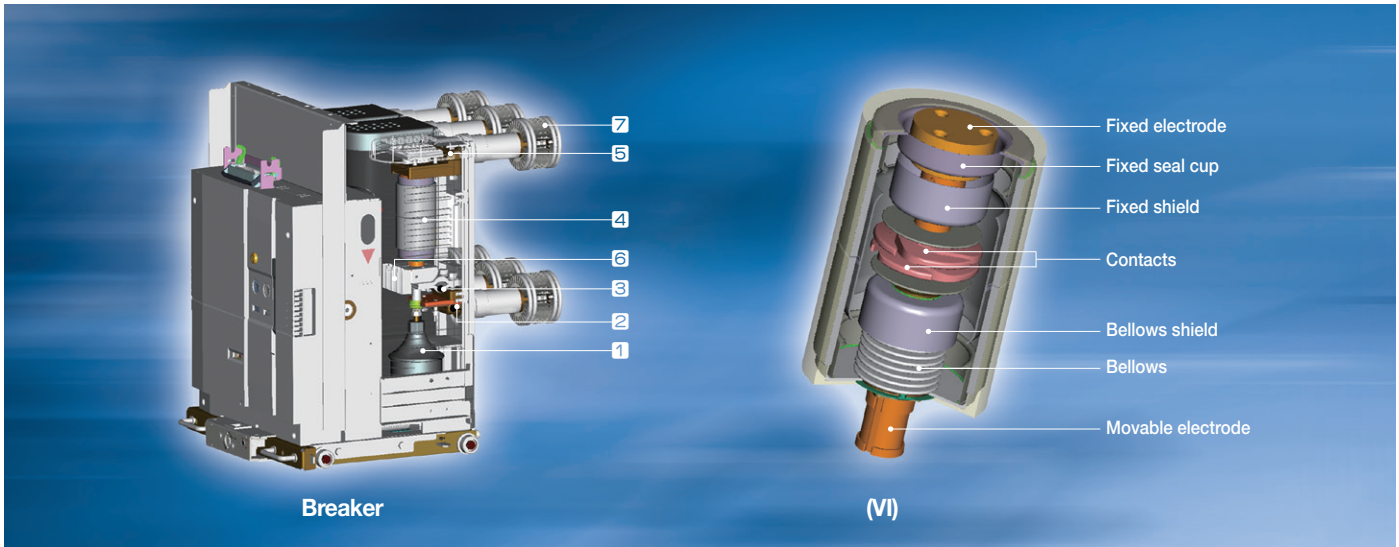


< E type cradle >



< F type cradle >

Structure



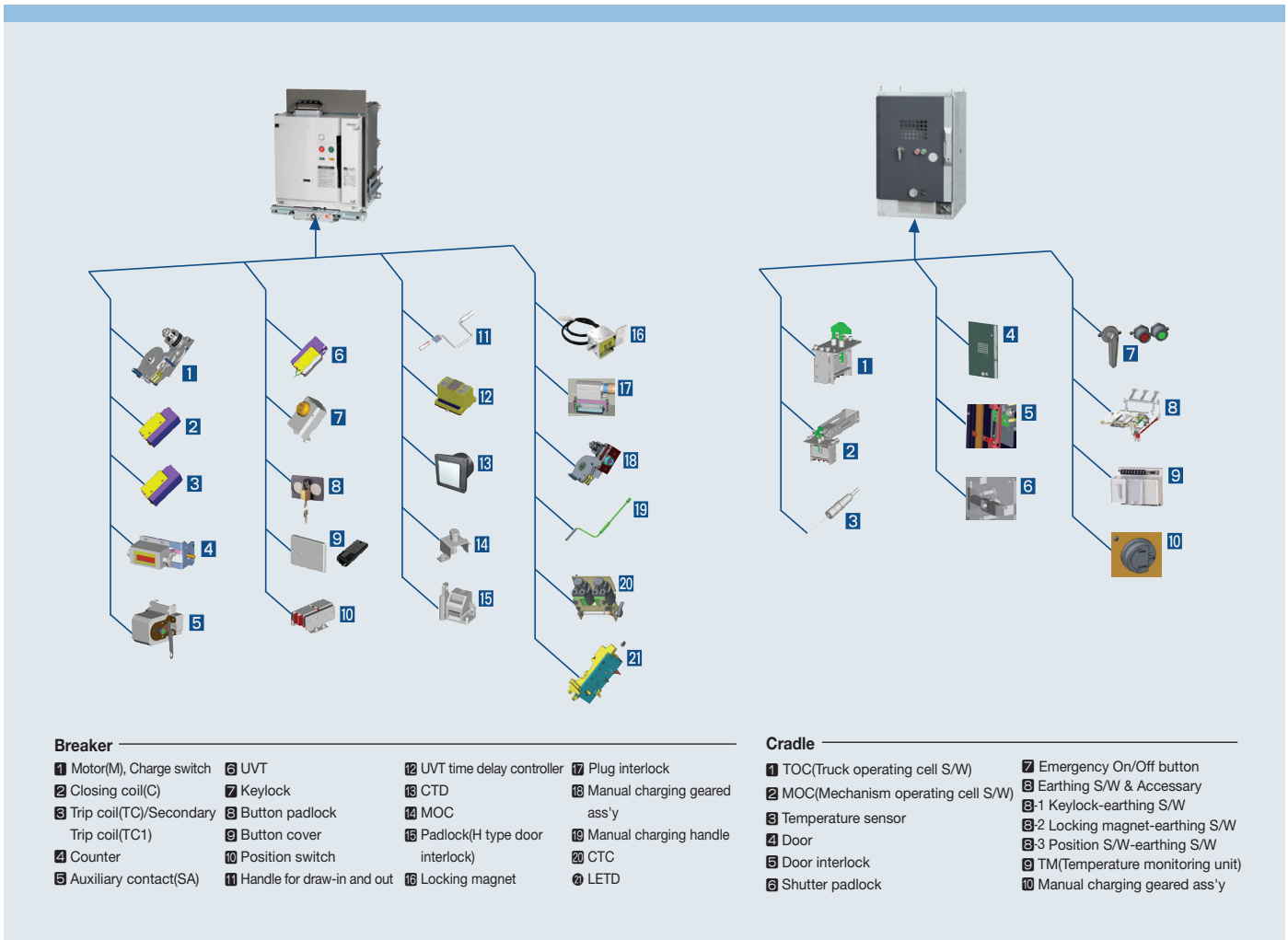
Breaker

- 1 Insulation rod
- 2 Lower terminal
- 3 Flexible shunt
- 4 Vacuum interrupter
- 5 Upper terminal
- 6 Heat sink, 2000A or more
- 7 Tulip contactor

Vacuum Interrupter, VI

The internal components of a typical Vacuum Interrupter are shown in the Fig. LS Vacuum Interrupter consists of a ceramic insulator, two end plates, arc shield, bellows, a movable and fixed electrode, and contact set. The ambient gas pressure within the evacuated tube is approximately 5×10^{-6} torr.

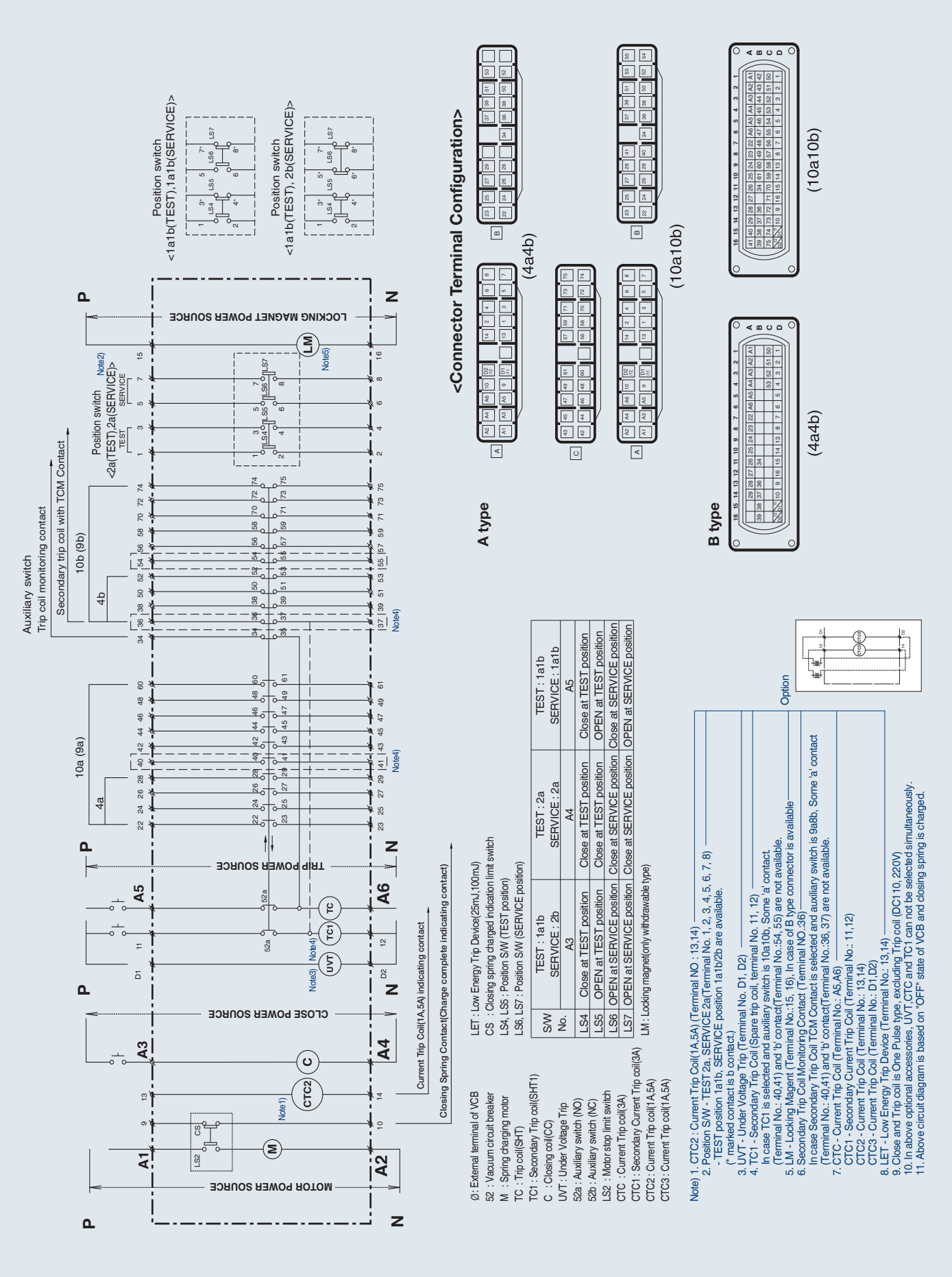
Accessories



Accessories

No	Designation	Division	Shape	Division	Remarks	No	Designation	Division	Shape	Division	Remarks
1	Geared motor	Basic		VL common	Rating division: DC 24V, 48V, 110V 125V, 220V AC 48V, 110V, 220V	17	MOC	Option (Breaker)			
2	Closing coil	Basic		VL common	Rating division: DC 24V, 48V, 110V 125V, 220V AC 48V, 110V, 220V	18	TOC	Option (Cradle)		VL common	
3	Opening coil	Basic		VL common	Rating division: DC 24V, 48V, 110V 125V, 220V AC 48V, 110V, 220V	19	MOC	Option (Cradle)		New development	
4	Auxiliary contact	Basic		New development	4a4b, 10a10b	20	Temperature sensor	Option (Cradle)		VL common	
5	UVT	Option (Breaker)		VL common	Rating division: DC 24V, 48V, 110V 125V, 220V AC 48V, 110V, 220V	21	Earthing S/W & accessory	Option (Cradle)		New development	
6	Additional opening coil	Option (Breaker)		VL common	Rating division: DC 24V, 48V, 110V 125V, 220V AC 48V, 110V, 220V	22	Shutter padlock	Option (Cradle)		VL common	
7	Position S/W (H type)	Option (Breaker)		VL common	Test/Run: 2a2a, 2a2b	23	Door emergence push button	Option (Cradle)		New development	
8	Keylock	Option (Breaker)		ACB common		24	Door	Option (Cradle)		New development	
9	Button padlock	Option (Breaker)		VL common		25	Door interlock	Option (Cradle)		New development	
10	Button cover	Option (Breaker)		VL common		26	CTD	Others		VL common	
11	Plug interlock	Option (Breaker/Cradle)		VL common		27	UVT time delay controller	Others		VL common	
12	Padlock (H type door interlock)	Option (Breaker)		VL common		28	Drawout handle	Others		VL common	
13	Manual charging geared ass'y	Option (Breaker)		VL common	Rating division: DC 24V, 48V, 110V 125V, 220V AC 48V, 110V, 220V	29	Temperature monitoring unit (TM)	Others		New development	
14	CTC	Option (Breaker)		New development	1A, 5A	30	Lift	Others		New development	
15	LETD	Option (Breaker)		VL common	25mJ	31	Manual charging handle	Others		VL common	
16	Manual charging geared ass'y	Option (Cradle)		New development							

Control circuit diagram





Safety Instructions

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



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



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