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Susol

DC Compact Switch-disconnectors

1600A Up to 1500Vdc



LS ELECTRIC

DC Compact Switch-disconnectors 1600A Up to 1500Vdc

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Change low voltage switchgears!

Another evolution of size, cost and performance for low voltage power circuit breakers

High Performance
 $I_{cw} = 50kA/1s$



Performance **UP**
Size **DOWN**

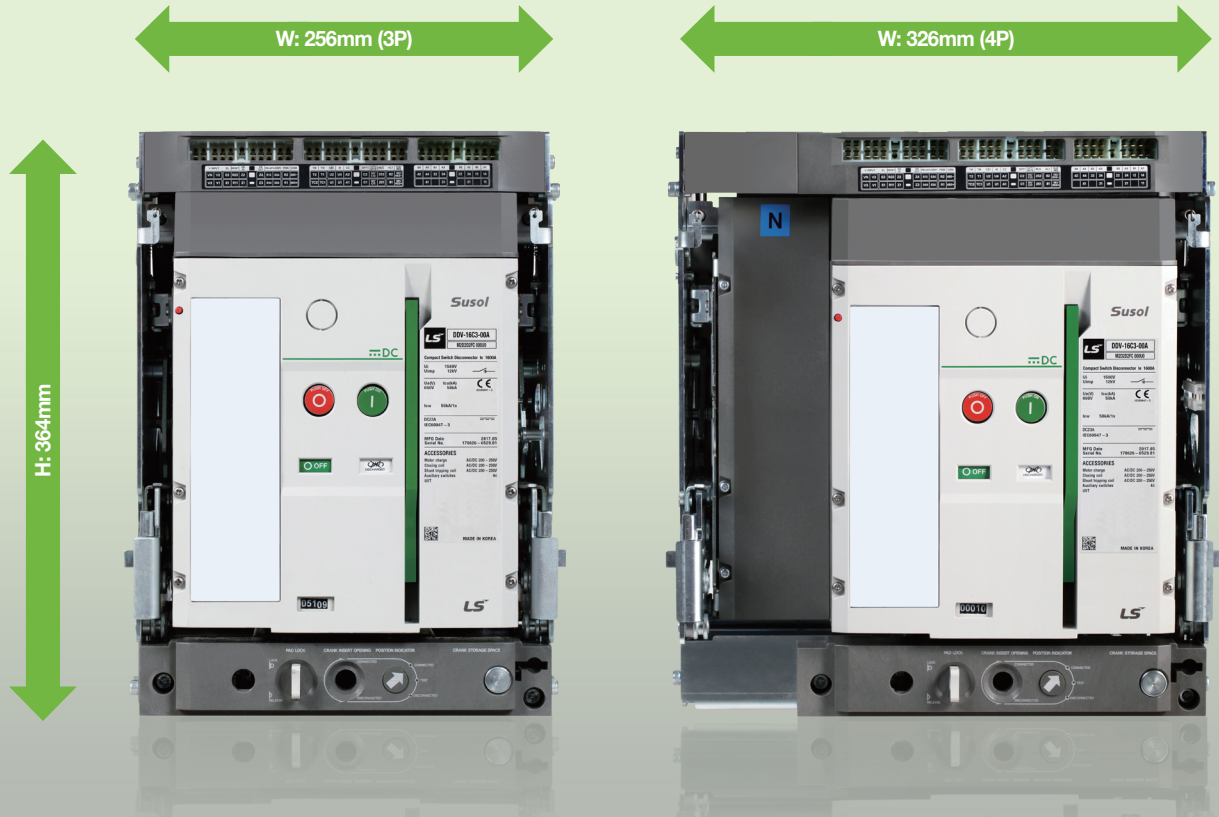
Susol Super Solution

DC Compact Switch-disconnectors 1600A

- DDH: Max. 1200Vdc, 1600A, I_{cw} 50kA/1sec
- DDV: Max. 1500Vdc, 1600A, I_{cw} 50kA/1sec

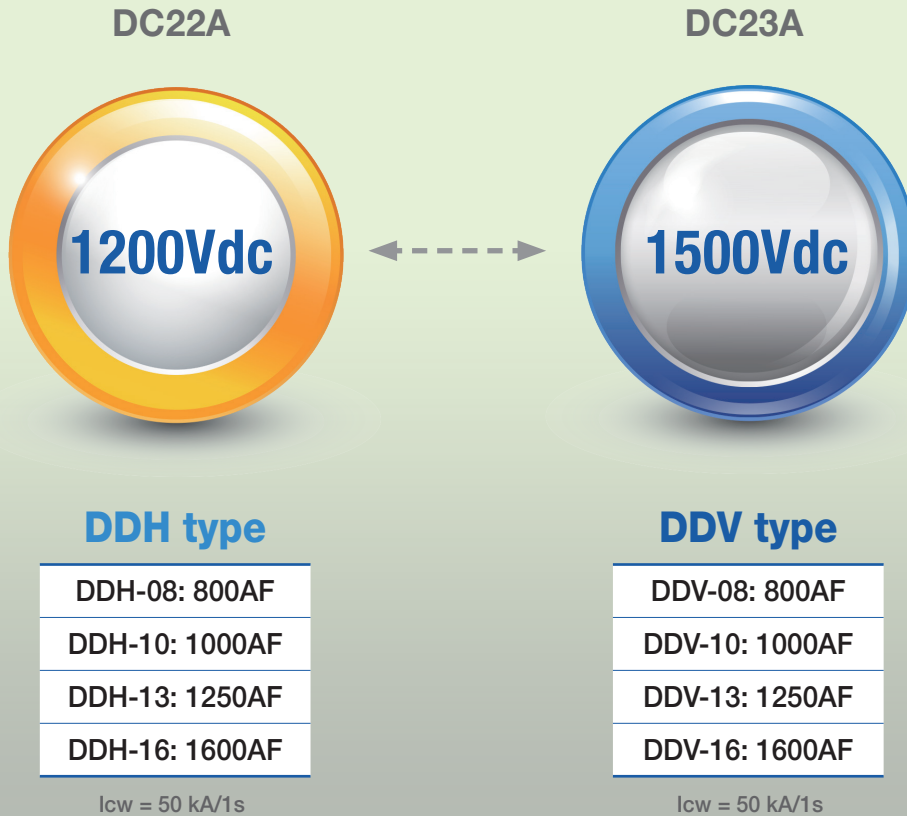
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DC Compact Switch-disconnectors 1600A



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Utilization Category



Features

- Rated current 800 ~ 1600A
- Rated operational voltage:
DDH type (3P: 750Vdc, 4P: 1200Vdc)
DDV type (3P: 1000Vdc, 4P: 1500Vdc)
- Rated short-time current (I_{cw}): 50kA/1s
- Operation durability without maintenance: 12,500 times
- Various control power sources
- Various accessories
- Application Standards and Certification:
IEC 60947-3, GB 14048.3

Connection



Various installation methods

Rear Connection



Vertical type, V



Horizontal type, H



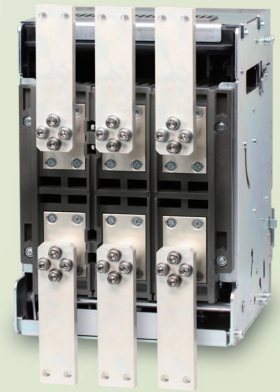
Spreader type, R



Mixed type, M



Mixed type, N



Front type, P

Front Connection



Spread type, Z



Vertical type, T



Cable lug type, X

- The front connection type is suitable for the panel that demands narrow depth for installation.
- The connection can be modified between vertical type and horizontal type by rotating the terminals through 90 degrees.

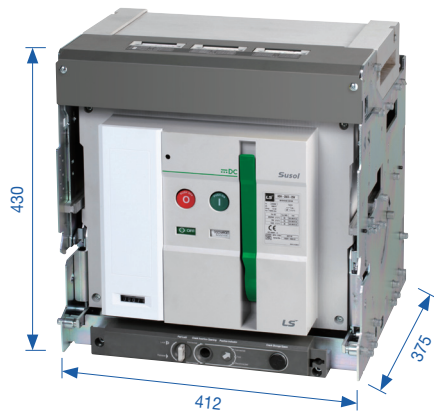
Compact size

Thanks to the reduced size compare to old switch-disconnector it is easy to handle the breaker as well as reducing the space and raw materials in the switchgear fabrication.

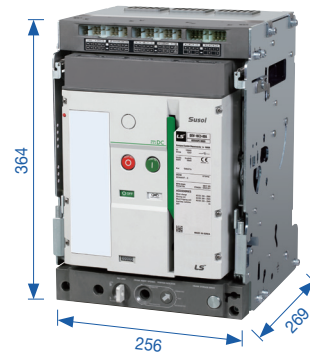
Compact Type

Unit (mm)

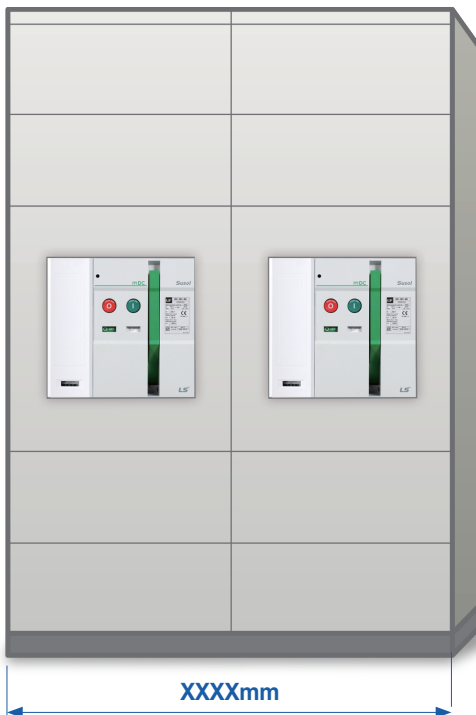
DC Switch-disconnector



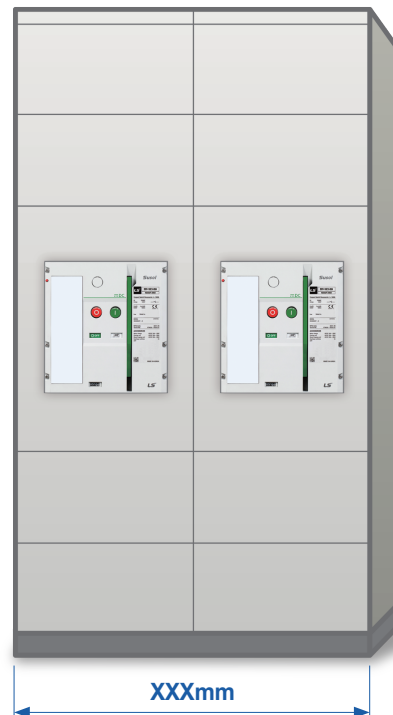
DC Compact Switch-disconnector



3-high



4-high





Fixed type



Drawable type

Commonness														
Rated insulation voltage (U _i)	(V)	1500												
Rated impulse withstand voltage (U _{imp})	(kV)	12												
Rated operational voltage (U _e)	(V)	750V DC (3P), 1200V DC (4P)				750V DC (2P)				1000V DC (3P), 1500V DC (4P)				
Number of poles	(P)	3, 4				2				3, 4				
Installation type		Fixed / Draw-out				Fixed				Fixed / Draw-out				
Related standards		IEC 60947-3 (DEKRA CB certification), GB 14048.3 (CCC certification)				IEC 60947-3				IEC 60947-3 (DEKRA CB certification), GB 14048.3 (CCC certification)				
Type	DDH				DDV				DDV					
	DDH-08C	DDH-10C	DDH-13C	DDH-16C	DDV-08C	DDV-10C	DDV-13C	DDV-16C	DDV-08C	DDV-10C	DDV-13C	DDV-16C		
Ampere frame (AF)	800AF	1000AF	1250AF	1600AF	800AF	1000AF	1250AF	1600AF	800AF	1000AF	1250AF	1600AF		
Utilization category (According to IEC 60947-3)	DC-22A				DC-22A				DC-23A					
Rated making capacity (I _{cm})	(kA peak)	DC 50				DC 50				DC 50				
Rated short-time withstand current (I _{cw})	(kA/1s)	DC 50				DC 50				DC 50				
Operation time (ms)	Opening time	40ms												
	Closing time	80ms under												
Connection	Horizontal type	○				○				○				
	Vertical type	● (Default)				● (Default)				● (Default)				
Mechanical and electrical life cycle														
Endurance (times) (Without maintenance)	Mechanical (120 times/hr)	12,500												
	Electrical (L/R 2ms) (30 times/hr)	2,000	1,000	500	500	2,000	1,000	500	500	4,000	2,000	1,000	1,000	
Dimension and weight														
Weight (3P/4P) (kg)	Draw-out	Without cradle	15.5(3P) / 19(4P)				-				15.5(3P) / 19(4P)			
		With cradle	22(3P) / 26(4P)				-				22(3P) / 26(4P)			
	Fixed	15.5(3P) / 19(4P)				14(2P)				15.5(3P) / 19(4P)				
External dimensions (W×H×D) (mm)	Draw-out	361.3×267×255.4(3P), 361.3×267×326(4P)				-				361.3×267×255.4(3P), 361.3×267×326(4P)				
	Fixed	283×219.5×272.4(3P), 283×219.5×342.4(4P)				283×219.5×272.4(2P)				283×219.5×272.4(3P), 283×219.5×342.4(4P)				

Accessories

Main body



Miss Insertion Preventing Device (MIP)



Auxiliary Switch (FX)



Ready to Close switch (RCS)



Shunt Coil (SHT)



Closing Coil (CC)



Under Voltage Trip Device (UVT)



Key Lock (K1)



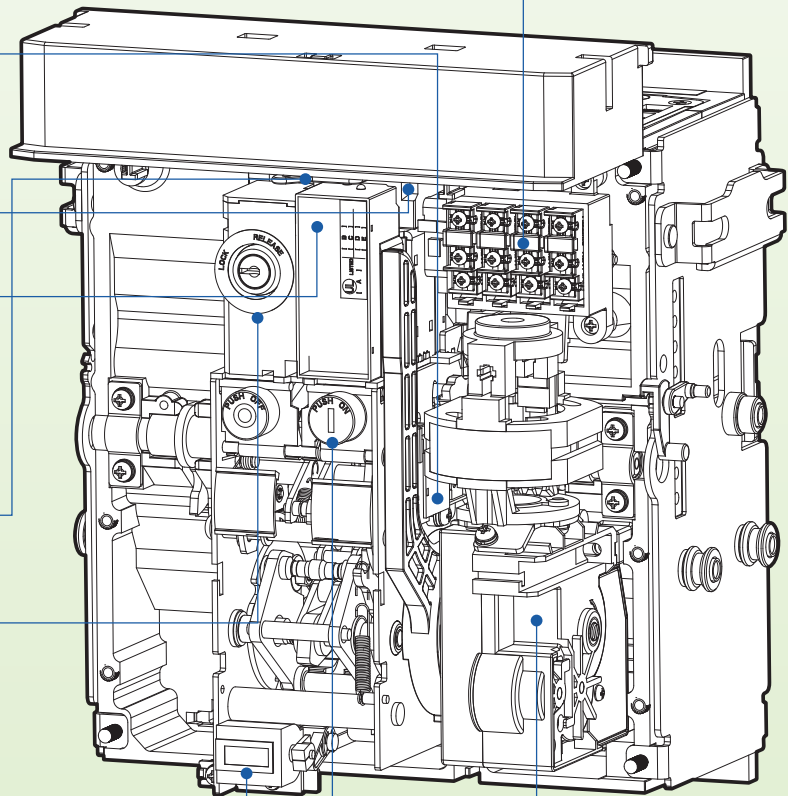
Counter (C)



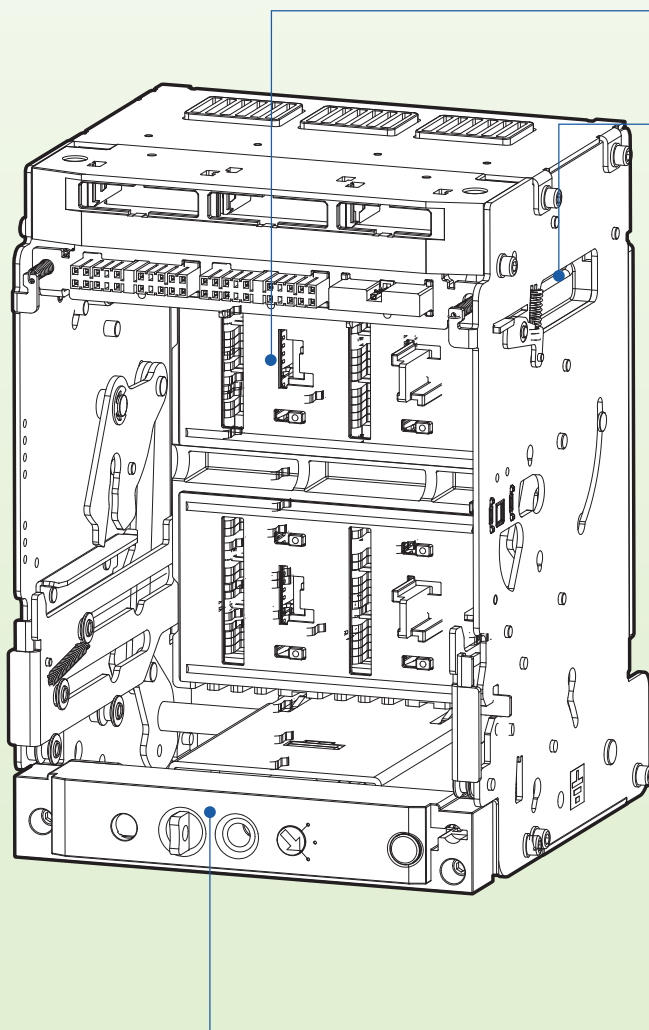
ON/OFF Button Padlock (B)



Motor (M)



Cradle



Miss Insertion Preventing Device (MIP)



Condensor Trip Device (CTD)



Safety Shutter (ST)



Lifting Hook (LH)



Interphase Barrier (IB)



UVT Time Delay Controller (UDC)



Remote I/O Unit (RCO)



Cell SW (CEL)



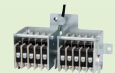
Door Interlock (DI)



Mechanical Interlock (MI)



Mechanical Operated Cell SW (MOC)



Racking Interlock & Position Lock (RI)



Door Frame (DF)



Dust Cover (DC)



External configuration

Draw-out (Main body)



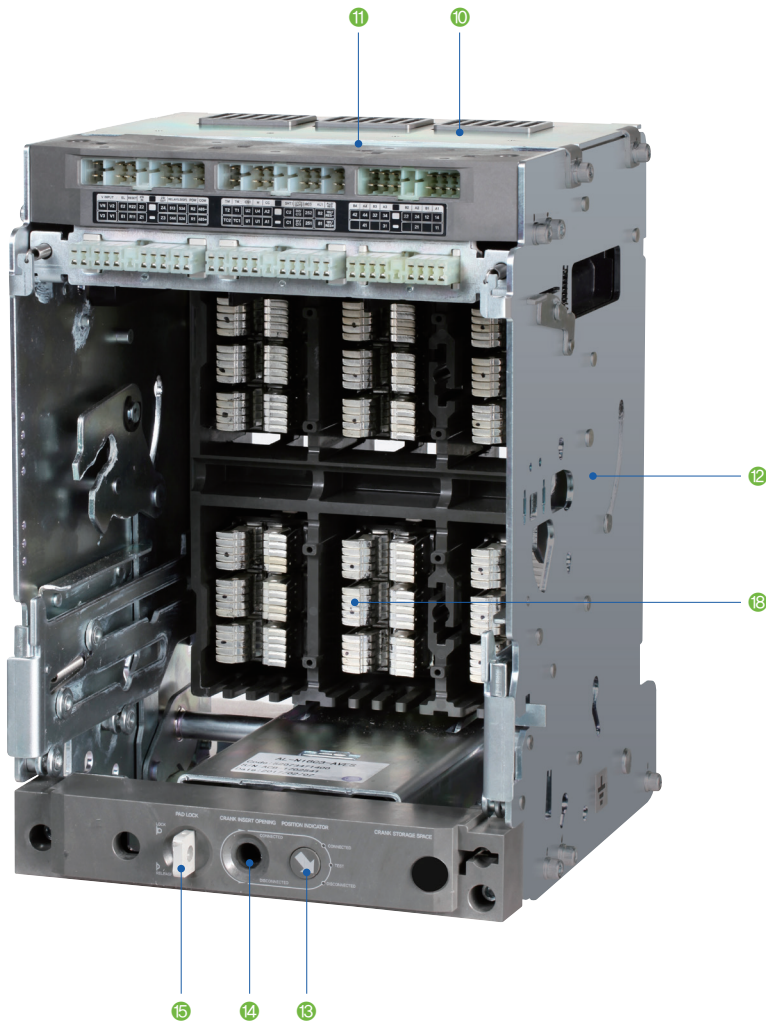
Marking

LS		DDV-16C3-00A	
		M2D2D2FC 000U0	
Compact Switch Disconnector Ie 1600A			
Ui	1500V		
Uimp	12kV		
Ue(V)	690V	Icu(kA)	50kA
			IEC60947-3
Icw	50kA/1s		
DC23A IEC60947-3			
MFG Date	2017.05		
Serial No.	170626-6529.01		
ACCESSORIES			
Motor charge	AC/DC 200-250V		
Closing coil	AC/DC 200-250V		
Shunt tripping coil	AC/DC 200-250V		
Auxiliary switches	4c		
UVT			
MADE IN KOREA			

- Ui: Rated insulation voltage
- Uimp: Impulse withstand voltage
- Ue: Rated operational voltage
- Icw: Short time withstand capacity
- Icm: Rated making capacity
- MFG. Date: Manufacturing date

- Motor charge Control power and terminal No.
- Closing coil Control power and terminal No.
- Shunt tripping coil Control power and terminal No.
- Auxiliary switches: Contact specification and terminal No.
- Under voltage trip: UVT terminal No.

Draw-out (Cradle)



Terms

- ① Counter
- ② OFF button
- ③ ON button
- ④ Series name
- ⑤ Charge handle
- ⑥ Name plate
- ⑦ Charge/Discharge indicator
- ⑧ ON/OFF indicator
- ⑨ Corporation logo
- ⑩ Arc cover (Zero Arc Space)
- ⑪ Safety control cover
- ⑫ Cradle
- ⑬ Position indicator
- ⑭ Handle inserting hole
- ⑮ Pad lock button
- ⑯ Arc chute
- ⑰ Front cover
- ⑱ Cradle finger

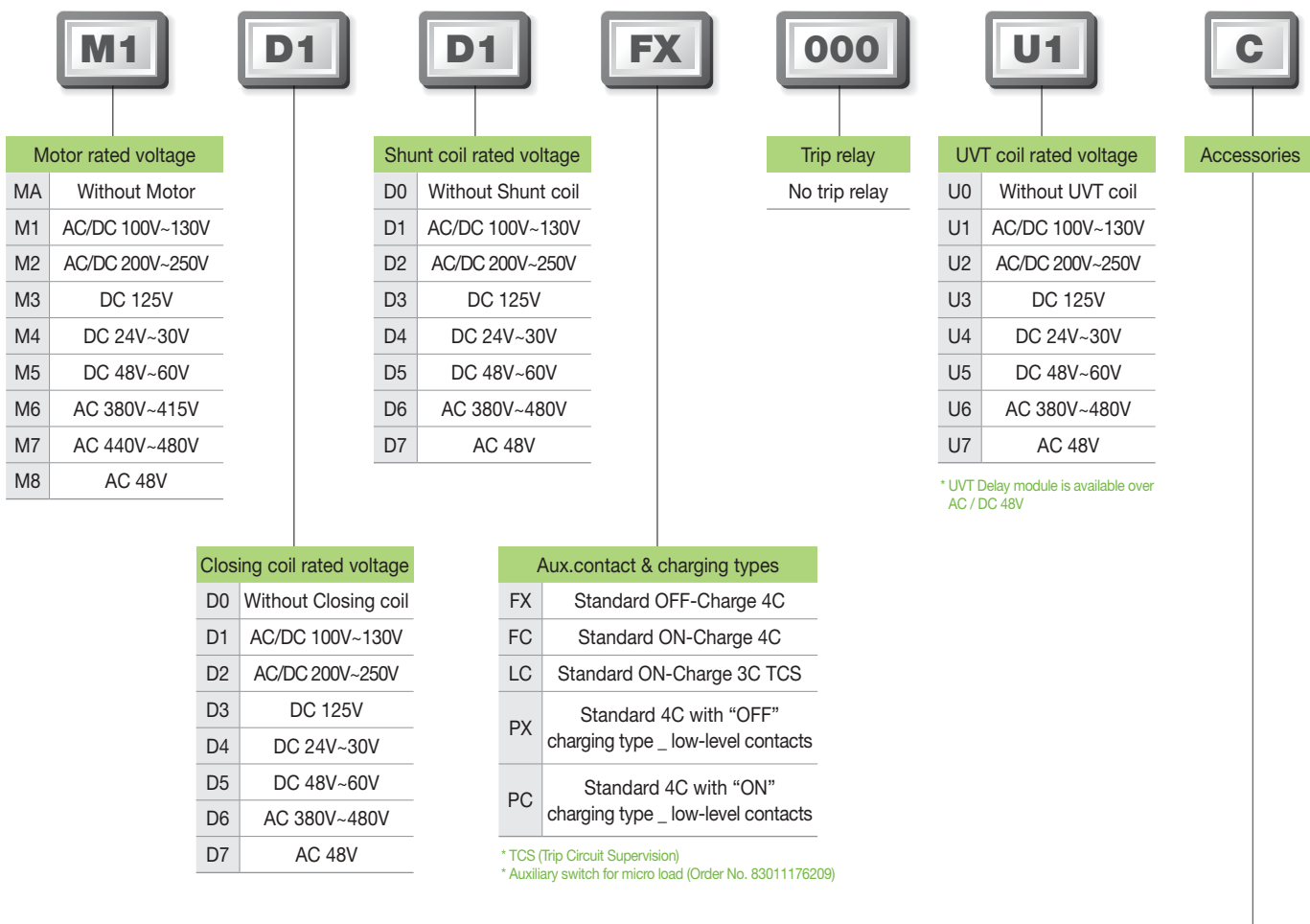
Ordering

DC Switch-Disconnectors main body

DDV — **16** **C** **3** — **00** **A**

Switch-disconnectors		Ampere frame		Frame size		Poles		CT ratio		Installation & Connection	
DDH	1200Vdc	08	800AF	C	800-1600AF	2	2Pole (DDV: 750Vdc)	00	None	withdrawable type	
DDV	1500Vdc	10	1000AF			3	3Pole (DDH:750Vdc)			A	Automatic Connection
		13	1250AF				3Pole (DDV:1000Vdc)			Fixed type	
		16	1600AF			4	4Pole (DDH:1200Vdc)			H	Horizontal type
							4Pole (DDV:1500Vdc)			V	Vertical type
										M	Upper-Horizontal/ Lower-Vertical type
										N	Upper-Vertical/ Lower-Horizontal type
										P	Flat type
										Z	Flat spread type
										R	Spread type
										T	Flat vertical type
										X	Cable lug type

DC Switch-Disconnectors accessories

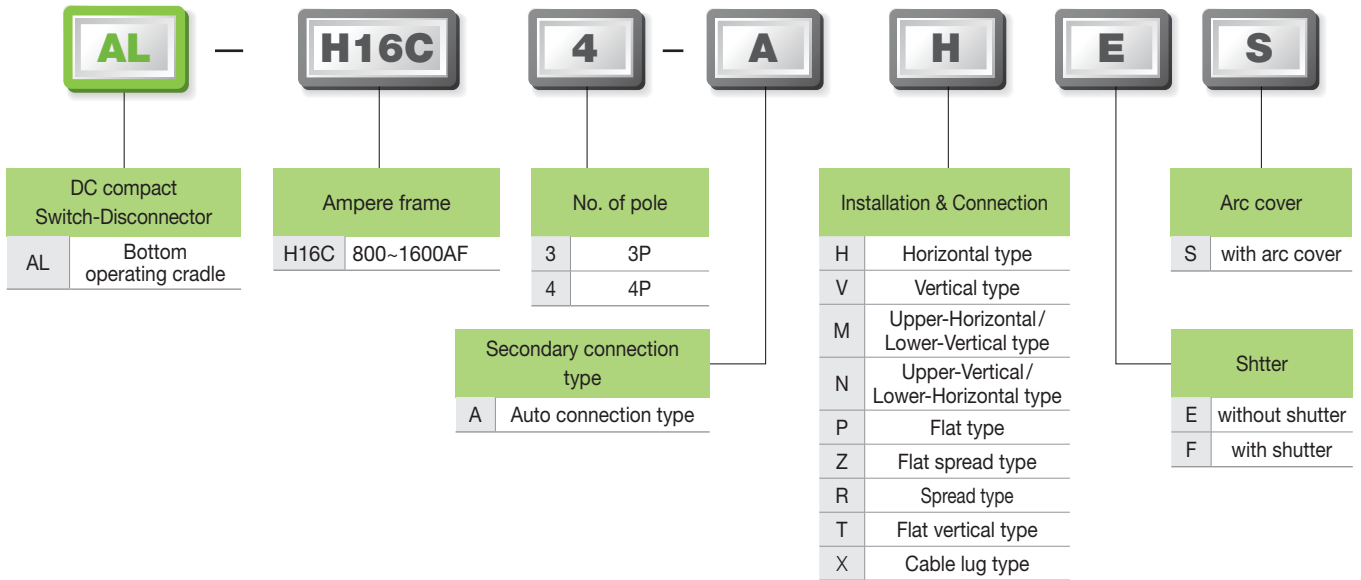


Code	Description	Option description
C	C	Counter
B	B	On/Off Button lock
M	MI	Mechanical interlock
D	DI or MOC	Door Interlock or MOC (Mechanism operated cell switch)
K	K1	Key Lock
K2	K2	Key Interlock Set
R	RCS	Ready to Close switch
H1	SHT2 ^{Note 2)}	AC/DC 100~130V, Double Shunt coil
H2		AC/DC 200~250V, Double Shunt coil
H3		DC 125V, Double Shunt coil
H4		DC 24~30V, Double Shunt coil
H5		DC 48~60V, Double Shunt coil
H6		AC 380~480V, Double Shunt coil
H7		AC 48V, Double Shunt coil

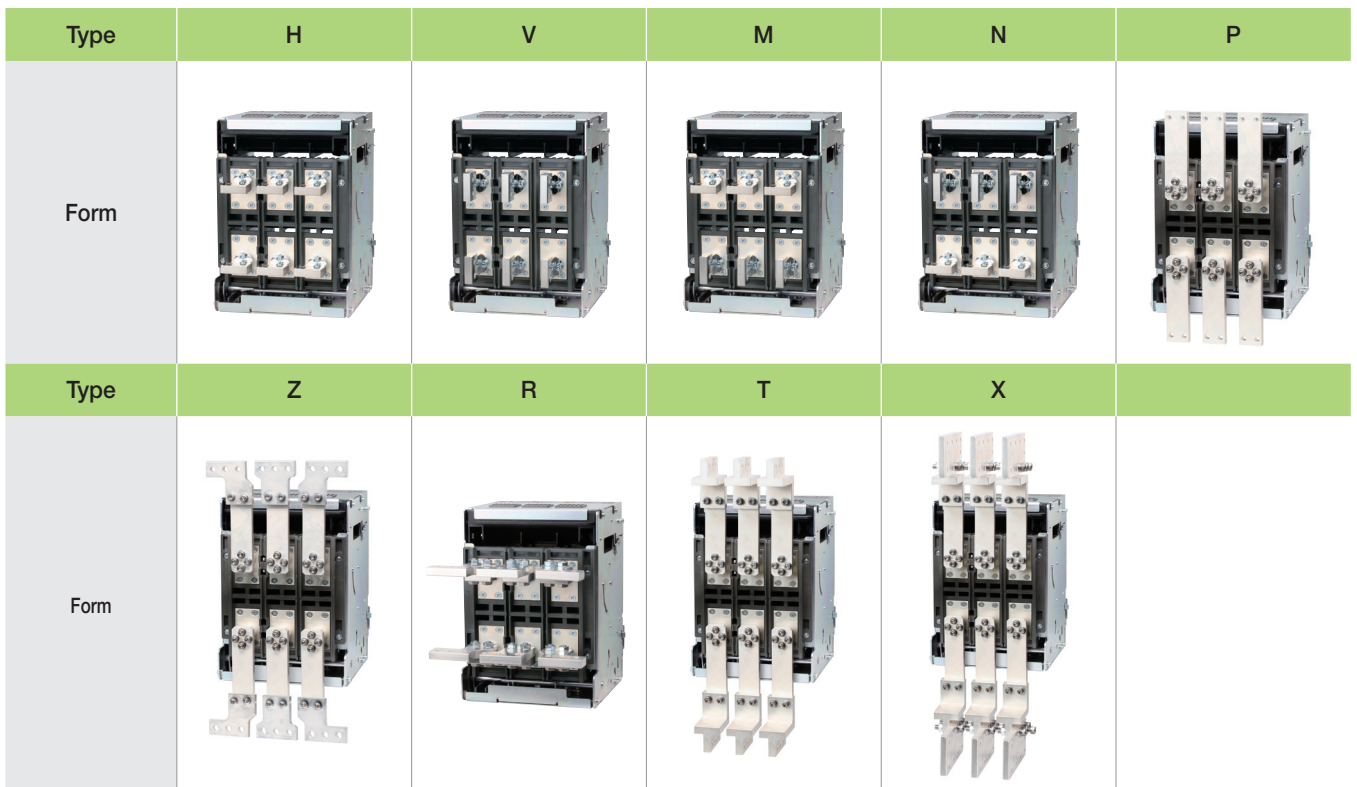
Note 1) * If mixed option is more than 5, it is separated by mixed option code.
2) UVT & SHT2 can be not applicable together.

Ordering

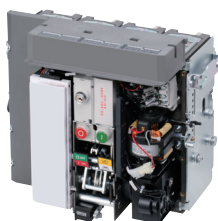
DC Switch-Disconnectors cradle



Various installation methods



Main body



Mounting	Accessories		Supply category		Remark ^{Note)}	Page
			Standard	Option		
Internal	SHT 1	Shunt Coil	-	○	*	18
	SHT 2	Double Shunt Coil	-	○	*	19
	CC	Closing Coil	-	○	*	20
	M	Motor	-	○	*	21
	CS1	Charge Switch	-	○	*	
	UVT	Under Voltage Trip Device	-	○	*	22
	RCS	Ready to Close Switch	-	○	*	23
	C	Counter	-	○	*	23
	FX	Auxiliary Switch	●	-	*	25
External	MI	Mechanical Interlock	-	○	*	27
	K1	Key Lock	-	○	*	24
	K2	Key Interlock Set	-	○	*	24
	B	On/Off Button Lock	-	○	*	25
	LH	Lifting Hook	-	○	-	26
	CTD	Condenser Trip Device	-	○	-	26
	DC	Dust Cover	-	○	-	27
	A	Automatic Connector	●	-	*	

* Separate purchasing is not allowed. Each item should be purchased with the main body.

Cradle

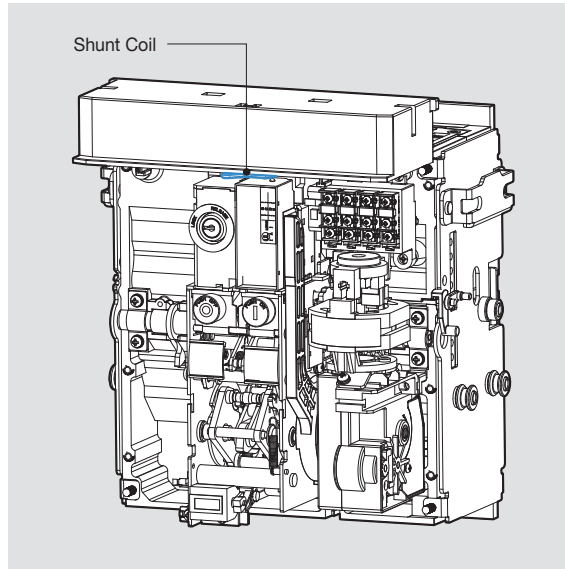


Mounting	Accessories		Supply category		Remark ^{Note)}	Page
			Standard	Option		
Cradle	ST	Safety Shutter	-	○	*	29
	DF	Door Frame	-	○		29
	MIP	Miss Insertion Prevent Device	-	○		34
	MOC	Mechanical Operated Cell Switch	-	○		28
	CEL	Cell Switch	-	○		31
	DI	Door Interlock	-	○		32
	ZAS	Zero Arc Space (Arc Cover)	●	-	*	32
	SC	Safety Control Cover	●	-	*	
	RI	Racking Interlock	-	○		33
	PL	Pad Lock/Position Lock	●	-	*	33
	IB	Interphase Barrier	●	-	-	30
	UDC	UVT time delay controller	-	○		35
	ADP	Compatible Adapter	-	○	-	
Other	RPH	Reverse Phase ACB	-	○	-	
	VAD	Various Connection Type	-	○	-	
	RCO	Remote I/O	-	○	-	36

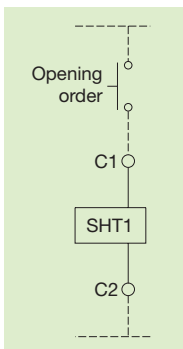
* Separate purchasing is not allowed. Each item should be purchased with the main body.

** Voltage module should be purchased with P/S type trip relay.

Shunt Coil [SHT1]



- SHT1 is a control device which trips a circuit breaker from remote place, when applying voltage continuously or instantaneously over 200ms to coil terminals (C1, C2).
- When UVT coil is installed, its location is changed.



Wiring Diagram

1. Rated voltage and characteristics of trip coil

Rated voltage (Vn)		Operating voltage range (V)	Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)		Inrush	Steady-state	
24~30	-	0.7~1.1 Vn	200	5	40
48~60	48	0.7~1.1 Vn			
100~130	100~130	0.7~1.1 Vn			
200~250	200~250	0.7~1.1 Vn			
-	380~480	0.7~1.1 Vn			

Note) Operating voltage range is the min. rated voltage standard for each rated voltage (Vn).

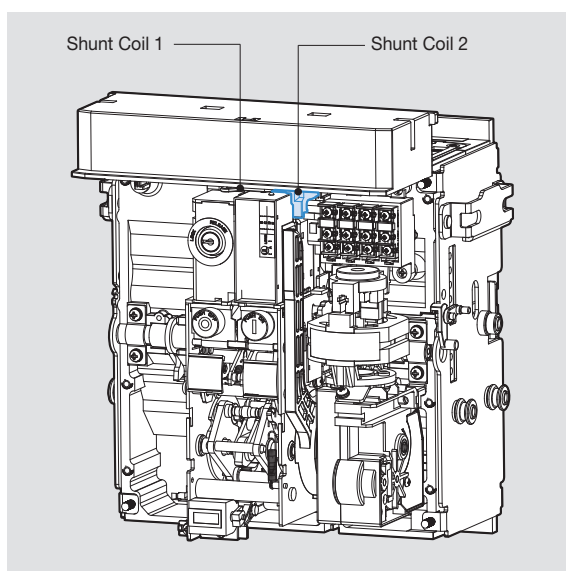
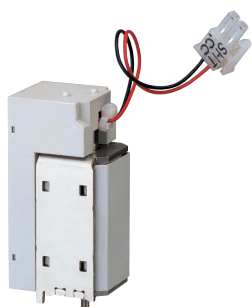
2. Specification of the wire

- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

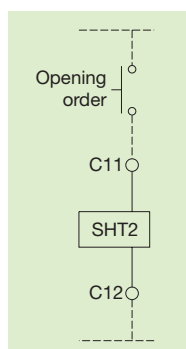
The maximum wire length

		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)	#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

Double Shunt Coil [SHT2]



- SHT2 is a control device which trips a circuit breaker doubly from the outside. When SHT1 doesn't operate normally, it can trip a circuit breaker safely.
- Shunt coil 1: Install it at existing location.
- Shunt coil 2: Install it on the right side of the Shunt coil 1
- It is not available with UVT coil when installing double shunt coil.



Wiring Diagram

1. Rated voltage and characteristics of trip coil

Rated voltage (Vn)		Operating voltage range (V)	Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)		Inrush	Steady-state	
24~30	-	0.7~1.1 Vn	200	5	40
48~60	48	0.7~1.1 Vn			
100~130	100~130	0.7~1.1 Vn			
200~250	200~250	0.7~1.1 Vn			
-	380~480	0.7~1.1 Vn			

Note) Operating voltage range is the min. rated voltage standard for each rated voltage (Vn).

2. Specification of the wire

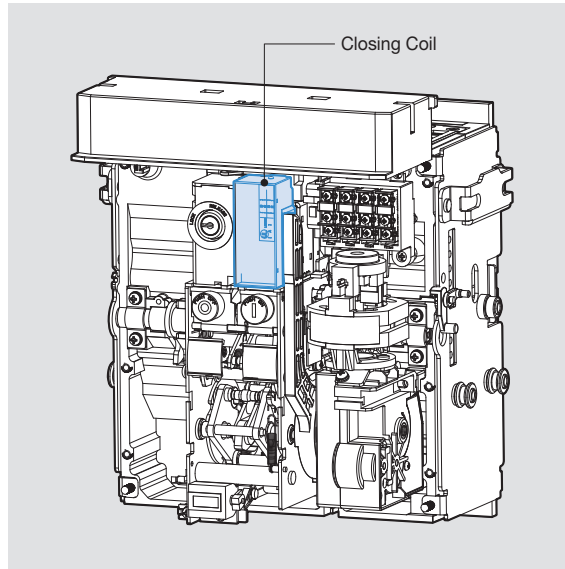
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

The maximum wire length

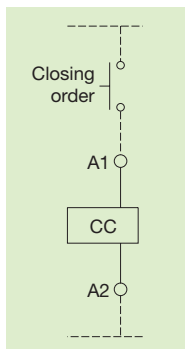
		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)	#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

Accessories

Closing Coil [CC]



- It is a control device which closes a circuit breaker, when the voltage is applied continuously or instantaneously over 200ms to the coil terminals (A1, A2).



Wiring Diagram

1. Rated voltage and characteristics of closing coil

Rated voltage (Vn)		Operating voltage range (V)	Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)		Inrush	Steady-state	
24~30	-	0.85~1.1 Vn	200	5	80
48~60	48	0.85~1.1 Vn			
100~130	100~130	0.85~1.1 Vn			
200~250	200~250	0.85~1.1 Vn			
-	380~480	0.85~1.1 Vn			

Note) Operating voltage range is the min. rated voltage standard for each rated voltage (Vn).

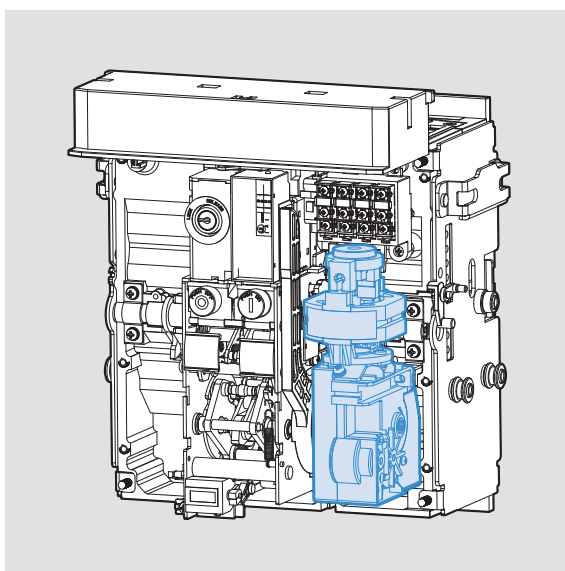
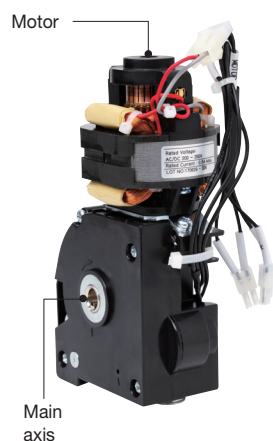
2. Specification of the wire

- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

The maximum wire length

		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)	#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

Motor [M]



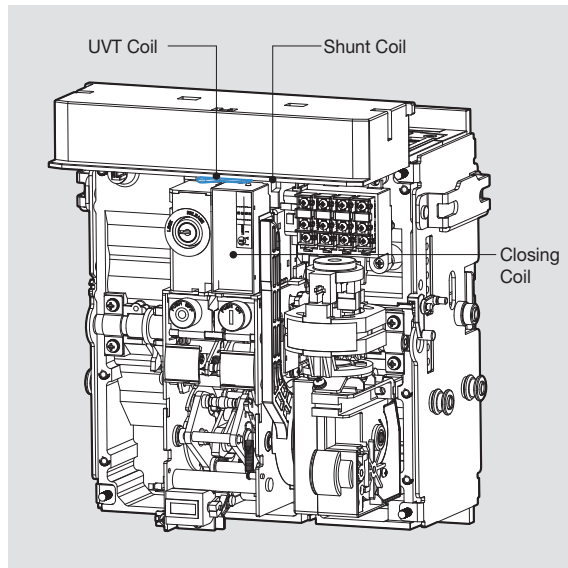
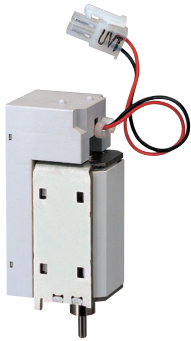
- Charge the closing spring of a circuit breaker by the external power source. Without the external power source, charge manually.
- Operating voltage range (IEC 60947) 85%~110%Vn

Input voltage (V)	DC 24~30V	AC/DC 48~60V	AC/DC 100~130V	AC/DC 200~250V	AC 380V	AC 440~480V
Load current (max.)	5A	3A	1A	0.5A	0.3A	0.3A
Starting current (Max.)	5 times of load current					
Load rpm (Motor)	15000~19000 rpm					
Charge time	Less than 3sec.					
Dielectric strength	2kV/min					
Using temperature range	-20°~ 60°					
Using humidity range	Max. RH 80% (No dew condensation)					
Endurance	15,000 cycle (Load connection, 2 times/min)					
Charge switch	10A at 250VAC					

Charge Switch [CS1]

- It is a built-in contact which sends the signal to the outside, when motor charging is completed. (1a)
- It has a “1a” contact built-in for complete charging.
- 10A at 250VAC

Under Voltage Trip Device [UVT]



- If the voltage of the main or the control power is under voltage, UVT which is installed inside of the breaker breaks the circuit automatically. Please connect with UVT time-delay device in order to present the time-delay function because UVT is technically instantaneous type.
- The closing of a circuit breaker is impossible mechanically or electrically if control power not supplied to UVT. To close the circuit breaker, 65~85% of rated voltage should be applied to both terminals of UVT coil (D1, D2).
- When using UVT coil, the double trip coil can not be used, and the location of trip coil is changed.

1. Rated voltage and characteristics of UVT coil

Rated voltage (Vn)		Operating voltage range (V)		Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)	Pick up	Drop out	Inrush	Steady-state	
24~30	-	0.65~0.85 Vn	0.4~0.6 Vn	200	5	50
48~60	48					
100~130	100~130					
200~250	200~250					
-	380~480					

Note) Operating voltage range is the min. rated voltage standard for each rated voltage (Vn).

2. Specification of the wire

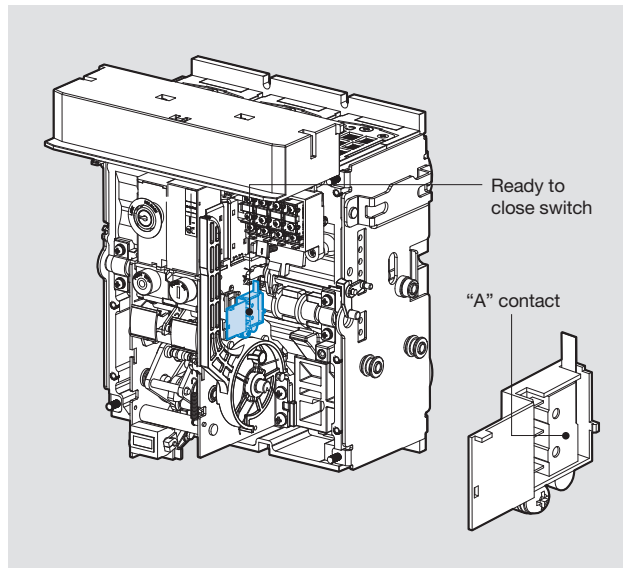
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

The maximum wire length

		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)	#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

Note) In case of using UVT coil, the location of Shunt coil is changed.

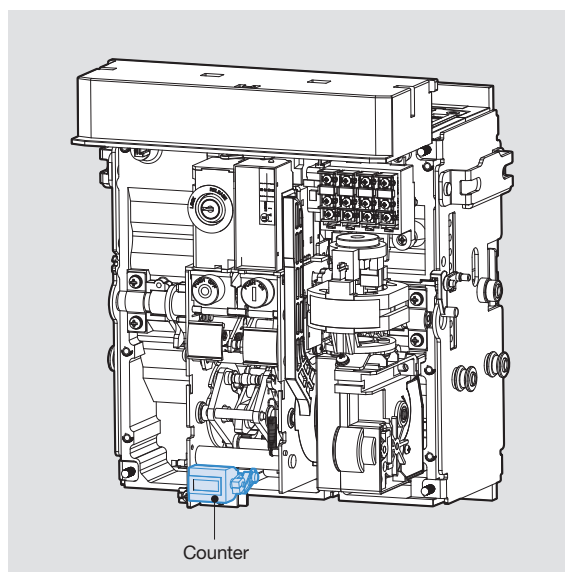
Ready to Close Switch [RCS]



- It interlocks with mechanism of circuit breaker.
- It indicates the status that the circuit breaker is ready to do closing operation.
- When mechanism is in OFF position or in Charge, contact is output with "ON" and it indicates that mechanism can be closed.

Classification	Standard		Remark
Contactor	250Vac	3A	
Capacity	250Vdc	5A	
	125Vdc	0.6 A	

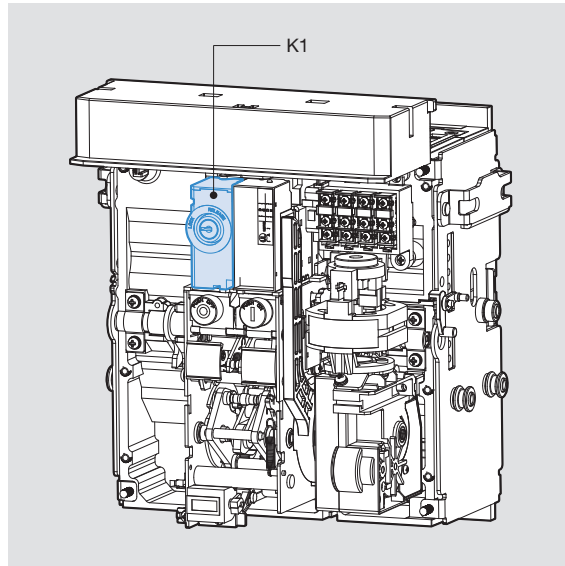
Counter [C]



- It displays the total number of ON/OFF operation of ACB.

Accessories

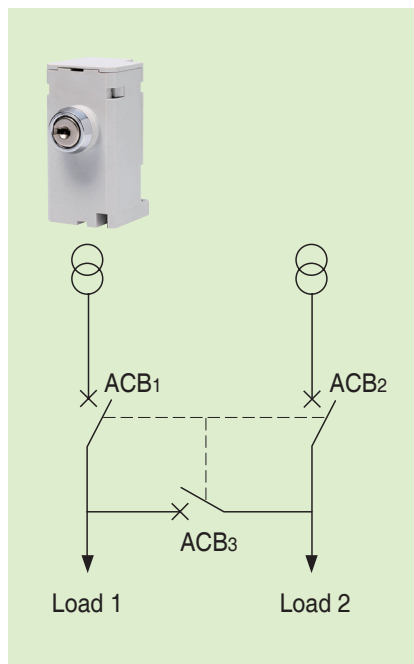
Key Lock [K1]



- It is a device for locking which prevents a certain circuit breaker from being operated by user's discretion when two or more circuit breakers are used at the same time.
- K1: Preventing mechanical closing

Key Interlock Set [K2]

Wiring



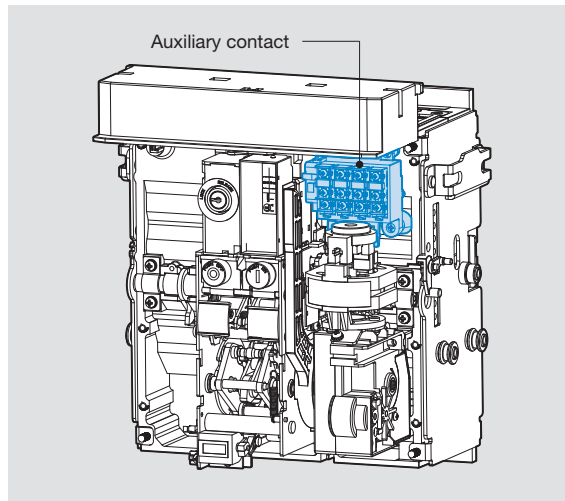
- 3 circuit breakers can be arranged for the continuous power supply to the load side and be interlocked mutually by using Key Lock embedded in each circuit breaker. Two same keys will be provided.

* How to order: 3 breakers must be ordered as a set, and K2 description must be added to the additional breakers. (2 keys are provided per 3 breakers.)

ACB-1	ACB-2	ACB-3	Status	
			LOAD1	LOAD2
●	●	●	OFF	OFF
●	○	○	OFF	ON
○	●	○	ON	OFF
○	○	●	ON	ON
●	●	○	OFF	OFF
●	○	●	OFF	ON
○	●	●	ON	OFF

○: Release ●: Lock

Auxiliary Switch [FX]



- It is a contact used to monitor ON/OFF position of ACB from remote place.

* Auxiliary switch for micro load (Order No. 8301176209)

Classification

Switch classification	Description	Resistive load	
		MAX.	MIN.
Standard	FC, FX, LC	AC250V 3A AC125V 5A	DC5V 160mA
Micro load	Oder No. 8301176209	AC125V 0.1A DC30V 0.1A	DC5V 1mA

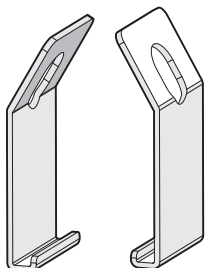
On/Off Button Lock [B]



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

Note) Padlocks(Ø5 - Ø6) are not supplied.

Lifting Hook [LH]



- It is a device to make an ACB easy to shift.
- Please hang it to both handles of the cradle.

Condenser Trip Device [CTD]

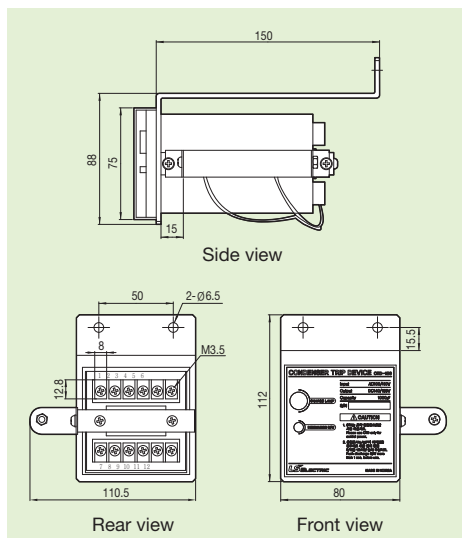


- It gets a circuit breaker tripped electrically within regular time when control power supply is broken down and is used with Shunt coil, SHT. In case there is no DC power, It can be used as the rectifier which supplies DC power to a circuit breaker by rectifying AC power.

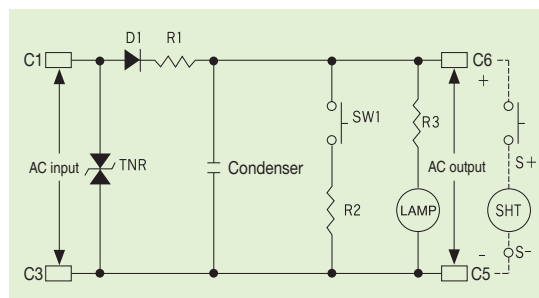
Ratings

Ratings	Specification	
Model	CTD-100	CTD-200
Rated input voltage (V)	AC 100/110	AC 200/220
Frequency (Hz)	50/60	50/60
Rated charge voltage (V)	140/155	280/310
Charging time	Within 5s	Within 5s
Trip possible time	Over 3 min	Over 2 min
Range of Input voltage (%)	85~110	85~110
Condenser capacity	1000 μ F	560 μ F

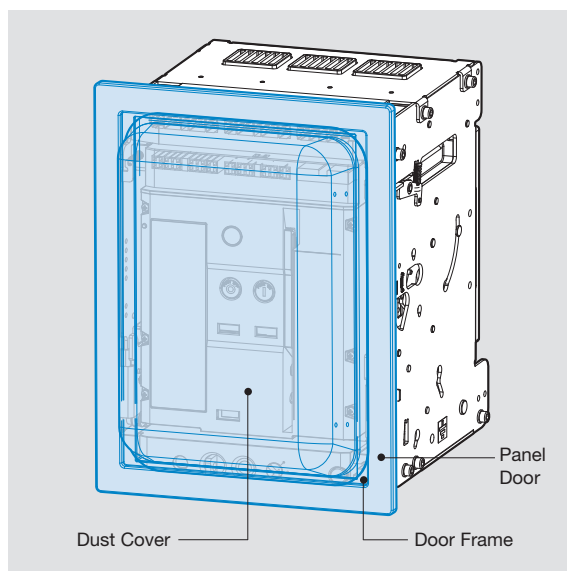
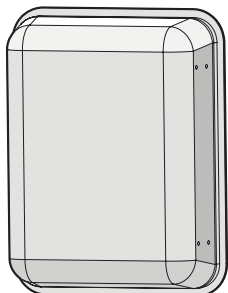
External dimension



Circuit diagram

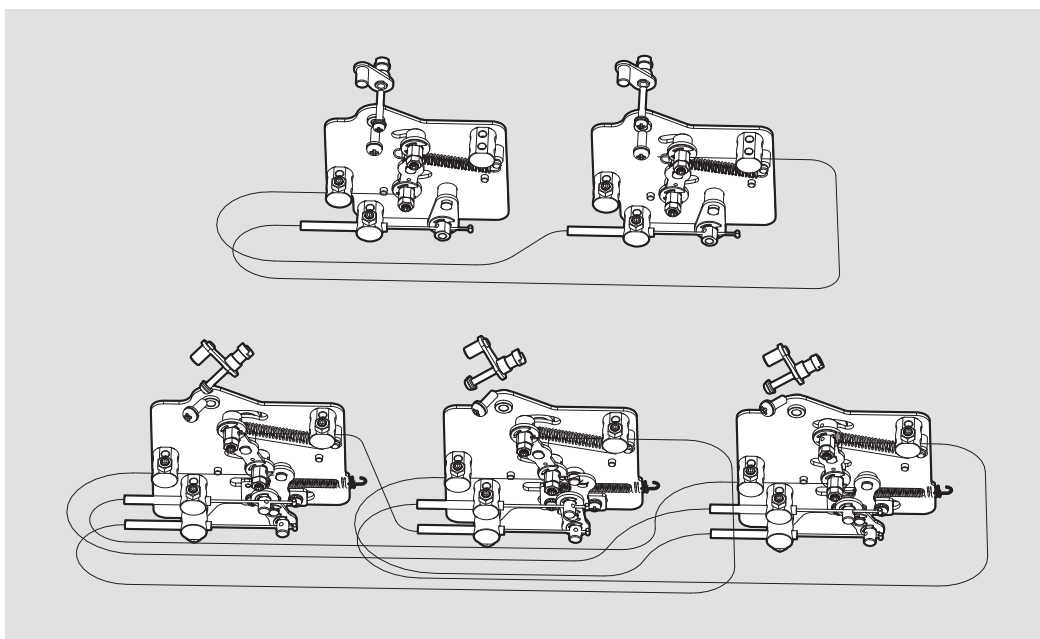


Dust Cover [DC]



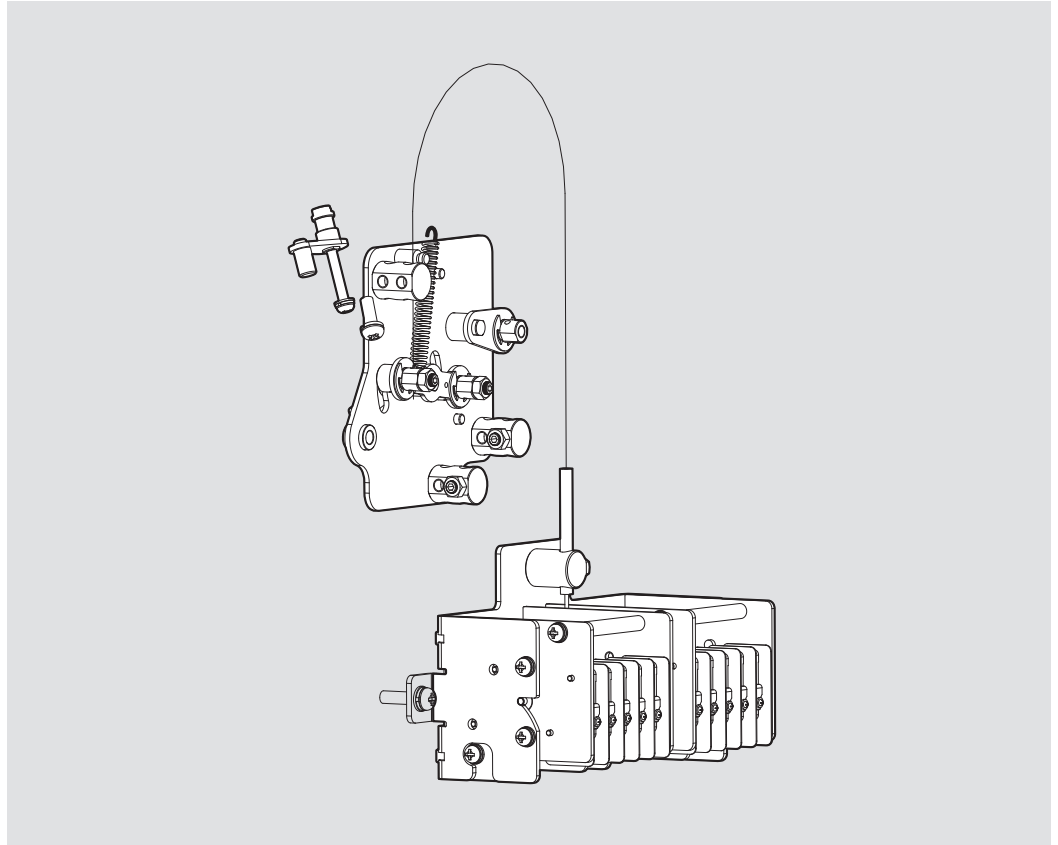
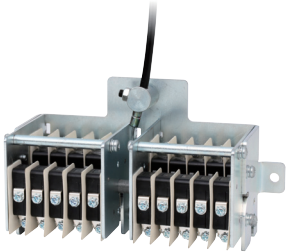
- Attached to the door frame.
- It protects the product from dust and moisture that may affect the operation of the instrument at the same time (IP54) which may cause fault operation and enhances the sealing degree by being mounted to protrude type of panel.
- It is transparent so that the front side of ACB is visible and the Cover can be opened/closed even if ACB is drawn out to until TEST position.

Mechanical Interlock [MI]

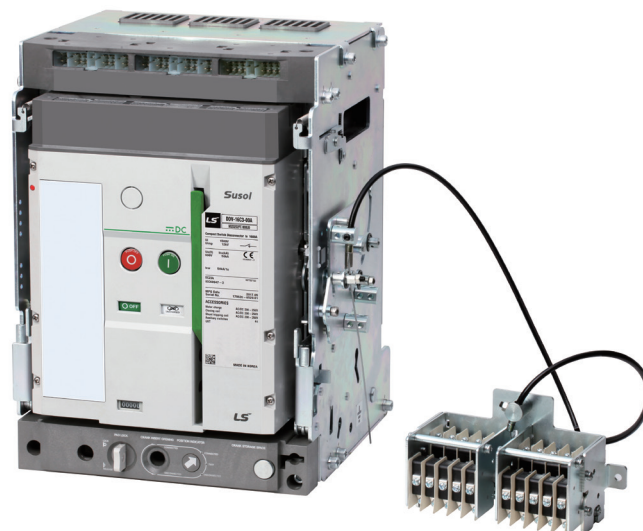


- It is used to interlock closing and trip between two or three breakers mechanically so as to prevent unintended operation at the same time.
- Wire type interlock can be applied upto 3 breakers

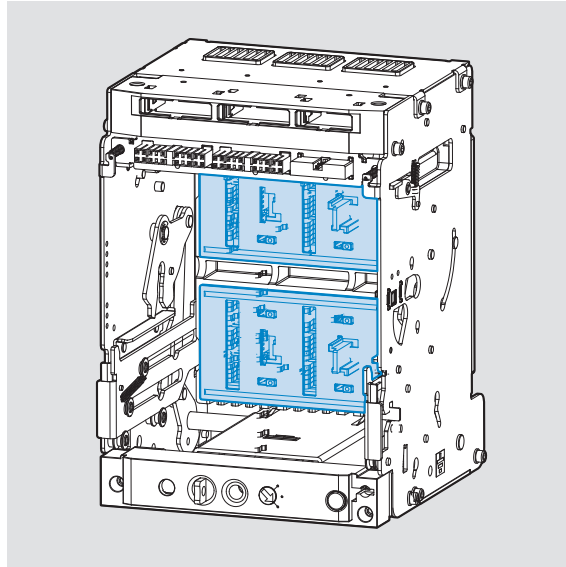
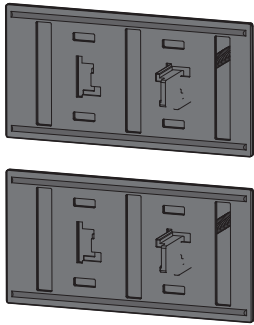
Mechanical Operated Cell Switch [MOC]



- It is the contact (10a10b) which displays the ON/OFF condition of ACB. It mechanically operates only when the breaker is “CONNECTED” position. A standard type and a high capacity type is available.
- When MOC link is installed to cradle, MOC can be equipped with the inside of panel.



Safety Shutter [ST]



- It is the automatic safety device to protect the connectors of main circuit by cutting off dangerous contact from outside while the breaker is drawn out. When the ACB is drawn in, the shutter is automatically opened.

- Plate Shutter is a total of 2 models

The types of safety shutter plate

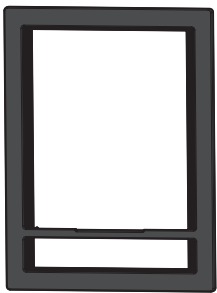
3P



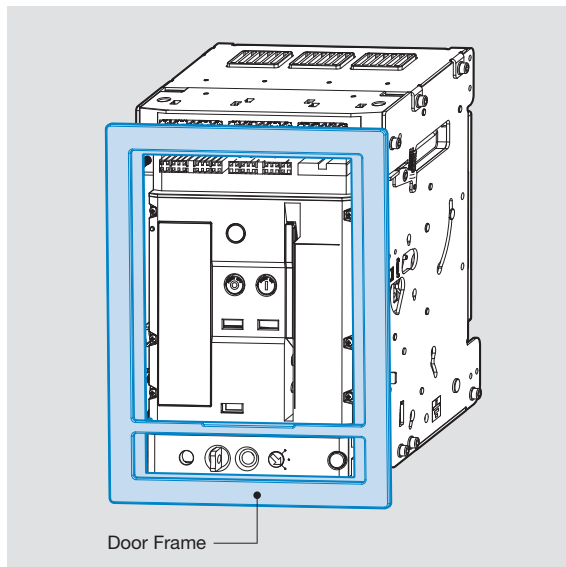
4P



Door Frame [DF]



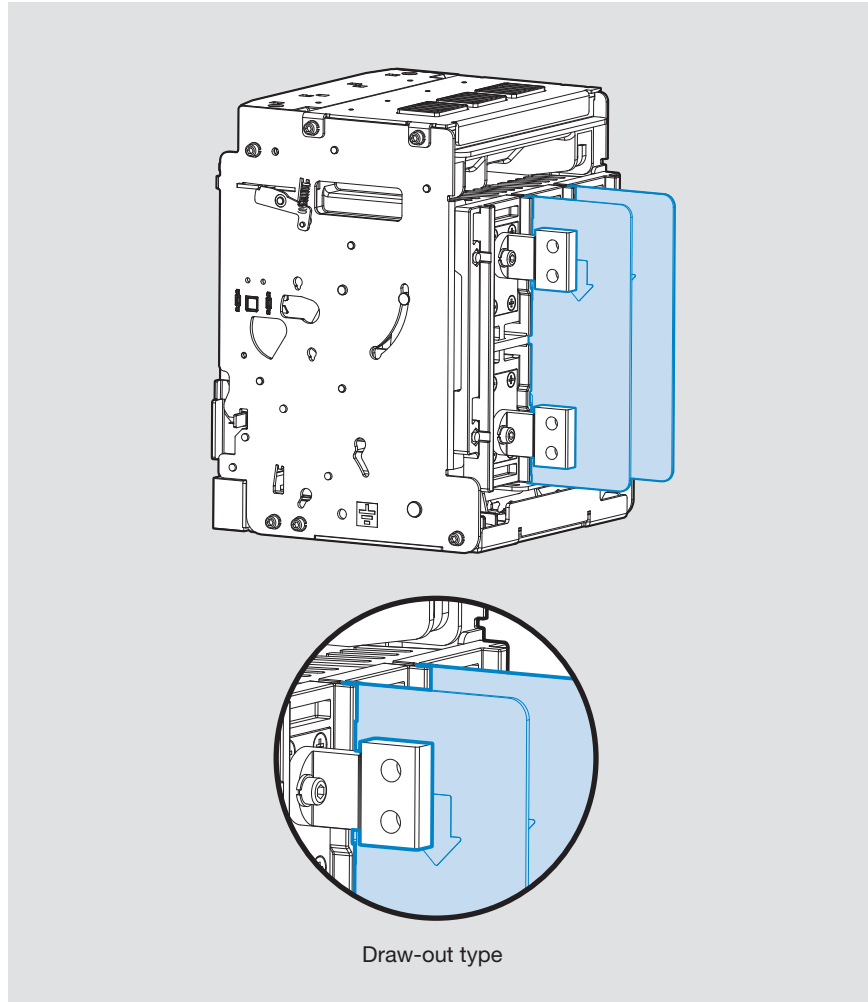
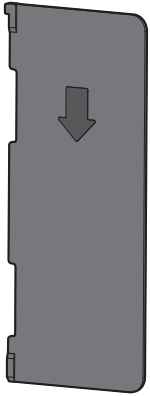
Draw-out type



Door Frame

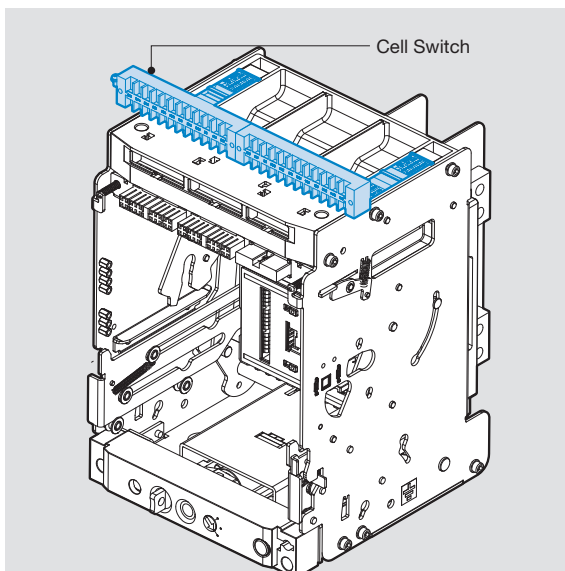
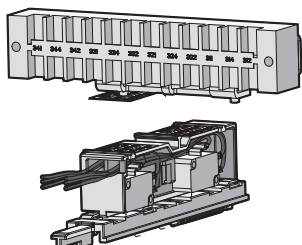
- When structuring the embedded type of ACB panel, it protects the protrude front of ACB and the cutting side of panel door by attaching it to the panel door.

Interphase Barrier [IB]



- Interphase barrier prevents the arc which may arise and result in short-circuit between phases in advance

Cell Switch [CEL]



- It is a contact which indicates the present position of ACB. (CONNECTED, TEST, DISCONNECTED)

<Contact configuration>

4C: 1Disconnected +1Test +2Connected

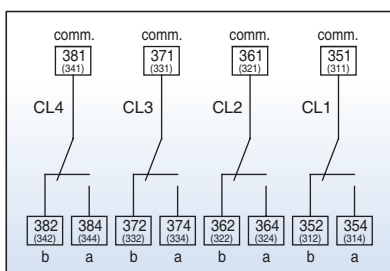
8C: 2Disconnected +2Test +4Connected

※ Contact configuration can be changeable if necessary.

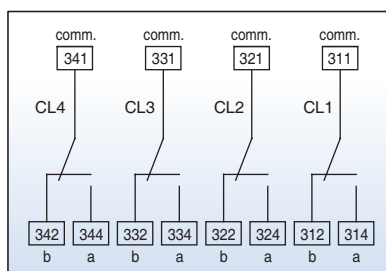
Operating characteristic

ACB position		DISCONNECTED		CONNECTED	
Draw-in and draw-out position		DISCONNECTED	TEST	CONNECTED	
Contact operation	CL-C (CONNECTED)	OFF	OFF	ON	
	CL-T (TEST)	OFF	ON	OFF	
	CL-D (DISCONNECTED)	ON	OFF	OFF	
Contact capacity	Voltage (V)	Resistive load		Inductive load	
		AC	460	5	2.5
			250	10	10
	DC	250	3	1.5	
		125	10	10	
		30	10		
Contact number		4C			

Terminal (4C, 8C)



4C attached to the right side of cradle

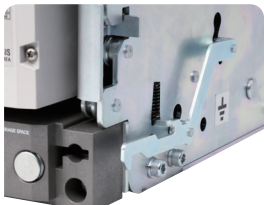


4C attached to the left side of cradle

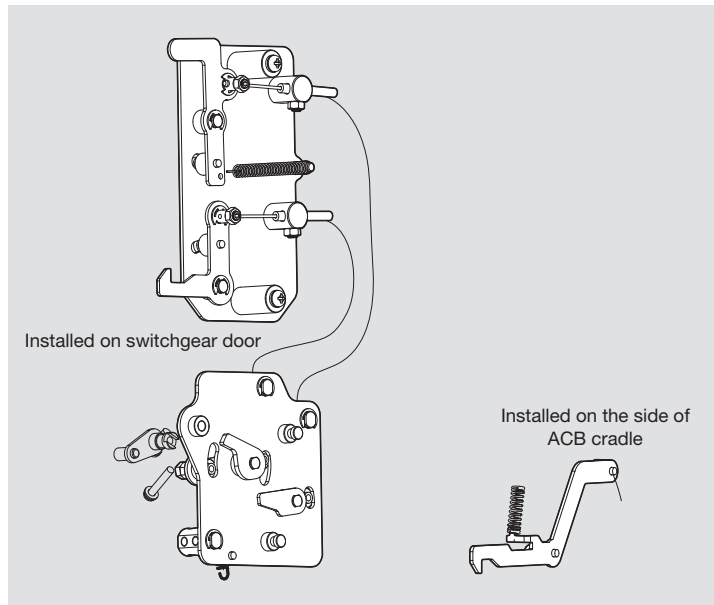
Door Interlock [DI]



Wite type



Catch type



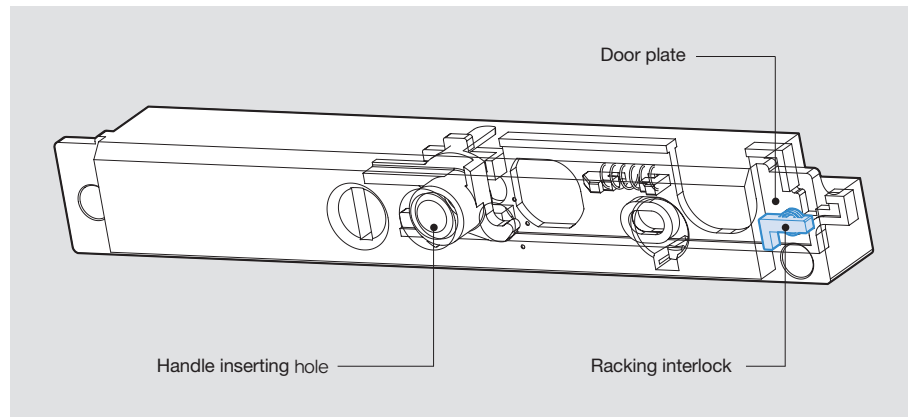
- It is a safety device which does not allow the panel door to open when a circuit breaker is in the "ON" position.

Zero Arc Space [ZAS]



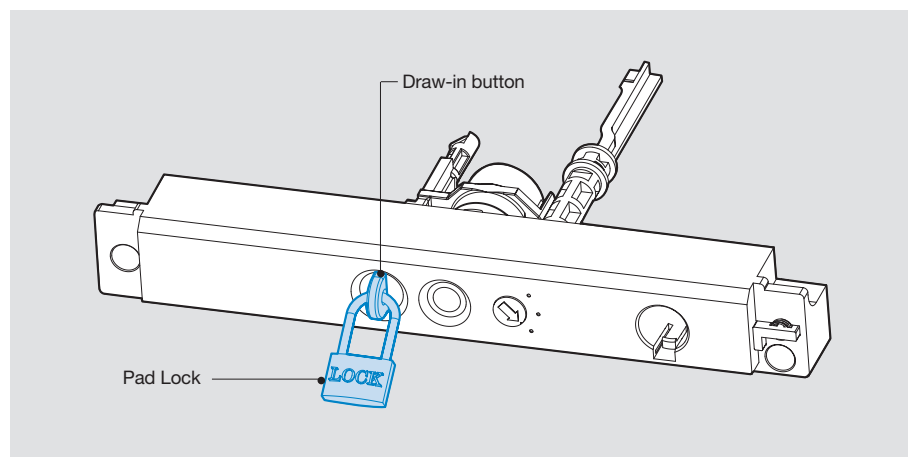
- Arc which may arise while breaking fault current is extinguished first by Arc chute in main body of circuit breaker and then completely extinguished by Arc cover. By preventing arc from exposing to the outside, it protects itself from all kinds of accidents.

Racking Interlock [RI]



- When panel door is opened, Draw in/out handle doesn't be inserted. Thus, panel handle can be inserted only when panel door is closed.

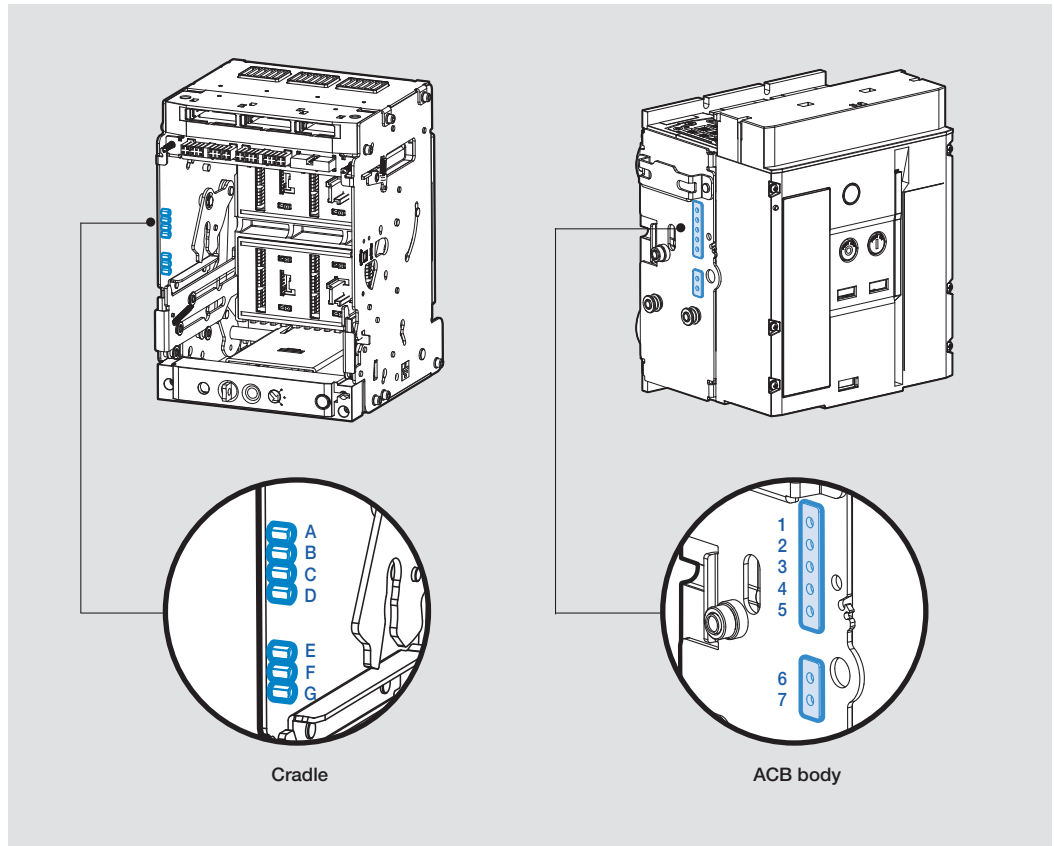
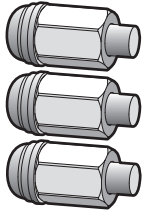
Pad Lock / Position Lock [PL]



ACB is subject to restriction regarding moving in connected, test, disconnected when drawing in or out. If main body of ACB is placed in 3 positions, it is locked and stopped when drawing in or out.

- As shown in the figure, if draw-in/out button pops out, it means locking is operating.
- To continue draw-in/out operation, release lock by pushing draw-in/out button
- In case it is locked as shown in the figure above, main body of ACB can not be drawn in or out into the cradle.
- For the lock device, user has to purchase it. ($\varnothing 5 \sim \varnothing 6$)

Miss Insertion Prevent Device [MIP]

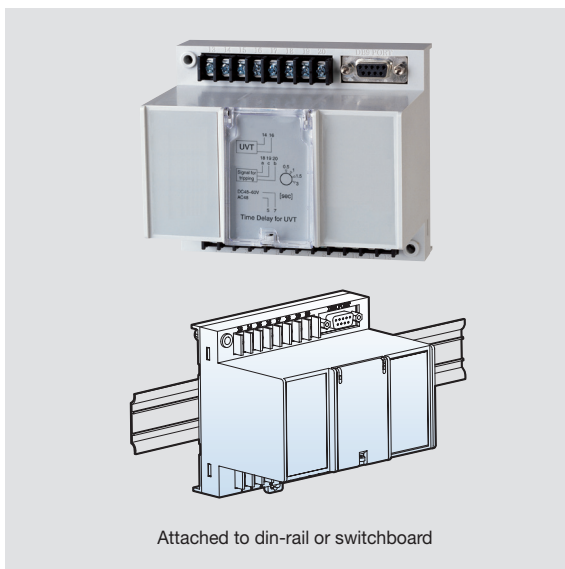


- When the main body of ACB is inserted to the cradle, if the ratings of ACB does not match with cradle, it mechanically prevents ACB from being inserted into cradle of ACB.
- The installation method is variable according to ratings.

	Rating	Cradle	ACB
DDH	800	ABCD	567
	1000	ABCE	467
	1200	ABCF	457
	1250	ABCG	456
	1600	ABDE	367

	Rating	Cradle	ACB
DDV	800	ABDF	357
	1000	ABDG	356
	1200	ABEF	347
	1250	ABEG	346
	1600	ABFG	345

UVT Time Delay Controller [UDC]



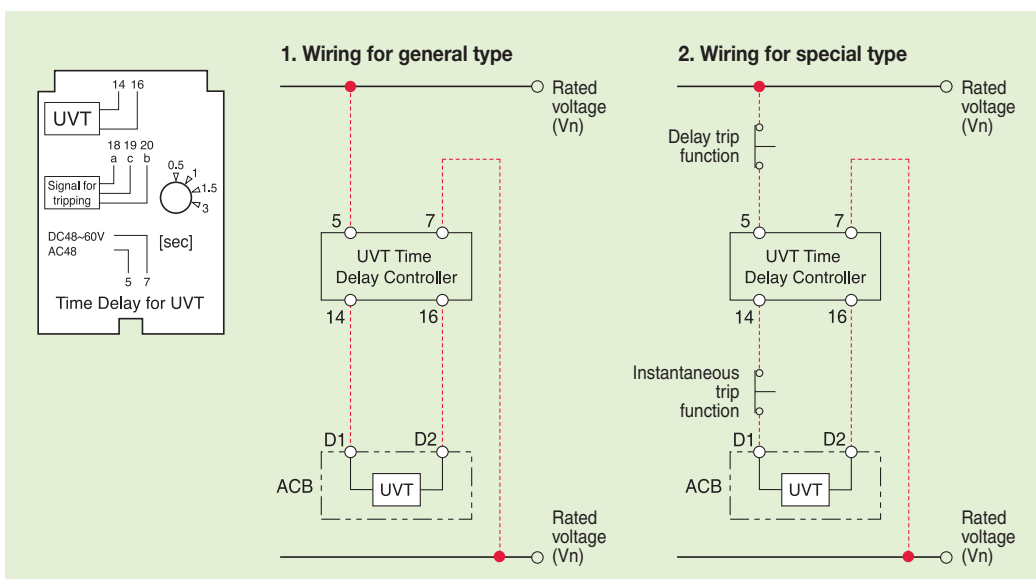
- UVT is a device which makes ACB tripped automatically to prevent the accident on load side due to under voltage or power breakdown. There are two types, Instantaneous type and time delay type.
- Instantaneous type: only available with UVT coil.
- Time delay type: available by connecting UVT coil and UVT time delay controller.
- Common use for the all types.

1. The rated voltage and characteristic of UVT time delay controller

Rated voltage (Vn)		Operating voltage range (V)		Power consumption (VA or W)		Trip time (s)
DC (V)	AC (V)	Pick up	Drop out	Inrush	Steady-state	
48~60	48	0.65~0.85 Vn	0.4~0.6 Vn	200	5	0.5,
100~130	100~130					1,
200~250	200~250					1.5,
-	380~480					3

Note) Operating voltage range is the min. rated standard for each rated voltage (Vn).

2. Wiring

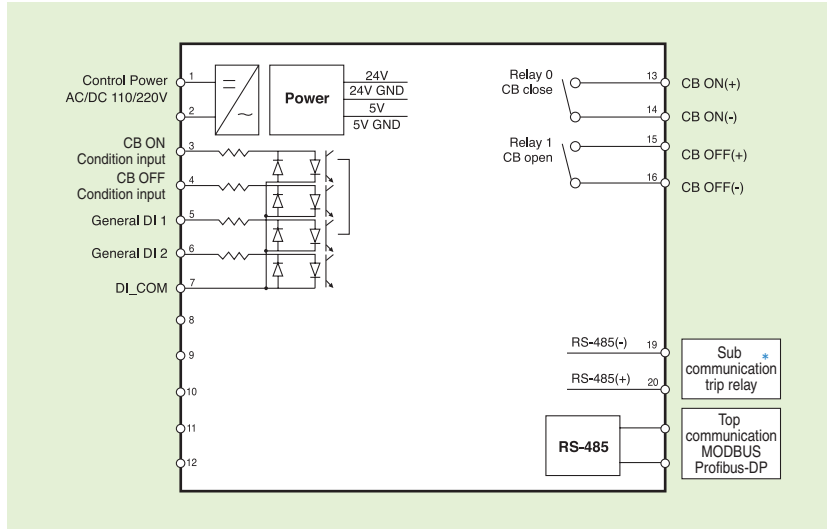
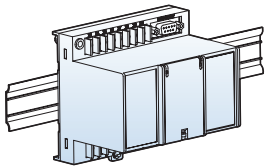


* The wiring presented with red color should be set by users.

Remote I/O Unit [RCO]

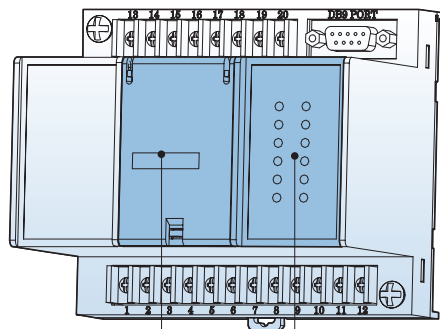


Remote I/O Unit



*In case of using Profibus-DP communication, it needs to communicate with ACB trip relay.

	Classification	Applied range	Remarks
CB control	Contact switching capacity	AC230V 16A / DC30V 16A	
	Max. switching capacity	3680VA, 480W	
Alarm	Contact switching capacity	AC230V 6A / DC25V 6A	Induction load (cos θ =0.4, L/R=7ms)
	Max. switching capacity	1880VA, 150W	

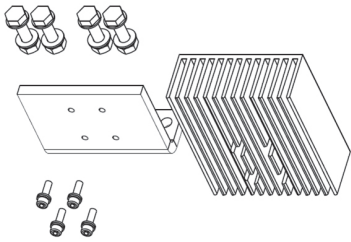
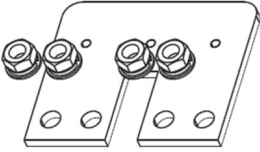
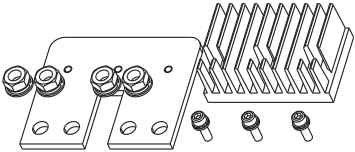
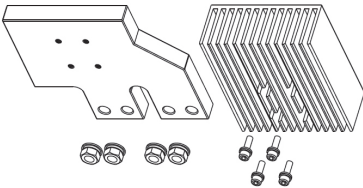


- Baud rate setting
- Comm. address setting
- Temperature setting

- Remote I/O unit has the I/O contact which can trip or close the ACB from the remote site by communication.
- For the general DO, the output of DI1 or DI2 is selectable.
- Remote I/O Unit communicates with Modbus / RS-485 communication basically, Profibus-DP need to be purchased separately.
- It supports SBO (Select Before Operation) function and guarantees the control reliability.
- Remote I/O unit can be installed on the cradle of ACB or the inside of panel.

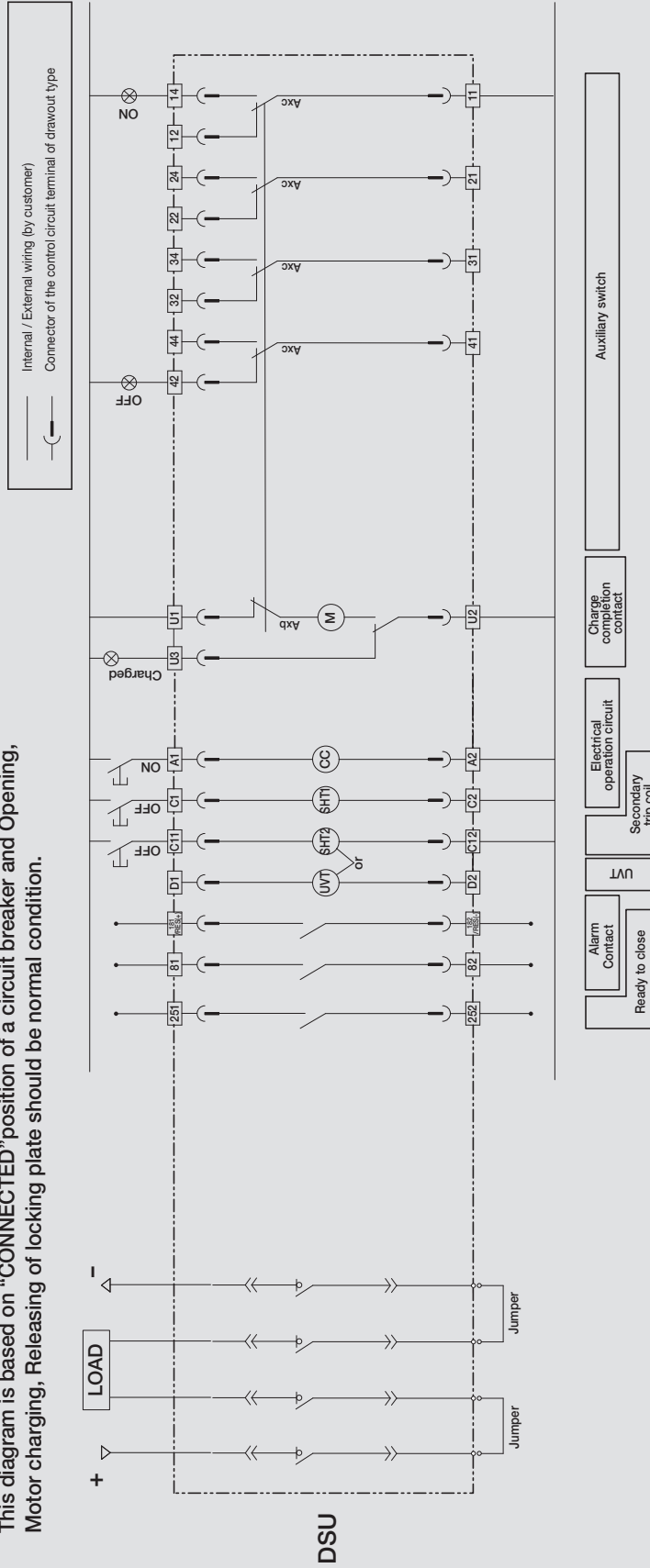
LED	Status	
1	DI1	Indicates digital Input #1condition
2	DI2	Indicates digital Input #2condition
3	DO ON	Indicates temperature alarm output is ON
4	DO OFF	Indicates temperature alarm output is OFF
5	CB ON	Indicates circuit break close condition
6	CB OFF	Indicates circuit break open condition
7	RUN LED	Indicates unit run condition
8	CB ERROR	Indicates circuit break terminal Disconnection/control Err condition

DC Short Busbar

Type	Rated current	Busbar connection	Order code	Edifice	Order quantity	Weight (kg/set)
Fixed / Draw-out type	800-1600A	Vertical / Horizontal	70223472600	Short busbar : 1ea/unit, Heatsink : 1ea/unit M10 Bolt Set : 4ea/unit, M6 Bolt: 4ea/unit M4 Screw : 1ea/unit 	3P : 1 unit 4P : 2 unit	2kg/unit
				Short busbar : 1ea/unit M10 Nut Set : 4ea/unit 	3P : 1 unit 4P : 2 unit	0.6kg/unit
Fixed type	1250A	Front	70223472601	Short busbar : 1ea/unit, Heatsink : 1ea/unit M10 Nut Set : 4ea/unit, M6 Bolt: 3ea/unit 	3P : 1 unit 4P : 2 unit	0.7kg/unit
	1600A		70223472602	Short busbar : 1ea/unit Heatsink : 1ea/unit, Barrier Pad : 1ea/unit M10 Nut Set : 4ea/unit, M6 Bolt: 4ea/unit 	3P : 1 unit 4P : 2 unit	5kg/unit

Control circuit diagram

This diagram is based on "CONNECTED" position of a circuit breaker and Opening, Motor charging, Releasing of locking plate should be normal condition.



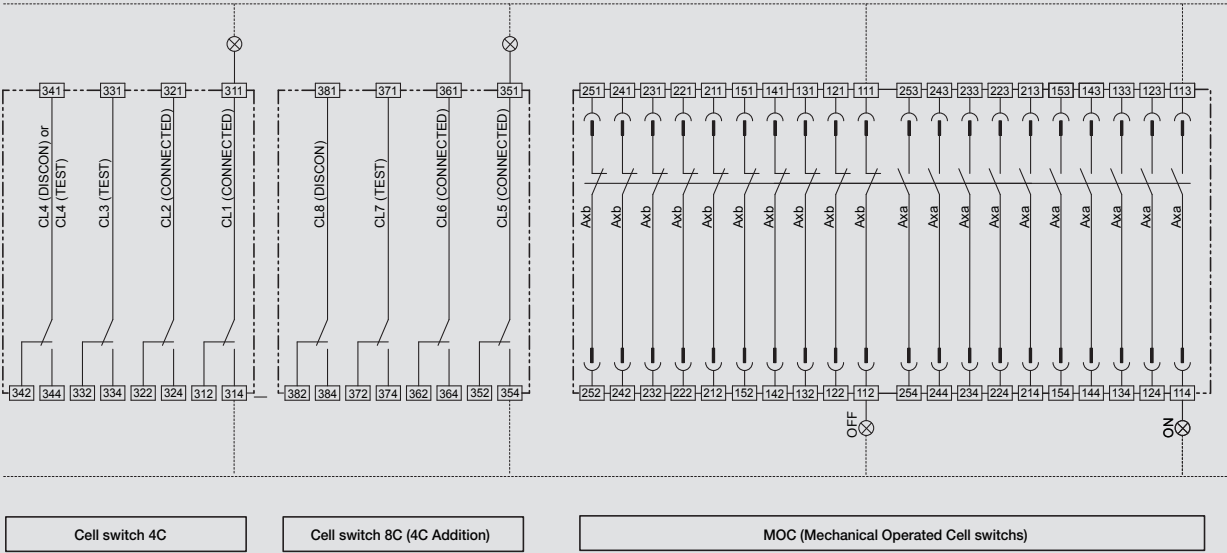
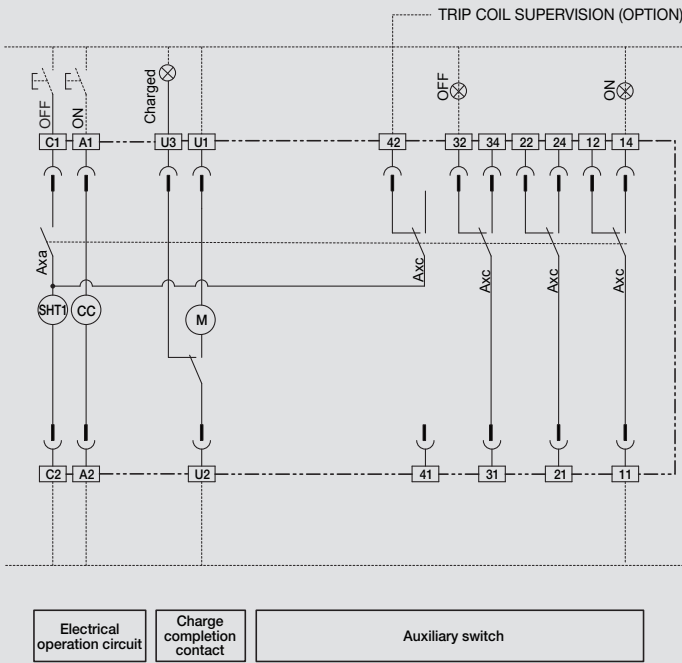
Terminal code description

11	12	~	41	42	Auxiliary switch "b" contact
11	14	~	41	44	Auxiliary switch "a" contact
U3	U2				Charge completion signal
U1	U2				Motor charging
A1	A2				Closing coil
C1	C2				Shunt trip
C11	C12				2nd shunt trip

Accessory code description

Axc	Auxiliary switch
CL1~CL4	Cell switch
(M)	Motor
(CC)	Closing coil
(SHT1)	1st Shunt coil
(SHT2)	2nd Shunt coil
(UVT)	UVT coil

- Note) 1. The diagram is shown with circuit de-energized, all devices open and charged and relays in normal position
 2. Relay is normal condition and charging type is "Off-Charging"
 3. The standard of auxiliary contact is 4C.
 4. Option
 - Ready to close contact, UVT coil, Fully charged contact, secondary trip coil
 5. Contact configuration for Cell Switch can be changeable if necessary



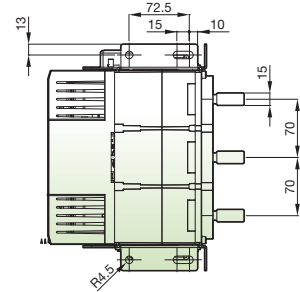
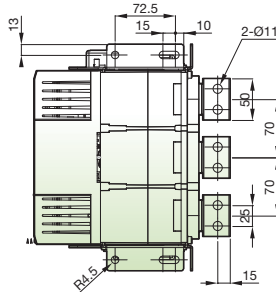
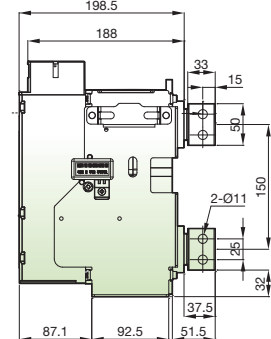
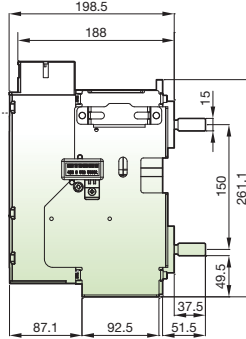
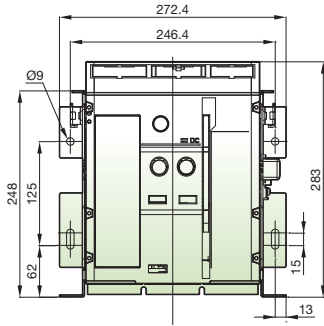
Terminal symbol

311 ~ 344	Cell switch
111 ~ 254	MOC

Dimensions

• 3P [Fixed H: Horizontal type / V: Vertical type]

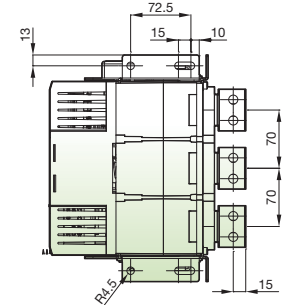
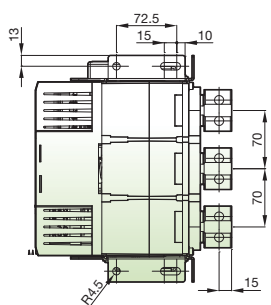
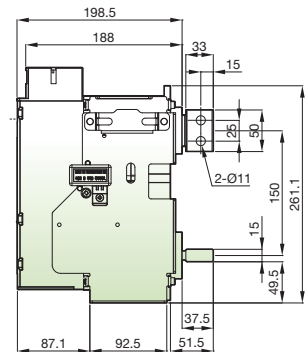
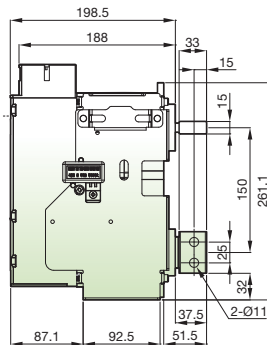
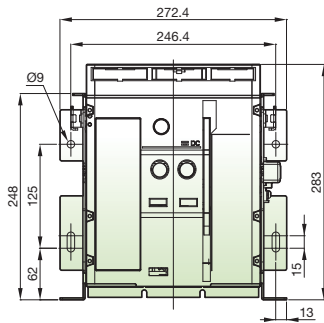
(Unit : mm)



H Type (Horizontal type)

V Type (Vertical type)

• 3P [Fixed M: Upper-Horizontal type, Lower-Vertical type / N: Upper-Vertical type, Lower-Horizontal type]



M Type

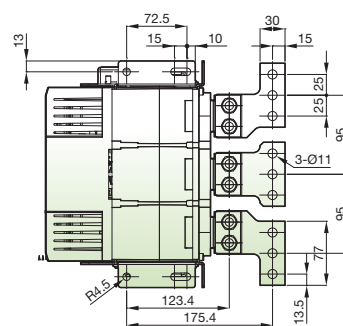
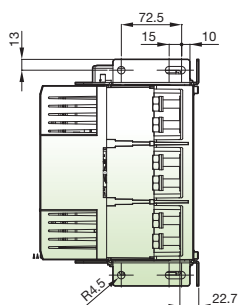
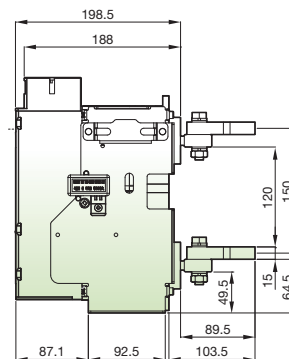
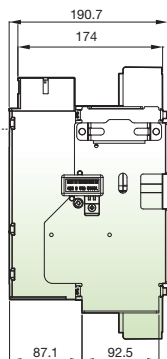
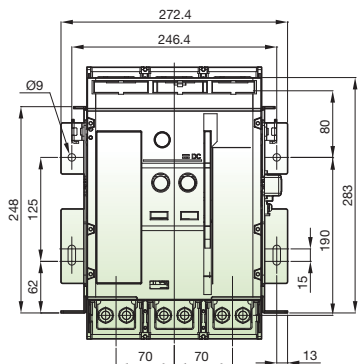
(Upper-Horizontal type, Lower-Vertical type)

N Type

(Upper-Vertical type, Lower-Horizontal type)

• 3P [Fixed P: Flat type / R: Spread type]

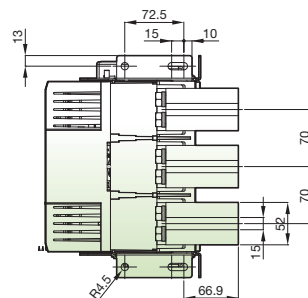
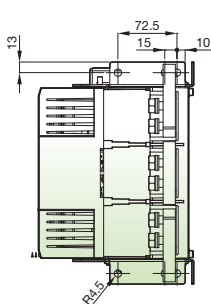
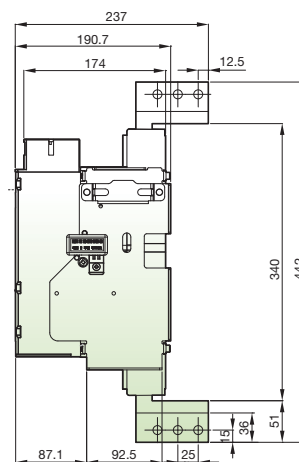
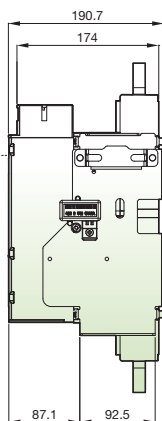
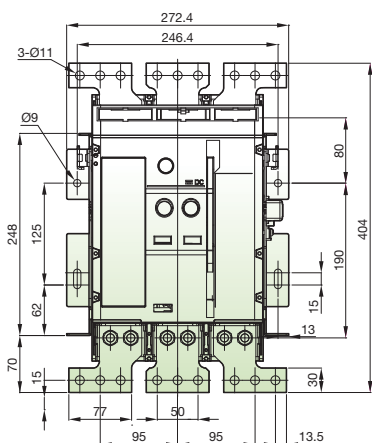
(Unit : mm)



P Type (Flat type)

R Type (Spread type)

• 3P [Fixed Z: Flat spread type / T: Flat vertical type]



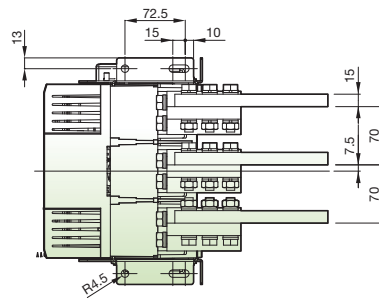
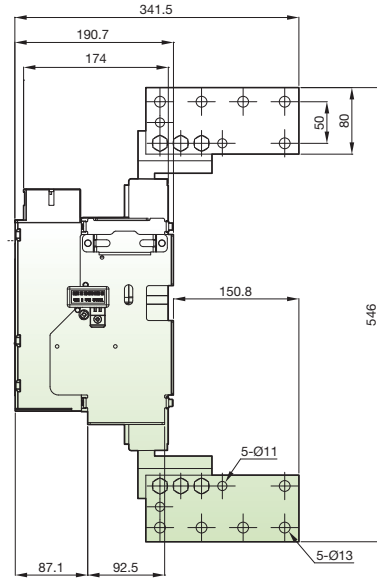
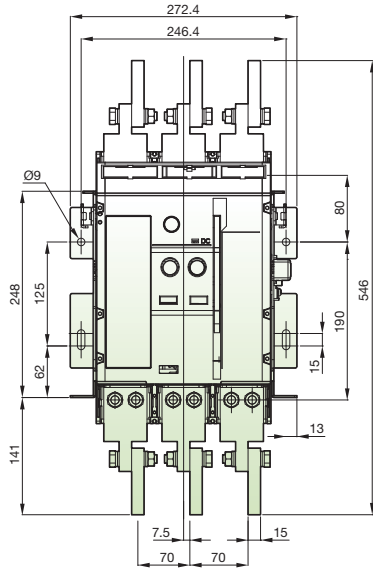
Z Type (Flat spread type)

T Type (Flat vertical type)

Dimensions

• 3P [Fixed X: Cable lug type]

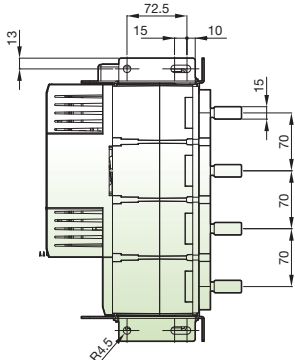
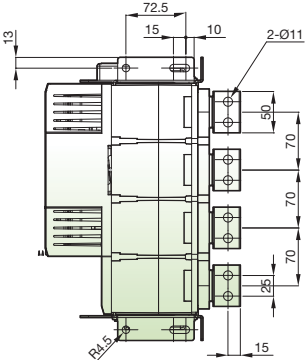
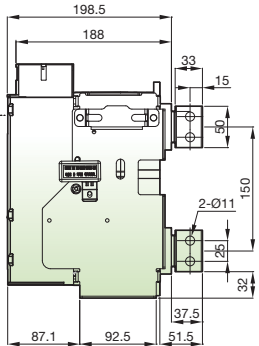
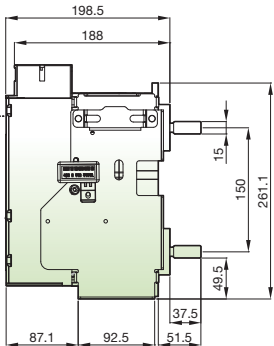
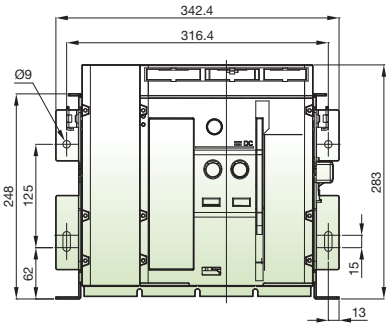
(Unit : mm)



X Type (Cable lug type)

• 4P [Fixed H: Horizontal type / V: Vertical type]

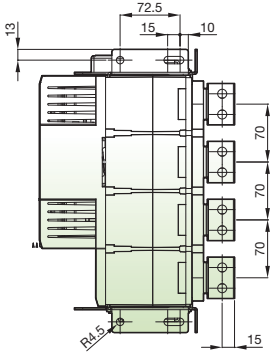
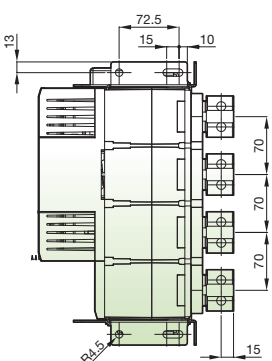
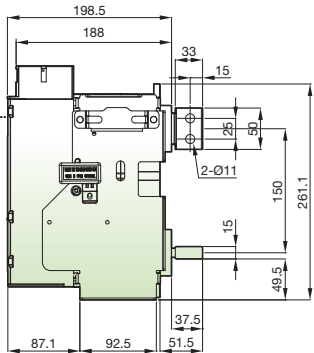
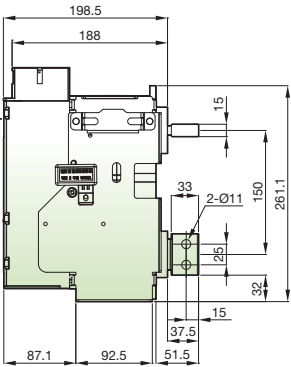
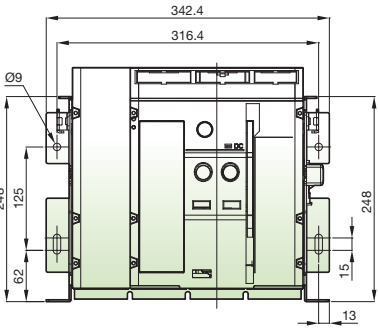
(Unit : mm)



H Type (Horizontal type)

V Type (Vertical type)

• 4P [Fixed M: Upper-Horizontal type, Lower-Vertical type / N: Upper-Vertical type, Lower-Horizontal type]



M Type

N Type

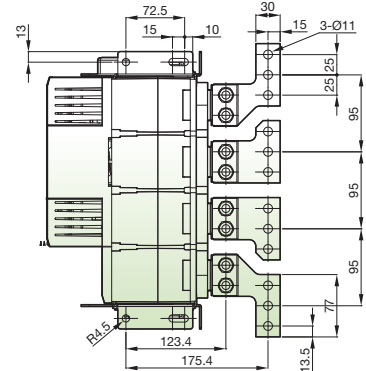
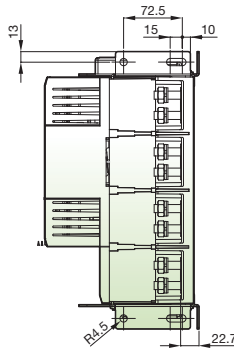
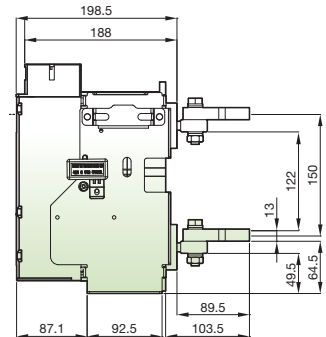
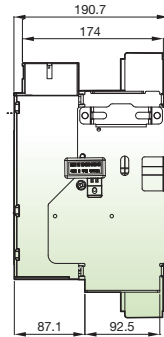
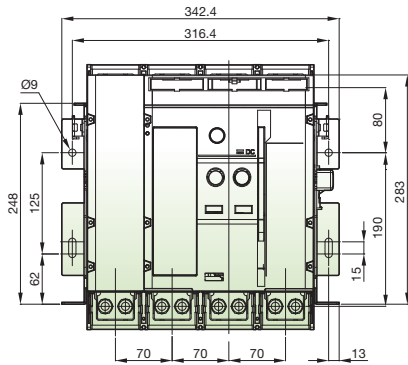
(Upper-Horizontal type, Lower-Vertical type)

(Upper-Vertical type, Lower-Horizontal type)

Dimensions

• 4P [Fixed P: Flat type / R: Spread type]

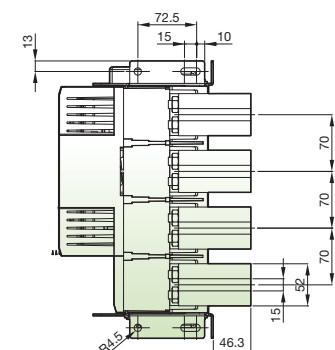
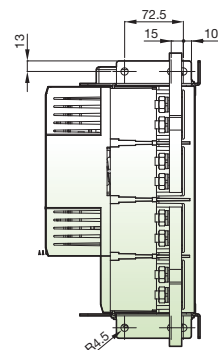
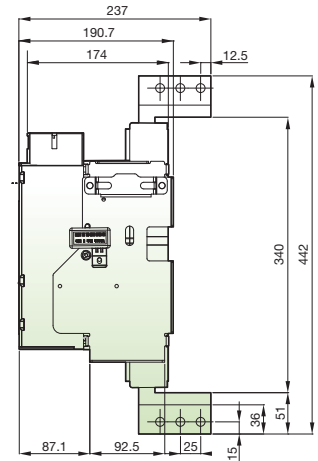
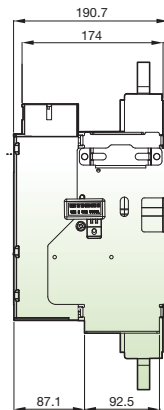
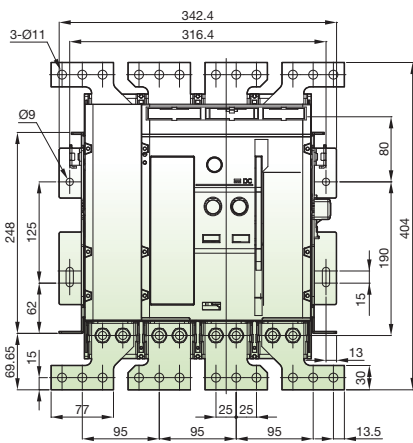
(Unit : mm)



P Type (Flat type)

R Type (Spread type)

• 4P [Fixed Z: Flat spread type / T: Flat vertical type]

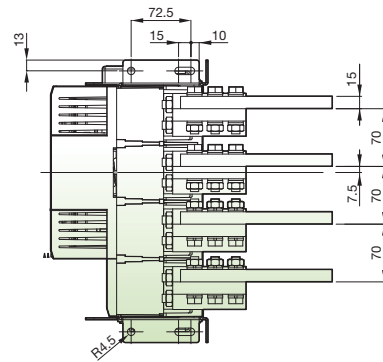
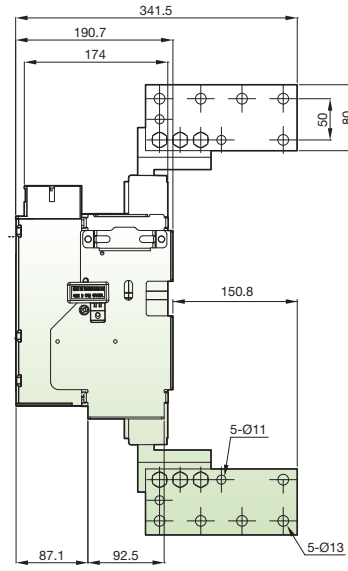
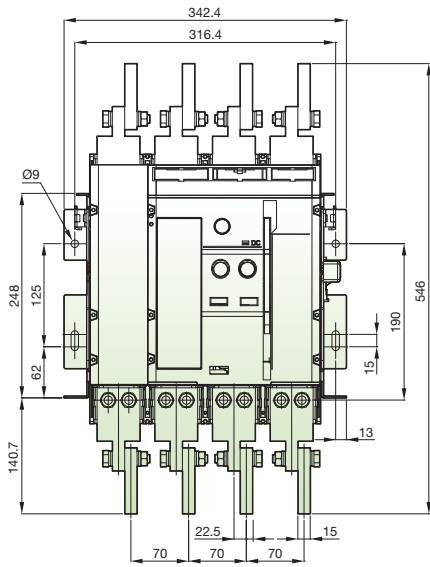


Z Type (Flat spread type)

T Type (Flat vertical type)

• 4P [Fixed X: Cable lug type]

(Unit : mm)

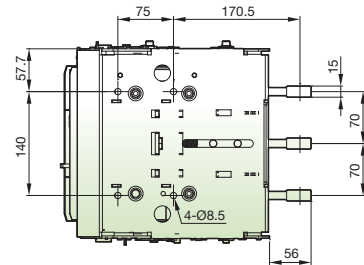
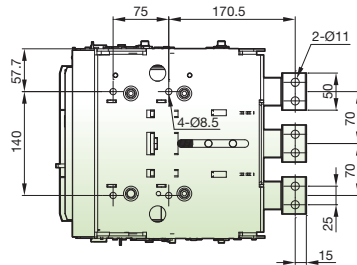
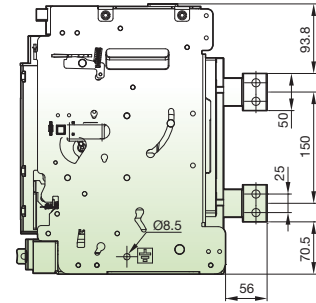
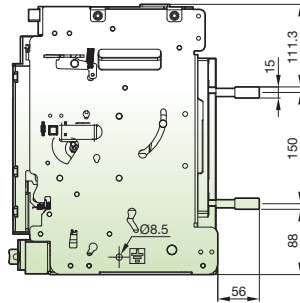
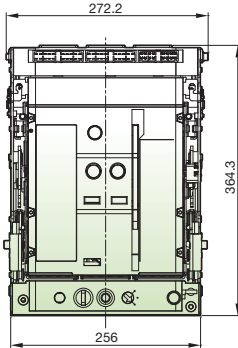


X Type (Cable lug type)

Dimensions

• 3P [Draw-out H: Horizontal type / V: Vertical type]

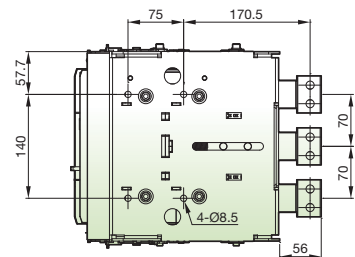
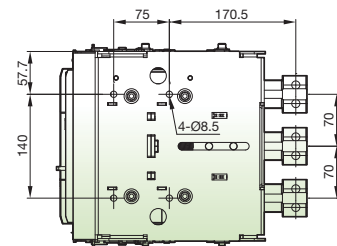
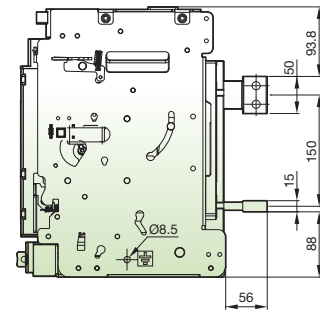
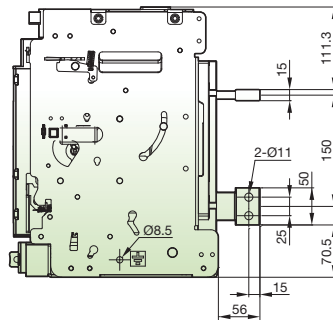
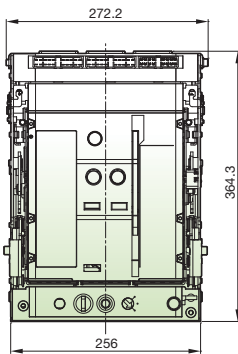
(Unit : mm)



H Type (Horizontal type)

V Type (Vertical type)

• 3P [Draw-out M: Upper-Horizontal type, Lower-Vertical type / N: Upper-Vertical type, Lower-Horizontal type]

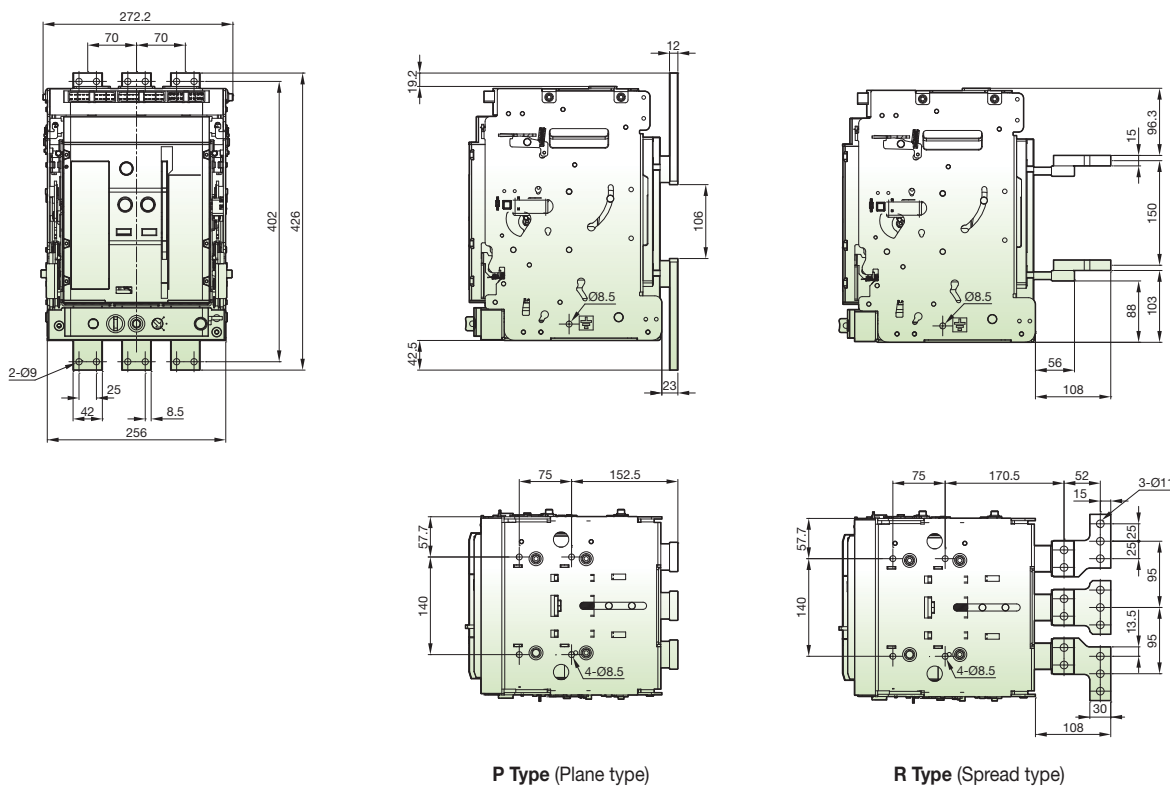


M Type
(Upper-Horizontal type, Lower-Vertical type)

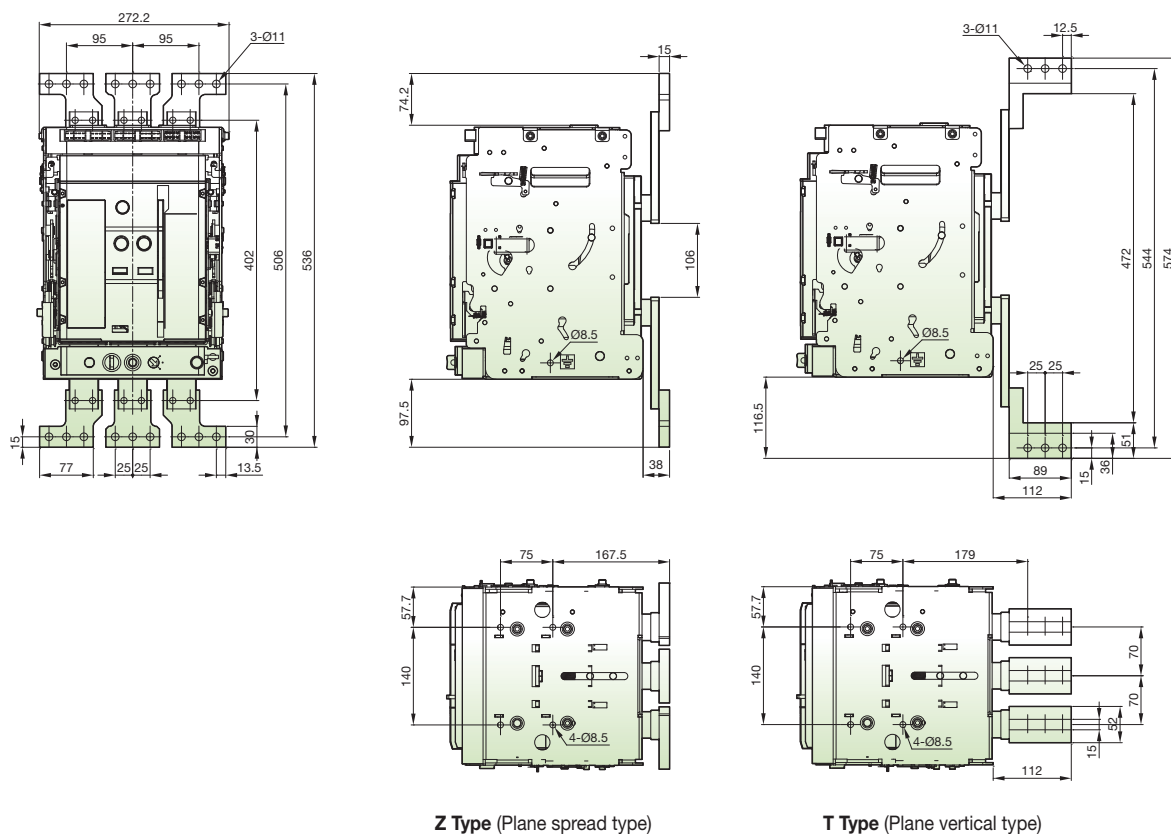
N Type
(Upper-Vertical type, Lower-Horizontal type)

• 3P [Draw-out P: Flat type / R: Spread type]

(Unit : mm)



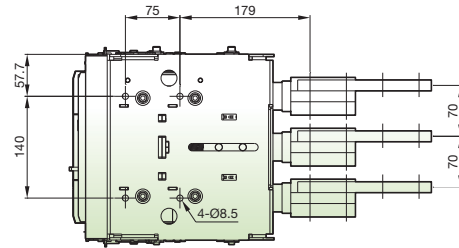
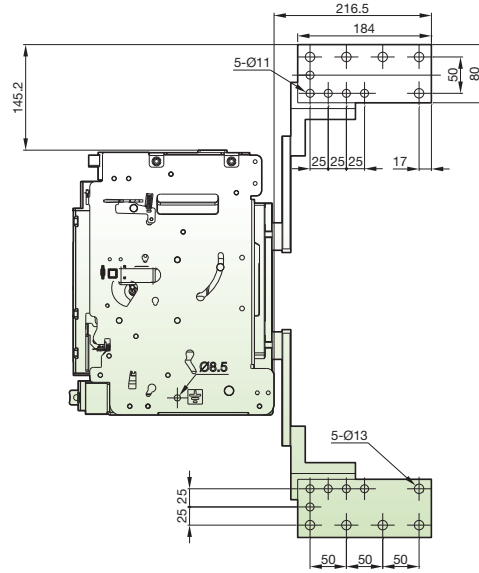
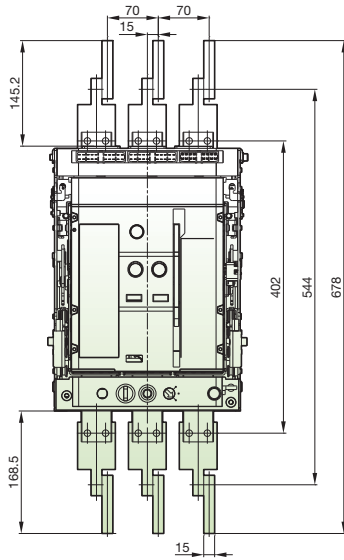
• 3P [Draw-out Z: Flat spread type / T: Flat vertical type]



Dimensions

• 3P [Draw-out X: Cable lug type]

(Unit : mm)

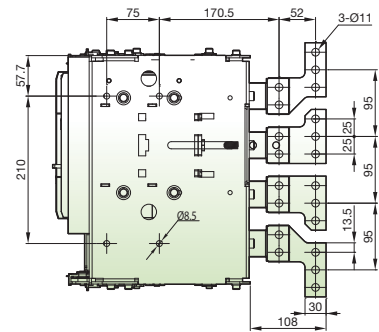
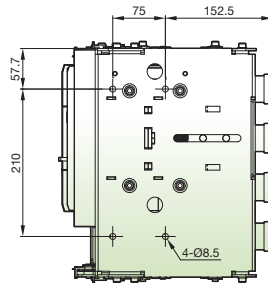
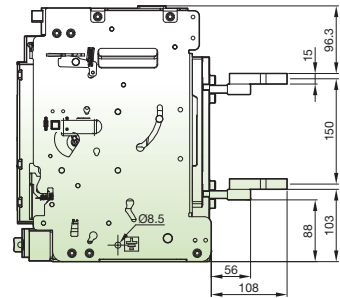
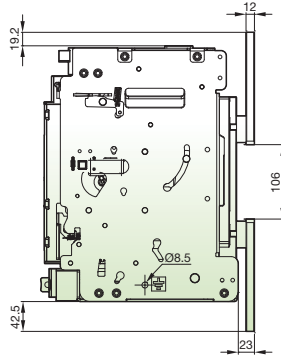
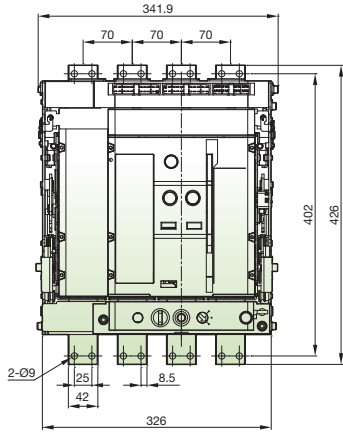


X Type (Cable lug type)

Dimensions

• 4P [Draw-out P: Flat type / R: Spread type]

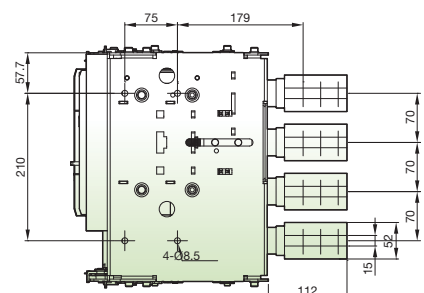
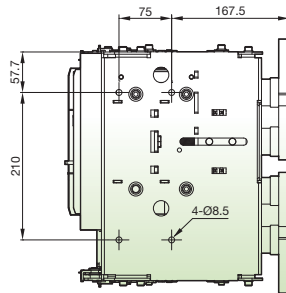
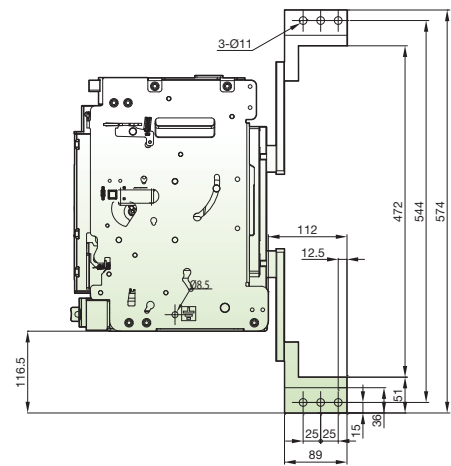
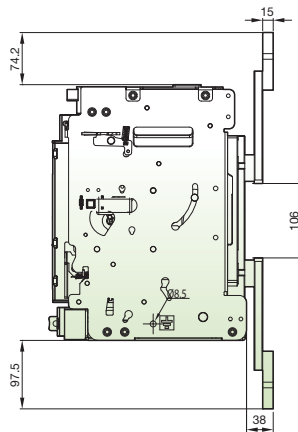
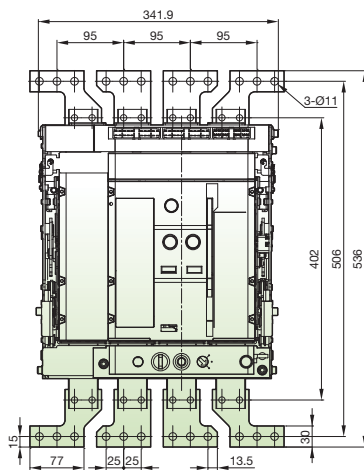
(Unit : mm)



P Type (Plane type)

R Type (Spread type)

• 4P [Draw-out Z: Flat spread type / T: Flat vertical type]

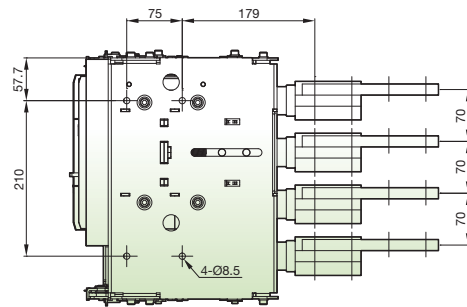
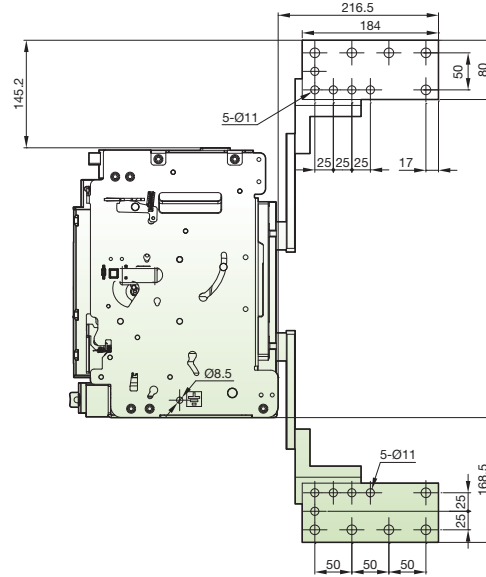
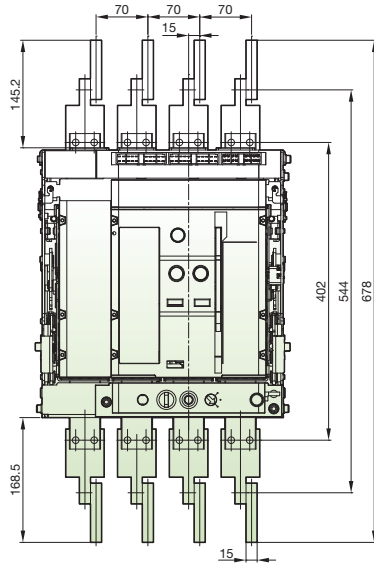


Z Type (Plane spread type)

T Type (Plane vertical type)

• 4P [Draw-out X: Cable lug type]

(Unit : mm)

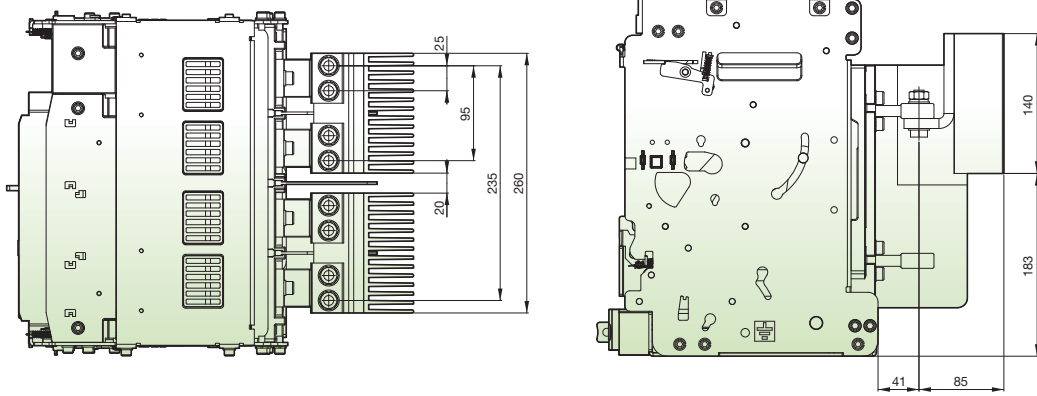


X Type (Cable lug type)

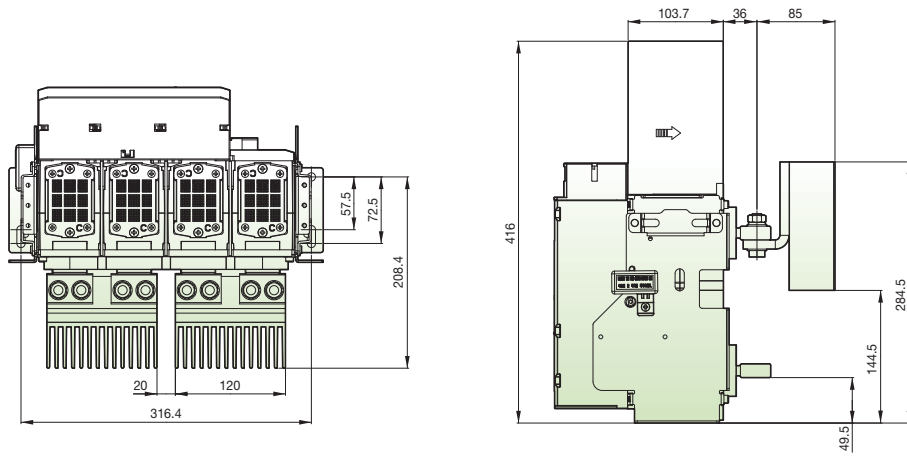
Dimensions (With short busbar)

• 4P Horizontal type(H), Vertical type(V) *Draw-out type(Up to 1600A)

(Unit : mm)

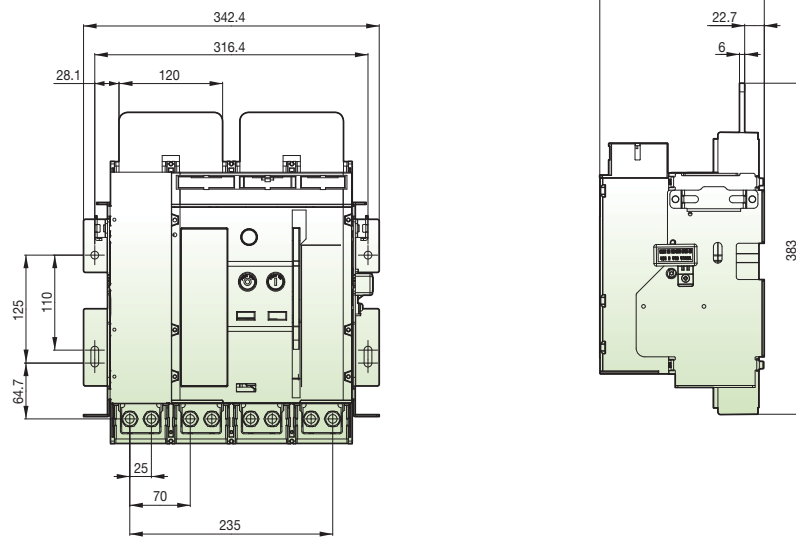


• 4P Horizontal type(H), Vertical type(V) *Fixed type(Up to 1600A)

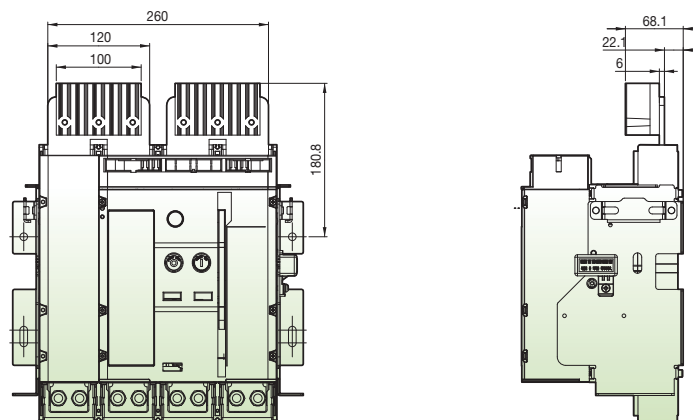


• 4P Plane type(P) *Fixed type(Up to 1000A)

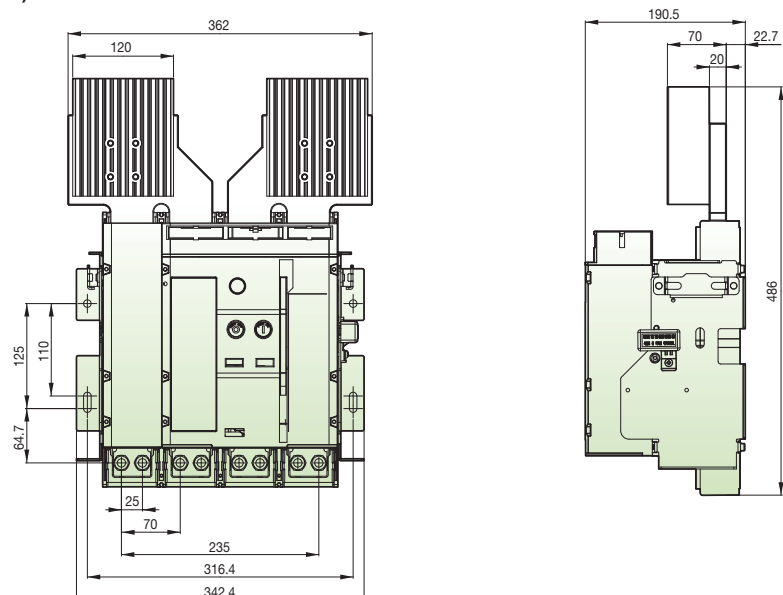
(Unit : mm)



• 4P Plane type(P) *Fixed type(Up to 1250A)



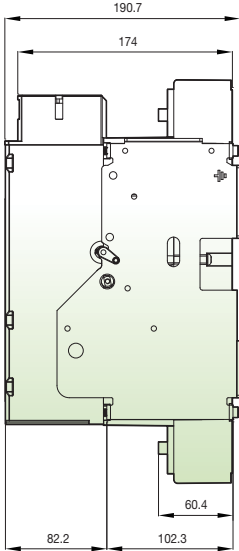
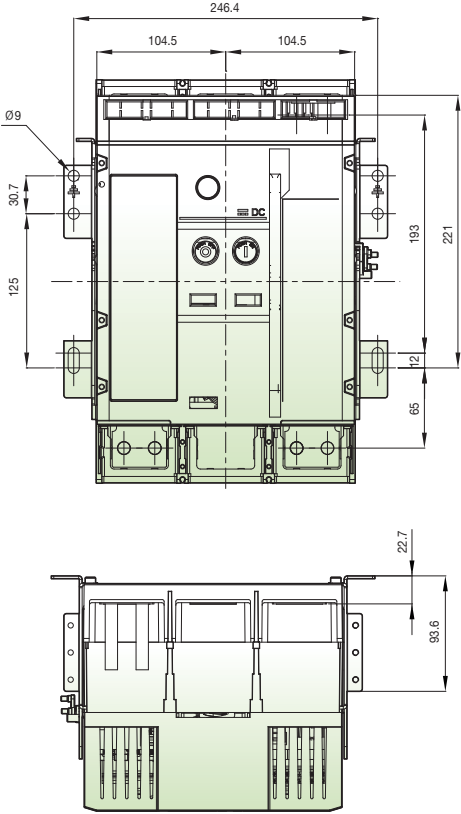
• 4P Plane type(P) *Fixed type(Up to 1600A)



Dimensions

• 2P Fixed Type(Up to 1600A)

(Unit : mm)



Normal / Special service condition

Normal service conditions

If following normal working conditions are all satisfied, Compact ACB should be used under this condition unless otherwise specified.

- 1) Ambient temperature
A range of max. +40°C to min. -5°C is recommended. However, the average temperature of 24 hours does not exceed +35°C.
- 2) Altitude 2,000m or less.
- 3) Environmental conditions
The air must be clean, and the relative humidity does not exceed 85% at a max. of +40°C and 90% at 20°C. Do not use and store in presence of corrosive or ammonia gas. (H₂S ≤ 0.01ppm, SO₂ ≤ 0.01ppm, NH₃ ≤ a few ppm)
- 4) Installation conditions
When installing Compact ACB, refer to catalogue or the installation instructions in the instruction manual.
- 5) Storage temperature
A range of max. +60°C to min. -20°C is recommended.
- 6) Replacement
Approx. 15 years (depends on number of breaking of over current or service condition). Please see maintenance and inspection for further detail.

Special service conditions

If In the case of special service condition, modified air circuit breakers are available. Please specify when ordering. Service life may be shorter, it depends on service conditions.

- 1) Special environmental conditions
If it is used at high temperature and/or high humidity, the insulation durability and other electrical or mechanical features may deteriorate. Therefore, the breaker should be specially treated. Moisture fungus treatment with increased corrosion-resistance is recommended. When using products under this condition, please contact LS service team or nearest sales representatives.
- 2) Special ambient temperature
If the ambient temperature exceeds +40, reduce the continuous conducting current for a use referring to Table. A.
- 3) Special altitude
If it is used at the 2,000m or higher the heat radiation rate is reduced and the operating voltage, continuous current capacity and breaking capacity are decreased. Moreover the durability of the insulation is also decreased owing to the atmospheric pressure. Contact us for further detail.

Table A. Temperature derating (Compact DC DSU)

Type	Drawout																
	Horizontal or Flat								Vertical								
	Connection type		Ambient temperature						Connection type		Ambient temperature						
		40	45	50	55	60	65	70			40	45	50	55	60	65	70
DDH/DDV-08C		800A	800A	800A	800A	800A	800A	800A			800A	800A	800A	800A	800A	800A	800A
DDH/DDV-10C		1000A	1000A	1000A	1000A	1000A	1000A	1000A			1000A	1000A	1000A	1000A	1000A	1000A	1000A
DDH/DDV-13C		1250A	1250A	1250A	1250A	1210A	1160A	1110A			1250A	1250A	1250A	1250A	1250A	1210A	1160A
DDH/DDV-16C		1600A	1560A	1520A	1480A	1440A	1390A	1340A			1600A	1600A	1600A	1560A	1520A	1470A	1420A

Type	Fixed																
	Horizontal or Flat								Vertical								
	Connection type		Ambient temperature						Connection type		Ambient temperature						
		40	45	50	55	60	65	70			40	45	50	55	60	65	70
DDH/DDV-08C		800A	800A	800A	800A	800A	800A	800A			800A	800A	800A	800A	800A	800A	800A
DDH/DDV-10C		1000A	1000A	1000A	1000A	1000A	1000A	1000A			1000A	1000A	1000A	1000A	1000A	1000A	1000A
DDH/DDV-13C		1250A	1250A	1250A	1250A	1250A	1250A	1210A			1250A	1250A	1250A	1250A	1250A	1250A	1250A
DDH/DDV-16C		1600A	1600A	1600A	1560A	1520A	1480A	1440A			1600A	1600A	1600A	1600A	1600A	1560A	1520A

* Ambient temperature is greater than 60°C, consult us.
* According to IEC 60947-3

Technical information

Altitude and Isolation Voltage

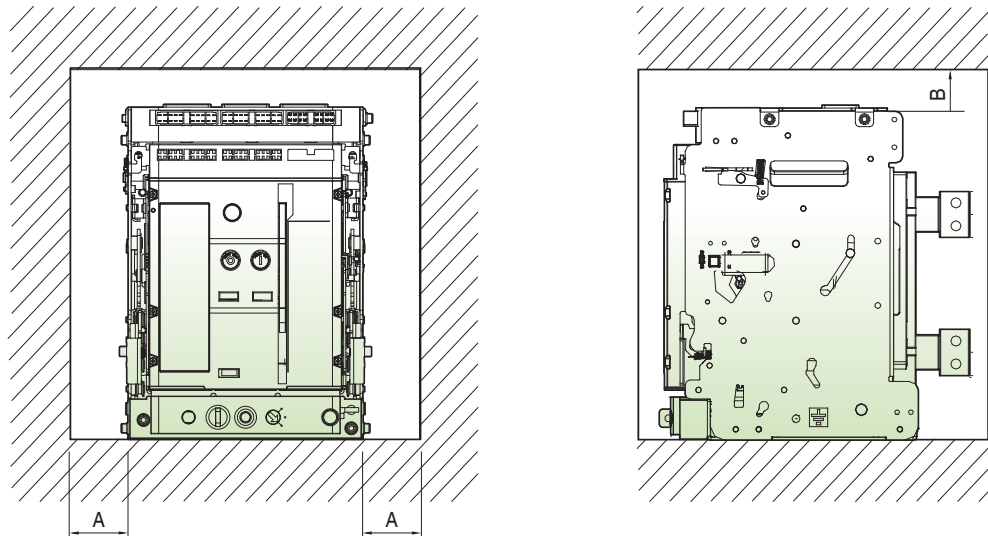
Altitude

Compact ACB is designed for operation at altitudes under 2000m. At altitudes higher than 2000m, change the ratings upon a service condition.

Item \ Altitude [m]	2000	3000	4000	5000
Max. operational voltage (Vdc)	1500	1350	1200	1050
	1200	1080	960	840
	1000	900	800	700
	750	675	600	525
Current compensation constant	1×In	0.98×In	0.96×In	0.94×In

Insulation clearance

When drawing the electric power supply panel, please keep the distance of Insulation clearance between Compact ACB and panel as listed in table.

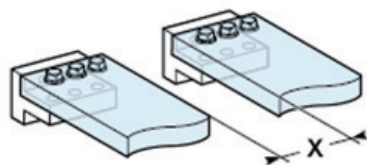


(Unit : mm)

Type	A	B
Fixed	50	150
Draw-out	5	50

Minimum clearances distance

For the safety, all the electric charging parts need to be installed over minimum clearances distance.



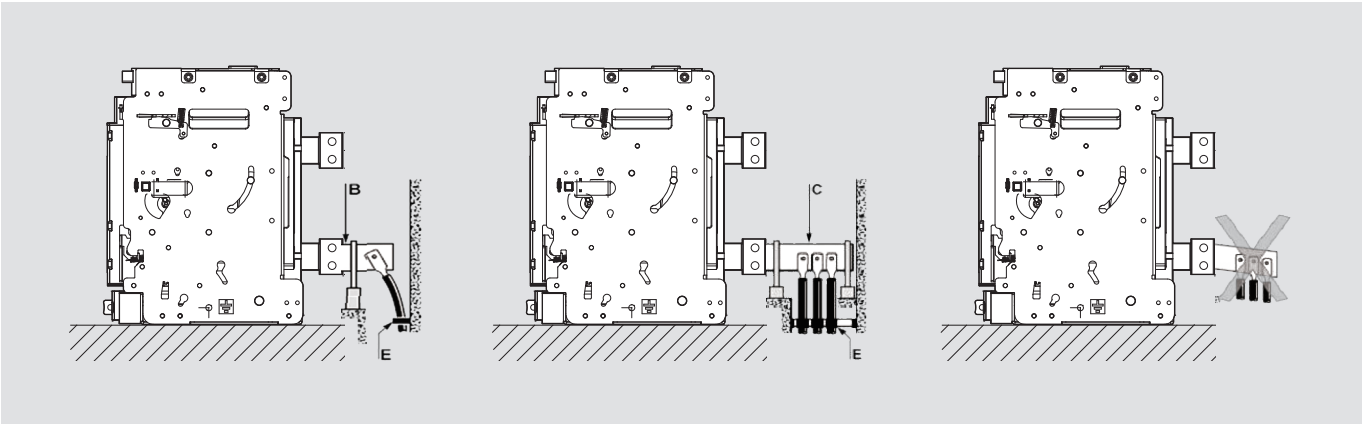
Insulating voltage (Ui)	Minimum clearances distance (X min)
1000Vdc below	14 mm
~ 1500Vdc	16 mm

Installation recommendation

BUS-BAR Connection

Cables connections

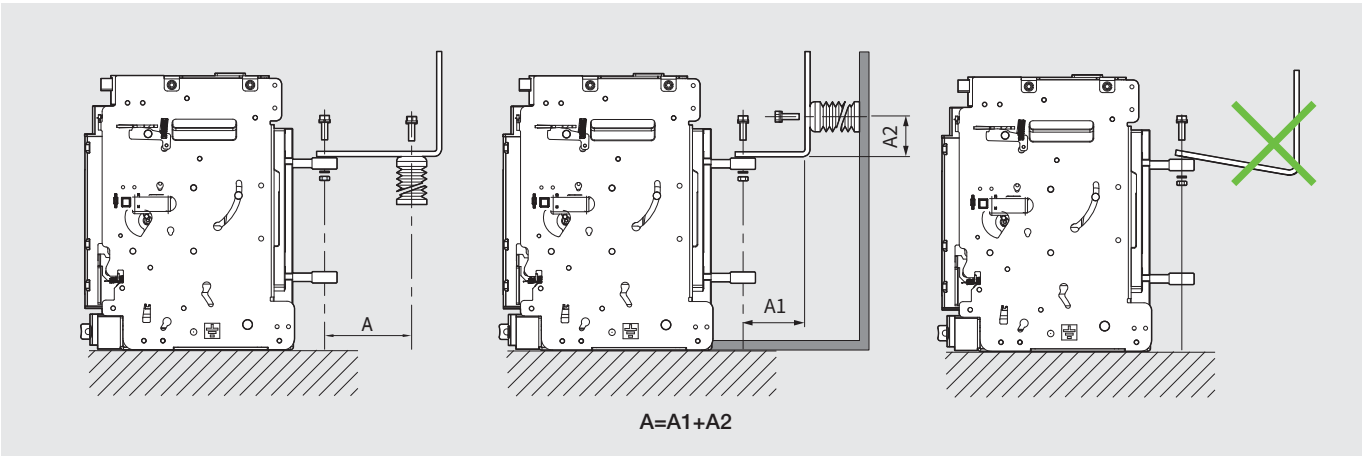
Make sure that no excessive mechanical force put on the rear terminals for cable connection. Extension terminal is fixed such as B, C and cable is to fixed to the frame such as E



Bus-bar connection

For busbar connection, connect access parts with a provided torque and fix with parallel installing the support not to apply terminal weight to circuit breaker.

In order to prevent the spread safety or secondary accidents, secure maximum safe distance A from the connection point (Compact ACB 690V 50kA 1600A The maximum safety clearance is 250mm) so that it can withstand the electric force generated in the event of a short circuit. (Support strength: Insulator bending load 720kg or more, tensile strength 3000kg or more)

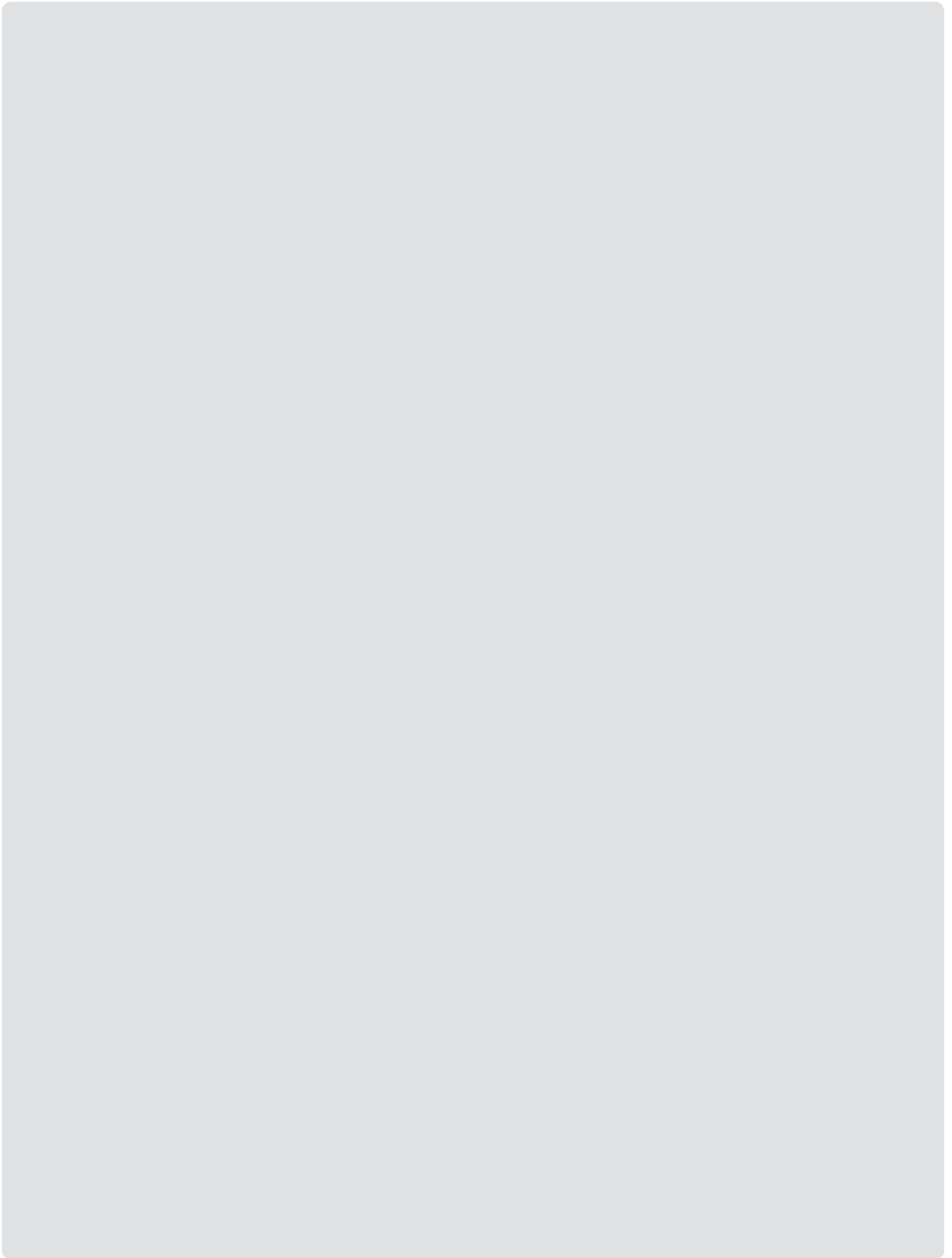


※ You can not get a warranty for damage caused by any modifications.

(Table 1) Maximum safe distance

Short capacity (kA)	30	50	65	80	100	150
Length A (mm)	350	300	250	150	150	150

Memo



Ordering sheet

If rated current or the order you placed is different from the ordering sheet listed below, please fill out another ordering sheet upon your specification.

Receipt	LS ELECTRIC Co., Ltd.			Order Day				Distributor Name				
Project				Contractor								
Delivery place				Delivery date				PNL Maker				
Main body	Type of ACB	DC compact Switch-Disconnector										
		<input type="checkbox"/> DDH					<input type="checkbox"/> DDV					
	Frame size	C (800~1600AF)					C (800~1600AF)					
	Ratings	AF					AF					
	No. of poles (Rated operating voltage)	<input type="checkbox"/> 3-pole (DC 750V)		<input type="checkbox"/> 4-pole (DC 1200V)			<input type="checkbox"/> 3-pole (DC 1000V)		<input type="checkbox"/> 4-pole (DC 1500V)			
	Installation type	<input type="checkbox"/> Draw-out type					<input type="checkbox"/> Fixed type					
	Closing type	<input type="checkbox"/> Manual closing										
		<input type="checkbox"/> Electrical closing										
Control power	<input type="checkbox"/> Charge method <div style="float: right; margin-top: 5px;"> <input type="checkbox"/> Standard type (OFF-Charging method) <input type="checkbox"/> Rapid auto-reclosing type (ON-Charging method) </div>											
	• Closing coil	<input type="checkbox"/> AC/DC 100-130V	<input type="checkbox"/> AC/DC 200-250V	<input type="checkbox"/> DC 125V	<input type="checkbox"/> DC 24-30V	<input type="checkbox"/> DC 48-60V	<input type="checkbox"/> DC 380-480V	<input type="checkbox"/> DC 48V				
	• Tripping coil	<input type="checkbox"/> AC/DC 100-130V	<input type="checkbox"/> AC/DC 200-250V	<input type="checkbox"/> DC 125V	<input type="checkbox"/> DC 24-30V	<input type="checkbox"/> DC 48-60V	<input type="checkbox"/> DC 380-480V	<input type="checkbox"/> DC 48V				
	• Motor charging	<input type="checkbox"/> AC/DC 100-130V	<input type="checkbox"/> AC/DC 200-250V	<input type="checkbox"/> DC 125V	<input type="checkbox"/> DC 24-30V	<input type="checkbox"/> DC 48-60V	<input type="checkbox"/> DC 380-480V	<input type="checkbox"/> DC 48V				
Cradle	Cradle type	<input type="checkbox"/> No Safety Shutter (E class)					<input type="checkbox"/> Safety Shutter Attachment (F class)					
	Installation type	<input type="checkbox"/> Manual connection					<input type="checkbox"/> Automatic connection					
Bus-bar connection	Bus-bar type	<input type="checkbox"/> Horizontal	<input type="checkbox"/> Vertical	<input type="checkbox"/> Flat	<input type="checkbox"/> Upper: Horizontal, Lower: Vertical	<input type="checkbox"/> Upper: Vertical, Lower: Horizontal	<input type="checkbox"/> Customer mounting					
		<input type="checkbox"/> Horizontal with Spreaders		<input type="checkbox"/> Flat with Spreaders			<input type="checkbox"/> Vertical with Extension	<input type="checkbox"/> Cable-Lug				
Accessory	Main body	Standard Accessory	• Aux. contact	<input type="checkbox"/> Standard type (4c, standard installation)								
			• Key Lock	<input type="checkbox"/> Single Key (ON-Lock)								
			• Undervoltage trip device (UVT, Instantaneous type)	<input type="checkbox"/> AC/DC 100V~130V		<input type="checkbox"/> DC 125V		<input type="checkbox"/> AC/DC 200V~250V				
				<input type="checkbox"/> DC 24V~30V		<input type="checkbox"/> DC 48V~60V		<input type="checkbox"/> AC 380V~480V		<input type="checkbox"/> AC 48V		
			• Counter	<input type="checkbox"/> Non-attachment type				<input type="checkbox"/> Attachment type				
			• Miss insertion preventive device (MIP)	<input type="checkbox"/> Non-attachment type				<input type="checkbox"/> Attachment type				
			• Double trip device (Same with Tripping voltage)	<input type="checkbox"/> Non-attachment type								
			• Ready-to-close contact	<input type="checkbox"/> Non-attachment type				<input type="checkbox"/> Attachment type				
	<input type="checkbox"/> Key Interlock (K2, ON-Lock)	<input type="checkbox"/> ON/OFF Button Lock										
	• Micro Load type (4 max.)	<input type="checkbox"/> Non-attachment type				qty.						
	Cradle mounting	• Cell switch (CL)	<input type="checkbox"/> 4c	<input type="checkbox"/> 8c								
		<input type="checkbox"/> Door Interlock with Wire type			<input type="checkbox"/> Door Interlock with catch type							
		• Mechanical operation contact (MOC)			<input type="checkbox"/> Standard type (10a10b)							
		• Mechanical Interlock (MI)			<input type="checkbox"/> Wire type (2 terminals)				<input type="checkbox"/> Wire type (3 terminals)			
		• Miss insertion preventive device (MIP)			<input type="checkbox"/> Non-attachment type				<input type="checkbox"/> Attachment type			
		<input type="checkbox"/> Racking Interlock		<input type="checkbox"/> Insulation barrier								
	External mounting	• UVT time delay controller			<input type="checkbox"/> AC/DC 100V-130V		<input type="checkbox"/> DC 125V		<input type="checkbox"/> AC/DC 200V~250V			
					<input type="checkbox"/> DC 48V~60V		<input type="checkbox"/> AC 380V~480V		<input type="checkbox"/> AC 48V			
<input type="checkbox"/> Door Frame (DF)		<input type="checkbox"/> Dust Cover	<input type="checkbox"/> Condenser trip device (CTD)		<input type="checkbox"/> Remote closing & trip							



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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