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Global
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for 10 years

Susol

DC COMPACT ACB

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**

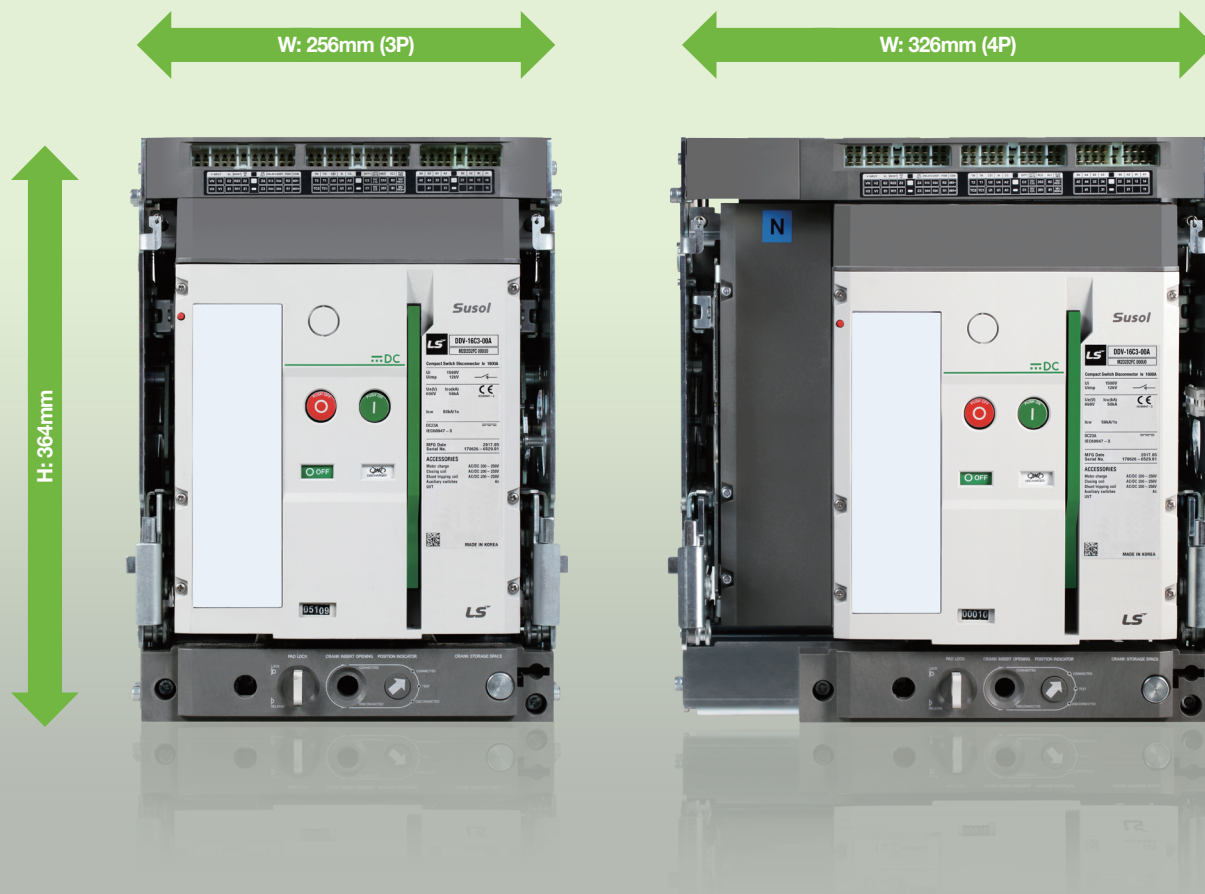
Susol *Super Solution*

DC Compact Switch-disconnectors 1600A

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

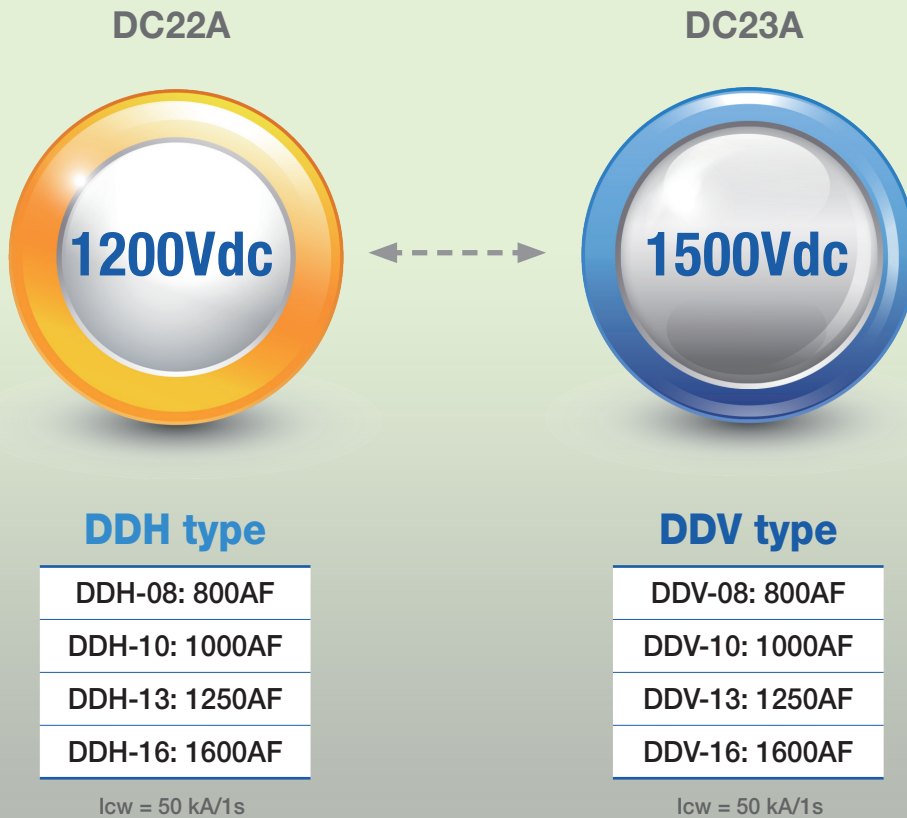
LS *ELECTRIC*

DC Compact Switch-disconnectors 1600A



Susol

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 (Icw): 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



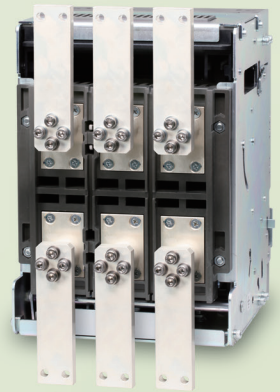
Spreader type, R



Mixed type, M



Mixed type, N

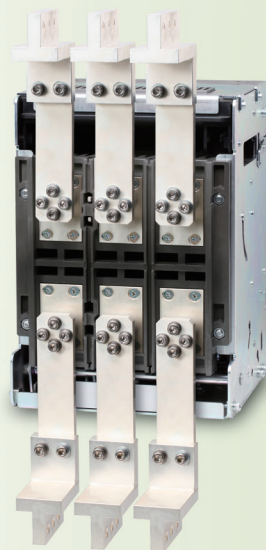


Front type, P

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.

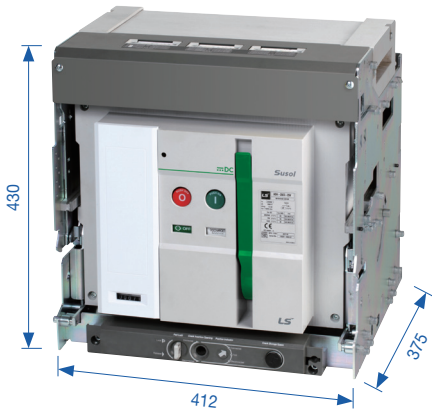
Compact size

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.

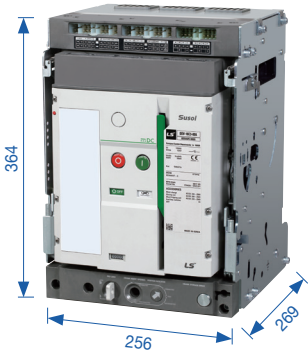
Compact Type

Unit (mm)

DC Switch-disconnector



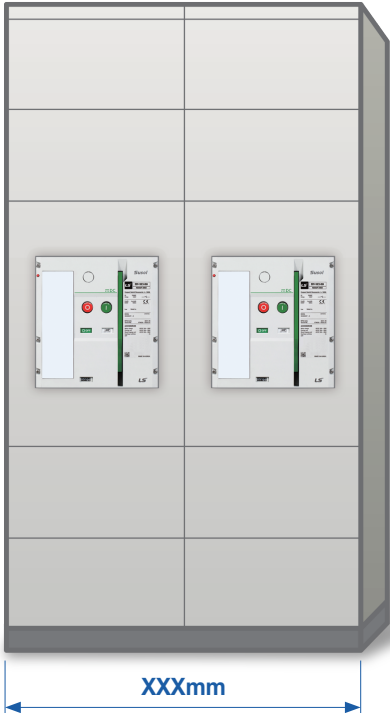
DC Compact Switch-disconnector



3-high



4-high



Switch-disconnectors ratings

DC Compact DSU



Fixed type



Drawable type

Commonness														
Rated insulation voltage (Ui)		(V)	1500											
Rated impulse withstand voltage (Uimp)		(kV)	12											
Rated operational voltage (Ue)		(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 (Icm)		(kA peak) DC	50				50				50			
Rated short-time withstand current (Icw)		(kA/1s) DC	50				50				50			
Operation time (ms)		Opening time	Less than 25ms under Icw/Less than 75ms over Icw											
		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
Demension and weight														
Weight (3P/4P)		Draw-out	15.5(3P) / 19(4P)				-				15.5(3P) / 19(4P)			
		Without cradle	22(3P) / 26(4P)				-				22(3P) / 26(4P)			
		With cradle	15.5(3P) / 19(4P)				14(2P)				15.5(3P) / 19(4P)			
External dimensions (W×H×D)		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)



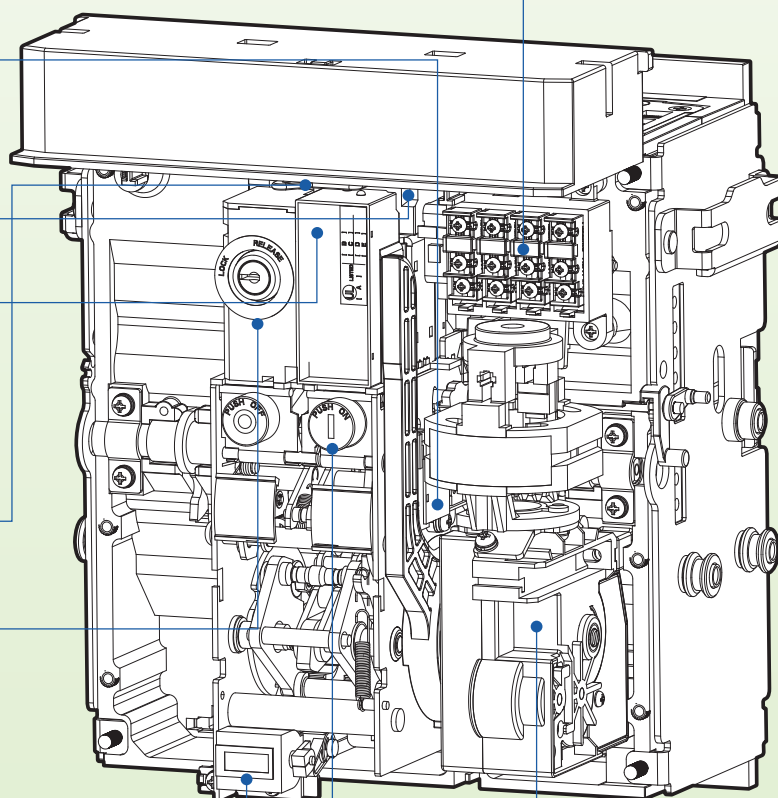
Counter (C)



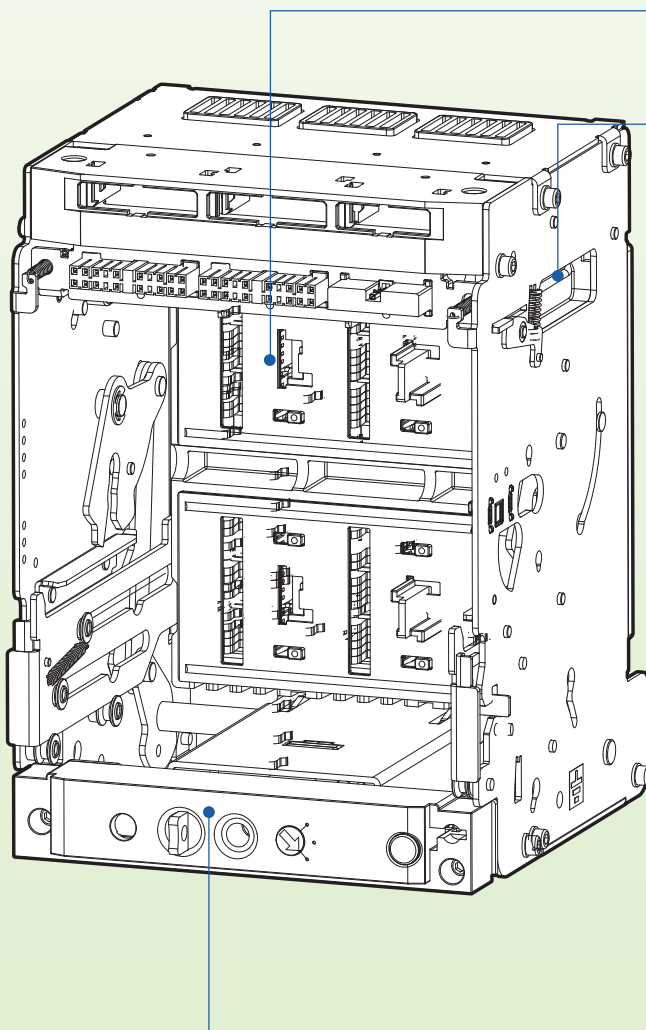
ON/OFF Button Padlock (B)



Motor (M)



Cradle



Miss Insertion Preventing Device (MIP)



Condensor Trip Device (CTD)



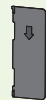
Safety Shutter (ST)



Lifting Hook (LH)



Interphase Barrier (IB)



UVT Time Delay Controller (UDC)



Remote I/O Unit (RCO)



Cell SW (CEL)



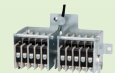
Door Interlock (DI)



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)

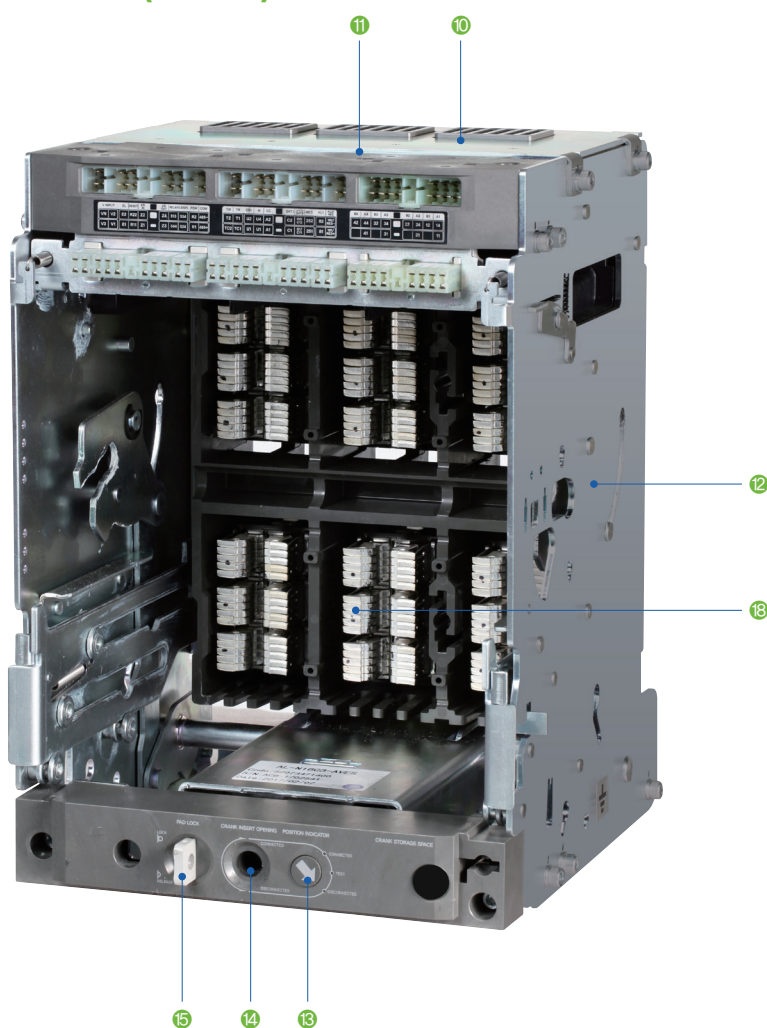


Marking

LS DDV-16C3-00A M2D2D2FC 000U0	
Compact Switch Disconnector Ie 1600A	
Ui	1500V
Uimp	12kV
Ue(V)	Icu(kA)
690V	50kA
CE 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
- Closing coil
- Shunt tripping coil
- 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

Switch-disconnectors	
DDH	1200Vdc
DDV	1500Vdc

—

16

Ampere frame	
08	800AF
10	1000AF
13	1250AF
16	1600AF

—

C

Frame size	
C	800~1600AF

—

3

Poles	
2	2Pole (DDV: 750Vdc)
3	3Pole (DDH:750Vdc) 3Pole (DDV:1000Vdc)
4	4Pole (DDH:1200Vdc) 4Pole (DDV:1500Vdc)

—

00

CT ratio	
00	None

—

A

Installation & Connection	
withdrawable type	
A	Automatic Connection
Fixed type	
H	Horizontal type
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

M1	D1	D1	FX	000	U1	C
Motor rated voltage		Shunt coil rated voltage		Trip relay	UVT coil rated voltage	Accessories
MA Without Motor		D0 Without Shunt coil		No trip relay	U0 Without UVT coil	
M1 AC/DC 100V~130V		D1 AC/DC 100V~130V			U1 AC/DC 100V~130V	
M2 AC/DC 200V~250V		D2 AC/DC 200V~250V			U2 AC/DC 200V~250V	
M3 DC 125V		D3 DC 125V			U3 DC 125V	
M4 DC 24V~30V		D4 DC 24V~30V			U4 DC 24V~30V	
M5 DC 48V~60V		D5 DC 48V~60V			U5 DC 48V~60V	
M6 AC 380V~415V		D6 AC 380V~480V			U6 AC 380V~480V	
M7 AC 440V~480V		D7 AC 48V			U7 AC 48V	
M8 AC 48V						
	Closing coil rated voltage		Aux.contact & charging types			
	D0 Without Closing coil		FX Standard OFF-Charge 4C			
	D1 AC/DC 100V~130V		FC Standard ON-Charge 4C			
	D2 AC/DC 200V~250V		LC Standard ON-Charge 3C TCS			
	D3 DC 125V		PX Standard 4C with "OFF" charging type _ low-level contacts			
	D4 DC 24V~30V		PC Standard 4C with "ON" charging type _ low-level contacts			
	D5 DC 48V~60V					
	D6 AC 380V~480V					
	D7 AC 48V					

* UVT Delay module is available over AC / DC 48V

* TCS (Trip Circuit Supervision)
* Auxiliary switch for micro load (Order No. 83011176209)

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

AL

DC compact Switch-Disconnecter

AL

Bottom operating cradle

—

H16C

Ampere frame

H16C

800~1600AF

—

4

No. of pole

3

3P

4

4P

—

A

Secondary connection type

A

Auto connection type

H

Installation & Connection

H

Horizontal type

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

E

Arc cover

S

with arc cover

S

Shtter

E

without shutter

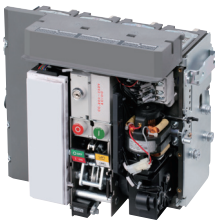
F

with shutter

Various installation methods

Type	H	V	M	N	P
Form					
Type	Z	R	T	X	
Form					

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
External	FX	Auxiliary Switch	●	-	*	25
	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

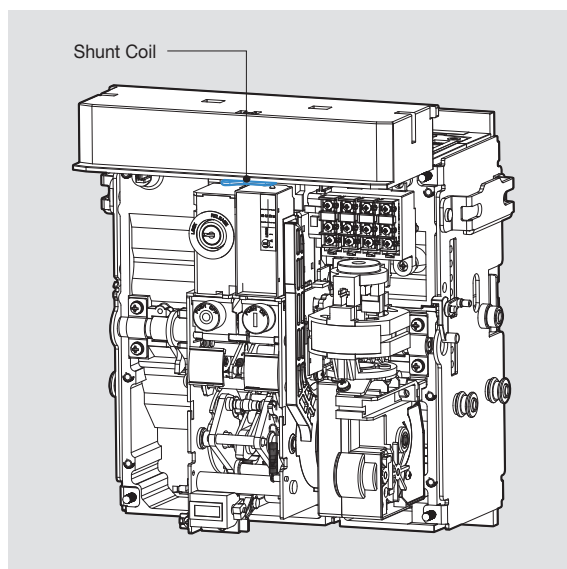


Mounting	Accessories		Supply category		Remark ^{Note)}	Page
			Standard	Option		
Cradle	MI	Mechanical Interlock	-	○		27
	ST	Safety Shutter	-	○	*	29
	DF	Door Frame	-	○		29
	MIP	Miss Insertion Prevent Device	-	○		34
	MOC	Mechanical Operated Cell Switch	-	○		28
	CEL	Cell Switch	-	○		31
	DI	Door Interlock	-	○		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

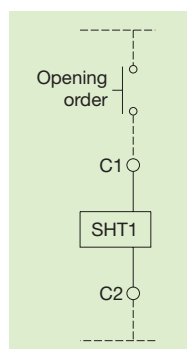
* Separate purchasing is not allowed. Each item should be purchased with the main body.

** 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).

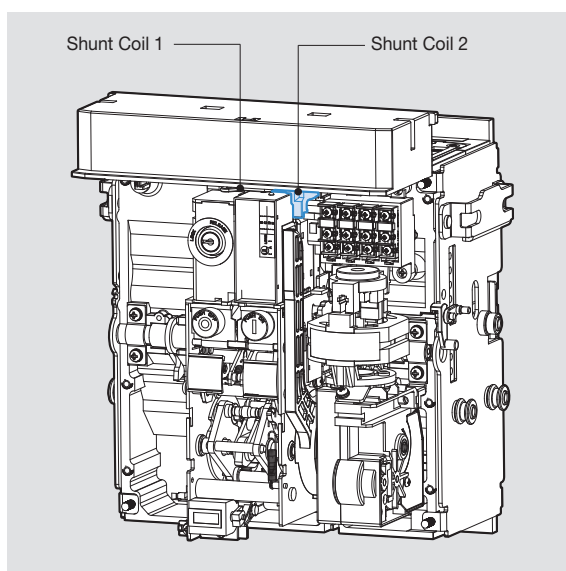
2. Specification of the wire

- 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.

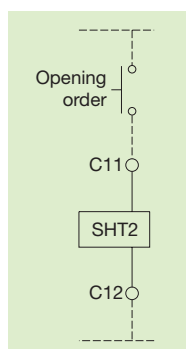
The maximum wire length

		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

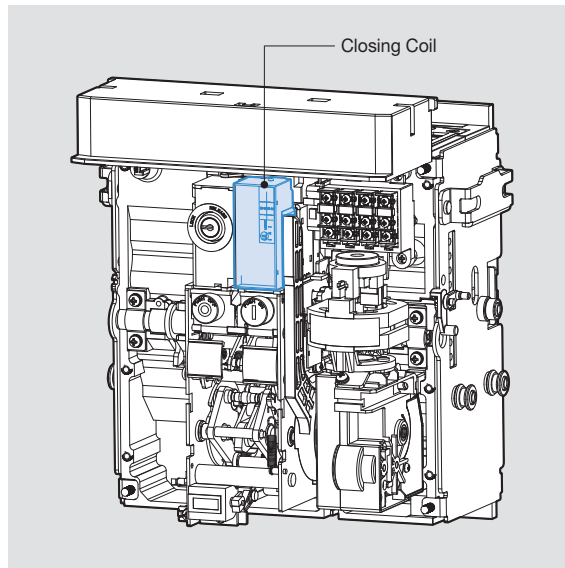
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

The maximum wire length

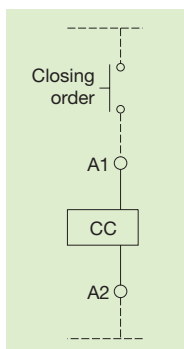
		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)	#14 AWG (2.08mm ²)	#16 AWG (1.31mm ²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

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).

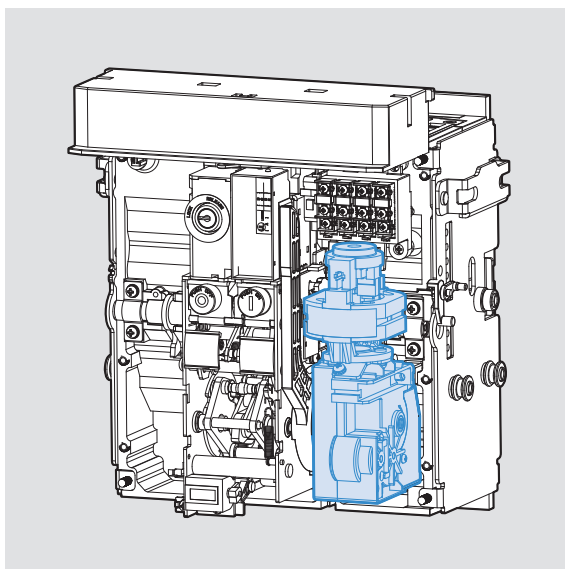
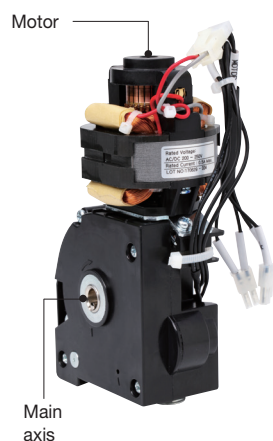
2. Specification of the wire

- 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]



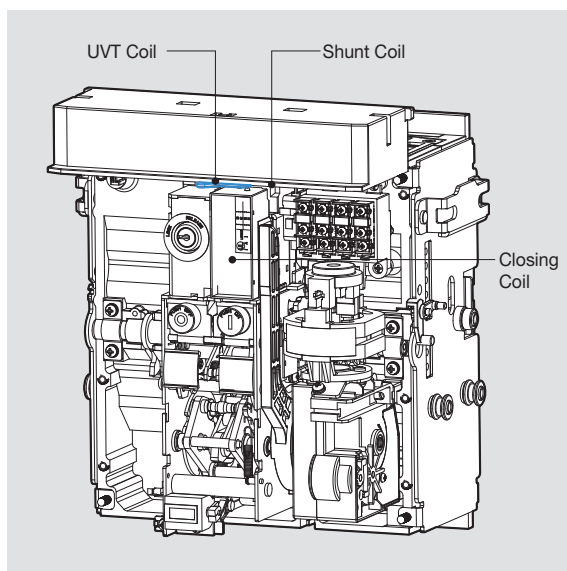
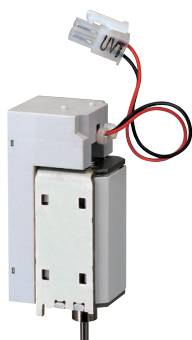
- Charge the closing spring of a circuit breaker by the external power source. Without the external power source, charge manually.
- Operating voltage range (IEC 60947)
85%~110%Vn

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

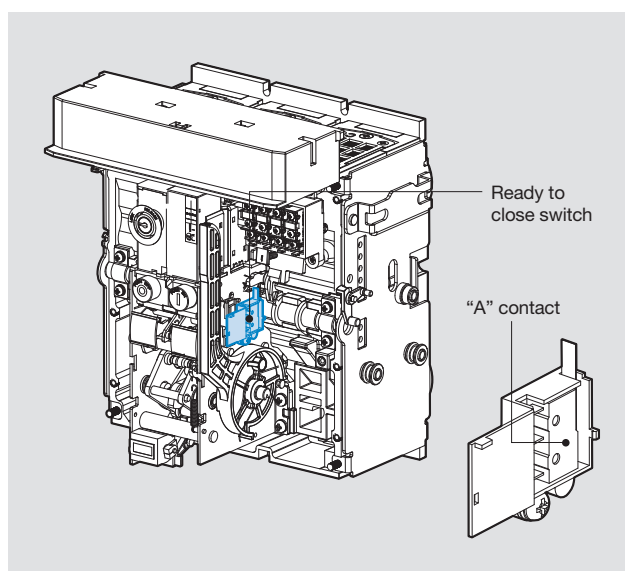
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

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.

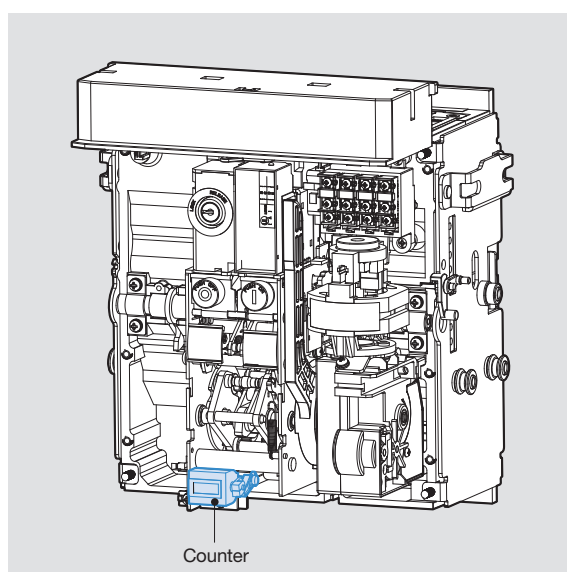
Ready to Close Switch [RCS]



- 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.

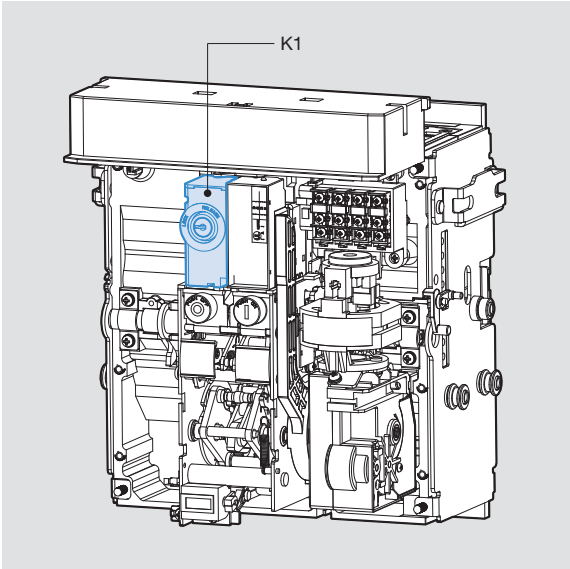
Classification	Standard		Remark
Contactor Capacity	250Vac	3A	
	250Vdc	5A	
	125Vdc	0.6 A	

Counter [C]



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

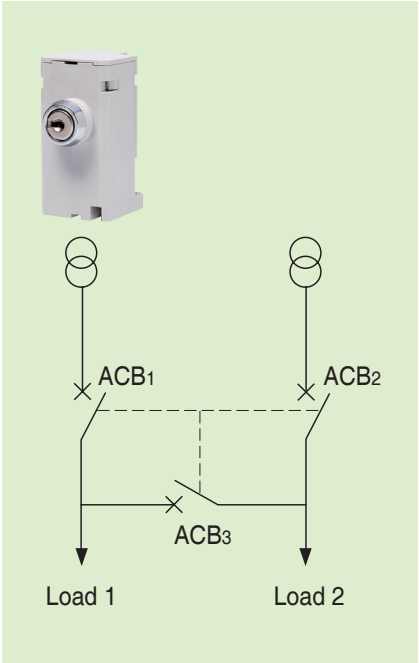
Key Lock [K1]



- 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



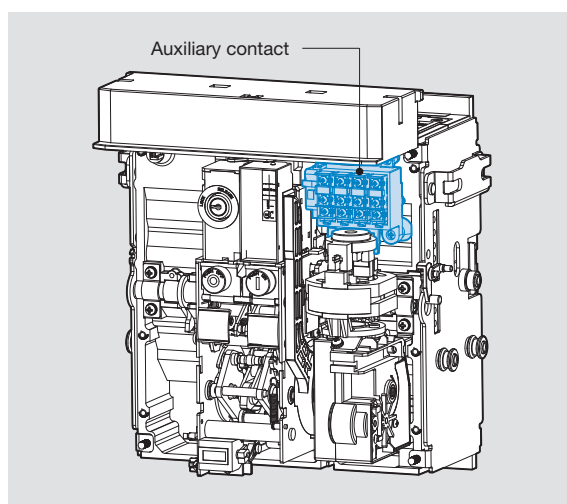
- 3 circuit breakers can be arranged for the continuous power supply to the load side and be interlocked mutually by using Key Lock embedded in each circuit breaker. Two same keys will be provided.

* 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]

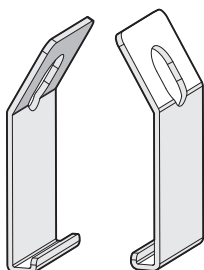


- It is to prevent manual operation of ACB's closing/tripping button due to user's wrong handling.
- It is not possible to handle ON/OFF operation under the "Button lock" status.
(Electrical ON/OFF operation is possible)

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

Accessories

Lifting Hook [LH]



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



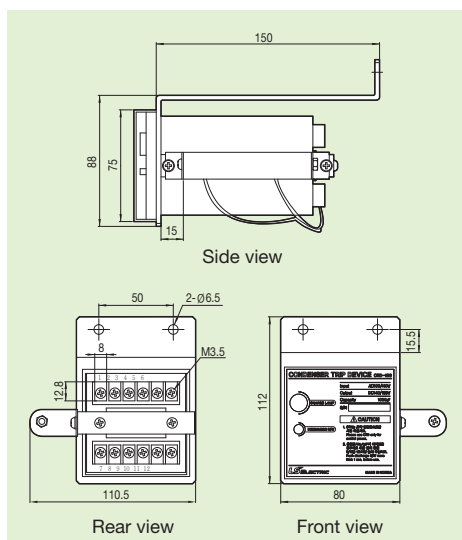
Condenser Trip Device [CTD]

- 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.

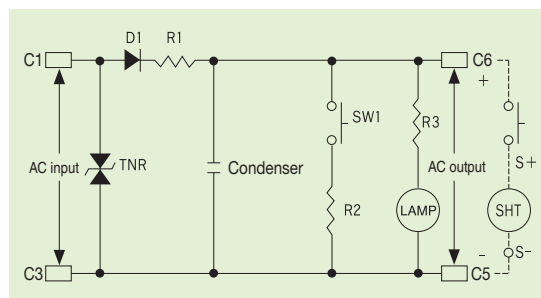
Ratings

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

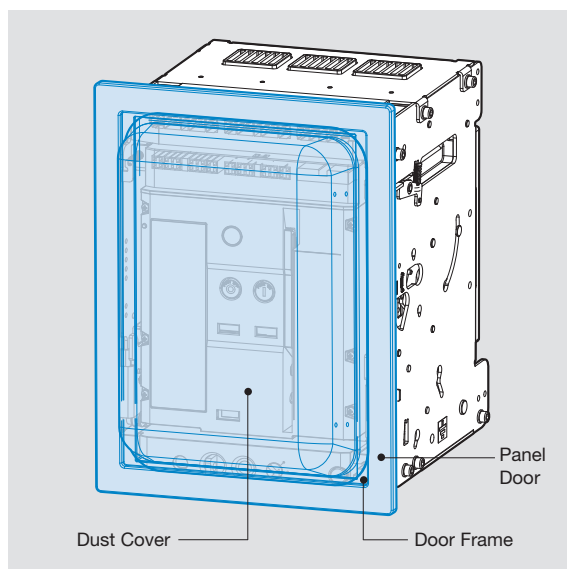
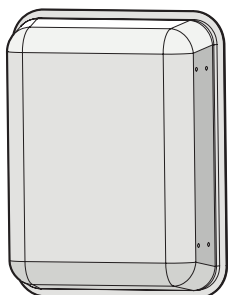
External dimension



Circuit diagram

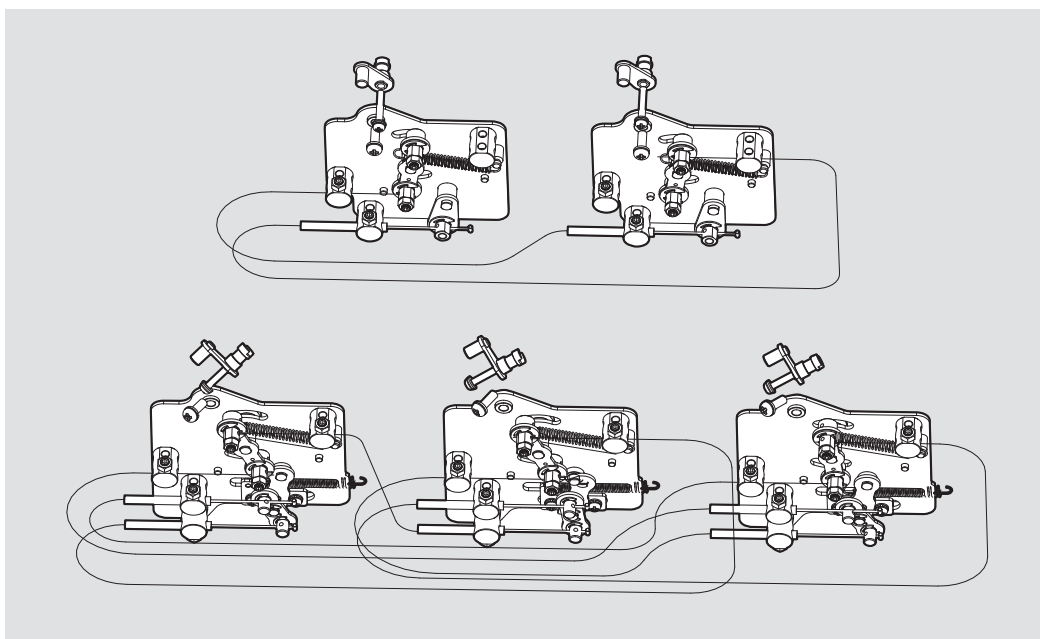


Dust Cover [DC]



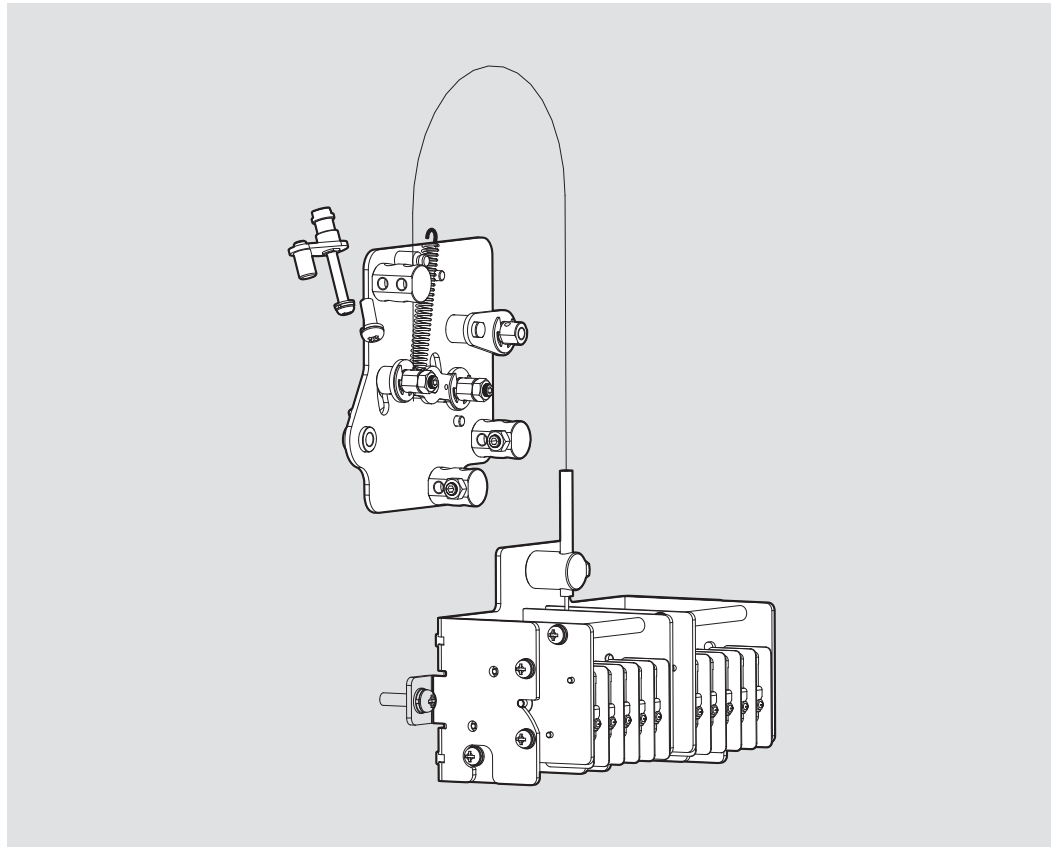
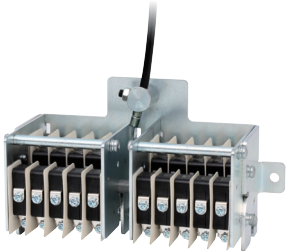
- Attached to the door frame.
- It protects the product from dust and moisture that may affect the operation of the instrument at the same time (IP54) which may cause fault operation and enhances the sealing degree by being mounted to protrude type of panel.
- It is transparent so that the front side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

Mechanical Interlock [MI]

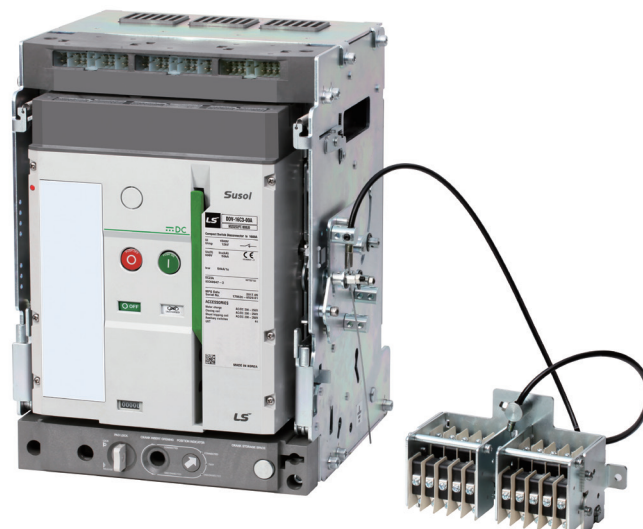


- It is used to interlock closing and trip between two or three breakers mechanically so as to prevent unintended operation at the same time.
- Wire type interlock can be applied upto 3 breakers

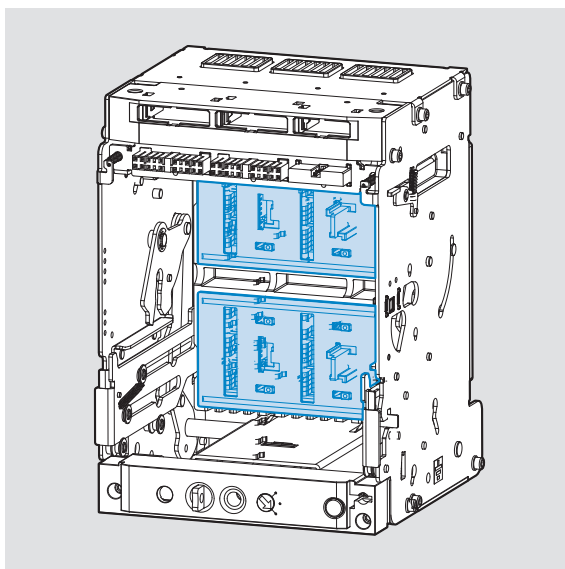
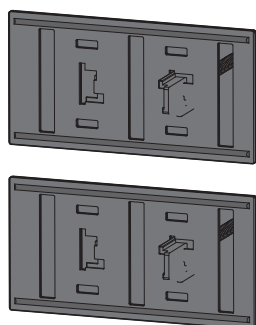
Mechanical Operated Cell Switch [MOC]



- 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

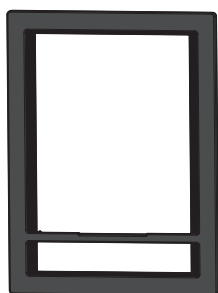
3P



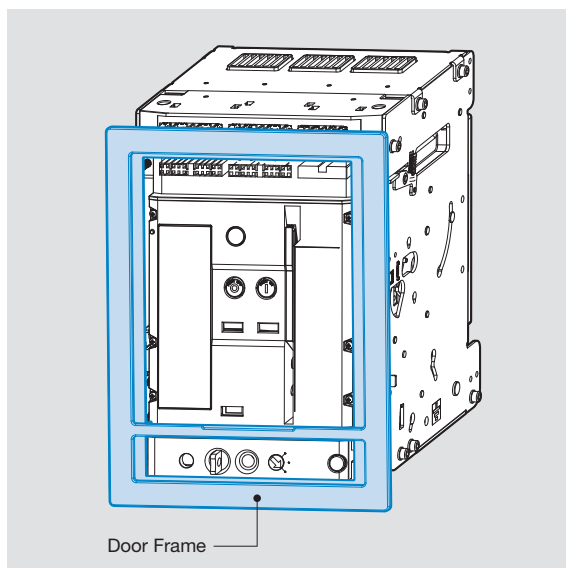
4P



Door Frame [DF]

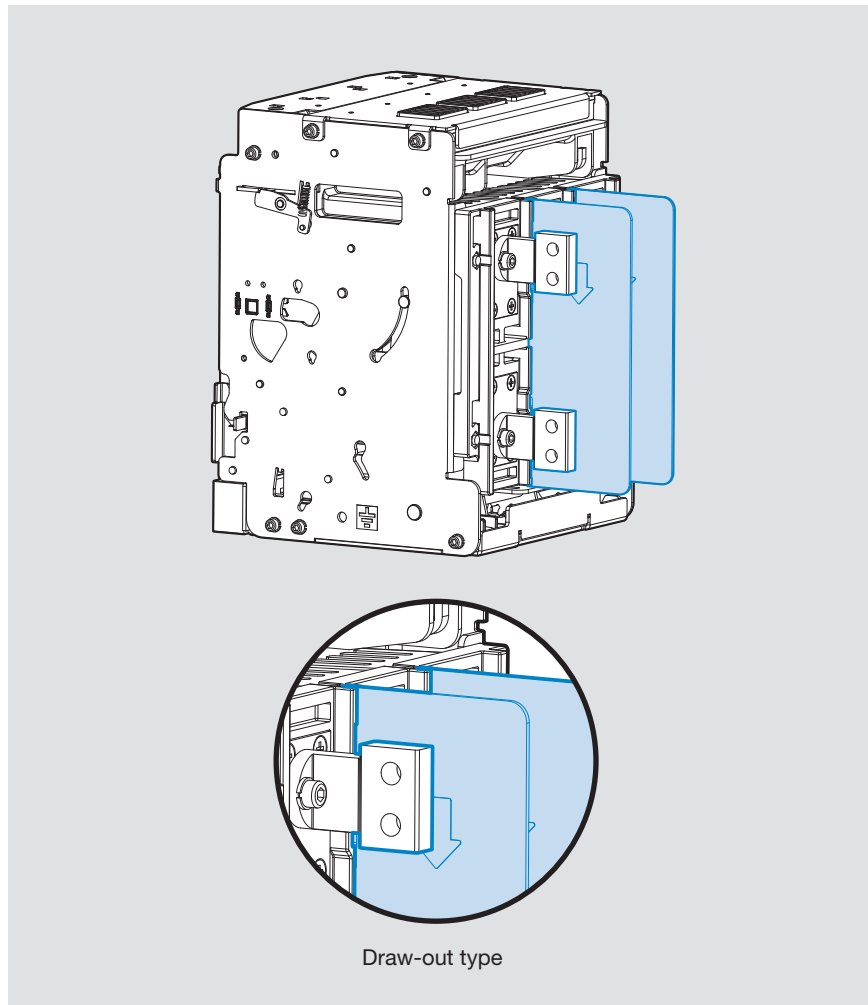
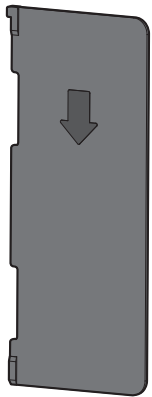


Draw-out type



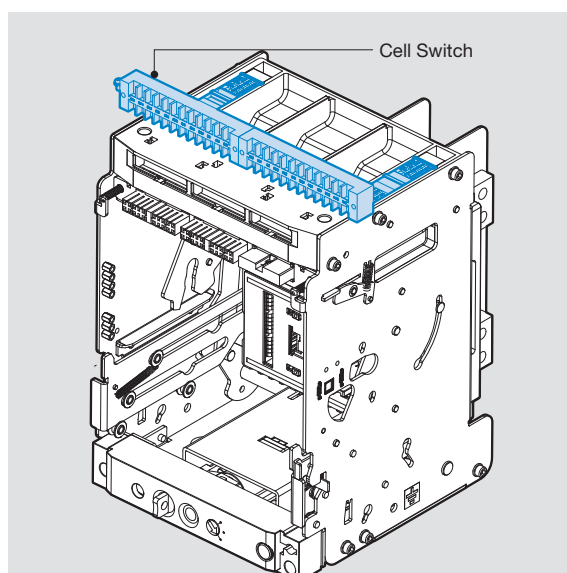
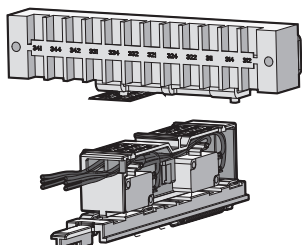
- When structuring the embedded type of ACB panel, it protects the protrude front of ACB and the cutting side of panel door by attaching it to the panel door.

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

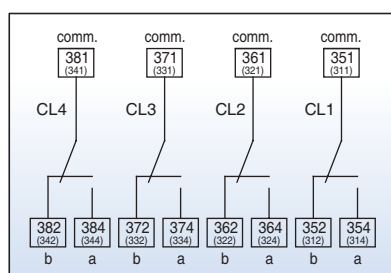
8C: 2Disconnected +2Test +4Connected

※ Contact configuration can be changeable if necessary.

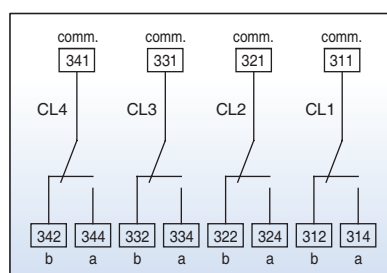
Operating characteristic

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

Terminal (4C, 8C)



4C attached to the right side of cradle



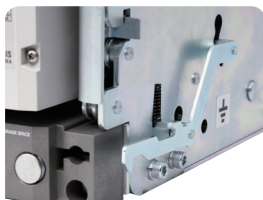
4C attached to the left side of cradle

Accessories

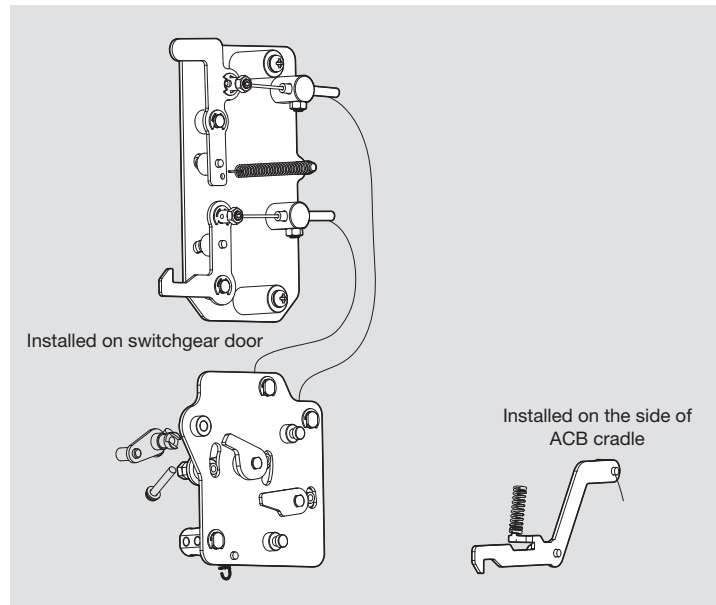
Door Interlock [DI]



Wite type



Catch type



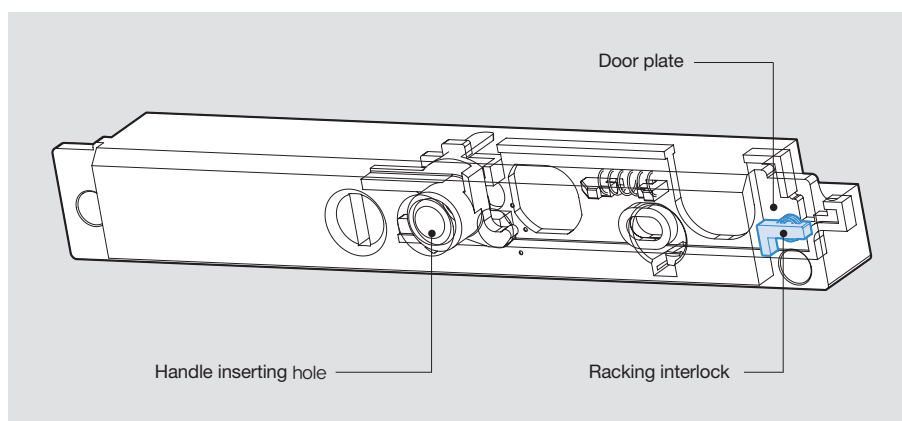
- It is a safety device which does not allow the panel door to open when a circuit breaker is in the "ON" position.

Zero Arc Space [ZAS]



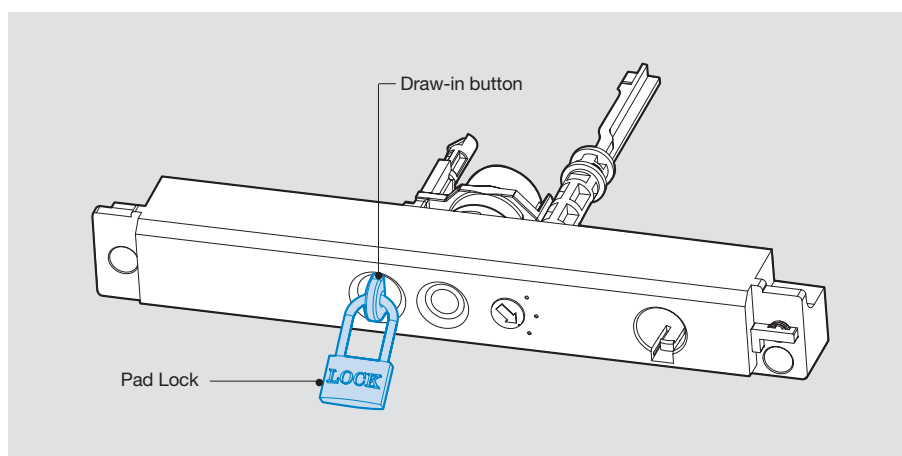
- Arc which may arise while breaking fault current is extinguished first by Arc chute in main body of circuit breaker and then completely extinguished by Arc cover. By preventing arc from exposing to the outside, it protects itself from all kinds of accidents.

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.

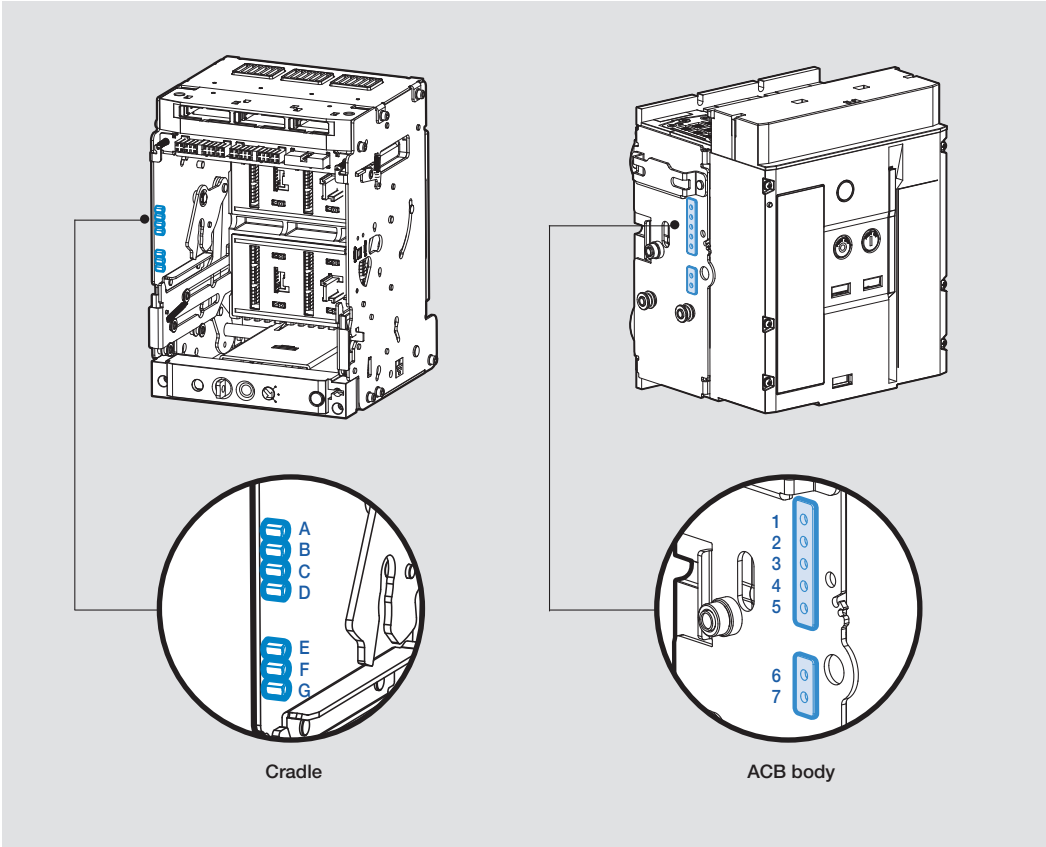
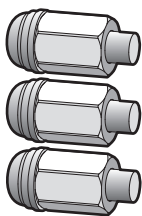
Pad Lock / Position Lock [PL]



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. (Ø5 ~ Ø6)

Miss Insertion Prevent Device [MIP]

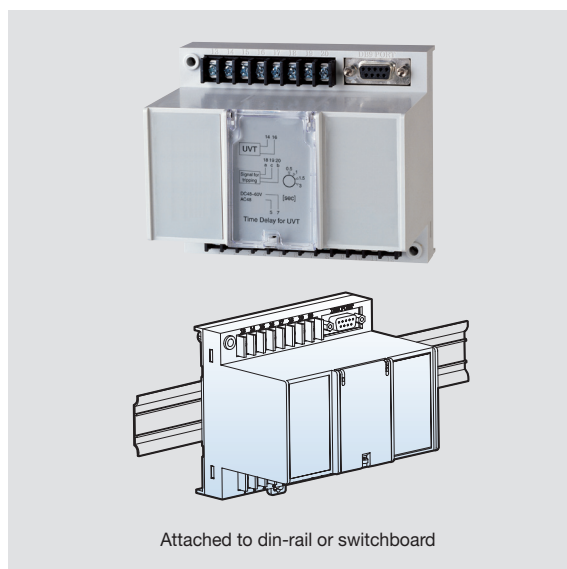


- When the main body of ACB is inserted to the cradle, if the ratings of ACB does not match with cradle, it mechanically prevents ACB from being inserted into cradle of ACB.
- The installation method is variable according to ratings.

	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]



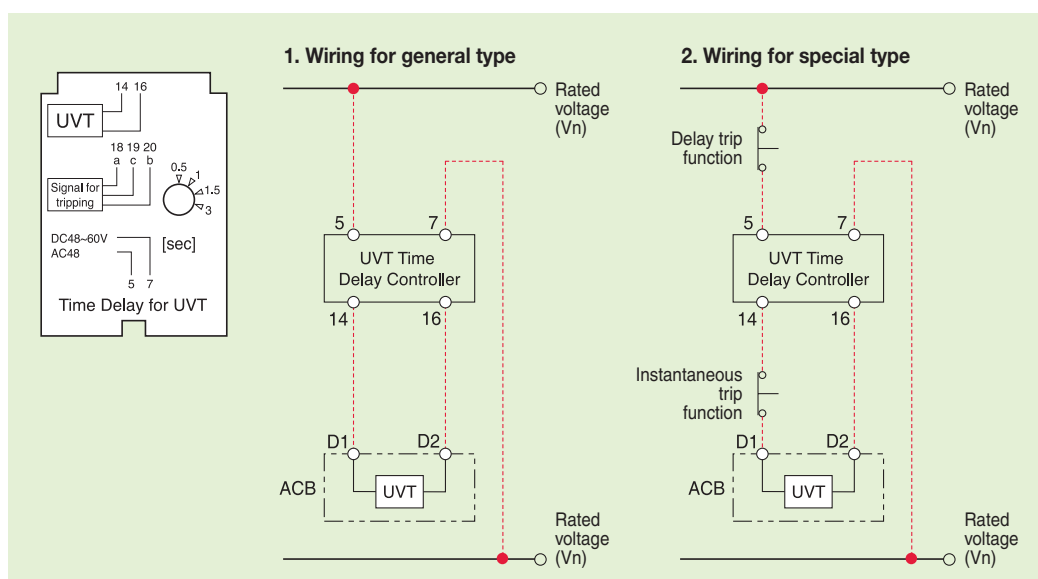
- UVT is a device which makes ACB tripped automatically to prevent the accident on load side due to under voltage or power breakdown. There are two types, Instantaneous type and time delay type.
- Instantaneous type: only available with UVT coil.
- Time delay type: available by connecting UVT coil and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

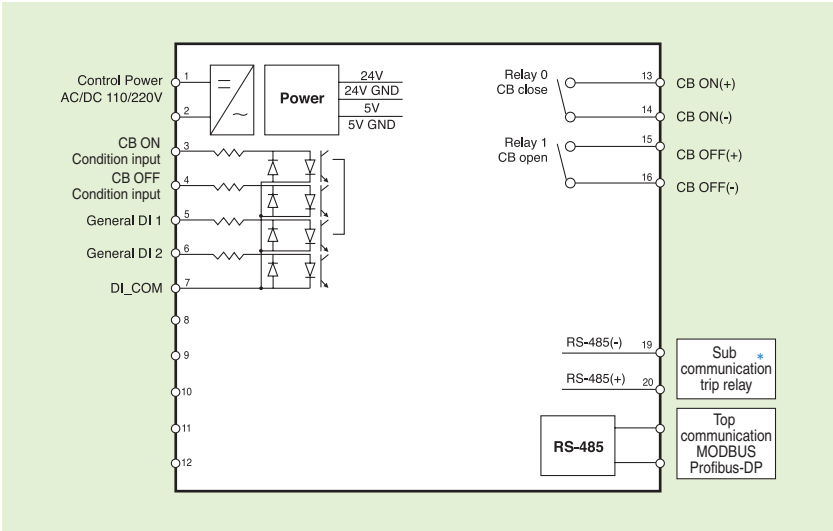
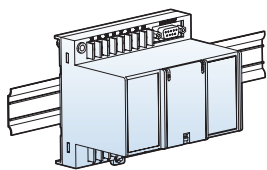


* The wiring presented with red color should be set by users.

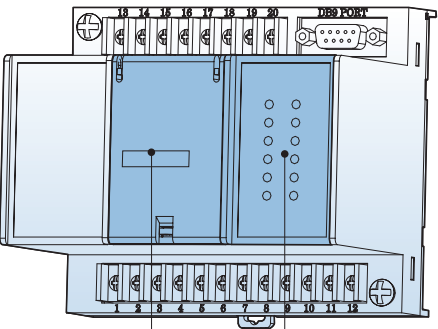
Remote I/O Unit [RCO]



Remote I/O Unit



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

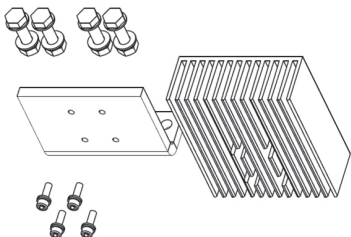
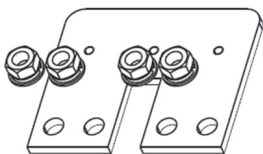
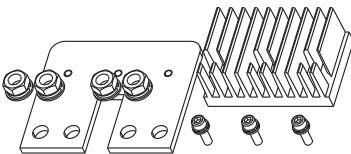
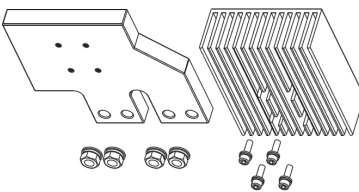


- Baud rate setting
- Comm. address setting
- Temperature setting

- 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.

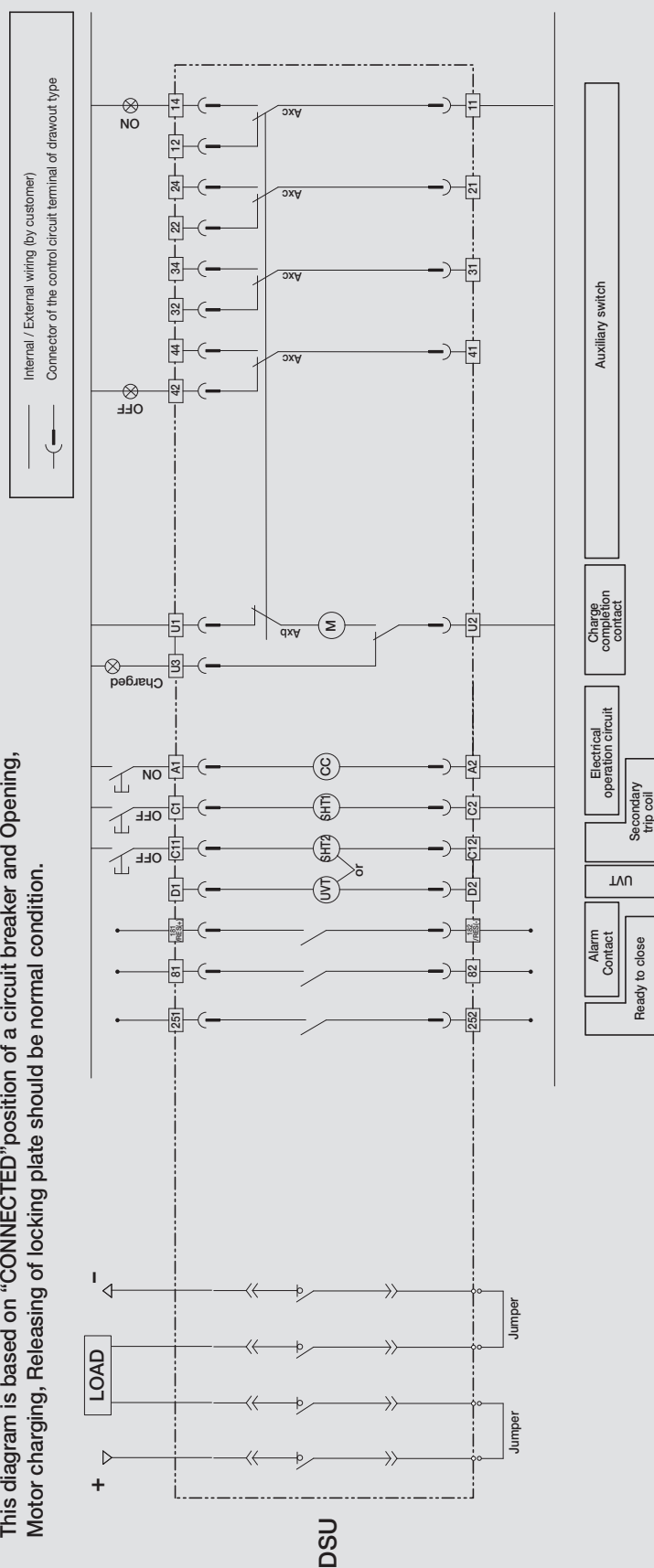
LED		Status
1	DI1	Indicates digital Input #1condition
2	DI2	Indicates digital Input #2condition
3	DO ON	Indicates temperature alarm output is ON
4	DO OFF	Indicates temperature alarm output is OFF
5	CB ON	Indicates circuit break close condition
6	CB OFF	Indicates circuit break open condition
7	RUN LED	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
	800-1000A		70223472603	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

Aux	Auxiliary switch
CL1-CL4	Cell switch
M	Motor
CC	Closing coil
sn1	1st Shunt coil
sn2	2nd Shunt coil
un1	UNT coil

Note) 1. The diagram is shown with circuit de-energized, all devices open and charged and relays in normal position

1. The diagram is shown with circuit de-energized, all devices open.
2. Relay is normal condition and charging type is "Off-Charging"

2. Relay is normal condition and charging is 4C.
3. The standard of auxiliary contact is 4C.

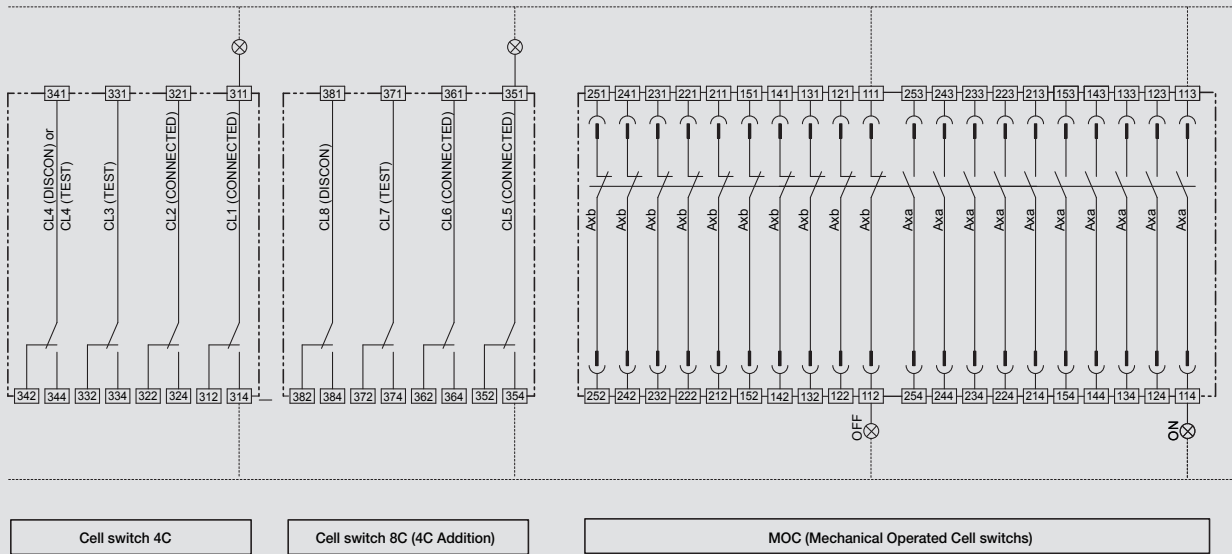
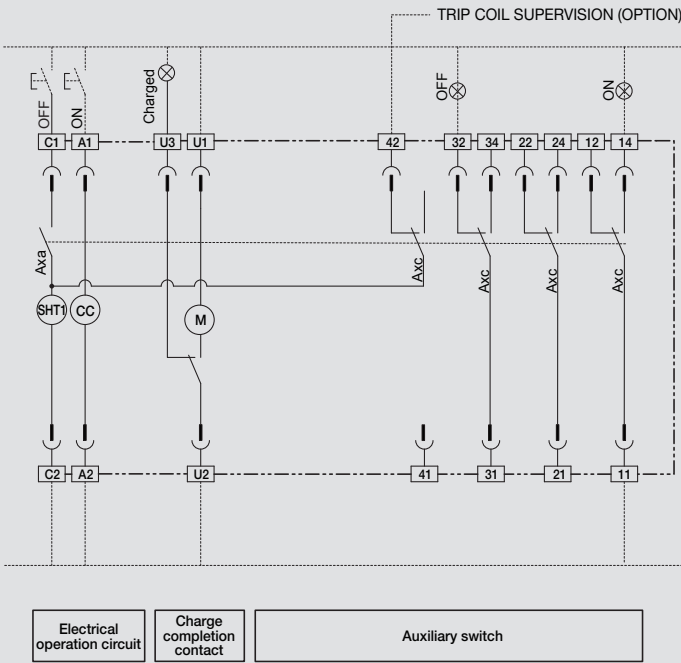
3. The star

4. Option

4. Option 1

- Ready to close contact, UVT coil, Fully charged contact, secondary trip coil

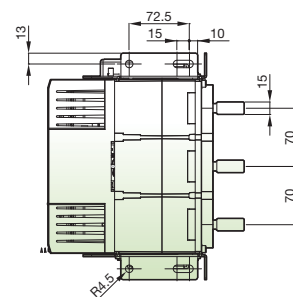
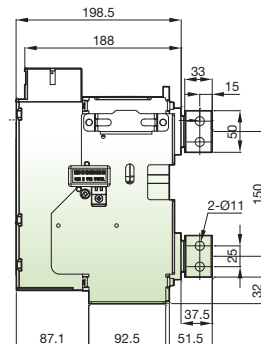
5. Contact configuration for Cell Switch can be changeable if necessary



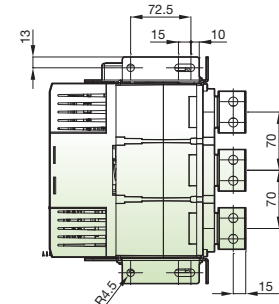
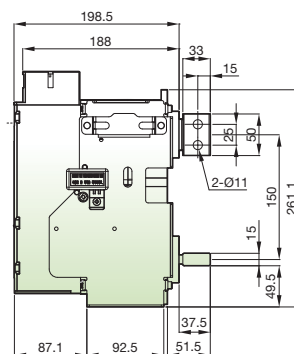
Terminal symbol

311 ~ 344	Cell switch
111 ~ 254	MOC

- (Unit : mm)



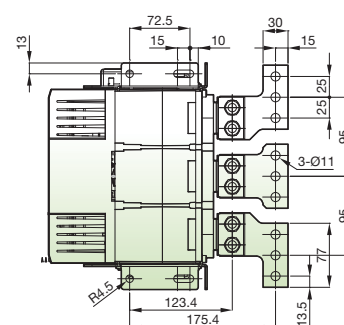
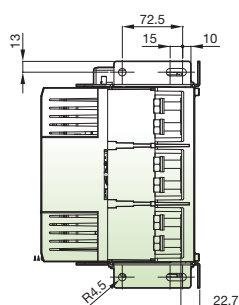
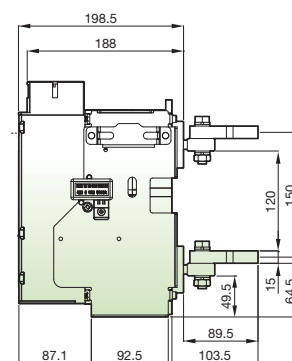
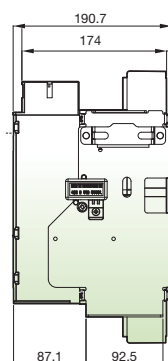
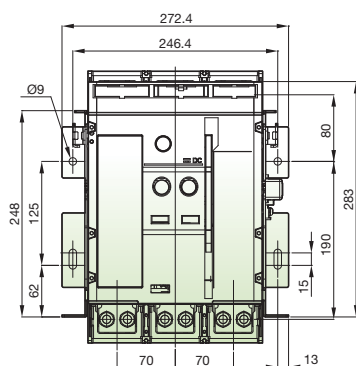
V Type (Vertical type)



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

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

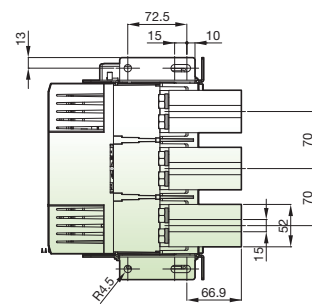
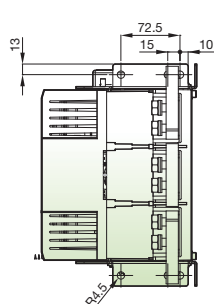
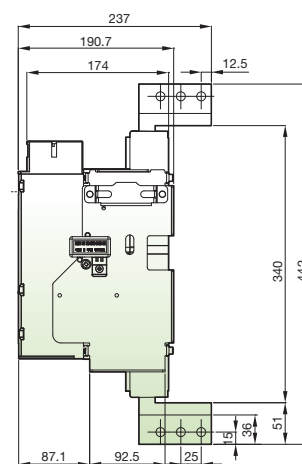
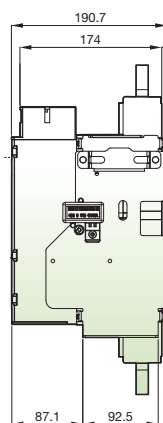
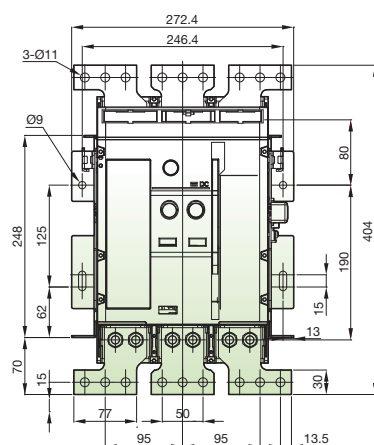
(Unit : mm)



P Type (Flat type)

R Type (Spread type)

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



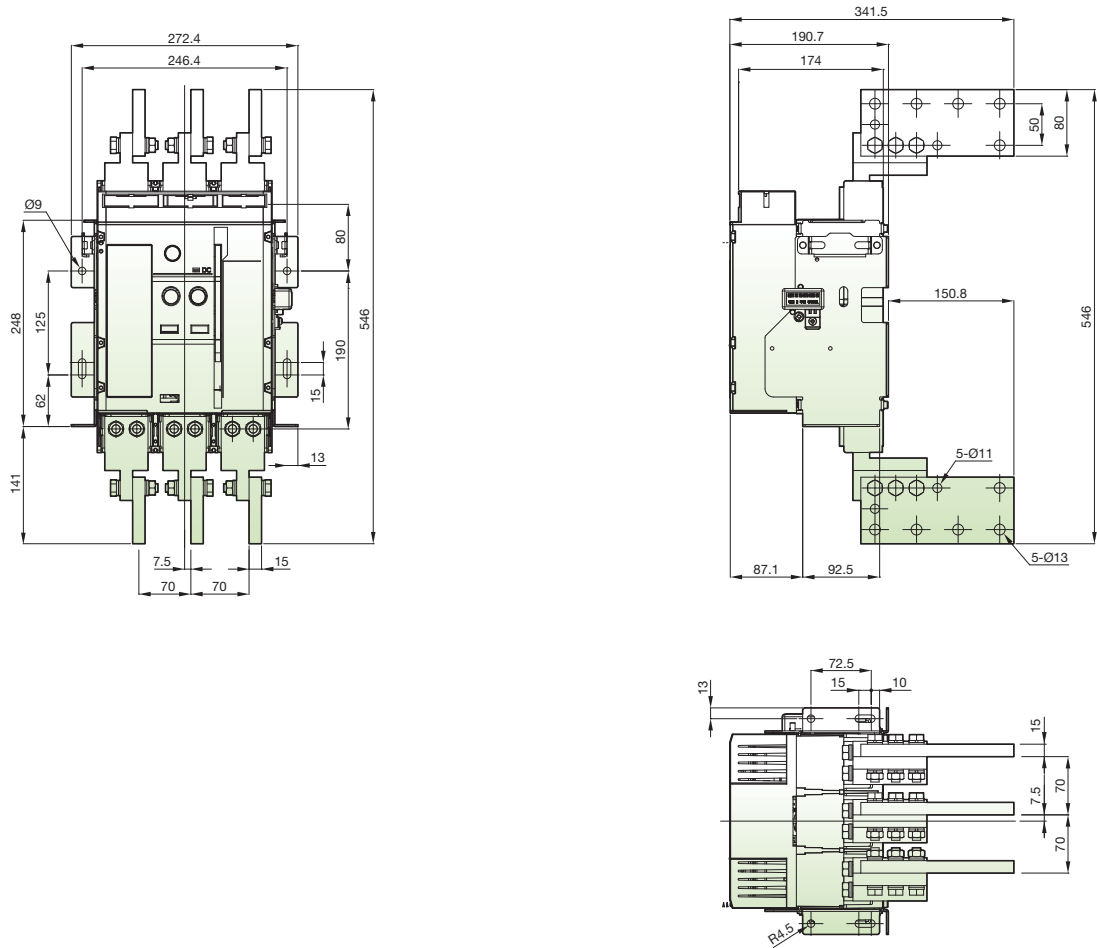
Z Type (Flat spread type)

T Type (Flat vertical type)

Dimensions

• 3P [Fixed X: Cable lug type]

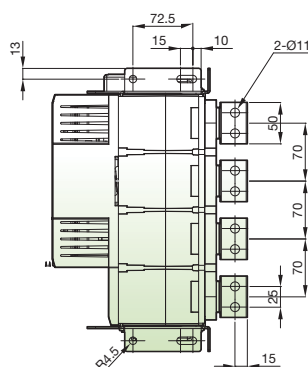
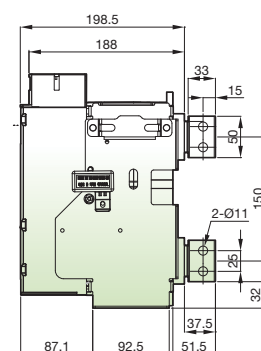
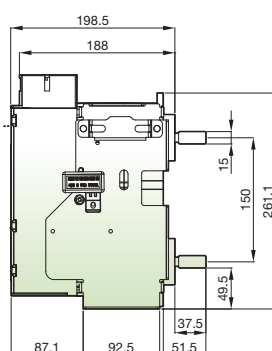
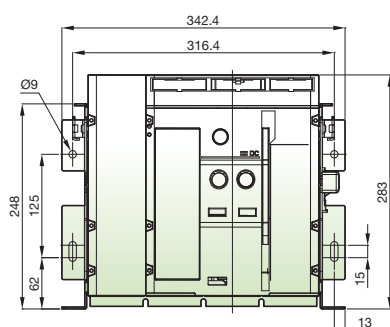
(Unit : mm)



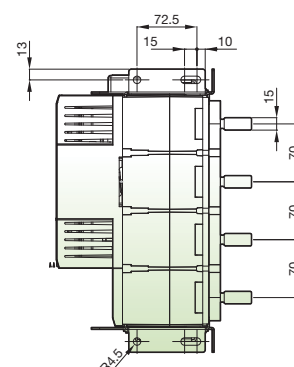
X Type (Cable lug type)

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

(Unit : mm)

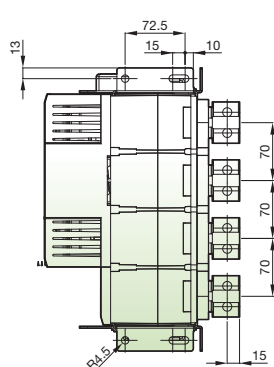
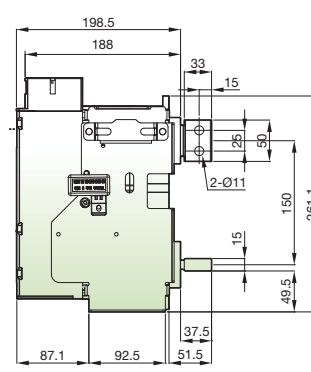
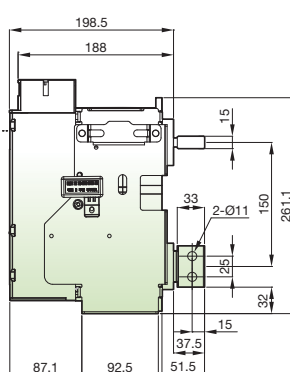
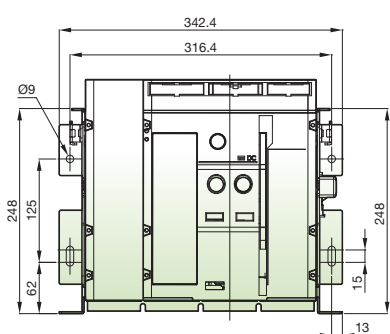


H Type (Horizontal type)



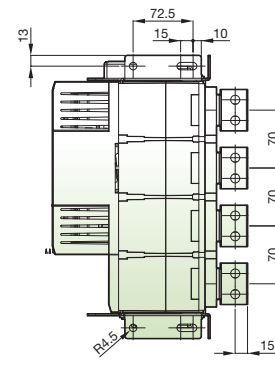
V Type (Vertical type)

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



M Type

(Upper-Horizontal type, Lower-Vertical type)



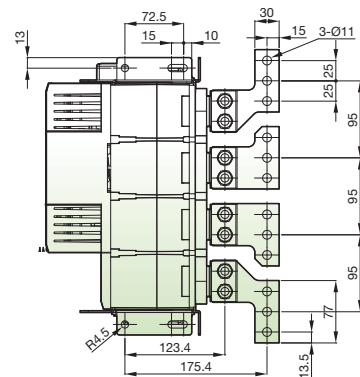
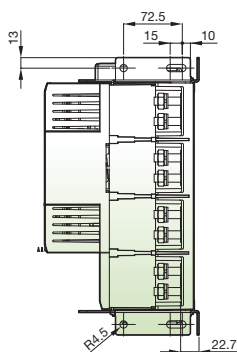
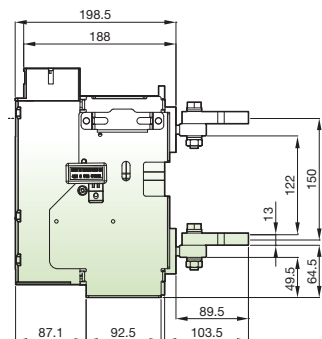
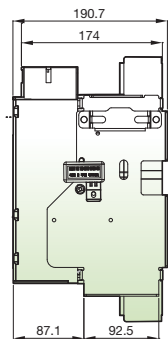
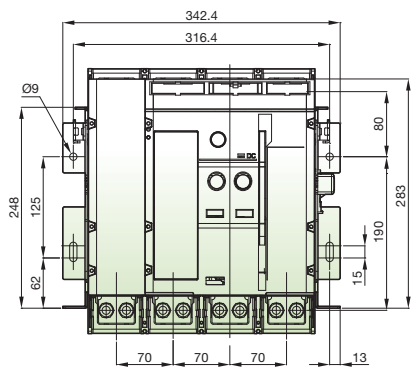
N Type

(Upper-Vertical type, Lower-Horizontal type)

Dimensions

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

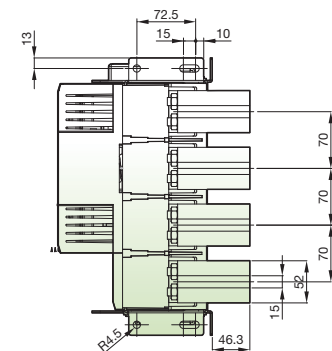
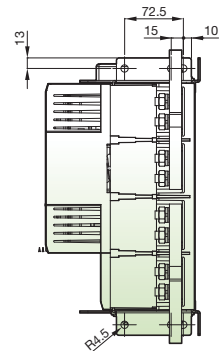
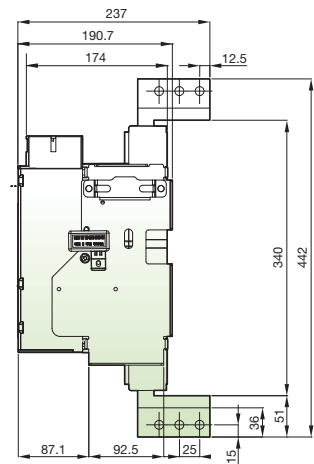
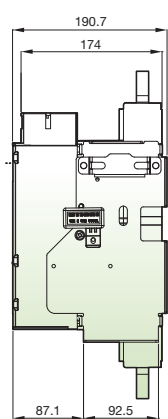
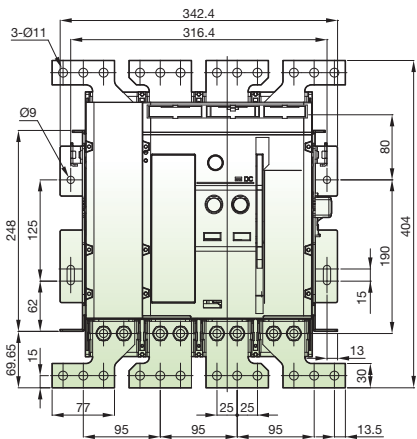
(Unit : mm)



P Type (Flat type)

R Type (Spread type)

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

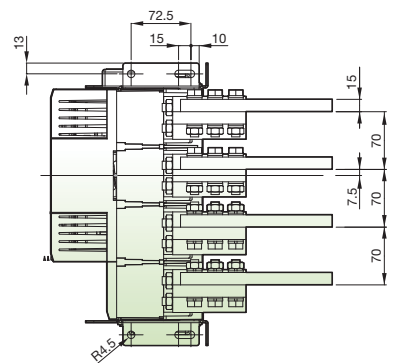
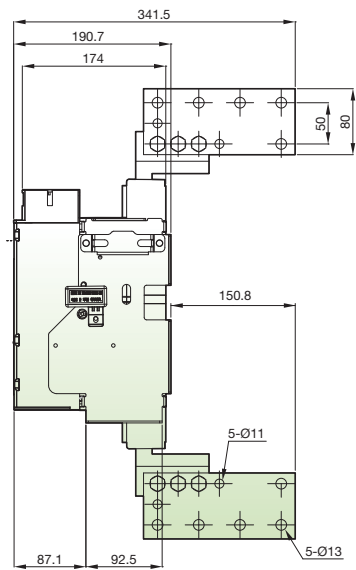
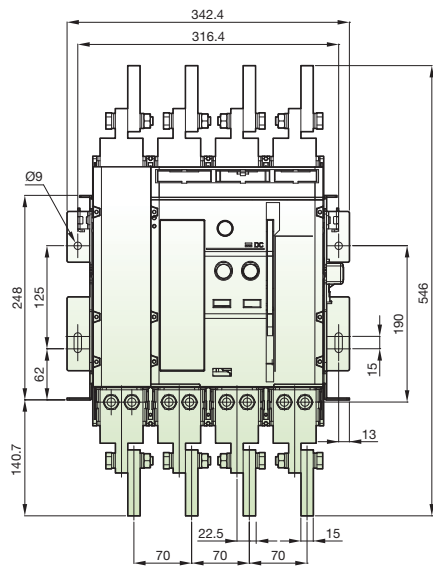


Z Type (Flat spread type)

T Type (Flat vertical type)

• 4P [Fixed X: Cable lug type]

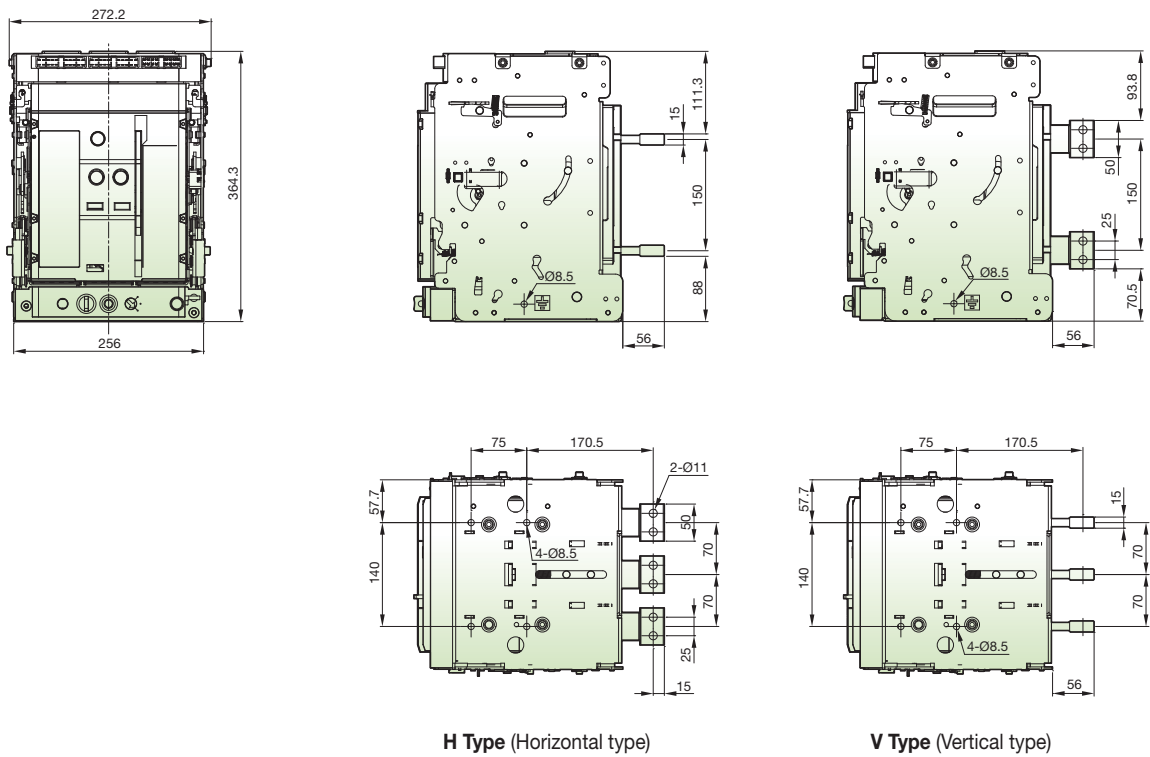
(Unit : mm)



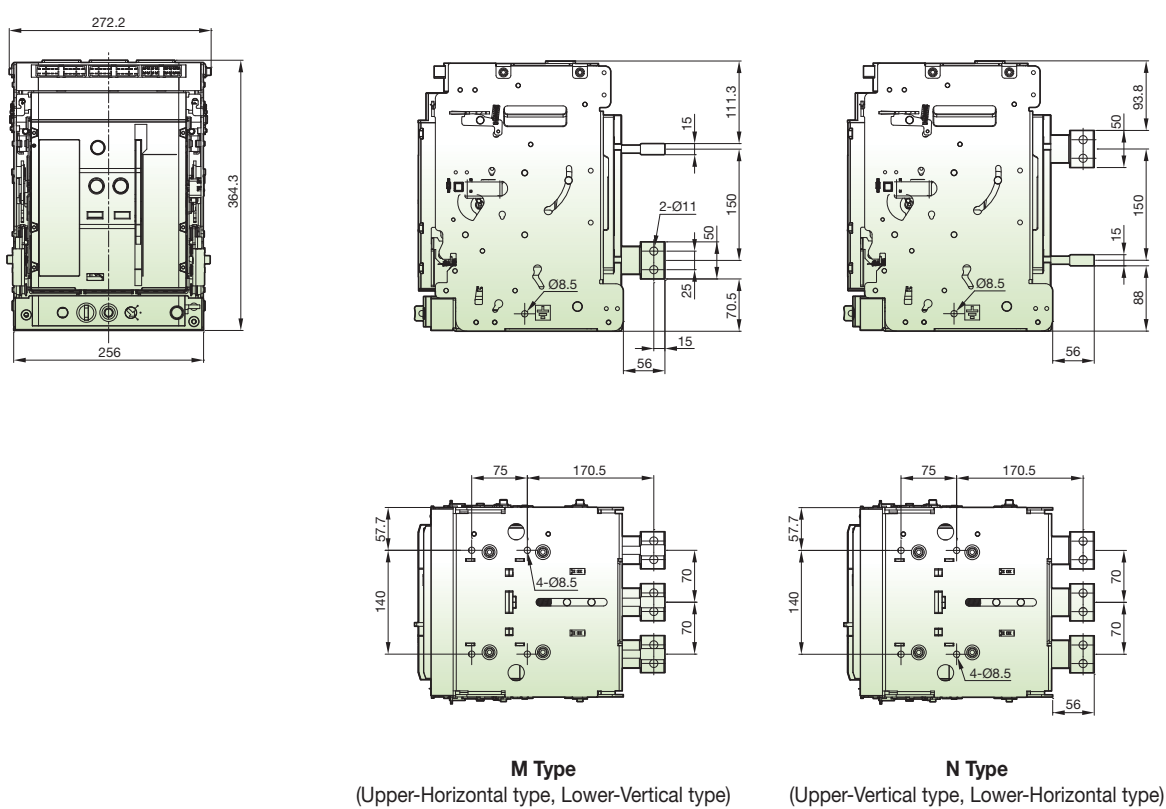
X Type (Cable lug type)

Dimensions

• 3P [Draw-out H: Horizontal type / V: Vertical type] (Unit : mm)

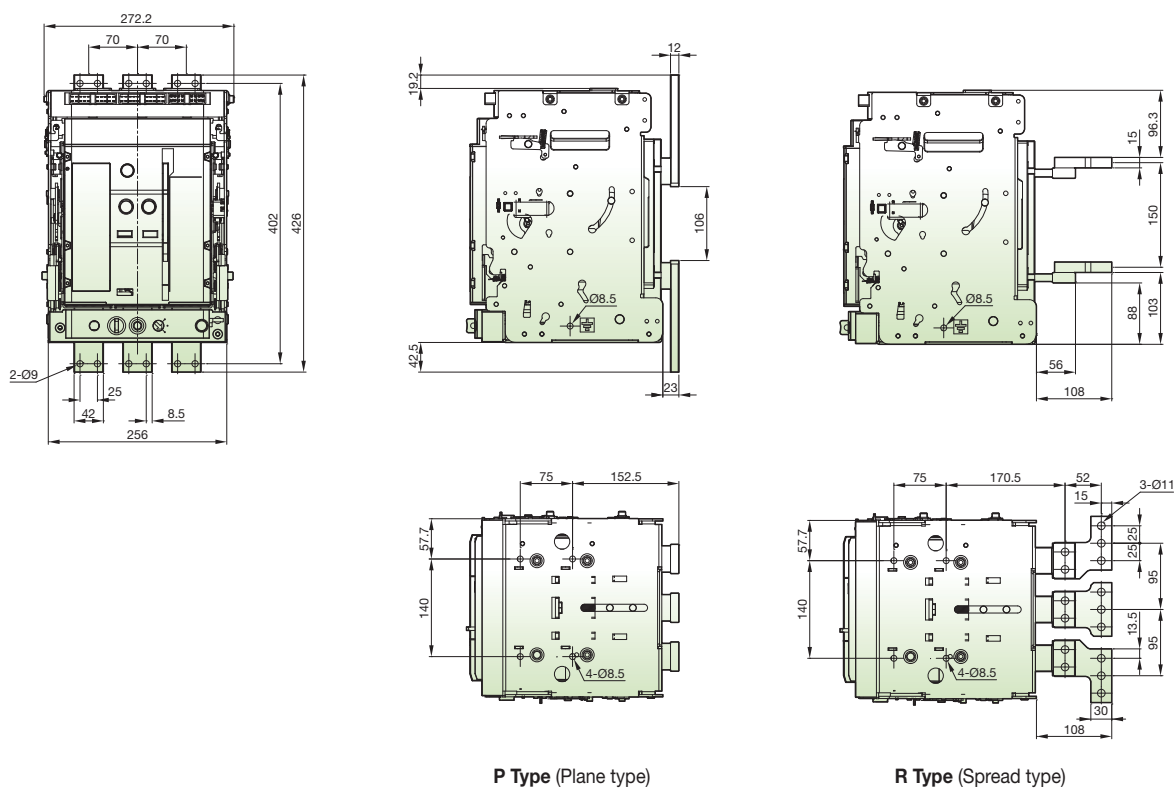


• 3P [Draw-out M: Upper-Horizontal type, Lower-Vertical type / N: Upper-Vertical type, Lower-Horizontal type]

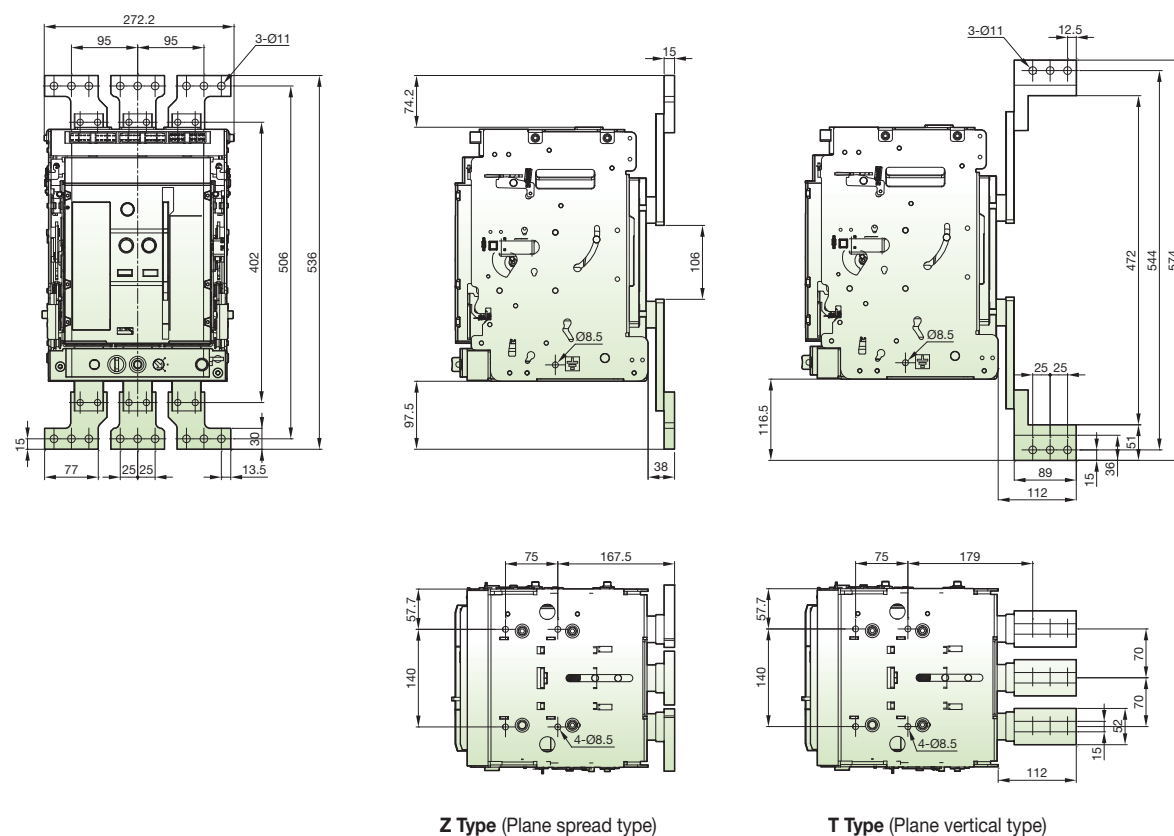


• 3P [Draw-out P: Flat type / R: Spread type]

(Unit : mm)



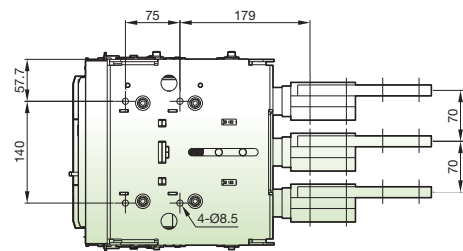
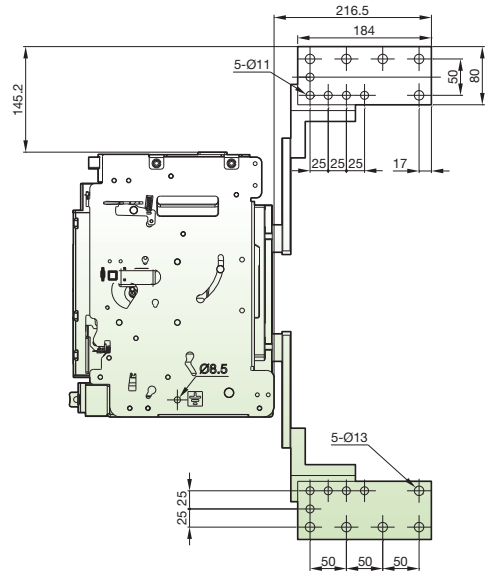
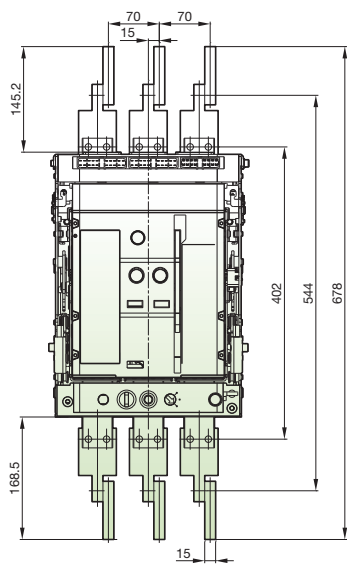
• 3P [Draw-out Z: Flat spread type / T: Flat vertical type]



Dimensions

• 3P [Draw-out X: Cable lug type]

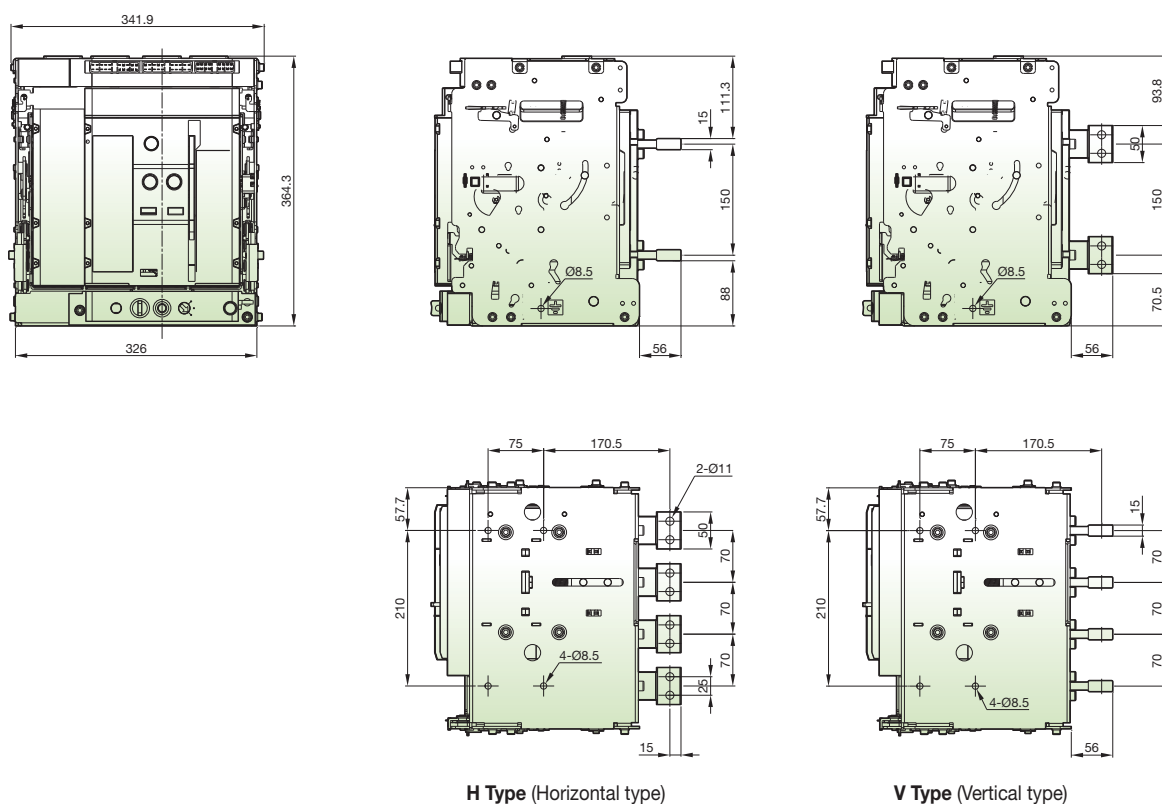
(Unit : mm)



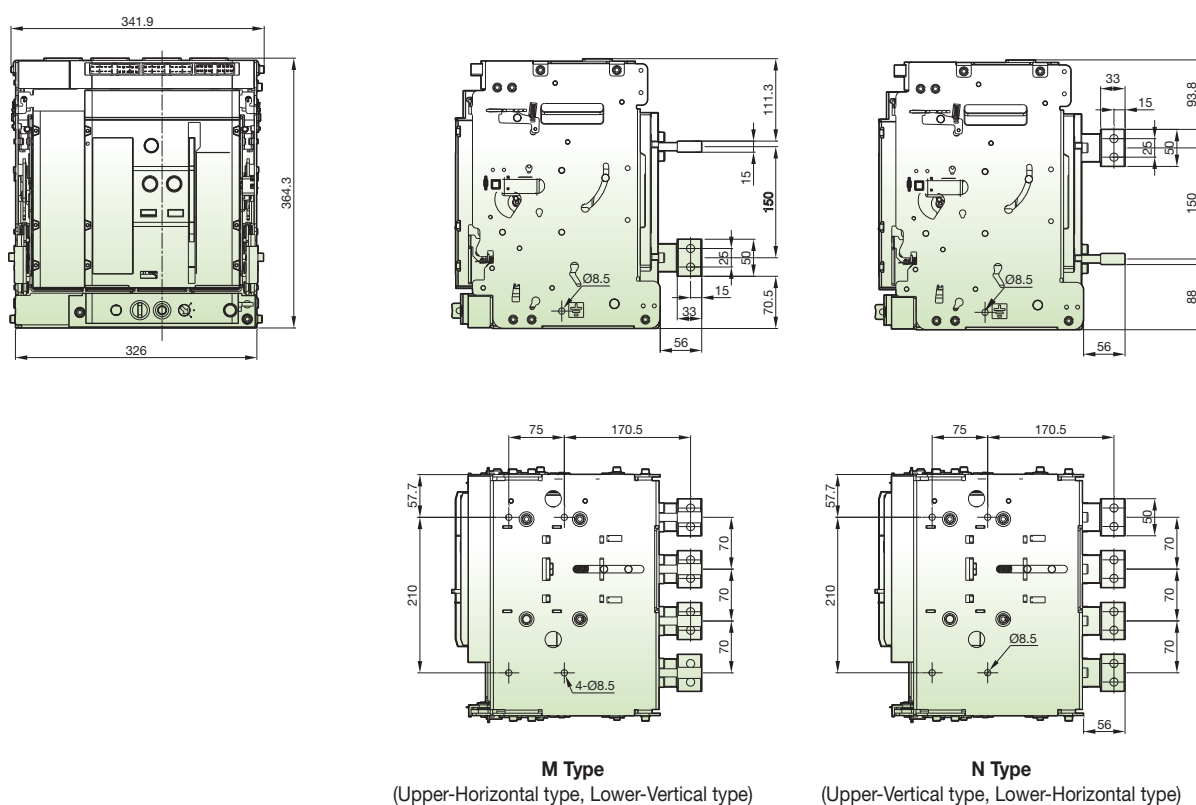
X Type (Cable lug type)

• 4P [Draw-out H: Horizontal type / V: Vertical type]

(Unit : mm)



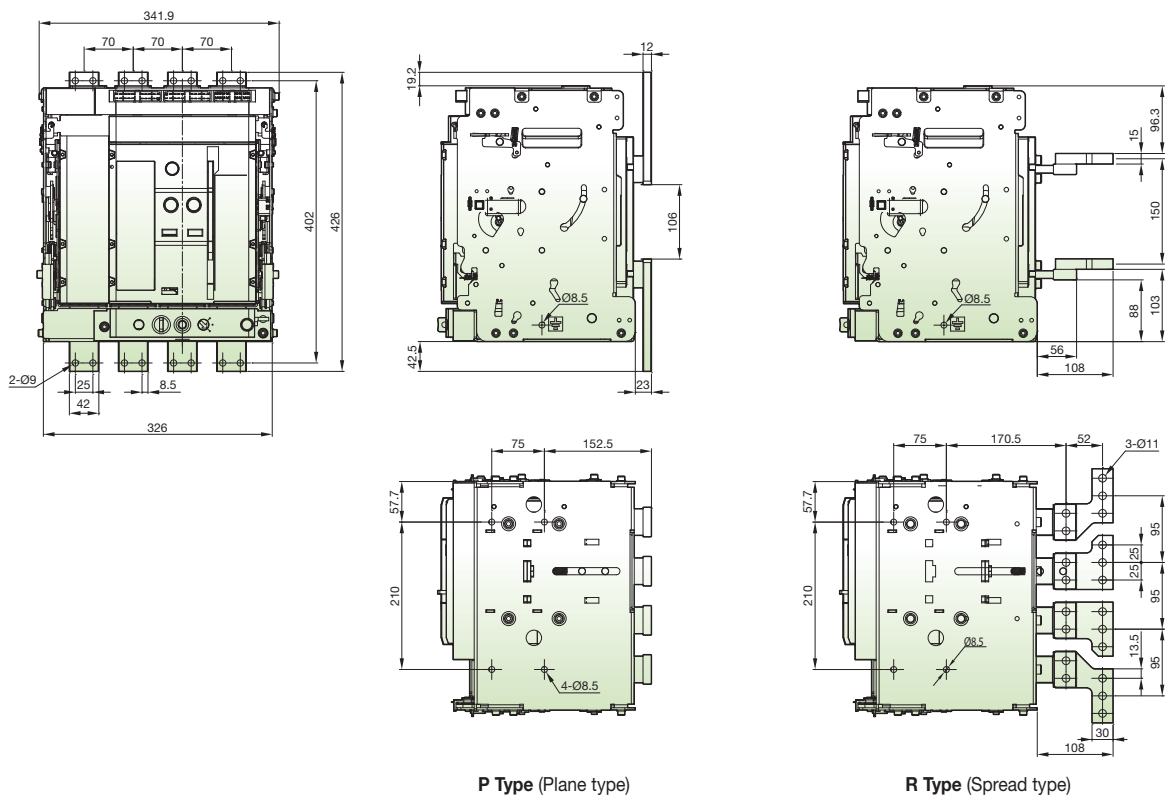
• 4P [Draw-out M: Upper-Horizontal type, Lower-Vertical type / N: Upper-Vertical type, Lower-Horizontal type]



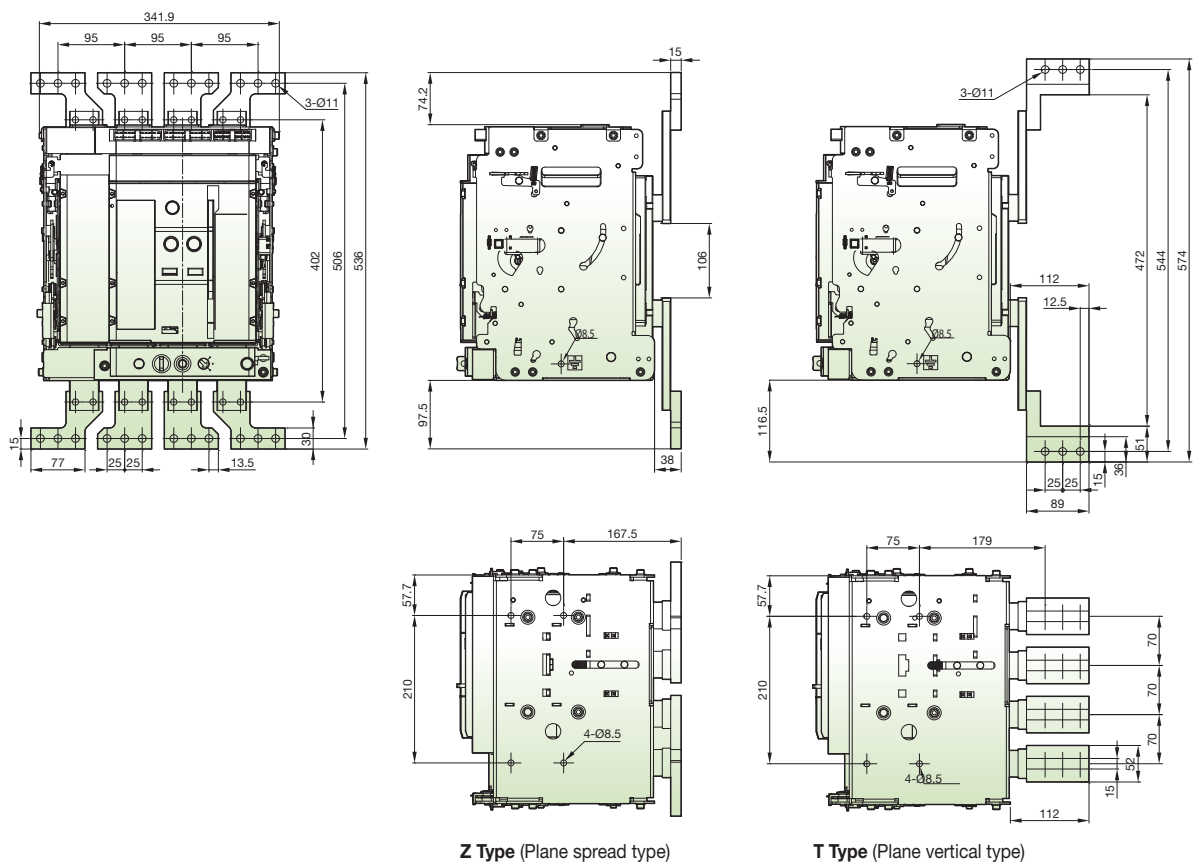
Dimensions

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

(Unit : mm)

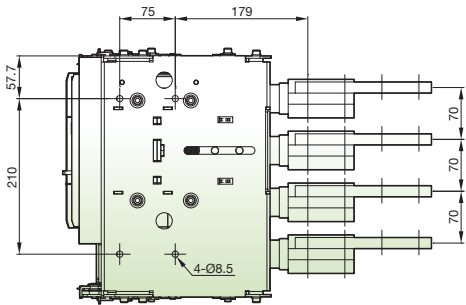
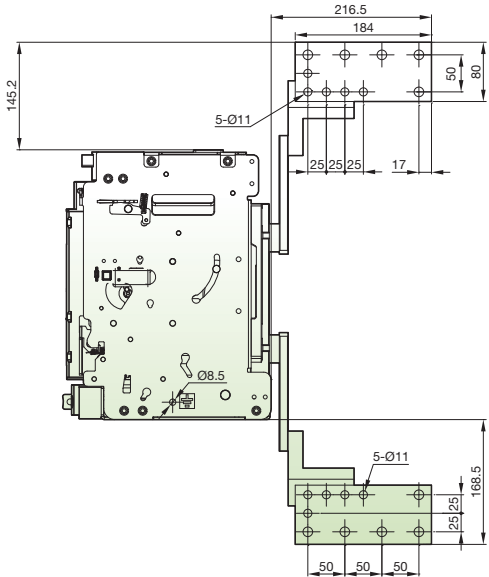
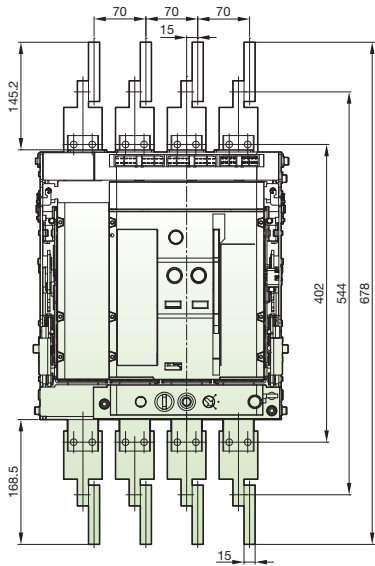


• 4P [Draw-out Z: Flat spread type / T: Flat vertical type]



• 4P [Draw-out X: Cable lug type]

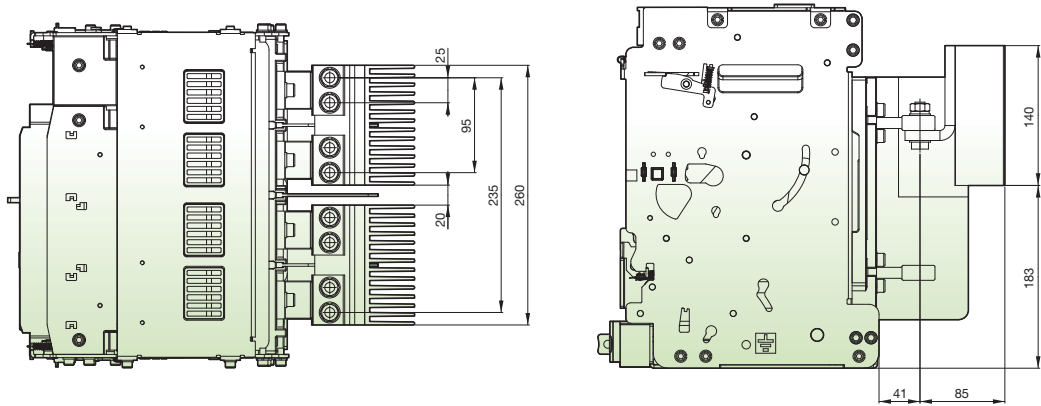
(Unit : mm)



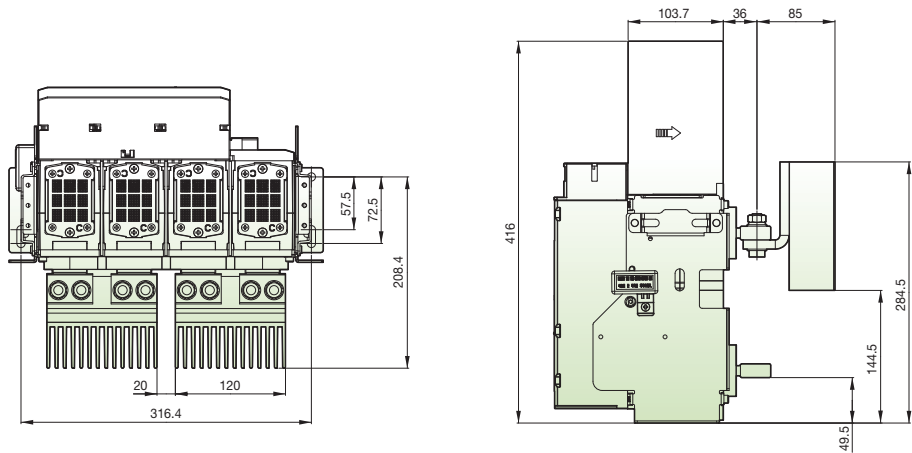
X Type (Cable lug type)

Dimensions (With short busbar)

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

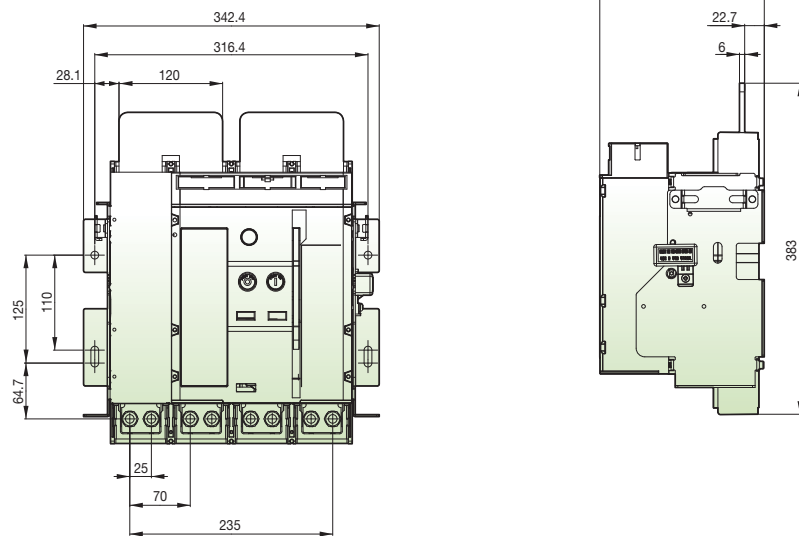


• 4P Horizontal type(H), Vertical type(V) *Fixed type(Up to 1600A)
 (Unit : mm)

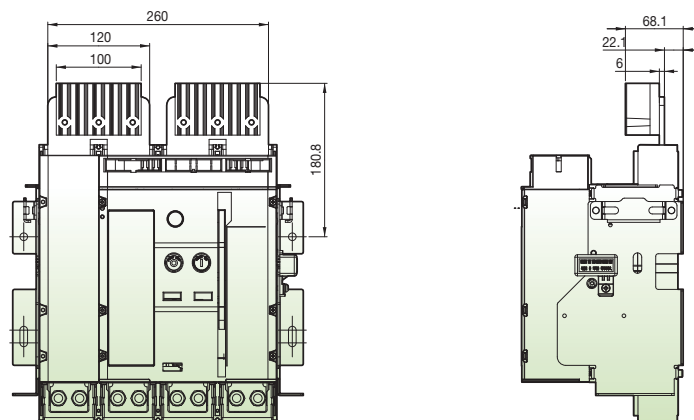


• 4P Plane type(P) *Fixed type(Up to 1000A)

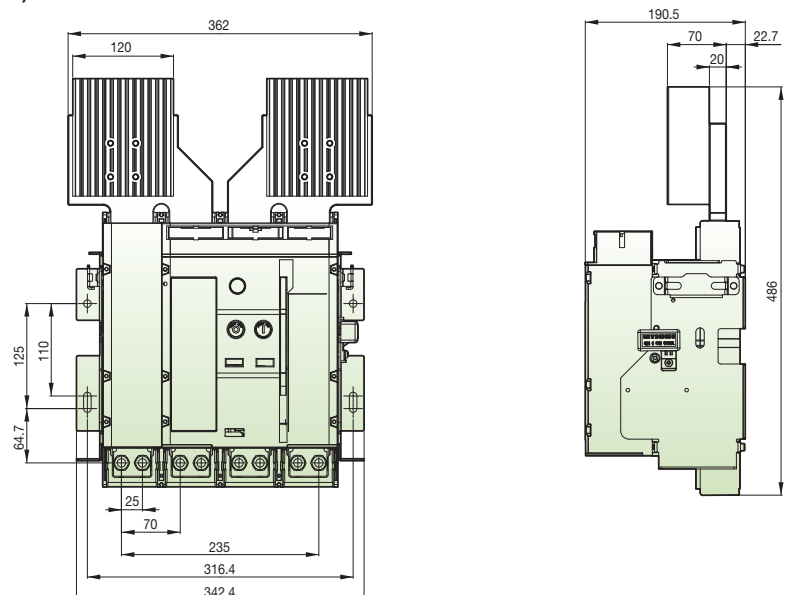
(Unit : mm)



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



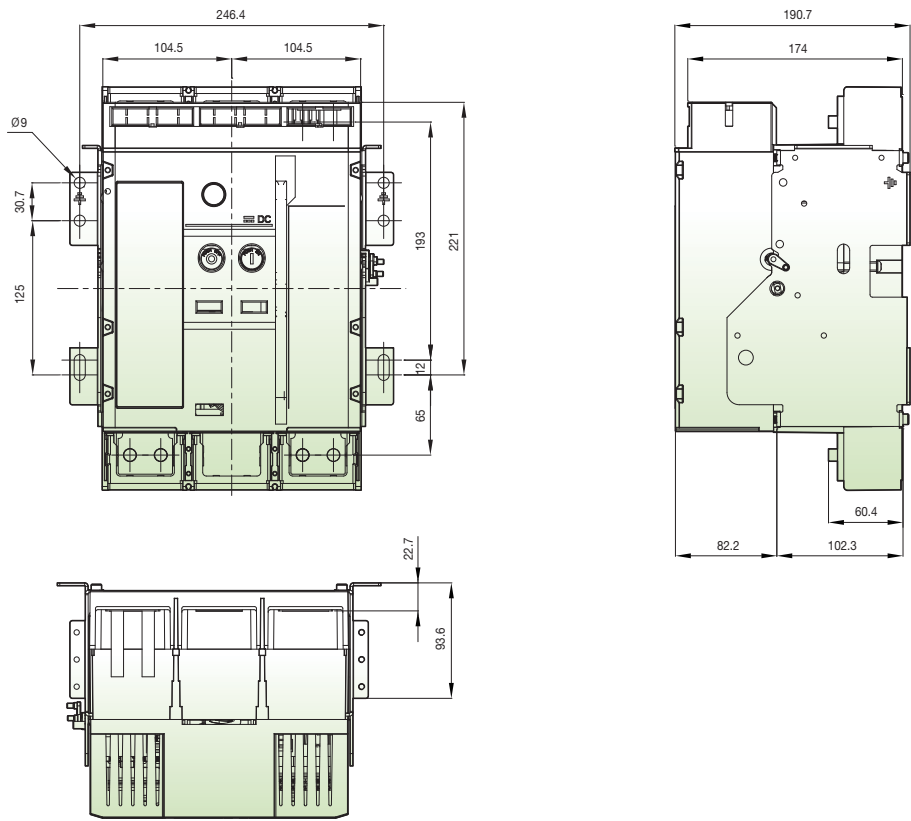
• 4P Plane type(P) *Fixed type(Up to 1600A)



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. ($H_2S \leq 0.01\text{ppm}$, $SO_2 \leq 0.01\text{ppm}$, $NH_3 \leq \text{a few ppm}$)
- 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													
Connection type	Horizontal or Flat							Vertical						
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													
Connection type	Horizontal or Flat							Vertical						
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

Altitude and Isolation Voltage

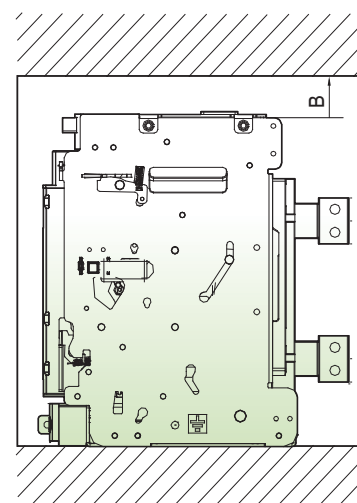
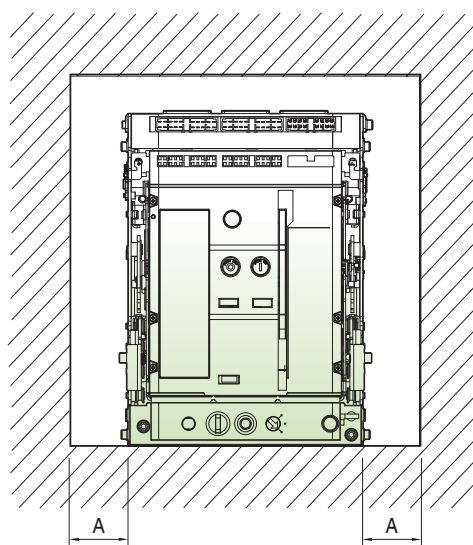
Altitude

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	$1 \times I_n$	$0.98 \times I_n$	$0.96 \times I_n$	$0.94 \times I_n$

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.

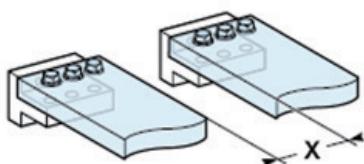


(Unit : mm)

Type	A	B
Fixed	50	150
Fixed (With Arc screen)	5	50
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

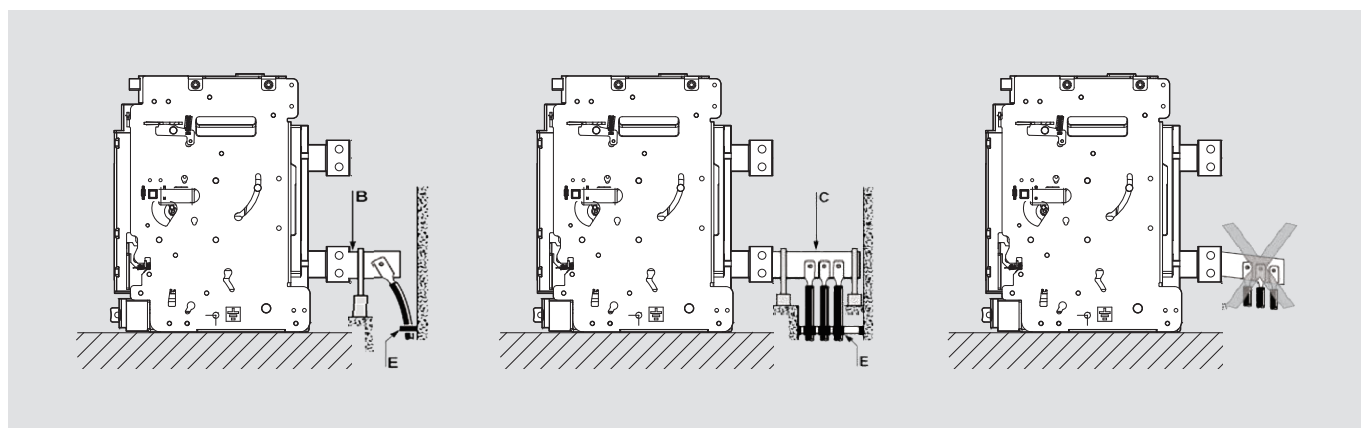
Installation recommendation

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

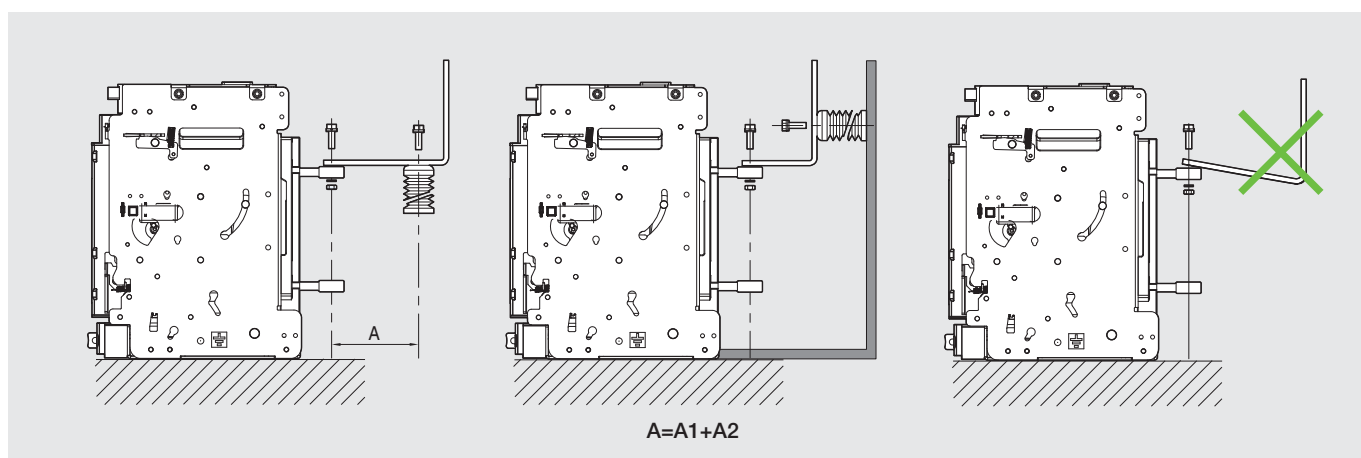


Bus-bar connection

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.

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											
		☐ DDH					☐ DDV						
	Frame size	C (800~1600AF)					C (800~1600AF)						
	Ratings	AF					AF						
	No. of poles (Rated operating voltage)	☐ 3-pole (DC 750V)		☐ 4-pole (DC 1200V)			☐ 3-pole (DC 1000V)		☐ 4-pole (DC 1500V)				
	Installation type	☐ Draw-out type ☐ Fixed type											
	Closing type	☐ Manual closing											
		☐ Electrical closing											
		☐ Charge method					☐ Standard type (OFF-Charging method) ☐ Rapid auto-reclosing type (ON-Charging method)						
	Control power	• Closing coil	☐ AC/DC 100~130V	☐ AC/DC 200~250V	☐ DC 125V	☐ DC 24~30V	☐ DC 48~60V	☐ DC 380~480V	☐ DC 48V				
• Tripping coil		☐ AC/DC 100~130V	☐ AC/DC 200~250V	☐ DC 125V	☐ DC 24~30V	☐ DC 48~60V	☐ DC 380~480V	☐ DC 48V					
• Motor charging		☐ AC/DC 100~130V	☐ AC/DC 200~250V	☐ DC 125V	☐ DC 24~30V	☐ DC 48~60V	☐ DC 380~480V	☐ DC 48V					
Cradle	Cradle type	☐ No Safety Shutter (E class)					☐ Safety Shutter Attachment (F class)						
	Installation type	☐ Manual connection					☐ Automatic connection						
Bus-bar connection	Bus-bar type	☐ Horizontal	☐ Vertical	☐ Flat	☐ Upper: Horizontal, Lower: Vertical		☐ Upper: Vertical, Lower: Horizontal		☐ Customer mounting				
		☐ Horizontal with Spreaders		☐ Flat with Spreaders			☐ Vertical with Extension		☐ Cable-Lug				
Accessory	Main body	Standard Accessory	• Aux. contact	☐ Standard type (4c, standard installation)									
			• Key Lock				☐ Single Key (ON-Lock)						
			• Undervoltage trip device (UVT, Instantaneous type)			☐ AC/DC 100V~130V		☐ DC 125V	☐ AC/DC 200V~250V				
						☐ DC 24V~30V	☐ DC 48V~60V		☐ AC 380V~480V		☐ AC 48V		
			• Counter				☐ Non-attachment type		☐ Attachment type				
			• Miss insertion preventive device (MIP)				☐ Non-attachment type		☐ Attachment type				
			• Double trip device (Same with Tripping voltage)				☐ Non-attachment type						
			• Ready-to-close contact				☐ Non-attachment type		☐ Attachment type				
			☐ Key Interlock (K2, ON-Lock)				☐ ON/OFF Button Lock						
			• Micro Load type (4 max.)				☐ Non-attachment type		qty.				
		Cradle mounting	• Cell switch (CL)		☐ 4c	☐ 8c							
			☐ Door Interlock with Wire type				☐ Door Interlock with catch type						
			• Mechanical operation contact (MOC)				☐ Standard type (10a10b)						
			• Mechanical Interlock (MI)				☐ Wire type (2 terminals)		☐ Wire type (3 terminals)				
			• Miss insertion preventive device (MIP)				☐ Non-attachment type		☐ Attachment type				
			☐ Racking Interlock		☐ Insulation barrier								
		External mounting	• UVT time delay controller			☐ AC/DC 100V~130V		☐ DC 125V	☐ AC/DC 200V~250V				
						☐ DC 48V~60V		☐ AC 380V~480V		☐ AC 48V			
			☐ Door Frame (DF)	☐ Dust Cover	☐ Condenser trip device (CTD)		☐ 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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