Susol Super Solution

DC 1500V

Compact Switch-disconnectors 1600A

LSIS

DC 1500V
Compact Switch-disconnectors 1600A

Contents

Change low voltage switchgears!

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

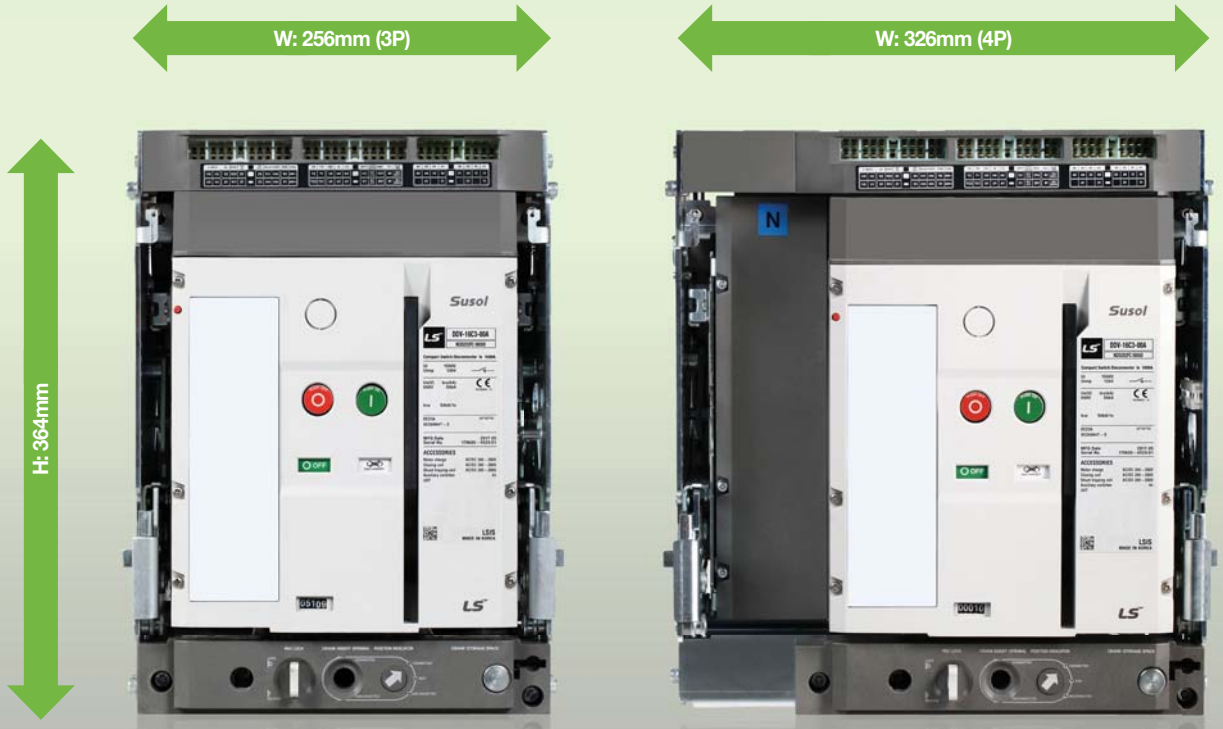
Susol *Super Solution*

DC Compact Switch-disconnectors 1600A

- DDH: Max. 1200Vdc, 1600A, Icw 50kA/1sec
- DDV: Max. 1500Vdc, 1600A, Icw 50kA/1sec

LSIS

DC 1500V
Compact Switch-disconnectors 1600A



Susol

Category type

DC22A

DC23A

DDH type
DDH-08: 800AF
DDH-10: 1000AF
DDH-13: 1250AF
DDH-16: 1600AF

Icw = 50 kA/1s

DDV type
DDV-08: 800AF
DDV-10: 1000AF
DDV-13: 1250AF
DDV-16: 1600AF

Icw = 50 kA/1s

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 (DEKRA CB certification), GB 14048.3 (CCC certification)

Connection

Various installation methods

Rear Connection

Vertical type, V

Horizontal type, H

Spreader type, R

Mixed type, M

Mixed type, N

Plain 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 stallation.
- The connection can be modified between vertical type and horizontal type by rotating the terminals through 90 degrees.

Compact size

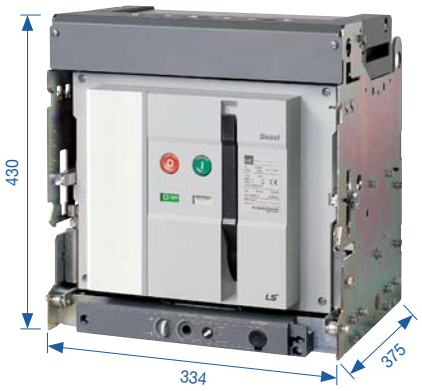
55%

Thanks to the reduced size by 55% it is easy to handle the breaker as well as reducing the space and raw materials in the switchgear fabrication.

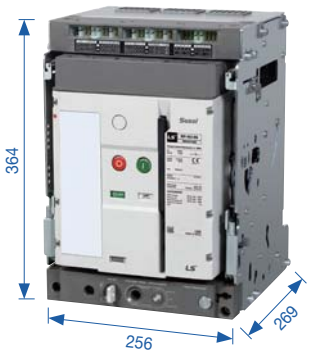
Compact Type

Unit (mm)

DC Switch-disconnector



DC Compact Switch-disconnector



3-high

4-high

Circuit breaker ratings

Fixed type

Drawable type

Commonness				Characteristics							
Rated operational voltage (Ue)	(V)			DC 750V (3P) , DC 1200V (4P)				DC 1000V (3P) , DC 1500V (4P)			
Rated insulation voltage (Ui)	(V)			1500							
Rated impulse withstand voltage (Uimp)	(kV)			12							
Number of poles	(P)			3, 4							
Installation type				Fixed / Draw-out							
Related standards				IEC 60947-3 (DEKRA CB certification), GB 14048.3 (CCC certification)							
Type				DDH				DDV			
				DDH-08C	DDH-10C	DDH-13C	DDH-16C	DDV-08C	DDV-10C	DDV-13C	DDV-16C
Ampere frame	(AF)			800AF	1000AF	1250AF	1600AF	800AF	1000AF	1250AF	1600AF
Utilization category (According to IEC 60947-3)				DC-22A				DC-23A			
Rated making capacity (Icm)	(kA peak)		DC	50							
Rated short-time withstand current (Icw)	(kA/1s)		DC	50							
Operation time	(ms)	Openning time		max. 40							
		Closing time		max. 80							
Horizontal type		Horizontal type		○							
		Vertical type		● (Default)							
Mechanical and electrical life cycle											
Endurance (times) (Without maintenance)		Mechanical		12,500							
		Electrical		Current	L/R			Current	L/R		
					2ms	7.5ms			2ms	7.5ms	
				~ 800A	2,000	-		~ 800A	4,000	2,000	
				~ 1600A	500	-		~ 1600A	1,000	500	
Demension and weight											
Weight (3P/4P)	(kg)	Draw-out	Without cradle	15.5/19				15.5/19			
			With cradle	22/26				22/26			
		Fixed		15.5/19				15.5/19			
External dimensions (W×H×D)	(mm)	Draw-out		361.3X267X255.4(3P), 361.3X267X326(4P)							
		Fixed		283X219.5X272.4(3P), 283X219.5X342.4(4P)							

Accessories

Breaker main

Miss Insertion Preventing Device (MIP)

Auxiliary Switch (FX)

Ready to Close switch (RCS)

Shunt Coil (SHT)

Closing Coil (CC)

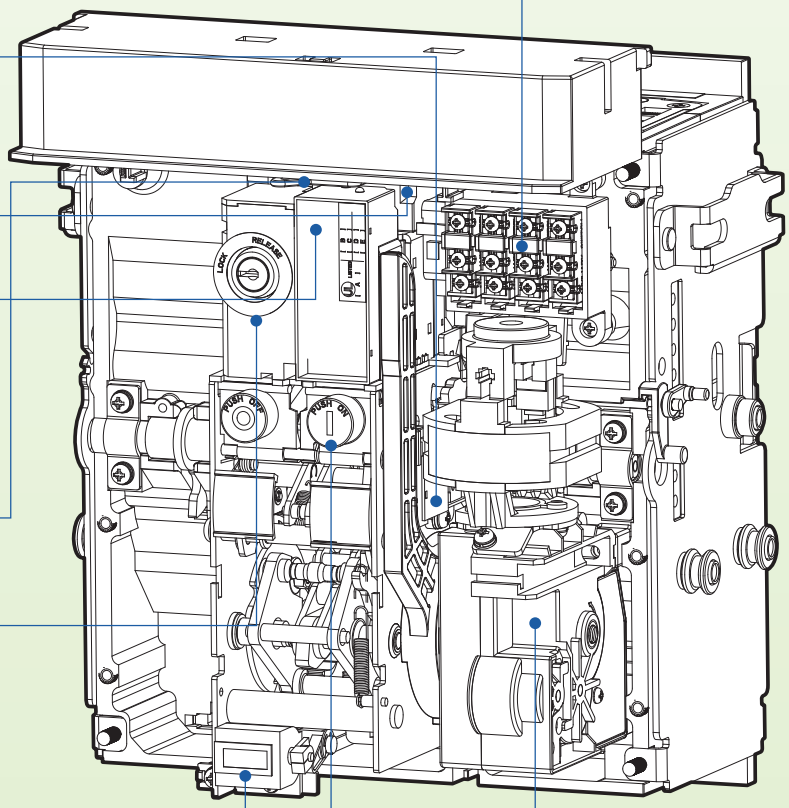
Under Voltage Trip Device (UVT)

Key Lock (K1)

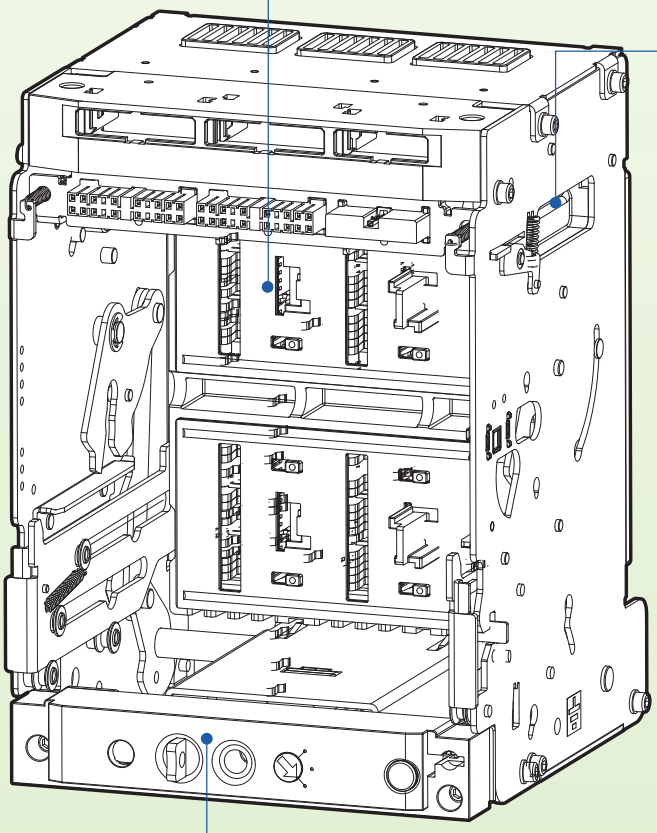
Counter (C)

ON/OFF Button Padlock (B)

Motor (M)



Cradle



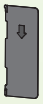
Miss Insertion Preventing Device (MIP)

Condensor Trip Device (CTD)

Safety Shutter (ST)

Lifting Hook (LH)

Insulation 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

Breaker main (Draw-out)

Rated name plate

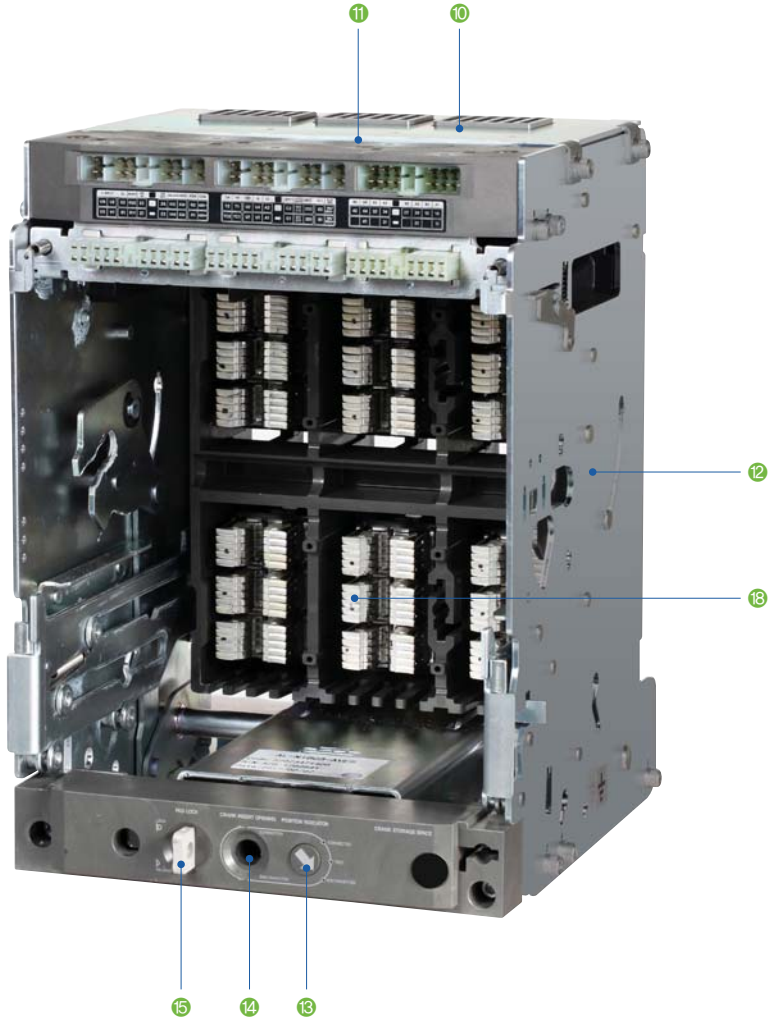
- Ui: Rated insulation voltage
- Uimp: Impulse withstand voltage
- Ue: Rated operational voltage
- Icw: Short time withstand capacity
- MFG. Date: Manufacturing date
- Icm: Rated making capacity

- Motor charge
- Closing coil
- 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. Rated 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 J

Switch-disconnectors	
DDH	1200Vdc
DDV	1500Vdc

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

Frame size	
C	800~1600AF

Poles	
3	3P(DDH:750V)
	3P(DDV:1000V)
4	4P(DDH:750V)
	4P(DDV:1000V)

CT ratio	
00	None

Installation & Connection	
withdrawable type	
A	Auto connection type for bottom operating cradle
J	Manual connection type for bottom operating cradle
Fixed type	
H	Horizontal type
V	Vertical type
M	Upper-Horizontal/ Lower-Vertical type
N	Upper-Vertical/ Lower-Horizontal type
P	Plane type
Z	Plane spread type
R	Spread type
T	Plane vertical type
X	Cable lug type

DC Switch-Disconnectors accessories

M1 D1 D1 FX 000 U1 C

Motor rated voltage	
MA	Without Motor
M1	AC/DC 100V~130V
M2	AC/DC 200V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M6	AC 380V~415V
M7	AC 440V~480V
M8	AC 48V

Closing coil rated voltage	
D0	Without Closing coil
D1	AC/DC 100V~130V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D6	AC 380V~480V
D7	AC 48V

Shunt coil rated voltage	
D0	Without Shunt coil
D1	AC/DC 100V~130V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D6	AC 380V~480V
D7	AC 48V

Aux.contact & charging types	
FX	Standard OFF-Charge 4C
FC	Standard ON-Charge 4C
SC	Standard ON-Charge 3C TCS

* TCS (Trip Circuit Supervision)

Trip relay
No trip relay

UVT coil rated voltage	
U0	Without UVT coil
U1	AC/DC 100V~130V
U2	AC/DC 200V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 380V~480V
U7	AC 48V

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

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

AL – **H16C** **4** – **J** **H** **E** **S**

DC compact Switch-Disconnector	
AL	Bottom operating cradle

Ampere frame	
H16C	800~1600AF

No. of pole	
3	3P
4	4P

Secondary connection type	
A	Auto connection type

Installation & Connection	
H	Horizontal type
V	Vertical type
M	Upper-Horizontal / Lower-Vertical type
N	Upper-Vertical / Lower-Horizontal type
P	Plane type
Z	Plane spread type
R	Spread type
T	Plane vertical type
X	Cable lug type

Shtter	
E	without shutter
F	with shutter

Arc cover	
S	with arc cover

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	-	○	*	46
	SHT 2	Double Shunt Coil	-	○	*	47
	CC	Closing Coil	-	○	*	48
	M	Motor	-	○	*	49
	CS1	Charge Switch	-	○	*	
	UVT	Under Voltage Trip Device	-	○	*	50
	RCS	Ready to Close Switch	-	○	*	54
	C	Counter	-	○	*	54
	FX	Auxiliary Switch	●	-	*	56
External	K1	Key Lock	-	○	*	55
	K2	Key Interlock Set	-	○	*	55
	B	On/Off Button Lock	-	○	*	56
	LH	Lifting Hook	-	○	-	57
	CTD	Condenser Trip Device	-	○	-	57
	DC	Dust Cover	-	○	-	59
	A	Automatic Connector	●	-	*	

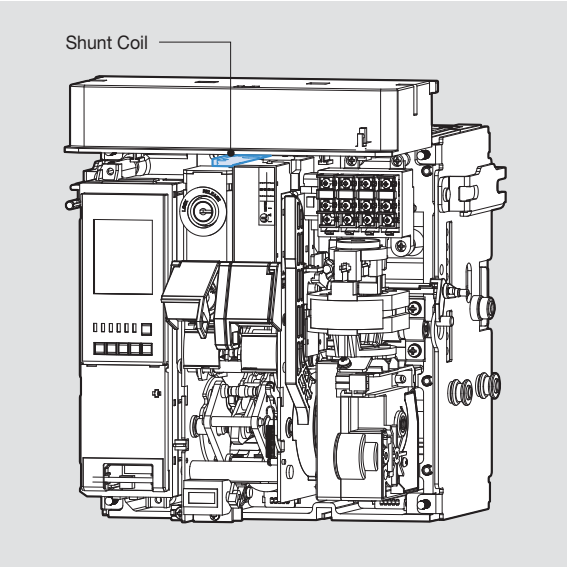
* Seperate purchasing is not allowed. Each item should be purchased with the main body.

Cradle

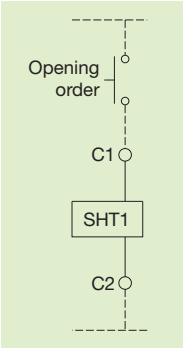
Mounting	Accessories		Supply category		Remark Note)	Page
			Standard	Option		
Cradle	MI	Mechanical Interlock	-	○		61
	ST	Safety Shutter	-	○	*	62
	DF	Door Frame	-	○		62
	MIP	Miss Insertion Prevent Device	-	○		67
	MOC	Mechanical Operated Cell Switch	-	○		60
	CEL	Cell Switch	-	○		64
	DI	Door Interlock	-	○		65
	ZAS	Zero Arc Space (Arc Cover)	●	-	*	65
	SC	Safety Control Cover	●	-	*	
	RI	Racking Interlock	-	○		66
	PL	Pad Lock/Position Lock	●	-	*	66
	IB	Interphase Barrier	●	-	-	63
	UDC	UVT time delay controller	-	○		68
	ADP	Compatible Adapter	-	○	-	
Other	RPH	Reverse Phase ACB	-	○	-	
	VAD	Various Connection Type	-	○	-	
	RCO	Remote I/O	-	○	-	69

* Seperate 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).

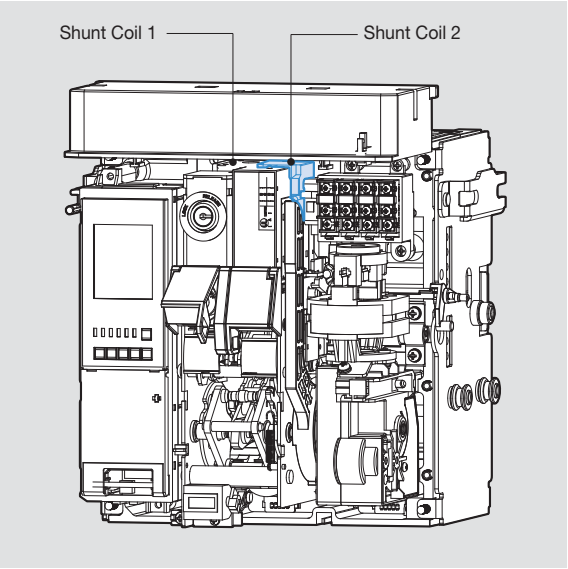
2. Specification of the wire

- 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.

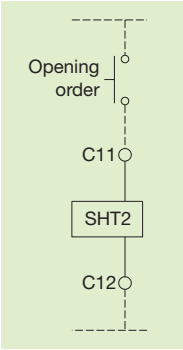
The maximum wire length

		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm²)	#16 AWG (1.31mm²)	#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
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).

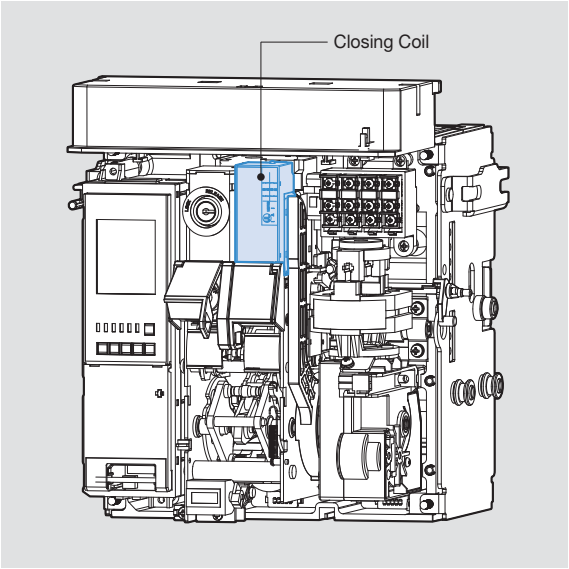
2. Specification of the wire

- 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.

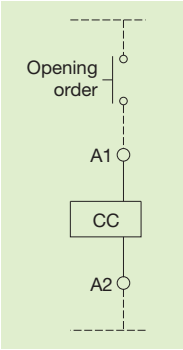
The maximum wire length

		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm²)	#16 AWG (1.31mm²)	#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

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).

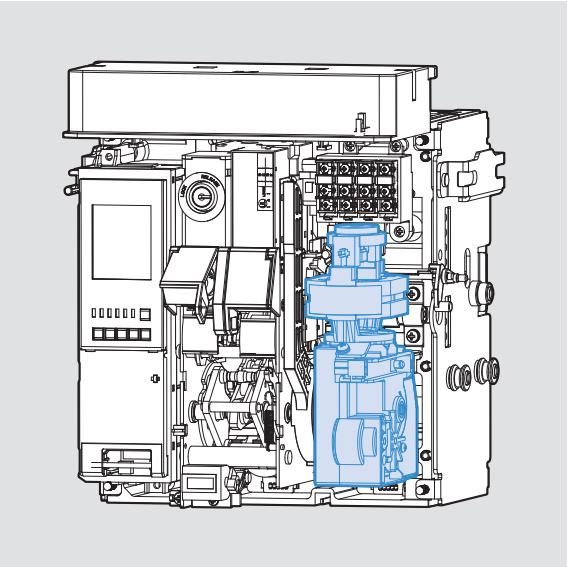
2. Specification of the wire

- 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 (2.08mm²)	#16 AWG (1.31mm²)	#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

Motor [M]



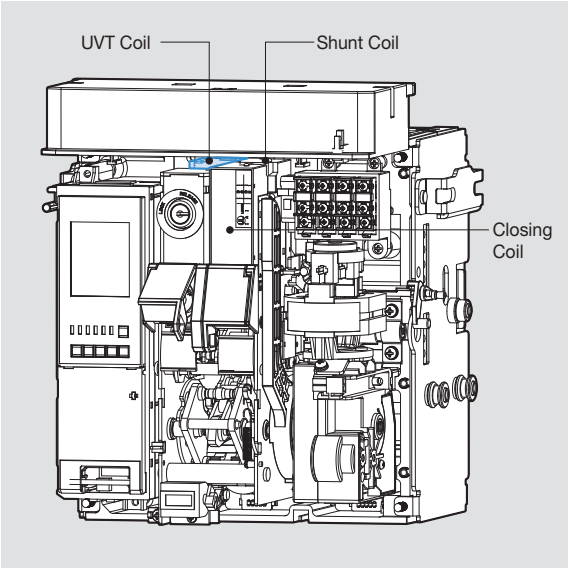
- Charge the closing spring of a circuit breaker by the external power source. Without the external power source, charge manually.
- Operating voltage range (IEC 60947) 85%~110%Vn

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.

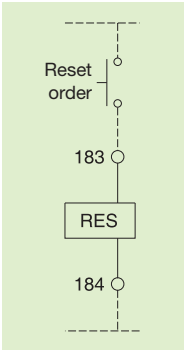
The maximum wire length

		Rated voltage (Vn)			
		DC 24~30V		DC/AC 48V	
Wire type		#14 AWG (2.08mm²)	#16 AWG (1.31mm²)	#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
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.

Remote Reset Switch [RES]

- Following tripping, this function resets the "fault trip" alarm contacts (AL) and the mechanical indicator (MRB) and enables circuit breaker closing.
  Push button switch: AC 125V 10A, AC 250V 6A, DC 110V 2.2A, DC 220V 1.1A Resistive load
- In case of auto reset type circuit breaker
  Following tripping, a reset of Manual Reset Button (MRB) or Remote Reset Switch (RES) is no longer required to enable circuit breaker closing.
  The mechanical indicator (MRB) and electrical indicator (AL) remain in fault position until the reset button is pressed.
- AL2 and RES are alternative.

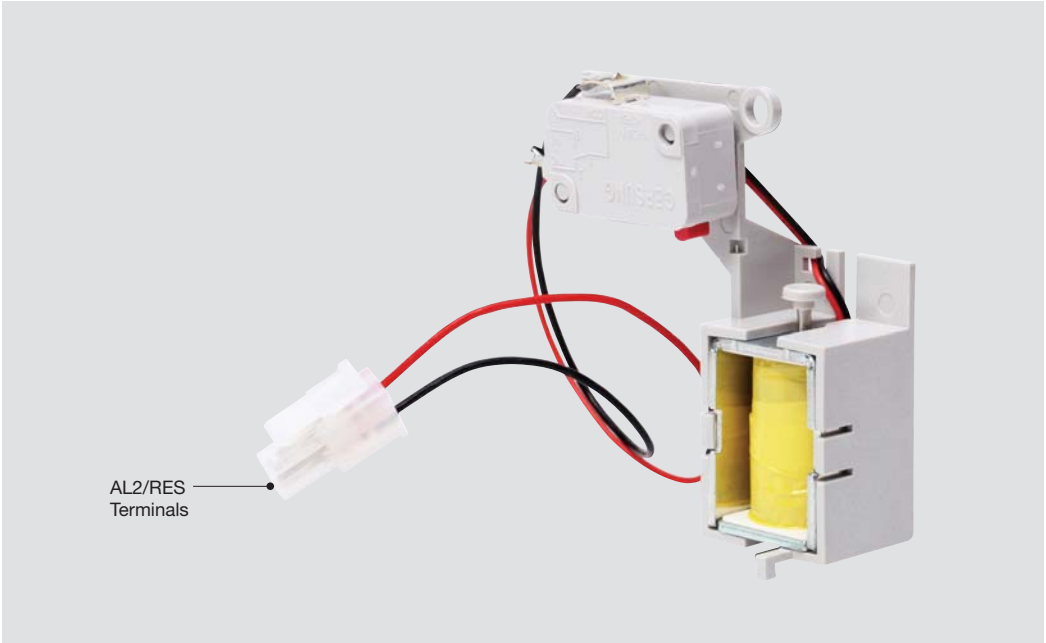


Wiring Diagram

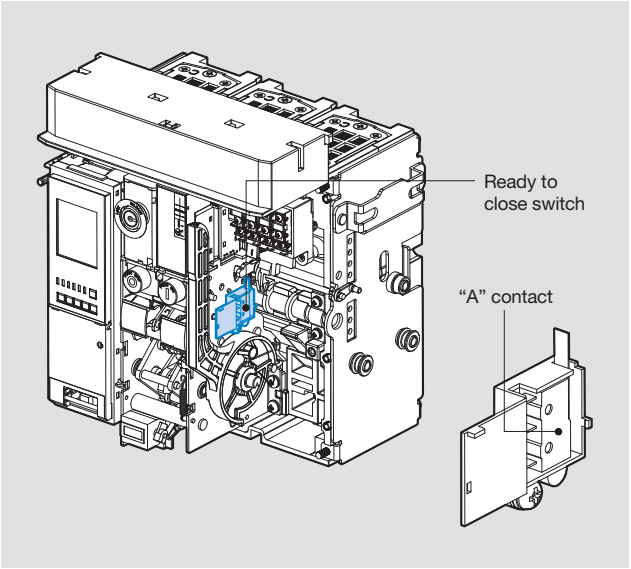
1. Rated voltage and rated current of RES

Rated voltage	Operating current (Max.)	Operating time	Wire spec.
AC 110~130V	3.7A	Less 40ms	#16 AWG (1.31mm²)
DC 110~125V	2.4A		
AC 200~250V	2.2A		

2. Appearance



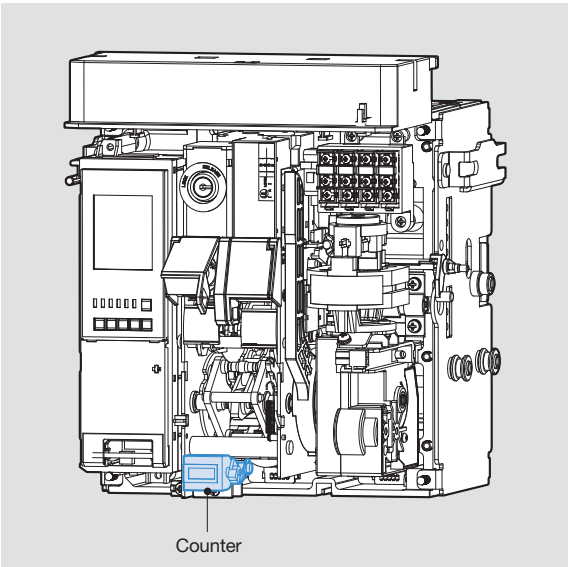
Ready to Close Switch [RCS]



- 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.

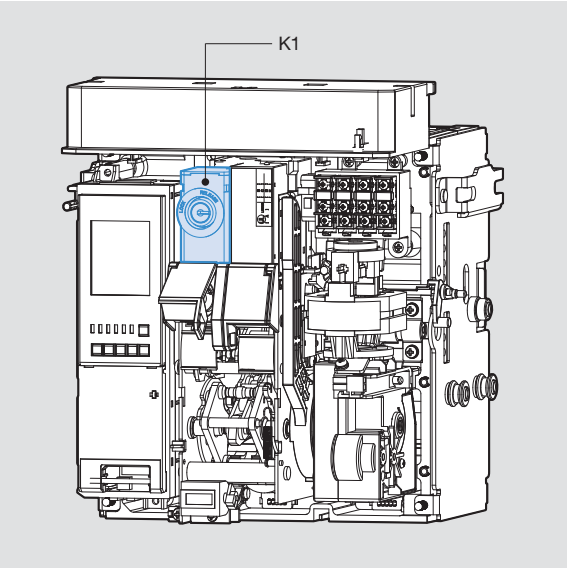
Classification	Standard		Remark
Contactor Capacity	250Vac	3A	
	250Vdc	5A	
	125Vdc	0.6 A	

Counter [C]



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

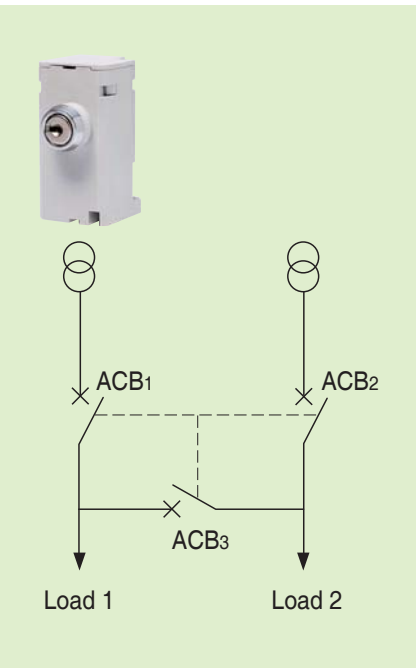
Key Lock [K1]



- 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

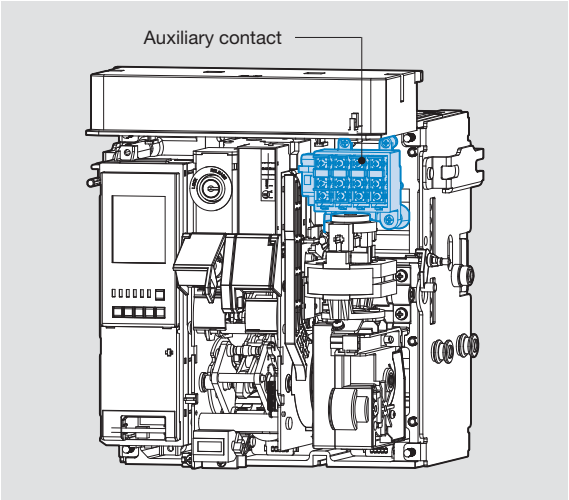


- 3 circuit breakers can be arranged for the continuous power supply to the load side and be interlocked mutually by using Key Lock embedded in each circuit breaker.

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.

Classification

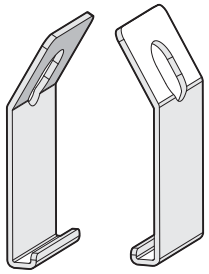
Switch classification	Voltage division	Voltage (V)	Current (A)
			Resistive load
Standard	AC	125	5
	AC	250	3
	DC	125	0.6

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.

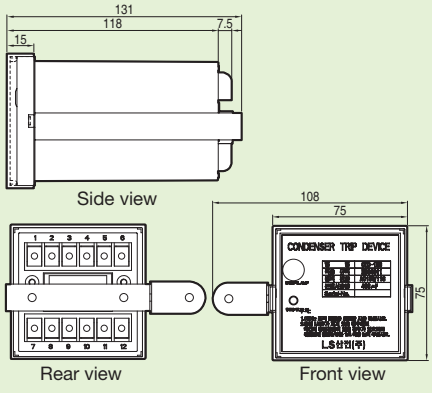
Condenser Trip Device [CTD]

- 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.

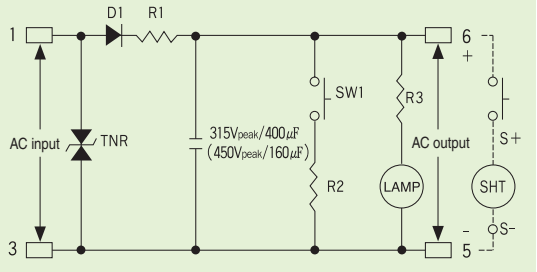
Ratings

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	400㎌	160㎌

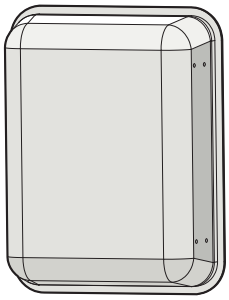
External dimension

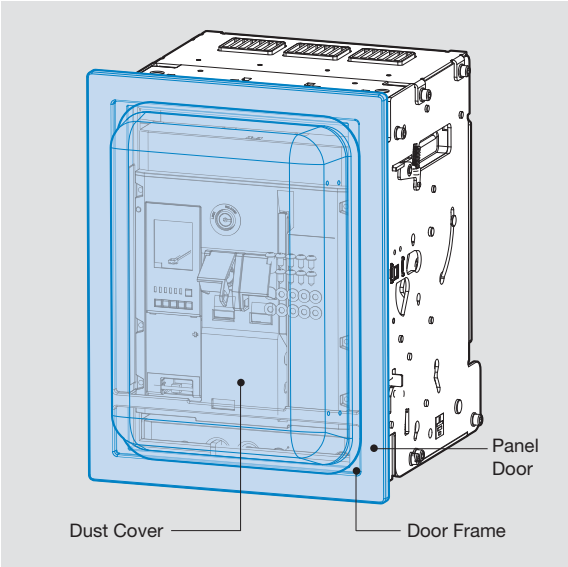


Circuit diagram



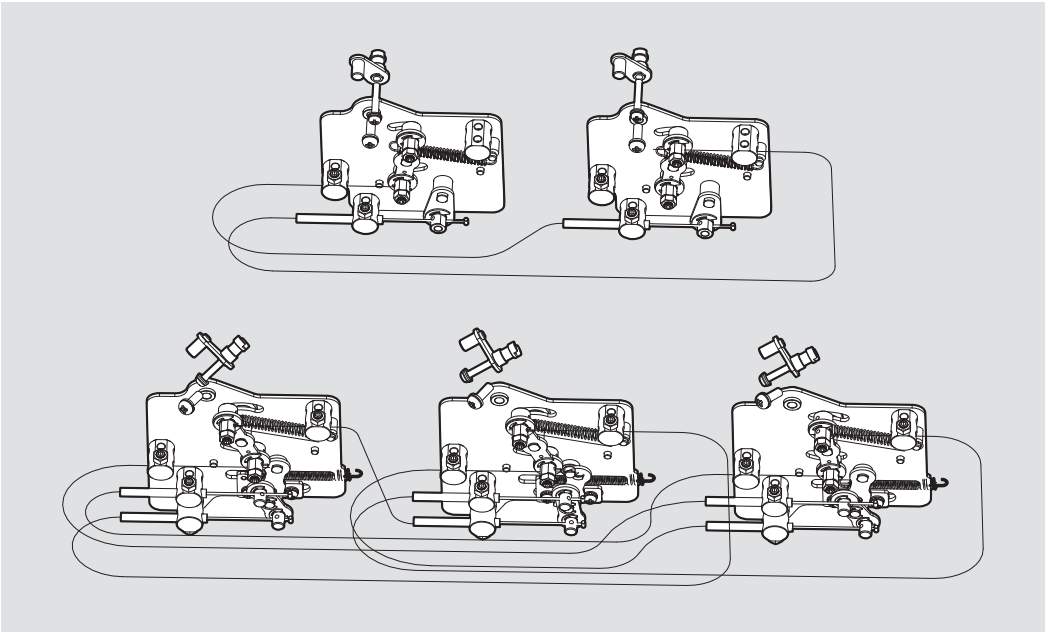
Dust Cover [DC]





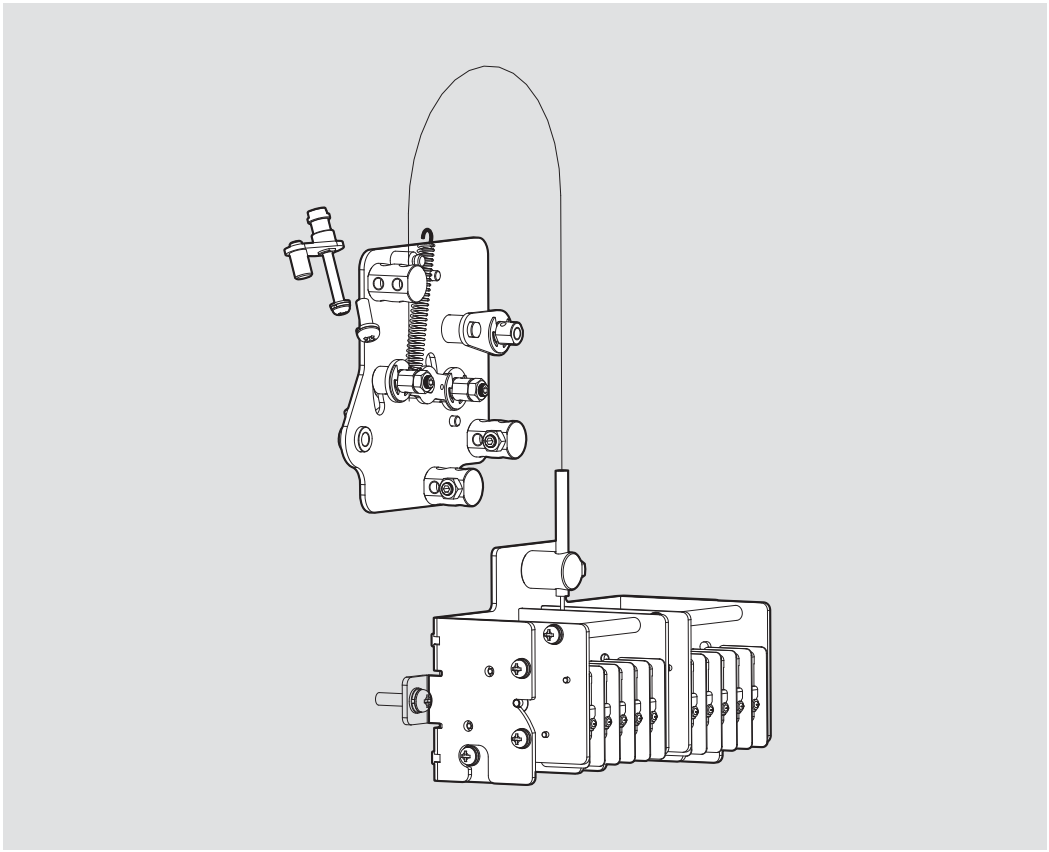
- Attach it to the door frame.
- It protects the product dust and moisture that may affect the operation of the instrument at the same time (IP54) which may cause fault operation and enhances the sealing degree by being mounted to protrude type of panel.
- It is transparent so that the front side of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

Mechanical Interlock [MI]



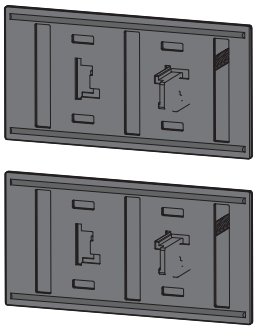
- It is used to interlock closing and trip between two or three breakers mechanically so as to prevent unintended operation at the same time.
- Wire type interlock can be applied upto 3 breakers

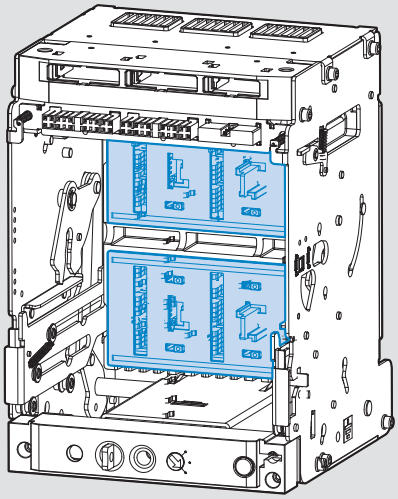
Mechanical Operated Cell Switch [MOC]



- 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]



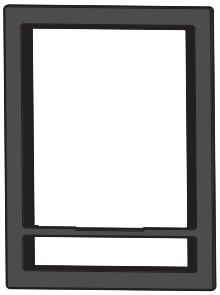


- It is the automatic safety device to protect the connectors of main circuit by cutting off dangerous contact from outside while the breaker is drawn out. When the ACB is drawn in, the shutter is automatically opened.
- Plate Shutter is a total of 2 models

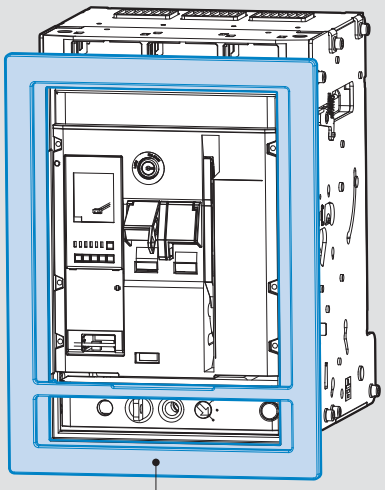
The types of safety shutter plate
3P

4P


Door Frame [DF]

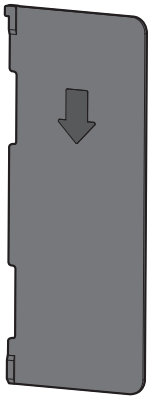


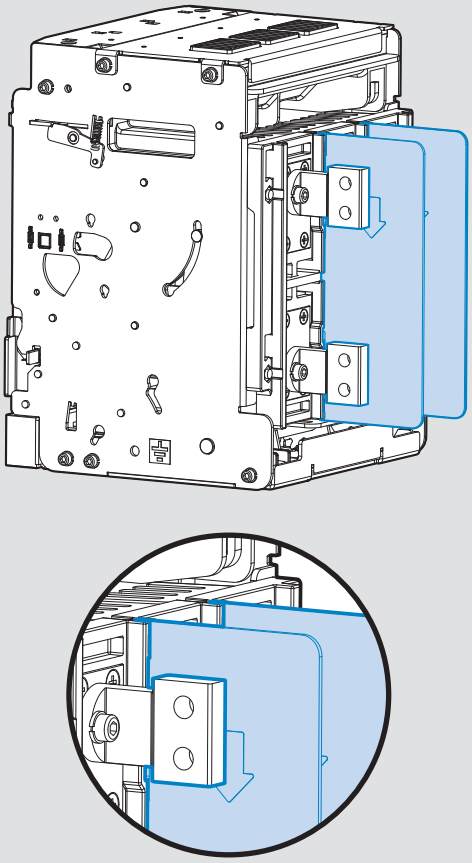
Draw-out type



- 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]

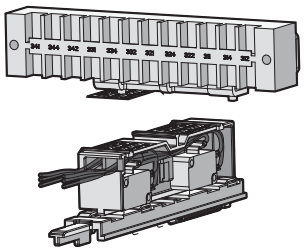


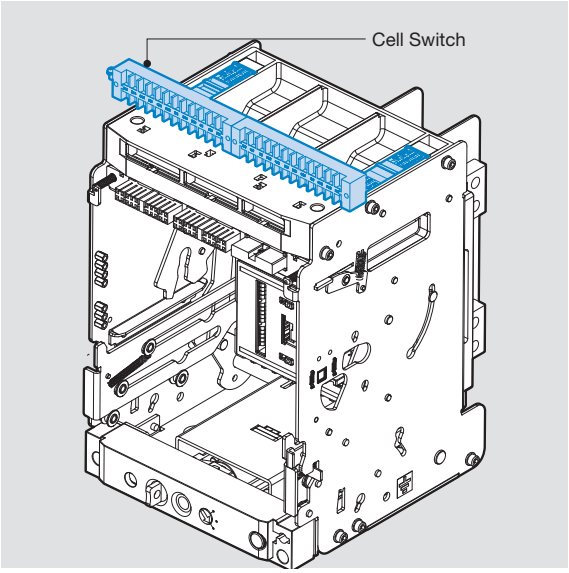


Draw-out type

- 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)

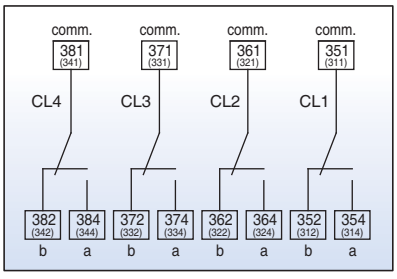
<Contact configuration>
4C: 1Disconnected +1Test +2Connected
8C: 2Disconnected +2Test +4Connected

※ Contact configuration can be changeable if necessary.

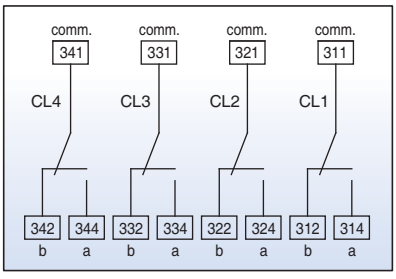
Operating characteristic

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

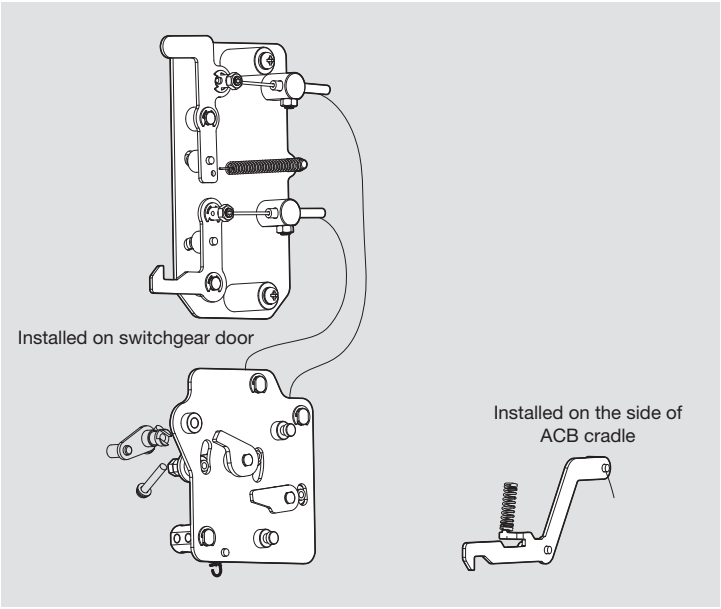


4C attached to the left side of cradle

Door Interlock [DI]

Wite type

Catch type

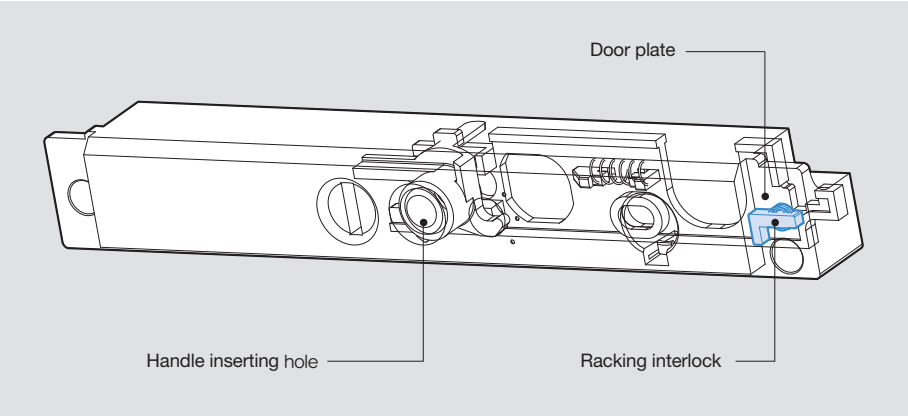


- It is a safety device which does not allow the panel door to open when a circuit breaker is in the “ON” position.

Zero Arc Space [ZAS]

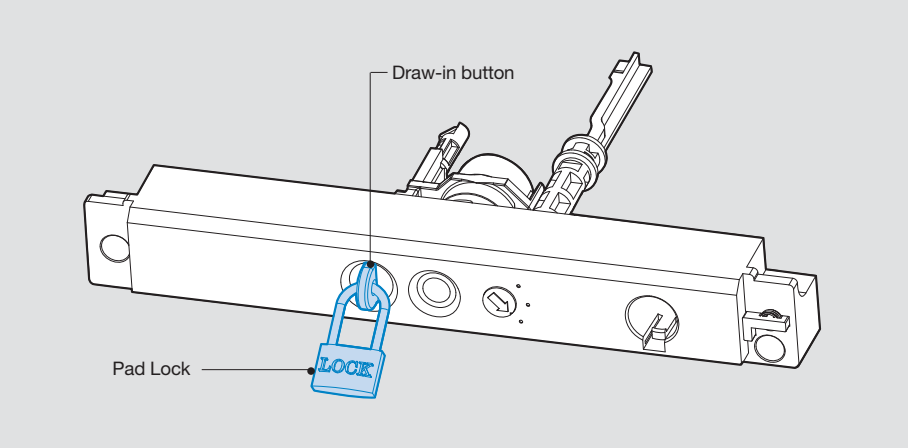
- Arc which may arise while breaking fault current is extinguished first by Arc chute in main body of circuit breaker and then completely extinguished by Arc cover.
  By preventing arc from exposing to the outside, it protects itself from all kinds of accidents.

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.

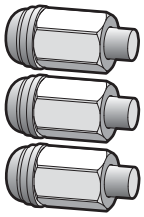
Pad Lock / Position Lock [PL]

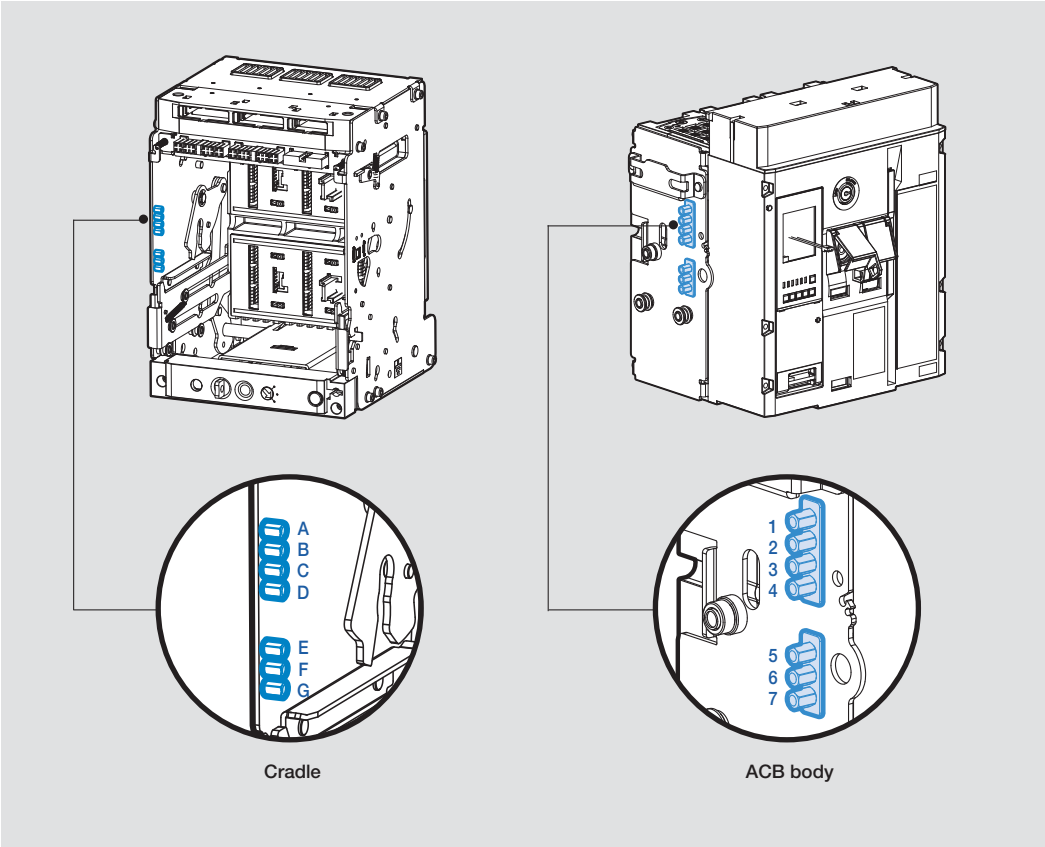


ACB is subject to restriction regarding moving in connected, test, disconnected when drawing in or out. If main body of ACB is placed in 3 positions, it is locked and stopped when drawing in or out.

- 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
AN	400	ABCD	567
	600	ABCE	467
	630	ABCF	457
	800	ABCG	456
	1000	ABDE	367
	1200	ABDF	357
	1250	ABDG	356
	1600	ABEF	347

	Rating	Cradle	ACB
AH	400	ABEG	346
	600	ABFG	345
	630	ACDE	267
	800	ACDF	257
	1000	ACDG	256
	1200	ACEF	247
	1250	ACEG	246
	1600	ACFG	245

	Rating	Cradle	ACB
AR	400	ADEF	237
	600	ADFG	235
	630	AEFG	234
	800	BCDE	167
	1000	BCDF	157

UVT Time Delay Controller [UDC]

Attached to din-rail or switchboard

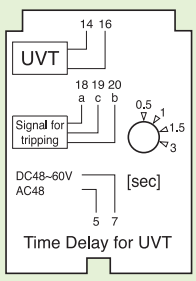
- UVT is a device which makes ACB tripped automatically to prevent the accident on load side due to under voltage or power breakdown. There are two types, Instantaneous type and time delay type.
- Instantaneous type: only available with UVT coil.
- Time delay type: available by connecting UVT coil and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

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

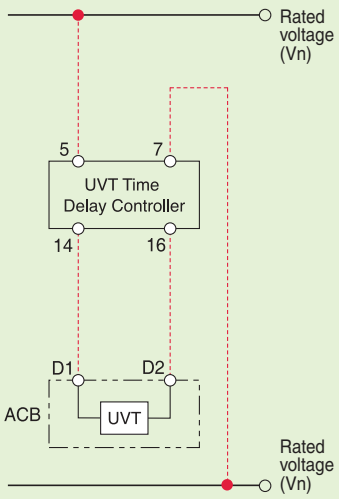
Rated voltage (Vn)		Operating voltage range (V)		Power consumption (VA or W)		Trip time (s)
DC (V)	AC (V)	Pick up	Drop out	Inrush	Steady-state	
48~60	48	0.65~0.85 Vn	0.4~0.6 Vn	200	5	0.5, 1, 1.5, 3
100~130	100~130					
200~250	200~250					
–	380~480					

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

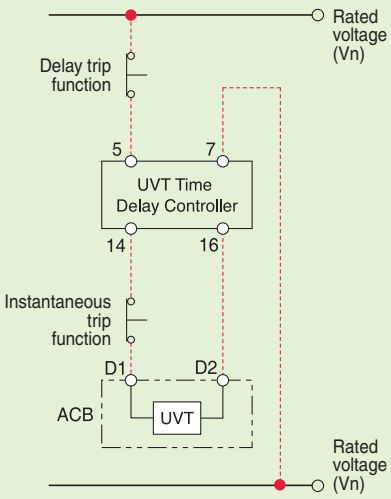
2. Wiring



1. Wiring for general type



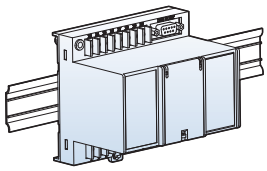
2. Wiring for special type

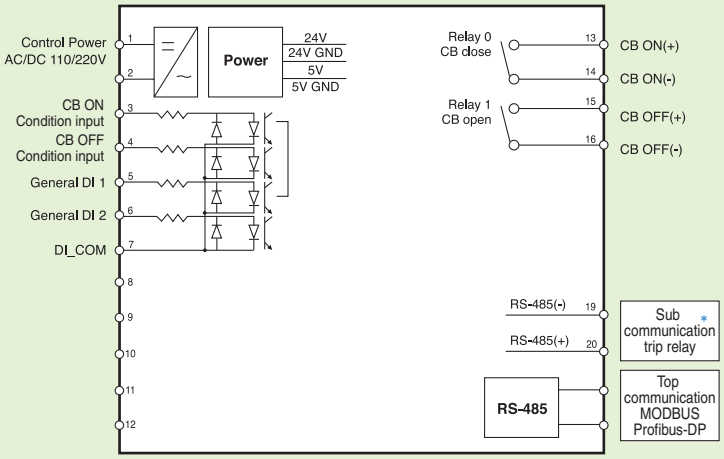


* The wiring presented with red color should be set by uesers.

Remote I/O Unit [RCO]

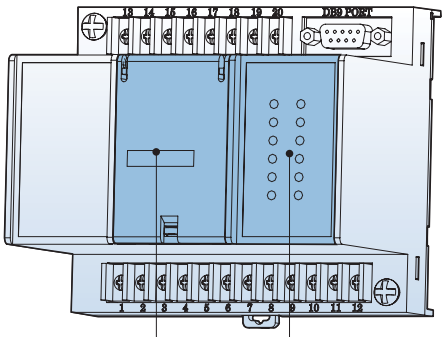
Remote I/O Unit





*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 (cosØ=0.4, L/R=7ms)
	Max. switching capacity	1880VA, 150W	

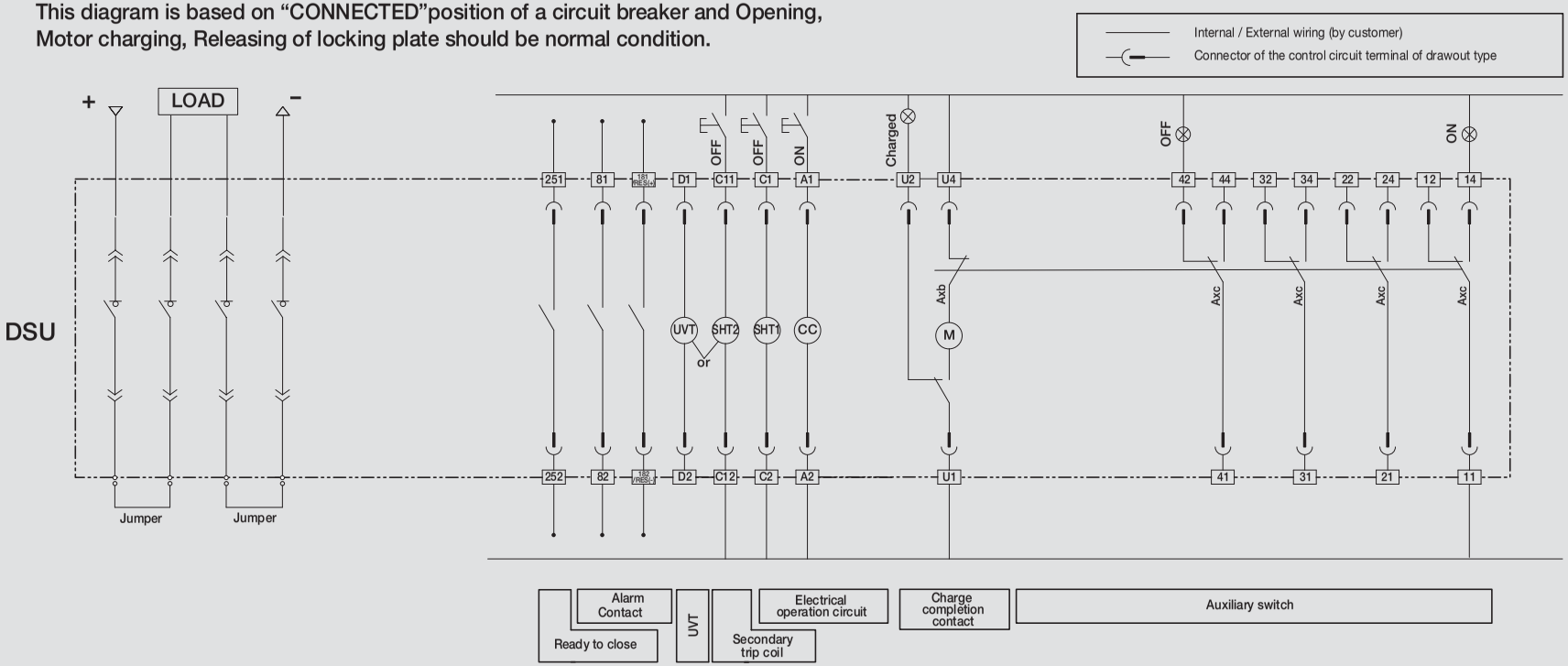


- Baud rate setting
- Comm. address setting
- Temperature setting

- 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

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

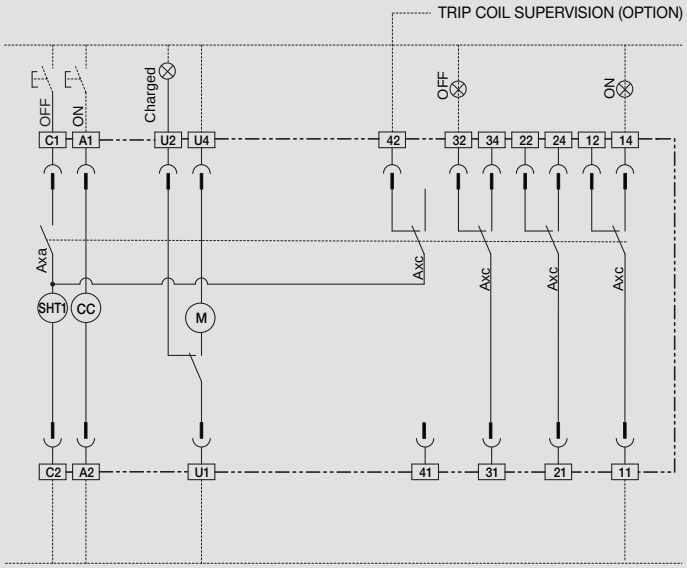
11 12 ~ 41 42	Auxiliary switch "b" contact
11 14 ~ 41 44	Auxiliary switch "a" contact
U1 U2	Charge completion signal
U1 U4	Motor charging
A1 A2	Closing coil
C1 C2	Shunt trip
C11 C12	2nd shunt trip

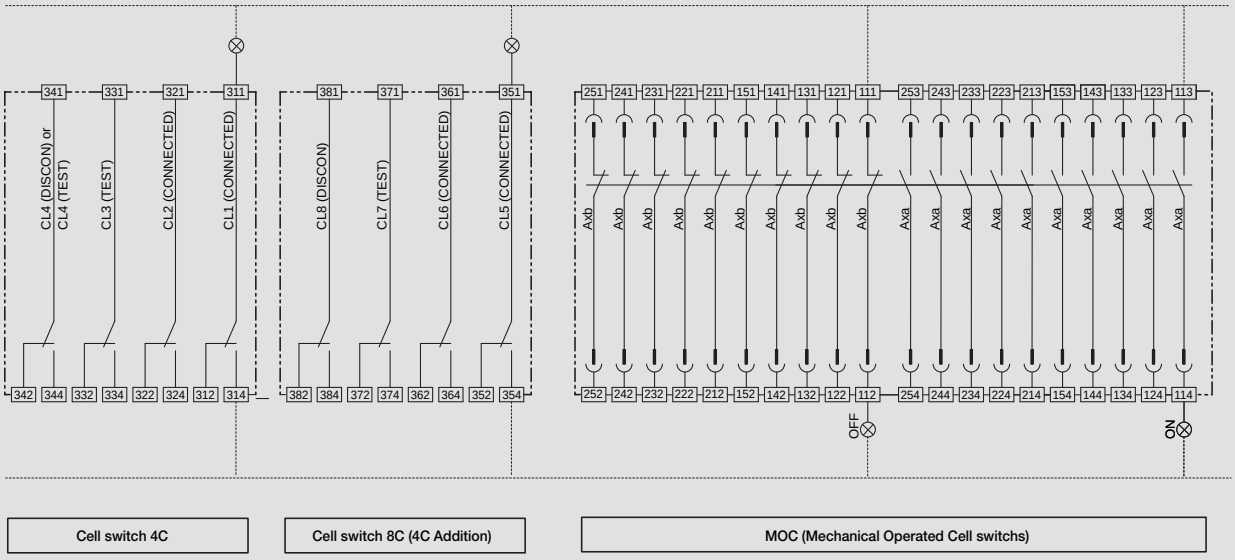
D1 D2	Voltage input terminal of UVT coil
311 ~ 344	Cell switch
251 252	Ready to close switch

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

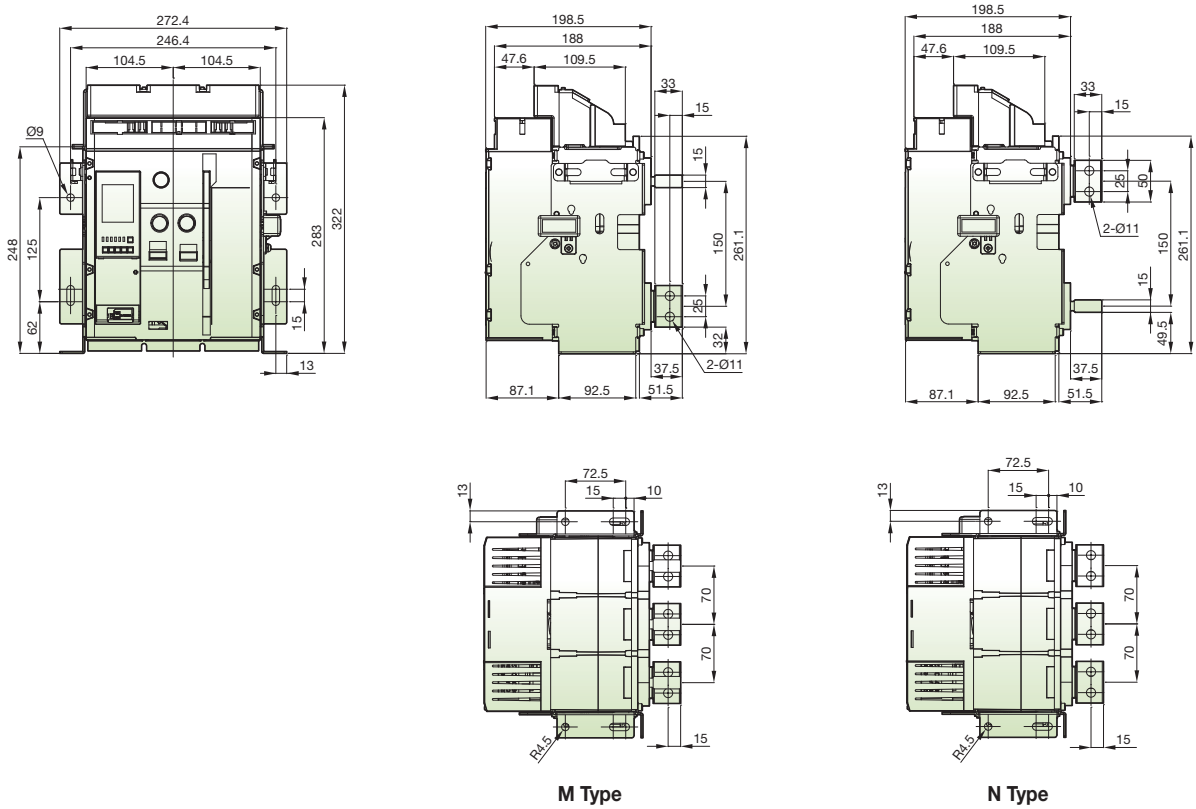
• 3P [Fixed H: Horizontal type / V: Vertical type]

(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]

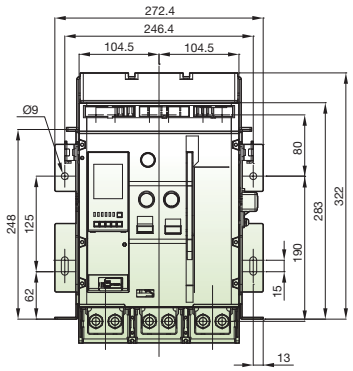


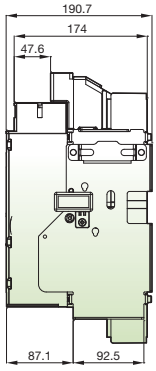
M Type
(Upper-Horizontal type, Lower-Vertical type)

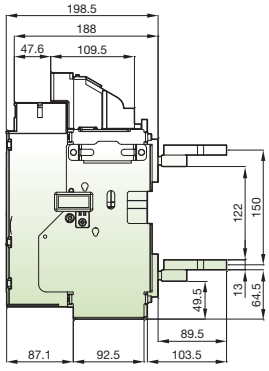
N Type
(Upper-Vertical type, Lower-Horizontal type)

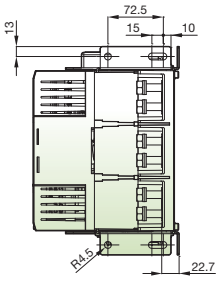
• 3P [Fixed P: Plane type / R: Spread type]

(Unit : mm)

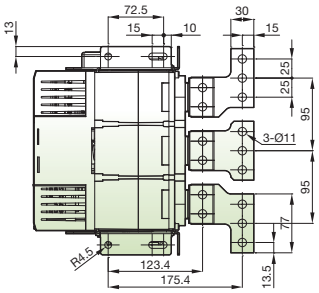






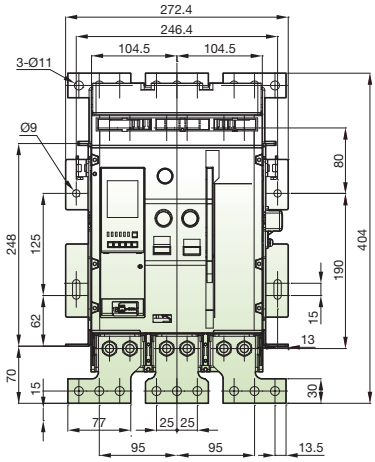


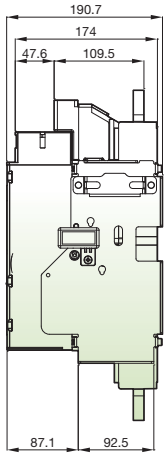
P Type (Plane type)

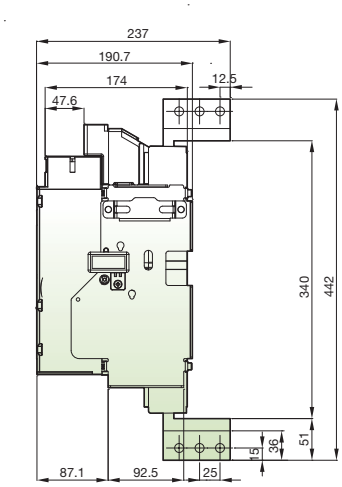


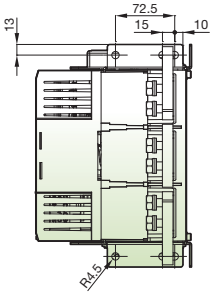
R Type (Spread type)

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

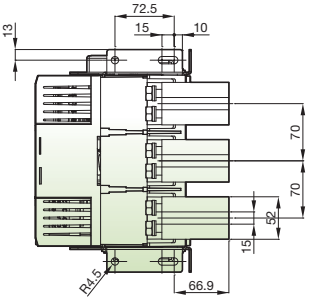








Z Type (Plane spread type)

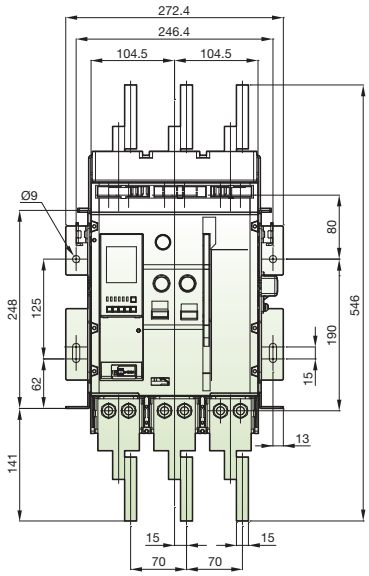


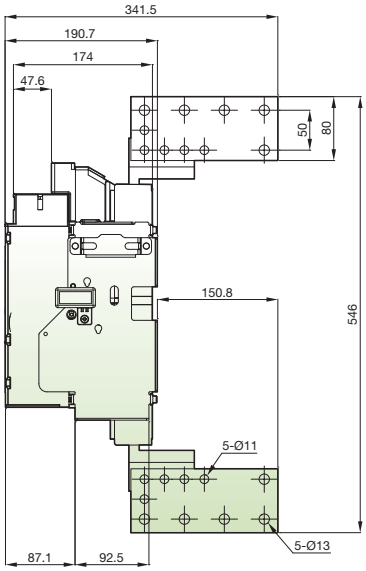
T Type (Plane vertical type)

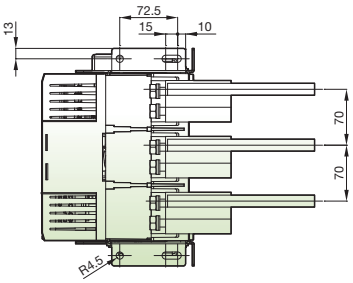
Dimensions

• 3P [Fixed X: Cable lug type]

(Unit : mm)



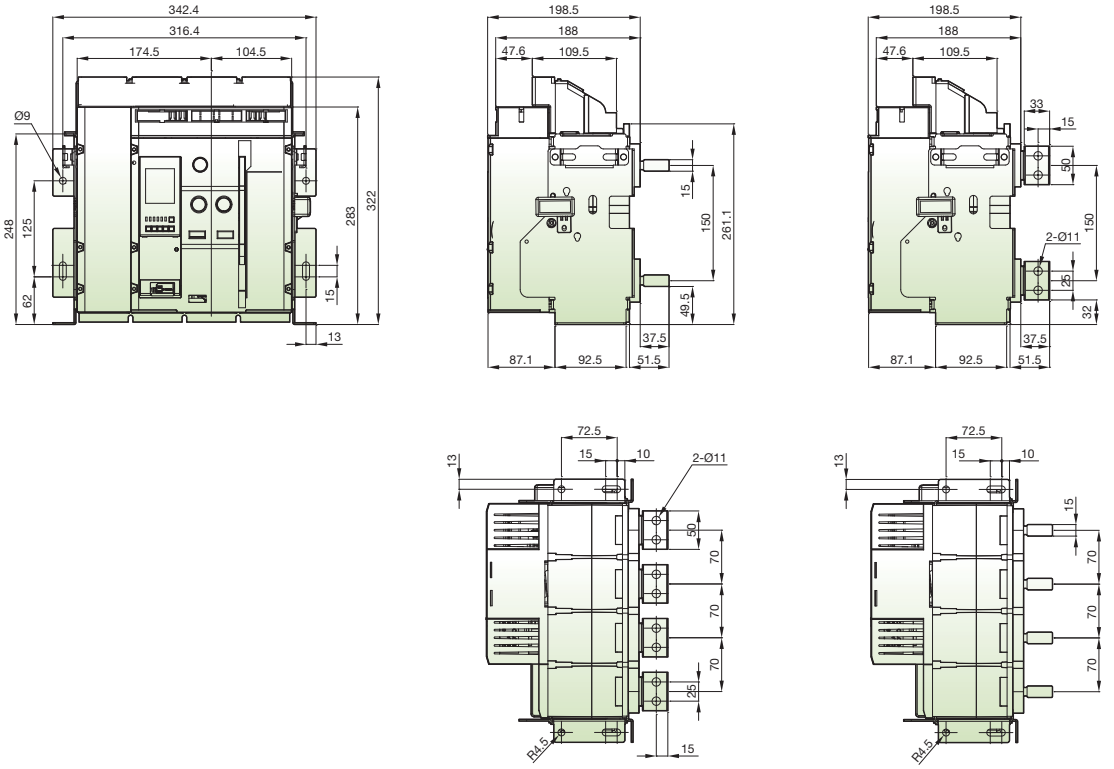




X Type (Cable lug type)

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

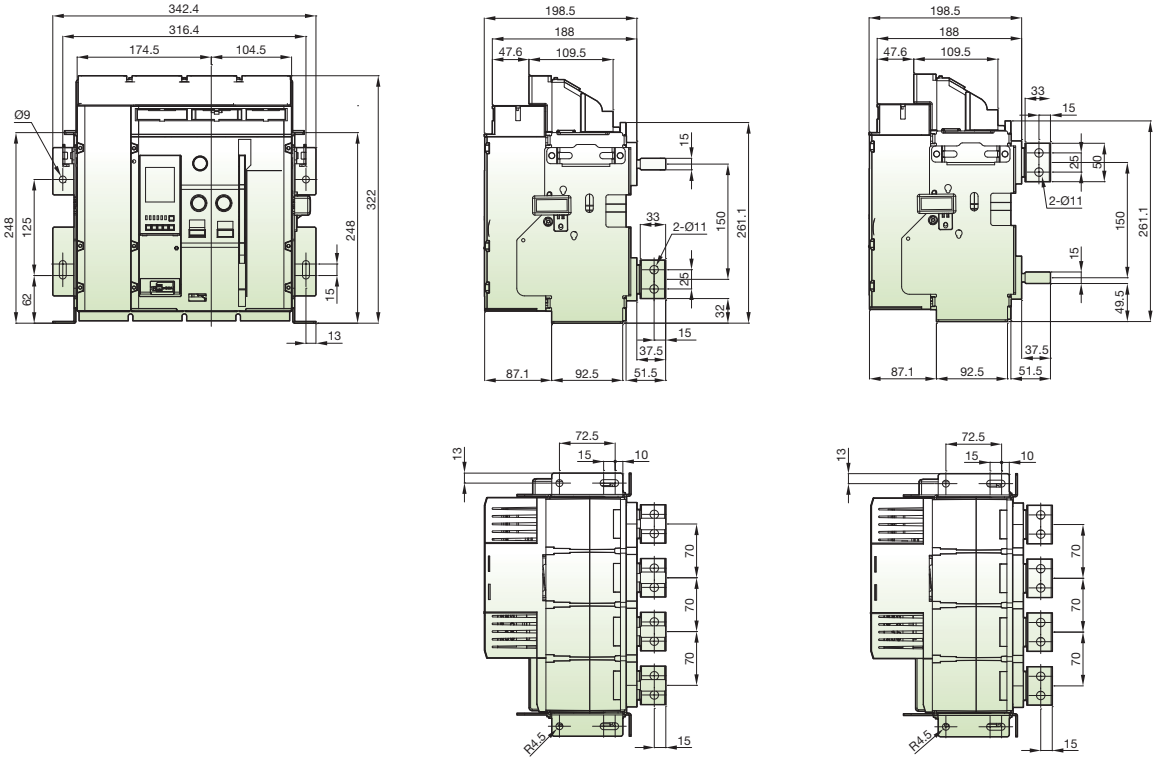
(Unit : mm)



H Type (Horizontal type)

V Type (Vertical type)

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



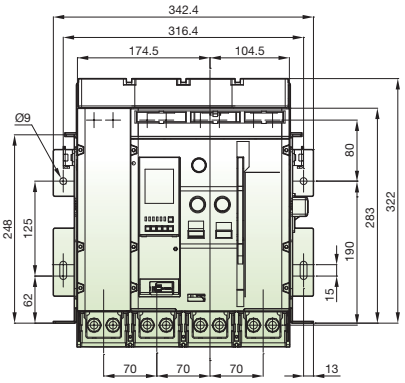
M Type
(Upper-Horizontal type, Lower-Vertical type)

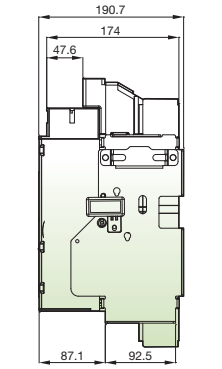
N Type
(Upper-Vertical type, Lower-Horizontal type)

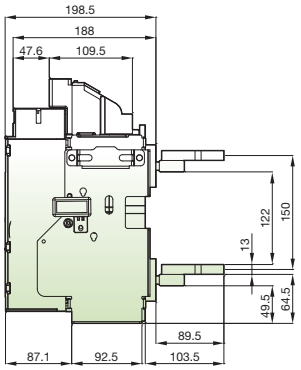
Dimensions

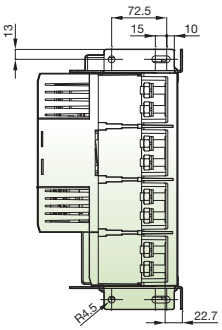
• 4P [Fixed P: Plane type / R: Spread type]

(Unit : mm)

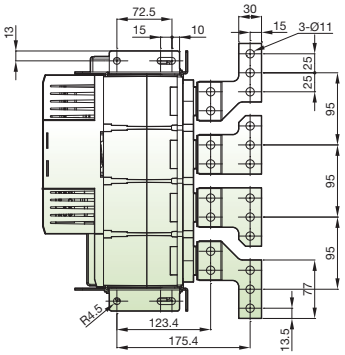






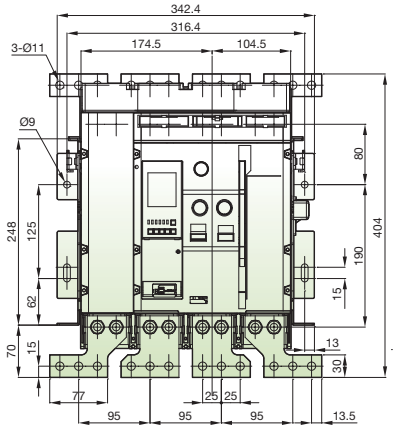


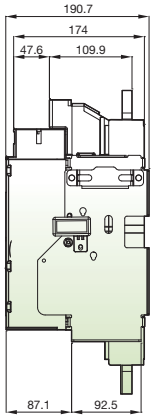
P Type (Plane type)

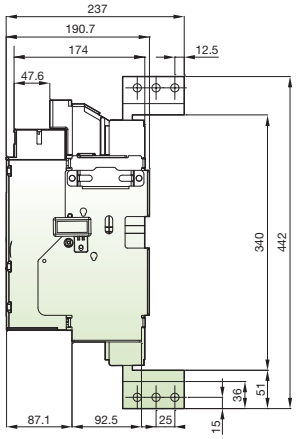


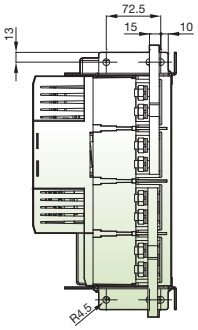
R Type (Spread type)

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

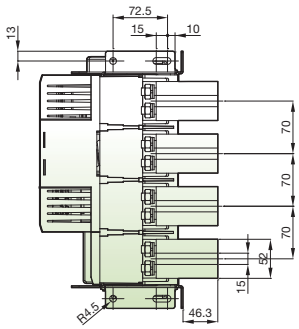








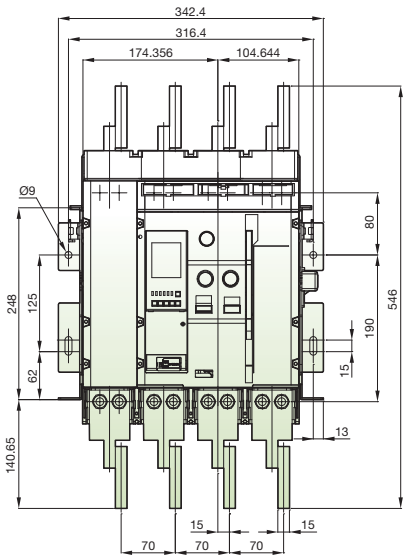
Z Type (Plane spread type)

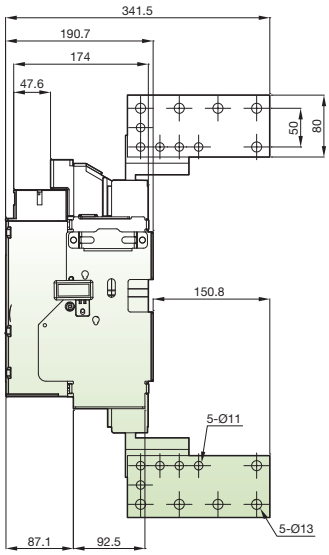


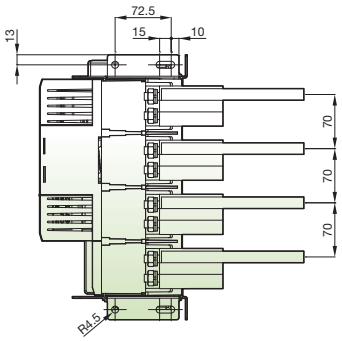
T Type (Plane vertical type)

• 4P [Fixed X: Cable lug type]

(Unit : mm)





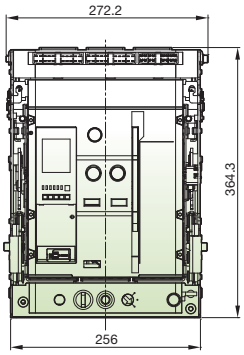


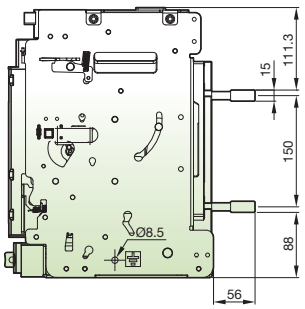
X Type (Cable lug type)

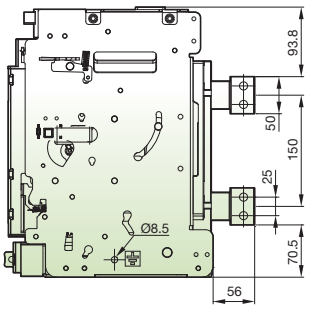
Dimensions

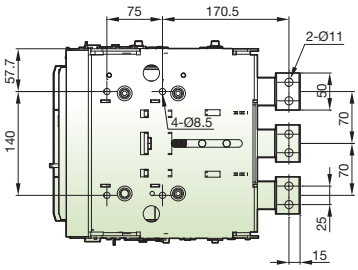
• 3P [Draw-out H: Horizontal type / V: Vertical type]

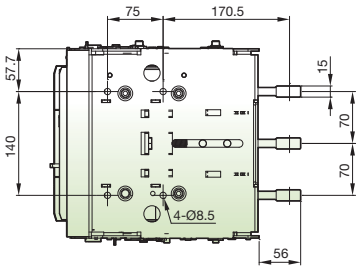
(Unit : mm)







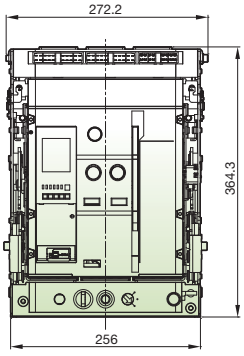


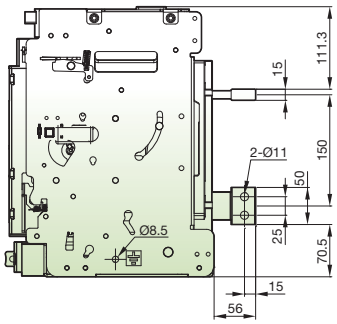


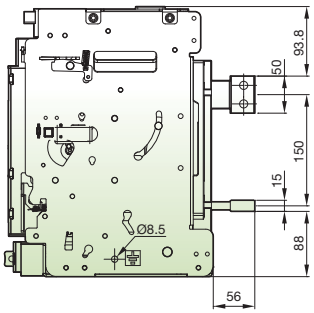
H Type (Horizontal type)

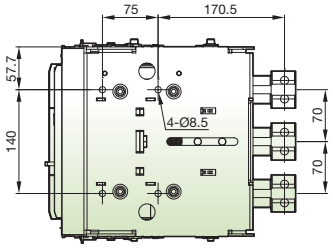
V Type (Vertical type)

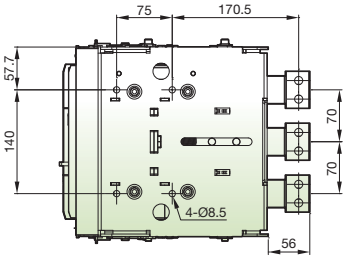
• 3P [Draw-out M: Upper-Horizontal type, Lower-Vertical type / N: Upper-Vertical type, Lower-Horizontal type]









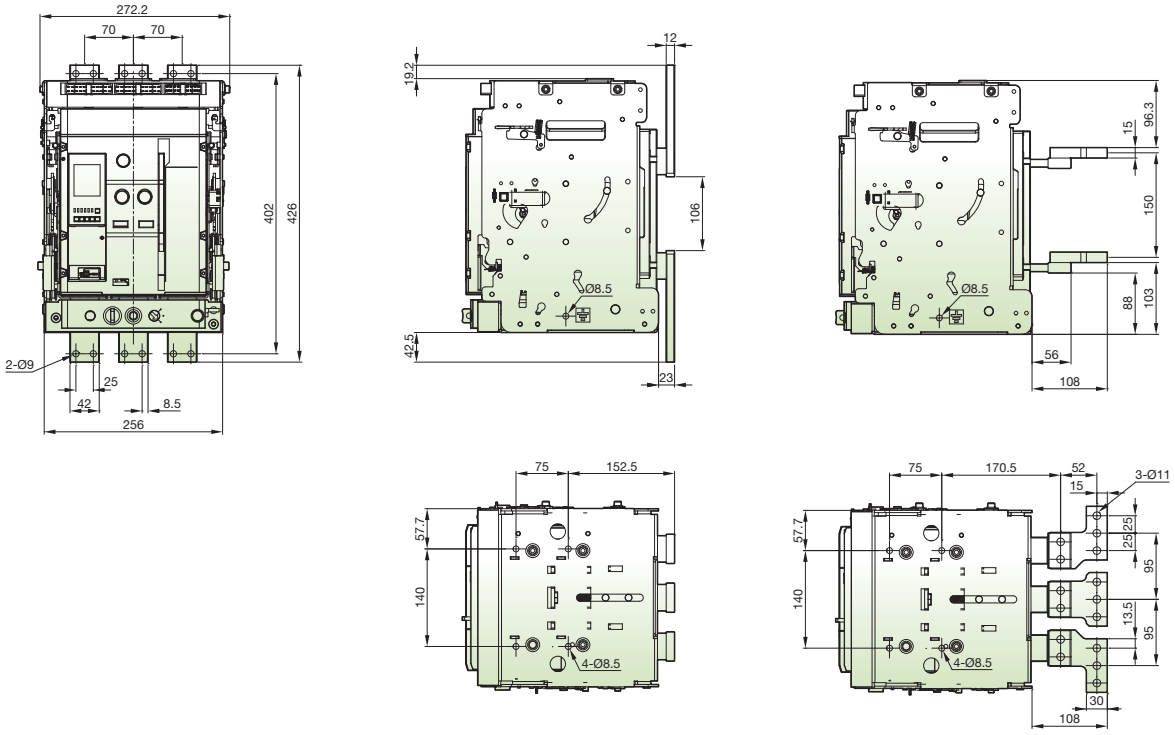


M Type
(Upper-Horizontal type, Lower-Vertical type)

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

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

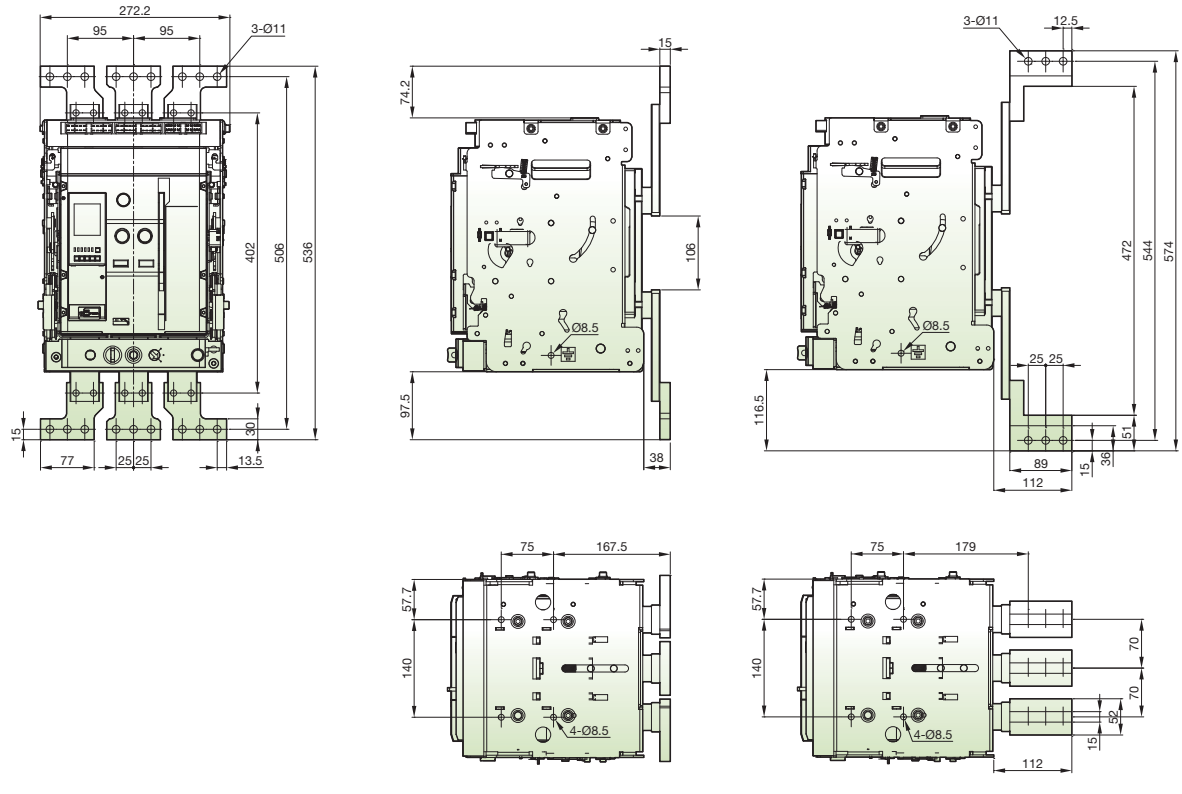
(Unit : mm)



P Type (Plane type)

R Type (Spread type)

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



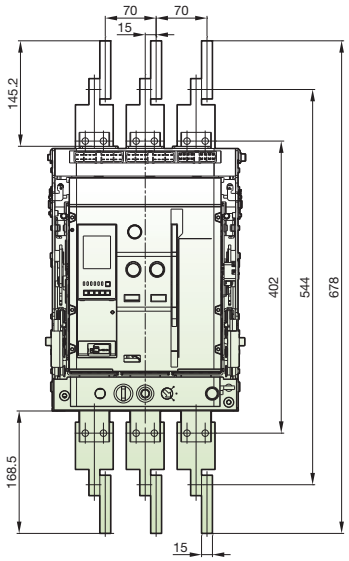
Z Type (Plane spread type)

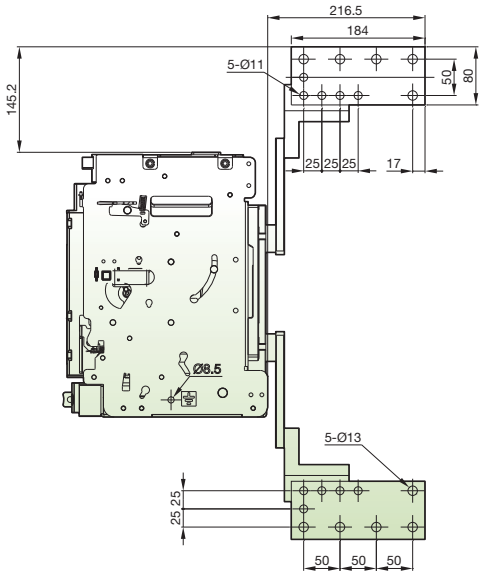
T Type (Plane vertical type)

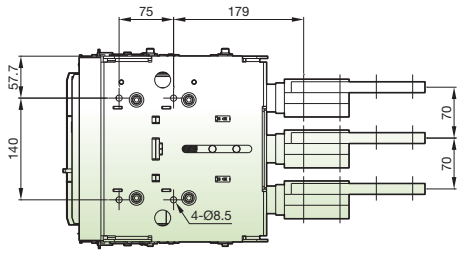
Dimensions

• 3P [Draw-out X: Cable lug type]

(Unit : mm)



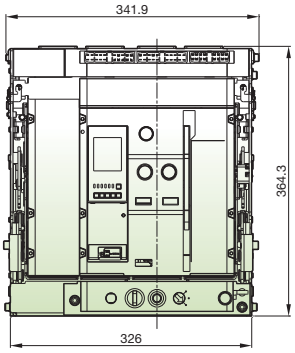


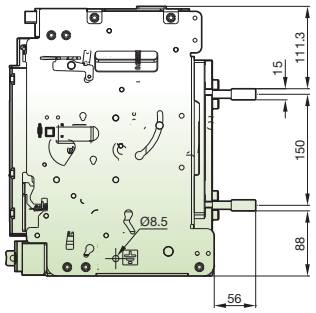


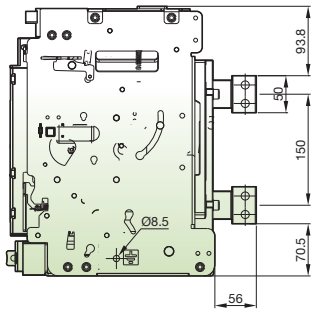
X Type (Cable lug type)

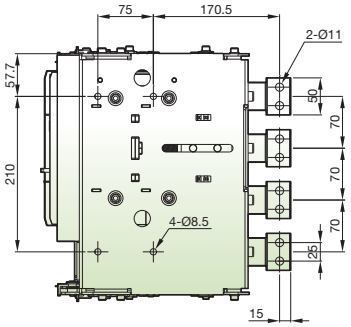
• 4P [Draw-out H: Horizontal type / V: Vertical type]

(Unit : mm)

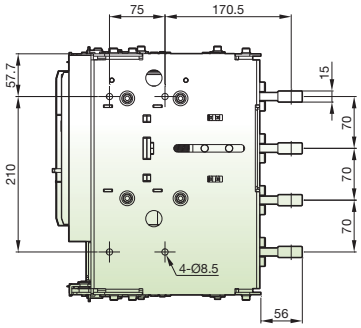






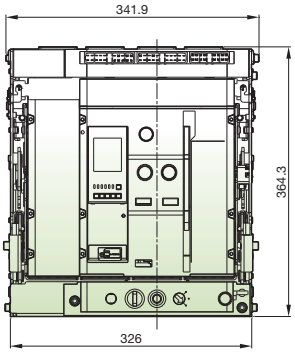


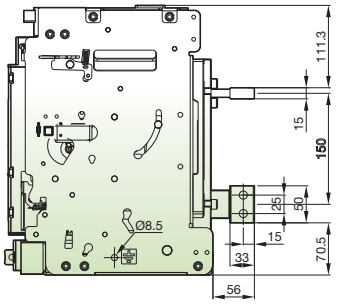
H Type (Horizontal type)

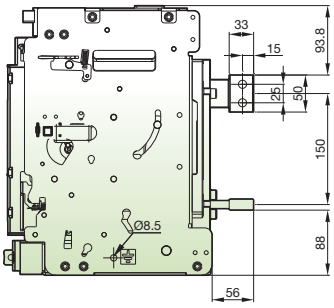


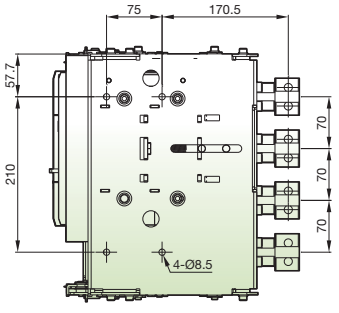
V Type (Vertical type)

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

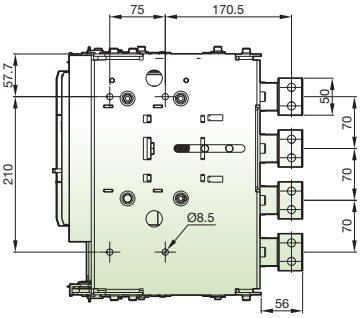








M Type
(Upper-Horizontal type, Lower-Vertical type)

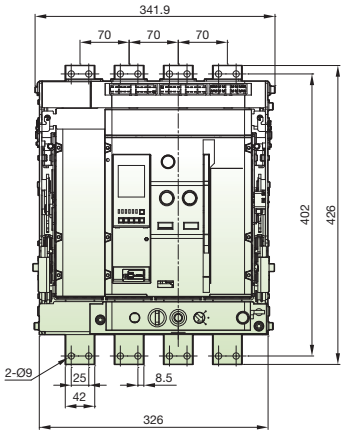


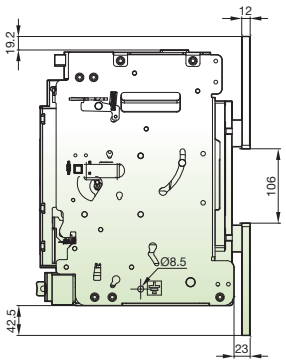
N Type
(Upper-Vertical type, Lower-Horizontal type)

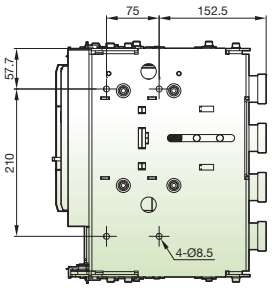
Dimensions

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

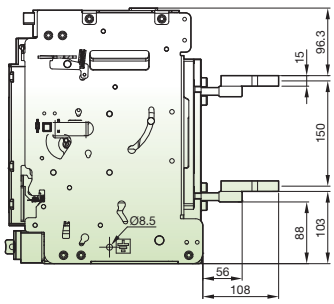
(Unit : mm)

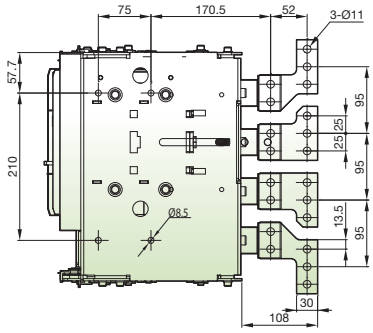






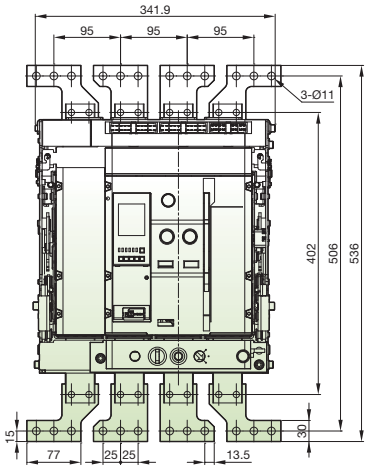
P Type (Plane type)

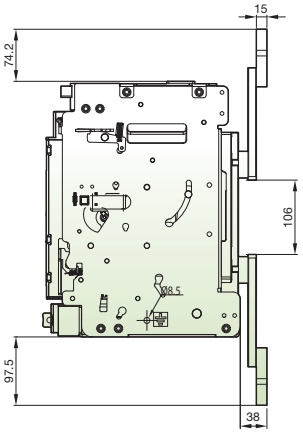


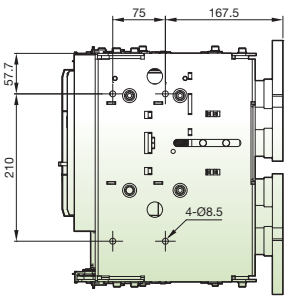


R Type (Spread type)

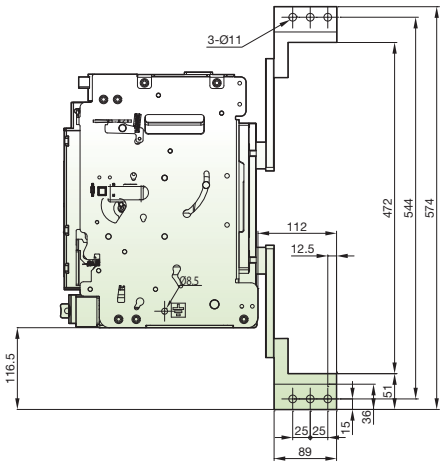
• 4P [Draw-out Z: Plane spread type / T: Plane vertical type]

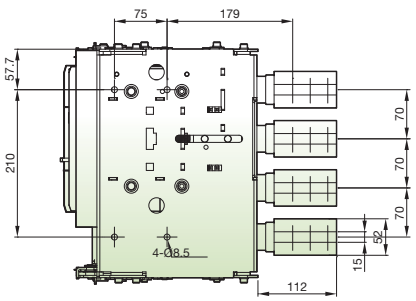






Z Type (Plane spread type)

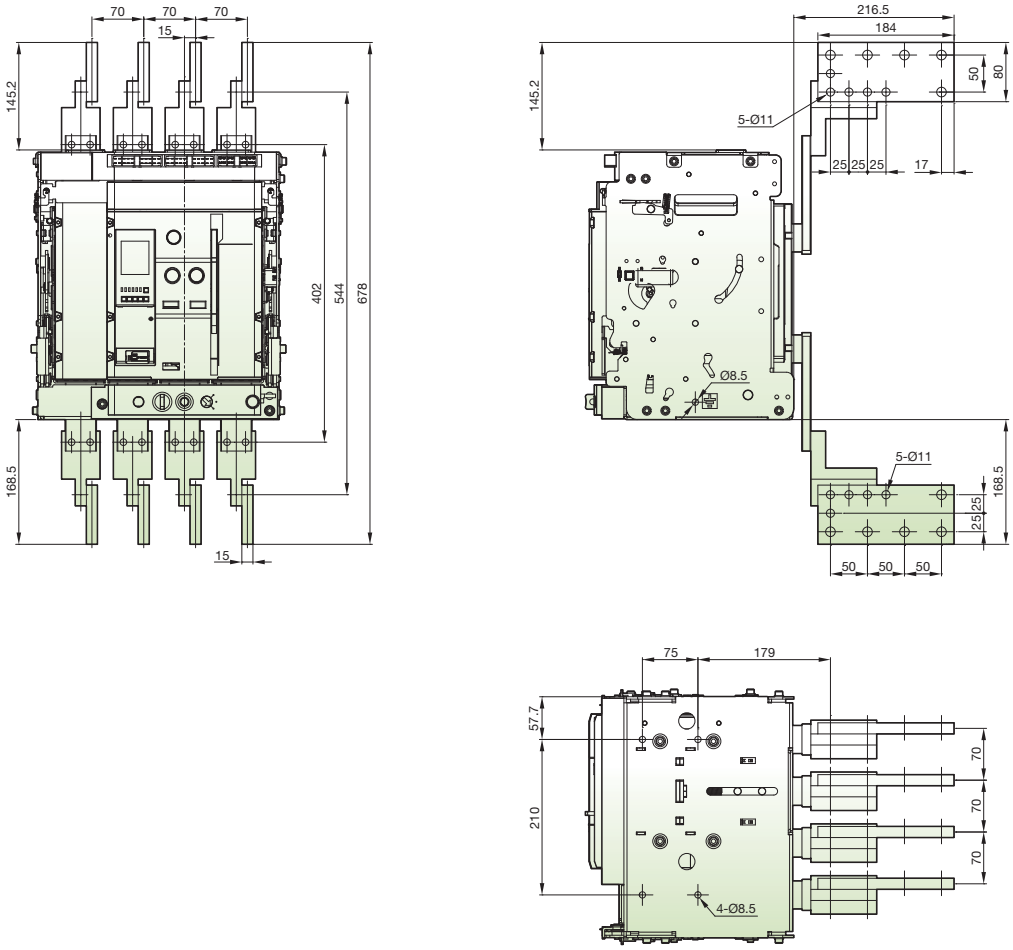




T Type (Plane vertical type)

• 4P [Draw-out X: Cable lug type]

(Unit : mm)



X Type (Cable lug type)

Normal / Special service condition

Normal service conditions

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

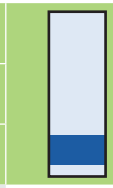
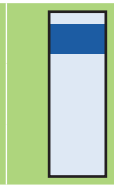
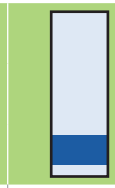
1) Ambient temperature
   A range of max. +40°C to min. -5°C is recommended. However, the average temperature of 24 hours does not exceed +35°C.
2) Altitude 2,000m or less.
3) Environmental conditions
   The air must be clean, and the relative humidity does not exceed 85% at a max. of +40°C and 90% at 20°C. Do not use and store in presence of corrosive or ammonia gas. ($H_2S \leq 0.01$ppm, $SO_2 \leq 0.01$ppm, $NH_3 \leq$ 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. Rated current correction table according to ambient temperature

Switchgear composition			3								
			2								
			1								
Connection Type				Vertical			Horizontal				
Busbar dimensions (mm)				2b. 50×10							
Switchgear			3			1330			1190		
 2000×400×600	IP41	35°C	2		1400			1240			
			1	1500			1310				
		45°C	3			1270			1120		
			2		1320			1180			
			1	1420			1240				
		55°C	3			1190			1050		
			2		1240			1090			
			1	1330			1160				
	IP54	35°C	3			1230			1090		
			2		1310			1160			
			1	1390			1300				
		45°C	3			1150			1020		
			2		1240			1100			
			1	1310			1220				
		55°C	3			1080			960		
			2		1160			1020			
			1	1220			1140				

Altitude and Isolation Voltage

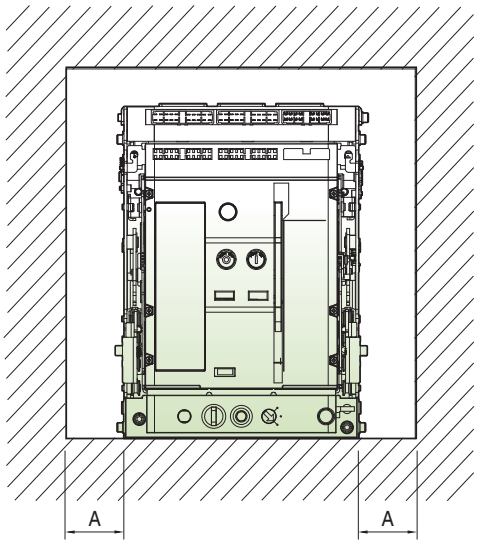
Altitude

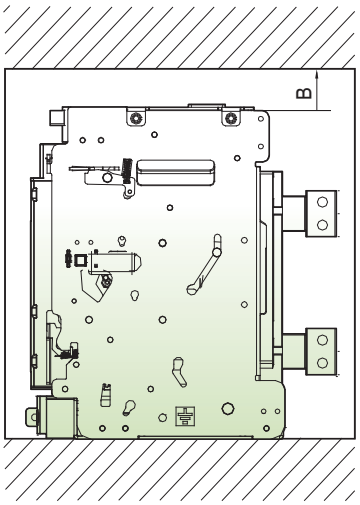
Compact ACB is designed for operation at altitudes under 2000m. At altitudes higher than 2000m, change the ratings upon a service condition.

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.



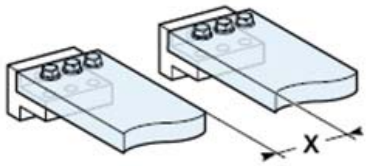


(Unit : mm)

Type	A	B
Fixed	50	150
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.



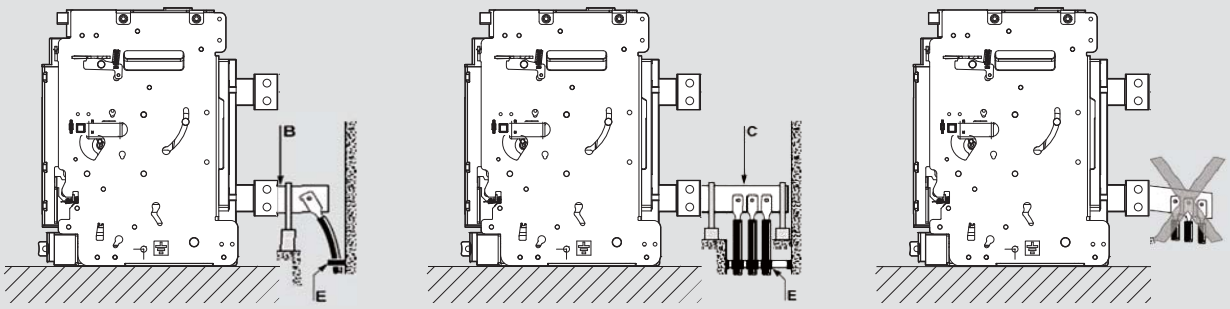
Insulating voltage (Ui)	Minimum clearances distance (X min)
1000Vdc below	14 mm
~ 1500Vdc	16 mm

Installation recommendation

BUS-BAR Connection

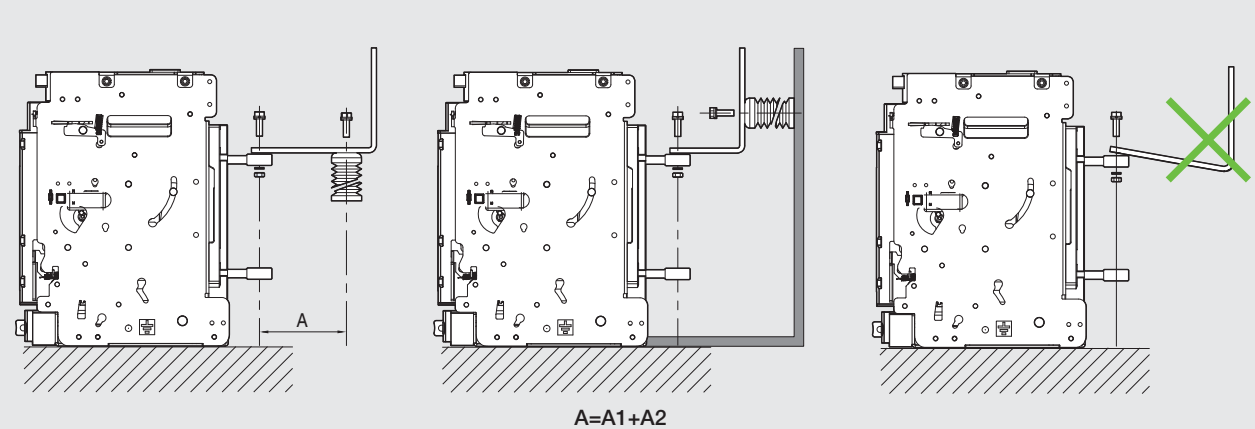
Cables connections

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	LSIS co., Ltd			Order Day				Distributor Name	
Project				Contractor					
Delivery place				Delivery date		PNL Maker			
Main body	Type of ACB	DC compact Switch-Disconnetor							
		☐ 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 type	☐ Horizontal	☐ Vertical	☐ Plane	☐ Upper: Horizontal, Lower: Vertical	☐ Upper: Vertical, Lower: Horizontal		☐ Customer mounting	
		☐ Horizontal with Spreaders		☐ Plane with Spreaders		☐ Vertical with Extention		☐ 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			
		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			

FUTURING SMART ENERGY

We open up a brighter future through
efficient and convenient energy solutions.

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.

LS IS

www.lsis.com

■ Head Quarter

127 LS-ro (Hogye-dong) Dongan-gu, Anyang-si,
Gyeonggi-Do, 14119, Korea
Tel. 82-2-2034-4902, 4684, 4429 Fax: 82-2-2034-4555

■ Overseas Subsidiaries

- **LSIS(Dalian) Co., Ltd.** (Dalian, China)
  Tel: 86-411-8730-7510 Fax: 86-411-8730-7560 E-Mail: dskim@lsis.com
- **LSIS(Wuxi) Co., Ltd.** (Wuxi, China)
  Tel: 86-510-8534-6666-8005 Fax: 86-510-8534-4078 E-Mail: sojin@lsis.com
- **LS VINA Industrial Systems Co., Ltd** (Hanoi, Vietnam)
  Tel: 84-4-6275-8055 Fax: 84-4-3882-0220 E-Mail: hjchoid@lsis.com
- **LSIS Middle East FZE** (Dubai, U.A.E.)
  Tel: 971-4-886-5360 Fax: 971-4-886-5361 E-Mail: shunlee@lsis.com
- **LSIS Europe B.V.** (Amsterdam, Netherlands)
  Tel: 31-20-654-1420 Fax: 31-20-654-1429 E-Mail: europartner@lsis.com
- **LSIS Japan Co., Ltd.** (Tokyo, Japan)
  Tel: 81-3-6268-8241 Fax: 81-3-6268-8240 E-Mail: bmin@lsis.com
- **LSIS USA Inc.** (Chicago, U.S.A)
  Tel: 1-800-891-2941 Fax: 847-383-6543 E-Mail: sales.us@lsis.com

Technical Question or After-sales Service

Customer Center-Quick Responsive Service, Excellent technical support | **82-1644-5481**

■ Overseas Branches

- **LSIS Shanghai Office** (China)
  Tel: 86-21-5237-9977 Fax: 86-21-5237-7189
- **LSIS Beijing Office** (China)
  Tel: 86-10-5761-3127 Fax: 86-10-5761-3128 E-Mail: htroh@lsis.com
- **LSIS Guangzhou Offce** (China)
  Tel: 86-20-8326-6784 Fax: 80-20-8326-6287 E-Mail: sojhtroh@lsis.com
- **LSIS Qingdao Office** (China)
  Tel: 86-532-8501-6058 Fax: 86-532-8501-6057 E-Mail: htroh@lsis.com
- **LSIS Chengdu Office** (China)
  Tel: 86-28-8670-3200 Fax: 86-28-8670-3203 E-Mail: yangcf@lsis.com
- **LSIS ShenYang Office** (China)
  Tel: 86-24-2321-9050 Fax: 86-24-8386-7210 E-Mail: yangcf@lsis.com
- **LSIS Jinan Office** (China)
  Tel: 86-531-8699-7826 Fax: 86-531-8697-7628 E-Mail: yangcf@lsis.com
- **LSIS Co., Ltd. Tokyo Office** (Japan)
  Tel: 81-3-6268-8241 Fax: 81-3-6268-8240 E-Mail: jschuna@lsis.com
- **LSIS Co., Ltd. Rep. Office** (Vietnam)
  Tel: 84-8-3823-7890 E-Mail: sjbaik@lsis.com
- **LSIS Moscow Office** (Rossia)
  Tel: 7-495-258-1466 Fax: 7-495-258-1467 E-Mail: jdpark1@lsis.com
- **LSIS Jakarta Office** (Indonesia)
  Tel: 62-21-293-7614 E-Mail: dioh@lsis.com

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