

Beyond X™

Susol & Metasol ACB

Air Circuit Breakers for Marine

LS ELECTRIC

Susol·Metasol
AIR CIRCUIT BREAKERS







It is customer's ACB that considers a customer's convenience in the use through the increase in the reliance of the operation characteristic by digital type of trip relay and the easy checking of load condition and fixed current value by LCD.

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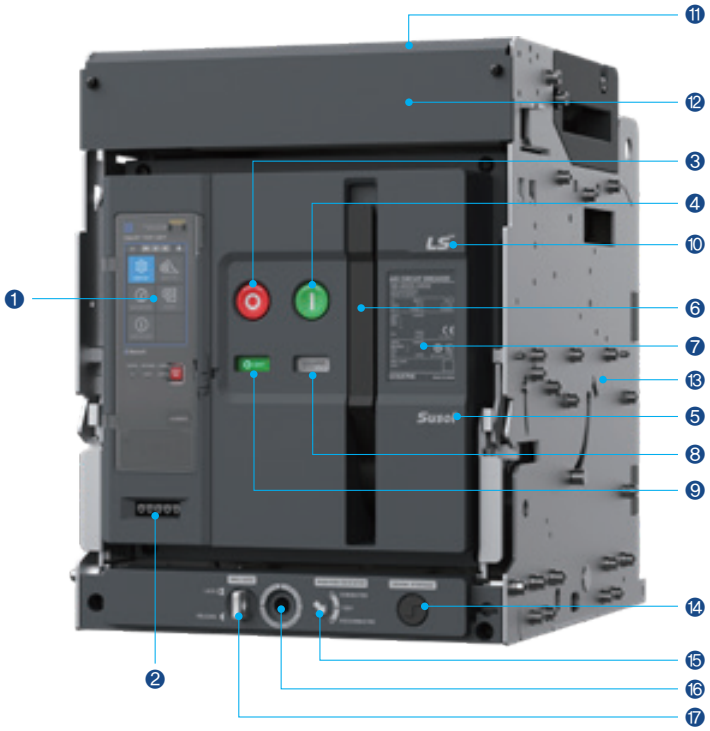
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External configuration

Fixed type ACB



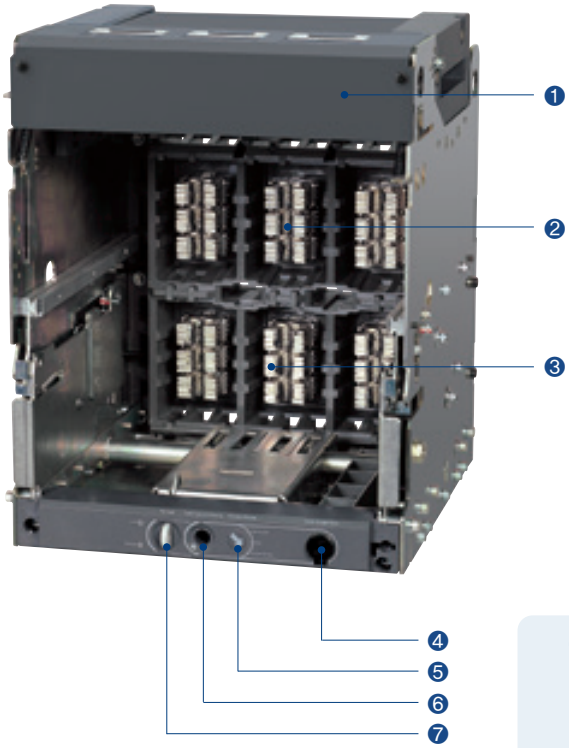
Draw-out ACB (Cradle)



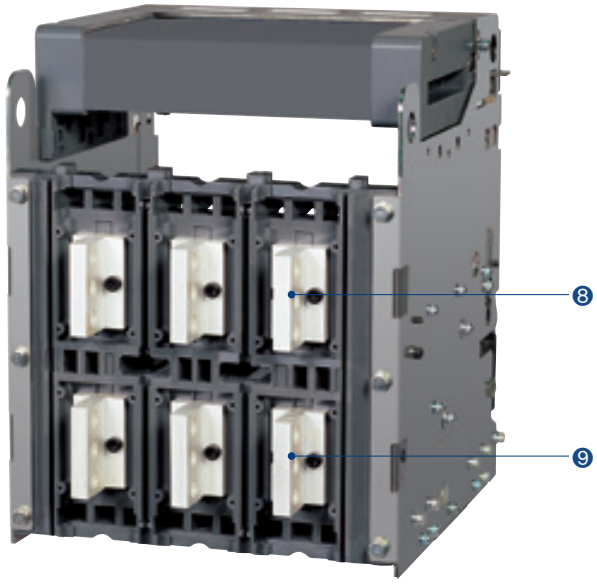
Terms

1. Trip relay
2. Counter
3. OFF button
4. ON button
5. Series name
6. Charge handle
7. Rated name plate
8. Charge/Discharge indicator
9. ON/OFF indicator
10. Corporation logo
11. Arc cover (Zero Arc Space)
12. Safety control cover
13. Cradle
14. Draw-out handle
15. Position indicator
16. Handle inserting hole
17. Pad lock button
18. Arc chute
19. Front cover
20. Fixed type bracket

Cradle (Internal)



Cradle (Rear)

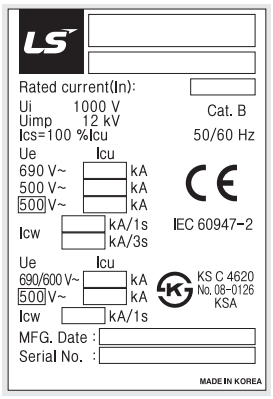


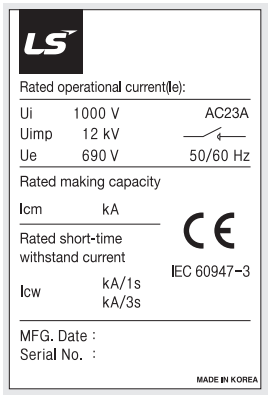
Terms

1. Safety control cover
2. Cradle finger
3. Cradle finger
4. Draw-out handle
5. Position indicator
6. Handle inserting hole
7. Pad lock button
8. Connecting terminal
9. Connecting terminal

Rated name plate

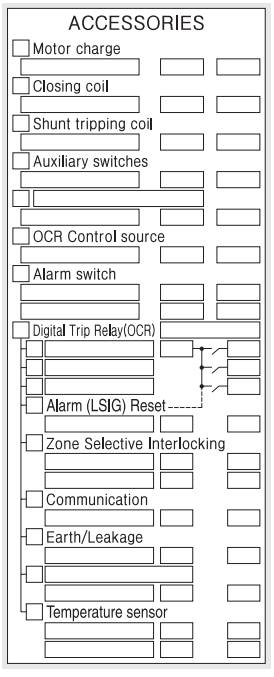
[Acronym explanation]





- Ui: Rated insulation voltage
- Uimp: Impulse withstand voltage
- Ue: Rated operational voltage (AC base)
- Icu: Ultimate breaking capacity
- Ics: Service breaking capacity
- Icw: Short time withstand capacity
- MFG. Date: Manufacturing date
- Icm: Rated making capacity

[Secondary nameplate]



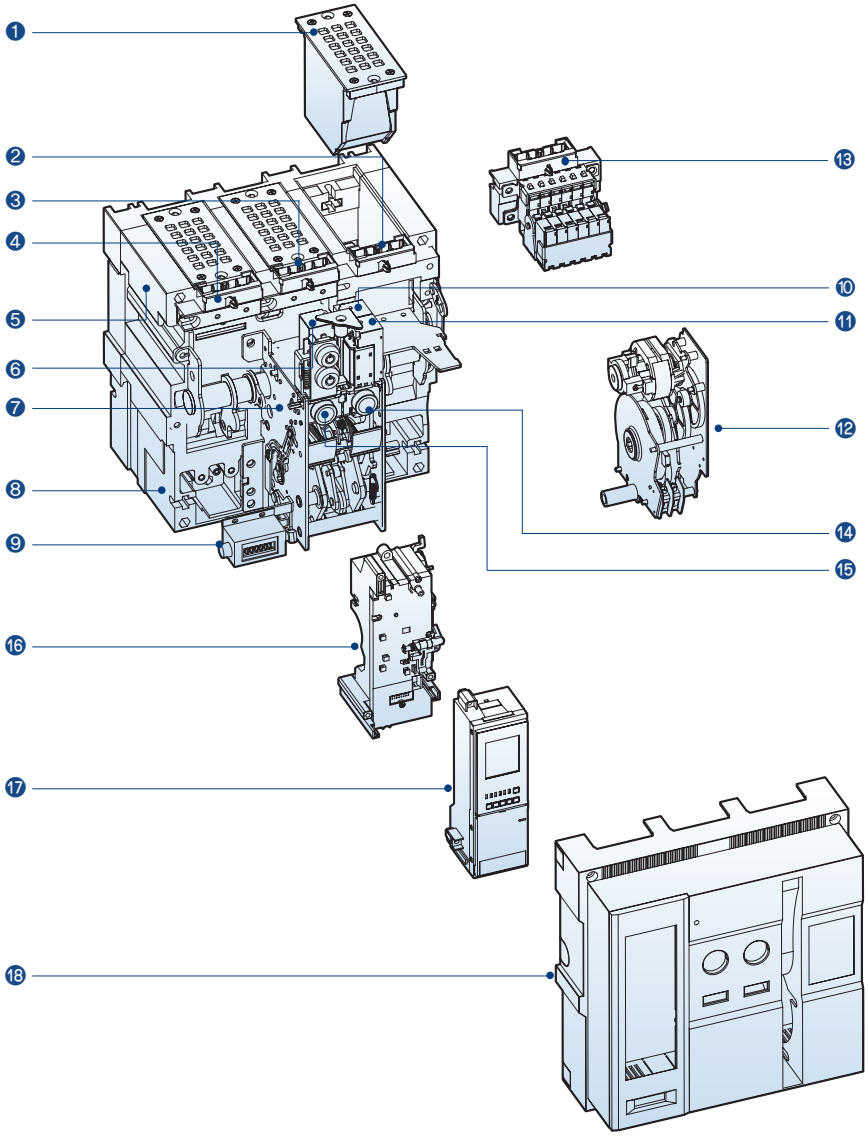
Explanation of terminologies

- Motor charge
- Closing coil
- Shunt tripping coil

(Control power and terminal No.)

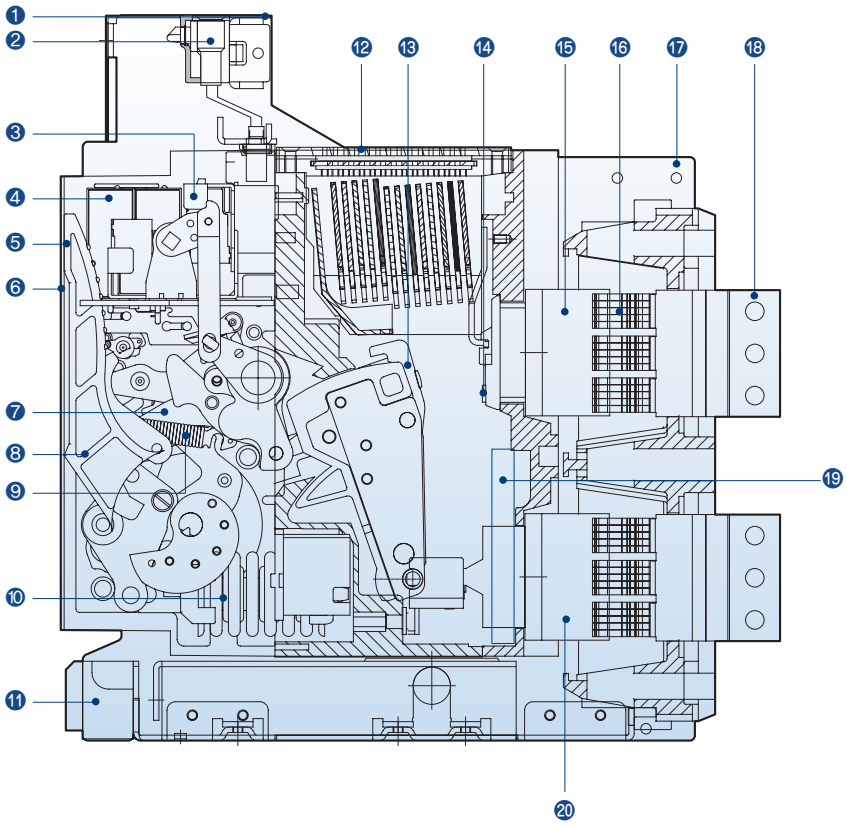
- Auxiliary switches: Contact specification and terminal No.
- Under voltage trip: UVT terminal No.
- Trip Relay control source: Trip relay control power
- Alarm switch: Alarm and terminal No.
- Digital trip relay: Switching diagram
- Z.S.I: Input/Output terminal No.
- Reset: LED/LCD reset
- Communication: Communication and terminal No.
- Voltage module: Phase voltage and symbol
- Earth/Leakage: Ground fault/ Earth leakage input terminal No.

Internal configuration



Terms

1. Arc chute
2. Aux. switch control terminal
3. Control power supply terminal
4. Trip relay control terminal
5. Carrying grip
6. Shunt coil
7. Mechanism
8. Main body
9. Counter
10. Shunt coil
11. Closing coil
12. Motor Ass'y
13. Aux. switch
14. ON button
15. OFF button
16. MTD base
17. Trip relay
18. Front cover



Terms

1. Control circuit terminal block
2. Control terminal
3. Auxiliary switches
4. Closing, Shunt, UVT coil
5. Trip relay
6. Front cover
7. Mechanism
8. Charge handle
9. Trip spring
10. Closing spring
11. Draw-in/out device
12. Arc chute
13. Moving contact
14. Fixed contact
15. Terminal on line side
16. Cradle finger
17. Cradle
18. Connecting terminal
19. Power supply CT
20. Terminal on load side

Ordering

ACB & Accessories

AH — 10 D 3 — 10 A

Type
Circuit Breakers
AH
AS



Ampere Frame			Frame sizes & phase array		No. of pole		Rated current		Connections	
AH AS	-	-	D	3P/4P Standard type RST(N)	3	3P(D)	00	Without Trip Relay & CT	Draw-out type	
	06	630AF					02	200A	A	Automatic connection
	08	800AF					04	400A		
							06	630A	Fixed type	
			W	4P Reverse phase type (N)RST	4	4P(D, W)	04	400A	H	Horizontal type
							06	630A	V	Vertical type
							08	800A	M	Mixed type Horizontal Vertical
	10	1000AF					10	1000A		
	13	1250AF					13	1250A		
	16	1600AF					16	1600A	N	Mixed type Vertical Horizontal
									P	Front type



AH AS	20	2000AF	E	3P/4P Standard type RST(N)	3	3P(E)	06	630A
							08	800A
							10	1000A
							13	1250A
							16	1600A
			X	4P Reverse phase type (N)RST	4	4P(E, X)	20	2000A
	25	2500AF					25	2500A
	32	3200AF					32	3200A
	40	4000AF					40	4000A



AS	40	4000AF	F	3P/4P Standard type RST(N)	3	3P(F)	40	4000A
	63	6300AF	Y	4P Reverse phase type (N)RST	4	4P(F, Y)	50	5000A



AH AS	40	4000AF	G	3P/4P Standard type RST(N)	3	3P(G)	40	4000A
	50	5000AF	Z	4P Reverse phase type (N)RST	4	4P(G, Z)	50	5000A
	63	6300AF					63	6300A

M1 D1 D1 AX NB1 U1 AL MAR

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

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

Trip relay

Refer to 40page

Marine

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

Aux.contact & charging types

AX	Standard OFF-Charge 3a3b
AC	Standard ON-Charge 3a3b
BX	Standard OFF-Charge 5a5b
BC	Standard ON-Charge 5a5b
HX	High capacity OFF-Charge 5a5b
HC	High capacity ON-Charge 5a5b
CC	Standard ON-Charge 6a6b
JC	High capacity ON-Charge 6a6b
GX	High capacity OFF-Charge 3a3b
GC	High capacity ON-Charge 3a3b
TX	TCS OFF-Charge 4a4b Note)
TC	TCS ON-Charge 5a5b Note)

Note) TCS (Trip Circuit Supervision):
The terminal supervising trip circuit and monitoring disconnection or disable of trip.

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

AL

Option	Type name		Option		Type name	
AL	AL1+MRB		B2	B2	On/Off Button lock	
A1	AL1+MRB+RES (AC110~130V)		M	MI	Mechanical interlock	
A2	AL1+AL2+MRB		D	DI	Door Interlock	
A3	AL1+MRB+RES (DC110~125V)				Door Interlock(Catcher type)	
A4	AL1+MRB+RES (AC200~250V)			MOC	Mechanism operated cell switch	
A5	AL1+MRB+Auto reset		K	K1	Key lock	
A6	AL1+AL2+MRB+Auto reset		K2	K2	Key Interlock set	
A7	AL1+MRB+RES (DC110~125V)+Auto reset		K3	K3	Key lock double	
A8	AL1+MRB+RES (AC200~250V)+Auto reset		K4	K4	Key lock (Same key)	
A9	AL1+MRB+RES (AC110~130V)+Auto reset		R	RCS	Ready to close switch	
Y2	AL1+AL2+MRB (2b contact)		T	TM	Temperature monitoring	
Y6	AL1+AL2+MRB+Auto reset (2b contact)		H1	SHT2	AC/DC 100~130V	Double shunt coil
Z2	AL1+AL2+MRB (1a1b contact)		H2		AC/DC 200~250V	
Z6	AL1+AL2+MRB+Auto reset (1a1b contact)		H3		DC 125V	
C	C	Counter	H4 3)		DC 24~30V	
S	CS2	Charge switch communication	H5		DC 48~60V	
B	B	On/Off Button lock	H6		AC 380~480V	
B1	B1	On/Off Button lock	H7		AC 48V	
(-V)	Without VDM module (External type VDM is required to order)					

1) 2)

Note) 1. Reduplicate of AL is not available
2. Reduplicate of Key lick is not available
3. Reduplicate of Double shunt coil is not available. It can not be used simultaneously with UVT.
4. RCS and CS2 cannot be used simultaneously
5. TM and auxiliary contacts TX, TC, CC, JC cannot be used simultaneously.
6. MI, DI and MOC cannot be used simultaneously with SBC.

Ordering

Cradle

AL — N16D | 3 — J | H | E | N

LS ACB cradle



Rated current & frame

S06~16D	AS-06~16D
H06~16D	AH-06~16D
S20~32E	AS-20~32E
S40E H40E	AS-40E AH-40E
S40~50F	AS-40~50F
S40~50G	AS-40~50G
H40~50G	AH-40~50G
S63G H63G	AS-63G AH-63G

No. of pole

3	3P
4	4P

Terminal connections

A	Automatic Connection
J	Manual Connection

Connections

H	Horizontal type (20D inapplicable)
V	Vertical type
M	Mixed type Line: Horizontal Load: Vertical (20D inapplicable)
N	Mixed type Line: Vertical Load: Horizontal (20D inapplicable)
P	Front type (20D, 40E, 50FG, 63G inapplicable)

Safety shutter

E	Without safety shutter
F	With safety shutter

Arc cover (Zero Arc Space)

N	Without Arc cover
S	With Arc cover

Trip relay







N	B	1
Trip Relay Type	Communication & protection	Control voltage & frequency

N		B		1	
N	Normal	B	Pre-Trip Alarm + Without comm.	1	AC/DC 100V~250V, 60Hz
				6	AC/DC 100V~250V, 50Hz

* Comm. works under control power
* LSoutput contacts works under control power.
(LED indicators works without control power)

A		B		1	
A	Ammeter	B	Pre-Trip Alarm + Comm.	1	AC/DC 100V~250V, 60Hz
				6	AC/DC 100V~250V, 50Hz

* Comm. works under control power
* Applicable to generator protection purpose
* Ground fault function unavailable at A(Pre-Trip Alarm + Comm.)

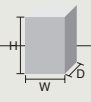
P		B		3			
P	Power meter	B	Pre-Trip Alarm + Comm.		Frequency	Control power voltage	Communication
				3	60Hz	AC/DC 100V~250V	Bluetooth
				4	60Hz	AC/DC 24V~48V	Bluetooth
				8	50Hz	AC/DC 100V~250V	Bluetooth
				9	50Hz	AC/DC 24V~48V	Bluetooth

* Comm. works under control power
* Applicable to generator protection purpose
* Voltage module required for P types. (supplied separately)
* Ground fault function unavailable at A(Pre-Trip Alarm + Comm.)

Ratings

Susol ACB



				Susol					
Type				AH-06D	AH-08D	AH-10D	AH-13D	AH-16D	AH-20D
Ampere frame	(AF)			630	800	1000	1250	1600	2000
Rated current (A)	(In max)		at 40°C	200, 400, 630	200, 400, 630, 800	630, 800, 1000	630, 800, 1000, 1250	800, 1000, 1250, 1600	1000, 1250, 1600, 2000
Setting current (A) *	Control trip relay (... × In max)			0.4 ~ 1.0					
Rated current of neutral pole (A)				630	800	1000	1250	1600	2000
Rated insulation voltage (V)	(Ui)			1,000					
Rated operational voltage (V)	(Ue)			690					
Rated impulse withstand voltage (kV)	(Uimp)			12					
Frequency (Hz)				50/60					
Number of poles (P)				3/4					
Rated breaking capacity (kA sym) AC 50/60Hz	(Icu)	IEC 60947-2 KS C 4620	220V/230V/380V/415V	85					
			460V/480V/500V	85					
			550V/600V/690V	65					
Rated service breaking capacity (kA)	(Ics)		... %×Icu	100%					
Rated making capacity (kA peak) AC 50/60Hz	(Icm)	IEC 60947-2 KS C 4620	220V/230V/380V/415V	187					
			460V/480V/500V	187					
			550V/600V/690V	143					
Rated short-time withstand current (kA)	(Icw)		1 sec	65					
			2 sec	60					
			3 sec	50					
Operating time (ms)			Maximum total breaking time	25ms over Icw / 75ms under Icw					
			Maximum closing time	80ms or 90ms					
Life cycle (time)		Mechanical (60 times per hour)		20,000					
(Without maintenance)		Electrical (30 times per hour)		5,000					
Connections **	Draw-out / Fixed		Horizontal connection	●					-
			Vertical connection	○					●
			Front connection	○					-
			Mixed connection	○					-
Weight (kg) (3P/4P)	Draw-out type	Main body (With cradle)	Motor charging type	63/74					70/85
			Manual charging type	61/72					68/83
		Cradle only		29/32					33/40
	Fixed type		Motor charging type	34/44					38/47
			Manual charging type	32/42					36/45
External dimensions (mm) (H×W×D)		Draw-out type	3P	430×334×375					
			4P	430×419×375					
		Fixed type	3P	300×300×295					
			4P	300×385×295					
Trip relay				N, A, P type					
Certificate & Approval				KS / KEMA / KERI / GOST / CCC					
Marine clasiflcation				LR, ABS, DNV, KR, BV, GL, RINA, NK					

* Refer to trip relay specification. ** ●: Standard, ○: Option





Susol									Susol		
AH-06E	AH-08E	AH-10E	AH-13E	AH-16E	AH-20E	AH-25E	AH-32E	AH-40E	AH-40G	AH-50G	AH-63G
630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
200, 400, 630	400, 630 800, (800)	630, 800, 1000	630, 800, 1000, 1250	800, 1000, 1250, 1600, (1600)	1000, 1250, 1600, 2000	1250, 1600, 2000, 2500	1600, 2000, 2500, 3200	2000, 2500, 3200, 4000, (3200)	2000, 2500, 3200, 4000	2500, 3200, 4000, 5000	3200, 4000, 5000, 6300
0.4 ~ 1.0									0.4 ~ 1.0		
630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
1,000									1,000		
690									690		
12									12		
50/60									50/60		
3/4									3/4		
100									150		
100									150		
85									100		
100%									100%		
220									330		
220									330		
187									220		
85									100		
75									85		
65									75		
25ms over Icw / 75ms under Icw									25ms over Icw / 75ms under Icw		
80ms or 90ms									80ms or 90ms		
15,000									10,000		
5,000									2,000		
●								-	○		
○								●	●		
○								-	-		
○								-	-		
87/103								107/139	181/223		186/230
85/101								102/145	179/221		184/228
44/55								65/85	97/117		102/124
44/55								61/81	98/123		103/130
42/53								60/80	96/121		101/128
430×412×375									460×785×375		
430×527×375									460×1015×375		
300×378×295									300×751×295		
300×493×295									300×981×295		
N, A, P type									N, A, P type		
KS / KEMA / KERI / GOST / CCC									KS / KEMA / KERI / GOST / CCC		
LR, ABS, DNV, KR, BV, GL, RINA, NK									LR, ABS, DNV, KR, BV, GL, RINA, NK		

Ratings

Metasol ACB



				Metasol				
Type				AS-06D	AS-08D	AS-10D	AS-13D	AS-16D
Ampere frame	(AF)			630	800	1000	1250	1600
Rated current (A)	(In max)		at 40°C	200, 400, 630	200, 400, 630, 800	630, 800, 1000	630, 800, 1000, 1250	800, 1000, 1250, 1600
Setting current (A) *	Control trip relay (... × In max)			0.4 ~ 1.0				
Rated current of neutral pole (A)				630	800	1000	1250	1600
Rated insulation voltage (V)	(Ui)			1,000				
Rated operational voltage (V)	(Ue)			690				
Rated impulse withstand voltage (kV)	(Uimp)			12				
Frequency (Hz)				50/60				
Number of poles (P)				3/4				
Rated breaking capacity (kA sym) AC 50/60Hz	(Icu)	IEC 60947-2 KS C 4620	220V/230V/380V/415V	70				
			460V/480V/500V	70				
			550V/600V/690V	65				
Rated service breaking capacity (kA)	(Ics)		... %×Icu	100%				
Rated making capacity (kA peak) AC 50/60Hz	(Icm)	IEC 60947-2 KS C 4620	220V/230V/380V/415V	154				
			460V/480V/500V	154				
			550V/600V/690V	143				
Rated short-time withstand current (kA)	(Icw)		1 sec	65				
			2 sec	50				
			3 sec	42				
Operating time (ms)			Maximum total breaking time	25ms over Icw / 75ms under Icw				
			Maximum closing time	80ms or 90ms				
Life cycle (time)		Mechanical (60 times per hour)		20,000				
(Without maintenance)		Electrical (30 times per hour)		5,00				
Connections **	Draw-out / Fixed		Horizontal connection	●				
			Vertical connection	○				
			Front connection	○				
			Mixed connection	○				
Weight (kg) (3P/4P)	Draw-out type	Main body (With cradle)	Motor charging type	63/74				
			Manual charging type	61/72				
		Cradle only		29/32				
	Fixed type		Motor charging type	34/44				
			Manual charging type	32/42				
External dimensions (mm) (H×W×D)		Draw-out type	3P	430×334×375				
			4P	430×419×375				
		Fixed type	3P	300×300×295				
			4P	300×385×295				
Trip relay				N, A, P type				
Certificate & Approval				KS / KEMA / KERI / GOST				
Marine clasiflcation				LR, ABS, DNV, KR, BV, GL, RINA, NK				

* Refer to trip relay specification. ** ●: Standard, ○: Option







Metasol				Metasol		Metasol		
AS-20E	AS-25E	AS-32E	AS-40E	AS-40F	AS-50F	AS-40G	AS-50G	AS-63G
2000	2500	3200	4000	4000	5000	4000	5000	6300
200, 400, 630, 800, 1000, 1250, 1600, 2000	1250, 1600, 2000, 2500	1600, 2000, 2500, 3200	2000, 2500, 3200, 4000	2000, 2500, 3200, 4000 (3200, 4000)	2500, 3200, 4000, 5000	2000, 2500, 3200, 4000	2500, 3200, 4000, 5000	3200, 4000, 5000, 6300
0.4 ~ 1.0				0.4 ~ 1.0		0.4 ~ 1.0		
2000	2500	3200	4000	4000	5000	4000	5000	6300
1,000				1,000		1,000		
690				690		690		
12				12		12		
50/60				50/60		50/60		
3/4				3/4		3/4		
85				100		120		
85				100		120		
85				85		100		
100%				100%		100%		
187				220		264		
187				220		264		
187				187		220		
85				85		100		
75				75		85		
65				65		75		
25ms over Icw / 75ms under Icw				25ms over Icw / 75ms under Icw		25ms over Icw / 75ms under Icw		
80ms or 90ms				80ms or 90ms		80ms or 90ms		
15,000				10,000		10,000		
5,000				2,000		2,000		
●			-	○		○		
○			●	●		●		
○			-	-		-		
○			-	-		-		
87/103			104/147	107/139		181/223		186/230
85/101			102/145	102/145		179/221		184/228
44/50			58/70	65/85		97/117		102/124
44/55			63/100	61/81		98/123		103/130
42/53			61/98	60/80		96/121		101/128
430×412×375				460×629×375		460×785×375		
430×527×375				460×799×375		460×1015×375		
300×378×295				300×597×295		300×751×295		
300×493×295				300×767×295		300×981×295		
N, A, P type				N, A, P type		N, A, P type		
KS / KEMA / KERI / GOST				KS / KEMA / KERI / GOST		KS / KEMA / KERI / GOST		
LR, ABS, DNV, KR, BV, GL, RINA, NK				LR, ABS, DNV, KR, BV, GL, RINA, NK		LR, ABS, DNV, KR, BV, GL, RINA, NK		

Trip Relay (STU : Smart Trip Unit)

The trip relay of Susol ACB provides the additional protection functions for voltage, frequency, unbalance, and others in addition to main protection functions for over current, short-circuit, ground fault. It supports the advanced measurement functions for voltage, current, power, electric energy, harmonics, communication function, and others.
Analog trip function interlocked with mechanism enhanced a durability of devices as well as the breaking capacity of ACB.
Zone selective interlocking function makes the protective coordination more simple and thermal memory can be applied to various loads.





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Trip relay types

		NB-Type	AB-Type	PB-Type
Externals				
Current relay		• L, S, I, G	• L(N), S, I, G, PTA, Gext	• L(N), S1, I, G, PTA, Gext • D, S(V)1, IU
Voltage relay		-	-	• UV1, OV1, RV, VU
Frequency relay		-	-	• UF1, OF1, ROCOF
Power relay		-	-	• RP, RQ1, OP, OQ, UP
Group control		-	-	-
Relay fine tuning		-	-	• Possible (Adjust knob and freely set operating value current)
ERMS		-	• Control by DI and Communication	• Control by DI and Communication
IDMTL Support		-	• L relay element (Thermal, DT, SIT, VIT, EIT, EIT50)	• L relay element (Thermal, DT, SIT, VIT, EIT, EIT50)
Trip information Maintenance LED		• L, S, I, G • SP : Self protection	• L, S, I, G/Gext/PTA, SP	• L, S, I, G/Gext/PTA, SP
Incident record	Screen	-	• Display of 32 incident events (Incident phase/current/time)	• Display of 127 incident events (Incident phase/current/time)
	Memory	-	• Saves 127 incident events • Saves 6 incident waveforms (In case of operation by Self Power, incident waveform is not saved)	• Saves 127 incident events • Saves 6 incident waveforms (In case of operation by Self Power, incident waveform is not saved)

Trip relays (STU)

Trip relay types

		NB-Type	AB-Type	PB-Type
Measuring function		-	• Current (A/B/C/N) • External CT current • Current phase (Based on the phase A) • Vector Sum zero sequence current • Imbalance negative sequence current • Previous current demand for each phase	• Current (A/B/C/N) • External CT current • Vector Sum zero sequence current • 3 phase voltage, line - to - line voltage • Frequency • Voltage/Current phase (Based on the phase A) • Total/Each phase power (P, Q, S) • Positive/Negative, Effective/Reactive/ Apparent energy • Vector sum zero sequence voltage • Positive, Negative sequence current • Previous current demand for each phase • Previous apparent, reactive and active power demand
Accuracy degree of measur-ement	Current	-	• 0.5%	• 0.5%
	Voltage	-	-	• 0.5%
	Power	-	-	• Class 1 (IEC 62053 - 21, 22)
	Frequency	• 50Hz or 60Hz	• 50Hz or 60Hz	• 0.1% (10 ~ 200Hz)
PQ function		-	• Voltage/Current harmonics harmonics 63rd • Current THD, TDD, K – Factor	• Voltage/Current harmonics harmonics 63rd • Voltage THD • Current THD, TDD, K – Factor
Measurement record		-	• Max Ext Io • Max Current demand • Max Io • Max In • Max Max internal temperature	• Max Current demand • Demand for max apparent, reactive and active power • Max active power • Max Vo • Max Io • Max Ext Io • Max In • Max internal temperature
Real time waveform		-	• Using USB/RS485 communication	• Using USB/RS485 communication • Using LCD screen

* A type can check measurement function, measurement record, and PQ function through USB communication.

		NB-Type	AB-Type	PB-Type
Communication		• NFC (Near Field communication)	• USB (For site operator) • RS485/Modbus (Communication type Only)	• USB (For site operator) • RS485/Modbus • BLE (Bluetooth, Option)
Power		• Self Power (Operates when it is higher than 30% of rated current by single phase load)	• Self Power (Operates when it is higher than 30% of rated current by single phase load) • AC/DC 100V~250V • AC/DC 24V~48V	• Self Power (Operates when it is higher than 50% of rated current by single phase load) • AC/DC 100V~250V • AC/DC 24V~48V
Event record		-	• 255 kinds including change of device status (Information, status, date and time)	• 255 kinds including change of device status (Information, status, date and time)
Clock		• RTC embedded (Back up with battery)	• RTC embedded (Back up with battery)	• RTC embedded (Back up with battery)
Other LED		• Run, Alarm, Self diagnosis	• Run, Alarm, Self diagnosis, Communication	• Run, Alarm, Self diagnosis, Communication
Operating button		• Reset button	• Reset/Menu/Tap/Up, Down/Enter	• Reset button • LCD Touch
Self diagnosis	LED	• RUN/AL LED blinking (Red ↔ Blue blinking)	• RUN/AL LED blinking (Red ↔ Blue blinking)	• RUN/AL LED blinking (Red ↔ Blue blinking)
	LCD	-	• Displays relevant Segment or error number at LCD	• Can check at self diagnosis screen on LCD
	List	• Battery Low Alarm: Occurs when internal battery is not inserted or battery voltage is low. • Rating Plug Unmatched or Error: Rating Plug is not assembled or there's error with Rating Plug. • Ampere Frame Error: Value of Rating Plug is not within 45 ~ 100% of AF. • MTD Fail (Wiring check): STU is not assembled with MTD or Trip coil is disconnected. • Factory Cfg Error: Factory mode setting is wrong. • Device Type Error: Rating Plug information is different from CT information. • Over Heat Error: Internal temperature of CPU is over 100 degree (N/A type) or 115 degree (P/S type) • Contact Wear Alarm: Contact wear rate is over 80% • Electrical Open Count Over Alarm: Electrical Open Count is over the tolerable degree of 80%. • Mechanical Open Count Over Alarm: Mechanical Open Count is over the tolerable degree of 80% • RTC Error: There's error at internal RTC information. • Memory Error: Duplicated internal setting saved at internal nonvolatile memory was damaged. • CT disconnection Error: CT disconnection occurred (Each phase is monitored). • ROM Err: Occurs when there is a problem with the software ROM • RAM Err: Occurs when there is a problem with the software RAM • CLOCK Err: Occurs when there is a problem with the software clock • PROGRAM Cnt. Err: Occurs when there is a problem with the software program counter • CPU Reg. Err: Occurs when there is a problem with the software CPU Register • Intercomm Error: Occurs when the network communication between CPU and HMI is in bad connection • Calibration Error: Occurs when the value of voltage, current and phase are different than entered values in factory		

Trip relays (STU)

NB type: 「Normal」type

Characteristic

■ Overload protection
- Long-time delay/Long-time delay neutral
- Thermal(Hot/Cold)
- IDMTL (DT,SIT,VIT,EIT,EIT50)

■ Short-circuit protection
- Short-time delay/Instantaneous
- Choose I^2t On or Off (For short-time delay)

■ Self power
- Operates when it is higher than 30% of rated current by single phase load

■ Communication – NFC
- For checking the last fault event
- For checking the last fault event

■ Self diagnosis
- CB status
- Trip coil monitoring
- Battery Low Alarm
- Rating Plug
- CT disconnection
- Over heat error
- Mechanical/Electrical open count over alarm
- RTC error
- Memory error
- MCU

Product appearance and structure



① NFC: NFC function indication and antenna location

② LED: Indication of trip info. and overload state



1) RUN/AL
- RUN: Indicating the operation(Blinking blue LED during turn on)
- AL: Indicating an overload(Turn on above 90%, Blink above 105%)
(Self diagnose error: Blinking blue and red LED)

2) SP: Override/MCR operation: Red LED, ERMS operation: Blue LED
3) COMM: Communication display LED(green)
4) Ir: LED Display for long-time over current relay operation
5) Isd/Ii: LED Display for short-time/Instantaneous over current relay operation
6) G: LED displaying operation for ground

③ Fault Reset/Esc Key: Fault/LED reset, Return to menu, Battery test

④ Iu/Ir: Long-time current setting, tr: Long-time tripping delay setting

⑤ Isd: Short-time current setting, tsd: Short-time tripping delay setting

⑥ Ii: Instantaneous current setting

⑦ Ig: Ground fault current setting, tg: Ground fault tripping delay setting

⑧ Rating Plug

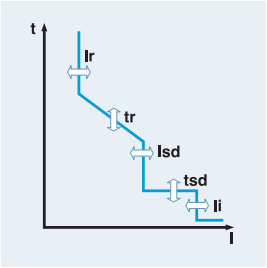
⑨ Battery

⑩ Override setting: DIP switches for override setting

⑪ TESTER: Connected with IPOT(TESTER)

⑫ USB Connector

Protection



Long time										
Pick up (A) between 1.05 and 1.15 Ir	Iu = In×...	0.5	0.6	0.7	0.8	0.9	1.0			
	Ir = Iu×...	0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1.0
Time delay (s) Tolerance: Pick Largest value between ±10% (Ir < 6In), ±20% (Ir ≥ 6In), or ±40ms	tr@(1.5×Ir)	12.5	25	50	100	200	300	400	500	Off
	tr@(6.0×Ir)	0.5	1	2	4	8	12	16	20	Off
	tr@(7.2×Ir)	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	Off

Note) 1. See manual for checking IDTML and equations.
2. Time tolerance should add +40ms for L/S/I/G, if power does not supply to the trip unit.

Short time										
Threshold (A) Accuracy: ±10%	Isd = Ir×...		1.5	2	3	4	5	6	8	10	Off
Time delay (s) Tolerance ▪ I^2t On: Pick Largest value between ±15% (Is ≤ 6In), ±20% (Is > 6In), or ±40ms ▪ I^2t Off: Pick Largest value between ±10% or 40ms	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4				
		I^2t On@(10×Ir)		0.1	0.2	0.3	0.4				
ZSI	ZSI Time (s)		0.04 ~ 0.2 (0.01s steps), OFF								
Instantaneous										
Threshold (A) Accuracy: ±10%	Ii = In×...		2	3	4	6	8	10	12	15	Off
Trip time			50ms or less								

Trip relays (STU)

AB type: 「Ammeter」 type

Characteristic

- Overload protection
  - Long-time delay/Long-time delay neutral
  - Thermal(Hot/Cold)
  - IDMTL (DT,SIT,VIT,EIT,EIT50)
- Short-circuit protection
  - Short-time delay/Instantaneous
  - Choose I^2t On or Off (For short-time delay)
- Power quality measurement Note)
  - 1^{st} ~ 63^{rd} Current/harmonic measurement
  - THD, TDD, K-factor of current
- Start-up function Note)
  - Select S/I/G/Gext
  - Set the start-up current and time
- ZSI(Zone Selective Interlocking)
  - Easy to implement the protective coordination.
- ERMS(Energy Reduction Maintenance Setting)
  - To secure safety for electric technician or site operator
- Fault recording Note)
  - Records 127ea of fault event information(Fault type, Phase, Current and time)
  - Recording 6ea of fault event waveforms.
- Event recording Note)
  - Records 255ea events of device (Related to changes of device setting, operation and status)
- 3ea of DO(Digital output)
- Segment LCD
- Real time waveform Note)
  - Current waveform
- Self power
  - Operates when it is higher than 30% of rated current by single phase load
- Communication
  - USB - Modbus/RS485
- Self diagnosis
  - CB status
  - Trip coil monitoring
  - Battery low alarm
  - Rating plug
  - CT disconnection
  - Over heat error
  - Mechanical/Electrical open count over alarm
  - RTC error
  - Memory error
  - MCU

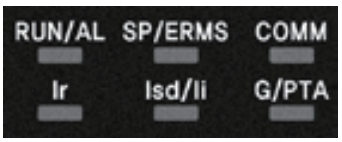
Note: It is possible to check data by using STU management program.

Product appearance and structure



① Segment LCD: Displaying information of measurement or status

② LED: LED: Indicating information of status or measurement



1) RUN/AL
   - RUN: Indicating the operation(Blinking blue LED during turn on)
   - AL: Indicating an overload(Turn on above 90%, Blink above 105%) (Self diagnose error: Blinking blue and red LED)
2) SP/ERMS: Override/MCR operation: Red LED, ERMS operation: Blue LED
3) COMM: Communication display LED(green)
4) Ir: LED Display for long-time over current relay operation
5) Isd/Ii: LED Display for short-time/Instantaneous over current relay operation
6) G/PTA: LED displaying operation for ground/Leakage fault protection relay, PTA

③ Fault Reset/Esc Key: Fault/LED reset, Return to menu, Battery test

④ Key: Move to menu or reset



Enter: Enter into secondary menu or setting input
Up/Down: Move the cursor up/down on screen or increase/decrease a setting value
Tap: Move setting item / Fix screen
Menu: Menu display ↔ Measurement display

⑤ Iu/Ir: Long-time current setting, tr: Long-time tripping delay setting

⑥ Isd: Short-time current setting, tsd: Short-time tripping delay setting

⑦ Ii: Instantaneous current setting

⑧ Ig: Ground fault current setting, tg: Ground fault tripping delay setting

⑨ Rating Plug

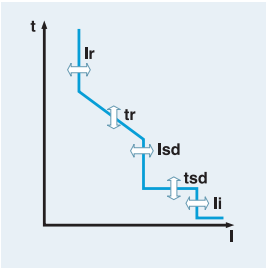
⑩ Battery

⑪ Override setting: DIP switches for override setting

⑫ TESTER: Connected with IPOT(TESTER)

⑬ USB Connector

Protection



Long time

Pick up (A) between 1.05 and 1.15 Ir	Iu = In×...	0.5	0.6	0.7	0.8	0.9	1.0			
	Ir = Iu×...	0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1.0
Time delay (s) Tolerance Pick Largest value between ±10% (Ir<6In), ±20% (Ir≥6In), or ±40ms	tr@(1.5×Ir)	12.5	25	50	100	200	300	400	500	Off
	tr@(6.0×Ir)	0.5	1	2	4	8	12	16	20	Off
	tr@(7.2×Ir)	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	Off

Note) 1. See manual for checking IDTML and equations.
2. Time tolerance should add +40ms for L/S/I/G, if power does not supply to the trip unit.

Short time

Threshold (A) Accuracy: ±10%	Isd = Ir×...	1.5	2	3	4	5	6	8	10	Off
Time delay (s) Tolerance ▪ I^2t On: Pick Largest value between ±15% (Is ≤ 6In), ±20% (Is > 6In), or ±40ms ▪ I^2t Off: Pick Largest value between ±10% or 40ms	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4			
		I^2t On@(10×Ir)		0.1	0.2	0.3	0.4			
ZSI	ZSI Time (s)	0.04 ~ 0.2 (0.01s steps), OFF								
Start up Tolerance: Pick Largest value between ±10% or 40ms	Pick up (A)	Above 1.2×Isd (10A steps)								
	Time delays (s)	0.1 ~ 30 (0.1s steps), OFF								

Instantaneous

Threshold (A) Accuracy: ±10%	Ii = In×...	2	3	4	6	8	10	12	15	Off
Trip time		Under 50ms								
Start up Tolerance: Pick Largest value between ±10% or 40ms	Pick up (A)	(2.0~16)×In(10A steps)								
	Time delays (s)	0.1 ~ 30 (0.1s steps), OFF								

PTA(Pre Trip Alarm)

Threshold (A) Accuracy: ±5%	Ip = Ir×...	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0
Time delay (ms) Tolerance Pick Largest value between ±10% (Ip < 1.2In), ±20% (Ip ≥ 1.2In), or ±40ms	tp@(1.2×Ip)	1	5	10	15	20	25	30	35	Off

Trip relays (STU)

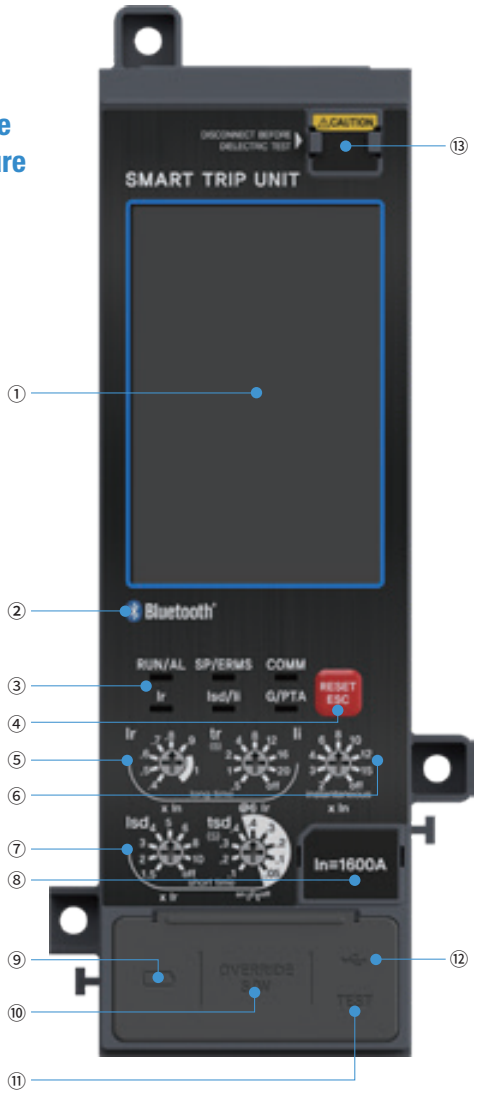
PB type: 「Power meter」 type

Characteristic

- Overload protection
  - Long-time delay/Long-time delay neutral
  - Thermal(Hot/Cold) - IDMTL (DT,SIT,VIT,EIT,EIT50)
- Short-circuit protection
  - Short-time delay/Instantaneous
  - I^2t On/Off optional (for short-time delay)
- Protection for Over voltage/Under voltage/Over frequency/ Under frequency/Unbalance/Reverse power
- Voltage & Current quality measurement
  - 1^{st} ~ 63^{rd} Voltage/Current/Harmonic measurement
  - THD of Voltage/Current, TDD/K-factor of current
- Start-up function
  - Select S/I/G/Gext
  - Set the start-up current and time
- Realization of protective coordination by ZSI (Zone Selective Interlocking)
- Fine-adjustable setting by knob and key
- ERMS(Energy Reduction Maintenance Setting)
  - To secure safety for electric technician or site operator by reducing ARC energy.
- Measurement and display function
  - 3 phase Current/Voltage/Power/Energy/Phase angle/ Frequency/PF/Demand
  - Indicates current/Voltage vector diagram
  - Real-time oscilloscope waveform
- Fault Recording
  - Records 127ea of fault event information (Fault type, Phase, Value, Current and time)
  - Record 6ea of fault event waveform Note)
- Event recording
  - Records events of device related to setting change, operation and state changes up to 256ea
- 3.5 inches graphic touch LCD
- 3 DO(Digital output)
- Self power
  - Operates when it is higher than 50% of rated current by single phase load
- Communication
  - Modbus/RS485
  - USB
  - BLE(Bluetooth, Option)
- Self diagnosis
  - Battery low alarm/Rating plug
  - Ampere frame error/MTD Fail
  - Device type/Over heat/Contact wear
  - Mechanical/Electrical open count over alarm
  - RTC/Memory/CT disconnection
  - Factory mode state

Note: It is possible to check data by using STU management program.

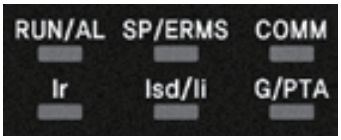
Product appearance and structure



① 3.5 inch graphic LCD (touch): Displaying information of measurement or status

② BLE: Indicating bluetooth function

③ LED: Indicating information of status or measurement



1) RUN/AL
   - RUN: Indicating the operation(Blinking blue LED during turn on)
   - AL: Indicating an overload(Turn on above 90%, Blink above 105%)
   - Self diagnose error: Blinking blue and red LED
2) SP/ERMS
   - Override/MCR operation: Red LED
   - ERMS operation: Blue LED
3) COMM: Communication display LED(green)
4) Ir: LED Display for long-time over current relay operation
5) Isd/Ii: LED Display for short-time/Instantaneous over current relay operation
6) G/PTA: LED displaying operation for Ground/Leakage fault protection relay, PTA

④ Reset/Esc Key: Fault/LED reset, Return to menu, Battery test

⑤ Ir: Long-time current setting, tr: Long-time tripping delay setting

⑥ Ii: Instantaneous current setting

⑦ Isd: Short-time current setting, tsd: Short-time tripping delay setting

⑧ Rating plug

⑨ Battery

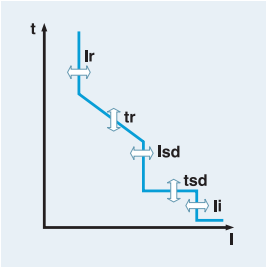
⑩ Override setting: DIP switches for override setting

⑪ TEST : Connected with IPOT(TESTER)

⑫ USB Connector

⑬ V plug: It is a connector that separating the VDM and STU during insulation test

Protection



Long time	Tolerance	Setting									
Pick up (A) between 1.05 and 1.15 Ir		Ir = Iu × ...	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
Time delay (s) Tolerance Pick Largest value between ±10% (Ir < 6In), ±20% (Ir ≥ 6In), or ±40ms		tr@(1.5×Ir)	12.5	25	50	100	200	300	400	500	Off
		tr@(6.0×Ir)	0.5	1	2	4	8	12	16	20	Off
		tr@(7.2×Ir)	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	Off

Note) 1. See manual for checking IDTML and equations. 2. Time tolerance should add +40ms for L/S/I/G, if power does not supply to the trip unit.
3. Threshold(A) value can be adjusted in 1A by touch LCD.

Short time	Tolerance	Setting								
Threshold (A) Accuracy: ±10%		Isd=Ir×...	1.5	2	3	4	5	6	8	10	Off
Time delay (s) Tolerance ■ I²t On: Pick Largest value between ±15% (Is ≤ 6In), ±20% (Is > 6In) or ±40ms ■ I²t Off: Pick Largest value between ±10% or 40ms	tsd	I²t Off	0.05	0.1	0.2	0.3	0.4				
		I²t On@(10×Ir)		0.1	0.2	0.3	0.4				
ZSI		ZSI Time (s)	0.04 ~ 0.2 (0.01s steps), OFF								
Start up Tolerance: Pick Largest value between ±10% or 40ms		Pick up (A)	(1.5 ~ 10) × In(10A steps)								
		Time delay (s)	0.1 ~ 30 (0.1s steps), OFF								

Note) Threshold(A) value can be adjusted in 1A by touch LCD.

Instantaneous	Tolerance	Setting								
Threshold (A) Accuracy: ±10%		Ii = In × ...	2	3	4	6	8	10	12	15	Off
Trip time			Under 50ms								
Start up Tolerance: Pick Largest value between ±10% or 40ms		Pick up (A)	(2.0 ~ 16) × In(10A steps)								
		Time delay (s)	0.1 ~ 30 (0.1s steps), OFF								

Note) Threshold(A) value can be adjusted in 1A by touch LCD.

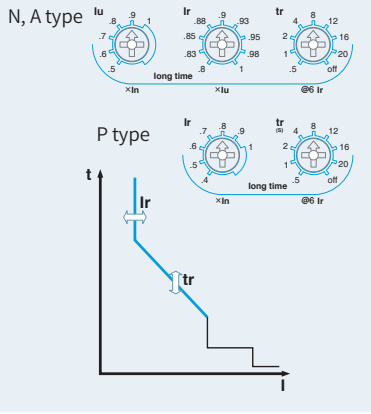
PTA(Pre Trip Alarm)	Tolerance	Setting	
Threshold (A) Accuracy: ±5%		Ip = Ir × ...	0.6 ~ 1.0 (1A steps), OFF
Time delay (ms) Tolerance Pick Largest value between ±10% (Ip < 1.2In), ±20% (Ip ≥ 1.2In), or ±40ms		tp@(1.2×Ip)	I²t can choose On/Off tp = 1 ~ 45 (0.01s steps)

Note) PTA should be adjusted by touch LCD.

Protection	Setting rage		Step	Accuracy	Setting rage	Step	Tolerance
Under voltage	Y-connection	(0.5 ~ 0.98) × Vn/√3	0.1V	±5% (> 100V) ±10% (≤ 100V)	0.1 ~ 120 s, OFF	0.01 s	Choose larget value: ±10% or ±40ms
	D-connection	0.5 ~ 0.98) × Vn					
Over voltage	Y-connection	(1.02 ~ 1.5) × Vn/√3					
	D-connection	1.02 ~ 1.5) × Vn					
Current unbalance	5 ~ 90%		1%	Choose larget value: Operating value ±10% or abs of operating value ±2%	0.5 ~ 60 s, OFF		
Voltage unbalance	5 ~ 90%						
Under frequency	12 ~ 150		1Hz	±5%	0.2 ~ 120 s, OFF		
Over frequency	20 ~ 200						
Rate of change of frequency	0.4 ~ 10		0.01Hz /s	Choose larget value: ±20% or 300 mHz/s	0.5 ~ 10 s, OFF		Choose larget value: ±30% or ±300ms
Reverse power/ Reactive power relay	Vn × In × 0.1/ √3 ~ Vn × In × 1.2 × √3		1W	±10% (> 0.2In), ±20% (≤ 0.2In)	0.5 ~ 100 s, OFF		Choose larget value: ±20% or ±200ms
Over power/ Reactive power relay	Vn × In × 0.1/ √3 ~ Vn × In × 1.2 × √3			±10%			
Under power/ Reactive power relay	Vn × In × 0.1/ √3 ~ Vn × In × 0.9 × √3						

Operation characteristics

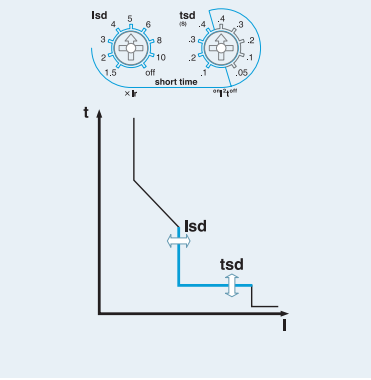
Long-time delay (L)



The function for overload protection which has time delayed characteristic in inverse ratio to fault current.

1. Standard current setting knob: Ir
   1) Setting range in P type: (0.4-0.5-0.6-0.7-0.8-0.9-1.0)×In
   2) Setting range in N type and A type: (0.4 ~1.0)×In
      - Iu: (0.5-0.6-0.7-0.8-0.9-1.0)×In
      - Ir: (0.8-0.83-0.85-0.88-0.9-0.93-0.95-0.98-1.0)×Iu
2. Time delay setting knob: tr
   - Standard operating time is based on the time of 6×Ir
   - Setting range: 0.5-1-2-4-8-12-16-20-Off sec
3. Relay pick-up current
   - When current over (1.11)×Ir flows in, relay is picked up.
4. Relay operates basing on the largest load current among R/S/T/N phase.

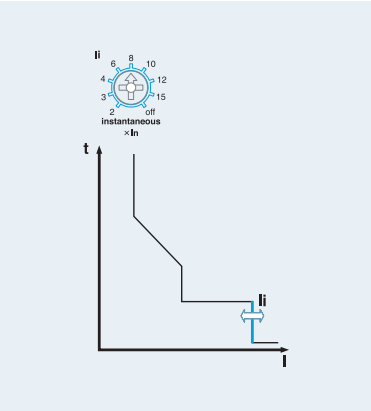
Short-time delay (S)



The function for fault current (over current) protection which has definite time characteristic and time delayed in inverse ratio to fault current.

1. Standard current setting knob: Isd
   - Setting range: (1.5-2-3-4-5-6-8-10-Off)×Ir
2. Time delay setting knob: tsd
   - Standard operating time is based on the time of 10×Ir.
   - Inverse time (I^2t On): 0.1-0.2-0.3-0.4 sec
   - Definite time (I^2t Off): 0.05-0.1-0.2-0.3-0.4 sec
3. Relay operates basing on the largest load current among R/S/T/N phase.
4. When ZSI function was set, the protection operation will take place instantaneously with input absence by downstream devices. It is advised to disable its ZSI function on the last downstream device.

Instantaneous (I)



The function for breaking fault current above the setting value within the shortest time to protect the circuit from short-circuit.

1. Standard current setting knob: Ii
   - N/A/P type setting range: (2-3-4-6-8-10-12-15-Off)×In
   - S type setting range: (2-16)×In
2. Relay operates basing on the largest load current among R/S/T/N phase.
3. Total breaking time is below 50ms.

■ PTA

1. Standard current setting Knob: Ip
   - Setting range: (0.7-0.8-0.85-0.9-0.95-1.0-1.05-1.1-Off)×In
2. Time delay setting Knob: tp
   - Standard operating time is based on the time of 1.01×Ip.
   - Setting range: 5-10-15-20-25-30-35-40-45 sec

Measurement function

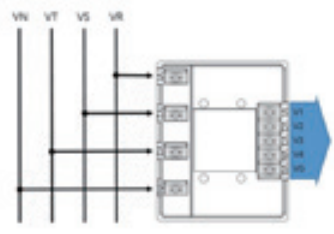
Type	Class.	Measurement element	Detailed element	Unit	Measurement range
P type	Current	Line current	Ia, Ib, Ic	A	0.02In~1.2In
		Normal current	I_1		
		Reverse current	I_2		
	Voltage	Line voltage	Vab, Vbc, Vca	V	1200V
		Phase voltage	Va, Vb, Vc	V	600V
		Normal voltage	V_1	V	3V~690V
		Reverse voltage	V_2		
	Angle	Line-to-line Line-to-current	∠VabIa, ∠VabIb, ∠VabIc, ∠VabVbc, ∠VabVca	°	0~360°
		Phase-to-phase	∠VaVb, ∠VaVc		
		Phase-to-current	∠VaIa, ∠VbIb, ∠VcIc		
	Power	Active power	Pa(ab), Pb(bc), Pc(ca), P	kW	0kW~99999kW
		Reactive power	Qa(ab), Qb(bc), Qc(ca), Q	kVar	0kVar~99999kVar
		Apparent power	Sa(ab), Sb(bc), Sc(ca), S	kVA	0kVA~99999kVA
	Energy	Active energy	WHa(ab), WHb(bc), WHc(ca), WH	kWh, MWh	0kWh~999,999MWh
		Reactive energy	VARHa(ab), VARHb(bc), VARHc(ca), VARH	kVarh, Mvarh	0kVarh~999,999MVarh
		Reverse active energy	rWHa(ab), rWHb(bc), rWHc(ca), rWH	kWh, MWh	0kWh~999,999MWh
	Freq.	Frequency (F)	Frequency	Hz	10~200Hz
	Power factor	Power factor (PF)	PFa(ab), PFb(bc), PFc(ca), PF	-	+ : Lead - : Lag
	Unbalance	Unbalance rate	Iunalance, Vunbalance	%	0.0~100.0
	Demand	Active power Demand	Peak demand	kW	0kW~99999kW
		Current demand	Peak demand	A	0.02In~1.2In
	Harmonics	Voltage harmonics	1^{st}~63^{th} harmonics of Va(ab),Vb(bc),Vc(ca)	V	4~690V
		Current harmonics	1^{st}~63^{th} harmonics of Ia,Ib,Ic	A	95%(3, 5, 7) / 65%(etc)
		THD, TDD	-	%	0.0 ~ 100.0
		K–Factor	-	-	1.0 ~

Voltage Divide Module

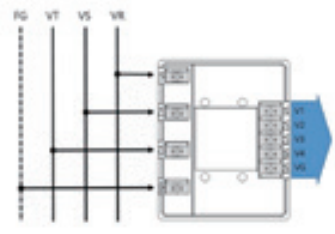


For P type trip relay, it is necessary to use voltage trip module for measuring the voltage at the load side of ACB.

Voltage input range
- Phase voltage: 35Vac ~ 973Vac
- Line voltage: 35Vac ~ 1635Vac

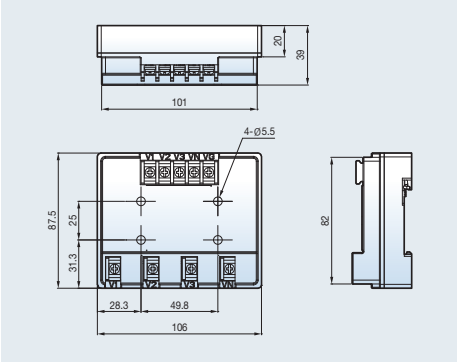


3P4W wiring



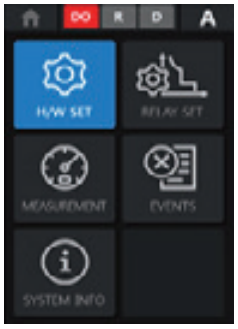
3P3W wiring

Item	Description	Feature	Remark
72313460708	TOTAL ASS'Y, VDM(Shield Cable), EXTERNAL, STU	Accessory	Separate purchasing



Protection element setting(P type)





Main menu



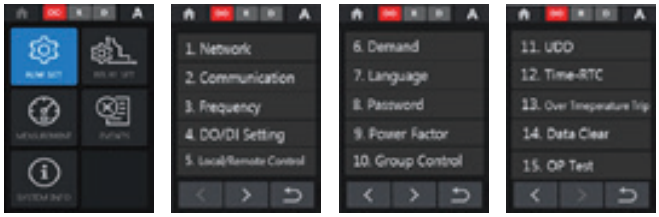
Screen transition

Return

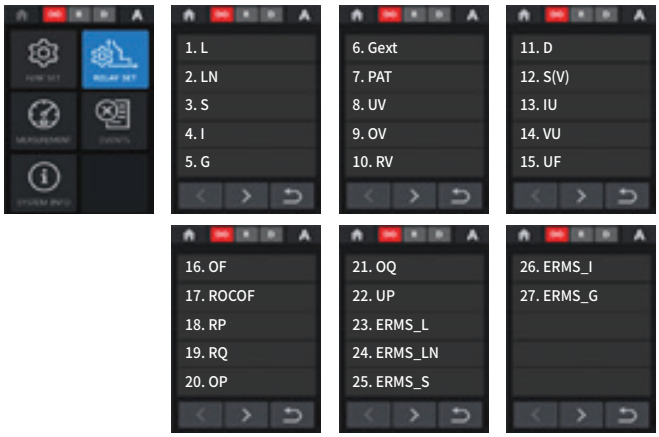
Cancel

Enter

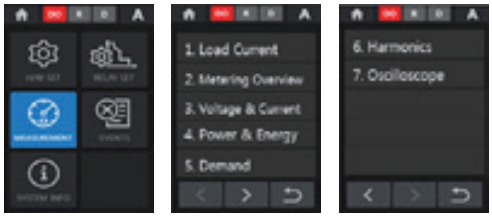
H/W SET display



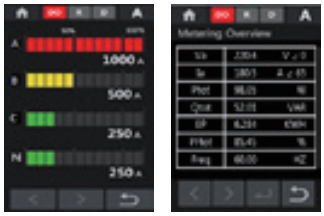
Relay SET display



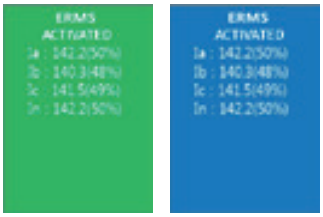
Measurement display



Measurement - Load Current/ Metering Overview



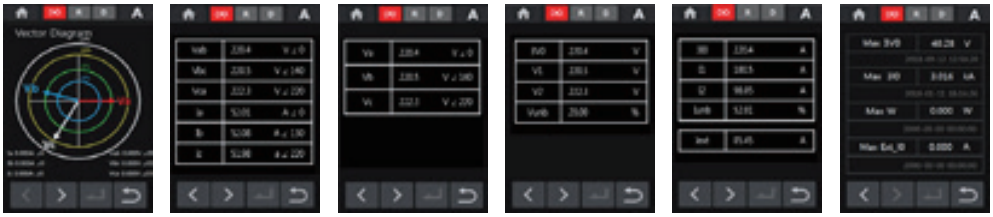
■ ERMS display



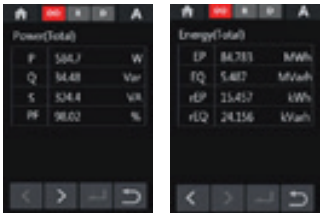
• The Screen during ERMS ON

Protection element setting(P type)

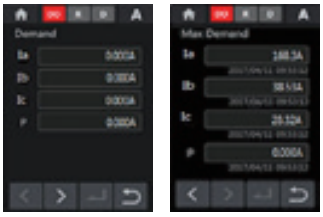
Measurement – Voltage & Current



Measurement – Power & Energy



Measurement - Demand



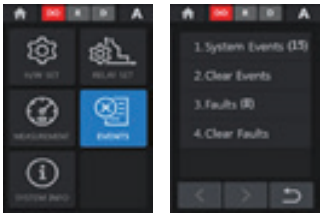
Measurement - Harmonics



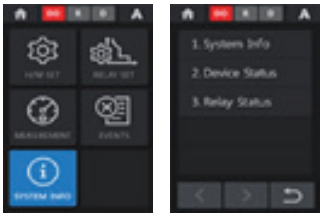
Measurement – Oscilloscope



EVENT display



System info display



Remote reset and digital I/O (A, P type)

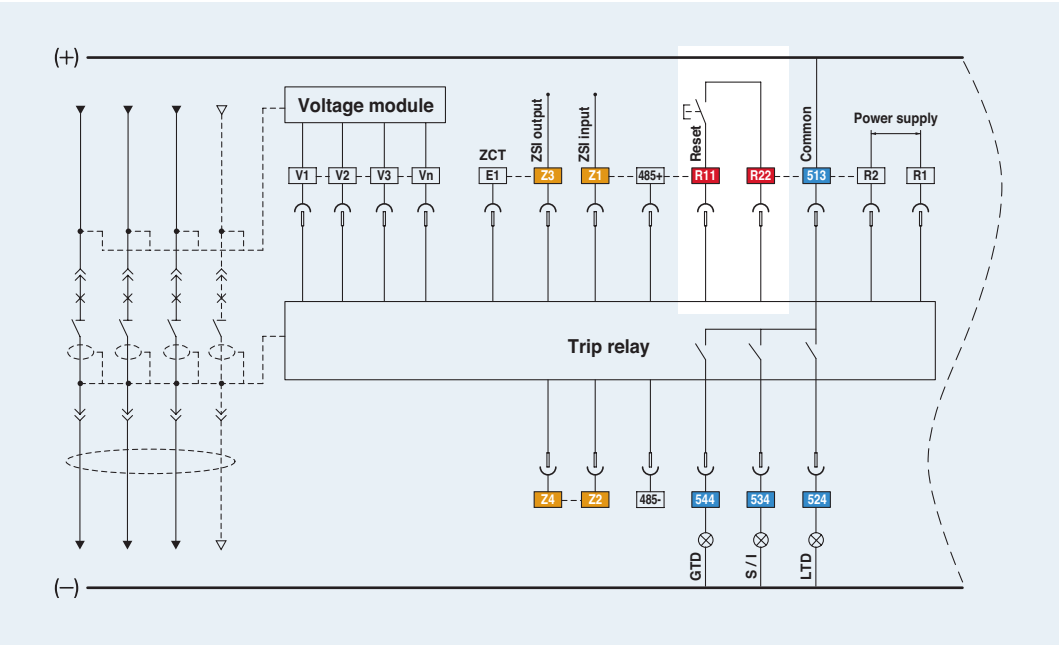
In case of that ACB operates due to accidents or over current, STU(Trip Relay) indicates the information of the accident through the LED and LCD.
Trip relay A, P and S type is possible to perform the remote reset by digital input, and have 3 DO(Digital output).

1. Methods to reset STU(Trip Relay) is to push the Reset button on the frontal side and to use the remote reset.

2. Digital input
   - Input[GD/EM(+) – GD/EM(-)] : Select ERMS, Local/Remote or Group DI (Programmable signaling contacts)
   - [R11-R22] input: Remote reset
   - [Z1-Z2] Input: ZSI input
   - [E1-E2] Input: ZCT for earth leakage detection or external CT input

※ All DI are dry contact that has 3.3V of recognition voltage. When inputting close by SSR(Solid State Relay) or open-collector, connect collector(Drain) to R11.

3. Digital output 3a(524, 534, 544-513)
   - It is available to extend and use the DO when the STU connects with the New TRIO.
   - However, the DO output when the ERMS is activated is only available only in the New TRIO.
   - Fault output: Long/Short time delay, Instantaneous, Ground fault, UVR, OVR, UFR, OFR, rPower, Vunbal, Iunbal (Maintains state as Latch form until user pushes reset.)
   - General DO: when setting L/R as remote, it is available to control close/open remotely by using communication.



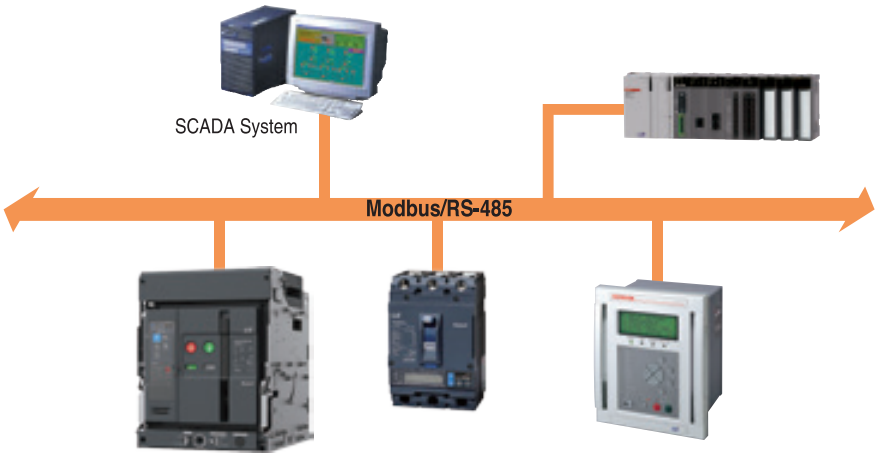
Trip Relay	Digital Output	Long time	Short time	Instant-aneous	Ground	Overload Alarm	UV	OV	UF	OF	IU	VU	D	S(V)	ROCOF	RP	RO	OP	OQ	UP	Note	General DO
P type	DO1(524)	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Program-mable	○
	DO2(534)	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○
	DO3(544)	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○
A type	DO1(524)	●	×	×	×	Not available																
	DO2(534)	×	●	●	×																	
	DO3(544)	×	×	×	●																	

Communication

Modbus/RS-485

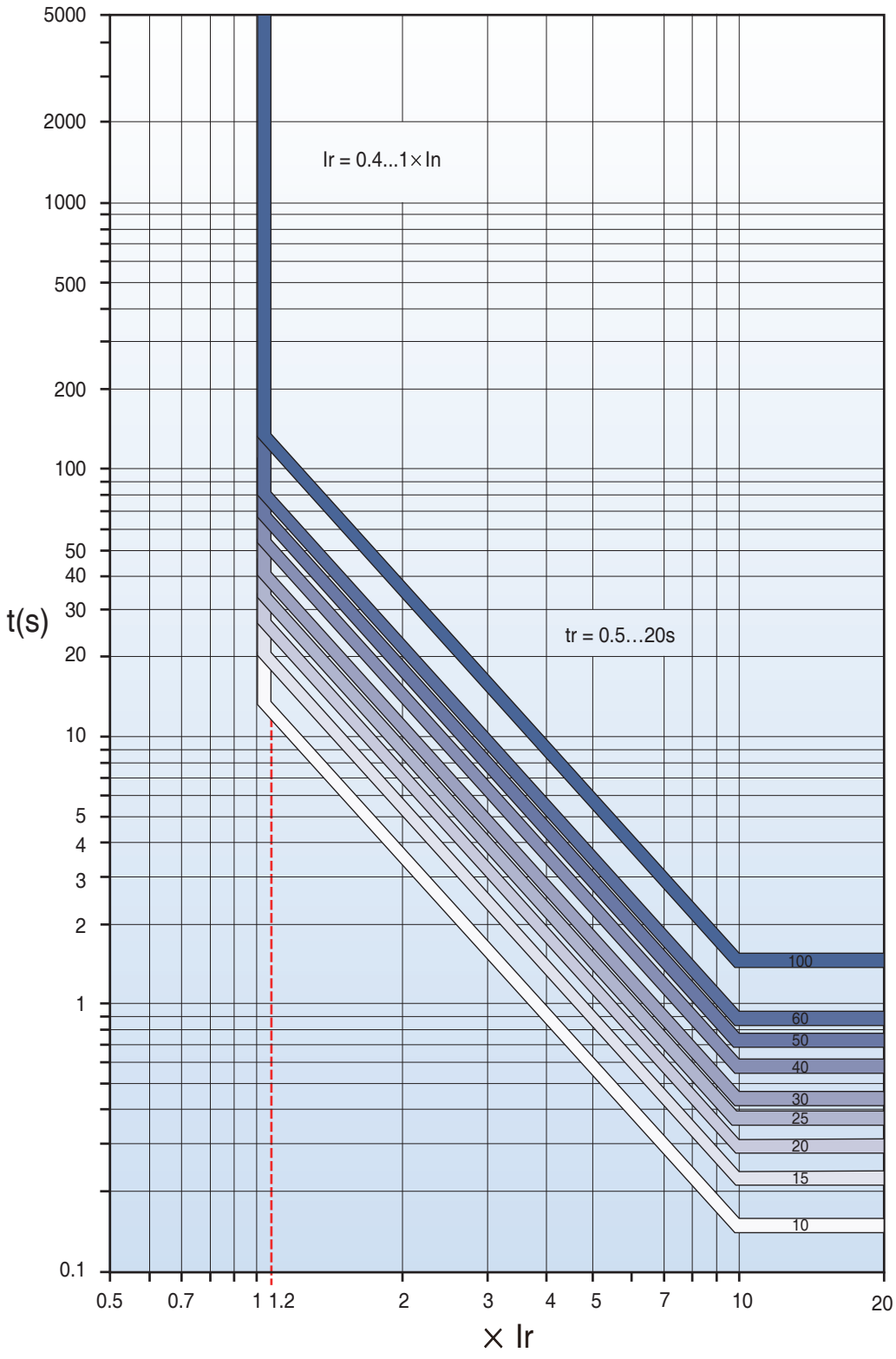
- Operation mode: Differential
- Distance: Max. 1.2km
- Cable :
  General RS-485 shielded twist
  2-pair cable
- Baud rate :
  9600bps, 19200bps, 38400bps
- Transmission method: Half-Duplex
- Termination: 100Ω

※ RS485 communication precautions
1) Operation mode and maximum communication distance:
   Support up to 1.2km in differential mode.
2) Communication line and cable specification:
   Use universal AWG22, twisted shield par cable.
3) Please make sure to ground the shield of the communication line.



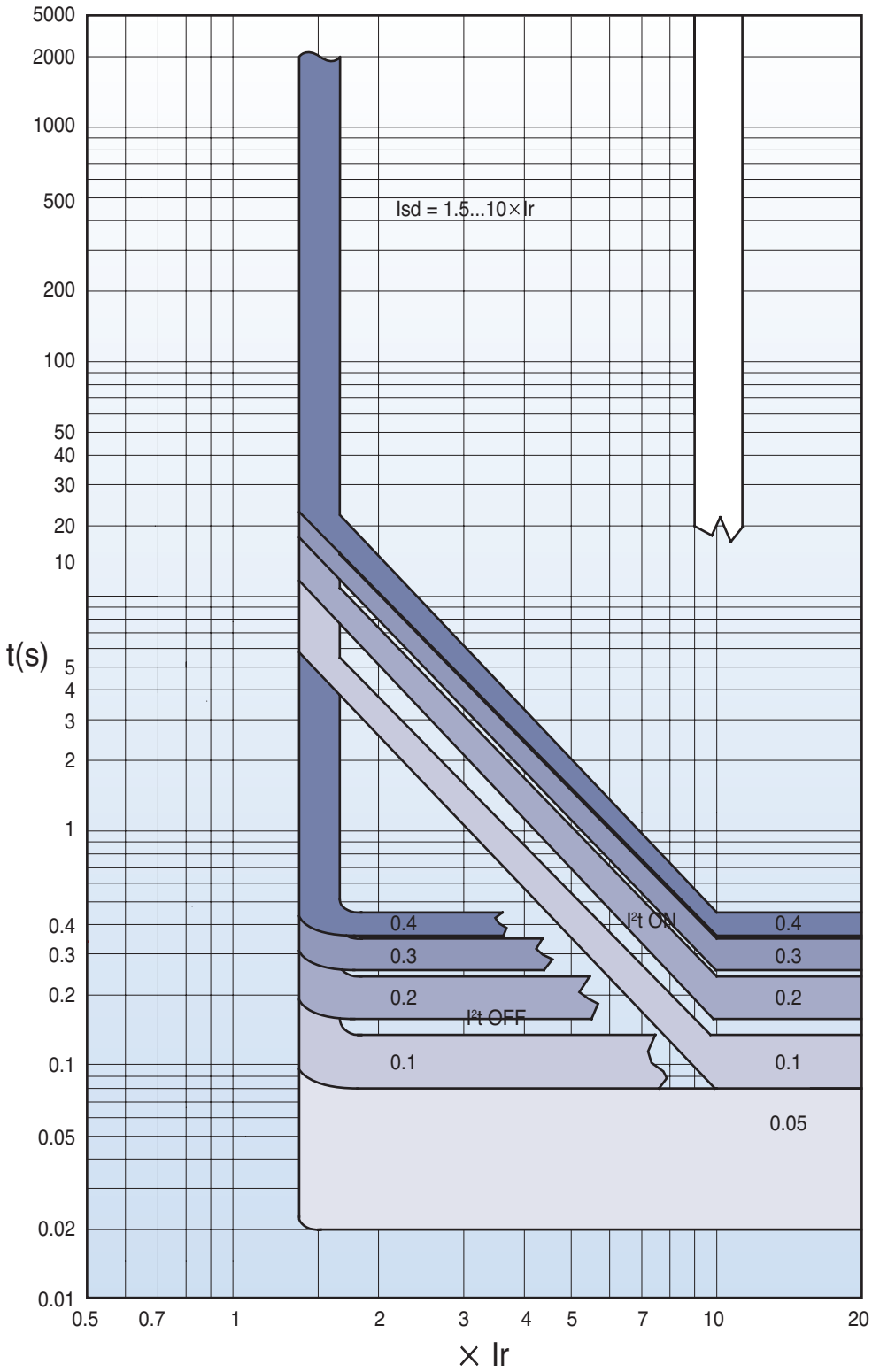
Characteristics curves

Long-time delay (L)



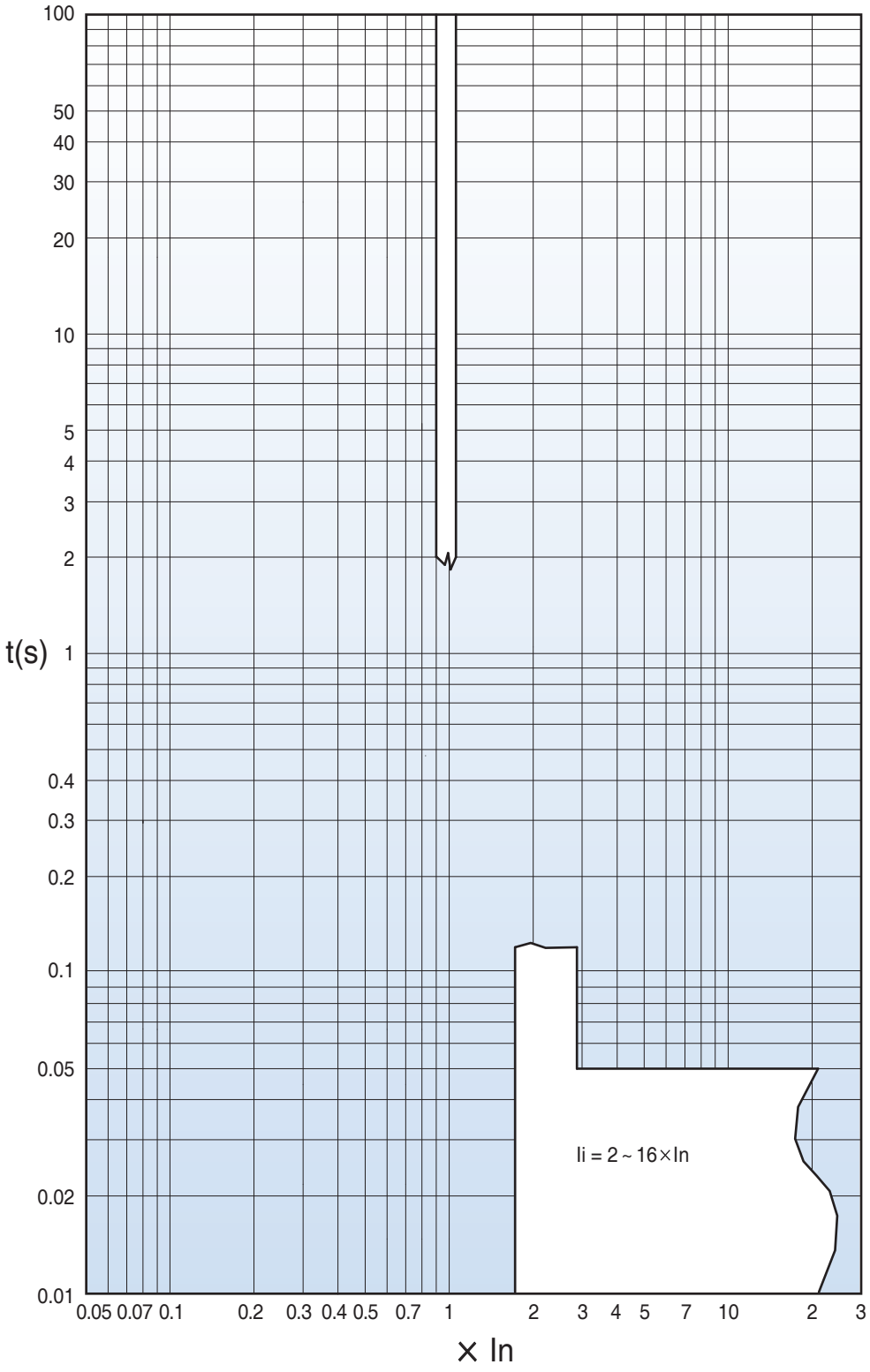
Characteristics curves

Short-time delay (S)



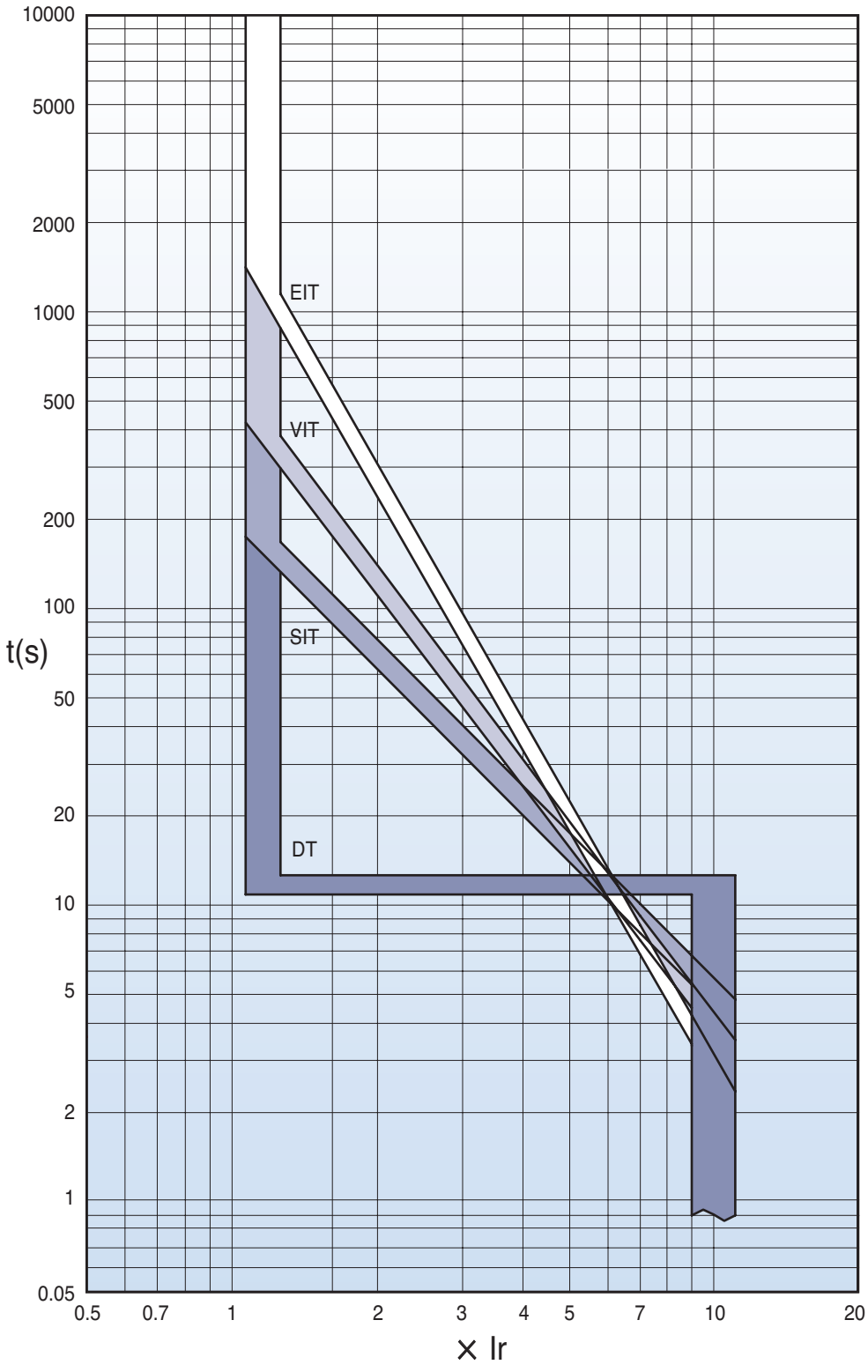
Characteristics curves

Instantaneous (I)



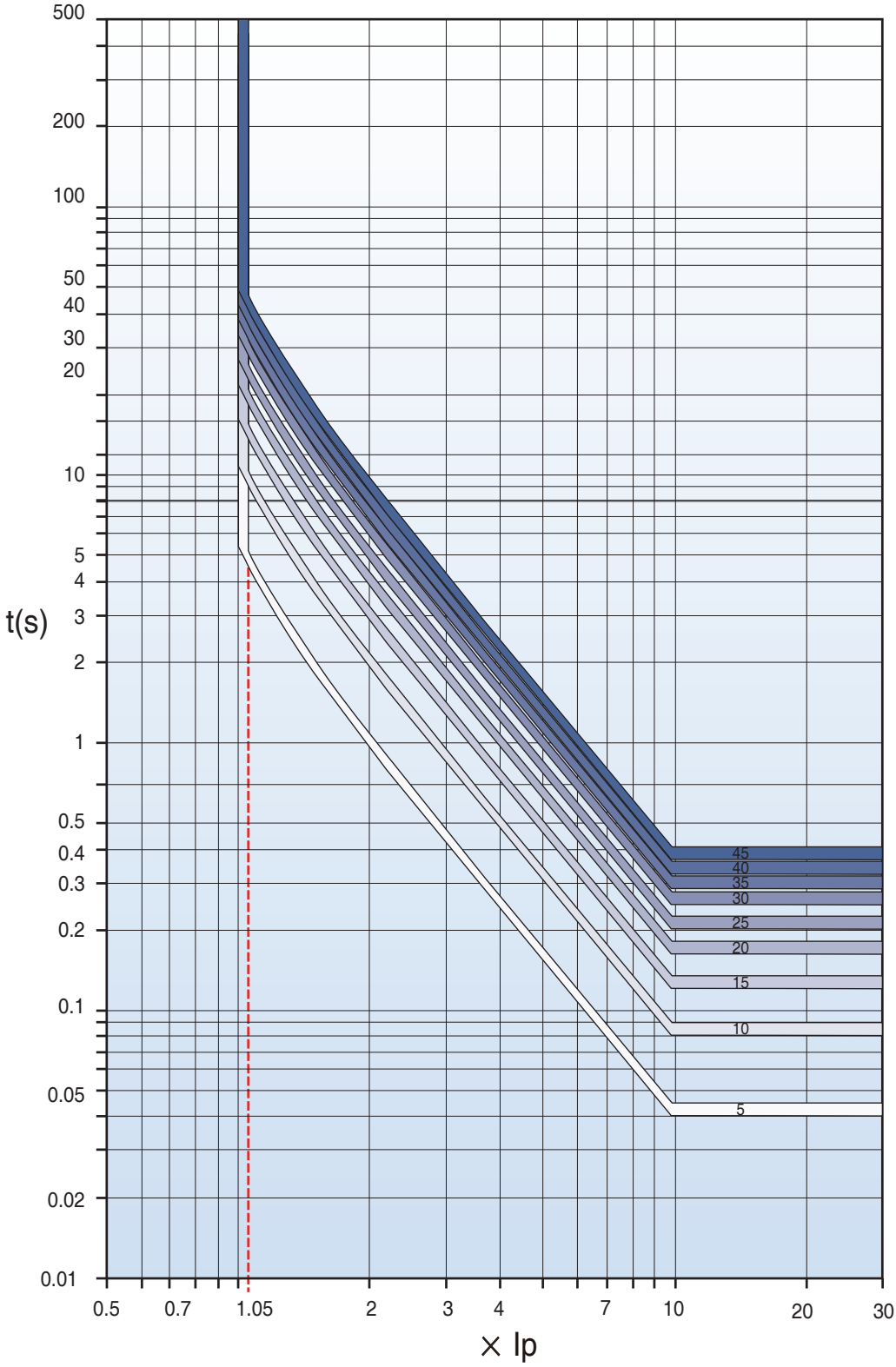
Characteristics curves

IDMTL

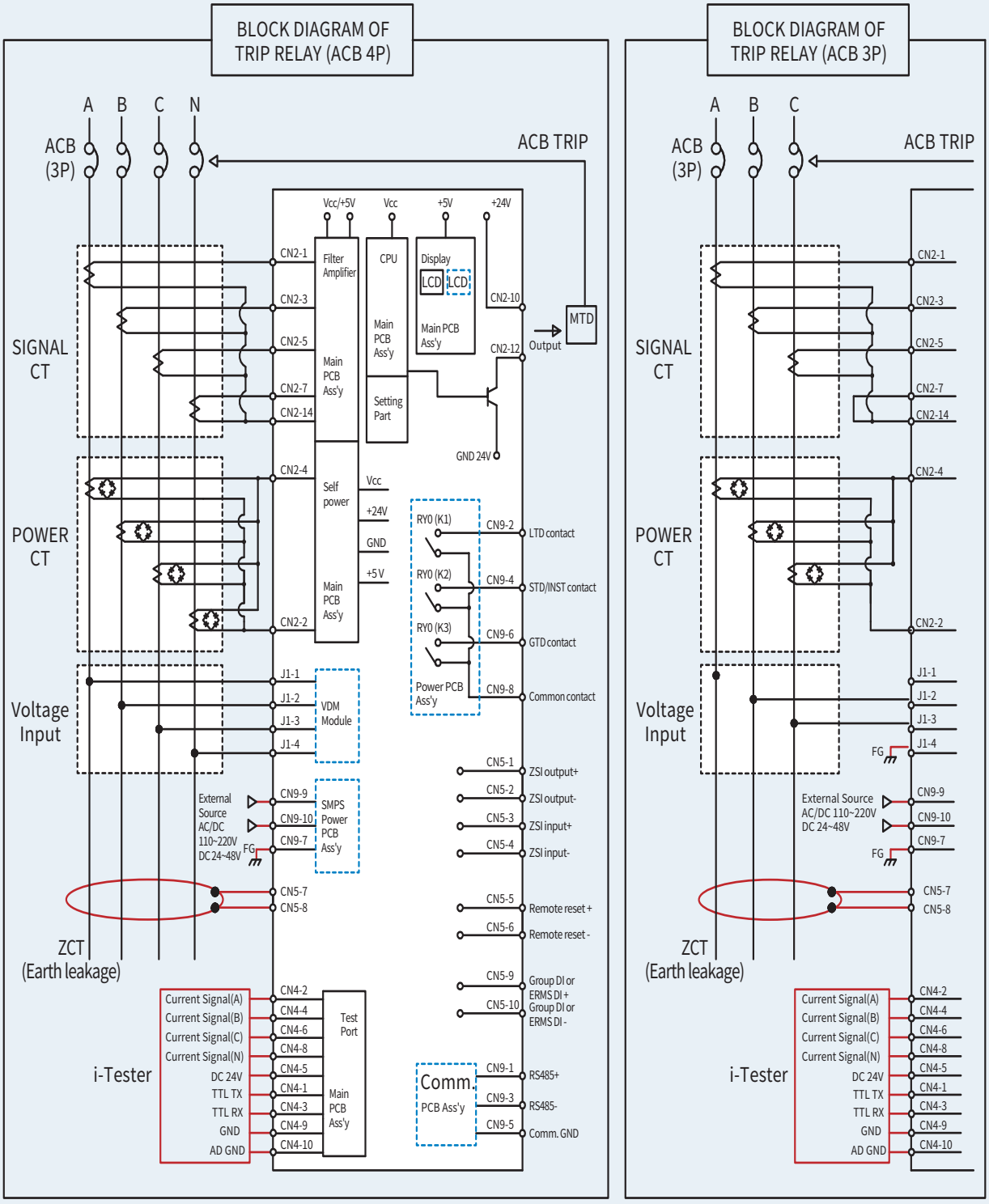


Characteristics curves

Pre Trip Alarm



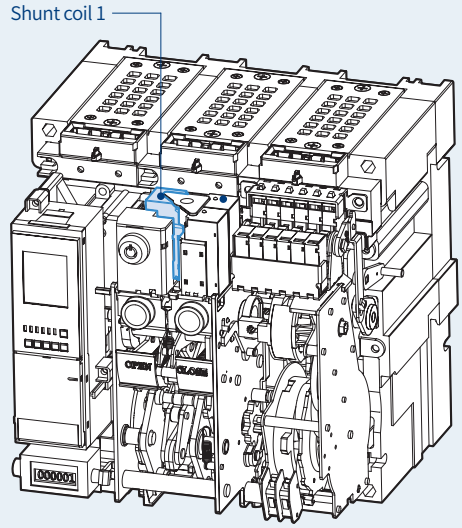
System block diagram(STU)



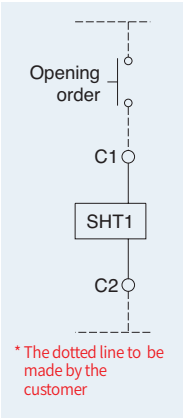
Accessories

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

■ 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	Less than 40ms under
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).

■ Specification of the wire

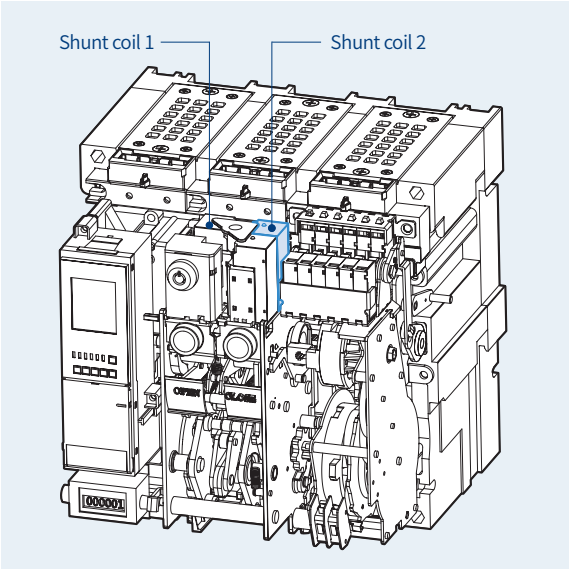
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

The maximum wire length

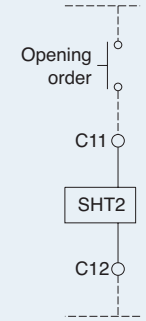
		Rated voltage (Vn)			
		DC 24~30V		DC / AC 48V	
Wire type		#14 AWG (2.08mm²)	#16 AWG (1.31mm²)	#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

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.



* The dotted line to be made by the customer

Wiring Diagram

■ 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	Less than 40ms
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).

■ Specification of the wire

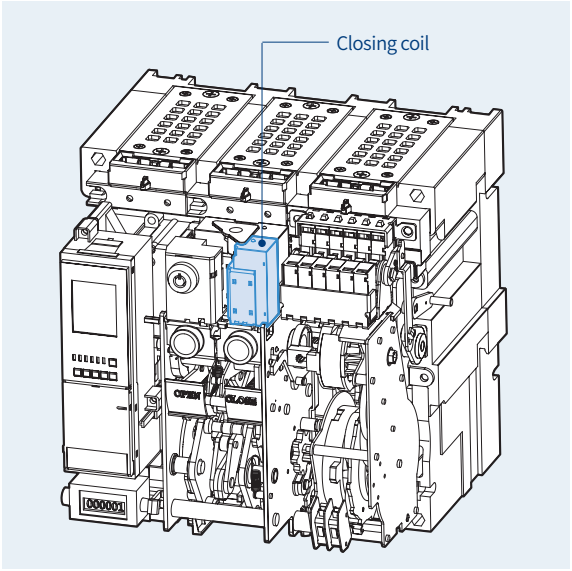
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

The maximum wire length

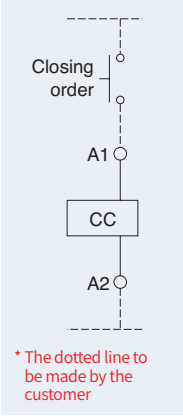
		Rated voltage (Vn)			
		DC 24~30V		DC / AC 48V	
Wire type		#14 AWG (2.08mm²)	#16 AWG (1.31mm²)	#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

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

■ Rated voltage and characteristics of Closing coil

Rated voltage (Vn)		Operating voltage range (V)	Power consumption (VA or W)		Closing time
DC (V)	AC (V)		Inrush	Steady-state	
24~30	-	0.85~1.1 Vn	200	5	Less than 80ms/90ms under
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 standard for each rated voltage (Vn).

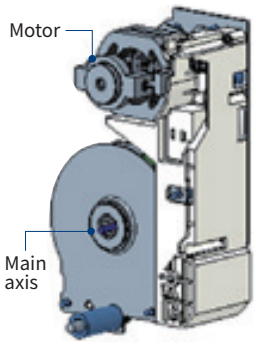
■ Specification of the wire

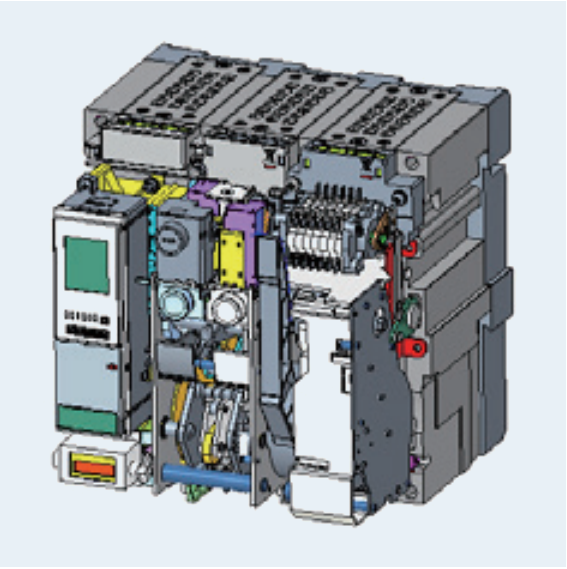
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC / AC 48~60V of rated voltage.

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 5sec.					
Dielectric strength	2kV/min					
Using temperature range	-20°~ 60°					
Using humidity range	Max. RH 80% (No dew condensation)					
Charge switch	10A at 250VAC					

Susol

Type	AH-D	AH-E	AH-G
Endurance	20,000	15,000	10,000

Metasol

AN, AS-D	AN, AS-E	AS-F	AS-G
20,000	15,000	10,000	10,000

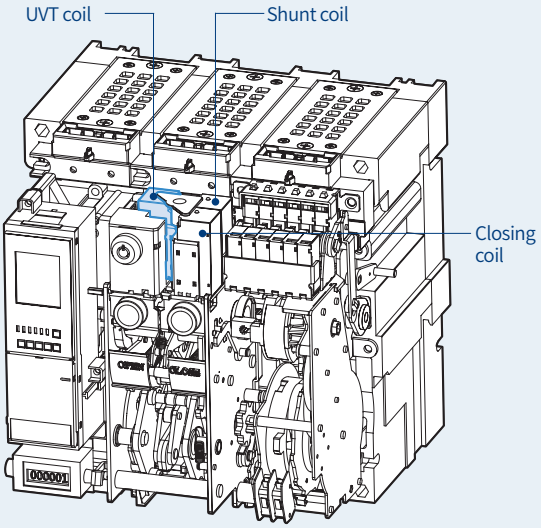
* Unit: Cycle (Frequency 2 cycles/ min)

Charge Switch [CS1]

Charge Switch Communication [CS2]

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.

■ 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	Less than 50ms
48~60	48					
100~130	100~130					
200~250	200~250					
-	380~480					

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

■ Specification of the wire

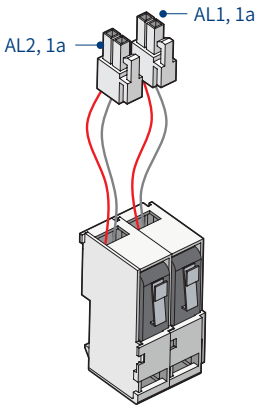
- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30V or DC/AC 48~60V of rated voltage.

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%	48.5m	30.5m	233.2m	143.9m
	85%	13.4m	8.8m	62.5m	39.3m

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

Trip Alarm Contact [AL]



- When a circuit breaker is tripped by Trip Relay which operates against the fault current , Trip Alarm switch provides the information regarding the trip of circuit breaker by sending the electrical signal from the mechanical indicator on front cover of main circuit breaker or internal auxiliary switch. (Installed at the inside of circuit breaker)
- When a circuit breaker tripped by fault current, a mechanical trip indicator (MRB, Manual Reset Button) pops out from the front cover and the switch (AL) which sends control signal electrically is conducted to output the information occurred from fault circuit breaker.
- MRB and AL can be operated only when tripping by Trip Relay, but doesn't be operated by Off button and OFF operation of trip coil.
- To re-close a circuit breaker after a trip, press MRB to reset it for closing.
- 2pcs of electrical trip switch (AL1, AL2, 1a) are provided (Option)
- Trip alarm contact and MRB(Manual reset bottom) need to be purchased together.

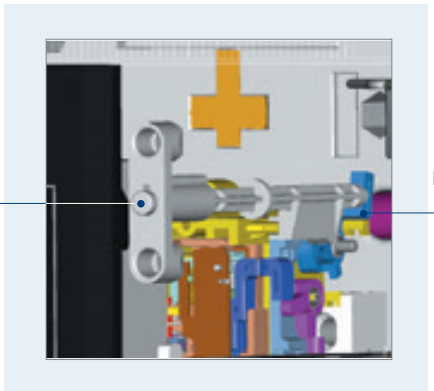
■ Electrical characteristics of trip alarm contact

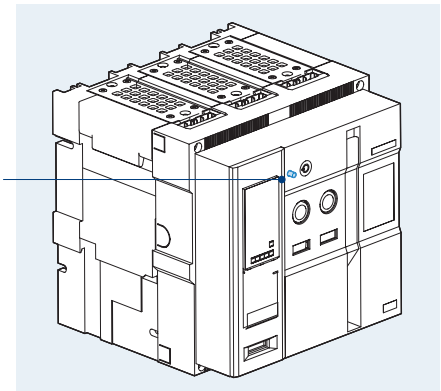
Rated voltage (V)	Non-inductive load (A)		Inductive load (A)		Inrush current
	Resistive load	lamp load	Inductive load	Motor load	
8V DC	11	3	6	3	MAX. 24A
30V DC	10	3	6	3	
125V DC	0.6	0.1	0.6	0.1	
250V DC	0.3	0.05	0.3	0.05	
250V AC	11	1.5	6	2	

Manual Reset Button [MRB]



- It is a function which resets a circuit breaker manually when a circuit breaker is tripped by Trip Relay.
- When a circuit breaker tripped by fault current, a mechanical trip indicator (MRB, Manual Reset Button) pops out from the front cover and the switch (AL) which sends control signal electrically is conducted to output the information occurred from fault circuit breaker.
- MRB can be operated only by Trip Relay but not by OFF operation of circuit breaker. To re-close a circuit breaker after a trip, press MRB to reset it for closing.



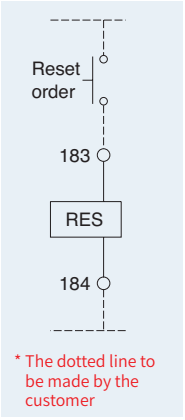


Note) The manual reset button is protruded in the event of trip.

Accessories

Remote Reset Switch [RES]

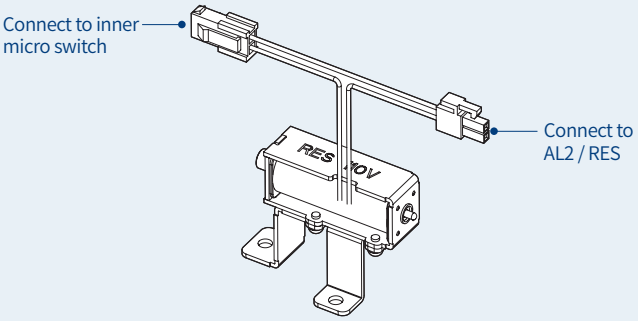
- Following tripping, this function resets the "fault trip" alarm contacts (AL) and the mechanical indicator (MRB) and enables circuit breaker closing.
  Push button switch: AC 125V 10A, AC 250V 6A, DC 110V 2.2A, DC 220V 1.1A Resistive load
- In case of auto reset type circuit breaker
  Following tripping, 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

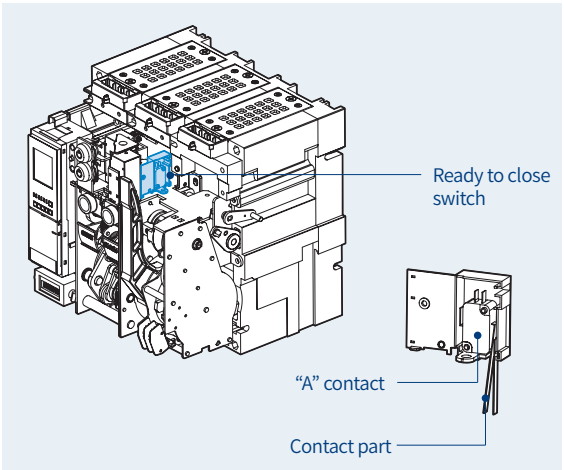
■ Rated voltage and rated current of RES

Rated voltage (V)	Operating current (Max.)		Operating time	Inrush current
AC 110~130V	AC	6A	Less 40ms	#14 AWG (2.08 mm²)
DC 110~125V	DC	5A		
AC / DC 200~250V	AC	3A		#16 AWG (1.31 mm²)
	DC	2.5A		



Ready to Close Switch [RCS]

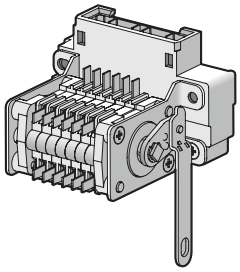


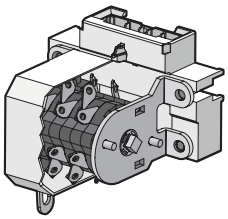


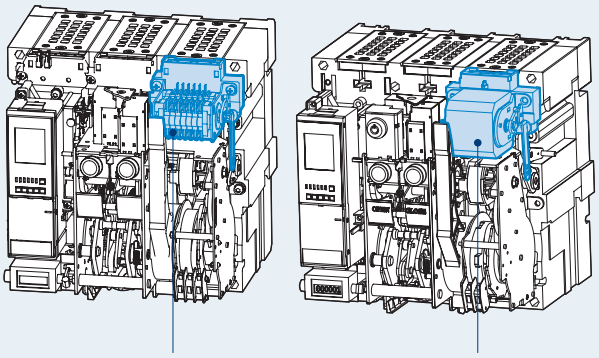
- RCS operates with the mechanism of the Breaker
- It indicates the status of the Breaker that is ready for closing operation.
- When mechanism is in OFF and Charged position, the contact closes which indicates that mechanism is ready to be closed.

Classification	Standard		Remark
Contactor Capacity	250/125 Vac	10 A	
	250 Vdc	0.3 A	
	125 Vdc	0.6 A	
	48 Vdc	3 A	
	24 Vdc	5 A	

Auxiliary switch [AX]



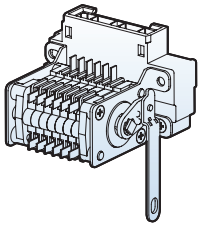
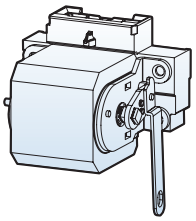




• It is a contact used to monitor ON/OFF position of ACB from remote place.

AUX. contact & charging types	
AX	Standard OFF charge 3a3b
AC	Standard ON charge 3a3b
BX	Standard OFF charge 5a5b
BC	Standard ON charge 5a5b
HX	High capacity OFF charge 5a5b
HC	High capacity ON charge 5a5b
CC	Standard ON charge 6a6b
JC	High capacity ON Charge 6a6b
GX	High capacity OFF charge 3a3b
GC	High capacity ON charge 3a3b

Standard classification

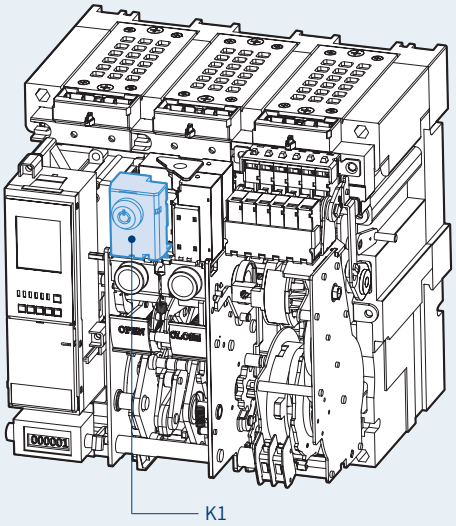
Standard		High capacity	
2000, 5000AF	4000, 6300AF	2000, 5000AF	4000, 6300AF
			

Classification			Standard		High capacity		Remark
			Resistive load	Inductive load	Resistive load	Inductive load	
Minimum current			DC24V, 5mA		DC5V, 1mA		
Contact capacity	AC	490V	5A	2A	5A	2.5A	
		250V	10A	6A	10A	10A	
		125V	10A	6A	10A	10A	
	DC	250V	0.3A	0.3A	3A	1.5A	
		125V	0.6A	0.6A	10A	6A	
		30V	10A	6A	10A	10A	
No. of Contact that can be used		AX	3a3b	-	-	-	Standard charging type
		BX	5a5b	-	-	-	
		HX	-	-	5a5b	-	
		GX	-	-	3a3b	-	
		AC	3a3b	-	-	-	Rapid auto-reclosing charging type
		BC	5a5b	-	-	-	
		CC	6a6b	-	-	-	
		HC	-	-	5a5b	-	
		JC	-	-	6a6b	-	
		GC	-	-	3a3b	-	

Accessories

Key Lock [K1]

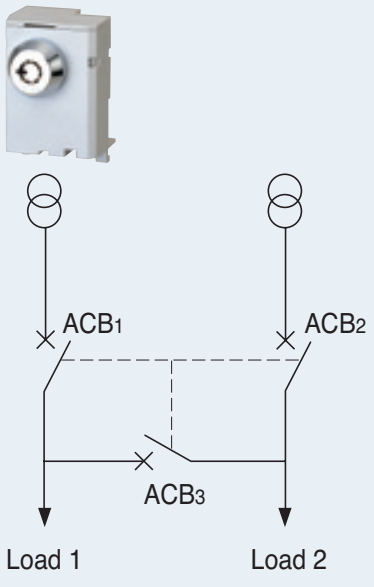




- It is a device for locking which prevents a certain circuit breaker from being operated by user's discretion when two or more circuit breakers are used at the same time.
- K1: Preventing mechanical closing

Key Interlock Set [K2]

Wiring



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

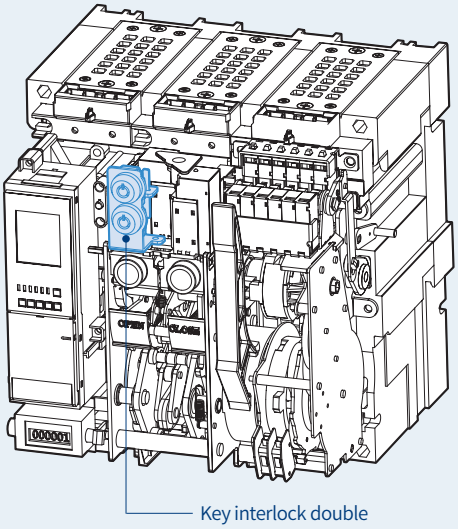
* How to order: 3 breakers must be ordered as a set, and K2 description must be added to the additional breakers. (2 keys are provided per 3 breakers.)

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

○ : Release ● : Lock

Double Key Lock [K3]

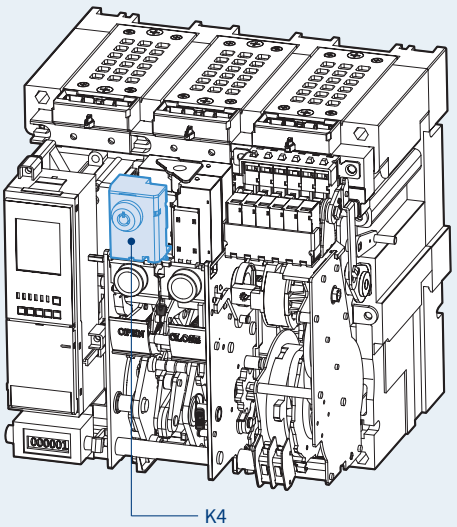




- When only two keys are released at the same time, circuit breakers operate.
  Handling method is same as K1.

Key Lock [K4]





- This keylock accessory provides a key which has same serial number.
- All ACBs with “K4” in the product description receive the same key.

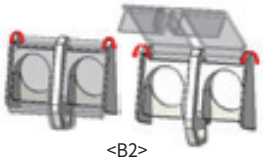
Accessories



<B>

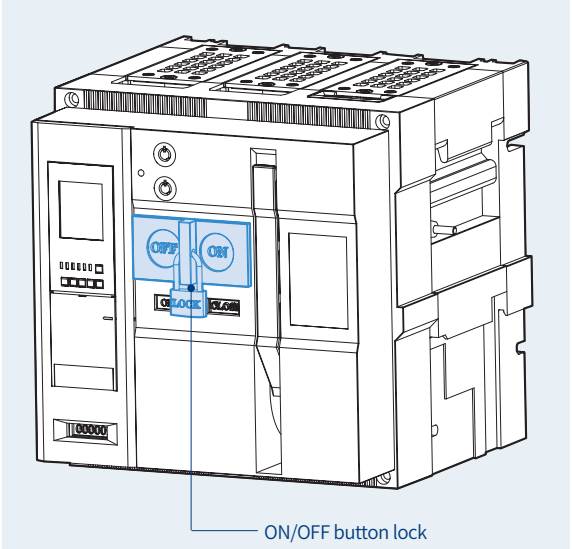


<B1>



<B2>

ON/OFF Button Lock [B, B1, B2]



- It is to prevent manual operation of ACB's closing / tripping button due to user's unexpected action handling.
- It is impossible to handle ON / OFF operation under the "Button lock" status.
  - B type: Blocking the button when keylock activated with padlock
  - B1 type: Blocking the button and pushing 'OFF' button when keylock activated with padlock
  - B2 type: Blocking the button when keylock activated without padlock.

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

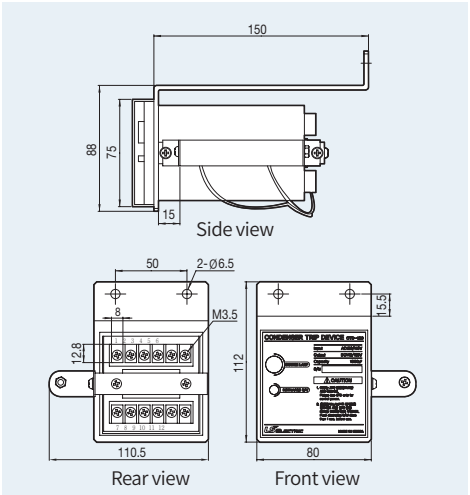


Condenser Trip Device [CTD]

- 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.

External dimension

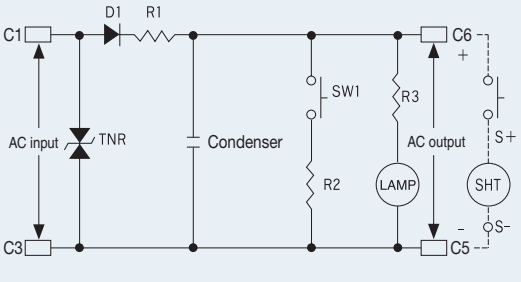
Unit (mm)



Ratings

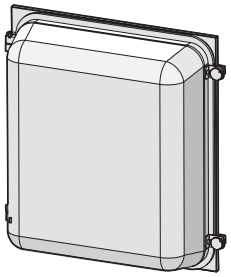
Ratings	Specification	
Model	CTD-100	CTD-200
Rated input voltage (V)	AC 100/110	AC 200/220
Frequency (Hz)	50/60	50/60
Rated charge voltage (V)	140/155	280/310
Charging time	Within 5s	Within 5s
Trip possible time	Over 3 min	Over 2 min
Range of Input voltage (%)	85~110	85~111
Condenser capacity	1000μF	560μF

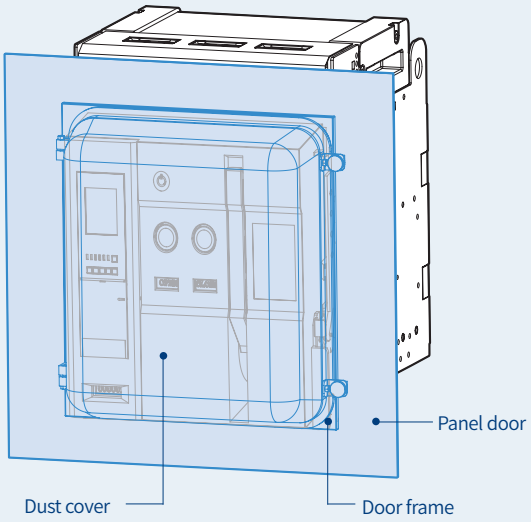
Circuit diagram



------ User wiring

Dust Cover [DC]

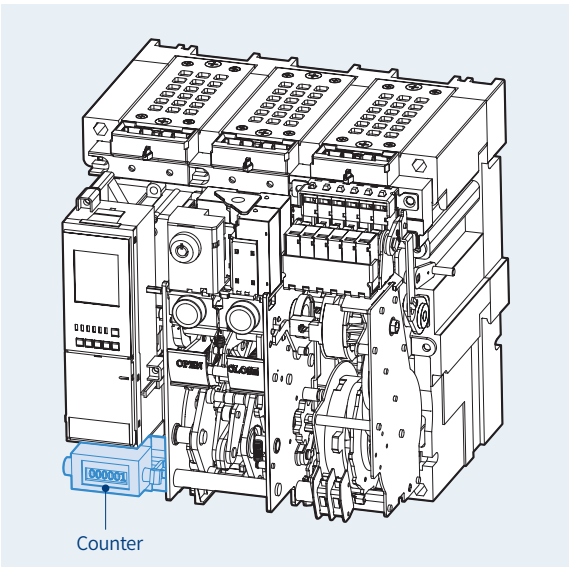




- Attach it to the door frame.
- It protects the product dust and moisture that may affect the operation of the instrument at the same time (IP54) which may cause fault operation and enhances the sealing degree by being mounted to protrude type of panel.
- It is transparent so that the front side of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

Counter [C]

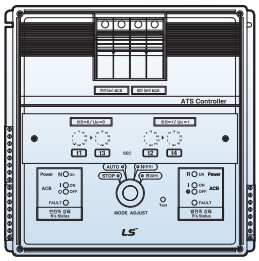




- It displays the total number of ON / OFF operation of ACB.

Accessories

Automatic Transfer Switch Controller [ATS]



Ratings

Model type	ATSC-110	ATSC-220
Rated voltage	AC 110V	AC 220V
Voltage range	AC 93.5 (±5%) ~126.5V (±5%)	AC 187 (±5%) ~ 253V (±5%)
Frequency	50Hz/60Hz	
Power consumption (apparent power)	15.4W	
4-location switch (stop, N, R, Auto)	■	■
Time setting (t1~t4)	■	■
Fault function (Trip Relay/Circuit breaker trouble)	■	■
Output contact (Auto, Load burden)	■	■

- t1: The delayed time from when UN (power supply of electric company) is tripped to when generator start-up signal contact is closed. (t1: 0.2, 0.5, 1, 2, 4, 8, 15, 30, 40, 50secs)
- t2: The delayed time from when UN is closed to when ACB2 is tripped. (t2: 0.2, 1, 2, 4, 8, 15, 30, 60, 120, 240secs)
- t3: The delayed time from when ACB1 is tripped to when ACB2 is closed. (t3: 0.5, 1, 2, 5, 10, 15, 20, 25, 30, 40secs)
- t4: The delayed time from when ACB2 is tripped to when ACB1 is closed. (t4: 0.5, 1, 2, 5, 10, 15, 20, 25, 30, 40secs)
- Stop-mode: This mode is for compulsory trip of ACB1(electric power company) or ACB2 (power station) when UN (power supply of electric power company) or UR (power supply of power station) is available.
  *UN or UR should be kept in ON position
- N-mode: This mode is for compulsory closing of ACB1 when UN is available.
  * it does not matter to be ON or OFF position of UR and if converting to N-mode while using UR, generator start-up signal contact is opened.
- R-mode: This mode is for compulsory closing of ACB2 during the use of UR regardless of that UN is available or not.
- Auto-mode: This mode is for transferring a circuit breaker automatically to available power supply of UN or UR. In short, it trips the circuit breaker where power supply is not available and it close the circuit breaker where power supply is available.

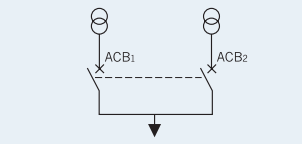
Example

Two ACBs are connected (ATS controller is available)

If one of connected ACB is “ON” status, the other cannot be “ON” through the mechanical/electrical interlock.

• Status

ACB_1	ACB_2
OFF	OFF
ON	OFF
OFF	ON



• Bar type ATS: Applicable models for each frame.

	Susol ACB	Metasol ACB
Frame	AH	AS
	20D3/20D4/40E3	20D3/20D4/40E3
	32E4	40E4/50F3
	63G3	50E4/63G3
	63G4	63G4

• Wire type

It is possible to interlock between devices without ampere frame and Number of Poles.
The standard type(2 ACBs) provides 2m wire. In case of special type(3 ACBs) provides 2.3m wires.

• Dimension of ATS is page 134 to 138.

• The control circuit of ATS controller is page 110 to 111.



<Wire Type>



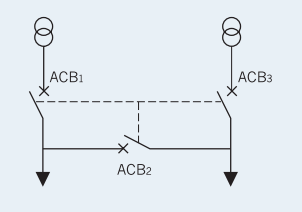
<Bar Type>

Three ACBs are connected(ATS controller is not available)

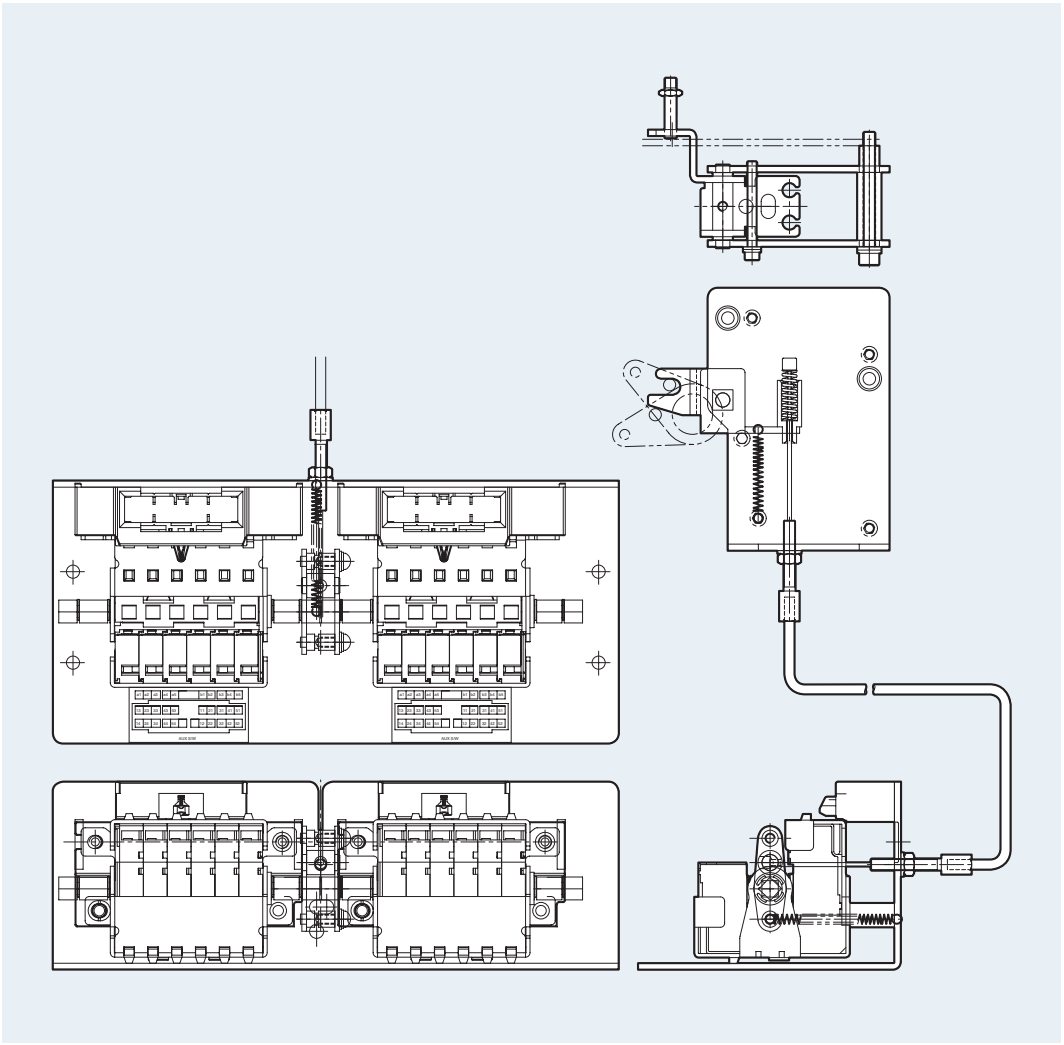
If any two of connected ACB is “ON” status, the other cannot be “ON” through the mechanical/electrical interlock.

• Status

ACB_1	ACB_2	ACB_3
OFF	OFF	OFF
ON	OFF	OFF
ON	ON	OFF
OFF	ON	ON
OFF	OFF	ON
OFF	OFF	ON



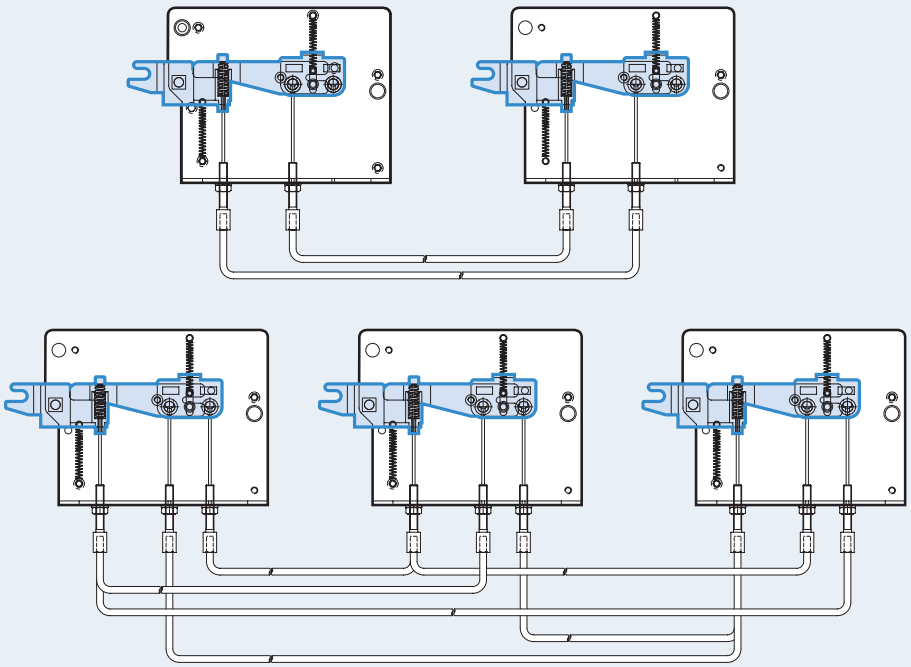
Mechanical Operated Cell Switch [MOC]



- 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.
- The contact capacity is as same as the ratings of aux. contacts.
- When MOC link is installed to cradle, MOC can be equipped with the inside of panel.

Mechanical Interlock [MI]

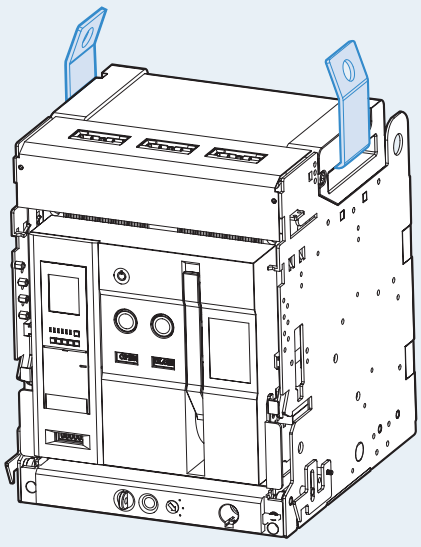




- It is used to interlock closing and trip between two or three breakers mechanically so as to prevent unintended operation at the same time.
- Wire type interlock can be applied upto 3 breakers

Lifting Hook [LH]





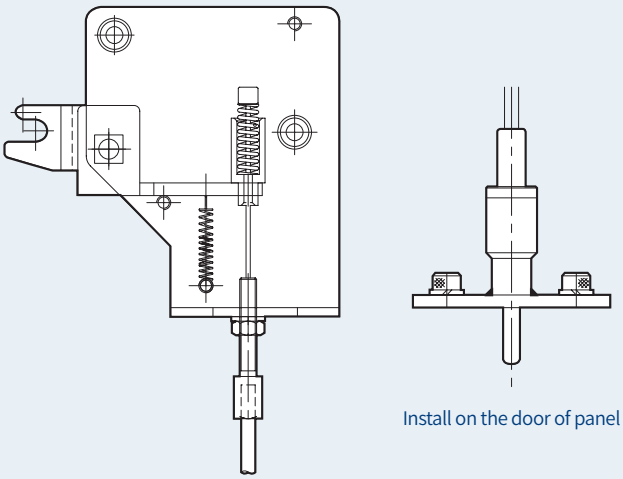
- Device that makes an ACB easy to lift.
- Please hang it to both handles of the arc cover.

* D/E-Frame: Necessary to purchase separately.
** F/G-Frame: Provide by default when purchasing ACB.
*** Required to order 2ea for use.

Accessories

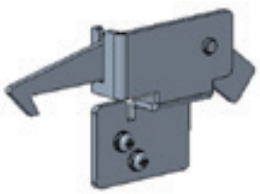
Door Interlock [DI]

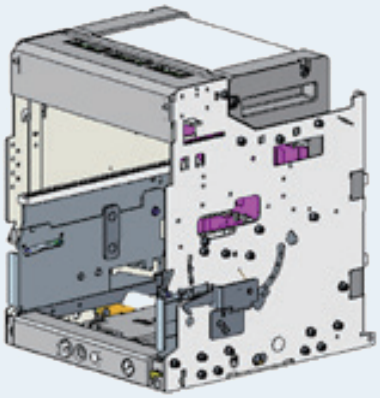
Normal type



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

Catch type





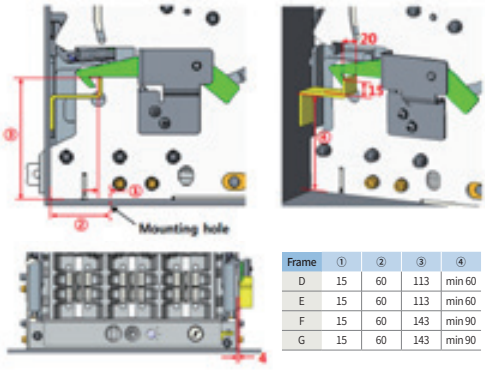
- Door interlock catch type is installed to cradle which allow to open panel door when the breaker is on the ‘Disconnected’ position.

Circuit breaker	Disconnected	Test	Connected
Panel door	Open	Close	Close

- It is possible to choose Left/Right type which depends on the door direction.

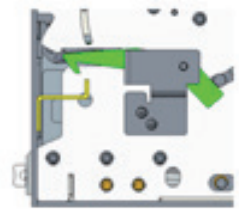
Catch type guide

1. The panel door will not be open when the circuit break in on the ‘Test’ or ‘Connected’.



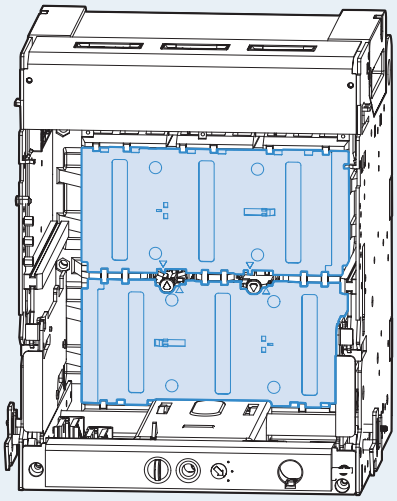
Frame	①	②	③	④
D	15	60	113	min 60
E	15	60	113	min 60
F	15	60	143	min 90
G	15	60	143	min 90

2. The panel door will be open when the circuit break in on the 'Disconnected'



Safety Shutter [ST]



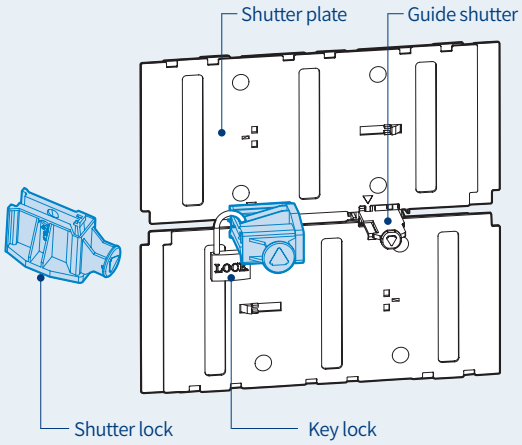


- It is the automatic safety device to protect the connectors of main circuit by cutting off dangerous contact from outside while the breaker is drawn out. When the ACB is drawn in, the shutter is automatically opened.
- There are 4 types of Safety Shutter and they are divided as shown in figure below.

The types of safety shutter plate	
2000 / 5000AF, 3P	4000 / 6300AF, 3P
	
2000 / 5000AF, 4P	4000 / 6300AF, 4P
	

Safety Shutter Lock [STL]





- It is a locking device which prevents safety shutter from being opened when it is closed.
  → If shutter lock is connected with guide shutter, the guide shutter can not be pushed structurally.
  Thus, it is not available to open the safety shutter.

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

Accessories

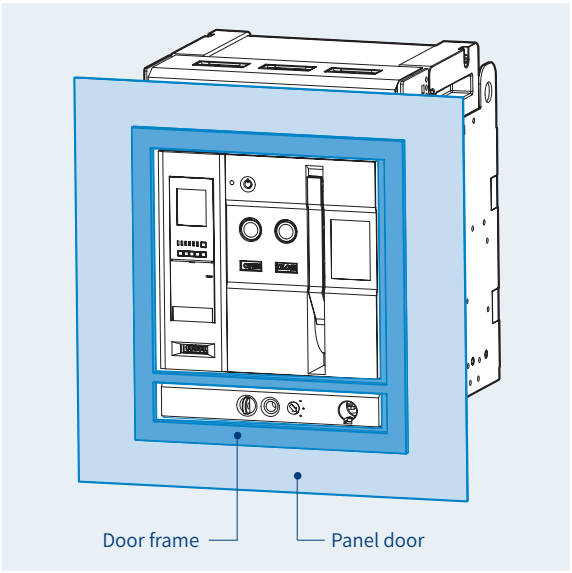
Door Frame [DF]



Fixed type



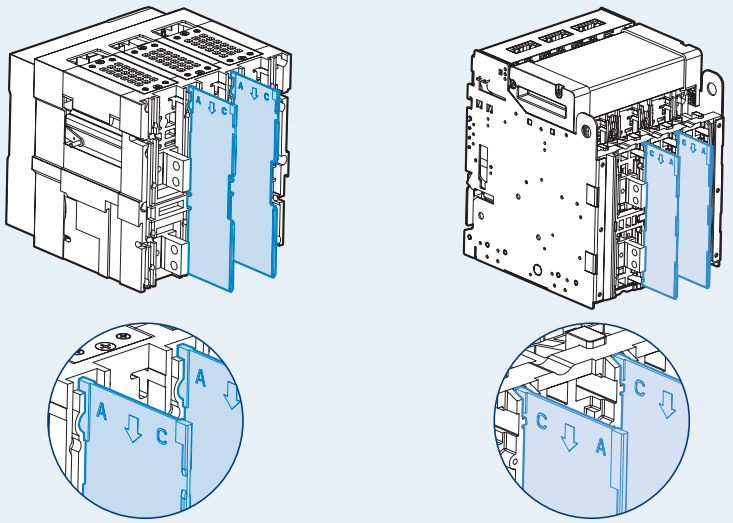
Draw-out type



- 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]



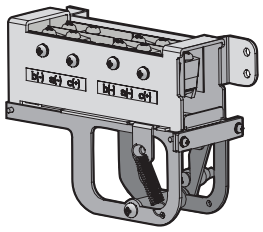


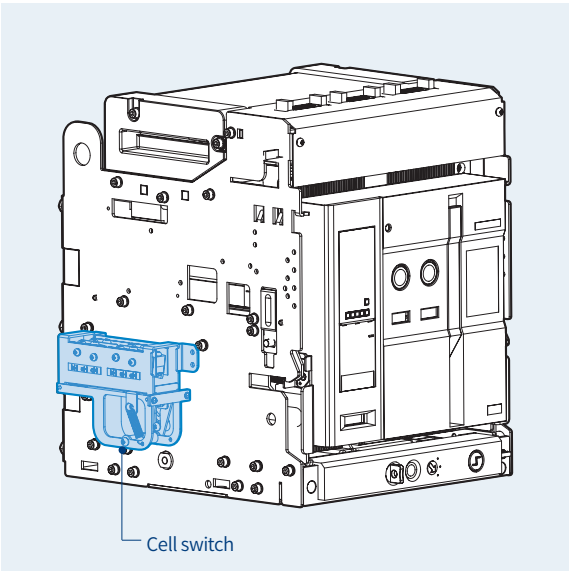
Fixed type

Draw-out type

- Interphase barrier prevents the arc which may arise and result in short-circuit between phases in advance
- As “C” stands for “CRADLE”, install the Interphase barrier in the direction of “C” in case of Draw-out type.
- As “A” stands for “ACB main frame”, install the Interphase barrier in the direction of “A” in case of Fixed type.

Cell Switch [CEL]





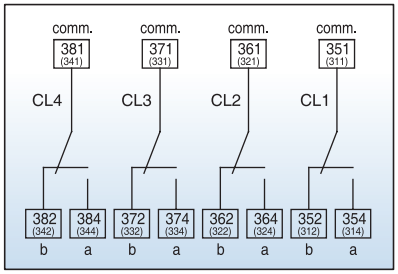
• It is a contact which indicates the present position of ACB. (CONNECTED, TEST, DISCONNECTED)

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

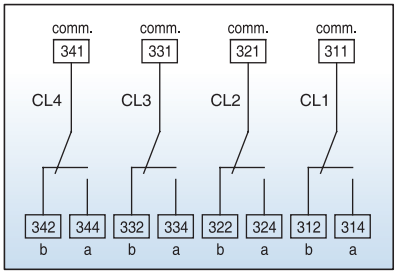
※ Contact configuration can be changeable if necessary.

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	460V	5		2.5
		250V	10		10
		125V			
	DC	250V	3		1.5
		125V	10		10
		30V	10		10
Contact number			4C		

Terminal (4C, 8C)

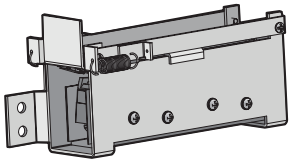


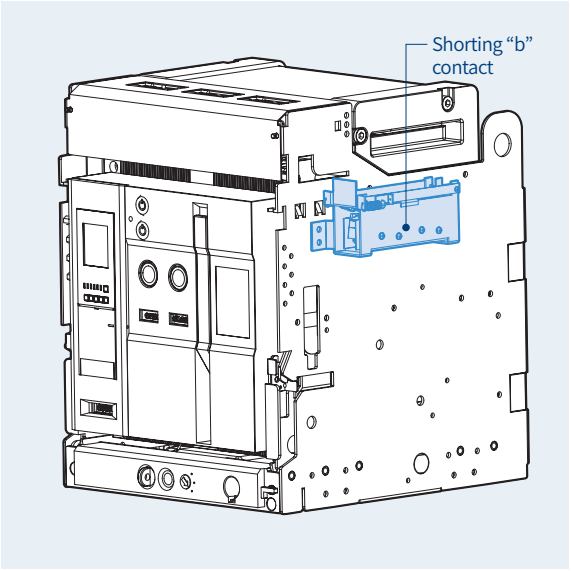
4C attached to the right side of cradle



4C attached to the left side of cradle

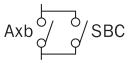
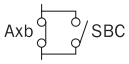
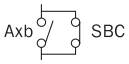
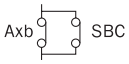
Shorting “b” Contact [SBC]





• It is the contact which keeps the external control circuit in normal by Aux. contact which disconnects “Axb” when ACB is moved from CONNECTED position to TEST position. The number of “shorting b-contact” corresponds to the number of “Axb” (4b)

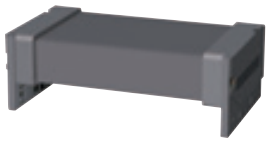
Contact condition (Link between Axb and shorting “b” contact)

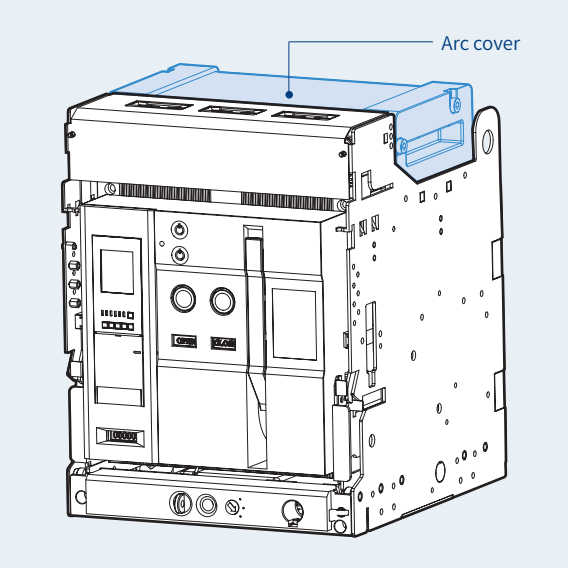
ACB position \ ACB condition	Close position [Auxiliary contact(Axb):OFF]	Open position [Auxiliary contact(Axb):ON]
Connected position (Shorting b contact : OFF)		
Test position (Shorting b contact : ON)		

Front connection terminal types

Connection type	Code	Description	Breaker
Front connection/Standard	62363461507	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN/AS/AH-D3	D3-Frame
Front connection/Standard	62363462510	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN/AS/AH-D4	D4-Frame
Front connection/Standard	62363463507	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN/AS/AH-E3	E3-Frame
Front connection/Standard	62363464512	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN/AS/AH-E4	E4-Frame
Front connection/Mixed	62363461508	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-D3	D3-Frame
Front connection/Mixed	62363462511	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-D4	D4-Frame
Front connection/Mixed	62363463506	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-E3	E3-Frame
Front connection/Mixed	62363464511	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-E4	E4-Frame

Zero Arc Space [ZAS]



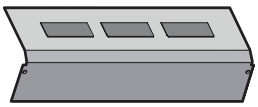


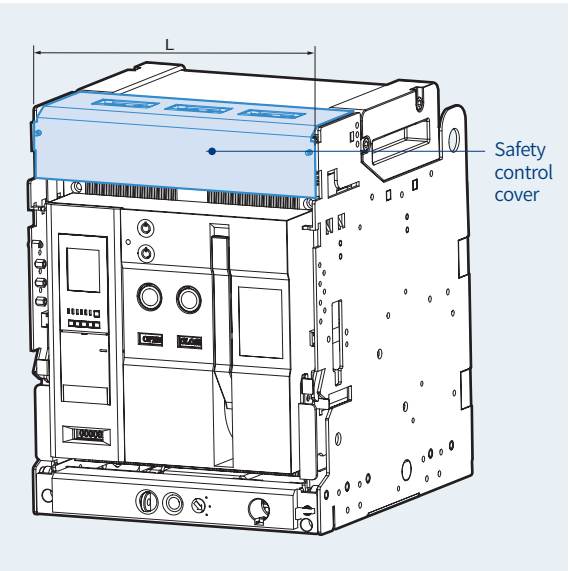
- Arc which may arise while breaking fault current is extinguished first by Arc chute in main body of circuit breaker and then completely extinguished by Arc cover.
  By preventing arc from exposing to the outside, it protects itself from all kinds of accidents.
- It is categorized into 8 types by ratings and poles.

Ampere frame	Cover length (mm)
2000AF 3P	281.4
2000AF 4P	366.4
4000AF 3P	359.4
4000AF 4P	474.4
5000AF 3P	576.4
5000AF 4P	746.4
6300AF 3P	732.4
6300AF 4P	962.4

* Zero Arc Space is only applicable for withdrawable type.

Safety Control Cover [SC]





- It protects control termina which exposes to the outside, and prevents the damages resulted from foreign substances.
- It is categorized into 8 types by ratings and poles.

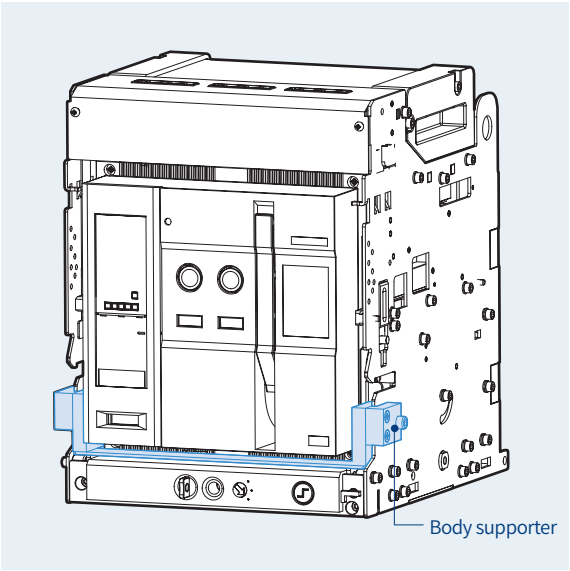
Ampere frame	Cover length (mm)
2000AF 3P	334
2000AF 4P	419
4000AF 3P	412
4000AF 4P	527
5000AF 3P	629
5000AF 4P	799
6300AF 3P	785
6300AF 4P	1015

- It is available only when the control block is in the mode of auto-connection.

Accessories

Body Supporter [BSP]

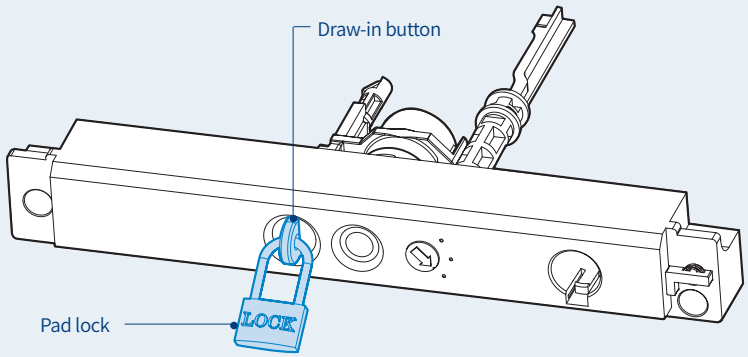




- It interlocks the main body of circuit breaker and cradle mechanically to fix the former in connected position.
  Therefore, all draw-in/outs are not available.

Pad Lock / Position Lock [PL]

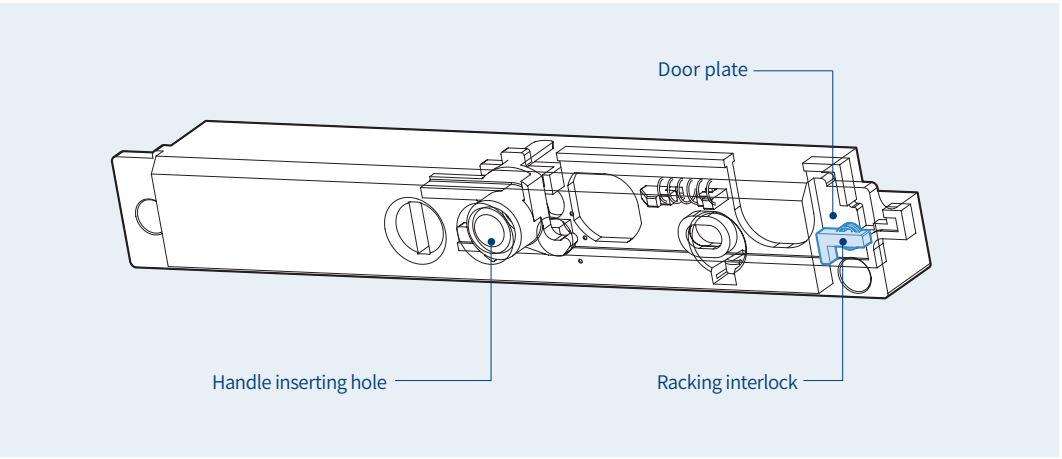




ACB is subject to restriction regarding moving in connected, test, disconnected when drawing in or out.
If main body of ACB is placed in 3 positions, it is locked and stopped when drawing in or out.

- 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 orout into the cradle.
- For the lock device, user has to purchase it. (Ø5 ~ Ø6)

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.

Handle [Long type]



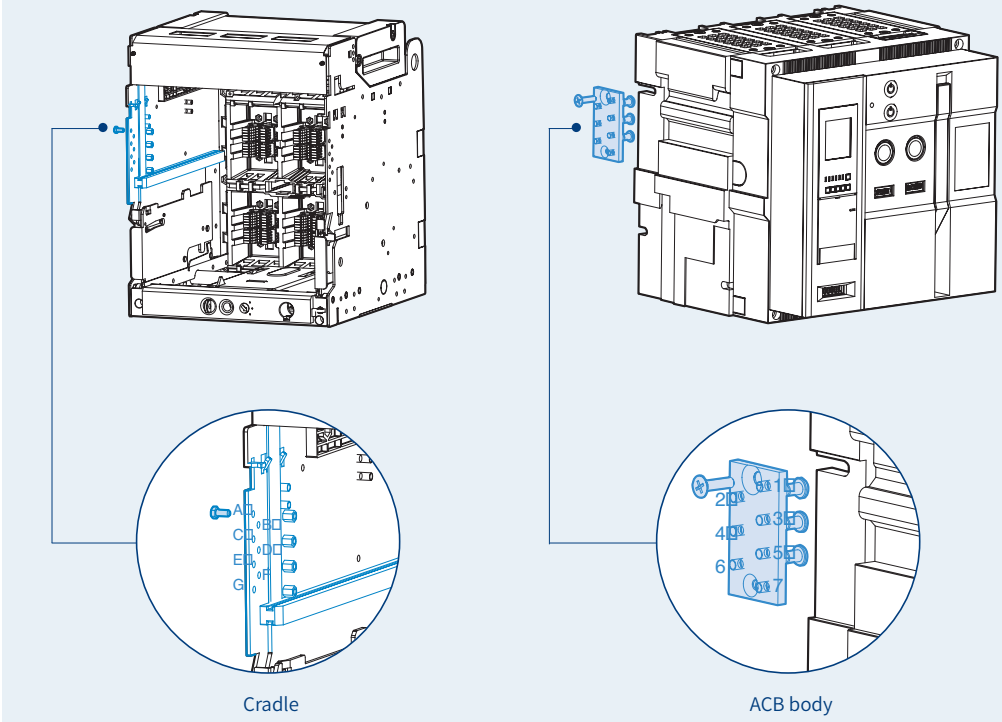
Order No. : 55223460402
Description : HANDLE ASS'Y, DRAW, LONG



Order No. : 55223460404
Description : HANDLE ASS'Y, DRAW, LONG, AL-D, E, F, G, HYX

Miss Insertion Prevent Device [MIP]



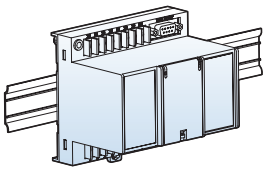


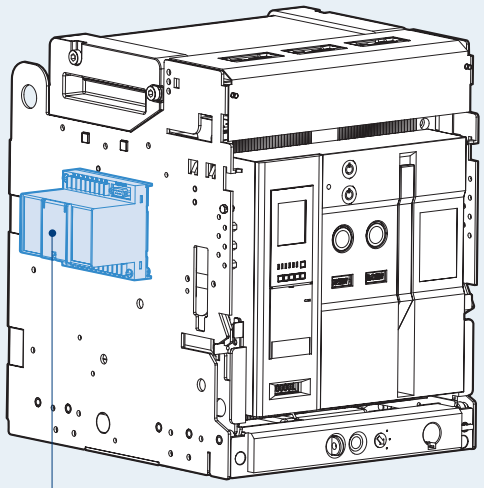
- When the main body of ACB is inserted to the cradle, if the ratings of ACB does not match with cradle, it mechanically prevents ACB from being inserted into cradle of ACB.
- The installation method is variable according to ratings.

Cradle	ACB	Cradle	ACB	Cradle	ACB	Cradle	ACB
ABCD	567	ADEF	237	ABEG	346	BCEG	146
ABCE	467	ADEG	236	ABFG	345	BDEF	137
ABCF	457	ADFG	235	ACDE	267	BDEG	136
ABCG	456	AEFG	234	ACDF	257	BDFG	135
ABDE	367	BCDE	167	ACDG	256	CDEF	127
ABDF	357	BCDF	157	ACEF	247	CDEG	126
ABDG	356	BCDG	156	ACEG	246	CEFG	124
ABEF	347	BCEF	147	ACFG	245	DEFG	123

UVT Time Delay Controller [UDC]







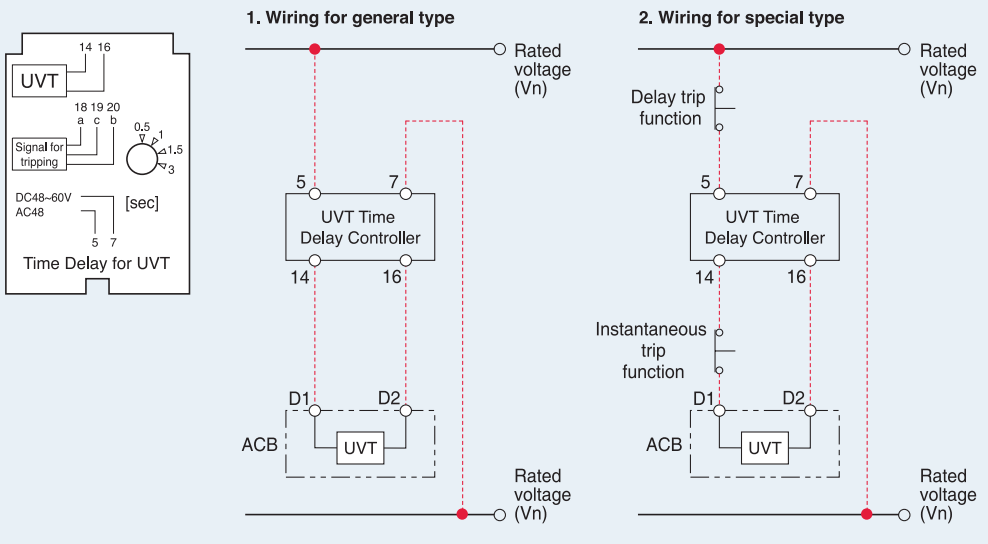
- UVT is a device which makes ACB tripped automatically to prevent the accident on load side due to under voltage or power breakdown.
  There are two types, Instantaneous type and time delay type.
- It can be installed on the rail or to the cradle.
- Instantaneous type: only available with UVT coil.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

■ 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					0.5, 1, 1.5, 3 (For 200V: 0.5, 1, 3, 5)
-	380~480					0.5, 1, 1.5, 3

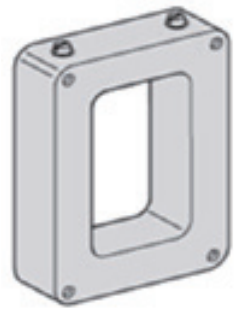
Note) 1. Operating voltage range is the min. rated standard for each rated voltage (Vn).
2. It will operate on time when the power is supplied enough to the UDC over the set of trip time.

■ Wiring



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

NCT (external Neutral Current Transformer)



The NCT(Neutral CT) allows to use following protecting functions when using 3-pole circuit breaker in WYE connection(3-phase, 4-line Y-line).

- Overload protection of neutral phase
- Residual Earth Fault protection

Note) The 4-pole circuit breaker does not need to this accessary because of the NCT is already included.

■ Application (STU type) :

STU Type		Communication & Protection
IEC	AO, PO, SO	Ground fault(External NCT) + Comm + ERMS

How to wire

See wiring diagram(page 97) before wiring. The ACB may malfunction when the NCT wires incorrectly.

The wiring cable of NCT should satisfy the conditions below

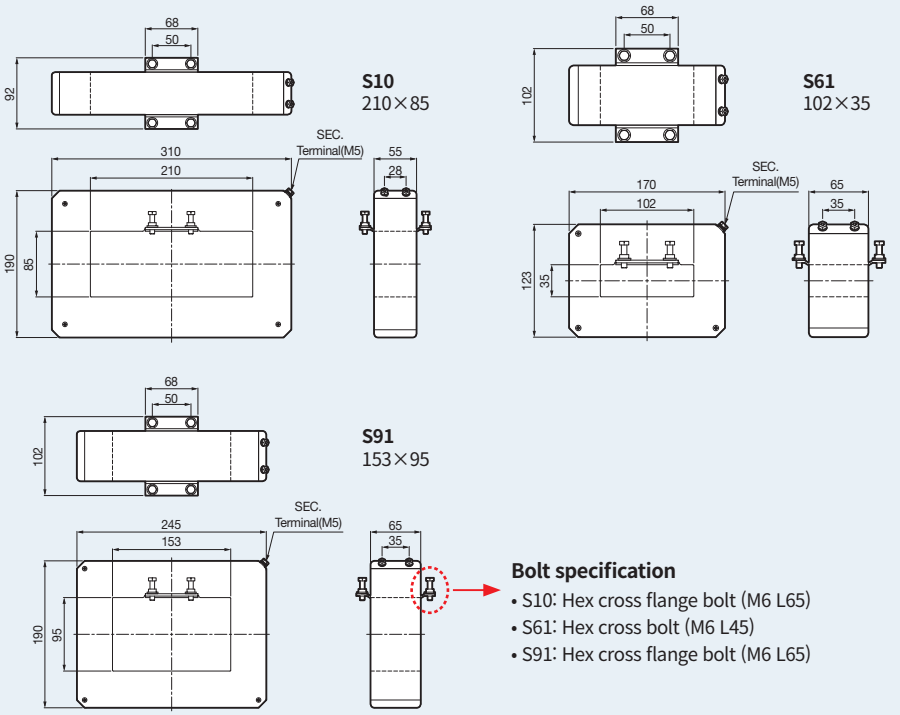
- Unshielded cable with 1 twisted pair
- Shielding connected to GND on one end only
- Maximum length 5 meters
- Cable cross-sectional area between AWG 16 to 20 (0.5mm2 to 1.25mm2)

■ Specification and ordering codes for NCT

Standard	Item Code	CT spec.			
		CT ratio	Burden	Frequency	Part size
IEC	76313460039	400 / 5A	5VA	50/60Hz	S91
	76313460023	600 / 5A	5VA	50/60Hz	S61
	76313460024	630 / 5A	5VA	50/60Hz	S61
	76313460025	800 / 5A	5VA	50/60Hz	S61
	76313460026	1000 / 5A	5VA	50/60Hz	S61
	76313460027	1200 / 5A	5VA	50/60Hz	S61
	76313460028	1250 / 5A	5VA	50/60Hz	S61
	76313460029	1600 / 5A	5VA	50/60Hz	S61
	76313460030	2000 / 5A	5VA	50/60Hz	S91
	76313460031	2500 / 5A	5VA	50/60Hz	S91
	76313460032	3000 / 5A	5VA	50/60Hz	S10
	76313460033	3200 / 5A	5VA	50/60Hz	S10
	76313460034	3600 / 5A	5VA	50/60Hz	S10
	76313460035	4000 / 5A	5VA	50/60Hz	S10
	76313460036	5000 / 5A	5VA	50/60Hz	S10
	76313460037	6000 / 5A	5VA	50/60Hz	S10
	76313460038	6000 / 5A	5VA	50/60Hz	S10

NCT dimensions

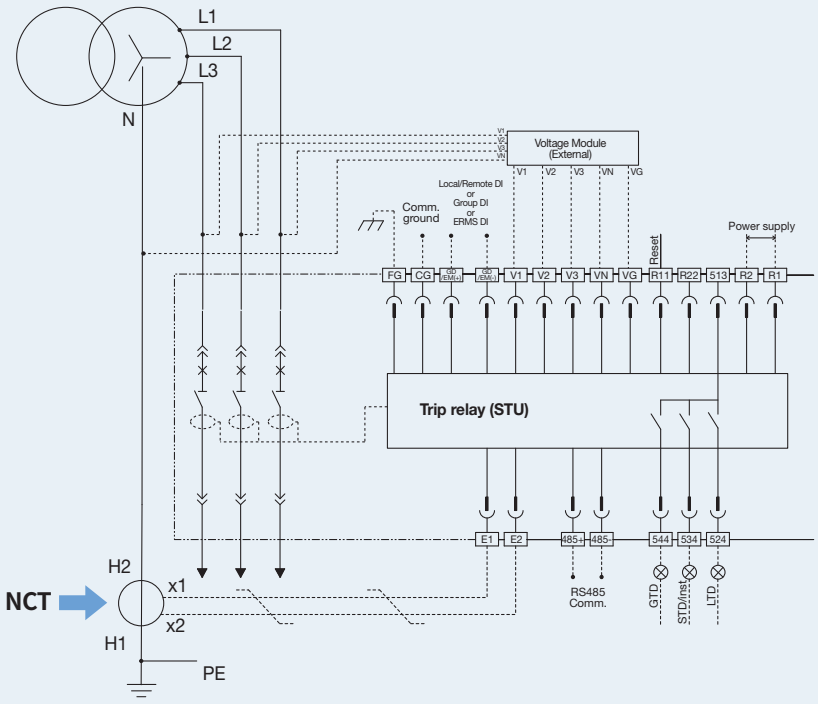
[Unit: mm]



Bolt specification

- S10: Hex cross flange bolt (M6 L65)
- S61: Hex cross bolt (M6 L45)
- S91: Hex cross flange bolt (M6 L65)

NCT installation circuit diagram



Accessories



IPOT (Intelligent Potable OCR Tester)

The IPOT (Intelligent Potable OCR Tester) is an accessory to test-drive ACB/MCCB. As a stand-alone type, it not only performs various relay tests such as manual/auto/user tests, but also has various functions such as self-calibration function, device information setting, relay setting, and device status checking. In addition, it supports 256×128 graphic LCD and supports not only English but also Chinese and Russian languages. It has the function to output the test and test results in the same way using the upper Manager S/W.

Features

- **Calibration function**
  - The calibration function of IPOT is used to calibrates the error using the output value set in IPOT and the measurement current data.
- **Device H/W setting function**
  - It consists of the part to set the system configuration and time of the device and the part to set the language and time of the IPOT it self.
- **Relay setting function**
  - It consists of the part to check the current relay element of the device and the part to set the relay.
- **Relay test**
  - As a part for testing the relay, it is composed of manual/automatic/user tests so that various relay tests can be conducted.
- **Control function**
  - It provides a function to clear or reset the device data and to control DO and CB.
- **System information**
  - It consists of the device information, relay status, and tester system information.
- **Test history**
  - It consists of a part to check the test history stored in IPOT and a part to delete the saved history information.

Specification

Type	Details
Model name	IPOT
Rated voltage	DC24V adapter, 9V alkaline battery 3EA, USB or rechargeable battery (10000mAH or more)
HMI	Graphic LCD module(256×128 Graphic LCD)
Supported language	English, Chinese, Russian
Key functions	· Device information checking function (information, DI, DO, self-diagnosis) · Relay and H/W information setting function · Device control and reset function · Relay test function - Manual/auto/user test function · Test history storage (up to 255) and output (PDF) function
LCD composition	Navigation TREE configuration for all
Size	98(W)×210.5(H)×43.5(D), unit : mm

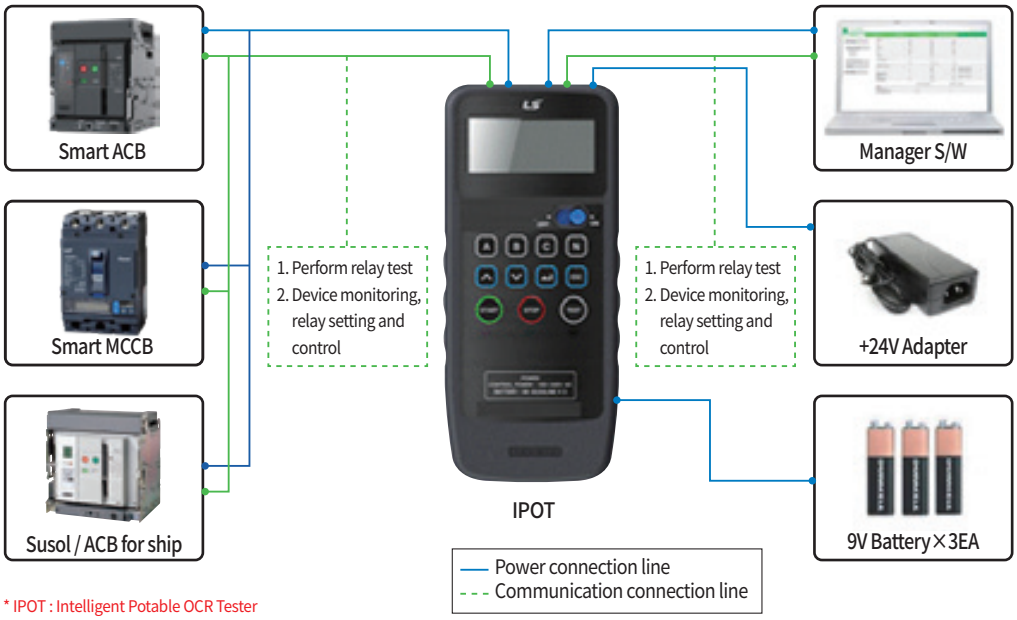
IPOT

Exterior description



Type	Details
❶ Power switch	Power On/Off function
❷ LCD	256×128 graphic LCD
❸ KEY PAD	Menu navigation, setting and operation buttons
❹ Adapter terminal	DC24V power input terminal
❺ USB terminal	USB communication connection terminal (USB2.0)
❻ Signal port	Signal terminals for device testing
❼ Battery	Equipped with 9V alkaline batteries (×3ea)

Device usage example



* IPOT : Intelligent Potable OCR Tester

Target device

Circuit breaker	Smart ACB(STU), Susol/Metasol ACB(Trip Relay), Smart MCCB, TS1600

Accessories

TRIO



This device is a device used to monitor ACB status, remote open/close operation control and temperature measurement by being installed on the LV panel or distribution panel.
It is also capable of expanding DI/DO through communicating with DTR.

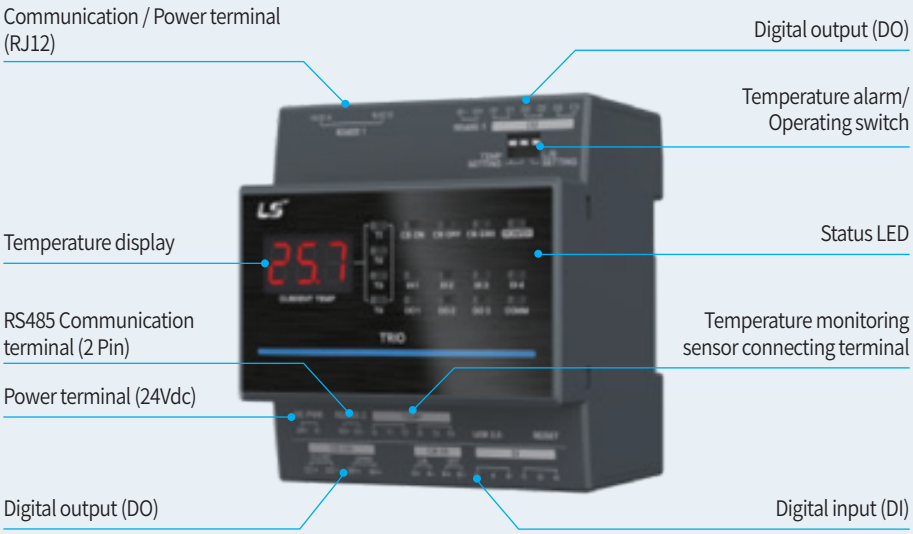
Characteristic

- Monitoring the temperature by using external temperature sensor.
- Monitoring the ACB status through the built-in function of DI/DO expansion.
- Compare with old TRIO, the number of DI/DO contact increased.
- Temperature display improved to 7S-egment level.

Rating

Item	Description	Remark
Rating voltage	DC24V (±10%)	21.6~26.4Vdc
Power consumption	Up to 6W	
Temperature monitoring sensor	4ea • Range: 0~150°C • Tollerence - Contact type: ±3°C - Non-contact type: 5°C • Alarming temperature - 55°C, 65°C, 70°C, 80°C • DO link available	Separate sale
DI	• Normal: 4ea • CB type: 2ea	• Cradle status monitoring • Closing spring status monitoring
DO	• Normal: 3ea • CB type: 2ea	• LATCH • Set 500ms available(CB control available)
LED	• Power LED • Comm. LED • CB LED: 3ea • DI LED: 4ea • DO LED: 3ea • Temperature sensor: 4ea	Temperature display – 7 segment - Under 100°C : display to 1 decimal place - Over 100°C : display to 1 digit place
Protocol	Modbus RTU	
Communication	RS485	Link with STU
Attachment method	• Din-rail • Screw	
Dimension(W×H×D)	72mm×81mm×65mm	
Battery	Applied 0.1F Supper CAP (up to 72 hours backup)	
Ambient air temperaturefor operation	-25 °C ~ +60 °C	
Ambient air temperaturefor Storage	-30 °C ~ +70 °C	
Humidity	Under 85% (Dew will not form)	

Exterior



Example



Sole usage



Use with STU

Device

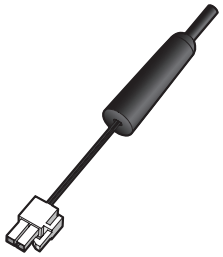
Circuit breaker	Susol/Metasol ACB with STU

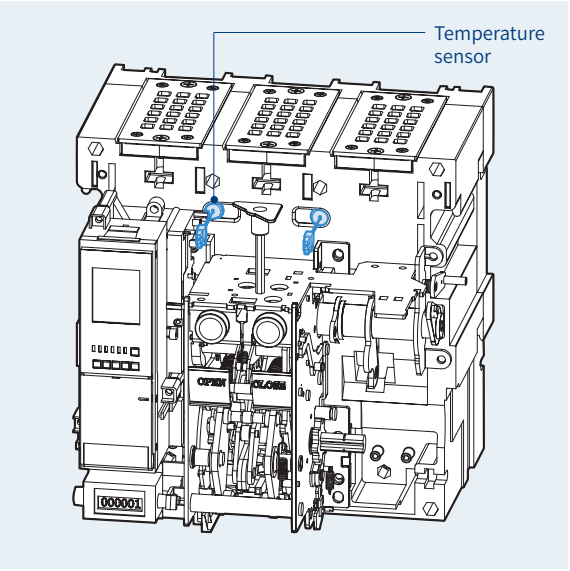
※ Can be used alone

Accessories

TRIO

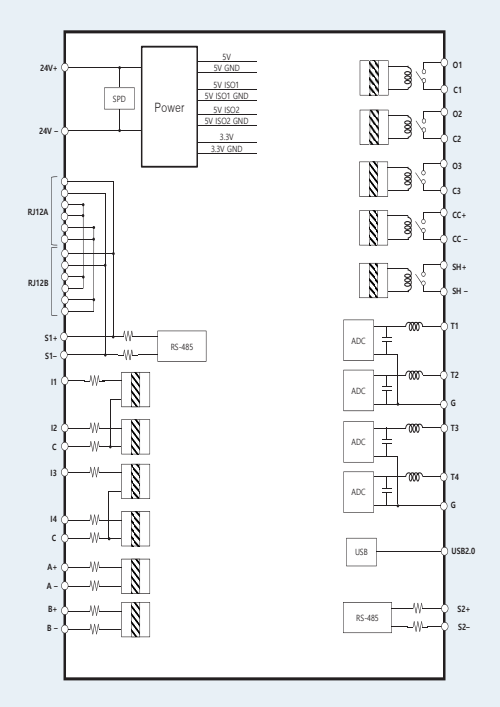
Temperature monitoring



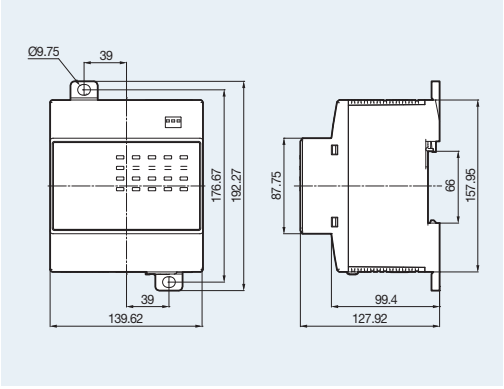


- TRIO unit is a device that indicates the temperature through a sensor inside/outside of the ACB.
- Up to 2 contactless tempe sensors can be installed and the output is connected to control terminal blocks.
- The contact temperature sensor is installed outside the ACB and can be installed in each phase.
- Displays the measured temperature for each sensor for 2 seconds.
- Temperature alarm can be set, and if the temperature rises above the set value, 7 Segments will flash every 1 second and DO contacts will be output.
- TRIO unit communicates with Modbus / RS-485 basically

■ Circuit Diagram

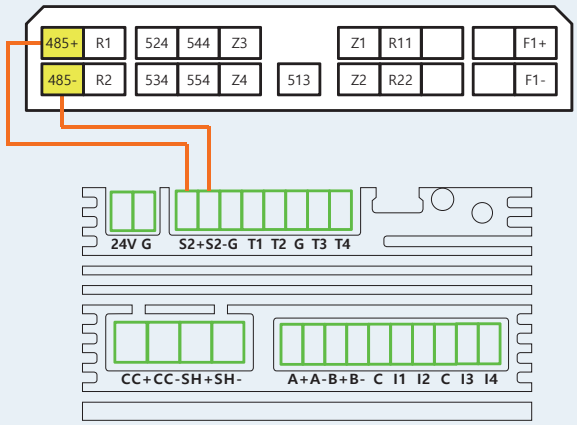


■ Dimension

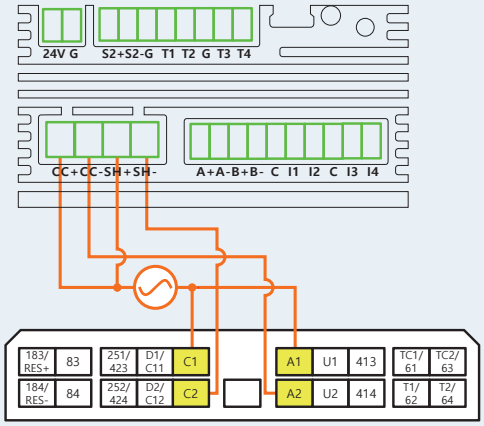


Wiring

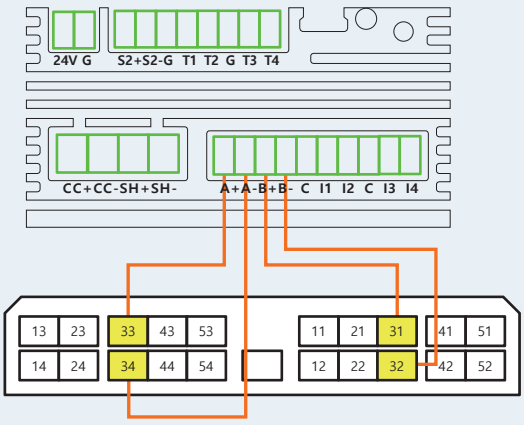
■ Connecting both ACB and RS485 Communication



■ Connecting with ACB control circuit



■ Connecting with ACB Auxiliary switch(status)



Accessories

Gateway



GATEWAY is the system communication devices within the Smart LV solution.
GATEWAY performs a role of sending the data of serially connected RS-485 communication type devices.
GATEWAY provides their independent web page for users to use the connected device settings/status and the monitoring service through this page.

Characteristic

Menu	Gateway Web Page
Set-up Screen	• Check the device information • Change the device name and location information
Thermography monitoring	• Provides status, event, and trend information • On the thermography monitoring device.
RS485 (Channel1 & 2)	• Displays name and status of the device connected to each RS485 channel. • Provides detailed information when you click the device name.
Automatic Search	• Provides RS485 automatic search feature. • Provides HMI connection feature.
General settings	• Provides Network, System, and Status information.
Monitoring dashboard	• Provides key status information of the connected devices. • Provides detailed information when you click the device name.

Rating

Classification	Weight Description	Remark
Rated voltage	• 24VDC (20.4 ~ 28.8VDC)	• IEC60038
Power consumption	• 11W or less	
Communication I/O Interface	• 1×RJ12: RS485 CH1, Modbus RTU • 1×Terminal Block: RS485 CH2, Modbus RTU • 2×RJ45: Ethernet Modbus TCP RSTP1, 2 • 1×RJ45: Ethernet WAN • 1×WiFi (including router feature)	• Ethernet port includes router function. • In case of E-TAG, 20EA per channel can be accommodated through E-COLLECTOR.
External interface	• 1×Digital input (DI) • 1×Digital output (DO) • 2×USB Type A port (Host) • 1×USB Mini B port (Device)	
Memory	• RAM: 256MB • Flash: 1GB	• Every 15 minutes • The data is stored 7days.
Attachment method	• DIN rail • Wall mount	
Dimension	• 90 (D)×81(H)×65 (W) • PCB: 85 (length)×76 (width)	
Weight	• 250g or less	
Web service	• Device setup and basic monitoring web page	
Button	• 1×Push Button • Factory reset: Push over 5 seconds Button input 5 seconds or more • Soft Reset : Push under 5 seconds	
Switch	• 2×Dip Switch / RS-485 communication Termination set	
Battery	• Applied 0.1F Supper CAP (up to 72 hours backup)	
Ambient air temperature for operation	• -25°C ~ +70 °C / WiFi communication option (0 ~ +50°C)	
Ambient air temperature for Storage	• -40°C ~ +85 °C / WiFi communication option (-20 ~ +80°C)	
Humidity	• Under 95% (Dew will not form)	

Web service

- Provides device registration and monitoring functions
- Provides remote firmware upgrade function
- Provides wave viewer function



ACB voltage, current waveform



Trip wave

Exterior description

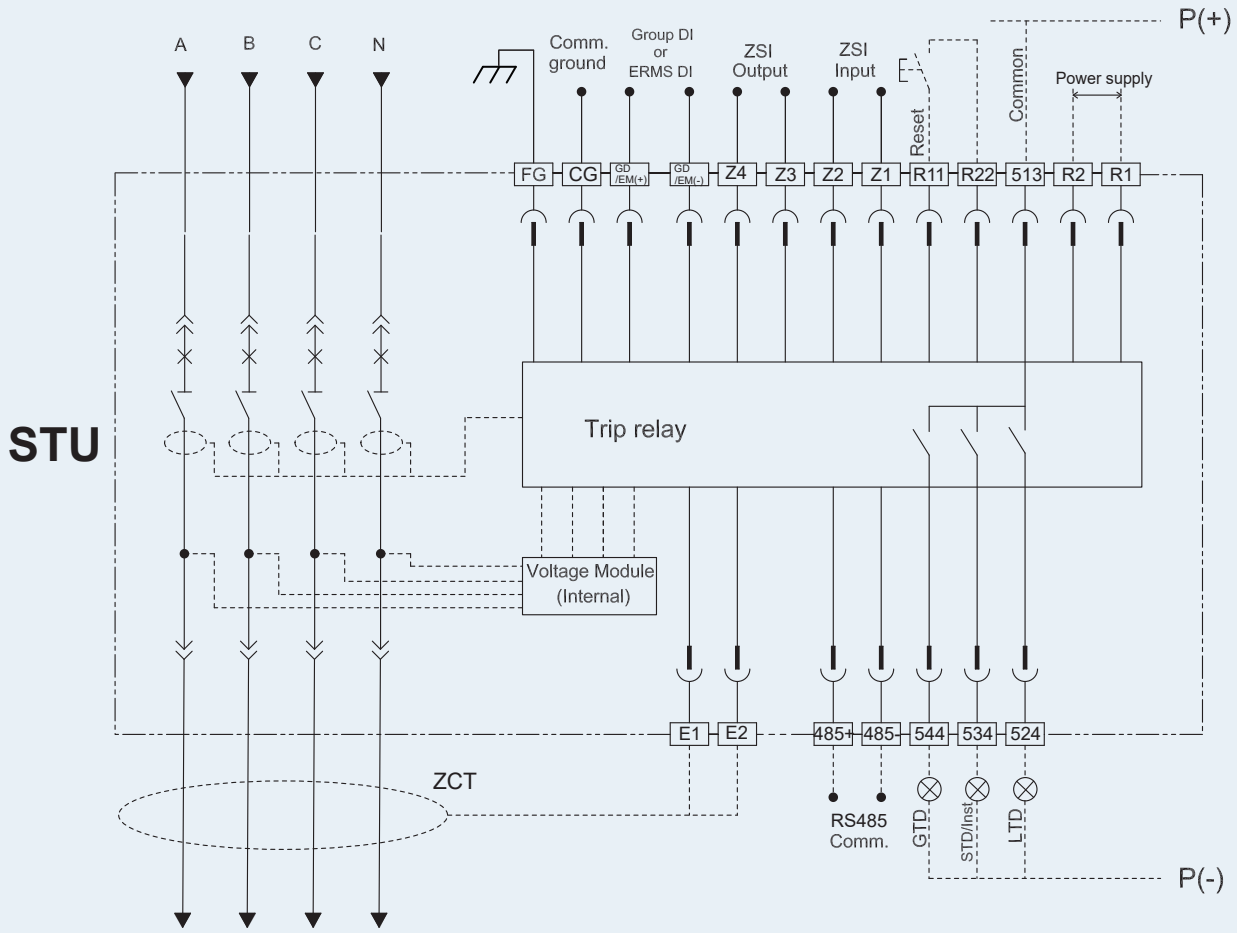


Target device

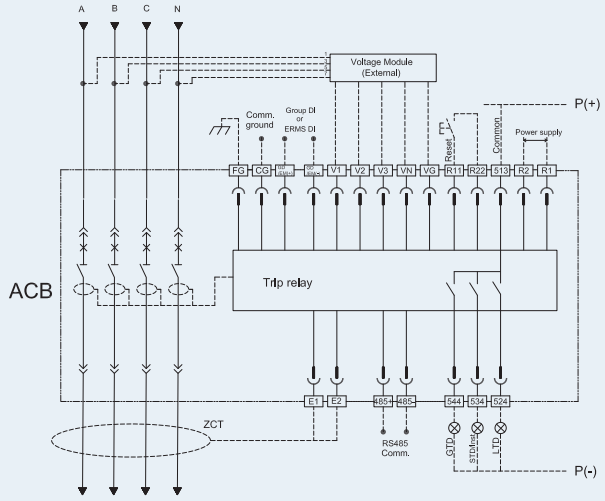
Circuit breaker	Susol ACB STU, Metasol ACB STU, Susol Smart MCCB
Measurement device	GIMAC1000, E TAG, MMP, DMPi
Accessory device	M LINK, TRIO

Electrical diagram

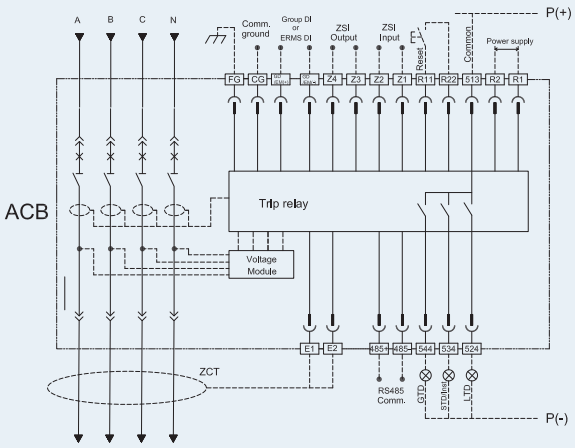
Trip relay (STU)

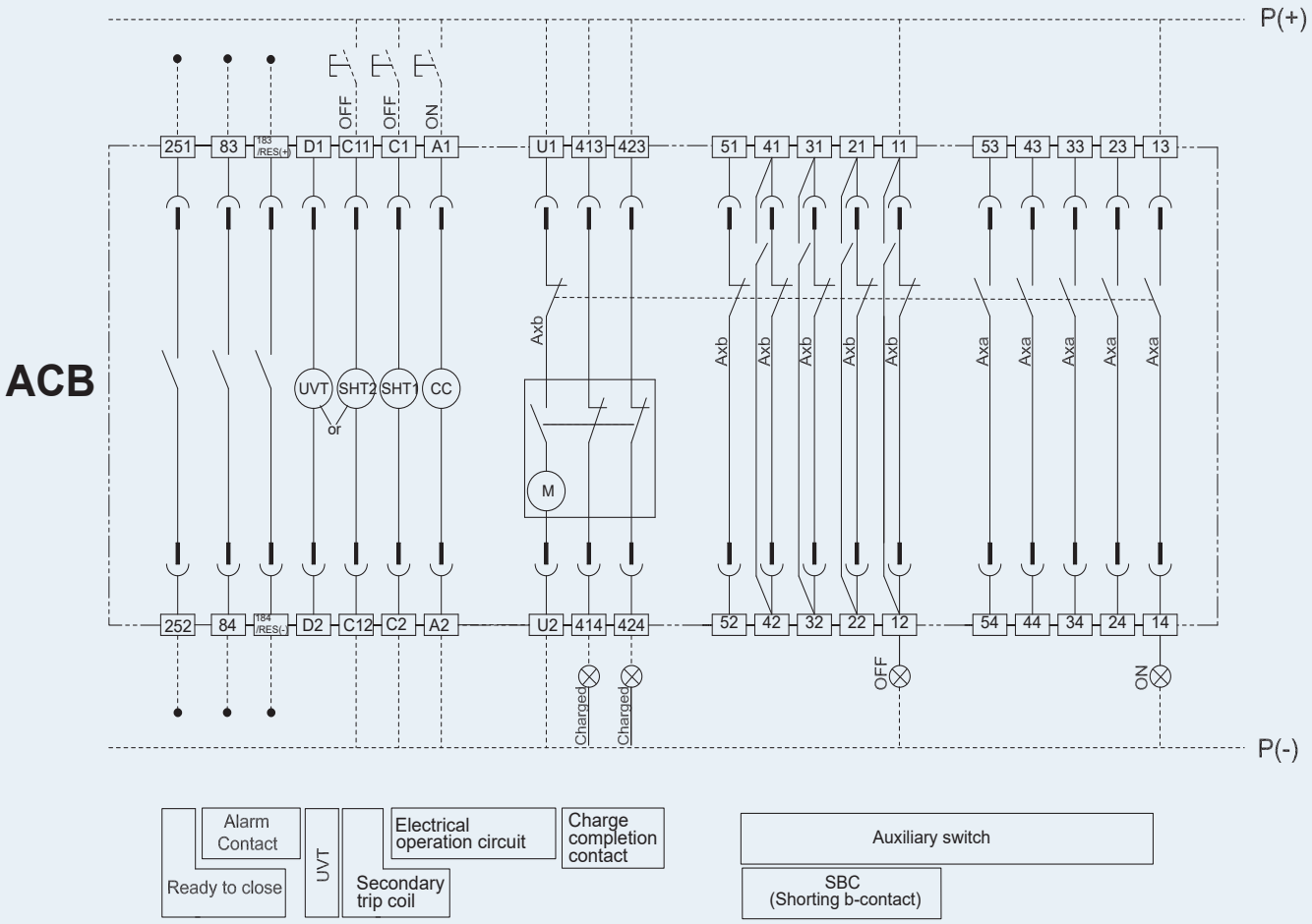


Wiring Diagram for External type VDM



Wiring Diagram for Internal type VDM

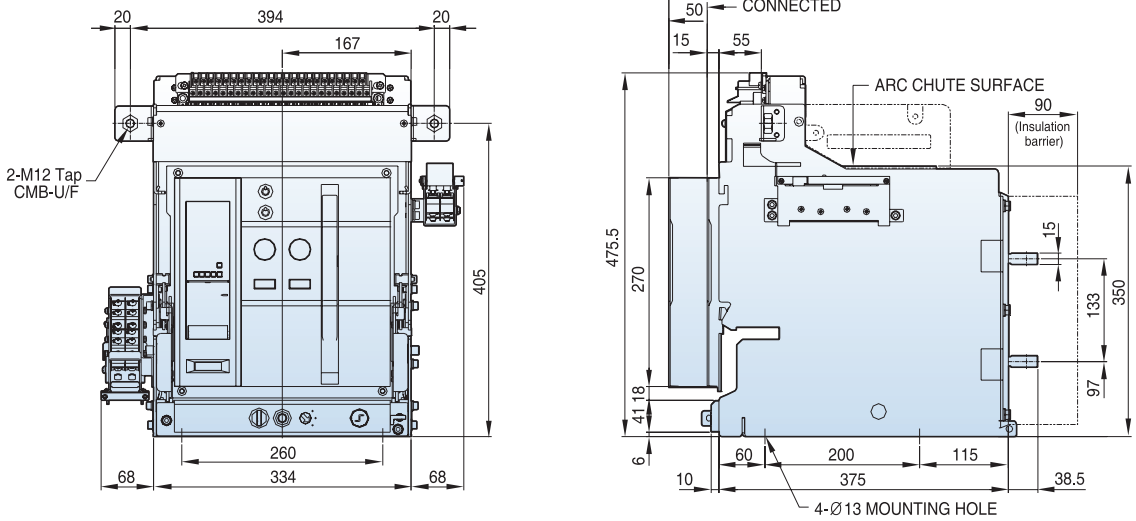



ACB
P(+)
P(-)
OFF
OFF
ON
251
83
183 /RES(+)
D1
C11
C1
A1
U1
413
423
51
41
31
21
11
53
43
33
23
13
Axb
Axa
UVT
SHT2
SHT1
CC
or
M
252
84
184 /RES(-)
D2
C12
C2
A2
U2
414
424
52
42
32
22
12
54
44
34
24
14
Charged
Charged
OFF
ON
Alarm Contact
Ready to close
UVT
Secondary trip coil
Electrical operation circuit
Charge completion contact
Auxiliary switch
SBC (Shorting b-contact)

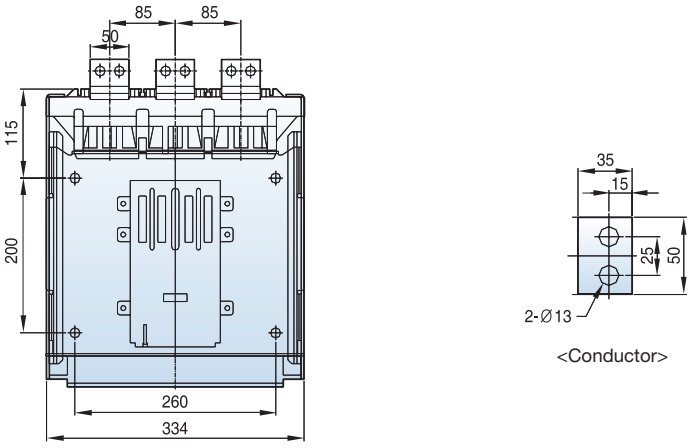
Dimensions

Draw-out 1600AF (630~1600A: AH/AS-06~16D3)

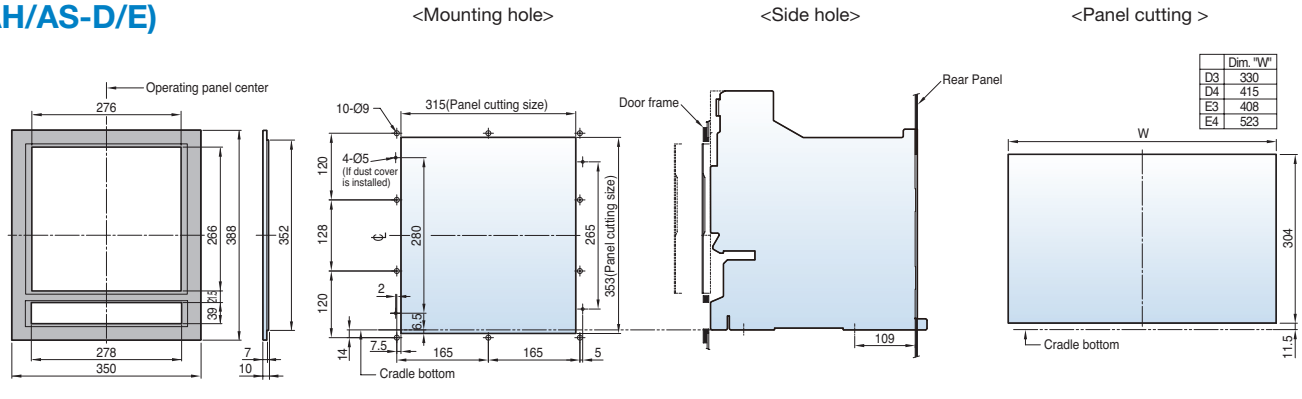
Front view



Vertical type



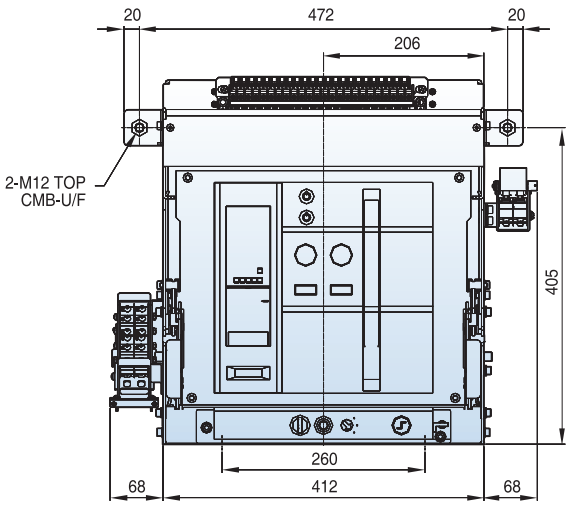
Door Frame: DF (AH/AS-D/E)

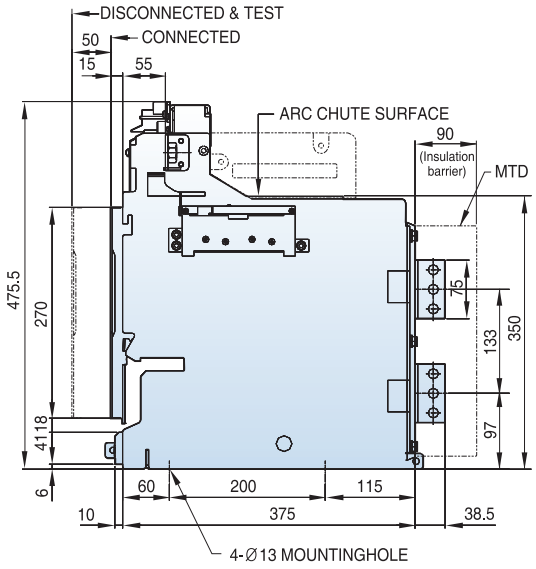


Note) The dimensions are for drawout type.

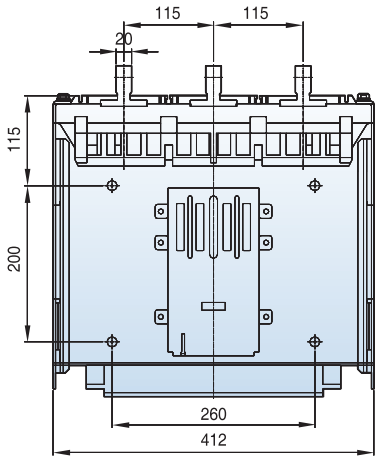
Draw-out type 3200AF
(2000~3200A: AH/AS-20~32E3)

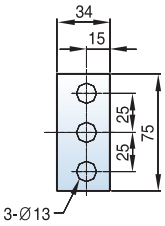
Front view





Vertical type



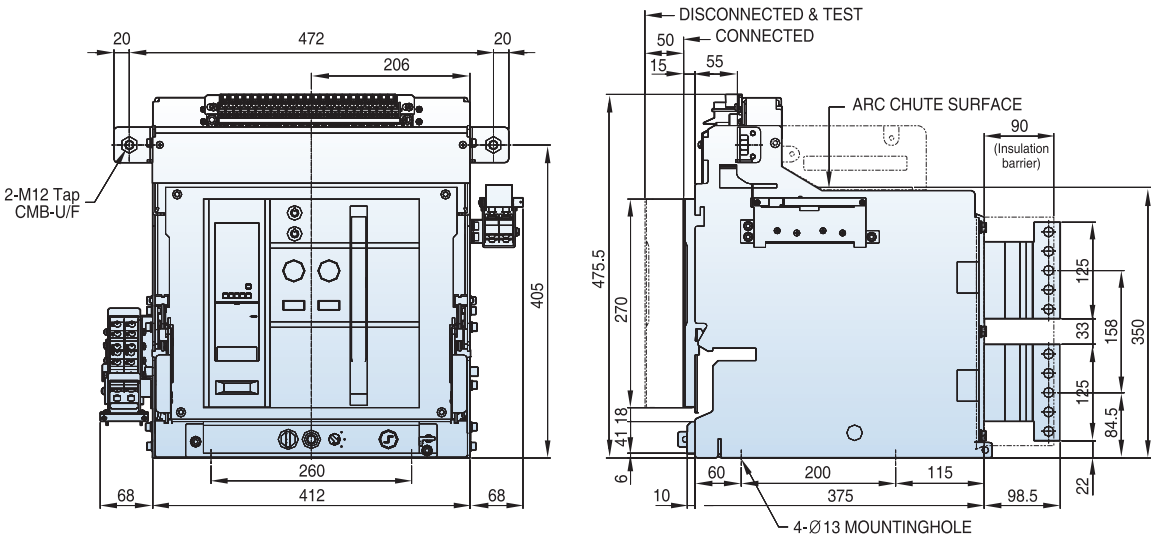


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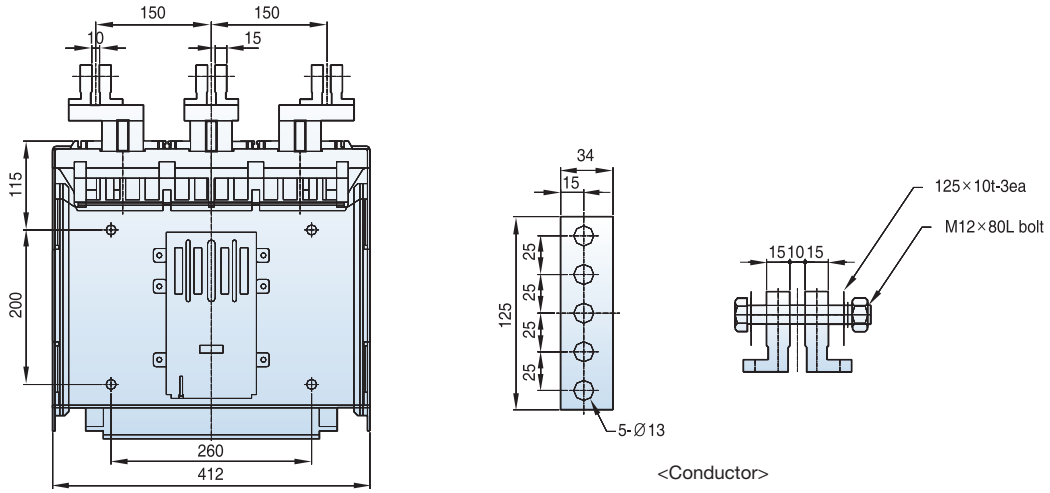
Dimensions

Draw-out type 4000AF (4000A: AH/AS-40E3)

Front view

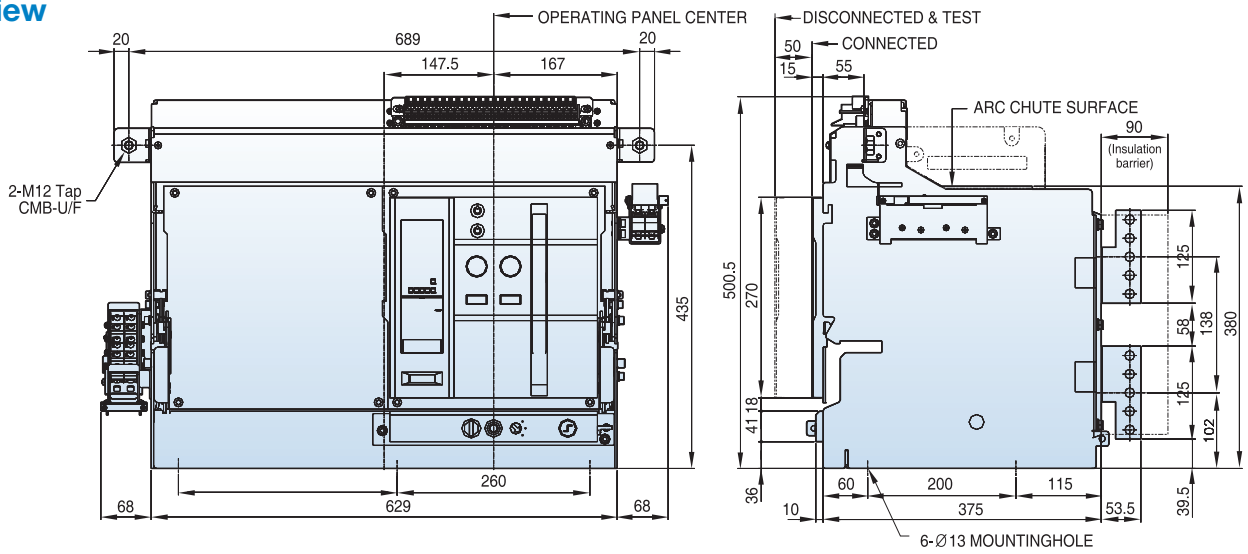


Vertical type

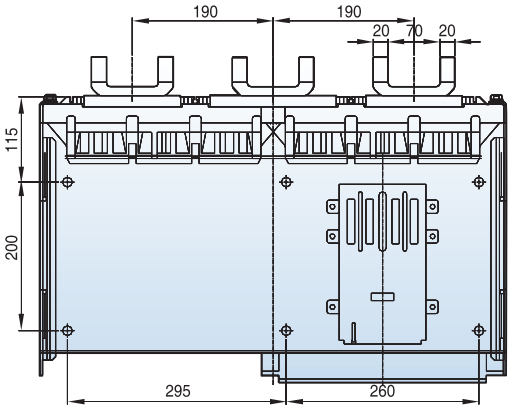


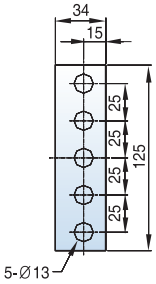
Draw-out type 5000AF
(4000~5000A: AS-40~50F3)

Front view



Vertical type





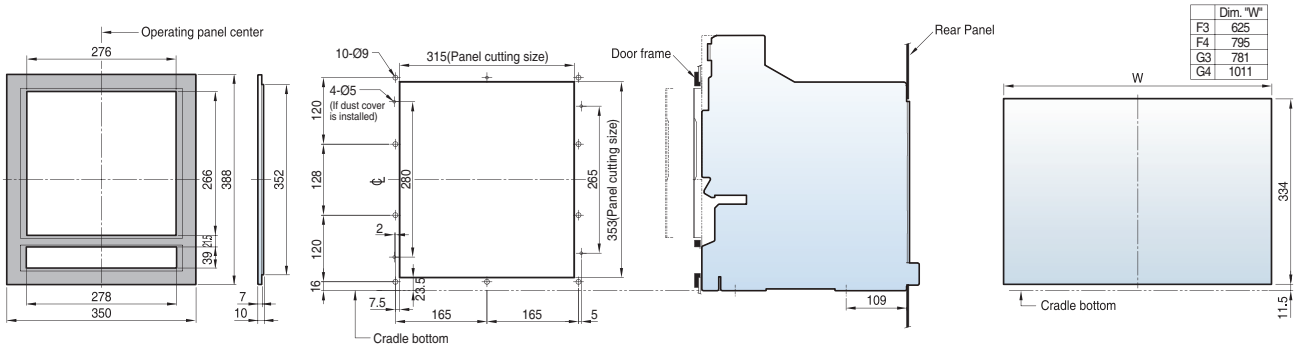
<Conductor>

Door Frame: DF
(AS-F/G, AH-G)

<Mounting hole>

<Side hole>

<Panel cutting >



	Dim. "W"
F3	625
F4	795
G3	781
G4	1011

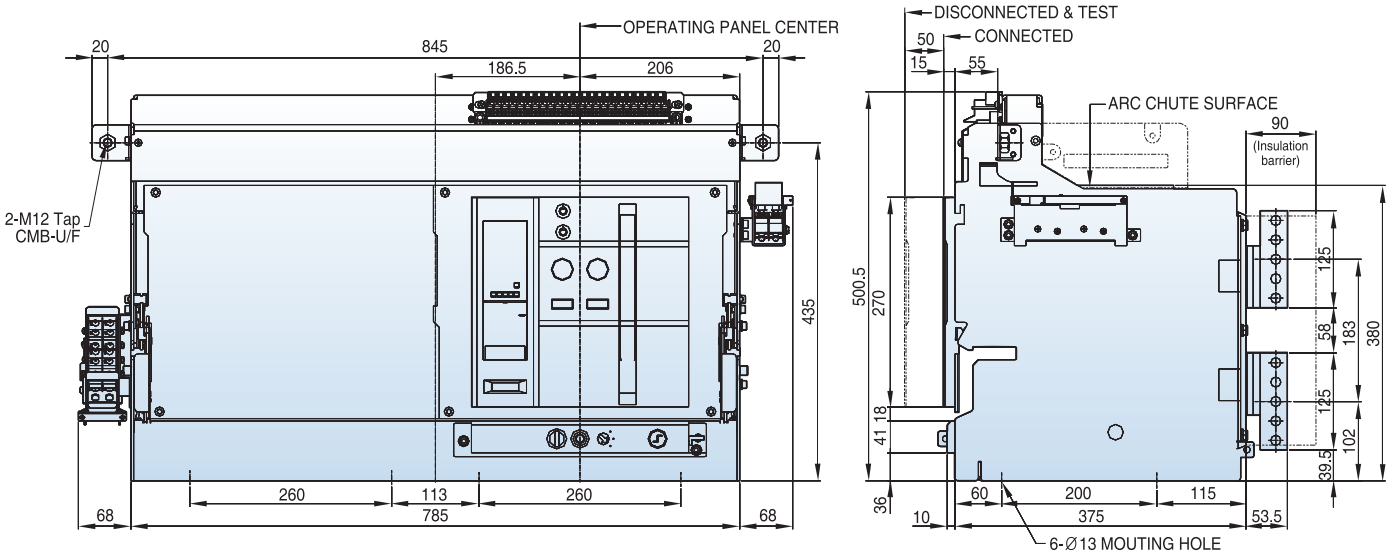
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Note) The dimensions are for drawout type.

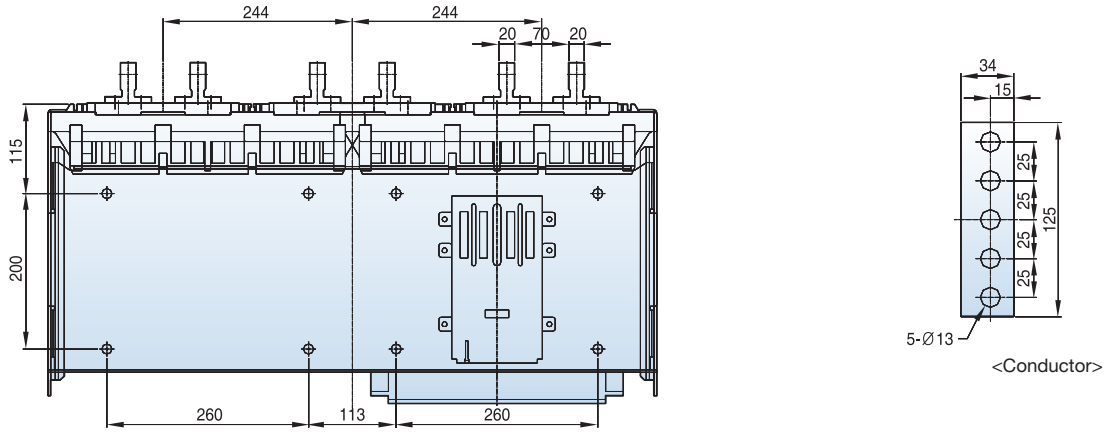
Dimensions

Draw-out type 6300AF
(4000~5000A: AH/AS-40~50G3)

Front view

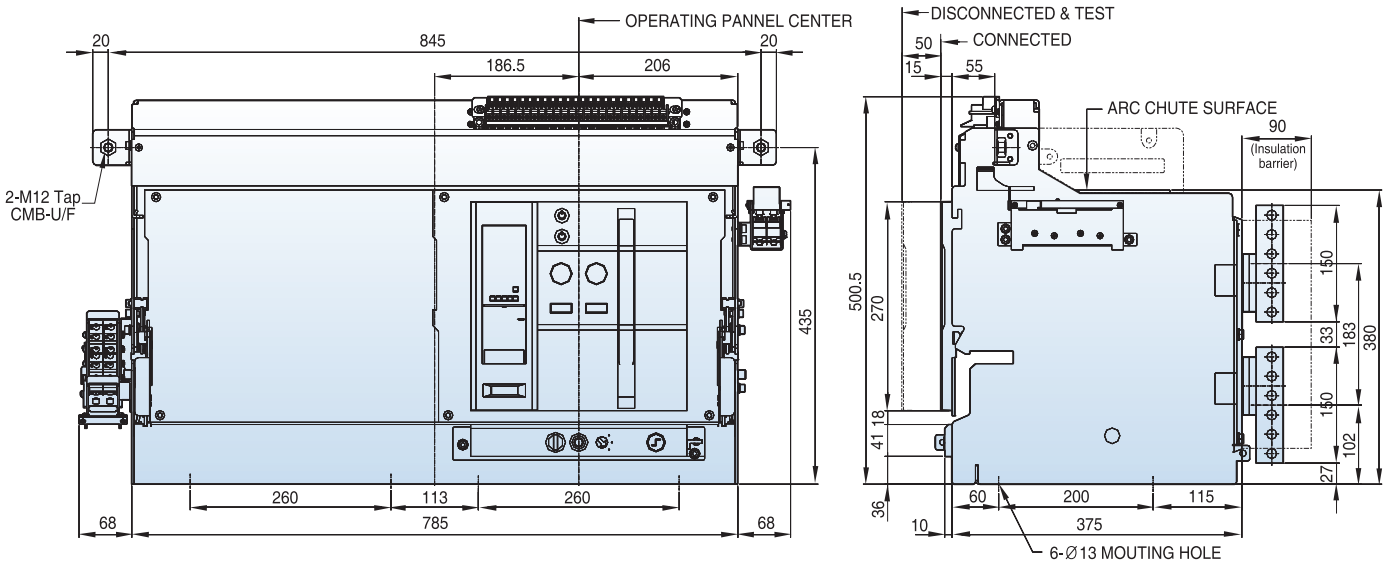


Vertical type

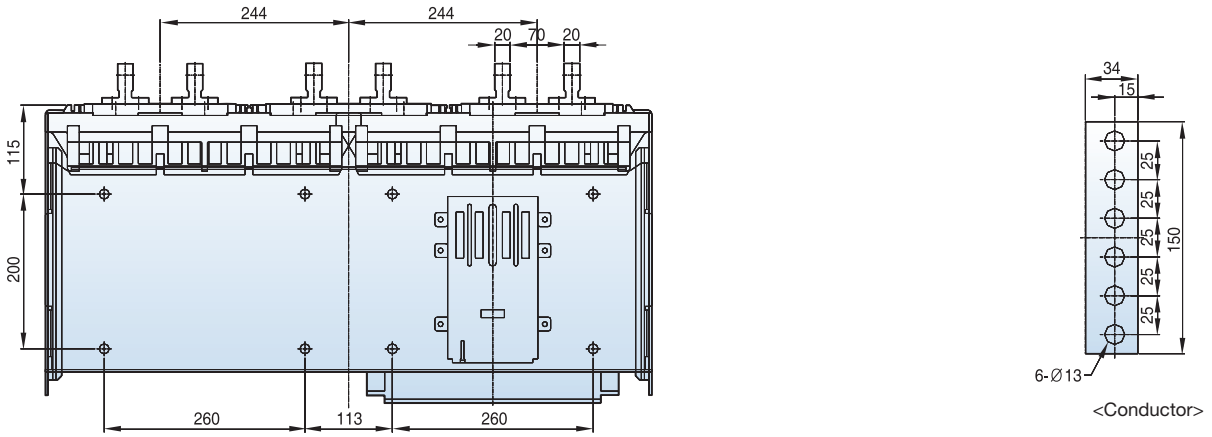


Draw-out type 6300AF
(6300A: AH/AS-63G3)

Front view

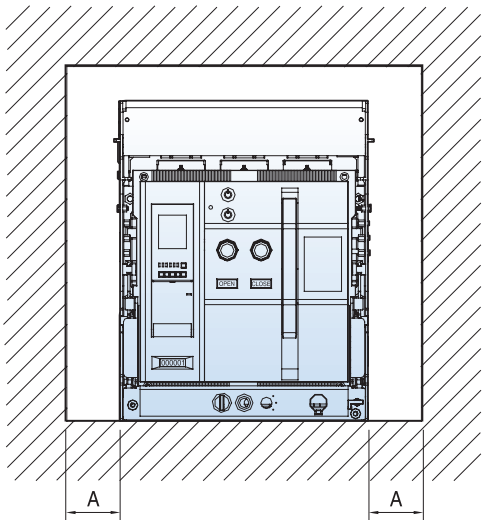


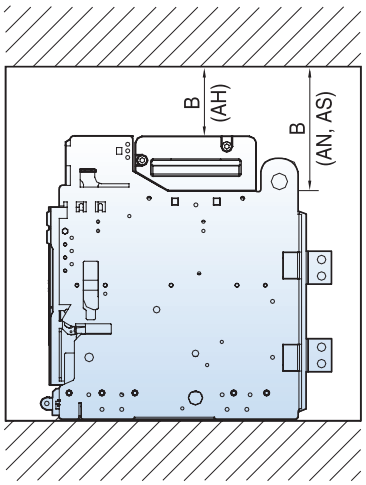
Vertical type



Insulation voltage

You should keep the isolation distance between ACB and panel as below table.



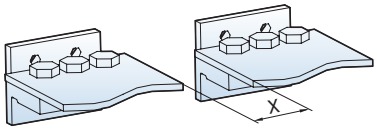


Type		A	B
Fixed	AS	50	150
	AH	50	150
Draw out	AS	50	150
	AH	50	0

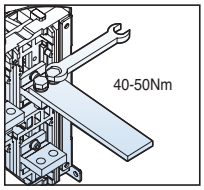
Note) When drawing the distribution panel, it is available to use regardless of the distance between ACB and the wall of the panel because Susol ACB(draw-in/out type) extinguishes the arc in the Arc Chute and Arc Cover clearly.

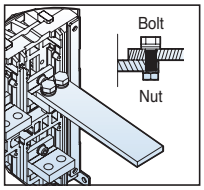
Minimum isolation distance

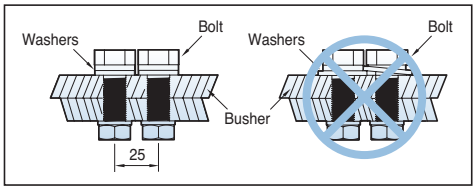
For the safety, all the electric charging parts need to be installed over minimum isolation distance.



Insulating voltage (Ui)	Minimum isolation distance (X min)
600V	8 mm
1000V	14 mm







Screw type	Tightening torque			
	Standard(kgf·cm)	Tolerance	Standard(N.m)	Tolerance
M8	135	±16	13.3	±1.6
M10	270	±32	26.5	±3.2
M12	480	±57	46.6	±5.6

Temperature derating

The table below indicates the maximum current rating, for each connection type, as a function of the ambient temperature around the circuit breaker and the busbars.
Circuit breakers with mixed connections have the same derating as horizontally connected breakers.
For ambient temperatures greater than 60°C, consult us.
Temperature inside the switchboard around the circuit breaker and its connection: T_i (IEC 60947-2)

Frame	Rated current	ACB terminal	Applicable busbar size														
				Horizontal type							Vertical type						
				40°C	45°C	50°C	55°C	60°C	65°C	70°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C
1600AF AH-D AS-D	200A	15t×50×1EA	5t×50×1EA	200A	200A	200A	200A	200A	200A	200A	200A	200A	200A	200A	200A	200A	200A
	400A			400A	400A	400A	400A	400A	400A	400A	400A	400A	400A	400A	400A	400A	400A
	630A		5t×50×2EA	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A
			10t×60×1EA														
	800A		6t×50×2EA	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A
			10t×60×1EA														
	1000A		8t×50×2EA	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A
	1250A		6t×75×2EA	-	-	-	-	-	-	-	1250A	1250A	1250A	1250A	1250A	1250A	1250A
			8t×60×2EA	1250A	1250A	1250A	1250A	1250A	1200A	1140A							
			10t×50×2EA	-	-	-	-	-	-	-							
	1600A		6t×75×3EA	-	-	-	-	-	-	-	1600A	1600A	1580A	1550A	1500A	1320A	1260A
			10t×60×2EA	1600A	1600A	1520A	1480A	1420A	1240A	1180A							
			8t×60×3EA														
4000AF AH-E AS-E	630A	20t×75×1EA	5t×50×2EA	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A
			10t×60×1EA														
	800A		6t×50×2EA	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A
			10t×60×1EA														
	1000A		8t×50×2EA	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A
	1250A		6t×75×2EA	-	-	-	-	-	-	-	1250A	1250A	1250A	1250A	1250A	1250A	1250A
			8t×60×2EA	1250A	1250A	1250A	1250A	1250A	1250A	1250A							
			10t×50×2EA														
	1600A		6t×75×3EA	-	-	-	-	-	-	-	1600A	1600A	1600A	1600A	1600A	1600A	1600A
			10t×60×2EA	1600A	1600A	1600A	1600A	1600A	1600A	1520A							
			8t×60×3EA														
	2000A		8t×75×3EA	2000A	2000A	2000A	2000A	2000A	1900A	1800A	2000A	2000A	2000A	2000A	2000A	2000A	2000A
			10t×100×2EA	-	-	-	-	-	-	-							
	2500A		10t×75×3EA	2500A	2500A	2500A	2400A	2300A	2220A	2140A	2500A	2500A	2500A	2500A	2400A	2320A	2240A
			8t×75×4EA														
	3200A		10t×100×3EA	-	-	-	-	-	-	-	3200A	3200A	3120A	3050A	2950A	2650A	2530A
			10t×75×4EA	3200A	3200A	3100A	3000A	2900A	2600A	2460A							
	4000A	10t×100×3EA	10t×100×4EA	-	-	-	-	-	-	-	4000A	4000A	3950A	3800A	3680A	3310A	3160A
			10t×75×5EA														
5000AF AS-F	4000A	20t×125×2EA	10t×100×4EA	4000A	4000A	3920A	3860A	3800A	3650A	3500A	4000A	4000A	3960A	3900A	3880A	3750A	3620A
	5000A		10t×125×4EA	5000A	5000A	4900A	4800A	4700A	4000A	3800A	5000A	5000A	4950A	4900A	4850A	4140A	3950A
6300AF AH-G AS-G	4000A	20t×125×2EA	10t×100×4EA	4000A	4000A	4000A	4000A	4000A	4000A	4000A	4000A	4000A	4000A	4000A	4000A	4000A	4000A
	5000A		10t×125×4EA	5000A	5000A	4900A	4820A	4750A	4690A	4490A	5000A	5000A	4950A	4870A	4850A	4830A	4630A
	6300A	20t×150×2EA	10t×150×4EA	6300A	6300A	6170A	6040A	5900A	5020A	4780A	6300A	6300A	6220A	6160A	6100A	5220A	4980A

Operating conditions

Ambient temperature

ACB devices can operate under the following temperature conditions
- The electrical and mechanical characteristics are stipulated for an ambient temperature of -20°C to +60°C
- The average temperature should be within +35°C
- Reduce the continuous conducting current when the temperature is over 45°C (refer to temperature derating)
- Storage condition : -40°C to +80°C is recommended.

Altitude

ACB is designed for operation at altitudes under 2000m. At altitudes higher than 2000m, emitting heat is lowered and operating voltage, continuous current capacity, and breaking capacity will be reduced. Durability of the insulation is also reduced according to the atmosphere pressure.
According to the below table, change the ratings upon a service condition.

Item \ Altitude [m]	2000m	3000m	4000m	5000m
Withstand voltage [V]	3500	3150	2500	2100
Average insulating voltage [V]	1000	900	700	600
Max. using voltage [V]	690	620	540	470
Current compensation constant	1×In	0.98×In	0.96×In	0.94×In

Environment

Under clean air;
Maximum temperature +40°C (relative humidity should be under 85%)
Maximum temperature +20°C (relative humidity should be under 90%)
Do not apply under corrosive or ammonia gas circumstances
($H_2S \leq 0.01$ppm, $SO_2 \leq 0.01$ppm, $NH_3 \leq$ a few ppm)

*** Extreme atmosphere conditions**

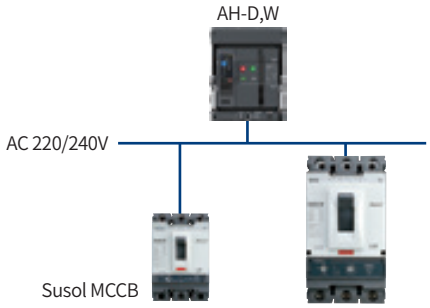
Under high temperature and/or high humidity, the insulation durability, electrical and mechanical features could be deteriorated. At this conditions, increasing corrosion-resistant dealing needs. Corrosion-resistant parts need under this conditions.
Inspection and Maintenance should be performed periodically which referred to inspection and replacement period in maintenance manual. The recommended product replacement cycle is 10 years from manufacturing date.

Internal resistance and power consumption

AF	Rated current (A)	Fixed type		Draw-out type	
		Inner resistance (mΩ)	Power consumption (W/3Phase)	Inner resistance (mΩ)	Power consumption (W/3Phase)
AH/AS-20D	630	0.015	18	0.03	36
	800	0.015	29	0.03	58
	1,000	0.015	45	0.03	90
	1,250	0.015	70	0.03	141
	1,600	0.015	115	0.03	230
	2,000	0.013	156	0.027	324
AH/AS-32E	2,000	0.01	120	0.02	240
	2,500	0.01	188	0.02	375
	3,200	0.01	307	0.02	614
AH/AS-40E	2,000	0.01	120	0.02	240
	2,500	0.01	188	0.02	375
	3,200	0.01	307	0.02	614
	4,000	0.008	384	0.011	528
AS-50F	4,000	0.008	384	0.011	528
	5,000	0.008	600	0.011	825
AH/AS-63G	4,000	0.006	288	0.009	432
	5,000	0.006	450	0.009	675
	6,300	0.005	595	0.007	833

Note) 1. Above power consumption is whole power consumption for each Rated current, 50/60Hz, 3/4pole.
2. This is inner assistant value per 1 pole.
3. Power factor = 1.0

Protective coordination



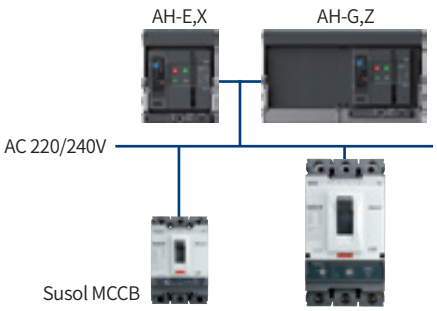
Rated voltage: AC 220/240V
Main breaker(Main ACB): Susol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Susol AH series									
				AH-D,W									
				AH-06D			AH-08D			AH-10D	AH-13D	AH-16D	AH-20D
			Rated current [A]	200	400	630	400	630	800	1000	1250	1600	2000
			Short time delay trip current (Max. 10In) Is [kA]	2	4	6.3	4	6.3	8	10	12.5	16	20
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	85									
Susol MCCB	TD100N	100	85	T	T	T	T	T	T	T	T	T	T
	TD100H	100	100	T	T	T	T	T	T	T	T	T	T
	TD100L	100	200	T	T	T	T	T	T	T	T	T	T
	TD160N	160	85	T	T	T	T	T	T	T	T	T	T
	TD160H	160	100	T	T	T	T	T	T	T	T	T	T
	TD160L	160	200	T	T	T	T	T	T	T	T	T	T
	TS100N	100	100	T	T	T	T	T	T	T	T	T	T
	TS100H	100	120	T	T	T	T	T	T	T	T	T	T
	TS100L	100	200	T	T	T	T	T	T	T	T	T	T
	TS160N	160	100	T	T	T	T	T	T	T	T	T	T
	TS160H	160	120	T	T	T	T	T	T	T	T	T	T
	TS160L	160	200	T	T	T	T	T	T	T	T	T	T
	TS250N	250	100	-	T	T	T	T	T	T	T	T	T
	TS250H	250	120	-	T	T	T	T	T	T	T	T	T
	TS250L	250	200	-	T	T	T	T	T	T	T	T	T
	TS400N	400	100	-	-	T	-	T	T	T	T	T	T
	TS400H	400	120	-	-	T	-	T	T	T	T	T	T
	TS400L	400	200	-	-	T	-	T	T	T	T	T	T
	TS630N	630	100	-	-	-	-	-	T	T	T	T	T
	TS630H	630	120	-	-	-	-	-	T	T	T	T	T
	TS630L	630	200	-	-	-	-	-	T	T	T	T	T
	TS800N	800	100	-	-	-	-	-	-	T	T	T	T
	TS800H	800	120	-	-	-	-	-	-	T	T	T	T
	TS800L	800	200	-	-	-	-	-	-	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
2. On table, marked number is breaking capacity limit (Unit: kA) for protective coordination.
3. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

Technical information

Protective coordination

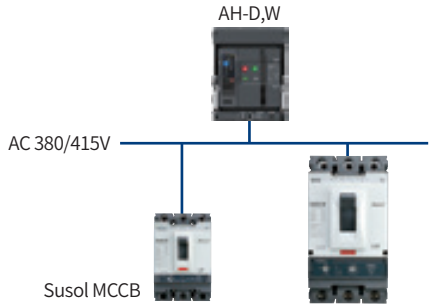


Rated voltage: AC 220/240V
Main breaker(Main ACB): Susol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Susol AH series												
				AH-E,X										AH-G,Z		
				AH-06E		AH-08E	AH-10E	AH-13E	AH-16E	AH-20E	AH-25E	AH-32E	AH-40E	AH-40G	AH-50G	AH-63G
			Rated current [A]	400	630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
			Short time delay trip current (Max. 10In) Is [kA]	4	6.3	8	10	12.5	16	20	25	32	40	40	50	63
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	100										150		
Susol MCCB	TD100N	100	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100H	100	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100L	100	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160N	160	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160H	160	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160L	160	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100N	100	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100H	100	120	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100L	100	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160N	160	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160H	160	120	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160L	160	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250N	250	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250H	250	120	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250L	250	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS400N	400	100	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400H	400	120	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400L	400	200	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS630N	630	100	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630H	630	120	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630L	630	200	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS800N	800	100	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800H	800	120	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800L	800	200	-	-	-	T	T	T	T	T	T	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
2. On table, marked number is breaking capacity limit (Unit: kA) for protective coordination.
3. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

Protective coordination



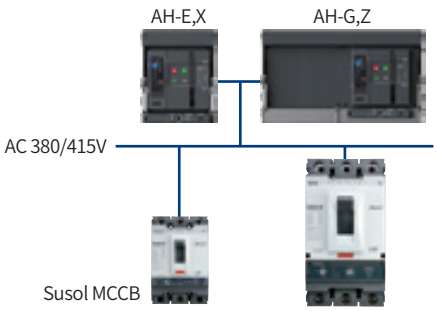
Rated voltage: AC 380/415V
Main breaker(Main ACB): Susol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Susol AH series									
				AH-D,W									
				AH-06D			AH-08D			AH-10D	AH-13D	AH-16D	AH-20D
			Rated current [A]	200	400	630	400	630	800	1000	1250	1600	2000
			Short time delay trip current (Max. 10In) Is [kA]	2	4	6.3	4	6.3	8	10	12.5	16	20
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	85									
Susol MCCB	TD100N	100	50	T	T	T	T	T	T	T	T	T	T
	TD100H	100	85	T	T	T	T	T	T	T	T	T	T
	TD100L	100	150	T	T	T	T	T	T	T	T	T	T
	TD160N	160	50	T	T	T	T	T	T	T	T	T	T
	TD160H	160	85	T	T	T	T	T	T	T	T	T	T
	TD160L	160	150	T	T	T	T	T	T	T	T	T	T
	TS100N	100	50	T	T	T	T	T	T	T	T	T	T
	TS100H	100	85	T	T	T	T	T	T	T	T	T	T
	TS100L	100	150	T	T	T	T	T	T	T	T	T	T
	TS160N	160	50	T	T	T	T	T	T	T	T	T	T
	TS160H	160	85	T	T	T	T	T	T	T	T	T	T
	TS160L	160	150	T	T	T	T	T	T	T	T	T	T
	TS250N	250	50	-	T	T	T	T	T	T	T	T	T
	TS250H	250	85	-	T	T	T	T	T	T	T	T	T
	TS250L	250	150	-	T	T	T	T	T	T	T	T	T
	TS400N	400	65	-	-	T	-	T	T	T	T	T	T
	TS400H	400	85	-	-	T	-	T	T	T	T	T	T
	TS400L	400	150	-	-	T	-	T	T	T	T	T	T
	TS630N	630	65	-	-	-	-	-	T	T	T	T	T
	TS630H	630	85	-	-	-	-	-	T	T	T	T	T
	TS630L	630	150	-	-	-	-	-	T	T	T	T	T
	TS800N	800	65	-	-	-	-	-	-	T	T	T	T
	TS800H	800	100	-	-	-	-	-	-	T	T	T	T
	TS800L	800	150	-	-	-	-	-	-	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
2. On table, marked number is breaking capacity limit (Unit: kA) for protective coordination.
3. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

Technical information

Protective coordination

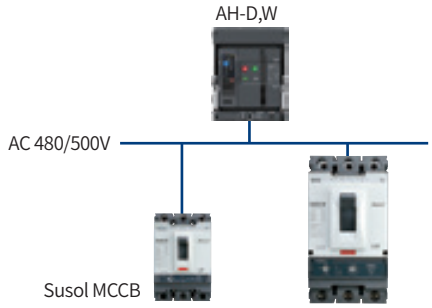


Rated voltage: AC 380/415V
Main breaker(Main ACB): Susol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Susol AH series												
				AH-E,X										AH-G,Z		
				AH-06E		AH-08E	AH-10E	AH-13E	AH-16E	AH-20E	AH-25E	AH-32E	AH-40E	AH-40G	AH-50G	AH-63G
			Rated current [A]	400	630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
			Short time delay trip current (Max. 10In) Is [kA]	4	6.3	8	10	12.5	16	20	25	32	40	40	50	63
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	100										150		
Susol MCCB	TD100N	100	50	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100H	100	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100L	100	150	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160N	160	50	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160H	160	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160L	160	150	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100N	100	50	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100H	100	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100L	100	150	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160N	160	50	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160H	160	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160L	160	150	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250N	250	50	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250H	250	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250L	250	150	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS400N	400	65	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400H	400	85	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400L	400	150	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS630N	630	65	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630H	630	85	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630L	630	150	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS800N	800	65	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800H	800	100	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800L	800	150	-	-	-	T	T	T	T	T	T	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
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3. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

Protective coordination



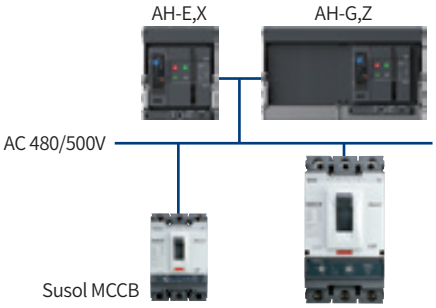
Rated voltage: AC 480/500V
Main breaker(Main ACB): Susol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Susol AH series									
				AH-D,W									
				AH-06D			AH-08D			AH-10D	AH-13D	AH-16D	AH-20D
			Rated current [A]	200	400	630	400	630	800	1000	1250	1600	2000
			Short time delay trip current (Max. 10In) Is [kA]	2	4	6.3	4	6.3	8	10	12.5	16	20
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	85									
Susol MCCB	TD100N	100	30	T	T	T	T	T	T	T	T	T	T
	TD100H	100	50	T	T	T	T	T	T	T	T	T	T
	TD100L	100	65	T	T	T	T	T	T	T	T	T	T
	TD160N	160	30	T	T	T	T	T	T	T	T	T	T
	TD160H	160	50	T	T	T	T	T	T	T	T	T	T
	TD160L	160	65	T	T	T	T	T	T	T	T	T	T
	TS100N	100	42	T	T	T	T	T	T	T	T	T	T
	TS100H	100	65	T	T	T	T	T	T	T	T	T	T
	TS100L	100	85	T	T	T	T	T	T	T	T	T	T
	TS160N	160	42	T	T	T	T	T	T	T	T	T	T
	TS160H	160	65	T	T	T	T	T	T	T	T	T	T
	TS160L	160	85	T	T	T	T	T	T	T	T	T	T
	TS250N	250	42	-	T	T	T	T	T	T	T	T	T
	TS250H	250	65	-	T	T	T	T	T	T	T	T	T
	TS250L	250	85	-	T	T	T	T	T	T	T	T	T
	TS400N	400	42	-	-	T	-	T	T	T	T	T	T
	TS400H	400	65	-	-	T	-	T	T	T	T	T	T
	TS400L	400	85	-	-	T	-	T	T	T	T	T	T
	TS630N	630	42	-	-	-	-	-	T	T	T	T	T
	TS630H	630	65	-	-	-	-	-	T	T	T	T	T
	TS630L	630	85	-	-	-	-	-	T	T	T	T	T
	TS800N	800	42	-	-	-	-	-	-	T	T	T	T
	TS800H	800	85	-	-	-	-	-	-	T	T	T	T
	TS800L	800	100	-	-	-	-	-	-	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
2. On table, marked number is breaking capacity limit (Unit: kA) for protective coordination.
3. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

Technical information

Protective coordination

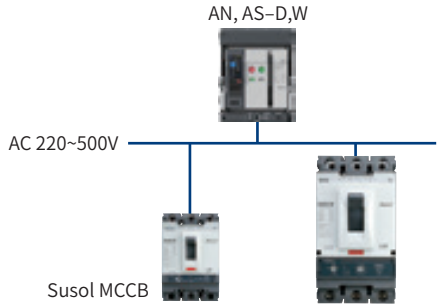


Rated voltage: AC 480/500V
Main breaker(Main ACB): Susol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Susol AH series												
				AH-E,X										AH-G,Z		
				AH-06E		AH-08E	AH-10E	AH-13E	AH-16E	AH-20E	AH-25E	AH-32E	AH-40E	AH-40G	AH-50G	AH-63G
			Rated current [A]	400	630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
			Short time delay trip current (Max. 10In) Is [kA]	4	6.3	8	10	12.5	16	20	25	32	40	40	50	63
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	100										150		
Susol MCCB	TD100N	100	30	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100H	100	50	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100L	100	65	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160N	160	30	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160H	160	50	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160L	160	65	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100N	100	42	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100H	100	65	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100L	100	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160N	160	42	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160H	160	65	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160L	160	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250N	250	42	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250H	250	65	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250L	250	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS400N	400	42	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400H	400	65	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400L	400	85	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS630N	630	42	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630H	630	65	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630L	630	85	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS800N	800	42	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800H	800	85	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800L	800	100	-	-	-	T	T	T	T	T	T	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
2. On table, marked number is breaking capacity limit (Unit: kA) for protective coordination.
3. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

Protective coordination

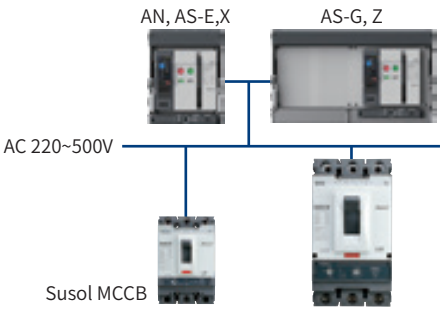


Rated voltage: AC 220~500V
Main breaker(Main ACB): Metasol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Metasol AN, AS series											
				AN, AS-D,W										AS-F,Y	
				AN, AS-06D			AN, AS-06D			AN, AS-10D	AN, AS-13D	AN, AS-13D	AN, AS-16D	AS-40F	AS-50F
			Rated current [A]	200	400	630	400	630	800	1000	1250	1600	2000	4000	5000
			Short time delay trip current (Max. 10In) Is [kA]	2	4	6.3	4	6.3	8	10	12.5	16	20	40	50
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	AN : 65kA / AS : 70kA										AS : 100kA	
Susol MCCB	TD100N	100	85	T	T	T	T	T	T	T	T	T	T	T	T
	TD100H	100	100	T	T	T	T	T	T	T	T	T	T	T	T
	TD100L	100	200	T	T	T	T	T	T	T	T	T	T	T	T
	TD160N	160	85	T	T	T	T	T	T	T	T	T	T	T	T
	TD160H	160	100	T	T	T	T	T	T	T	T	T	T	T	T
	TD160L	160	200	T	T	T	T	T	T	T	T	T	T	T	T
	TS100N	100	100	T	T	T	T	T	T	T	T	T	T	T	T
	TS100H	100	120	T	T	T	T	T	T	T	T	T	T	T	T
	TS100L	100	200	T	T	T	T	T	T	T	T	T	T	T	T
	TS160N	160	100	T	T	T	T	T	T	T	T	T	T	T	T
	TS160H	160	120	T	T	T	T	T	T	T	T	T	T	T	T
	TS160L	160	200	T	T	T	T	T	T	T	T	T	T	T	T
	TS250N	250	100	-	T	T	T	T	T	T	T	T	T	T	T
	TS250H	250	120	-	T	T	T	T	T	T	T	T	T	T	T
	TS250L	250	200	-	T	T	T	T	T	T	T	T	T	T	T
	TS400N	400	100	-	-	T	-	T	T	T	T	T	T	T	T
	TS400H	400	120	-	-	T	-	T	T	T	T	T	T	T	T
	TS400L	400	200	-	-	T	-	T	T	T	T	T	T	T	T
	TS630N	630	100	-	-	-	-	-	T	T	T	T	T	T	T
	TS630H	630	120	-	-	-	-	-	T	T	T	T	T	T	T
	TS630L	630	200	-	-	-	-	-	T	T	T	T	T	T	T
	TS800N	800	100	-	-	-	-	-	-	T	T	T	T	T	T
	TS800H	800	120	-	-	-	-	-	-	T	T	T	T	T	T
	TS800L	800	200	-	-	-	-	-	-	T	T	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
2. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

Protective coordination



Rated voltage: AC 220~500V
Main breaker(Main ACB): Metasol ACB
Downstream breaker(Downstream MCCB): Susol MCCB TD/TS series
Below protective coordination table is based on ACB equipped with Trip Relay under arrangement of short time delay trip current as 10 times of rated current.

Upstream breaker / Downstream breaker			Product type	Metasol AN, AS series												
				AN, AS-E,X										AS-G,Z		
				AS-06E		AS-08E	AS-10E	AS-13E	AS-16E	AN, AS-20E	AN, AS-25E	AN, AS-32E	AS-40E	AS-40G	AS-50G	AS-63G
			Rated current [A]	400	630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
			Short time delay trip current (Max. 10In) Is [kA]	4	6.3	8	10	12.5	16	20	25	32	40	40	50	63
Model		Rated current [A]	Ultimate breaking capacity Icu [kA]	AN: 70kA / AS: 85kA										AS: 120kA		
Susol MCCB	TD100N	100	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100H	100	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD100L	100	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160N	160	85	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160H	160	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TD160L	160	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100N	100	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100H	100	120	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS100L	100	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160N	160	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160H	160	120	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS160L	160	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250N	250	100	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250H	250	120	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS250L	250	200	T	T	T	T	T	T	T	T	T	T	T	T	T
	TS400N	400	100	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400H	400	120	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS400L	400	200	-	T	T	T	T	T	T	T	T	T	T	T	T
	TS630N	630	100	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630H	630	120	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS630L	630	200	-	-	T	T	T	T	T	T	T	T	T	T	T
	TS800N	800	100	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800H	800	120	-	-	-	T	T	T	T	T	T	T	T	T	T
	TS800L	800	200	-	-	-	T	T	T	T	T	T	T	T	T	T

Note) 1. On table, protective coordination is not available for areas where number is missing.
2. On table, areas that is marked as T are capable of total discrimination up to its Downstream breaker's rated short breaking capacity.

AH, AS series Air Circuit Breakers comply with the following international standard;

IEC 60947-1

Low-voltage switchgear and controlgear
- Part 1: General rules

IEC 60947-2

Low-voltage switchgear and controlgear
- Part 2: Circuit-breakers

The following certificates are available on a request.
- CE Declaration of conformity
- Certificate of conformance test (CB) - IEC 60947
- Full type test report issued by KEMA
- Letter of origin
- Taiwan TPC

CE conformity marking

The CE conformity marking shall indicate conformity to all the obligations imposed on the manufacturer, as regards his products, by virtue of the European Community directives providing for the affixing of the CE marking. When the CE marking is affixed on a product, it represents a declaration of the manufacturer or of his authorized representative that the product in question conforms to all the applicable provisions including the conformity assessment procedures. This prevents the Member States from limiting the marketing and putting into service of products bearing the CE marking, unless this measure is justified by the proved non-conformity of the product.

IECEE CB SCHEME

The IECEE CB Scheme is the world's first truly international system for acceptance of test reports dealing with the safety of electrical and electronic products. It is a multilateral agreement among participating countries and certification organizations. A manufacturer utilizing a CB test report issued by one of these organizations can obtain national certification in all other member countries of the CB Scheme.
The Scheme is based on the use of international (IEC) Standards. If some members' national standards are not yet completely harmonized with IEC Standards, national differences are permitted if clearly declared to all other members. The CB Scheme utilizes CB Test Certificates to attest that product samples have successfully passed the appropriate tests and are in compliance with the requirements of the relevant IEC Standard and with the declared national differences of various member countries.
The main objective of the Scheme, is to facilitate trade by promoting harmonization of the national standards with international Standards and cooperation among product certifiers worldwide in order to bring product manufacturers a step closer to the ideal concept of "one product, one test, one mark, where applicable".

- LR, ABS, DNV, KR, BV, GL, RINA, NK
- GOST, TPC



Time chart

Long time

Ir \ tr	0.5	1	2	4	8	12	16	20
1.11	58806	117611	235223	470445	940890	1411335	1881780	2352225
1.15	36041	72082	144163	288326	576652	864978	1153305	1441631
1.20	26827	53654	107308	214615	429231	643846	858461	1073077
1.25	21777	43553	87106	174212	348424	522636	696848	871060
1.30	18408	36817	73634	147268	294535	441803	589071	736338
1.35	15947	31895	63789	127579	255157	382736	510314	637893
1.40	14049	28098	56197	112393	224787	337180	449573	561967
1.45	12532	25063	50126	100252	200504	300756	401009	501261
1.50	11286	22573	45145	90290	180580	270870	361160	451450
1.55	10244	20488	40977	81954	163907	245861	327814	409768
1.60	9359	18717	37434	74869	149737	224606	299474	374343
1.65	8596	17193	34386	68771	137542	206313	275084	343855
1.70	7934	15867	31734	63468	126936	190404	253873	317341
1.75	7352	14704	29408	58815	117631	176446	235261	294077
1.80	6838	13675	27351	54702	109404	164106	218808	273509
1.85	6380	12760	25521	51041	102082	153123	204164	255205
1.90	5970	11941	23882	47764	95528	143292	191056	238820
1.95	5602	11204	22408	44815	89630	134446	179261	224076
2.00	5269	10537	21075	42150	84299	126449	168598	210748
2.05	4966	9932	19865	39730	79459	119189	158919	198649
2.10	4691	9381	18762	37525	75049	112574	150099	187623
2.15	4439	8877	17754	35508	71017	106525	142034	177542
2.20	4207	8415	16829	33659	67318	100976	134635	168294
2.25	3995	7989	15979	31957	63914	95871	127829	159786
2.30	3798	7597	15194	30387	60775	91162	121550	151937
2.35	3617	7234	14468	28936	57871	86807	115742	144678
2.40	3449	6897	13795	27590	55180	82769	110359	137949
2.45	3292	6585	13170	26339	52679	79018	105358	131697
2.50	3147	6294	12588	25176	50351	75527	100702	125878
2.55	3011	6022	12045	24090	48180	72269	96359	120449
2.60	2884	5769	11538	23075	46151	69226	92301	115377
2.65	2766	5531	11063	22126	44251	66377	88503	110628
2.70	2654	5309	10618	21235	42471	63706	84941	106177
2.75	2550	5100	10200	20399	40799	61198	81597	101997
2.80	2452	4903	9807	19613	39226	58840	78453	98066
2.85	2359	4718	9436	18873	37746	56619	75491	94364
2.90	2272	4544	9087	18175	36350	54524	72699	90874
2.95	2189	4379	8758	17516	35032	52547	70063	87579
3.00	2112	4223	8446	16893	33786	50679	67572	84464
3.05	2038	4076	8152	16303	32607	48910	65214	81517
3.10	1968	3936	7872	15745	31490	47235	62980	78725
3.15	1902	3804	7608	15215	30431	45646	60862	76077
3.20	1839	3678	7356	14713	29425	44138	58851	73563
3.25	1779	3559	7117	14235	28470	42705	56940	71175
3.30	1723	3445	6890	13781	27561	41342	55122	68903
3.35	1669	3337	6674	13348	26696	40044	53392	66741
3.40	1617	3234	6468	12936	25872	38808	51744	64680
3.45	1568	3136	6272	12543	25086	37629	50172	62715
3.50	1521	3042	6084	12168	24336	36504	48672	60841
3.55	1476	2952	5905	11810	23620	35430	47240	59050
3.60	1433	2867	5734	11468	22935	34403	45871	57338
3.65	1393	2785	5570	11140	22281	33421	44561	55702

Ir \ tr	0.5	1	2	4	8	12	16	20
3.70	1353	2707	5413	10827	21654	32481	43308	54135
3.75	1316	2632	5263	10527	21054	31581	42108	52634
3.80	1280	2560	5120	10239	20479	30718	40957	51196
3.85	1245	2491	4982	9963	19927	29890	39854	49817
3.90	1212	2425	4849	9699	19398	29096	38795	48494
3.95	1181	2361	4722	9445	18889	28334	37779	47223
4.00	1150	2300	4600	9201	18401	27602	36802	46003
4.05	1121	2241	4483	8966	17932	26898	35864	44830
4.10	1093	2185	4370	8740	17481	26221	34961	43701
4.15	1065	2131	4262	8523	17046	25569	34092	42615
4.20	1039	2079	4157	8314	16628	24942	33256	41570
4.25	1014	2028	4056	8113	16225	24338	32451	40563
4.30	990	1980	3959	7919	15837	23756	31674	39593
4.35	966	1933	3866	7731	15463	23194	30926	38657
4.40	944	1888	3776	7551	15102	22653	30204	37755
4.45	922	1844	3688	7377	14754	22131	29507	36884
4.50	901	1802	3604	7209	14417	21626	28835	36043
4.55	881	1762	3523	7046	14093	21139	28185	35231
4.60	861	1722	3445	6889	13779	20668	27557	34447
4.65	842	1684	3369	6738	13475	20213	26951	33688
4.70	824	1648	3295	6591	13182	19773	26364	32955
4.75	806	1612	3225	6449	12898	19347	25796	32245
4.80	789	1578	3156	6312	12624	18935	25247	31559
4.85	772	1545	3089	6179	12358	18536	24715	30894
4.90	756	1513	3025	6050	12100	18150	24200	30250
4.95	741	1481	2963	5925	11851	17776	23701	29627
5.00	726	1451	2902	5804	11609	17413	23218	29022
5.05	711	1422	2844	5687	11374	17062	22749	28436
5.10	697	1393	2787	5574	11147	16721	22294	27868
5.15	683	1366	2732	5463	10927	16390	21853	27317
5.20	670	1339	2678	5356	10713	16069	21425	26782
5.25	657	1313	2626	5252	10505	15757	21010	26262
5.30	644	1288	2576	5152	10303	15455	20607	25758
5.35	632	1263	2527	5054	10107	15161	20215	25268
5.40	620	1240	2479	4959	9917	14876	19834	24793
5.45	608	1217	2433	4866	9732	14598	19464	24330
5.50	597	1194	2388	4776	9552	14329	19105	23881
5.55	586	1172	2344	4689	9378	14066	18755	23444
5.60	575	1151	2302	4604	9207	13811	18415	23019
5.65	565	1130	2261	4521	9042	13563	18084	22605
5.70	555	1110	2220	4441	8881	13322	17762	22203
5.75	545	1091	2181	4362	8724	13087	17449	21811
5.80	536	1071	2143	4286	8572	12858	17144	21430
5.85	526	1053	2106	4212	8423	12635	16847	21058
5.90	517	1035	2070	4139	8279	12418	16557	20697
5.95	509	1017	2034	4069	8138	12206	16275	20344
6.00	500	1000	2000	4000	8000	12000	16000	20001
6.05	492	983	1967	3933	7866	11799	15733	19666
6.10	483	967	1934	3868	7736	11604	15471	19339
6.15	476	951	1902	3804	7608	11413	15217	19021
6.20	468	936	1871	3742	7484	11226	14968	18710
6.25	460	920	1841	3682	7363	11045	14726	18408

Long time

tr / ×Ir	0.5	1	2	4	8	12	16	20
6.30	453	906	1811	3622	7245	10867	14490	18112
6.35	446	891	1782	3565	7129	10694	14259	17823
6.40	439	877	1754	3508	7017	10525	14034	17542
6.45	432	863	1727	3453	6907	10360	13814	17267
6.50	425	850	1700	3400	6799	10199	13599	16998
6.55	418	837	1674	3347	6694	10042	13389	16736
6.60	412	824	1648	3296	6592	9888	13184	16480
6.65	406	811	1623	3246	6492	9738	12984	16230
6.70	400	799	1598	3197	6394	9591	12788	15985
6.75	394	787	1575	3149	6298	9447	12597	15746
6.80	388	776	1551	3102	6205	9307	12410	15512
6.85	382	764	1528	3057	6113	9170	12227	15283
6.90	376	753	1506	3012	6024	9036	12048	15060
6.95	371	742	1484	2968	5936	8905	11873	14841
7.00	366	731	1463	2925	5851	8776	11702	14627
7.05	360	721	1442	2884	5767	8651	11534	14418
7.10	355	711	1421	2843	5685	8528	11371	14213
7.15	350	701	1401	2803	5605	8408	11210	14013
7.20	345	691	1382	2763	5527	8290	11053	13816
7.25	341	681	1362	2725	5450	8175	10899	13624
7.30	336	672	1344	2687	5374	8062	10749	13436
7.35	331	663	1325	2650	5301	7951	10601	13252
7.40	327	654	1307	2614	5229	7843	10457	13071
7.45	322	645	1289	2579	5158	7737	10316	12895
7.50	318	636	1272	2544	5089	7633	10177	12721
7.55	314	628	1255	2510	5021	7531	10041	12552
7.60	310	619	1239	2477	4954	7431	9908	12385
7.65	306	611	1222	2444	4889	7333	9778	12222
7.70	302	603	1206	2412	4825	7237	9650	12062
7.75	298	595	1191	2381	4762	7143	9524	11906
7.80	294	588	1175	2350	4701	7051	9401	11752
7.85	290	580	1160	2320	4640	6961	9281	11601
7.90	286	573	1145	2291	4581	6872	9163	11453
7.95	283	565	1131	2262	4523	6785	9047	11308
8.00	279	558	1117	2233	4466	6700	8933	11166
8.05	276	551	1103	2205	4411	6616	8821	11026
8.10	272	544	1089	2178	4356	6534	8712	10889
8.15	269	538	1076	2151	4302	6453	8604	10755
8.20	266	531	1062	2125	4249	6374	8498	10623
8.25	262	525	1049	2099	4197	6296	8395	10494
8.30	259	518	1037	2073	4147	6220	8293	10366
8.35	256	512	1024	2048	4097	6145	8193	10242
8.40	253	506	1012	2024	4048	6071	8095	10119
8.45	250	500	1000	2000	3999	5999	7999	9998
8.50	247	494	988	1976	3952	5928	7904	9880
8.55	244	488	976	1953	3906	5858	7811	9764
8.60	241	482	965	1930	3860	5790	7720	9650
8.65	238	477	954	1908	3815	5723	7630	9538
8.70	236	471	943	1886	3771	5657	7542	9428
8.75	233	466	932	1864	3728	5592	7455	9319
8.80	230	461	921	1843	3685	5528	7370	9213
8.85	228	455	911	1822	3643	5465	7287	9108

tr / ×Ir	0.5	1	2	4	8	12	16	20
8.90	225	450	901	1801	3602	5403	7204	9005
8.95	223	445	890	1781	3562	5343	7123	8904
9.00	220	440	880	1761	3522	5283	7044	8805
9.05	218	435	871	1741	3483	5224	6966	8707
9.10	215	431	861	1722	3444	5167	6889	8611
9.15	213	426	852	1703	3407	5110	6813	8516
9.20	211	421	842	1685	3369	5054	6739	8423
9.25	208	417	833	1666	3333	4999	6666	8332
9.30	206	412	824	1648	3297	4945	6594	8242
9.35	204	408	815	1631	3261	4892	6523	8153
9.40	202	403	807	1613	3227	4840	6453	8066
9.45	200	399	798	1596	3192	4788	6384	7981
9.50	197	395	790	1579	3159	4738	6317	7896
9.55	195	391	781	1563	3125	4688	6251	7813
9.60	193	387	773	1546	3093	4639	6185	7732
9.65	191	383	765	1530	3060	4591	6121	7651
9.70	189	379	757	1514	3029	4543	6058	7572
9.75	187	375	749	1499	2998	4496	5995	7494
9.80	185	371	742	1483	2967	4450	5934	7417
9.85	184	367	734	1468	2937	4405	5873	7342
9.90	182	363	727	1453	2907	4360	5814	7267
9.95	180	360	719	1439	2878	4316	5755	7194
10.00	178	356	712	1424	2849	4273	5697	7122

Time chart

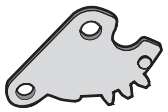
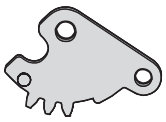
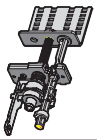
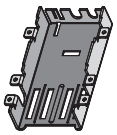
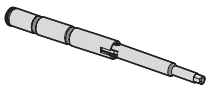
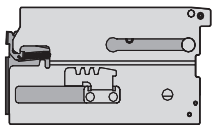
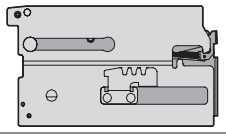
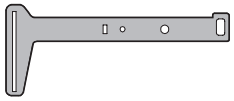
Short time

tsd / ×Ir	0.1	0.2	0.3	0.4
1.40	5102	10204	15306	20408
1.45	4756	9512	14269	19025
1.50	4444	8889	13333	17778
1.55	4162	8325	12487	16649
1.60	3906	7813	11719	15625
1.65	3673	7346	11019	14692
1.70	3460	6920	10381	13841
1.75	3265	6531	9796	13061
1.80	3086	6173	9259	12346
1.85	2922	5844	8766	11687
1.90	2770	5540	8310	11080
1.95	2630	5260	7890	10519
2.00	2500	5000	7500	10000
2.05	2380	4759	7139	9518
2.10	2268	4535	6803	9070
2.15	2163	4327	6490	8653
2.20	2066	4132	6198	8264
2.25	1975	3951	5926	7901
2.30	1890	3781	5671	7561
2.35	1811	3622	5432	7243
2.40	1736	3472	5208	6944
2.45	1666	3332	4998	6664
2.50	1600	3200	4800	6400
2.55	1538	3076	4614	6151
2.60	1479	2959	4438	5917
2.65	1424	2848	4272	5696
2.70	1372	2743	4115	5487
2.75	1322	2645	3967	5289
2.80	1276	2551	3827	5102
2.85	1231	2462	3693	4925
2.90	1189	2378	3567	4756
2.95	1149	2298	3447	4596
3.00	1111	2222	3333	4444
3.05	1075	2150	3225	4300
3.10	1041	2081	3122	4162
3.15	1008	2016	3023	4031
3.20	977	1953	2930	3906
3.25	947	1893	2840	3787
3.30	918	1837	2755	3673
3.35	891	1782	2673	3564
3.40	865	1730	2595	3460
3.45	840	1680	2520	3361
3.50	816	1633	2449	3265
3.55	793	1587	2380	3174
3.60	772	1543	2315	3086

tsd / ×Ir	0.1	0.2	0.3	0.4
3.65	751	1501	2252	3002
3.70	730	1461	2191	2922
3.75	711	1422	2133	2844
3.80	693	1385	2078	2770
3.85	675	1349	2024	2699
3.90	657	1315	1972	2630
3.95	641	1282	1923	2564
4.00	625	1250	1875	2500
4.05	610	1219	1829	2439
4.10	595	1190	1785	2380
4.15	581	1161	1742	2323
4.20	567	1134	1701	2268
4.25	554	1107	1661	2215
4.30	541	1082	1622	2163
4.35	528	1057	1585	2114
4.40	517	1033	1550	2066
4.45	505	1010	1515	2020
4.50	494	988	1481	1975
4.55	483	966	1449	1932
4.60	473	945	1418	1890
4.65	462	925	1387	1850
4.70	453	905	1358	1811
4.75	443	886	1330	1773
4.80	434	868	1302	1736
4.85	425	850	1275	1700
4.90	416	833	1249	1666
4.95	408	816	1224	1632
5.00	400	800	1200	1600
5.05	392	784	1176	1568
5.10	384	769	1153	1538
5.15	377	754	1131	1508
5.20	370	740	1109	1479
5.25	363	726	1088	1451
5.30	356	712	1068	1424
5.35	349	699	1048	1398
5.40	343	686	1029	1372
5.45	337	673	1010	1347
5.50	331	661	992	1322
5.55	325	649	974	1299
5.60	319	638	957	1276
5.65	313	627	940	1253
5.70	308	616	923	1231
5.75	302	605	907	1210
5.80	297	595	892	1189
5.85	292	584	877	1169

tsd / ×Ir	0.1	0.2	0.3	0.4
5.90	287	575	862	1149
5.95	282	565	847	1130
6.00	278	556	833	1111
6.05	273	546	820	1093
6.10	269	537	806	1075
6.15	264	529	793	1058
6.20	260	520	780	1041
6.25	256	512	768	1024
6.30	252	504	756	1008
6.35	248	496	744	992
6.40	244	488	732	977
6.45	240	481	721	961
6.50	237	473	710	947
6.55	233	466	699	932
6.60	230	459	689	918
6.65	226	452	678	905
6.70	223	446	668	891
6.75	219	439	658	878
6.80	216	433	649	865
6.85	213	426	639	852
6.90	210	420	630	840
6.95	207	414	621	828
7.00	204	408	612	816
7.05	201	402	604	805
7.10	198	397	595	793
7.15	196	391	587	782
7.20	193	386	579	772
7.25	190	380	571	761
7.30	188	375	563	751
7.35	185	370	555	740
7.40	183	365	548	730
7.45	180	360	541	721
7.50	178	356	533	711
7.55	175	351	526	702
7.60	173	346	519	693
7.65	171	342	513	683
7.70	169	337	506	675
7.75	166	333	499	666
7.80	164	329	493	657
7.85	162	325	487	649
7.90	160	320	481	641
7.95	158	316	475	633
8.00	156	312	469	625
8.05	154	309	463	617
8.10	152	305	457	610

tsd / ×Ir	0.1	0.2	0.3	0.4
8.15	151	301	452	602
8.20	149	297	446	595
8.25	147	294	441	588
8.30	145	290	435	581
8.35	143	287	430	574
8.40	142	283	425	567
8.45	140	280	420	560
8.50	138	277	415	554
8.55	137	274	410	547
8.60	135	270	406	541
8.65	134	267	401	535
8.70	132	264	396	528
8.75	131	261	392	522
8.80	129	258	387	517
8.85	128	255	383	511
8.90	126	252	379	505
8.95	125	250	375	499
9.00	123	247	370	494
9.05	122	244	366	488
9.10	121	242	362	483
9.15	119	239	358	478
9.20	118	236	354	473
9.25	117	234	351	467
9.30	116	231	347	462
9.35	114	229	343	458
9.40	113	226	340	453
9.45	112	224	336	448
9.50	111	222	332	443
9.55	110	219	329	439
9.60	109	217	326	434
9.65	107	215	322	430
9.70	106	213	319	425
9.75	105	210	316	421
9.80	104	208	312	416
9.85	103	206	309	412
9.90	102	204	306	408
9.95	101	202	303	404
10.00	100	200	300	400

NO.		FRAME SIZE	OUTLINE	Quantities			Remarks Part NO.
				Working		Spare	
				Per Set	Per Vess		
1	Right gear ass'y draw	D,E,F,G		1		1	46273460401
2	Left gear ass'y draw	D,E,F,G		1		1	46273460402
3	Lock ass'y	D,E,F,G		1		1	56773460401
4	Lock ass'y cover	D,E,F,G		1		1	54613460401
5	Manual handle	D,E,F,G		1		1	55223460401
6	Right rail	D,E,F,G		1		1	59023460401
7	Left rail	D,E,F,G		1		1	59023460402
8	Safety control cover	D,E,F,G		1		1	64613461402 (AL-D3) 64613462402 (AL-D4) 64613463402 (AL-E3) 64613464402 (AL-E4) 64613465405 (AL-F3) 64613465406 (AL-F4) 64613465407 (AL-G3) 64613465408 (AL-G4)
9	Bottom cover	D,E,F,G		1		1	64623460401
10	Autocon link	D,E,F,G		1		1	65313460401



Accessories Item Code

Mounting	Accessories		Page
 Main body	MI	Mechanical Interlock KIT	100
	K1, K2, K3, K4	Keylock Frame	100
	LH	Lifting hook	100
	CTD	Condenser trip device	100
	IPOT	Intelligent Potable OCR Tester	101
	-	Front-type Terminal	101
	DC	Dust cover	101
	ATS	ATS (ATS Controller)	101
	VM	Voltage module	102
	ZCT	Zero current transformer	102
 Cradle	SBC	Shorting “b” contact	103
	STL	Safety shutter lock	103
	DF	Door Frame	103
	MIP	Miss insertion prevent device	103
	MOC	Mechanical operated cell switch	104
	CEL	Cell Switch	104
	DI	Door Interlock	104
	BSP	Body supporter	104
	UDC	UVT Time Delay Controller	105
	IB	Interphase barrier	105
	RI	Racking Interlock	105
	-	Draw In/Out Handle (Long-type)	105
	-	Push-in Module	106
	-	TRIO	106

Accessories Item Code (Main body)

Mechanical Interlock KIT [MI]



Description	Item Code	Classification
TOTAL ASS'Y, M/I KIT, WIRE_2WAY, AN, AS, AH-D, E, F, G, A/S	72313460791	2M
TOTAL ASS'Y, M/I KIT, WIRE_2WAY, 2.6m, AN, AS, AH-D, E, F, G, A/S	72313460792	3.6M
TOTAL ASS'Y, M/I KIT, WIRE_3WAY, AN, AS, AH-D, E, F, G, A/S	72313460793	3M

Keylock Frame



Description	Item Code	Classification
FRAME ASS'Y, KEY LOCK, PROFALUX, KIRK(CAMLOCK)	54623460001	Single CAM LOCK Type - Profalux keylock - Kirkkey lock (KCAM00010)
FRAME ASS'Y, KEY LOCK, REVERSE	54623460002	-
TOTAL ASS'Y, FRAME, KIRKKEY, AN, AS, AH-D, E, F, G	72313460864	Single CAM LOCK Type - Kirkkey lock (CN-22(KC40-10))
TOTAL ASS'Y, KEY LOCK, CASTELL, AN, AS, AH-D, E, F, G	72313460696	-
TOTAL ASS'Y, FRAME, DOUBLE KIRKKEY, AN, AS, AH-D, E, F, G	72313460902	Double CAM LOCK Type - Kirkkey lock (KCAM00010)

Lifting hook [LH]



Description	Item Code	Classification	Quantity per item code
HOOK, LIFT, LBA-C 630~3200A	46513451003	D/E	1ea
HOOK,LIFT,AN,AS,AH	46513460882	F/G	1ea

Condenser trip device [CTD]



Description	Item Code	Classification
CTD ASS'Y, AC100 / 110V, ACB	76123460001	110 V
CTD ASS'Y, AC200 / 220V, ACB	76123460002	220 V

IPOT [Intelligent Potable OCR Tester]



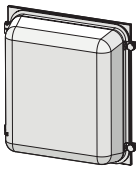
Description	Item Code	Classification
TOTAL ASS'Y, IPOT, Trip Relay Tester	72313460410	Trip Relay & STU

Front-type Terminal



Description	Item Code	Classification
SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN / AS / AH-D3	62363461507	-
SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN / AS / AH-D4	62363462510	-
SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN / AS / AH-E3	62363463507	-
SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, AN / AS / AH-E4	62363464512	-

Dust cover [DC]



Description	Item Code	Classification
COVER ASS'Y, DUST & DOOR FRAME, AN / AS / AH-DEFG	64623460502	Draw-out type
COVER ASS'Y, DUST & DOOR FRAME, AN, AH-D, E, F, G, IP54	64623460504	IP 54
COVER ASS'Y, DUST & DOOR FRAME, AN / AS / AH-DEFG, FIXED	64623460507	Fixed type

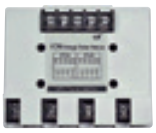
ATS Controller [ATS]



Description	Item Code	Classification
ATS CONTROLLER AC220V(ATSC-220)	28360041	220 V
ATS CONTROLLER AC110V(ATSC-110)	28360042	110 V

Accessories Item Code (Main body)

Voltage module [VM]



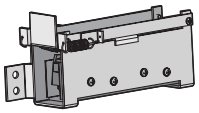
Description	Item Code	Classification
TOTAL ASS'Y, VDM(with Cable), EXTERNAL, STU	72313460708	Externally attached
TOTAL ASS'Y, VDM, EXTERNAL, STU	72313460709	VDM only

Zero current transformer [ZCT]



Description	Item Code	Classification
ZCT, WYZR-120HL, 1000/1, SUSOL Trip Relay 1000AF, CABLE TYPE	76513460301	D 120
ZCT, WYZR-200HL, 1000/1, SUSOL Trip Relay 2000AF, CABLE TYPE	76513460302	D 200

Shorting "b" contact [SBC]



Description	Item Code	Classification
SWITCH ASS'Y, SHORT/B, CONTACT, CRADLE, AN, AH-D, E, F, G	62503460401	for Marine

Safety shutter lock [STL]



Description	Item Code	Classification
LOCK, SHUTTER, AN, AS, AH-D, E, F, G, 2EA	56763460411	2 ea

Door Frame [DF]



고정형



인출형

Description	Item Code	Classification
DOOR ASS'Y, FRAME Drawout	64723460501	Fixed type
DOOR ASS'Y, FRAME FIXED	64723460502	Draw-out type

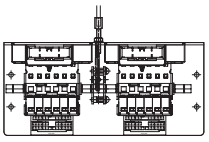
Miss insertion prevent device [MIP]



Description	Item Code	Classification
MIP ASS'Y, 630~6300A, AN, AS, AH-D, E, F, G	84113460501	-

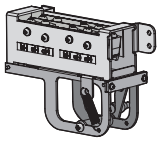
Accessories Item Code (Cradle)

Mechanical operated cell switch [MOC]



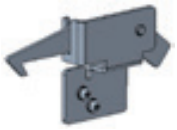
Description	Item Code	Classification
TOTAL ASS'Y, MOC, AN, AS, AH, 200~6300A, ROTARY	72313460659	-

Cell Switch [CEL]



Description	Item Code	Classification
TOTAL ASS'Y, CELL SWITCH, 4C_LEFT, 630~6300A, AN, AS, AH	72313460501	Left type
TOTAL ASS'Y, CELL SWITCH, 4C_LEFT_WITH COVER, AN, AS, AH	72313460621	Left cover attached
TOTAL ASS'Y, CELL SWITCH, 4C_RIGHT, 630~6300A, AN, AS, AH	72313460537	Right type
TOTAL ASS'Y,C ELL SWITCH, 8C_LEFT, 630~6300A, AN, AS, AH	72313460620	Left, 8C
TOTAL ASS'Y, CELL SWITCH, 8C_LEFT_WITH COVER, AN, AS, AH	72313460623	cover, 8C

Door Interlock [DI]



Description	Item Code	Classification
INTERLOCK ASS'Y, DOOR, AN, AS, AH-D, E, F, G	56123460504	-
INTERLOCK ASS'Y, DOOR CATCH, LEFT, AN, AS, AH-D, E, F, G	56123460513	Catch-type
INTERLOCK ASS'Y, DOOR CATCH, RIGHT, AN, AS, AH-D, E, F, G	56123460512	Catch-type

Body supporter [BSP]



Description	Item Code	Classification
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-D3	72313461501	-
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-D4	72313462501	-
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-E3	72313463501	-
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-E4	72313464501	-
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-F3	72313465501	-
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-F4	72313465502	-
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-G3	72313465503	-
TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-G4	72313465504	-

UVT Time Delay Controller [UDC]



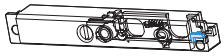
Description	Item Code	Classification
DEVICE ASS'Y, UVT DELAY, ADC100~130V, AN, AS, AH-D, E, F, G	52773460272	-
DEVICE ASS'Y, UVT DELAY, ADC200~250V, AN, AS, AH-D, E, F, G	52773460273	-
DEVICE ASS'Y, UVT DELAY, ADC200~250V, 5S, AN, AS, AH-D, E, F, G	52773460280	Delay 5 s
DEVICE ASS'Y, UVT DELAY, DC48~60V, AC48V, AN, AS, AH-D, E, F, G	52773460271	-
DEVICE ASS'Y, UVT DELAY, AC380~480V, AN, AS, AH-D, E, F, G	52773460274	-

Interphase barrier [IB]



Description	Item Code	Classification
BARRIER, INSULATION, LS-C, 630~6300A, 3EA	67213460011	100 mm
BARRIER, INSULATION, LS-C, 630~6300A, LONG, 3EA	67213460013	140 mm

Racking Interlock [RI]



Description	Item Code	Classification
INTERLOCK ASS'Y, RACKING	56123460501	-
INTERLOCK ASS'Y, RACKING	56123460521	-

Draw In/Out Handle [Long-type]



Description	Item Code	Classification
HANDLE ASS'Y, DRAW, LONG, AL-D, E, F, G	55223460402	-
HANDLE ASS'Y, DRAW, LONG, AL-D, E, F, G, HYX	55223460404	T type

Accessories Item Code (Cradle)

Push-in Module



Description	Item Code	Classification
TOTAL ASS'Y, PUSH-IN MODULE, AMP	72313460660	Push-in
TOTAL ASS'Y, SCREW MODULE, AMP	72313460661	Screw

TRIO



Description	Item Code	Classification
TOTAL ASS'Y, New TRIO, Smart LV	72313460500	TRIO
TOTAL ASS'Y, CONTACT TEMPERATURE SENSOR, TRIO	72313460280	Contact sensor
IPM6P-ACDC240V/DC24V36W, TS250i~TS800i	02410001	SMPS

Ordering sheet

For faster quote processing, please use the following request for ordering sheet. For each section, check the applicable box or enter value corresponding to your choice.

Receipt	LS ELECTRIC Co., Ltd.	Order date		Distributor name	
Project		Contractor			
Delivery place		Delivery date		PNL Maker	

ACB main body	Type of ACB	☐ AH ☐ AS				Quantity		
	Frame size	☐ D (630~1600AF)	☐ E (2000~4000AF)	☐ F (4000~5000AF)	☐ G (4000~6300AF)			
	Ratings	AF						
	Rated current (CT)	A						
	Trip relay	☐ NO						
		☐ YES						
	No.of poles	☐ 3-pole				☐ 4-pole	☐ Standard type (R, S, T, N)	
							☐ Reverse phase type (N, R, S, T)	
	Installation type	☐ Draw-out type				☐ Fixed type		
	Closing type	☐ Manual closing						
		☐ Electrical closing						
		• Charge method: Charging completion contact(1b) is basically installed				Standard type (OFF-Charge method)		
						Rapid auto-reclosing type (ON-Charge method)		
		• Motor operating voltage		☐ AC/DC 100V~130V		☐ DC 125V	☐ DC 24V~30V	☐ AC 48V~60V
				☐ AC/DC 200V~250V		☐ DC 380V~415V	☐ AC 440V~480V	☐ AC 48V
	Closing voltage	☐ AC/DC 100V~130V	☐ DC 125V	☐ AC/DC 200V~250V	☐ DC 24V~30V	☐ DC 48V~60V	☐ AC 380V~480V	☐ AC 48V
	Trip voltage	☐ AC/DC 100V~130V	☐ DC 125V	☐ AC/DC 200V~250V	☐ DC 24V~30V	☐ DC 48V~60V	☐ AC 380V~480V	☐ AC 48V
ACB cradle	Cradle type	☐ No safety shutter (E class)				☐ Safety shutter attachment (F class)		
	Terminal connection	☐ Manual connection				☐ Automatic connection		
	Connections	☐ Horizontal		☐ Vertical		☐ Front connection		
		☐ Line: Horizontal, Load: Vertical		☐ Line: Vertical, Load: Horizontal		☐ Separate order/ User Installation		
ACB accessory	ACB Main body	• Aux. contact(AX)	☐ Standard type (3a3b, Standard installation)			☐ Extended type (5a5b)	☐ High capacity	
		• Key Lock(K1, K3)				☐ Single key, K1 (ON–Lock)	☐ Double key, K3 (ON–Lock)	
		• Undervoltage trip device (UVT, Instantaneous)						
		☐ AC/DC 100V~130V	☐ AC/DC 200V~250V	☐ DC 125V		☐ DC 24V~30V	☐ DC 48V~60V	☐ AC/DC 380V~480V ☐ AC 48V
	Standard accessory	• Mechanical operation contact (MOC), Door Interlock (DI)				☐ Non-attachment type	☐ Attachment type	
		• Mechanical interlock (MI)				☐ Non-attachment type	☐ Attachment type	
		• Counter(C)				☐ Non-attachment type	☐ Attachment type	
		• Miss insertion preventive device (MIP)				☐ Non-attachment type	☐ Attachment type	
		• Double shunt coil(SHT2)				☐ Non-attachment type	☐ Attachment type	
		• Ready-to-close switch(RCS)				☐ Non-attachment type	☐ Attachment type	
		• Trip alarm switch, Manual reset button(AL, MRB)				☐ Non-attachment type	☐ Attachment type	
		☐ Key interlock (K2, ON–Lock)				☐ ON/OFF Button Lock	☐ Temperature Alarm	
	ACB cradle Standard accessory	☐ Safety shutter lock(STL)						
		☐ Zero arc space(ZAS) Note 2)						
	Separate purchase Main body mounting	☐ Interphase Barrier(IB)						
		☐ Slow closing lever(SL)						
	Cradle mounting	• Cell switch(CL)	☐ 4c	☐ 8c				
		☐ Door interlock(DI)						
		• Mechanical operation contact (MOC)				☐ Standard type (10a10b)	☐ High capacity(10a10b)	
		• Mechanical Interlock (MI)				☐ Wire type (2 terminals)	☐ Wire type (3 terminals)	
		• Shortening b-contact (SBC, 4b Max)		☐ 1a		☐ 2a	☐ 3b	☐ 4a
		• Miss insertion preventive device (MIP)				☐ Non-attachment type	☐ Attachment type	
		• Cradle mounting block(CMB)	☐ Safety control cover(SC)					
		• Racking interlock(RI)	☐ Interphase Barrier(IB) Note 2)					
	External mounting	• UVT time delay controller(UDC)						
		☐ AC/DC 100V~130V	☐ AC/DC 200V~250V	☐ DC 125V		☐ DC 48V~60V	☐ AC 380V~480V	☐ AC 48V
		☐ Door frame (DF)		☐ Condenser trip device (CTD)			☐ Trip Relay tester	
		☐ Dust cover(DC)	☐ Profibus-DP Comm.(PC)			☐ Temperature alarm(TM)	☐ Remote I/O(RCO)	

Type		Frequency		Control voltage			Comm.	
		60Hz	50Hz	No	AC/DC 100~250V	DC 24~48V	No	Yes
N	Normal	☐ NB1	☐ NB6	●	-	-	●	-
A	Ammeter	☐ AB1	☐ AB6	-	●	-	●	-

Type		Frequency		Control voltage		Comm.	Optional function
		60Hz	50Hz	AC/DC 100~250V	DC 24~48V		Pre-Trip Alarm
P	Power Meter	☐ PB3	☐ PB8	●	-	●	●
		☐ PB4	☐ PB9	-	●	●	●

Note) - Communication function is not available under no control voltage
- P(Power) Meter is also available for generator protection
- P Meter needs the accessory(VDM) for voltage measurement

Note) 1. The standard accessory for Susol (AH).
2. Aux. contact with extended/high capacity type adopts the rapid auto-reclosing method and available up to 6a6b.

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