Beyond X™

Susol UL ACB

Susol UL Air Circuit Breakers

LS ELECTRIC

Beyond X™

Beyond X™ Susol ACB delivers reliable, low-loss power management with high breaking capacity, featuring multi-protocol connectivity for remote monitoring and a modular design for installation and maintenance.

The Susol ACB Series revolutionizes power distribution systems by introducing intelligent connectivity and advanced remote monitoring features. LS Electric's newest ACB products feature convenient access to device data through Modbus, BLE, NFC or direct USB connection; providing users with easy access and efficient control over their power distribution infrastructure.

Designed with advanced electronic trip units, it offers precise, intelligent monitoring and seamless integration with modern energy management systems.The Susol ACB's innovative modular design ensures simple installation and maintenance, while delivering high breaking capacity with minimal energy loss, making it the ideal choice for reliable and sustainable power management in any application.

1. Intro

Beyond X™ Susol ACB Series revolutionizes power distribution systems by introducing intelligent connectivity and advanced remote monitoring features.

2. Beyond X™ Susol UL ACB

Beyond X™ Susol ACB delivers high breaking capacity with minimal energy loss, making it ideal for reliable and sustainable power management in any application.

3. Smart trip unit

Designed with advanced electronic trip units, it offers precise, intelligent monitoring and seamless integration with modern energy management systems

4. Accessories

Beyond X™ Susol ACB's innovative modular design ensures simple installation and maintenance.

5. Technical information

LS Electric's newest ACB products feature convenient access to device data through Modbus, BLE, NFC or direct USB connection; providing users with easy access and efficient control over their power distribution infrastructure.

Intro

Overview

- World-class accuracy
  - 0.5%(Current, Voltage) / Class 1.0(Power meter)
- High (130kA) breaking capacity full line-up to 6000A
- Meet compact design needs for panel size flexibility
- 100% rated neutral pole in 4-Pole configurations
- Interchangeable trip unit and rating plug
- High rated maximum voltage-Up to 847Vac

C-Frame
UAN/UAS
800~1200AF

D-Frame
UAS
800~1600AF

E-Frame
UAH
800~4000AF

G-Frame
UAH
3200~6000AF

Codes and Standards

Susol UL ACBs are manufactured and tested in accordance with the following standards:

C-Frame	D/E/G-Frame
UL 489 CSA C22.2 No. 5-16	IEEE C37.13 IEEE C37.17 ANSI C37.50 UL 1066 (cULus Listed) CSA C22.2 No.31-10

Susol UL ACBs are UL certified. Refer to the UL file numbers below formore information.

UL file numbers				
Frame	**File No.**	**Vol.**	**Sec.**	**Description**
C	E362901	1	2	Circuit breakers with Equipment Ground-fault Protection
C	E223516	2	3	Switch, molded case
C	E231289	2	12	Circuit breaker, molded case
C	E223241	4	2	Circuit breaker Trip Units
D	E326950	1	1	LOW VOLTAGE AC POWER CIRCUIT BREAKERS D-frame
E	E326950	1	2	LOW VOLTAGE AC POWER CIRCUIT BREAKERS E-frame
G	E326950	1	3	LOW VOLTAGE AC POWER CIRCUIT BREAKERS G-frame
D/E/G	E326950	3	2	LOW VOLTAGE AC POWER CIRCUIT BREAKERS TRIP UNIT (STU)

Circuit breakers should be applied according to guidelines detailed in the National Electrical Code® (NEC®) and other local wiring codes.

Ratings overview for UL489 product

Frame Series			C UAN		UAS	
Ampere Frame (AF)			800	1200	800	1200
Current (A)			400	800	400	800
			600	1000	600	1000
			800	1200	800	1200
Neutral pole current-carrying capacity for 4-pole CBs			100%			
Frequency			50/60Hz			
Rated short circuit current (kA, Symmetrical)		800Vac	-	-	42	42
		600Vac	42	42	50	50
		480Vac	50	50	65	65
		240Vac	50	50	65	65
Rated short time current (kA)			42	42	42	42
Dimensions (H×W×D) Inch (mm)	Draw-out type	3P	14.34×10.07×10.81 (364.3×256×274.5)			
		4P	14.34×12.83×10.81 (364.3×326×274.5)			
	Fixed type	3P	12.69×10.72×7.81 (322.3×272.4×198.5)			
		4P	12.69×13.48×7.81 (322.3×342.4×198.5)			
Weight lb (kg)	Draw-out type (Without cradle)	3P	46.3(21)			
		4P	56.2(25.5)			
	Fixed type	3P	35.3(16)			
		4P	43.0(19.5)			
Certification					UL489	

Ratings overview for UL1066 product

Frame Series		D UAS		E UAH/UAW						G UAH			
Ampere Frame (AF)		800	1600	800	1600	2000	2500	3200	4000	3200	4000	5000	6000
Current (A)		400	800	400	800	1000	1200	1600	2000	1600	2000	2500	3000
		600	1000	600	1000	1200	1250	2000	2500	2000	2500	3000	3200
		630	1200	630	1200	1250	1600	2500	3200	2500	3000	3200	3600
		800	1250	800	1250	1600	2000	3000	4000	3000	3200	3600	4000
			1600		1600	2000	2500	3200		3200	3600	4000	5000
											4000	5000	6000
Neutral pole current-carrying capacity for 4-pole CBs		100%		100%						100%			
Frequency		50/60Hz		50/60Hz						50/60Hz			
Rated short circuit current (kA, Symmetrical)	847Vac	-	-	85	85	85	85	85	85	-	-	-	-
	635Vac	65	65	85	85	85	85	85	85	100	100	100	100
	508Vac	85	85	100	100	100	100	100	100	130	130	130	130
	254Vac	85	85	100	100	100	100	100	100	130	130	130	130
Rated short time current (kA)		65	65	85	85	85	85	85	85	100	100	100	100
Dimensions (H×W×D) Inch (mm)	Draw-out type 3P	16.93×13.15×16.02 (430×334×407)		16.93×16.22×16.02 (430×412×407)						18.11×30.91×16.02 (460×785×407)			
	Draw-out type 4P	16.93×16.50×16.02 (430×419×407)		16.93×20.75×16.02 (430×527×407)						18.11×39.96×16.02 (460×1015×407)			
	Fixed type 3P	11.81×11.81×11.61 (300×300×295)		11.81×14.88×11.61 (300×378×295)						11.81×29.57×11.61 (300×751×295)			
	Fixed type 4P	11.81×15.16×11.61 (300×385×295)		11.81×19.41×11.61 (300×493×295)						11.81×38.62×11.61 (300×981×295)			
Weight lb (kg)	Draw-out type (Without cradle) 3P	154(70)		214(97)	214(97)	214(97)	245(111)	326(148)	331(150)	489(222)			
	Draw-out type (Without cradle) 4P	187(85)		269(122)	269(122)	269(122)	309(140)	414(188)	418(190)	626(284)			
	Fixed type 3P	77(35)		101(46)	101(46)	101(46)	110(50)	196(89)	200(91)	227(127)			
	Fixed type 4P	99(45)		126(57)	126(57)	126(57)	137(62)	249(113)	253(115)	287(130)			
Certification		UL1066		UL1066						UL1066			

Operating conditions

Ambient temperature

Susol UL Series circuit breakers are designed to function within the temperature ranges as described below:

- The electrical and mechanical attributes are specified for an ambient temperature ranging from -13°F (-25°C) to 140°F (+60°C).
- Susol UL circuit breakers have undergone testing for functionality within industrial environments and can be mechanically cycled in temperatures as low as -31°F (-35°C) and at altitudes of up to +13,000 ft. (3,900 m).

Operating the circuit breaker at temperatures exceeding 104°F (40°C) may require derating or using a larger bus bar. For further details, refer to the relevant instructional bulletin and Temperature Correction Factors on page 157 of this catalog.

Circuit breakers equipped with trip units lacking LCD displays can be stored in their original packaging within a temperature range of -40°F (-40°C) to 185°F (85°C).

For circuit breakers equipped with trip units featuring LCD displays, the permissible storage temperature range is from -13°F (-25°C) to 185°F (85°C).

Altitude

Susol UL Series circuit breakers are designed for operation at altitudes equal to or below 13,000 ft. (3,900 m). Refer to Altitude correction factors as outlined in ANSI C37.20.1 par. 7.1.4.1 (Table 10), located on page 154, for altitude correction details.

Vibration

Susol UL Series circuit breakers adhere to the IEC 60068-2-6 standard concerning vibration.

- Within the range of 2 to 13.2 Hz, the amplitude is 0.039 inches (1 mm).
- Within the range of 13.2 to 100 Hz, a constant acceleration of 0.024 ounces (0.7 g) is maintained.

Humidity

Susol UL Series circuit breakers have undergone testing according to the following conditions:

- IEC 68-2-30—damp heat (temperature of +55°C and relative humidity of 95%)
- IEC 68-2-52 Level 2—salt mist
- The materials utilized in Susol UL Series circuit breakers are not conducive to the development of fungus and mold.

Intro

Features

High Ampere Interrupting Rating (AIR): The ANSI Certified Susol UL Series circuit breakers possess an interrupting rating of 130 kA at 508 Vac, even without fuses.

High Short-Time Current Rating: The Susol UL Series circuit breakers boast remarkable short-time ratings, reaching up to 100 kA.

100% Rated Circuit Breaker: The Susol UL Series circuit breakers are engineered to operate continuously at their full current rating.

Reverse Fed Circuit Breaker: Susol UL Series circuit breakers are capable of receiving power input from either the top or the bottom of the circuit breaker.

Two-Step Stored Energy Mechanism: The Susol UL Series circuit breakers utilize a stored energy mechanism that can be charged either manually or by a motor for operation.

The closing time is less than 90ms. The initiation of closing and opening operations can be carried out remotely or by using the push buttons located on the front cover of the circuit breaker. It is possible to perform an Open-Close-Open (O-C-O) cycle without recharging.

Draw-out or Fixed Mount, 3-Pole (3P) or 4-Pole (4P) Construction: Susol UL Series circuit breakers are offered in either draw-out or fixed mount configurations, and in both three-pole (3P) and four-pole (4P) constructions.

Field-Installable Trip Units, Sensor Plugs, and Accessories: Trip units, sensor plugs, and a majority of accessories can be easily installed in the field using only a screwdriver, without the need to adjust the circuit breaker.
The standard design of accessories enables several components to be shared throughout the entire circuit breaker line.

Reinforced Insulation: The circuit breaker front is isolated by two insulation barriers from the current carrying conductors.

Isolation Function through Positive Indication of Contact Status: Mechanical indication of main contact position displayed on breaker's front panel.

Segregated Compartment: Upon removing the accessory cover to access the accessory compartment, the main contacts remain completely isolated by the secondary insulation barrier. Additionally, interphase partitioning ensures complete insulation between each pole, even when the accessory cover is removed.

Functions keylock on Cradle: Up to two kirk keys can be installed for dual-key locking in the cradle, greatly simplifying the assembly of optional components and allowing for enhanced operational efficiency.

Anti-Pumping Feature: Every Susol UL Series circuit breaker incorporates an anti-pumping feature, ensuring that an opening command consistently supersedes a closing command. In cases where opening and closing commands coincide, the charged mechanism discharges without initiating any motion of the main contacts, thus maintaining the circuit breaker in the open (OFF) position.

If simultaneous opening and closing commands are maintained, the standard mechanism offers an anti-pumping function that ensures the main contacts remain in the open position.

Furthermore, following a fault trip or intentional circuit breaker opening (achieved through manual or electrical controls while keeping the closing coil energized), the circuit breaker cannot be closed unless the power supply to the closing coil is interrupted and subsequently restored.

Note:
If the automatic reset after fault trip (Accessories A5~A9) option is installed, the automatic control system should consider the data provided by the circuit breaker before initiating a new closing command or preventing the circuit breaker from closing. This data includes the type of fault, such as overload, short-circuit, or ground fault.

Front Door Disconnection: Access to the racking handle and racking mechanism is available via the front door cutout. It's feasible to disconnect the circuit breaker without the need to open the door and expose live components.

Draw-out Mechanism: The draw-out assembly mechanism enables the circuit breaker to be positioned in three states (connected, test, disconnected), as depicted in the diagram below.

Note:
In the case of UL/ANSI circuit breakers, the clusters are installed on the circuit breaker itself; whereas for IEC circuit breakers, the clusters are mounted on the cradle.

Maintenance: In order to preserve the operational and safety features of the Susol UL Series throughout its service life, LS ELECTRIC suggests that periodic inspections and scheduled onsite maintenance be performed by qualified personnel, as outlined in bulletin, titled "[ACB] Maintenance Manual" LS ELECTRIC Field Services provides an extensive range of field maintenance services under the name ONSITE MAINTENANCE, encompassing four distinct service types:

- On-Site Repair involves addressing a system with the aim of ensuring it fulfills its intended function.
- On-Site Preventive Maintenance involves conducting scheduled inspections at predetermined intervals to minimize the likelihood of system failure or operational decline.
- On-site preventative maintenance involves the collection and analysis of system parameters, preventative assessments, and identification of deviations from factory state or notable performance trends. Employing Onsite Condition Maintenance enables the anticipation of essential corrective measures to guarantee equipment safety and uninterrupted service. Immediate repairs can be executed if spare parts are available onsite, or repairs can be scheduled for a more convenient time.

On-Site Asset Diagnostic is employed to recognize signs of malfunction or deterioration before issues arise, which may not be detectable through standard preventive maintenance. It identifies deviations in functionality compared to the initial specifications of the device (when it was new). If deviations are identified, a repair plan is advised to restore the original conditions.

The Maintenance Guide can be accessed via our website (www.ls-electric.com) and offers comprehensive information regarding:

- The necessary types of maintenance vary based on the criticality of the safeguarded circuit and the risks associated with potential malfunctions of the component.
- Considerations are required for normal, enhanced, and harsh environmental and operational conditions.
- Routine preventive maintenance tasks to be performed under standard environmental and operational circumstances, along with the necessary level of expertise for executing these tasks.
- The environmental and operational conditions that expedite the aging of the device.
- The suggested schedule for on-site maintenance based on the importance of the equipment and the environmental conditions under which the equipment functions.

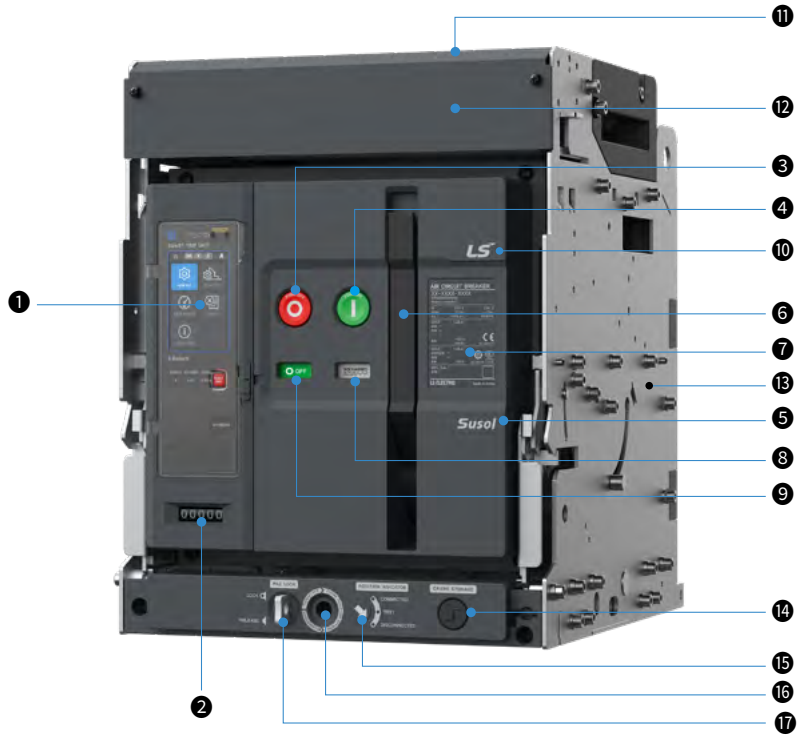
An illustrative instance of preventive maintenance involves the removal of arc chambers for visual contact inspection and assessment of wear indicator grooves (refer to Contact Wear Indicators on page for wear indication details). Moreover, the operation counter can signal the need for inspections and potential maintenance. For ANSI Certified circuit breakers, the service life can be extended by substituting the arc chamber or spring-charging motor. To learn about regular and unfavorable operating conditions, please check "[ACB] Maintenance Manual", accessible at www.ls-electric.com.

Intro

Appearance

Fixed type ACB

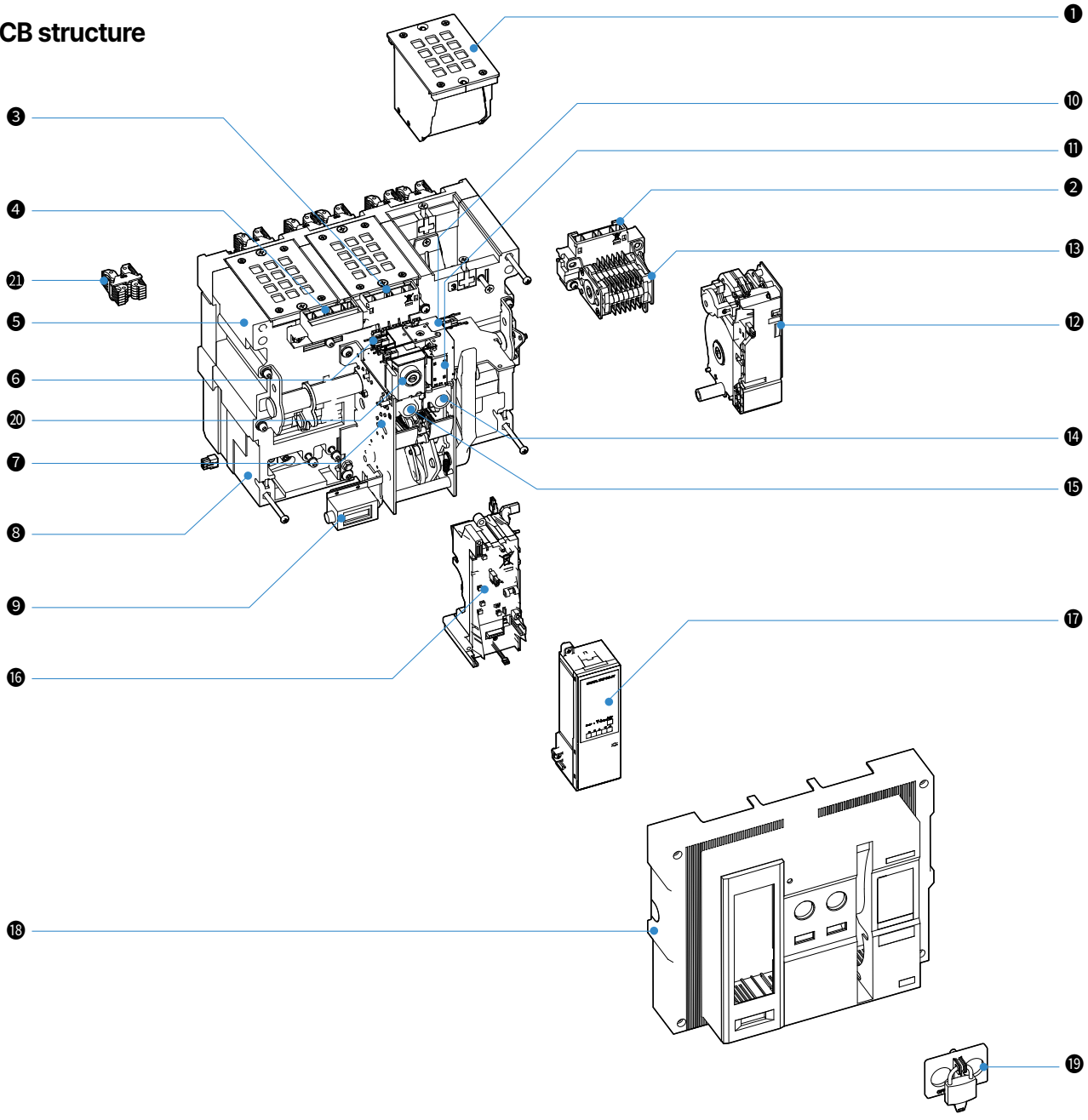
Draw-out ACB (Cradle)



Terms

❶ Trip relay
❷ Counter
❸ OFF button
❹ ON button
❺ Series name
❻ Charge handle
❼ Rated name plate
❽ Charge/Discharge indicator
❾ ON/OFF indicator
❿ Corporation logo
⓫ Arc cover (Zero Arc Space)
⓬ Safety control cover
⓭ Cradle
⓮ Draw-out handle
⓯ Position indicator
⓰ Handle inserting hole
⓱ Pad lock button
⓲ Arc chute
⓳ Front cover
⓴ Fixed type bracket

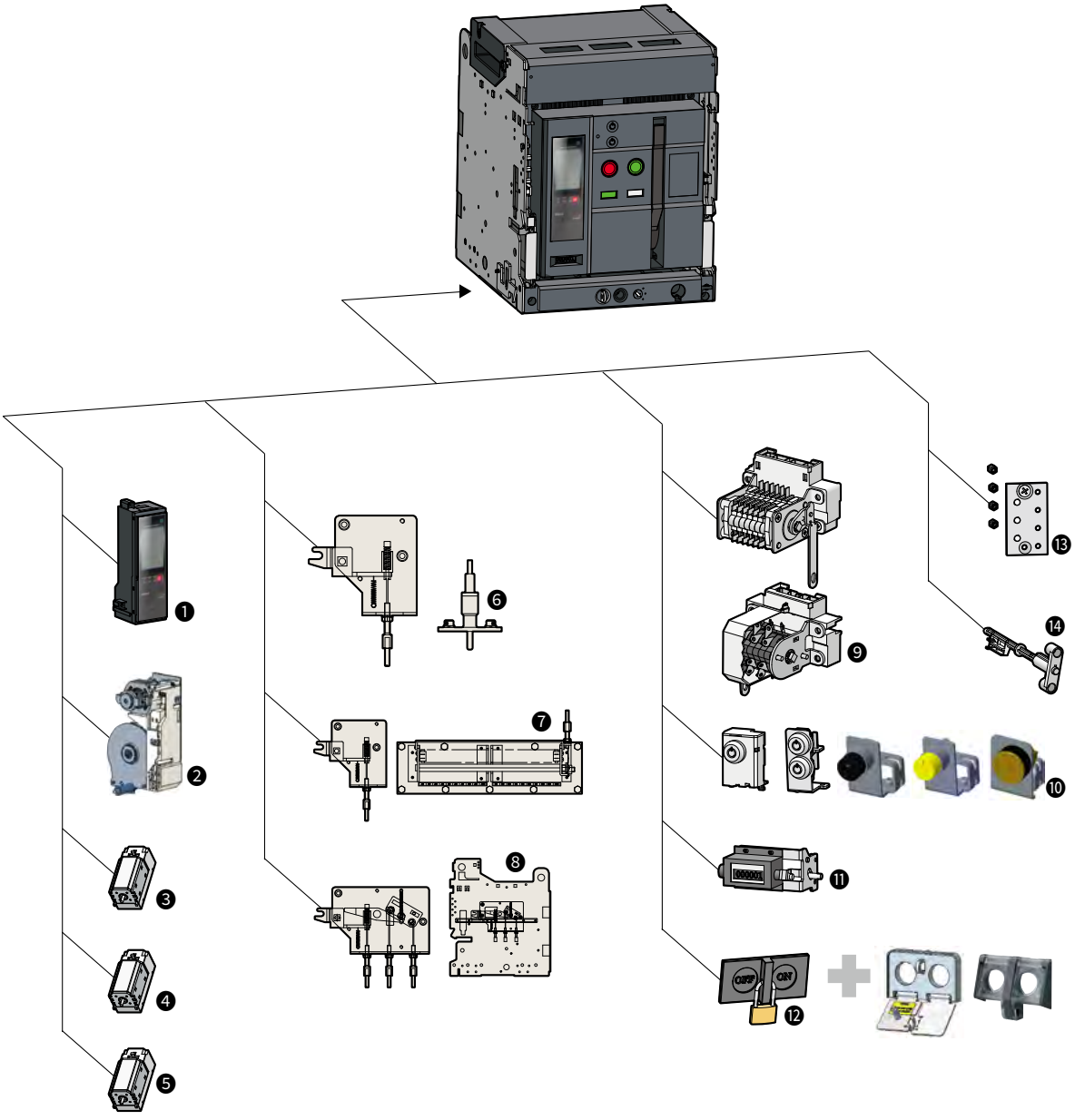
ACB structure



❶ Arc chute
❷ Aux. switch control terminal
❸ Control power supply terminal
❹ Trip relay control terminal
❺ Carrying grip
❻ Secondary Shunt coil/UVT coil
❼ Mechanism
❽ Main body
❾ Counter
❿ Shunt coil
⓫ Closing coil
⓬ Motor Ass'y
⓭ Aux. switch
⓮ ON button
⓯ OFF button
⓰ MTD base
⓱ Trip relay
⓲ Front cover
⓳ Button cover
⓴ Key Lock
㉑ Finger

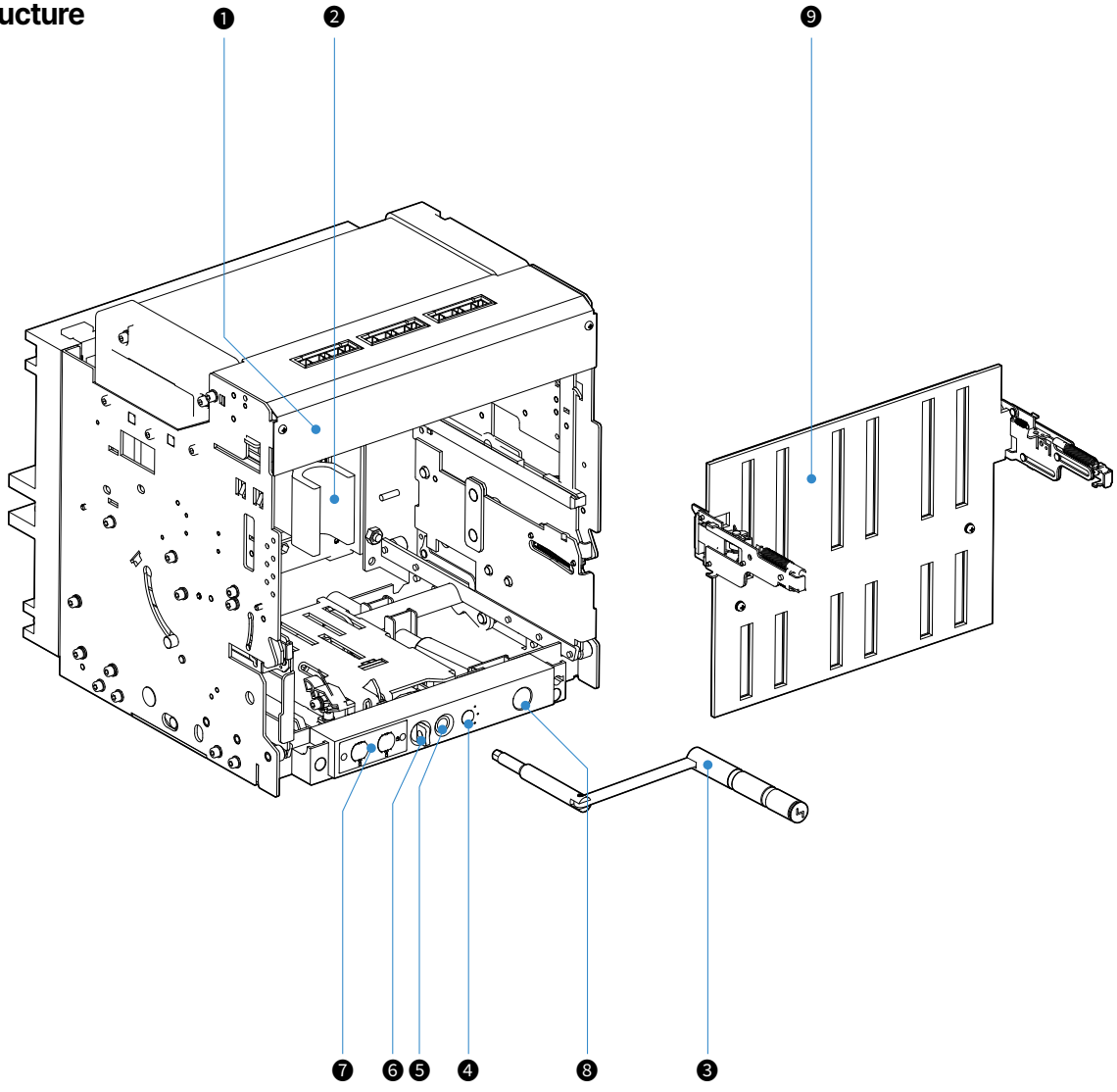
Appearance

ACB accessories



❶ Trip Relay
❷ Motor (M)
❸ Closing Coil (CC)
❹ Shunt Coil (SHT)
❺ Under Voltage Trip Device (UVT)
❻ Door Interlock (DI)
❼ MOC (Mechanical Operated Cell Switch)
❽ Mechanical interlock (MI)
❾ Auxiliary Switch (AX)
❿ Key Lock (K1), Double Key Lock (K3)
⓫ Counter (C)
⓬ On/Off Button Lock (B)
⓭ Miss Insertion Preventing Device (MIP)
⓮ Manual Reset Button (MRB)

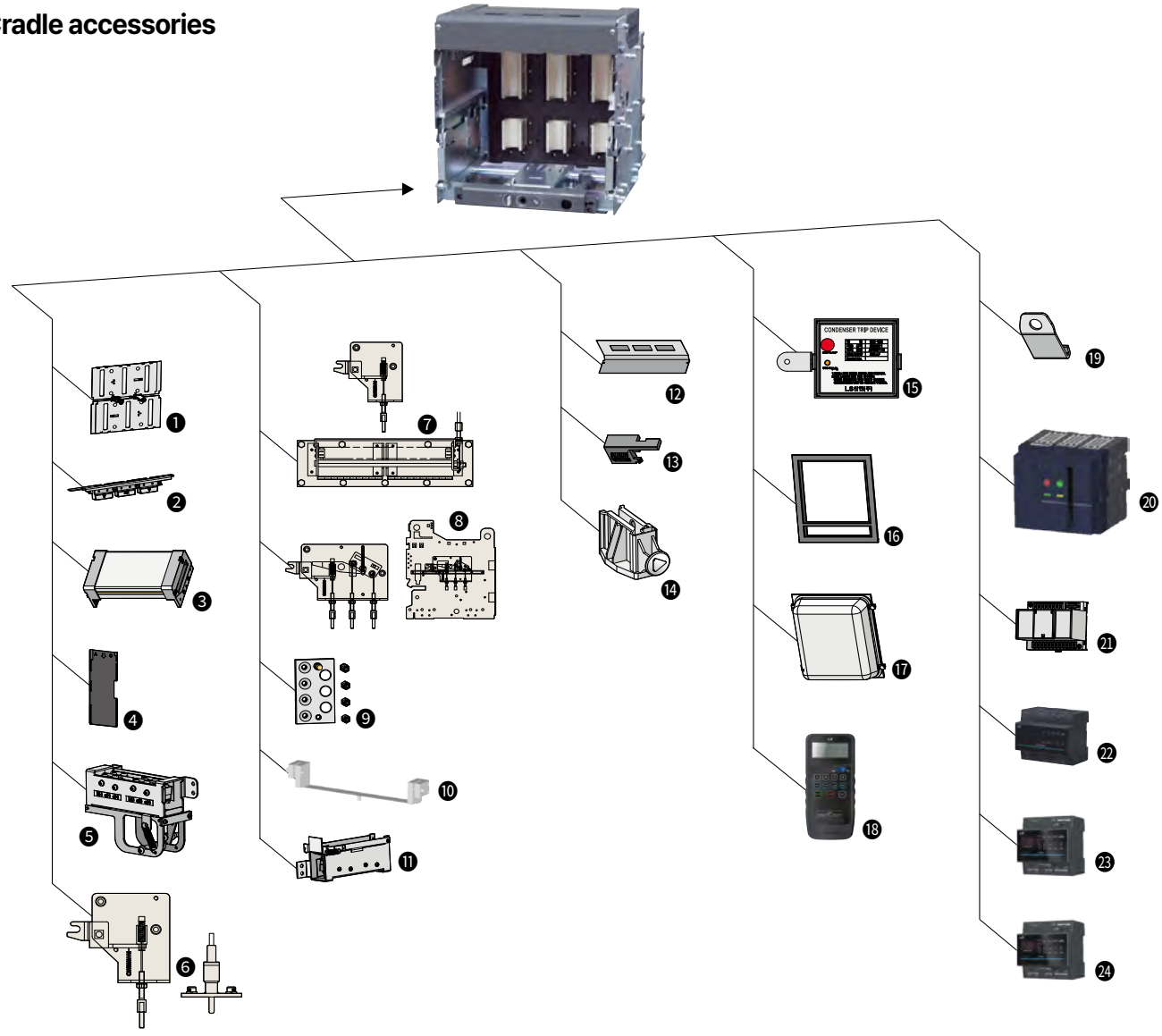
Cradle Structure



❶ Safety control cover
❷ Cradle finger
❸ Draw-out handle
❹ Position indicator
❺ Handle inserting hole
❻ Pad lock button
❼ Key Lock
❽ Handle storage
❾ Safety shutter

Appearance

Cradle accessories



❶ Safety Shutter (ST)
❷ Manual Connector
❸ Zero Arc Space (ZAS)
❹ Insulation Barrier (IB)
❺ Cell Switch (CEL)
❻ Door Interlock (DI)
❼ MOC (Mechanical Operated Cell switch)
❽ Mechanical Interlock (MI)
❾ Miss Insertion Prevent Device (MIP)
❿ Body Supporter (BSP)
⓫ Shorting "b" Contact (SBC)
⓬ Safety Control Cover (SC)
⓭ Racking Interlock (RI)
⓮ Safety Shutter Lock (STL)

Other

⓯ Condenser Trip Device (CTD)
⓰ Door Frame (DF)
⓱ Dust Cover (DC)
⓲ Intelligent Potable OCR Tester (IPOT)
⓳ Lifting Hook (LM)
⓴ Dummy ACB
㉑ UVT Time Delay Controller (UDC)
㉒ Gateway/Data Logger
㉓ Profibus-DP
㉔ Temperature Alarm

Name plate

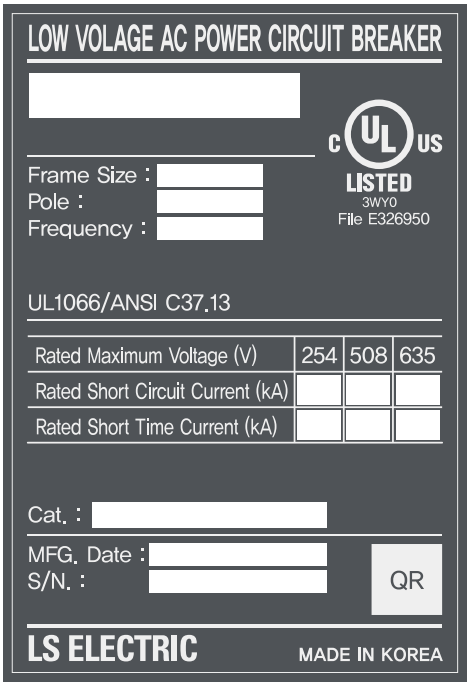
Terminology

- Motor charge
- Closing coil
- Shunt tripping coil

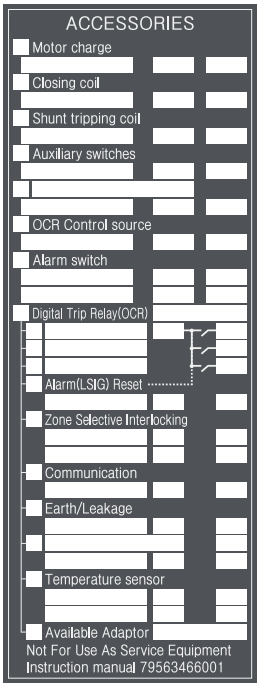
Control power and terminal No.

- 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.

[Product nameplate]



[Secondary nameplate]



Intro

Multiple connections

Standard connection

Horizontal type

Vertical type

Front type

Mixed connection

Horizontal / Vertical type

Vertical / Horizontal type

Horizontal / Front type

Vertical / Front type

Front / Horizontal type

Front / Vertical type

For details about possible connector types, refer to specific frame chapters in the catalog.

Beyond X™ Susol UL ACB C-Frame

Beyond X™ Susol ACB delivers high breaking capacity with minimal energy loss, making it ideal for reliable and sustainable power management in any application.

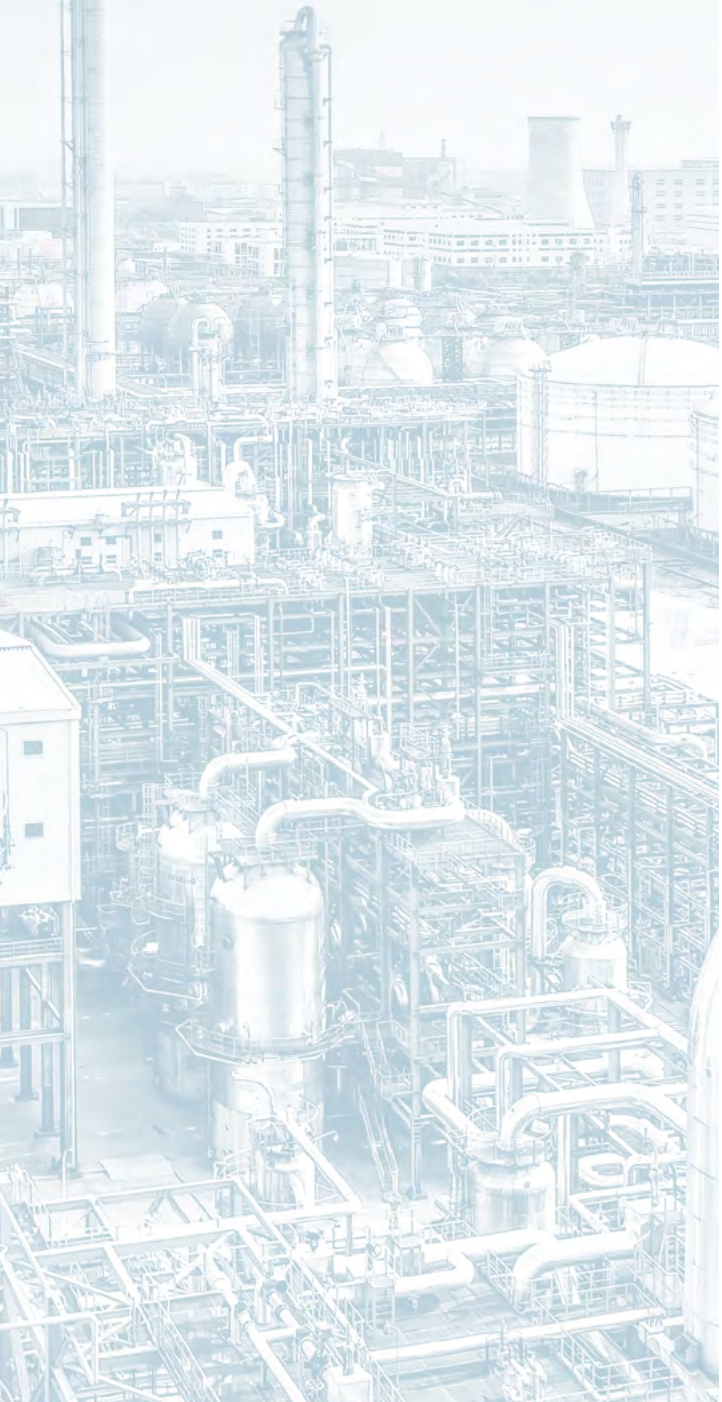


Table of Contents

Susol UL ACB C-Frame

Configuration

Main body

UAS — 12 — C — 3 — 10 — A

Air circuit breaker	
UAS	Up to 800Vac
UAN	Up to 600Vac

Frame size	
08	800AF
12	1200AF

Frame type and phase	
C	3P/4P Standard (N)ABC
V	4P Reversed ABC(N)

Poles	
3	3 Poles
4	4 Poles

Rating current	
00	None
04	400A
05	600A
08	800A
10	1000A
12	1200A

Mounting and terminal	
Draw-out type	
A	Draw-out
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal
	Lower - Vertical
N	Upper - Vertical
	Lower - Horizontal
P	Flat

Switch	
UAA	Switch

Frame size	
08	800AF
12	1200AF

Frame type and phase	
C	3P/4P Standard (N)ABC
V	4P Reversed ABC(N)

Poles	
3	3 Poles
4	4 Poles

Rating current	
00	None

Mounting and terminal	
Draw-out type	
A	Draw-out
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal
	Lower - Vertical
N	Upper - Vertical
	Lower - Horizontal
P	Flat

Cradle

UDL — S12C — 3 — A — V — F — S

Type and ampere frame	
S12C	800~1200A

Poles	
3	3 Poles
4	4 Poles

Secondary connection type	
A	Auto connection type (Connection type)
B	Auto connection type (Screw joint type)

Terminal connection	
H	Horizontal
V	Vertical
M	Upper - Horizontal Lower - Vertical
N	Upper - Vertical Lower - Horizontal

Arc cover	
S	With arc cover

Shutter	
F	With shutter

M1

Motor operator	
MA	None(Manual Operation)
M1	AC/DC 100V~125V
M2	AC/DC 200V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M8	AC 48V

D1

Closing coil	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

D1

Shunt trip	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

FX

Charging/Auxiliary switch	
FX	Standard OFF - Charge 4C
FC	Standard ON - Charge 4C
LC	Standard ON-Charge 3C with TCS contact
PX	Standard OFF-Charge 4C (Low level contact)
PC	SStandard ON-Charge 4C (Low level contact)

NG0

Trip unit (Relay)

Please check page 26.

U1

UVT Coil	
U0	None
U1	AC/DC 100V~125V
U2	AC/DC 200V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 380V~480V
U7	AC 48V

AL

Accessories

Please check below

Accessory selection					
Package code					
E01	E02	E03	E04	E05	E06
	✓				
				✓	
					✓
✓			✓		
✓		✓			✓
✓		✓	✓	✓	
✓			✓	✓	
	✓				
✓	✓		✓	✓	✓
		✓			
✓	✓	✓		✓	✓
	✓				

Self Selection	Accessory Codes	Description
	AL	AL1+MRB (Trip alarm contact 1+Manual reset button)
	A1	AL1+MRB+RES(AC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A2	AL1+AL2+MRB (Trip alarm contact 1&2+Manual reset button)
	A3	AL1+MRB+RES(DC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A4	AL1+MRB+RES(AC200V~250V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A5	AL1+MRB+Auto reset (Trip alarm contact 1+Manual reset button+ Auto reset)
	A6	AL1+AL2+MRB+Auto reset (Trip alarm contact 1&2+Manual reset button+ Auto reset)
	A7	AL1+MRB+RES(DC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A8	AL1+MRB+RES(AC200V~250V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A9	AL1+MRB+RES(AC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	C	Counter
	B	On/Off button lock
	M	Mechanical Interlock
	D	Door interlock(DI) or MOC(Mechniasim operated cell switch
	K	Key lock
	K2	Key interlock set
	R	Ready to close switch
	H1	Double shunt coil(AC/DC100V~125V)
	H2	Double shunt coil(AC/DC200V~250V)
	H3	Double shunt coil(DC125V)
	H4	Double shunt coil(DC24V~30V)
	H5	Double shunt coil(DC48V~60V)
	H7	Double shunt coil(AC48V)

Susol UL ACB C-Frame

Configuration

Trip unit

N		G		0		
OCR Type		Communication and protection		Control voltage		Frequency
N	Normal	G	Ground fault (Residual earth fault protection)	0	Self-Power only	60Hz
			* L,S,I,G configuration as standard (with LED indicators)	5	Self-Power only	50Hz
A	Ammeter	G	Ground fault (Residual earth fault protection)	0	Self-Power only	60Hz
		I	Ground fault (Residual earth fault protection)+ERMS	1	AC/DC 110V~250V	60Hz
		E	Earth leakage (Extermal CT, Earth leakage over 30A)	2	DC 24V~60V	60Hz
		T	Earth leakage (Extermal CT, Earth leakage over 30A)+ERMS	5	Self-Power only	50Hz
		C	Ground fault (Residual earth fault protection)+Comm.	6	AC/DC 110V~250V	50Hz
		Q	Ground fault (Residual earth fault protection)+Comm.+ERMS	7	DC 24V~60V	50Hz
		X	Earth leakage (Extermal CT, Earth leakage over 30A)+Comm.			
		R	Earth leakage (Extermal CT, Earth leakage over 30A)+Comm.+ERMS			
			* Communication and output contacts DO NOT work under self-power condition. * Communication and output contacts for L,S,I,G do not work except OCR LED without control power supply. * E, T, X, R External CT - Private ZCT applied (fault current >30A)			
P	Power meter	C	Ground fault (Residual earth fault protection)+Comm.	1	AC/DC 110V~250V	60Hz
		Q	Ground fault (Residual earth fault protection)+Comm.+ERMS	2	DC 24V~60V	60Hz
		X	Earth leakage (Extermal CT, Earth leakage over 30A)+Comm.	6	AC/DC 110V~250V	50Hz
		R	Earth leakage (Extermal CT, Earth leakage over 30A)+Comm.+ERMS	7	DC 24V~60V	50Hz
			* Communication functions are normal. (Function unavailable without control power supply) * Applicable to generator protection purpose * Voltage module of P type or more is basic. * X, R External CT - Private ZCT applied (fault current >30A)			
S	Supreme meter	C	Ground fault (Residual earth fault protection)+Comm.	1	AC/DC 110V~250V	60Hz
		Q	Ground fault (Residual earth fault protection)+Comm.+ERMS	2	DC 24V~60V	60Hz
		X	Earth leakage (Extermal CT, Earth leakage over 30A)+Comm.	6	AC/DC 110V~250V	50Hz
		R	Earth leakage (Extermal CT, Earth leakage over 30A)+Comm.+ERMS	7	DC 24V~60V	50Hz
			* Communication functions are normal. (Function unavailable without control power supply) * Applicable to generator protection purpose * Voltage module of P type or more is basic. * X, R External CT - Private ZCT applied (fault current >30A)			

Rating

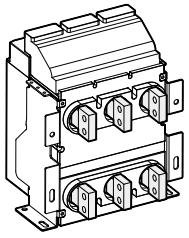
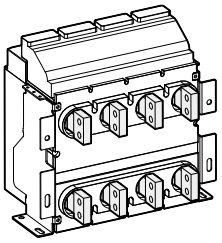
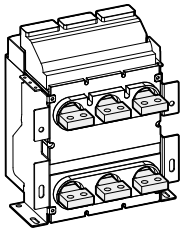
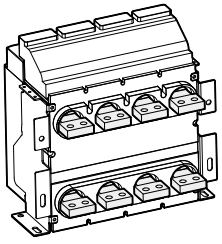
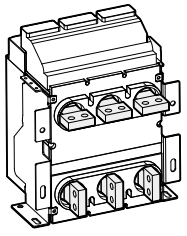
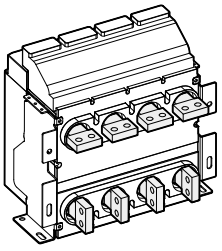
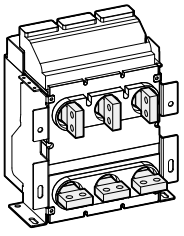
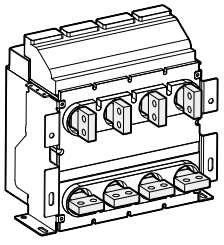
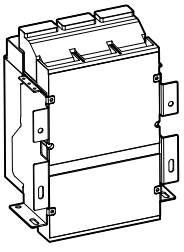
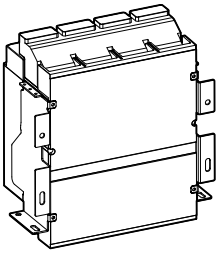
Characteristics								
Rated operational voltage (V)			AC 800					
Rated insulation voltage (V)			1000					
Frequency (Hz)			50/60					
Rated impulse withstand voltage (kV)			12					
Number of poles (P)			3/4					
Type			Circuit breaker				Switch	
			UAN		UAS		UAA	
Description			UAN-08C	UAN-12C	UAS-08C	UAS-12C	UAA-08C	UAA-12C
Ampere Frame (AF)			800	1200	800	1200	800	1200
Rated current (A) (In Max.) at 40°C			400	-	400	-	800	1200
			600	-	600	-	-	-
			800	800	800	800	-	-
			-	1000	-	1000	-	-
			-	1200	-	1200	-	-
Rated current of neutral pole (A)			100%					
Interrupting Ratings (kA)	UL489	AC 800V	-		42		42	
		AC 600V	42		50			
		AC 480V	50		65			
		AC 240V	50		65			
Rated short time current (kA)			42					
Operating time (ms)	Closing Time		≤ 80				≤ 80	
	Total breaking time		≤ 25				≤ 40**	
			≤ 75					
Mechanical and electrical life cycles								
Endurance (time)	Mechanical		12,500					
	Electrical (30 cycle/Hr)	~ AC 600V	6,000					
		AC 800V	500					
Weight and Demensions								
Weight lb (kg)	Drawout (without cradle)	3P	46.3 (21)				43 (19.5)	
		4P	56.2 (25.5)				54 (24.5)	
	Fixed	3P	35.3 (16)				34.2 (15.5)	
		4P	43 (19.5)				42 (19)	
Dimensions (H×W×D) Inch (mm)	Draw-out type	3P	14.34×10.07×10.81 (364.3×256×274.5*)					
		4P	14.34×12.83×10.81 (364.3×326×274.5*)					
	Fixed type	3P	12.69×10.72×7.81 (322×272.4×198.5*)					
		4P	12.69×13.48×7.81 (322×342.4×198.5*)					

* Without teminal length
** Operation time is by shunt coil not Trip unit

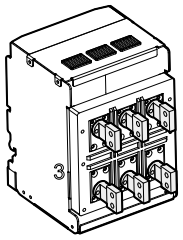
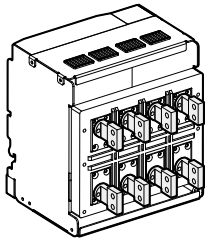
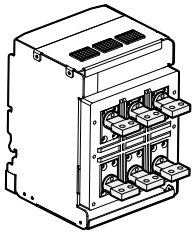
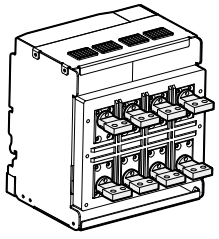
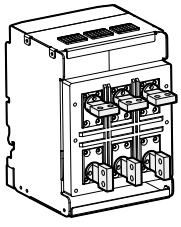
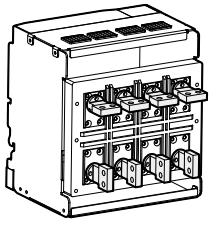
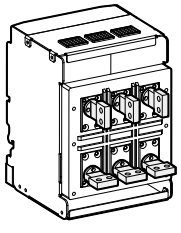
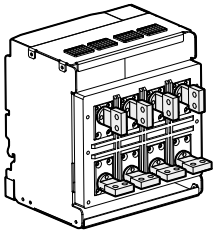
Susol UL ACB C-Frame

Multiple connections

Fixed type

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
c	Vertical (V)	800 to 1200A		
	Horizontal (H)			
	Upper-Horizontal /Lower-Vertical (M)			
	Upper-Vertical /Lower-Horizontal (N)			
	Flat (P)			

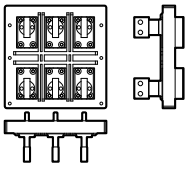
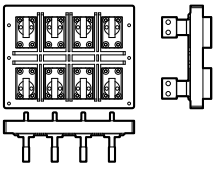
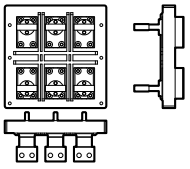
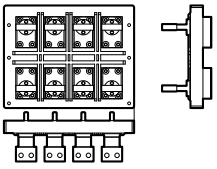
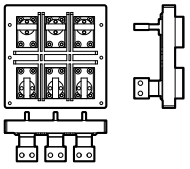
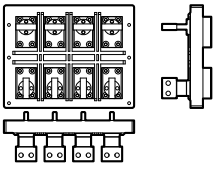
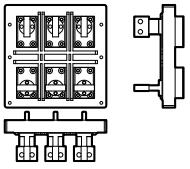
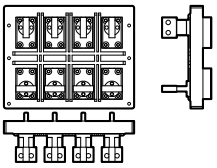
Draw-out type

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
C	Vertical (V)	800 to 1200A		
	Horizontal (H)			
	Upper-Horizontal /Lower-Vertical (M)			
	Upper-Vertical /Lower-Horizontal (N)			

Susol UL ACB C-Frame

Multiple connections

Connector view

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
C	Vertical (V)	800 to 1200A		
	Horizontal (H)			
	Upper-Horizontal /Lower-Vertical (M)			
	Upper-Vertical /Lower-Horizontal (N)			

Dimensions

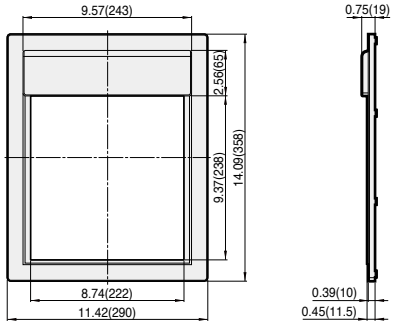
Enclosure Size

Number of Poles	ACB Rating		Enclosure Dimensions		Ventilation Area	
	Rated Current	Ampere Frame	(W×H×D)		Top	
			inch	mm	inch²	mm²
3P	1200A and below, UL 489	C	11.06×17.72×9.84	281×450×250	-	-
4P	1200A and below, UL 489	C	13.78×17.72×9.84	350×450×250	-	-

Door Frame

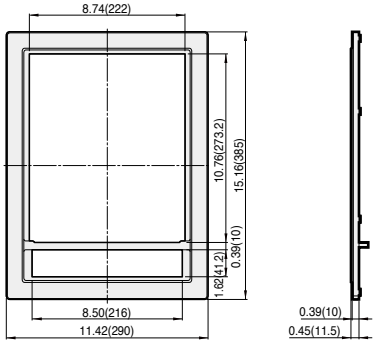
Fixed type

[inch (mm)]



Draw-out type

[inch (mm)]



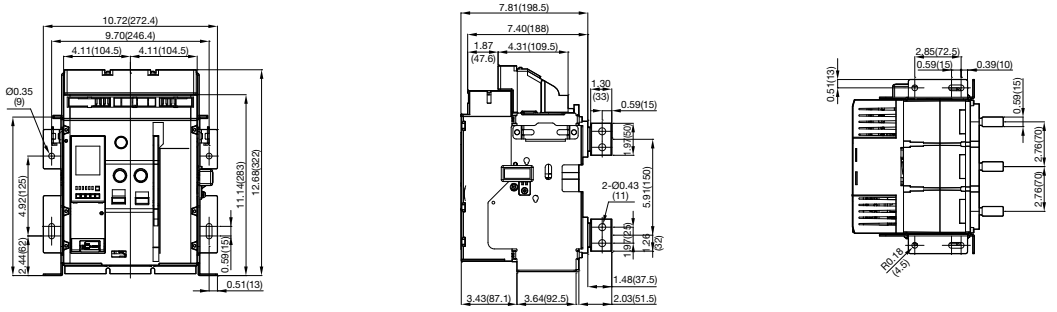
Susol UL ACB C-Frame

Dimensions

Fixed type

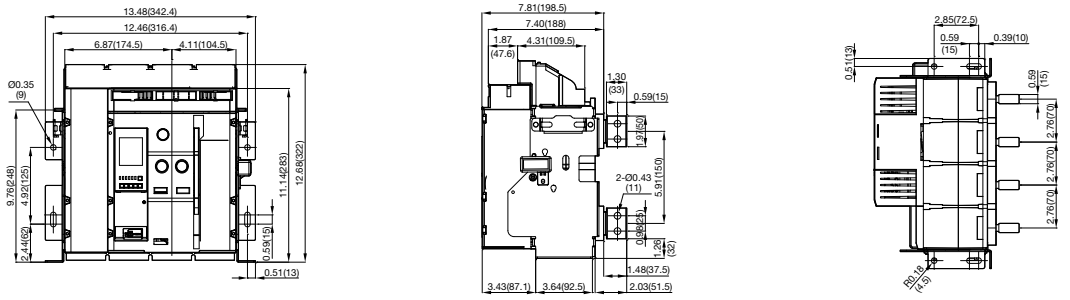
Vertical type(V) (3P)

[inch (mm)]



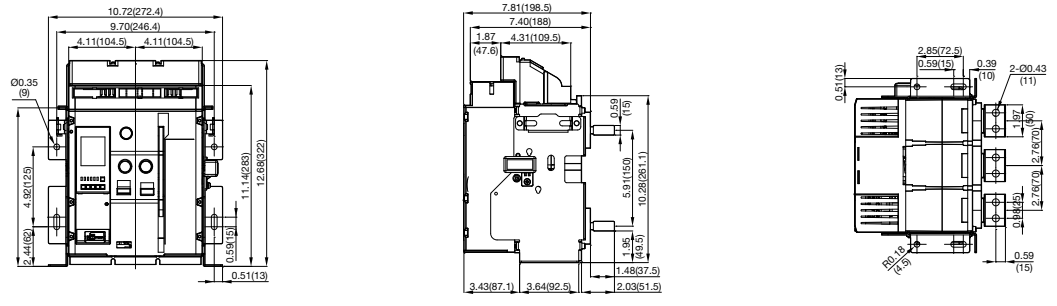
Vertical type(V) (4P)

[inch (mm)]



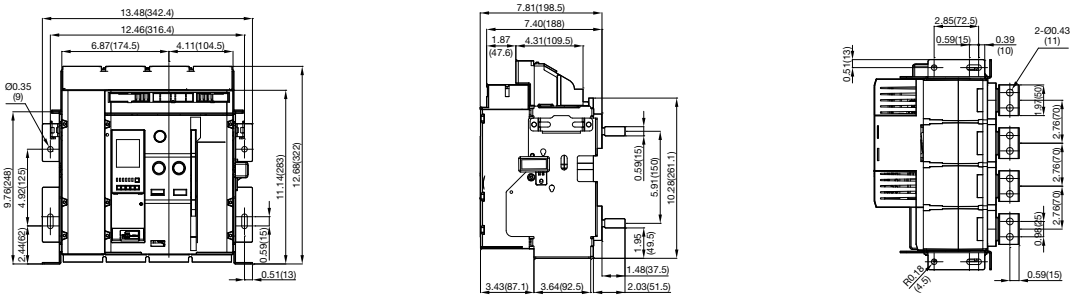
Horizontal type(H) (3P)

[inch (mm)]



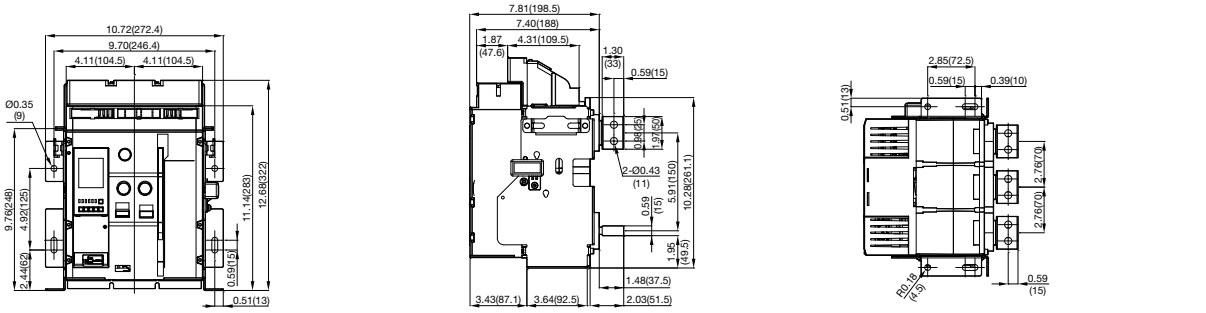
Horizontal type(H) (4P)

[inch (mm)]



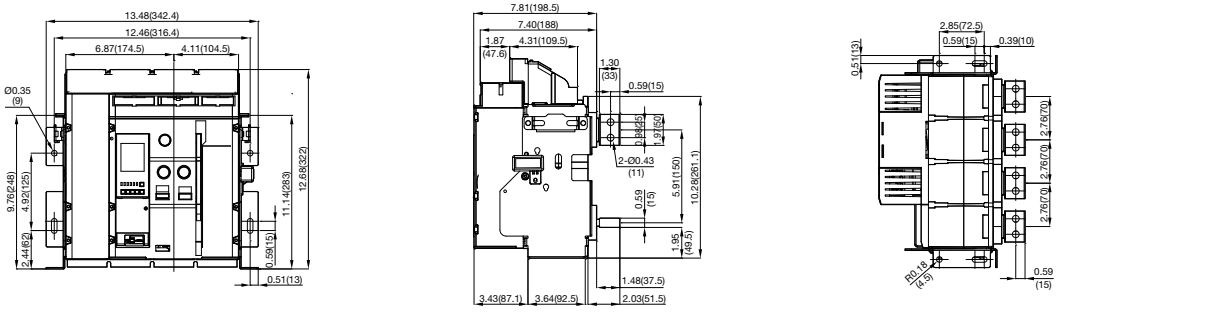
Vertical-Horizontal type(N) (3P)

[inch (mm)]



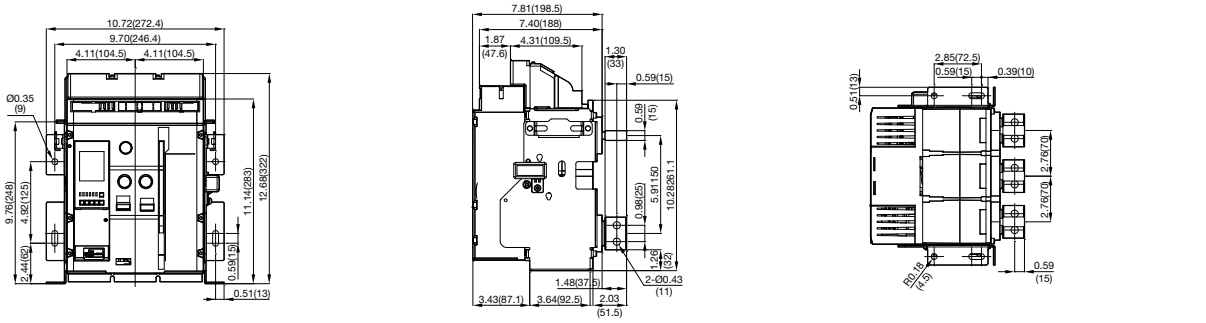
Vertical-Horizontal type(N) (4P)

[inch (mm)]



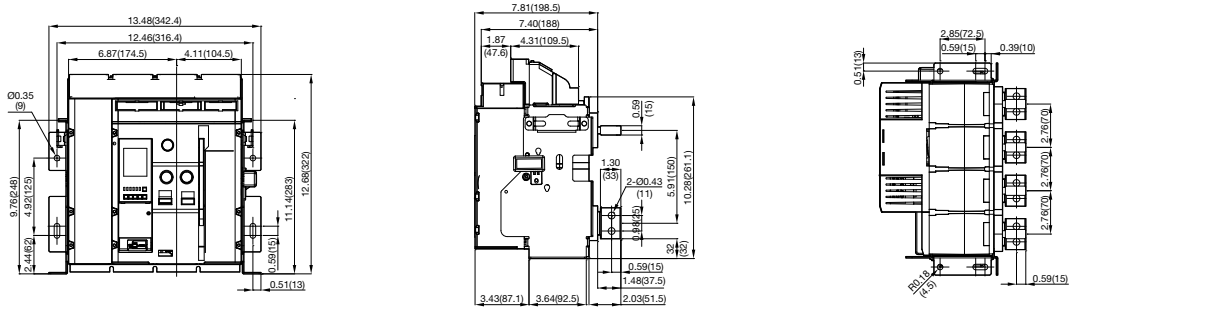
Horizontal-Vertical type(M) (3P)

[inch (mm)]



Horizontal-Vertical type(M) (4P)

[inch (mm)]



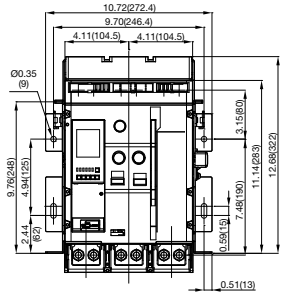
Susol UL ACB C-Frame

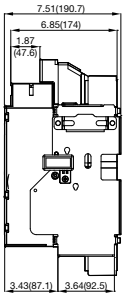
Dimensions

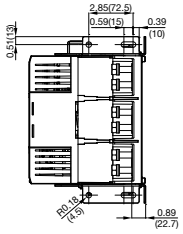
Fixed type

Flat type(P) (3P)

[inch (mm)]

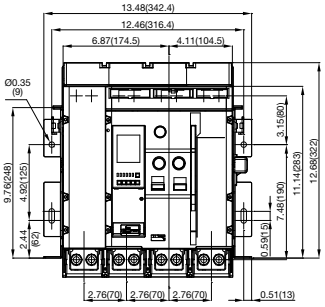


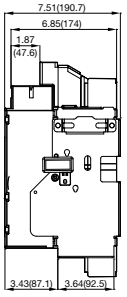


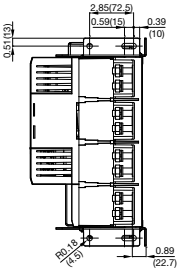


Flat type(P) (4P)

[inch (mm)]

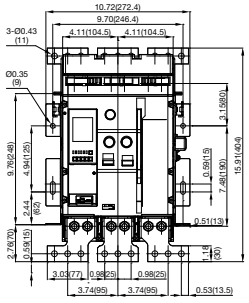


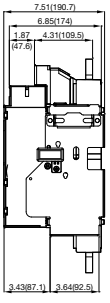


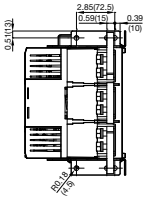


Flat + Spread busbar type (3P)

[inch (mm)]

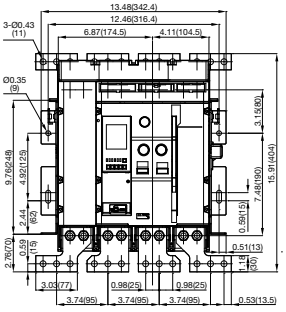


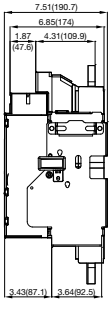


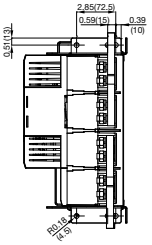


Flat + Spread busbar type (4P)

[inch (mm)]



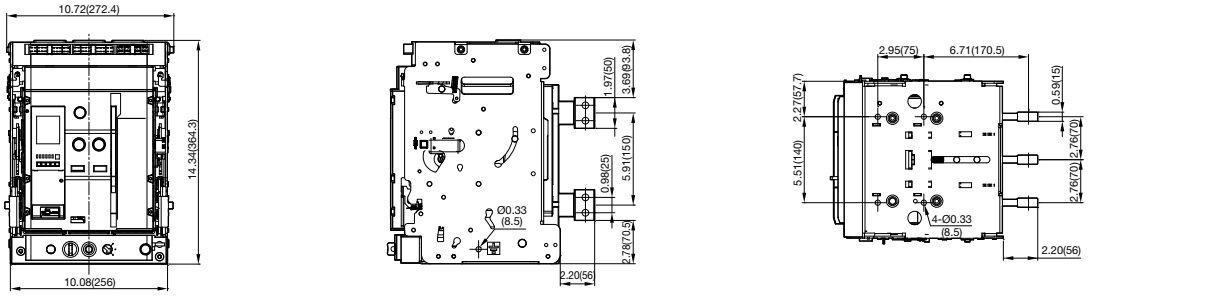




Draw-out type

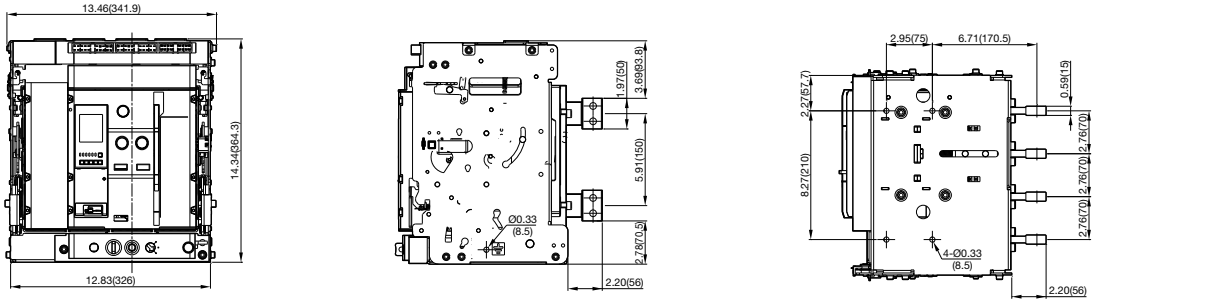
Vertical type(V) (3P)

[inch (mm)]



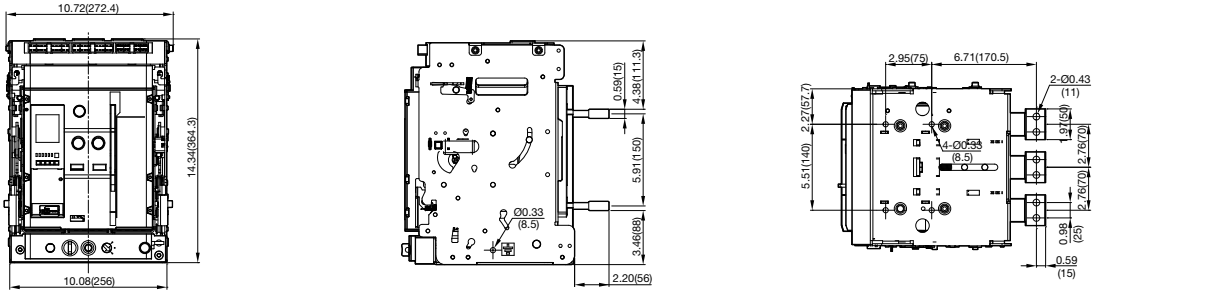
Vertical type(V) (4P)

[inch (mm)]



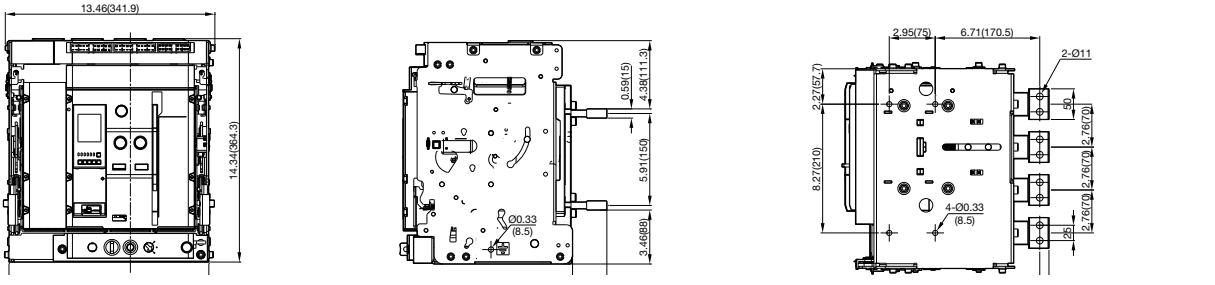
Horizontal type(H) (3P)

[inch (mm)]



Horizontal type(H) (4P)

[inch (mm)]



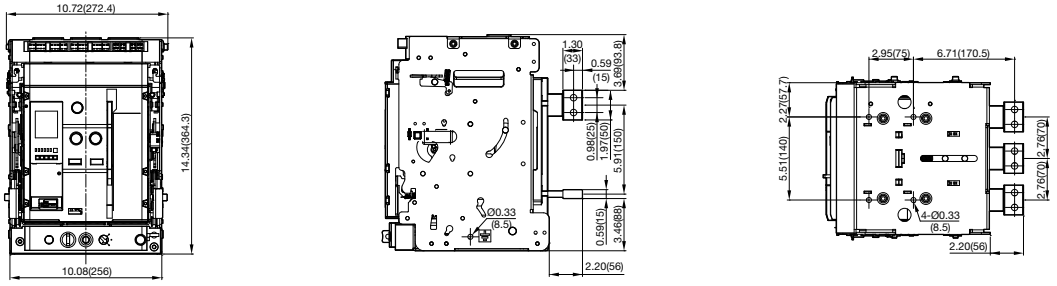
Susol UL ACB C-Frame

Dimensions

Draw-out type

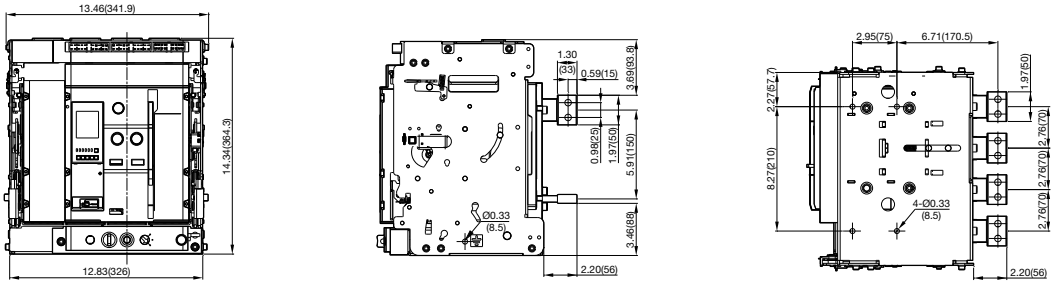
Vertical-Horizontal type(N) (3P)

[inch (mm)]



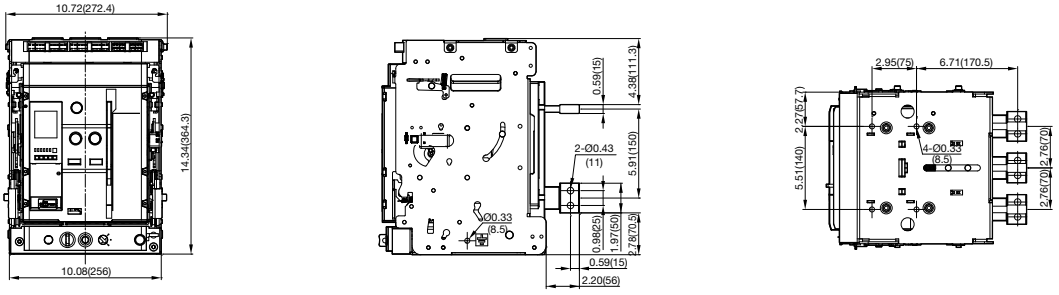
Vertical-Horizontal type(N) (4P)

[inch (mm)]



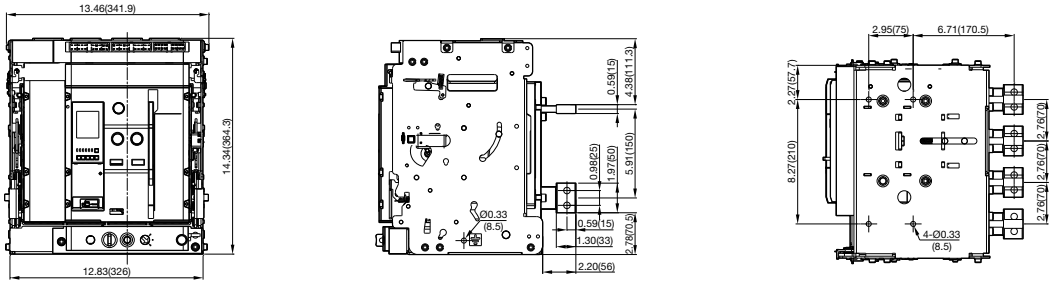
Horizontal-Vertical type(M) (3P)

[inch (mm)]



Horizontal-Vertical type(M) (4P)

[inch (mm)]



Beyond X™ Susol UL ACB D-Frame

Beyond X™ Susol ACB delivers high breaking capacity with minimal energy loss, making it ideal for reliable and sustainable power management in any application.

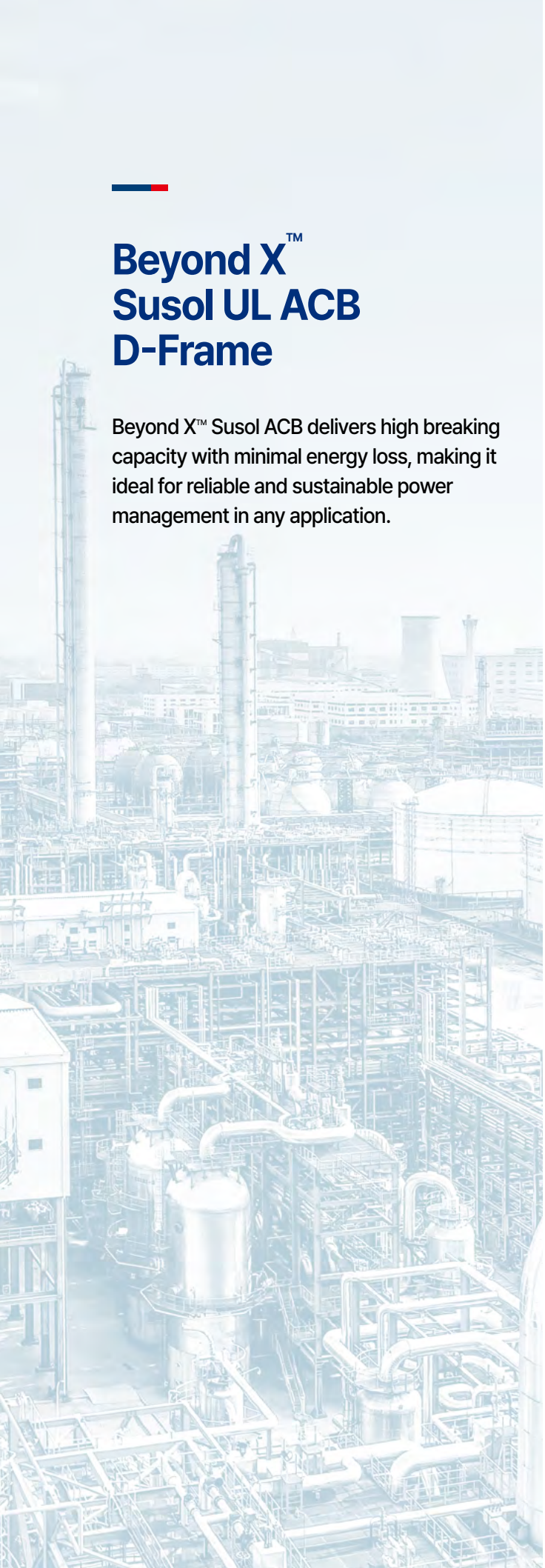


Table of Contents

Susol UL ACB D-Frame

Configuration

Main body

UAS — 16 — D — 3 — 16 — A

Air circuit breaker	
UAS	Up to 635Vac

Frame size	
08	800AF
16	1600AF

Frame type and phase	
D	3P/4P Standard ABC(N)
W	4P Reversed (N)ABC

Poles	
3	3 Poles
4	4 Poles

Rating current	
04	400A
05	600A
06	630A
08	800A
08	800A
10	1000A
12	1200A
13	1250A
16	1600A

Mounting and terminal	
Draw-out type	
A	Draw-out
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal
	Lower - Vertical
N	Upper - Vertical
	Lower - Horizontal
P [1]	Flat
G	Horizontal-Con
W	Vertical-Con

Note 1: Flat type(P-type) should purchase flat type terminal kit separately. See page 173 to find item code.

Switch	
UAA	Switch

Frame size	
08	800AF
16	1600AF

Frame type and phase	
D	3P/4P Standard ABC(N)
W	4P Reversed (N)ABC

Poles	
3	3 Poles
4	4 Poles

Rating current	
00	None

Mounting and terminal	
Draw-out type	
A	Draw-out
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal
	Lower - Vertical
N	Upper - Vertical
	Lower - Horizontal
P [1]	Flat
G	Horizontal-Con
W	Vertical-Con

Cradle

UAL — S16D — 3 — A — V — F — S — 1E

Type and ampere frame	
S16D	800~1600AF

Poles	
3	3P
4	4P

Secondary connector type	
A	Connector type
B	Screw joint type
C	Spring type

Terminal configuration	
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal
	Lower - Vertical
N	Upper - Vertical
	Lower - Horizontal
P [1]	Flat
G	Horizontal-Con
W	Vertical-Con

Shutter	
E	Without safety shutter
F	With safety shutter

Other options	
N	Without arc cover
S	With arc cover
T [2]	With arc cover & Metering CT

Class	
1E	1E Class

Breaker				Corresponding cradle
UAS-08D	UAS-08W	UAA-08D	UAA-08W	S16D
UAS-16D	UAS-16W	UAA-16D	UAA-16W	

Note 1: Flat type (P-type) should purchase flat type terminal kit separately. See page 173 to find item code.
2: Metering CT (T-Option) must be ordered separately.
The depth of Metering CT included cradle is longer than normal cradle. Please check Dimensions page.

M1 D1 D1 HX NHO U1 AL 1E

Motor operator	
MA	None(Manual Operation)
M1	AC/DC 100V~125V
M2	AC/DC 200V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M8	AC 48V

Shunt trip	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

Trip unit (Relay)
Please check page 40.

Accessories
Please check below

Class	
1E	1E Class
N1E	N1E Class

Closing coil	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

Charging/Auxiliary switch	
HX	High capacity OFF charge/5a5b
HC	High capacity ON charge/5a5b
GX	High capacity OFF charge/3a3b
GC	High capacity ON charge/3a3b
JC	High capacity ON charge/6a6b

UVT Coil	
U0	None
U1	AC/DC 100V~125V
U2	AC/DC 200V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 380V~480V
U7	AC 48V

Accessory selection					
Package code					
N01	N02	N03	N04	N05	N06
	✓				
				✓	
					✓
✓			✓		
✓		✓	✓	✓	
✓			✓	✓	
	✓				
✓	✓		✓	✓	✓
		✓			
✓	✓	✓		✓	✓
		✓	✓	✓	✓
✓	✓				
	✓				

Self Selection	Accessory Codes	Description
	AL	AL1+MRB (Trip alarm contact 1+Manual reset button)
	A1	AL1+MRB+RES(AC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A2	AL1+AL2+MRB (Trip alarm contact 1&2+Manual reset button)
	A3	AL1+MRB+RES(DC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A4	AL1+MRB+RES(AC200V~250V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A5	AL1+MRB+Auto reset (Trip alarm contact 1+Manual reset button+Auto reset)
	A6	AL1+AL2+MRB+Auto reset (Trip alarm contact 1&2+Manual reset button+Auto reset)
	A7	AL1+MRB+RES(DC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A8	AL1+MRB+RES(AC200V~250V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A9	AL1+MRB+RES(AC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	Y2	AL1+AL2+MRB (2b contact)
	Y6	AL1+AL2+MRB+Auto reset (2b contact)
	Z2	AL1+AL2+MRB (1a1b contact)
	Z6	AL1+AL2+MRB+Auto reset (1a1b contact)
	S	Charge switch communication(CS2)
	B	Lockable On/Off button cover
	M	Mechanical Interlock
	D	Door interlock(DI) or MOC(Mechniasim operated cell switch
	(-V)	Without VDM module (External type VDM is required to order)
	K	Key lock
	K2	Key interlock set
	K3	Key interlock double
	K4	Key lock(Same key)
	K5	Profalux lock(CAMLOCK type)
	K6	Kirkkey lock(CAMLOCK type)
	K7	Kirkkey lock(CN-22 type)
	R	Ready to close switch
	T	Temperature monitoring
	E	Spring auto release
	H1	Double shunt coil(AC/DC100V~125V)
	H2	Double shunt coil(AC/DC200V~250V)
	H3	Double shunt coil(DC125V)
	H4	Double shunt coil(DC24V~30V)
	H5	Double shunt coil(DC48V~60V)
	H7	Double shunt coil(AC48V)

* The Counter option is automatically applied.

Susol UL ACB D-Frame

Configuration

Trip Unit

N — Trip Relay Type

N	
000	Trip Relay N/A
N	Normal

H — Communication and protection

H	
H	L, S, I, G

0 — Control voltage and frequency

	Frequency used	Control power voltage	Comm.
0	60Hz	Self-Power Note1	NFC
5	50Hz	Self-Power Note1	NFC

A — Ammeter

A	
A	Ammeter

H — Communication and protection

H	L, S, I, G
D	L, S, I, G + Comm.
Y	L, S, I, Gext + Ground wire CT + Comm.
O **	L, S, I, G + Neutral CT + Comm.

* L, S, I: Long time delay trip, Short time delay trip, Instantaneous trip
* G: Ground fault (Residual earth fault protection)
* Ground fault system by vector sum
* Communication and output contacts DO NOT work under self-power condition
* Gext + Ground wire CT: Source return Type
* Customers must purchase their own Ground wire CT (Secondary output: 5A, accuracy 1%)
** AO provides the function to detect and protect the ground fault current by applying the NCT (Neutral CT) in the neutral wire when 3-pole circuit breaker is used in 3-phase 4-wire system.
* Customers must purchase their own Neutral CT (Primary output: same as ACB's Rated Current / Secondary output: 5A, accuracy 1%)

0 — Control voltage and frequency

	Frequency used	Control power voltage	Comm.
0	60Hz	Self-Power	N/A
1	60Hz	AC/DC 100V~250V	N/A
2	60Hz	DC 24V~48V	N/A
5	50Hz	Self-Power	N/A
6	50Hz	AC/DC 100V~250V	N/A
7	50Hz	DC 24V~48V	N/A

Note 1: The Self-Power function is to receive power from the main circuit inside the circuit breaker without external power to the STU Communication. ZSI, Remote Reset and DO functions are not available and EVENT is not logged when using Self - Power only.

P — Trip unit type

P	Power meter

S — Relay function / Commuttation (MODBUS)

S	L, S, I, G + PTA
Y	L, S, I, Gext + Ground wire CT
O	L, S, I, G + Neutral CT

1

	Frequency	Control power voltage	Communication
1	60Hz	AC/DC 100V~250V	N/A
2	60Hz	DC 24V~48V	N/A
3	60Hz	AC/DC 100V~250V	Bluetooth
4	60Hz	DC 24V~48V	Bluetooth
6	50Hz	AC/DC 100V~250V	N/A
7	50Hz	DC 24V~48V	N/A
8	50Hz	AC/DC 100V~250V	Bluetooth
9	50Hz	DC 24V~48V	Bluetooth

S — Trip unit type

S	Supreme meter

S — Relay function / Commuttation (MODBUS)

S	L, S, I, G + PTA
Y	L, S, I, Gext + Ground wire CT
O	L, S, I, G + Neutral CT

1

	Frequency	Control power voltage	Communication
1	60Hz	AC/DC 100V~250V	Bluetooth, NFC
2	60Hz	DC 24V~48V	Bluetooth, NFC
6	50Hz	AC/DC 100V~250V	Bluetooth, NFC
7	50Hz	DC 24V~48V	Bluetooth, NFC

* Self-power is automatic power supply to the Trip Unit without additional control power
* L, S, I: Long time delay trip, Short time delay trip, Instantaneous trip
* G: Ground fault (Residual earth fault protection)
* Gext + Ground wire CT: Source return type
* PTA: Pre-trip alarm function
* Customers must purchase their own Ground wire CT (Secondary output: 5A, accuracy 1%)
* Customers must purchase their own Neutral CT (Primary output: same as ACB's Rated Current / Secondary output: 5A, accuracy 1%)
* The STU acceptable voltage range is 100 to 250V
* If you want an external VDM, please insert '(-V)' at the end of the full ordering

Item	Description	Features	Notes
72313460708	TOTAL ASS'Y,VDM(Shield Cable), EXTERNAL, STU	Accessory	Separate purchase

* To apply external VDM separately, order the code above.

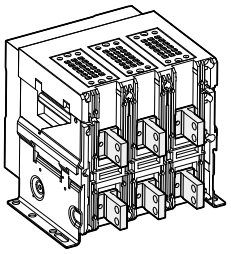
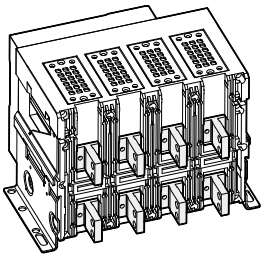
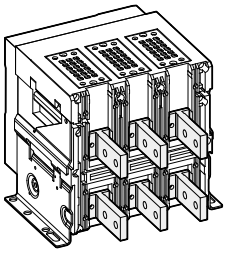
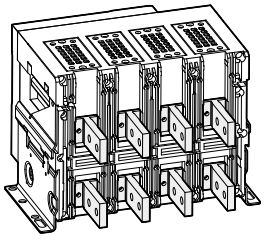
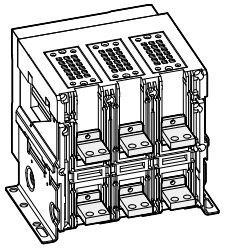
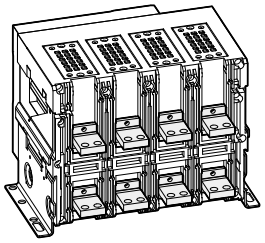
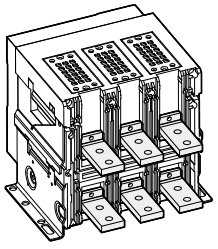
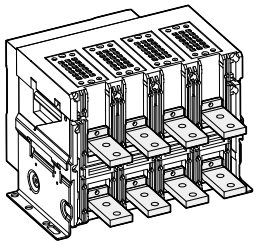
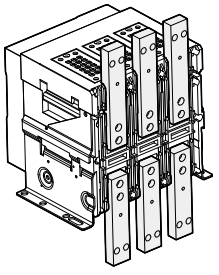
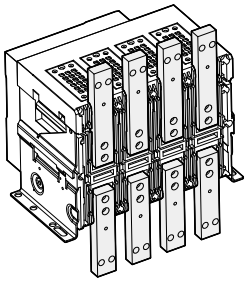
Rating

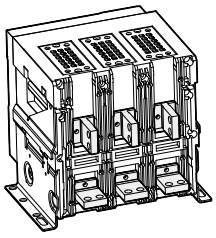
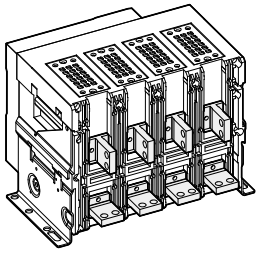
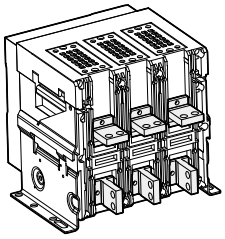
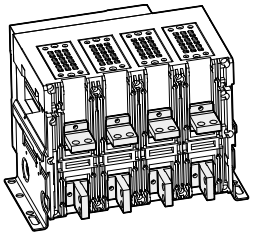
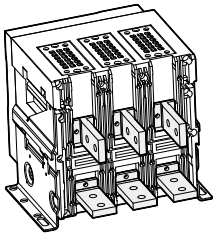
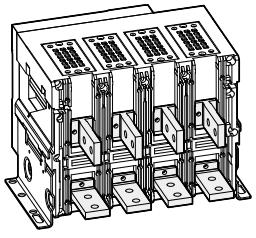
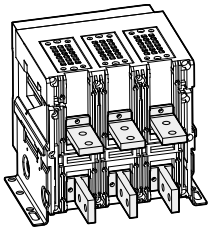
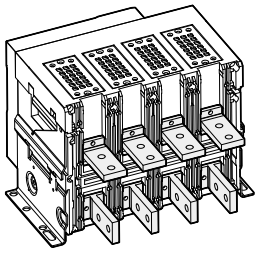
Type					Susol UAS-□□D/UAA-□□D
Ampere Frame (AF)					08 16
Rated current (CT Ration)	(A)			at 40°C	800 1600
Rated current (Available Rating plug)	(V)			at 40°C	400 800 600 1000 630 1200 800 1250 1600
Rated maximum voltage	(V)				254/508/635
Frequency	(Hz)				UAS: 50/60
Number of poles	(P)				3/4
Type of trip relay (Electronic trip device)					N, A, P, S (4 type)
Rated short circuit current (Sym.) (Duty: O-15s-CO)	(kA)	With instantaneous	AC	847V(60Hz)	-
				635V	65
				508V	85
				254V	85
		Without instantaneous	AC	847V(60Hz)	-
				635V	65
				508V	85
				254V	85
Rated making current (X/R=more than 6.6)	(kA peak)	With instantaneous	AC	847V(60Hz)	-
				635V	149.5
				508V	195.5
				254V	195.5
		Without instantaneous	AC	847V(60Hz)	-
				635V	149.5
				508V	150.5
				254V	151.5
Rated short time current	(kA)		AC		65
Operating time (t)	(ms)	Breaking time			Less than 30ms
		Opening time			Less than 50ms
		Closing time			Less than 80ms
		Charging time			Less than 5 sec.
Endurance Rating C/O Cycles) (Without maintenance)	(Cycles)	Mechanical (60 times per hour)			12,500
		Electrical (30 times per hour)			2,800
Weight (Includes charging motor)	lb (kg)	Drawout type	Main Body with Cradle	3P	154 (70)
				4P	187 (85)
			Only Cradle	3P	71 (32)
				4P	84 (38)
		Fixed type		3P	77 (35)
				4P	99 (45)
External dimensions 	Draw-out type	inch (mm)	H×W×D	3P	16.93×13.15×16.02 (430×334×407)
				4P	16.93×16.50×16.02 (430×419×407)
	Fixed type	inch (mm)	H×W×D	3P	11.81×11.81×11.61 (300×300×295)
				4P	11.81×15.16×11.61 (300×385×295)
Enclosure dimensions		inch (mm)	H×W×D	3P	19.69×15.75×13.39 (500×400×340)
				4P	19.69×19.69×13.39 (500×500×340)
Operating Temperature					-4°F ~ +140°F (-20°C ~ +60°C)
Standards					UL 1066 / ANSI C37.13

Susol UL ACB D-Frame

Multiple connections

Fixed type

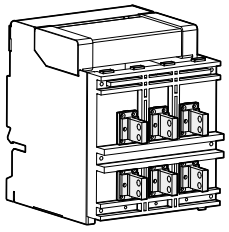
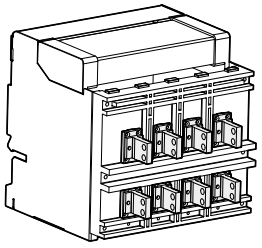
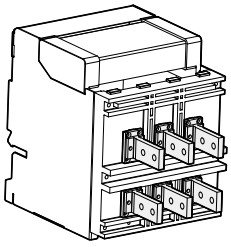
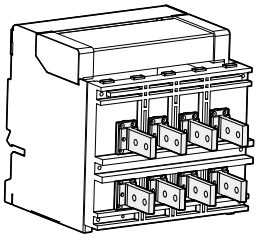
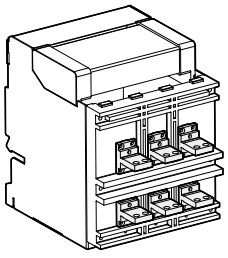
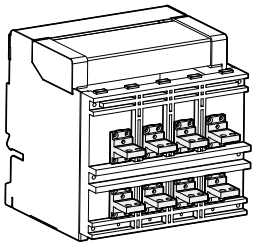
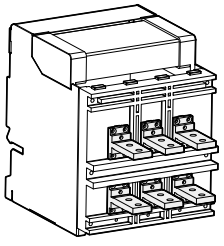
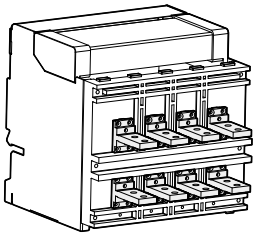
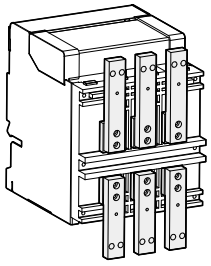
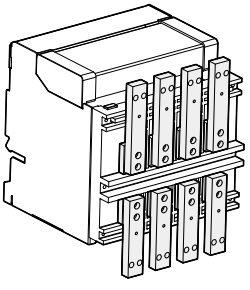
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
D	Vertical (V)	800 to 1600A		
	Vertical-con (W)			
	Horizontal (H)			
	Horizontal-con (G)			
	Flat Connection (P)			

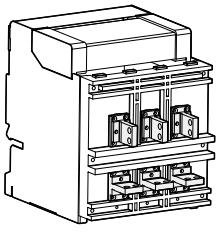
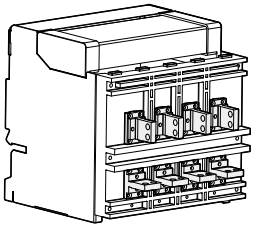
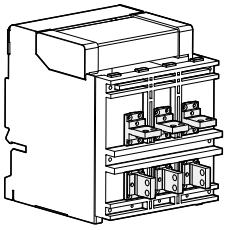
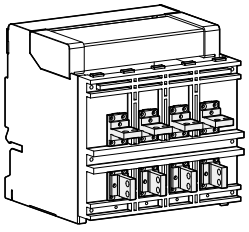
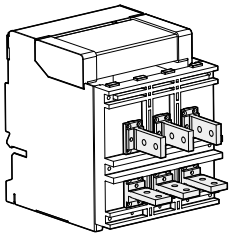
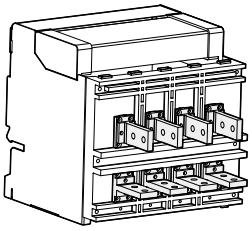
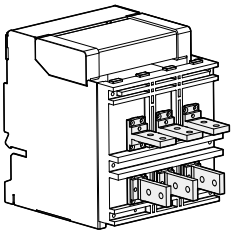
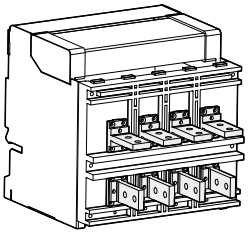
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
D	Vertical/ Horizontal (N)	800 to 2000A		
	Horizontal/ Vertical (M)			
	Vertical/ Horizontal-con			
	Horizontal/ Vertical-con			

Susol UL ACB D-Frame

Multiple connections

Draw-out type

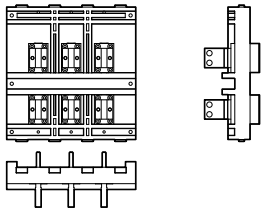
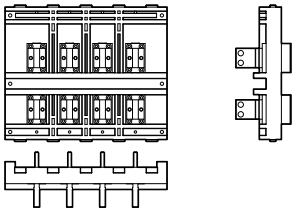
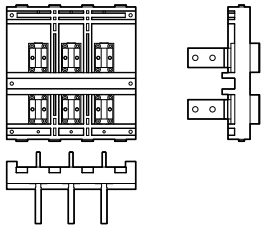
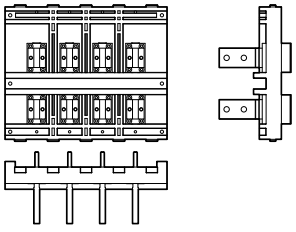
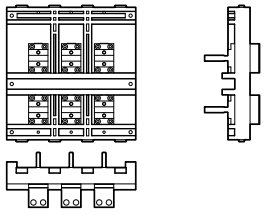
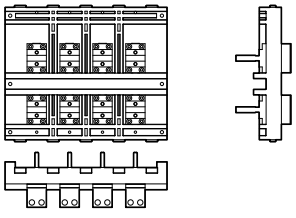
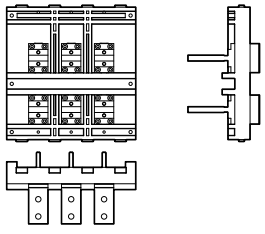
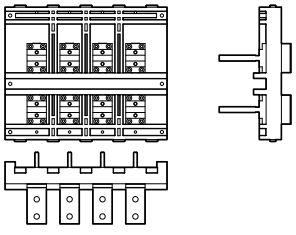
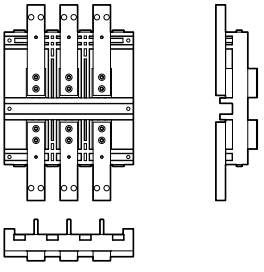
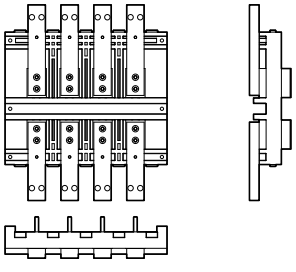
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
D	Vertical (V)	800 to 1600A		
	Vertical-con (W)			
	Horizontal (H)			
	Horizontal-con (G)			
	Flat Connection (P)			

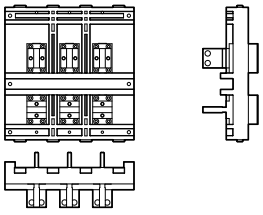
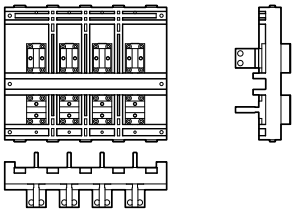
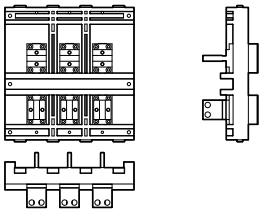
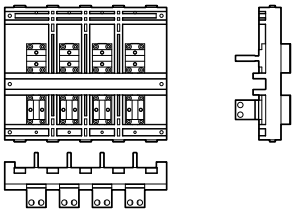
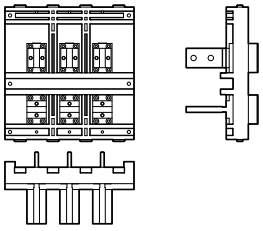
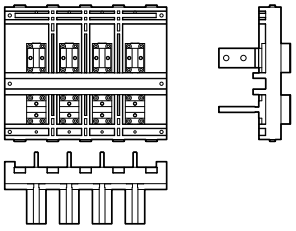
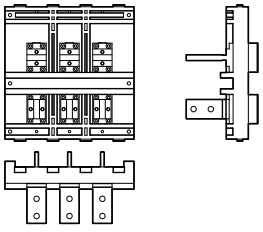
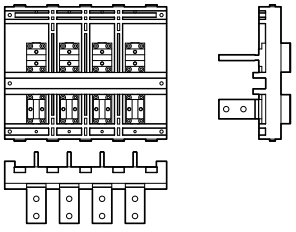
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
D	Vertical/ Horizontal (N)	800 to 2000A		
	Horizontal/ Vertical (M)			
	Vertical/ Horizontal-con			
	Horizontal/ Vertical-con			

Susol UL ACB D-Frame

Multiple connections

Connector view

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
D	Vertical (V)	800 to 1600A		
	Vertical-con (W)			
	Horizontal (H)			
	Horizontal-con (G)			
	Flat Connection (P)			

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
D	Vertical/ Horizontal (N)	800 to 2000A		
	Horizontal/ Vertical (M)			
	Vertical/ Horizontal-con			
	Horizontal/ Vertical-con			

Susol UL ACB D-Frame

Dimensions

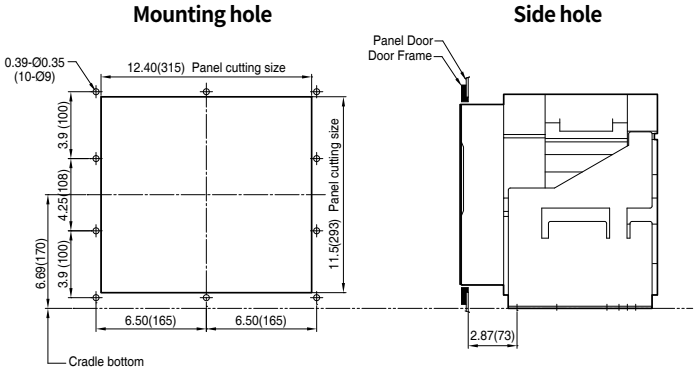
Enclosure Size

Number of Poles	ACB Rating		Enclosure Dimensions		Ventilation Area	
	Rated Current	Ampere Frame	(W×H×D)		Top	
			inch	mm	inch²	mm²
3P	1600A and below, UL 1066 (ANSI C37.50)	D	14.72×19.45×13.98	374×494×355	21.51	13879
4P	1600A and below, UL 1066 (ANSI C37.50)	D	18.07×19.45×13.98	459×494×355	28.86	18617

Door Frame

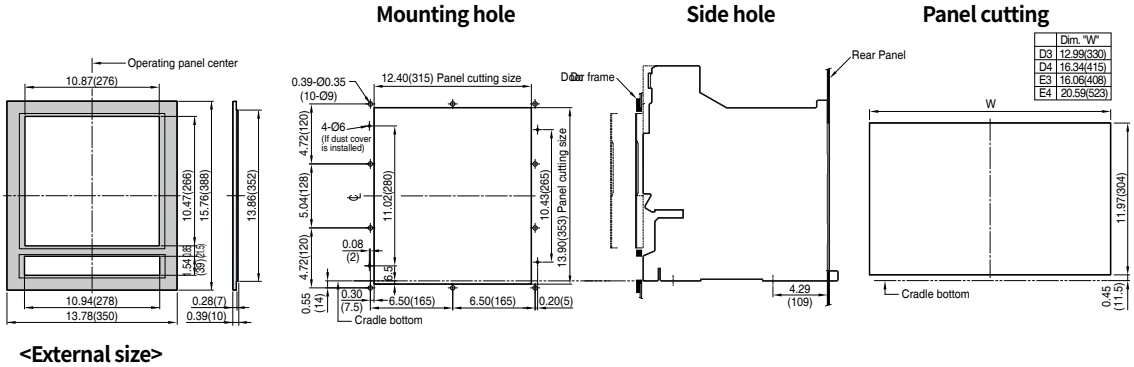
Fixed type

[inch (mm)]



Draw-out type

[inch (mm)]

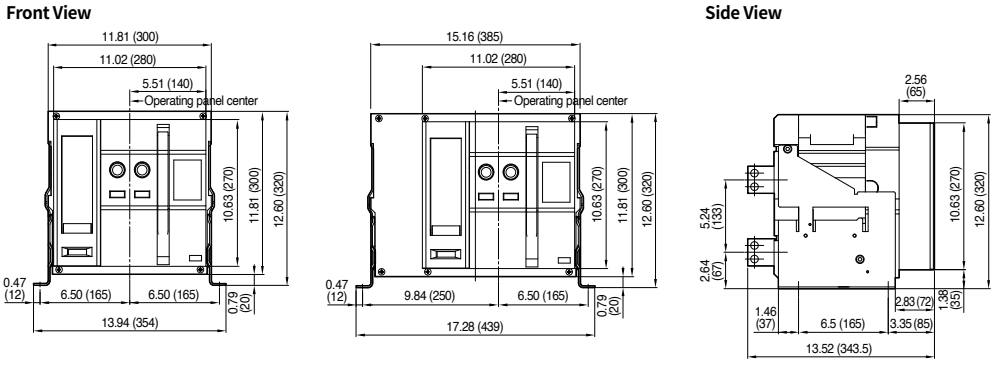


<External size>

Fixed type [UAS-08/16D]

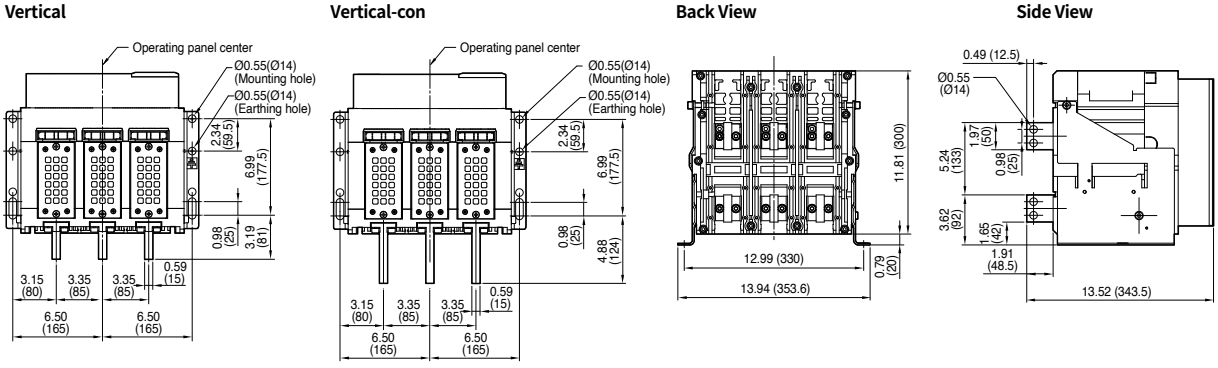
Front view (3P, 4P)

[inch (mm)]



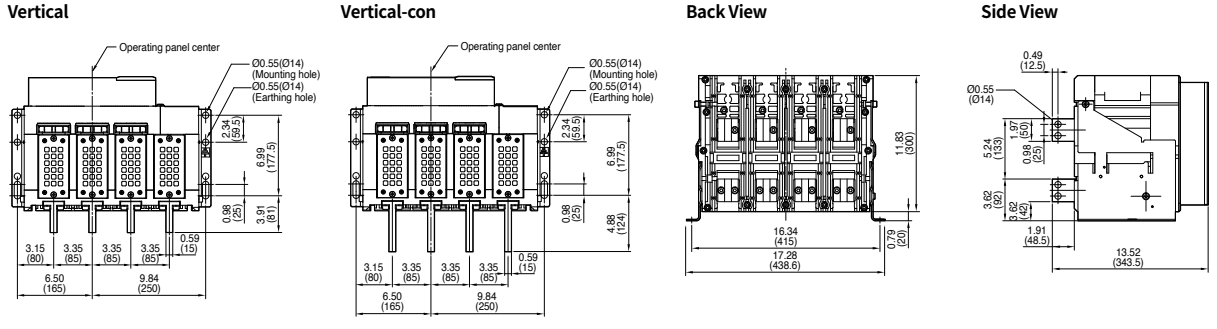
Vertical type (3P)

[inch (mm)]



Vertical type (4P)

[inch (mm)]



Susol UL ACB D-Frame

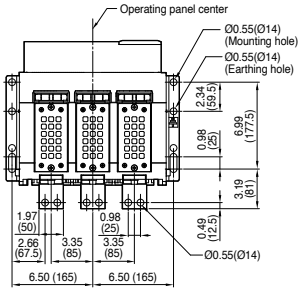
Dimensions

Fixed type [UAS-08/16D]

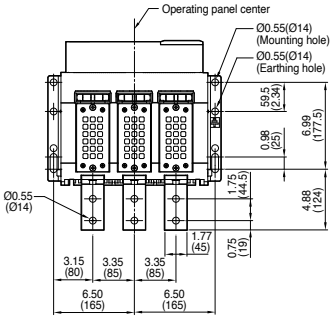
Horizontal type (3P)

[inch (mm)]

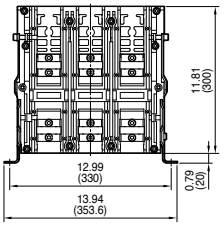
Horizontal



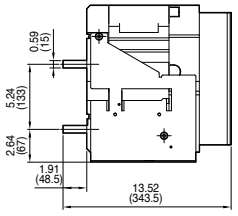
Horizontal-con



Back View



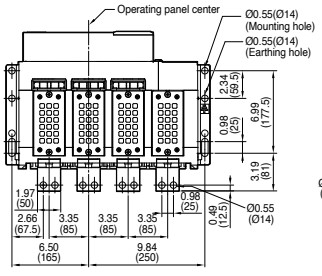
Side View



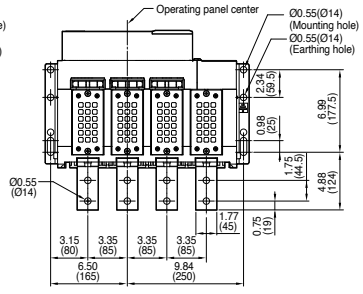
Horizontal type (4P)

[inch (mm)]

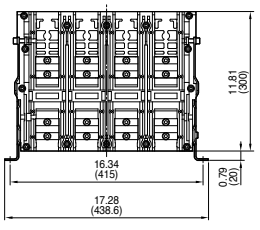
Horizontal



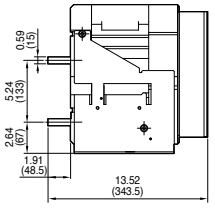
Horizontal-con



Back View



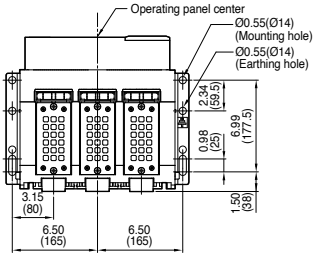
Side View

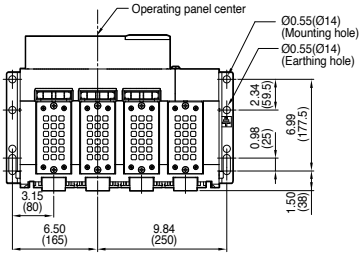


Flat connection type (3P, 4P)

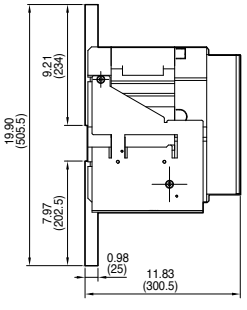
[inch (mm)]

Top View





Side View

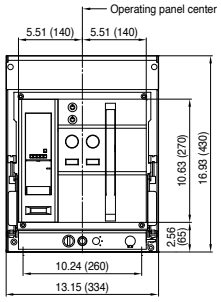


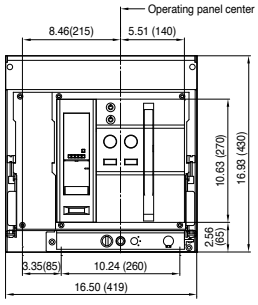
Draw-out type[UAS-08/16D]

Front view (3P, 4P)

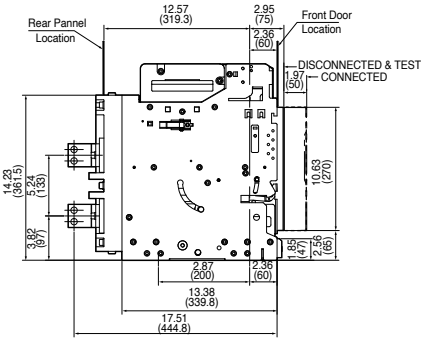
[inch (mm)]

Front View





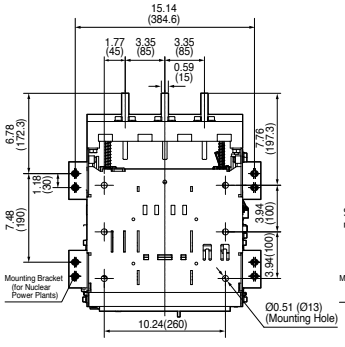
Side View



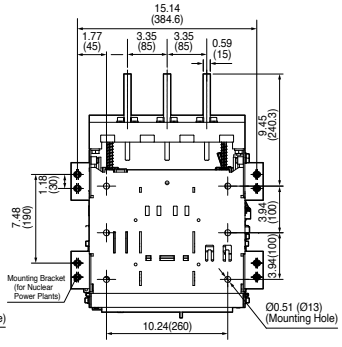
Vertical type (3P)

[inch (mm)]

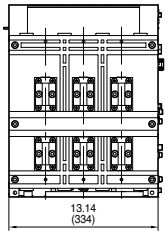
Bottom View



Vertical-con

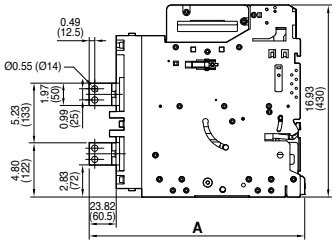


Back View



Side View

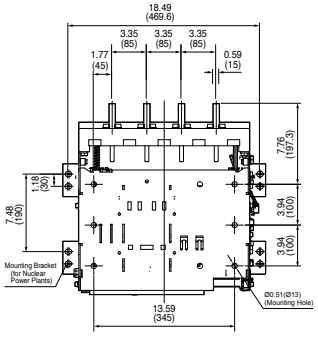
Dimension "A"		inch	mm
Vertical	Without Metering CT	18.39	467.3
	With Metering CT	18.98	482.3
Vertical-Con	Without Metering CT	20.09	510.3
	With Metering CT	20.68	525.3



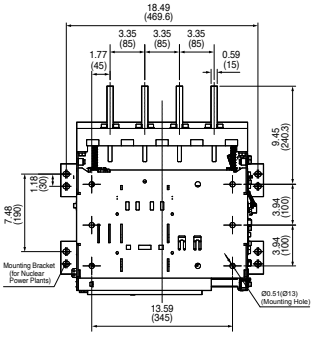
Vertical type (4P)

[inch (mm)]

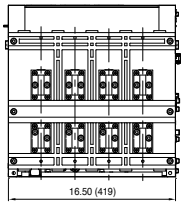
Bottom View



Vertical-con

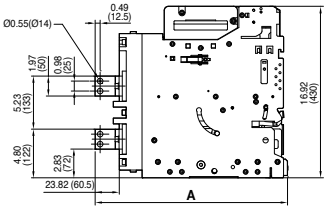


Back View



Side View

Dimension "A"		inch	mm
Vertical	Without Metering CT	18.39	467.3
	With Metering CT	18.98	482.3
Vertical-Con	Without Metering CT	20.09	510.3
	With Metering CT	20.68	525.3



Susol UL ACB D-Frame

Dimensions

Draw-out type[UAS-08/16D]

Horizontal type (3P)

[inch (mm)]

Bottom View **Vertical-con** **Back View** **Side View**

Dimension "A"		inch	mm
Vertical	Without Metering CT	18.39	467.3
	With Metering CT	18.98	482.3
Vertical-Con	Without Metering CT	20.09	510.3
	With Metering CT	20.68	525.3

Horizontal type (4P)

[inch (mm)]

Bottom View **Vertical-con** **Back View** **Side View**

Dimension "A"		inch	mm
Vertical	Without Metering CT	18.39	467.3
	With Metering CT	18.98	482.3
Vertical-Con	Without Metering CT	20.09	510.3
	With Metering CT	20.68	525.3

Flat connection type

[inch (mm)]

Bottom View **Back View** **Side View**

Dimension "A"		inch	mm
Flat	Without Metering CT	17.02	432.3
	With Metering CT	17.61	447.3

Beyond X™ Susol UL ACB E-Frame

Beyond X™ Susol ACB delivers high breaking capacity with minimal energy loss, making it ideal for reliable and sustainable power management in any application.

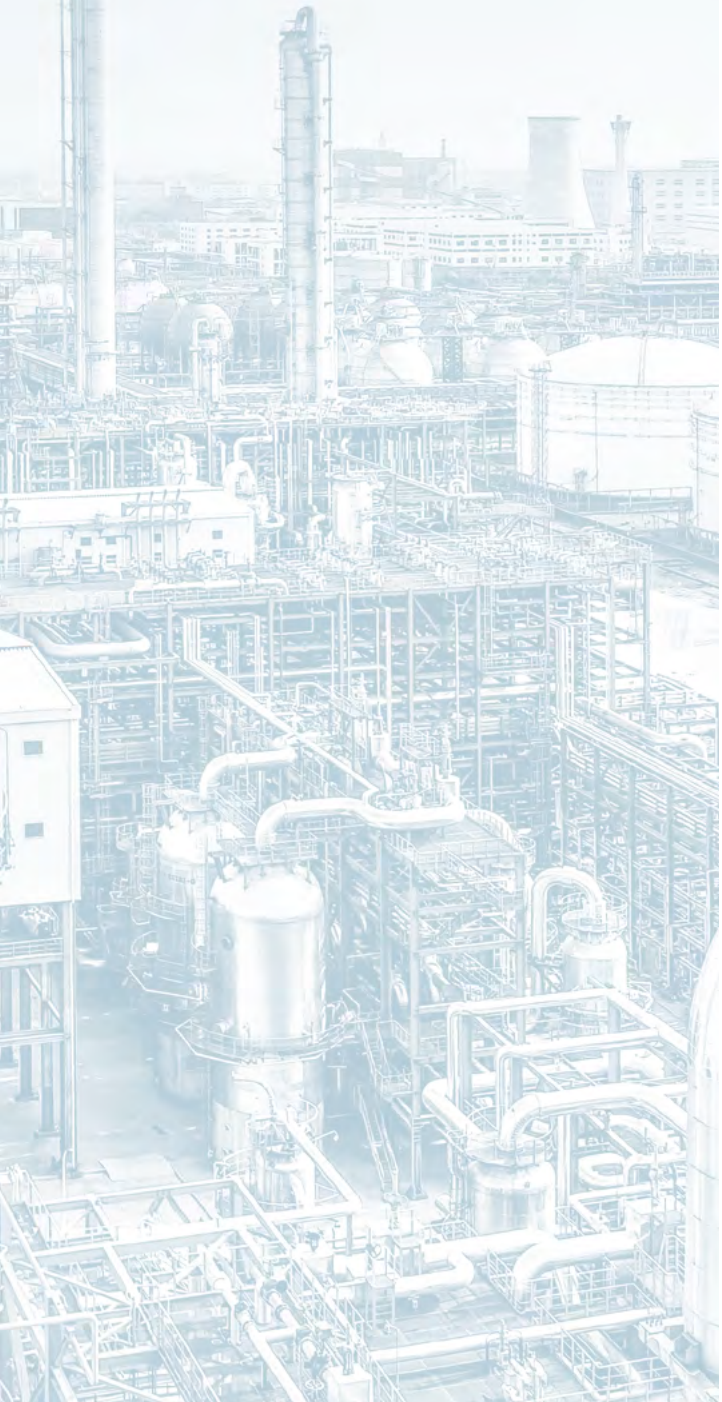


Table of Contents

Susol UL ACB E-Frame

Configuration

Main body

UAH — 32 — E — 3 — 32 — A

Air circuit breaker	
UAW	Up to 847Vac
UAH	Up to 635Vac

Frame size	
08	800AF
16	1600AF
20	2000AF
25	2500AF
32	3200AF
40	4000AF

Frame type and phase	
E	3P/4P Standard ABC(N)
X	4P Reversed (N)ABC

Poles	
3	3P
4	4P

Rating current	
04	400A
05	600A
06	630A
08	800A
10	1000A
12	1200A
13	1250A
16	1600A
20	2000A
25	2500A
30	3000A
32	3200A
40	4000A

Mounting and terminal	
Draw-out type	
A	Draw-out
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal Lower - Vertical
N	Upper - Vertical Lower - Horizontal
P [1)]	Flat

Note 1: Flat type(P-type) should purchase flat type terminal kit separately.
See page 173 to find item code.

Switch

Switch	
UAA	Switch

Frame size	
08	800AF
16	1600AF
20	2000AF
25 [2]	2500AF
32 [3]	3200AF

Frame type and phase	
E	3P/4P Standard ABC(N)
X	4P Reversed (N)ABC

Poles	
3	3P
4	4P

Rating current	
00	None

Mounting and terminal	
Draw-out type	
A	Draw-out
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal Lower - Vertical
N	Upper - Vertical Lower - Horizontal
P [1]	Flat

Note 2: The applicable terminal types of UAA-25E(X) are H, V, M and N.
3: The applicable terminal type of UAA-32E(X) is V only.

Cradle

UAL — S32E — 3 — A — V — F — S

Type and Ampere frame	
S20E	2000AF
W20E	2000AF
S25E	2500AF
W25E	2500AF
S32E	3200AF
W32E	3200AF
S40E	4000AF
W40E	4000AF

Poles	
3	3 Poles
4	4 Poles

Secondary connector type	
A	Connector type
B	Screw joint type
C	Spring type

Terminal connection	
H	Horizontal
V	Vertical
M	Upper - Horizontal Lower - Vertical
N	Upper - Vertical Lower - Horizontal
P [1]	Flat

Shutter	
E	Without safety shutter
F	With safety shutter

Other options	
N	Without arc cover
S	With arc cover
T [2]	With arc cover & Metering CT

※ 1) Flat type (P-type) should purchase flat type terminal kit separately.
See page 173 to find item code.
2) Metering CT (T-Option) must be ordered separately.
The depth of Metering CT included cradle is longer than normal cradle.
Please check Dimension page.

Breaker				Corresponding cradle
UAH-08E	UAH-08X	UAA-08E	UAA-08X	S20E
UAH-16E	UAH-16X	UAA-16E	UAA-16X	
UAH-20E	UAH-20X	UAA-20E	UAA-20X	
UAH-25E	UAH-25X	UAA-25E	UAA-25X	S25E
UAH-32E	UAH-32X	UAA-32E	UAA-32X	S32E
UAH-40E	UAH-40X			S40E
UAW-08E	UAW-08X			W20E
UAW-16E	UAW-16X			
UAW-20E	UAW-20X			
UAW-25E	UAW-25X			W25E
UAW-32E	UAW-32X			W32E
UAW-40E	UAW-40X			W40E

M1

Motor operator	
MA	None (Manual operated)
M1	AC/DC 100V~125V
M2	AC/DC 200V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M8	AC 48V

D1

Closing coil	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

D1

Shunt trip	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

HX

Charging/Auxiliary switch	
HX	High capacity OFF charge/5a5b
HC	High capacity ON charge/5a5b
GX	High capacity OFF charge/3a3b
GC	High capacity ON charge/3a3b
JC	Capacity ON charge/6a6b

NHO

Trip unit (Relay)
Please check page 56.

U1

UVT Coil	
U0	None
U1	AC/DC 100V~125V
U2	AC/DC 200V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 380V~480V
U7	AC 48V

AL

Accessories
Please check below.

Accessory selection					
Package code					
N01	N02	N03	N04	N05	N06
	✓				
				✓	
					✓
✓			✓		
✓		✓	✓	✓	
✓			✓	✓	
	✓				
✓	✓		✓	✓	✓
		✓			
✓	✓	✓		✓	✓
		✓	✓	✓	✓
✓	✓				
	✓				

Self Selection	Accessory Codes	Description
	AL	AL1+MRB (Trip alarm contact 1+Manual reset button)
	A1	AL1+MRB+RES(AC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A2	AL1+AL2+MRB (Trip alarm contact 1&2+Manual reset button)
	A3	AL1+MRB+RES(DC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A4	AL1+MRB+RES(AC200V~250V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A5	AL1+MRB+Auto reset (Trip alarm contact 1+Manual reset button+Auto reset)
	A6	AL1+AL2+MRB+Auto reset (Trip alarm contact 1&2+Manual reset button+Auto reset)
	A7	AL1+MRB+RES(DC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A8	AL1+MRB+RES(AC200V~250V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A9	AL1+MRB+RES(AC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	Y2	AL1+AL2+MRB (2b contact)
	Y6	AL1+AL2+MRB+Auto reset (2b contact)
	Z2	AL1+AL2+MRB (1a1b contact)
	Z6	AL1+AL2+MRB+Auto reset (1a1b contact)
	S	Charge switch communication(CS2)
	B	Lockable On/Off button cover
	M	Mechanical Interlock
	D	Door interlock(DI) or MOC(Mechniasim operated cell switch
	(-V)	Without VDM module (External type VDM is required to order)
	K	Key lock
	K2	Key interlock set
	K3	Key interlock double
	K4	Key lock(Same key)
	K5	Profalux lock(CAMLOCK type)
	K6	Kirkkey lock(CAMLOCK type)
	K7	Kirkkey lock(CN-22 type)
	R	Ready to close switch
	T	Temperature monitoring
	E	Spring auto release
	H1	Double shunt coil(AC/DC100V~125V)
	H2	Double shunt coil(AC/DC200V~250V)
	H3	Double shunt coil(DC125V)
	H4	Double shunt coil(DC24V~30V)
	H5	Double shunt coil(DC48V~60V)
	H7	Double shunt coil(AC48V)

* The Counter option is automatically applied.

Susol UL ACB E-Frame

Configuration

Trip Unit

N	H	0
Trip Relay Type	Communication and protection	Control voltage and frequency

N	
000	Trip Relay N/A
N	Normal

H	
H	L, S, I, G

0	Frequency used	Control power voltage	Comm.
0	60Hz	Self-Power Note 1	NFC
5	50Hz	Self-Power Note 1	NFC

A	
A	Ammeter

H	
H	L, S, I, G
D	L, S, I, G + Comm.
Y	L, S, I, Gext + Ground wire CT + Comm.
O **	L, S, I, G + Neutral CT + Comm.

* L, S, I: Long time delay trip, Short time delay trip, Instantaneous trip
* G: Ground fault (Residual earth fault protection)
* Ground fault system by vector sum
* Communication and output contacts DO NOT work under self-power condition
* Gext + Ground wire CT: Source return Type
* Customers must purchase their own Ground wire CT (Secondary output: 5A, accuracy 1%)
** AO provides the function to detect and protect the ground fault current by applying the NCT (Neutral CT) in the neutral wire when 3-pole circuit breaker is used in 3-phase 4-wire system.
* Customers must purchase their own Neutral CT (Primary output: same as ACB's Rated Current / Secondary output: 5A, accuracy 1%)

0	Frequency used	Control power voltage	Comm.
0	60Hz	Self-Power	N/A
1	60Hz	AC/DC 100V~250V	N/A
2	60Hz	DC 24V~48V	N/A
5	50Hz	Self-Power	N/A
6	50Hz	AC/DC 100V~250V	N/A
7	50Hz	DC 24V~48V	N/A

Note 1: The Self-Power function is to receive power from the main circuit inside the circuit breaker without external power to the STU Communication. ZSI, Remote Reset and DO functions are not available and EVENT is not logged when using Self - Power only.

P		
Trip unit type	Relay function / Communtation (MODBUS)	
P	Power meter	S	L, S, I, G + PTA
		Y	L, S, I, Gext + Ground wire CT
		O	L, S, I, G + Neutral CT

1	Frequency	Control power voltage	Communication
1	60Hz	AC/DC 100V~250V	N/A
2	60Hz	DC 24V~48V	N/A
3	60Hz	AC/DC 100V~250V	Bluetooth
4	60Hz	DC 24V~48V	Bluetooth
6	50Hz	AC/DC 100V~250V	N/A
7	50Hz	DC 24V~48V	N/A
8	50Hz	AC/DC 100V~250V	Bluetooth
9	50Hz	DC 24V~48V	Bluetooth

S		
Trip unit type	Relay function / Communtation (MODBUS)	
S	Supreme meter	S	L, S, I, G + PTA
		Y	L, S, I, Gext + Ground wire CT
		O	L, S, I, G + Neutral CT

1	Frequency	Control power voltage	Communication
1	60Hz	AC/DC 100V~250V	Bluetooth, NFC
2	60Hz	DC 24V~48V	Bluetooth, NFC
6	50Hz	AC/DC 100V~250V	Bluetooth, NFC
7	50Hz	DC 24V~48V	Bluetooth, NFC

* Self-power is automatic power supply to the Trip Unit without additional control power
* L, S, I: Long time delay trip, Short time delay trip, Instantaneous trip
* G: Ground fault (Residual earth fault protection)
* Gext + Ground wire CT: Source return type
* PTA: Pre-trip alarm function
* Customers must purchase their own Ground wire CT (Secondary output: 5A, accuracy 1%)
* Customers must purchase their own Neutral CT (Primary output: same as ACB's Rated Current / Secondary output: 5A, accuracy 1%)
* The STU acceptable voltage range is 100 to 250V
* If you want an external VDM, please insert '(-V)' at the end of the full order

Item	Description	Features	Notes
72313460708	TOTAL ASS'Y,VDM(Shield Cable), EXTERNAL, STU	Accessory	Separate purchase

* To apply external VDM separately, order the code above.

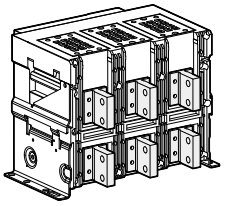
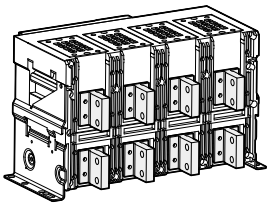
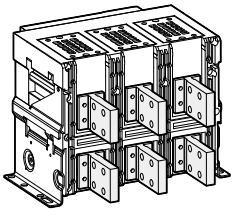
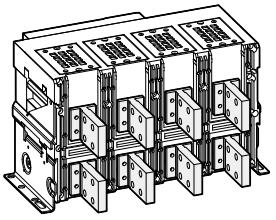
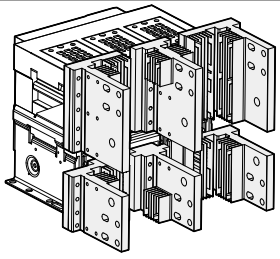
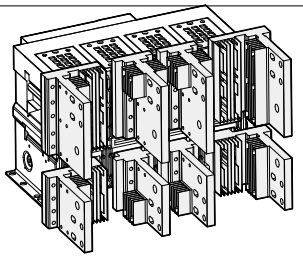
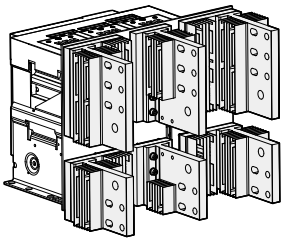
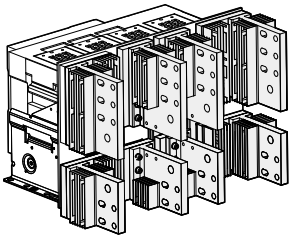
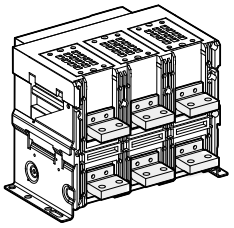
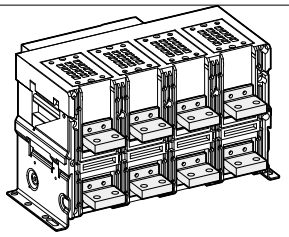
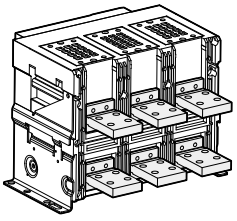
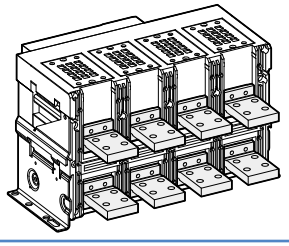
Rating

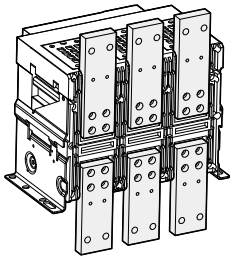
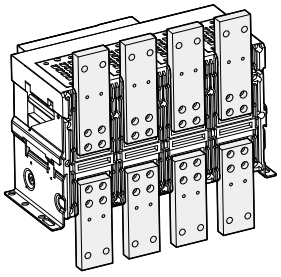
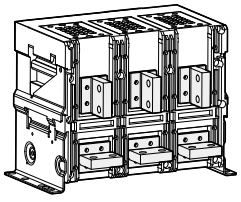
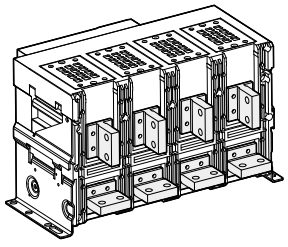
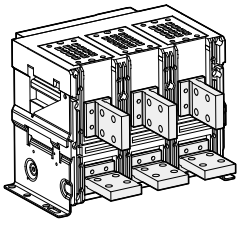
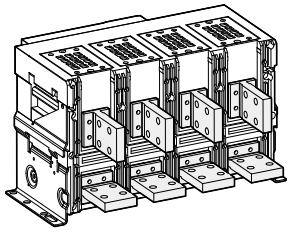
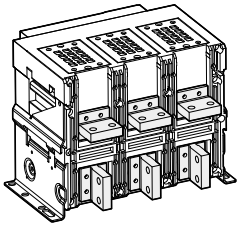
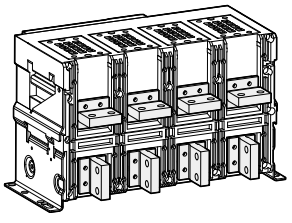
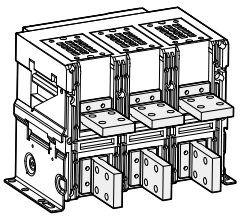
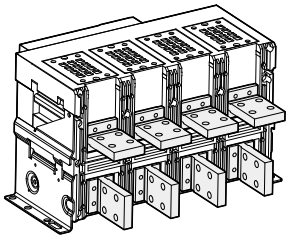
Type					Susol UAH-□□E / UAW-□□E / UAA-□□E			
Ampere Frame (AF)					08	16	20	25	32	40
Rated current (CT Ration)	(A)			at 40°C	800	1600	2000	2500	3200	4000
Rated current (Available Rating plug)	(V)			at 40°C	400	800	1000	1200	1600	2000
					600	1000	1200	1250	2000	2500
					630	1200	1250	1600	2500	3200
					800	1250	1600	2000	3000	4000
						1600	2000	2500	3200	
Rated maximum voltage	(V)				254/508/635/847 (UAW)					
Frequency	(Hz)				UAH/UAW: 50/60					
Number of poles	(P)				3/4					
Type of trip relay (Electronic trip device)					N, A, P, S (4 type)					
Rated short circuit current (Sym.) (Duty: O-15s-CO)	(kA)	With instantaneous	AC	847V(60Hz)	85					
				635V	85					
				508V	100					
				254V	100					
		Without instantaneous	AC	847V(60Hz)	85					
				635V	85					
				508V	85					
				254V	85					
Rated making current (X/R=more than 6.6)	(kA peak)	With instantaneous	AC	847V(60Hz)	195.5					
				635V	195.5					
				508V	230					
				254V	230					
		Without instantaneous	AC	847V(60Hz)	195.5					
				635V	195.5					
				508V	195.5					
				254V	195.5					
Rated short time current	(kA)		AC		85					
Operating time (t)	(ms)	Breaking time			Less than 30ms					
		Opening time			Less than 50ms					
		Closing time			Less than 80ms					
		Charging time			Less than 5 sec.					
Endurance Rating C/O Cycles) (Without maintenance)	(Cycles)	Mechanical (60 times per hour)			12,500					
		Electrical (30 times per hour)			2,800			1,000	400	
Weight (Includes charging motor)	lb (kg)	Drawout type	Main Body with Cradle	3P	214 (97)	245 (111)		326 (148)	331 (150)	
				4P	269 (122)	309 (140)		414 (188)	418 (190)	
			Only Cradle	3P	99 (45)	123 (56)		205 (93)	209 (95)	
				4P	121 (55)	152 (69)		256 (116)	259 (118)	
		Fixed type		3P	101 (46)	110 (50)		196 (89)	200 (91)	
				4P	126 (57)	137 (62)		249 (113)	253 (115)	
External dimensions	Draw-out type	inch (mm)	H×W×D	3P	16.93×16.22×16.02 (430×412×407)					
				4P	16.93×20.75×16.02 (430×527×407)					
	Fixed type	inch (mm)	H×W×D	3P	11.81×14.88×11.61 (300×378×295)					
				4P	11.81×19.41×11.61 (300×493×295)					
Enclosure dimensions		inch (mm)	H×W×D	3P	19.69×19.69×13.39 (500×500×340)					
				4P	19.69×24.21×13.39 (500×615×340)					
Operating Temperature					-4°F ~ +140°F (-20°C ~ +60°C)					
Standards					UL 1066 / ANSI C37.13					

Susol UL ACB E-Frame

Multiple connections

Fixed type

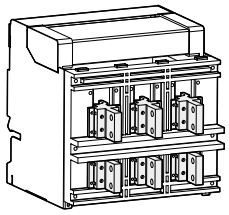
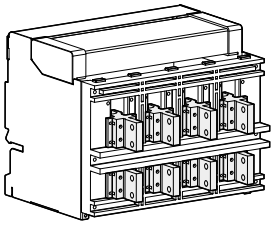
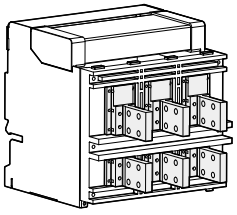
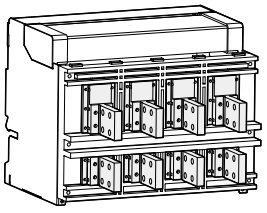
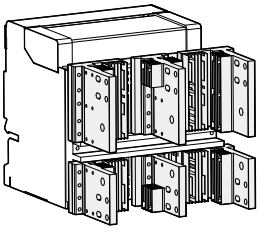
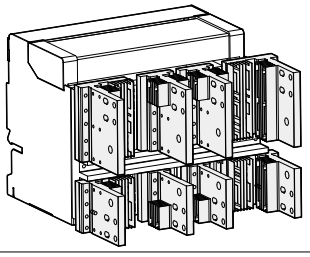
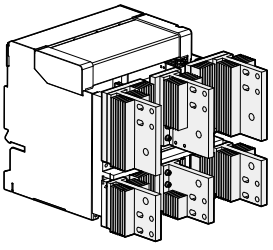
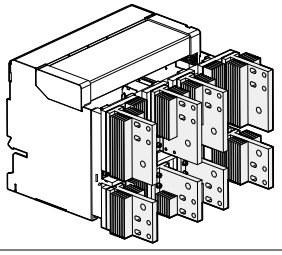
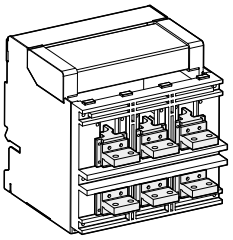
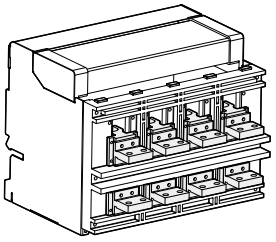
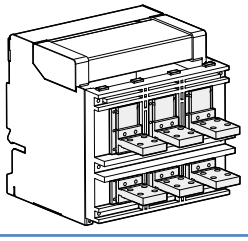
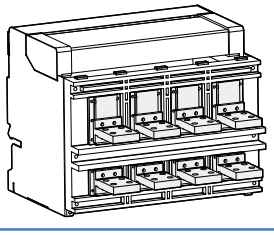
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
E	Vertical (V)	800 to 2000A		
		2500A		
		3200A		
		4000A		
	Horizontal (H)	800 to 2000A		
		2500A		

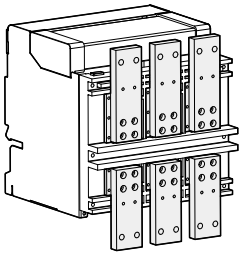
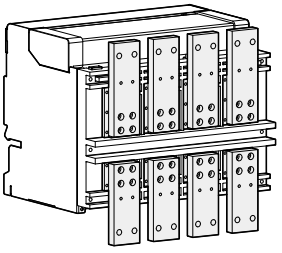
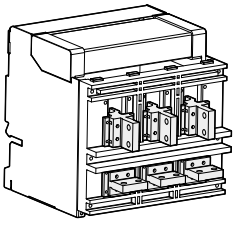
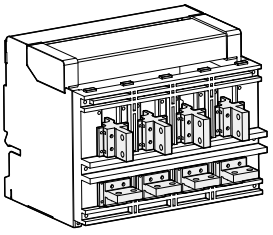
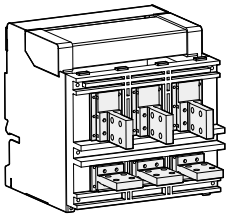
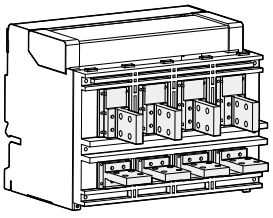
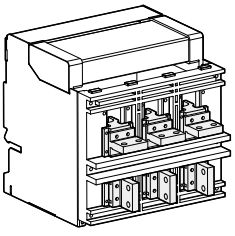
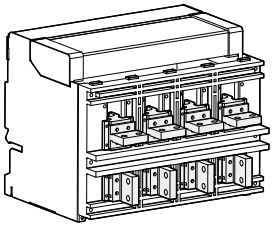
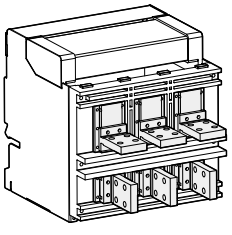
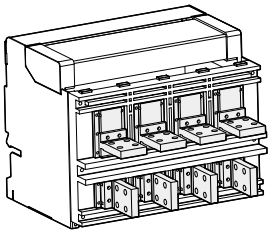
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
E	Flat connection (P)	800 to 2000A		
	Vertical/ Horizontal (N)	800 to 2000A		
		2500A		
	Horizontal/ Vertical (M)	800 to 2000A		
		2500A		

Susol UL ACB E-Frame

Multiple connections

Draw-out type

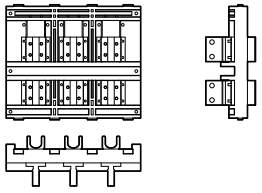
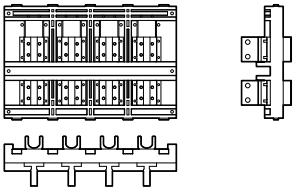
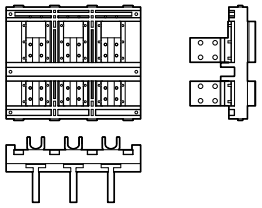
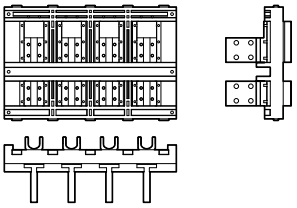
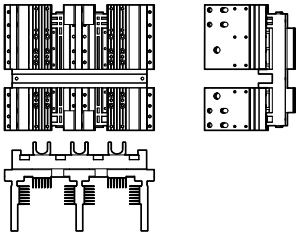
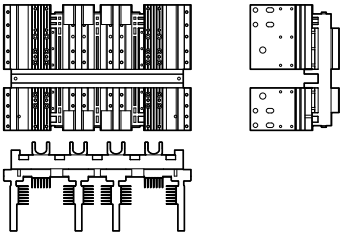
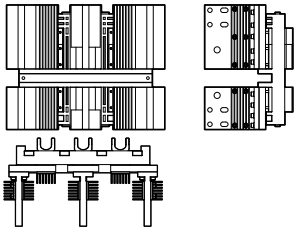
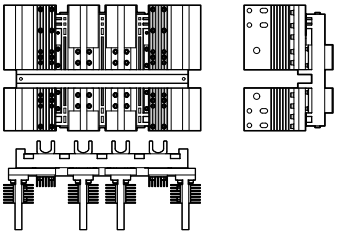
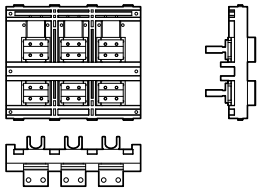
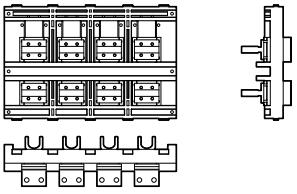
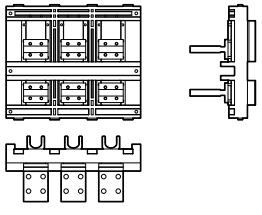
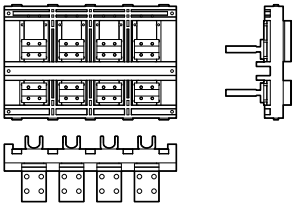
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
E	Vertical (V)	800 to 2000A		
		2500A		
		3200A		
		4000A		
	Horizontal (H)	800 to 2000A		
		2500A		

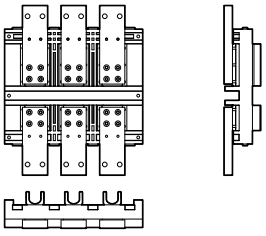
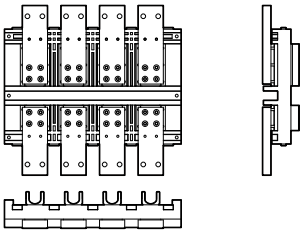
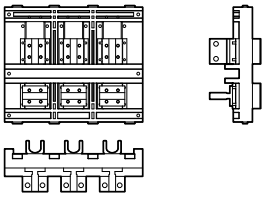
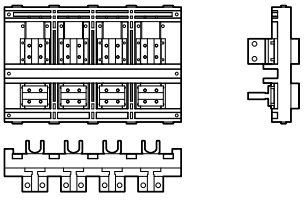
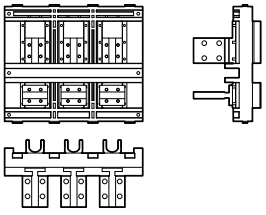
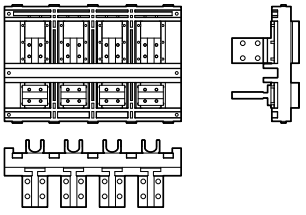
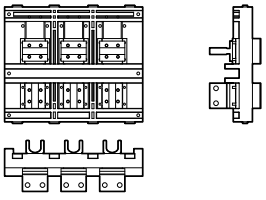
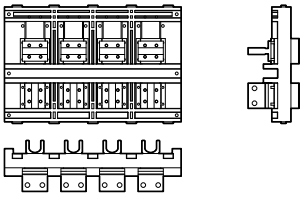
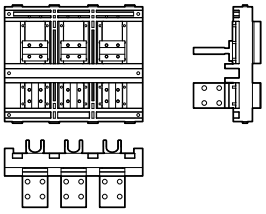
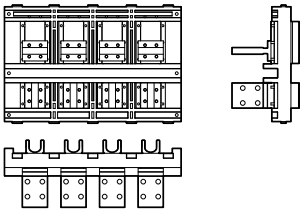
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
E	Flat connection (P)	800 to 2000A		
	Vertical/ Horizontal (N)	800 to 2000A		
		2500A		
	Horizontal/ Vertical (M)	800 to 2000A		
		2500A		

Susol UL ACB E-Frame

Multiple connections

Connector view

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
E	Vertical (V)	800 to 2000A		
		2500A		
		3200A		
		4000A		
	Horizontal (H)	800 to 2000A		
		2500A		

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
E	Flat connection (P)	800 to 2000A		
	Vertical/ Horizontal (N)	800 to 2000A		
		2500A		
	Horizontal/ Vertical (M)	800 to 2000A		
		2500A		

Susol UL ACB E-Frame

Dimensions

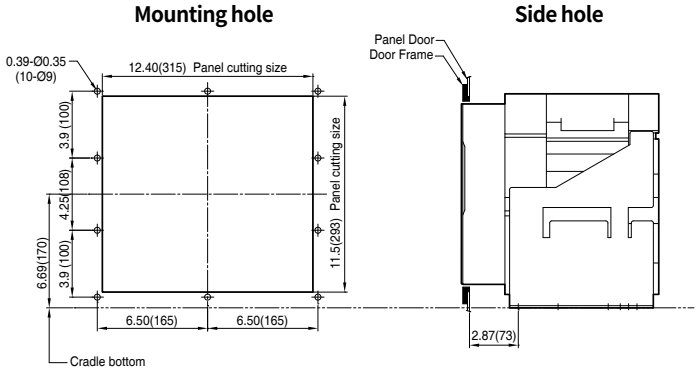
Enclosure size

Number of Poles	ACB Rating		Enclosure Dimensions		Ventilation Area	
	Rated Current	Ampere Frame	(W×H×D)		Top	
			inch	mm	inch²	mm²
3P	4000A and below, UL 1066 (ANSI C37.50)	E	14.72×19.45×13.98	374×494×355	21.51	13879
4P	4000A and below, UL 1066 (ANSI C37.50)	E	18.07×19.45×13.98	459×494×355	28.86	18617

Door frame

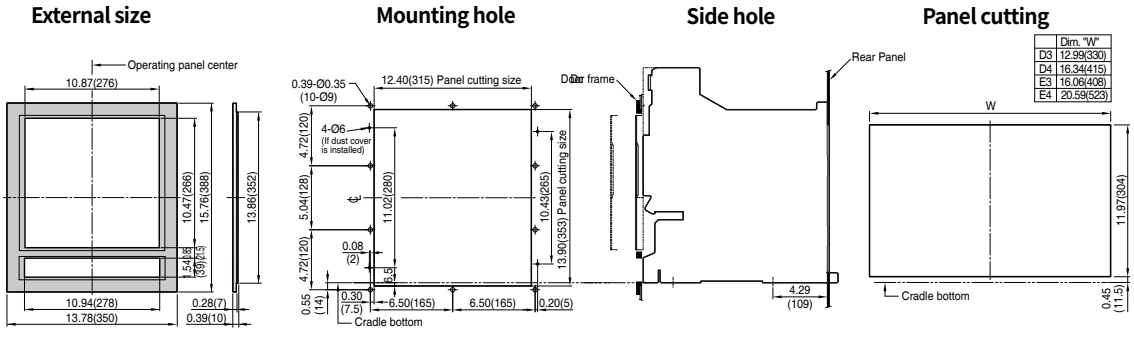
[inch (mm)]

Fixed type



[inch (mm)]

Draw-out type

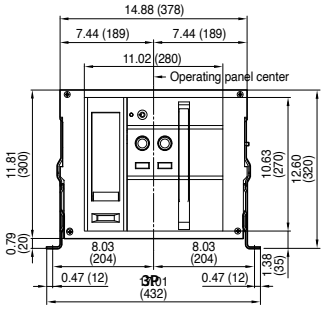


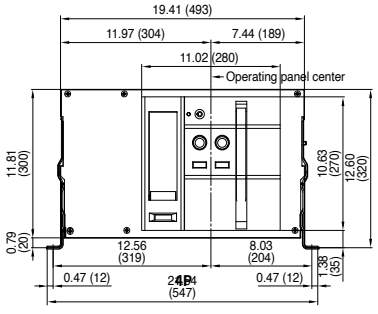
Fixed type [UAH-08/16/20E], [UAW-08/16/20E]

Horizontal type (3P, 4P)

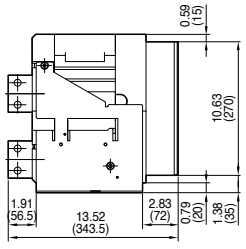
[inch (mm)]

Front View





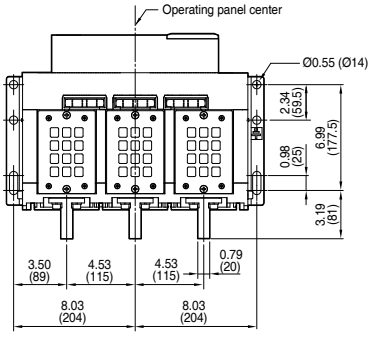
Side View



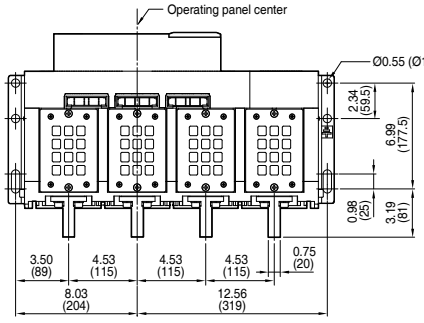
Vertical type (3P, 4P)

[inch (mm)]

Top View

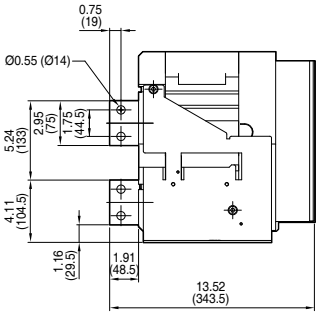


3P



4P

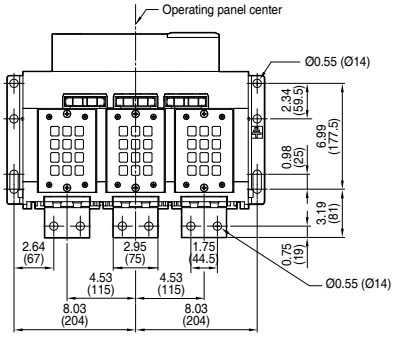
Side View



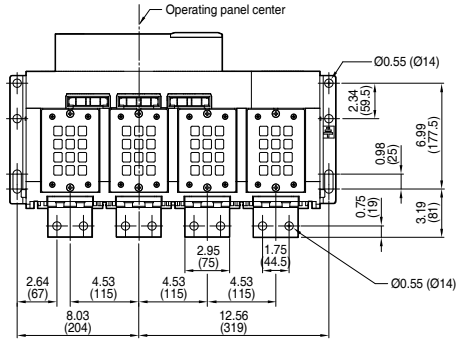
Horizontal type (3P, 4P)

[inch (mm)]

Top View

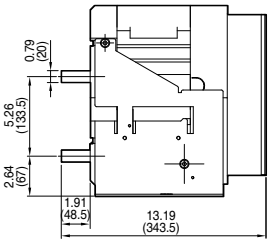


3P



4P

Side View



Susol UL ACB E-Frame

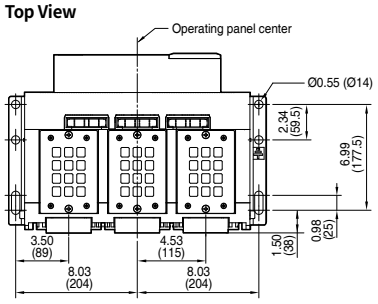
Dimensions

Fixed type [UAH-08/16/20E], [UAW-08/16/20E]

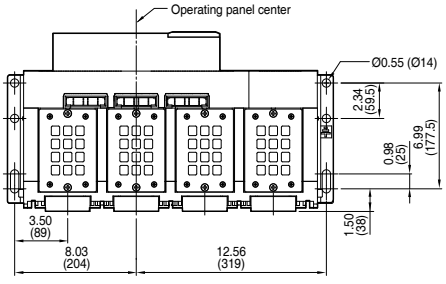
Flat connection type (3P, 4P)

[inch (mm)]

Top View

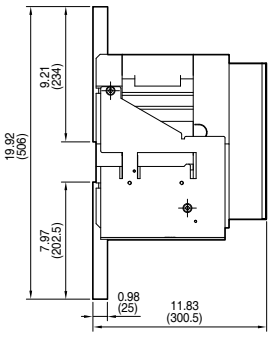


3P



4P

Side View

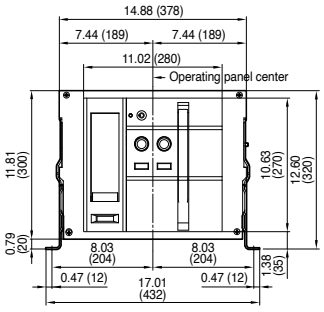


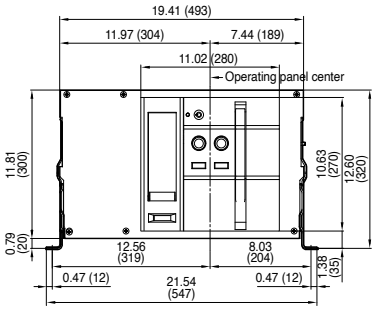
Fixed type [UAH-25E], [UAW-25E]

Front view (3P, 4P)

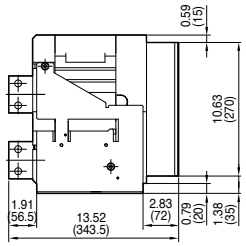
[inch (mm)]

Front View





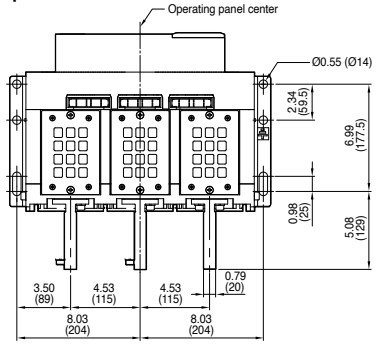
Side View



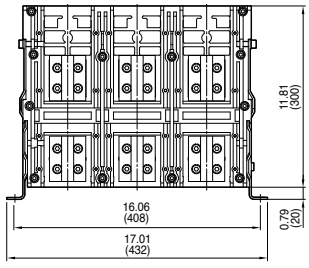
Vertical type (3P)

[inch (mm)]

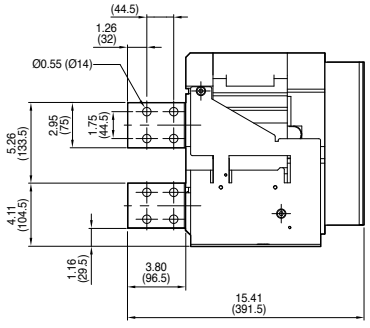
Top View



Back View



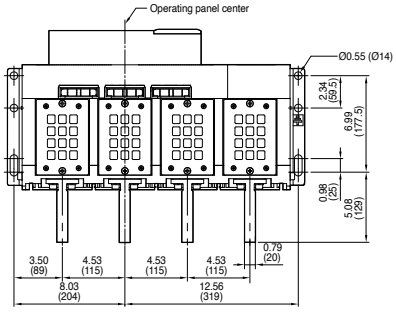
Side View



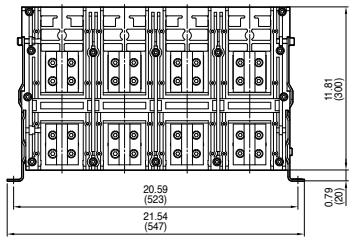
Vertical type (4P)

[inch (mm)]

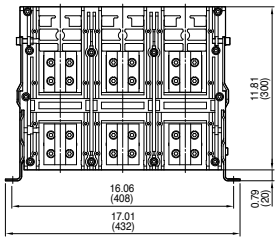
Top View



Back View



Side View



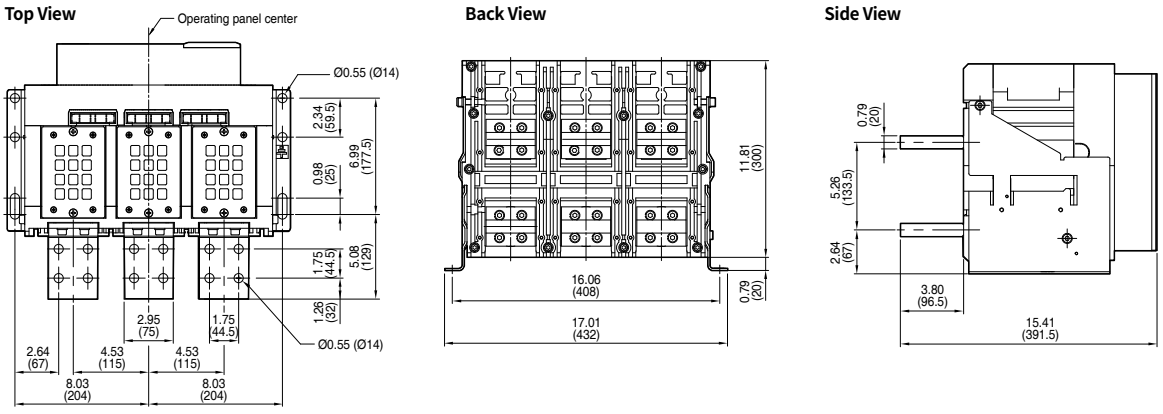
Susol UL ACB E-Frame

Dimensions

Fixed type [UAH-25E], [UAW-25E]

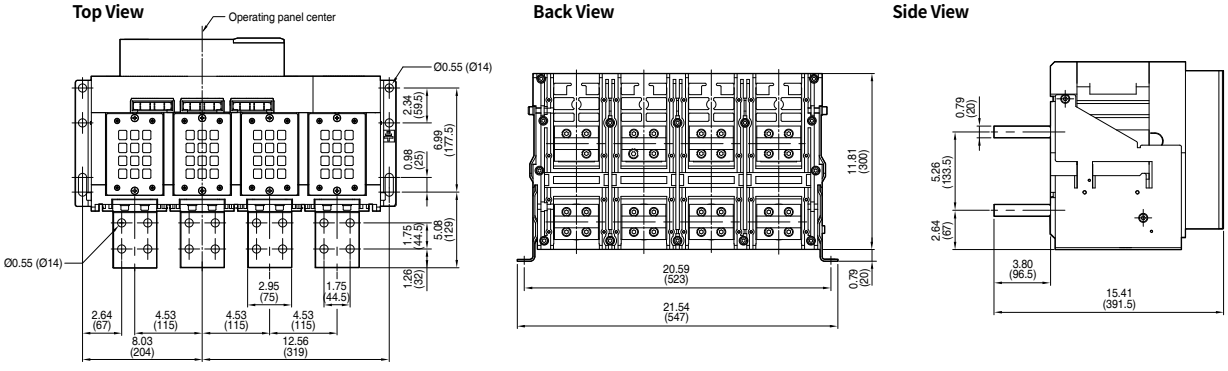
Horizontal type (3P)

[inch (mm)]



Horizontal type (4P)

[inch (mm)]

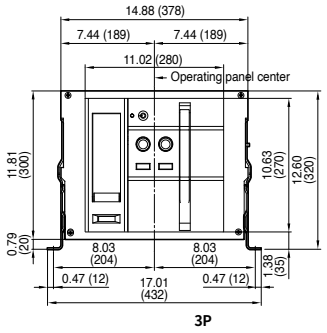


Fixed type [UAH-32E], [UAW-32E]

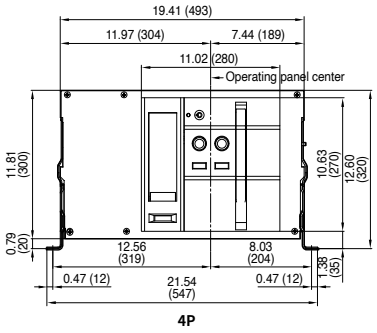
Front view (3P, 4P)

[inch (mm)]

Front View

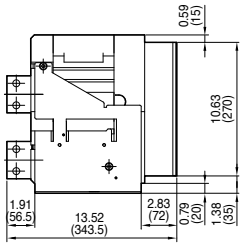


3P



4P

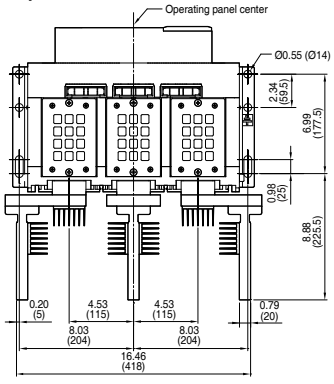
Side View



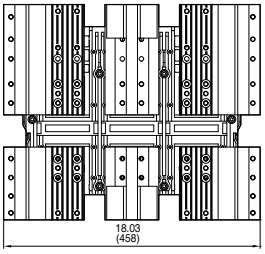
Vertical type (3P)

[inch (mm)]

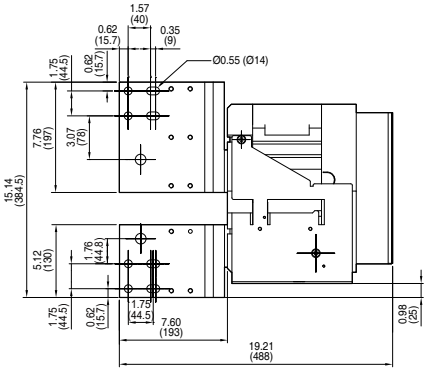
Top View



Back View



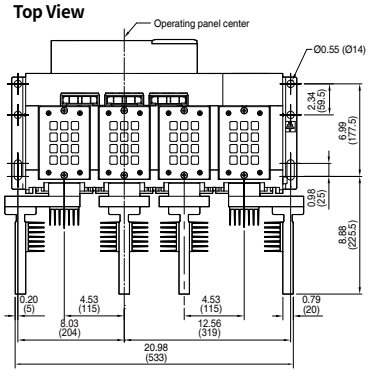
Side View



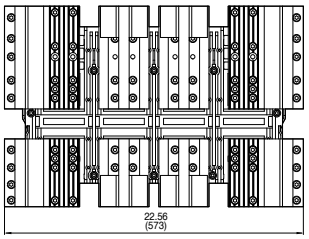
Vertical type (4P)

[inch (mm)]

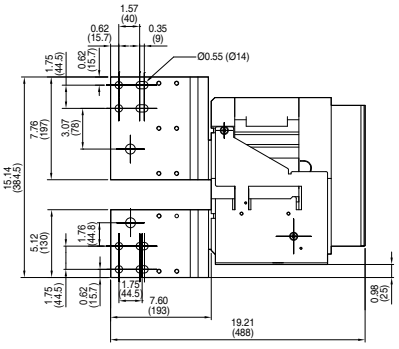
Top View



Back View



Side View



Susol UL ACB E-Frame

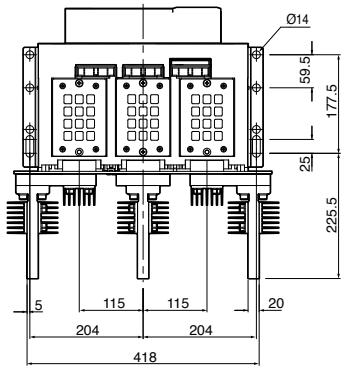
Dimensions

Fixed type [UAH-40E]

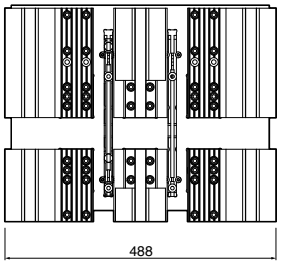
Vertical type (3P)

[inch (mm)]

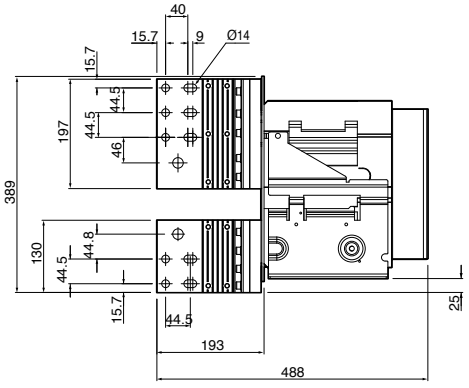
Top View



Back View



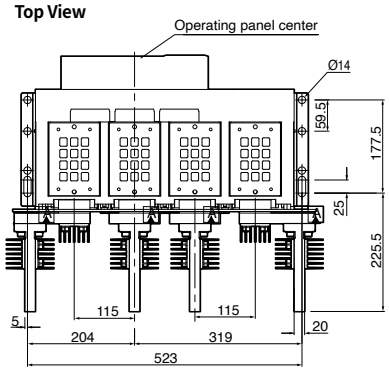
Side View



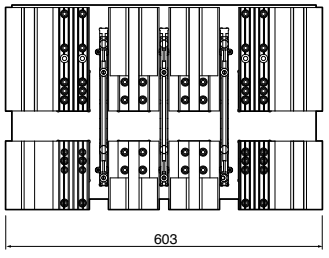
Vertical type (4P)

[inch (mm)]

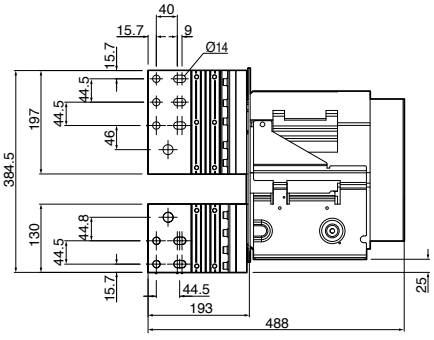
Top View



Back View



Side View

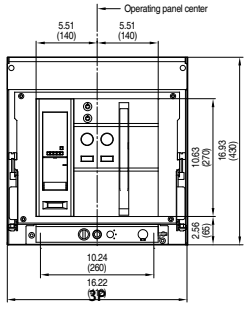


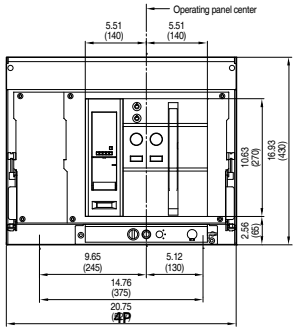
Draw-out type [UAH-08/16/20E]

Front view (3P, 4P)

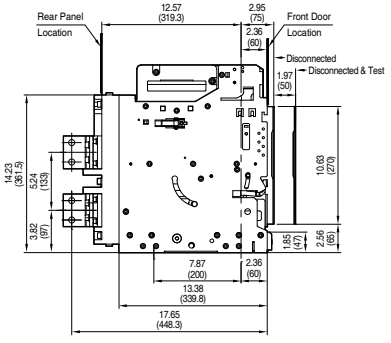
[inch (mm)]

Front View





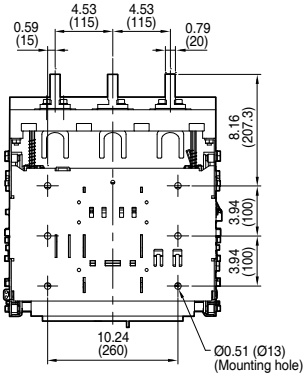
Side View



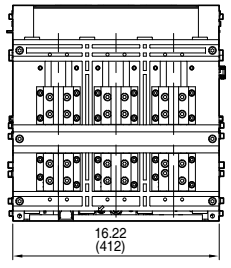
Vertical type (3P)

[inch (mm)]

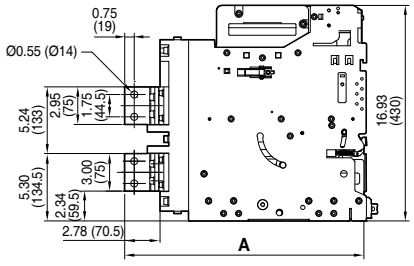
Bottom View



Back View



Side View

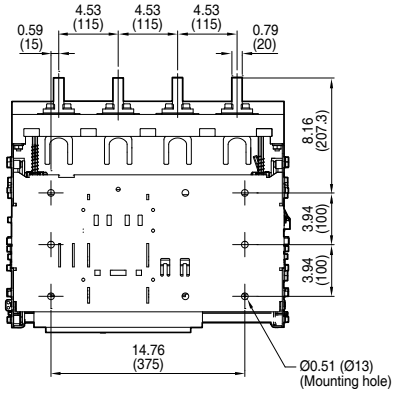


Dimension "A"		inch	mm
Vertical (3P)	Without Metering CT	18.79	477.3
	With Metering CT	19.38	492.3

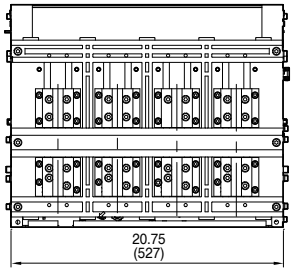
Vertical type (4P)

[inch (mm)]

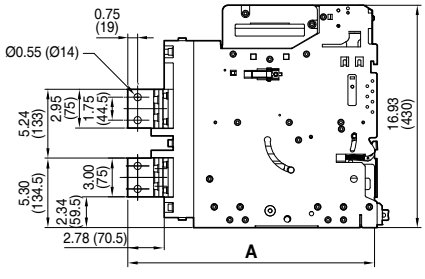
Bottom View



Back View



Side View



Dimension "A"		inch	mm
Vertical (4P)	Without Metering CT	18.79	477.3
	With Metering CT	19.38	492.3

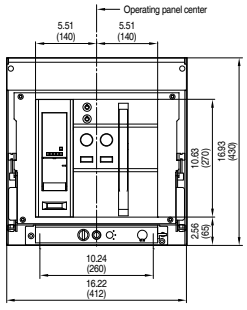
Susol UL ACB E-Frame

Dimensions

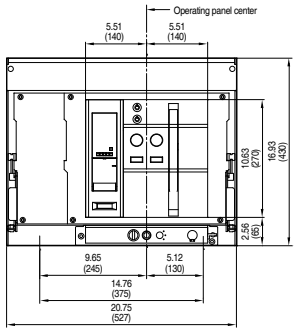
Draw-out type [UAH-08/16/20E]

Front view (3P, 4P)

[inch (mm)]



3P

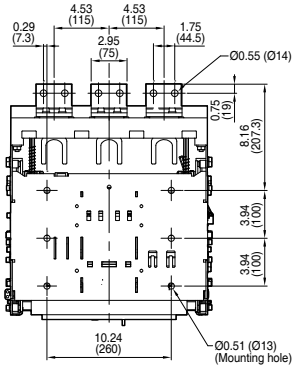


4P

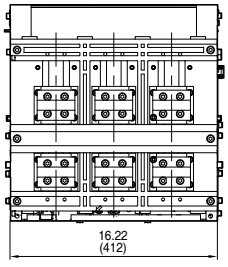
Horizontal type (3P)

[inch (mm)]

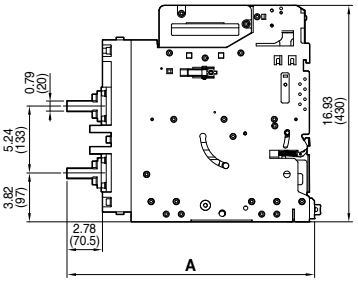
Bottom View



Back View



Side View

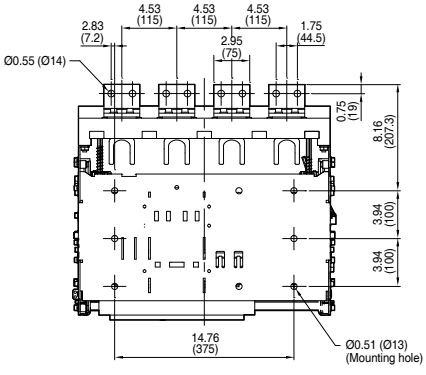


Dimension "A"		inch	mm
Horizontal (3P)	Without Metering CT	18.79	477.3
	With Metering CT	19.38	492.3

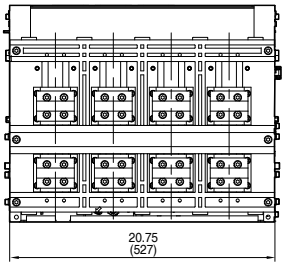
Horizontal type (4P)

[inch (mm)]

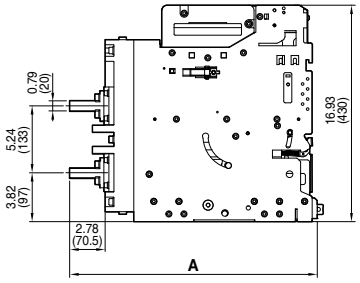
Bottom View



Back View



Side View

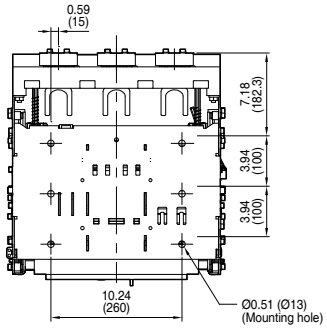


Dimension "A"		inch	mm
Horizontal (4P)	Without Metering CT	18.79	477.3
	With Metering CT	19.38	492.3

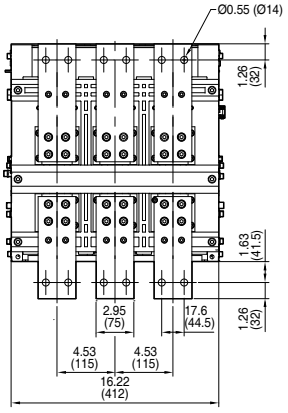
Flat connection type (3P)

[inch (mm)]

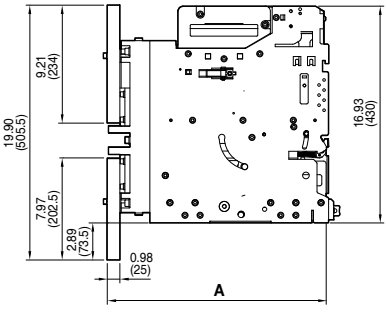
Bottom View



Back View



Side View

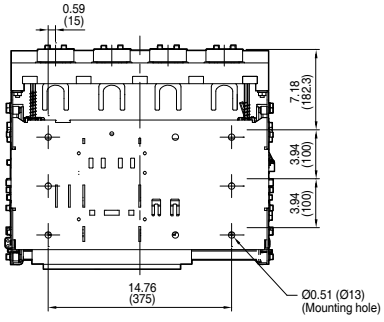


Dimension "A"		inch	mm
Flat (3P)	Without Metering CT	17.09	434.3
	With Metering CT	17.68	449.3

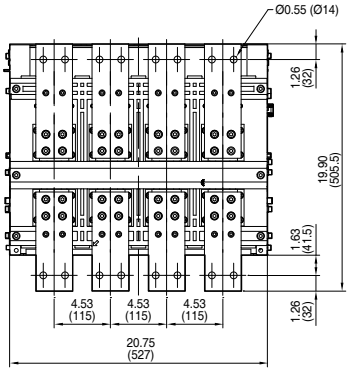
Flat connection type (4P)

[inch (mm)]

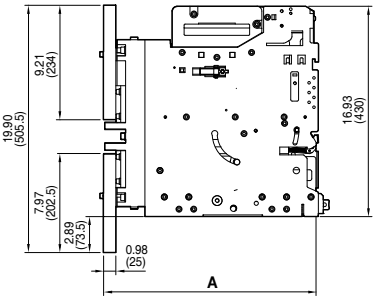
Bottom View



Back View



Side View



Dimension "A"		inch	mm
Flat (4P)	Without Metering CT	17.09	434.3
	With Metering CT	17.68	449.3

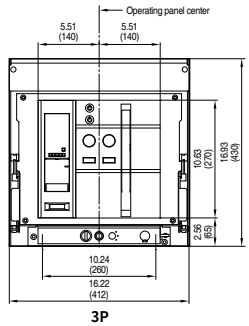
Susol UL ACB E-Frame

Dimensions

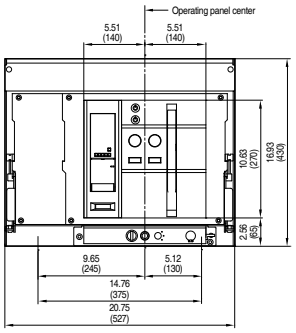
Draw-out type [UAH-25E]

Front view (3P, 4P)

[inch (mm)]

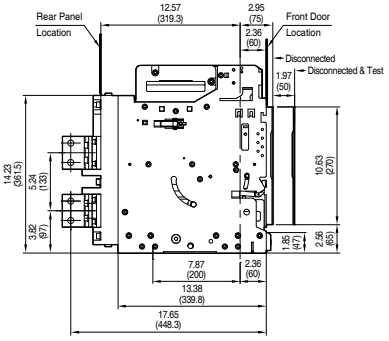


3P



4P

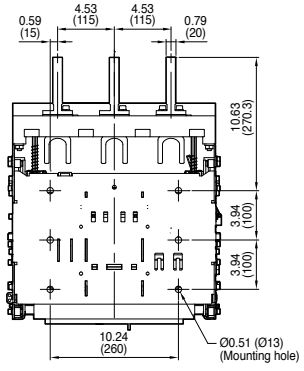
Side View



Vertical type (3P)

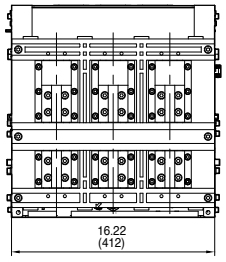
[inch (mm)]

Bottom View



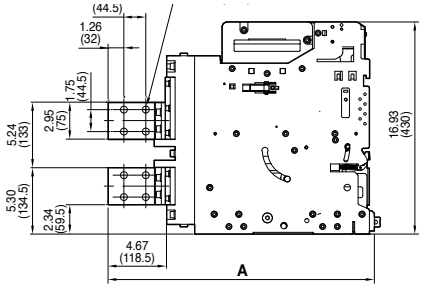
3P

Back View



3P

Side View

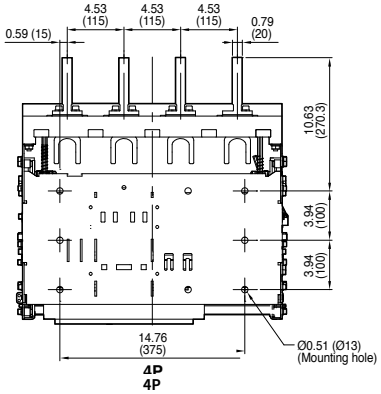


Dimension "A"		inch	mm
Vertical (3P)	Without Metering CT	20.68	525.3
	With Metering CT	21.27	540.3

Vertical type (4P)

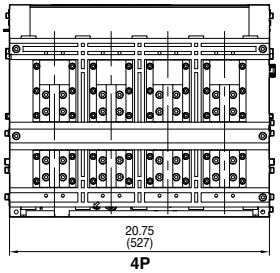
[inch (mm)]

Bottom View



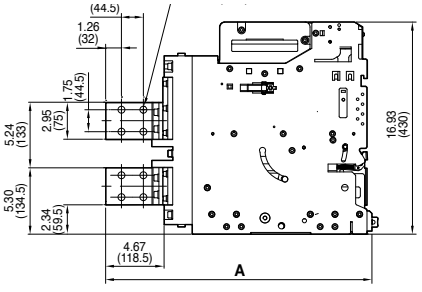
4P
4P

Back View



4P
4P

Side View

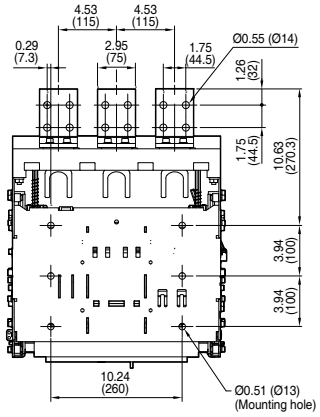


Dimension "A"		inch	mm
Vertical (4P)	Without Metering CT	20.68	525.3
	With Metering CT	21.27	540.3

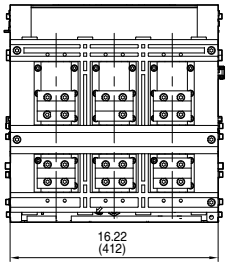
Horizontal type (3P)

[inch (mm)]

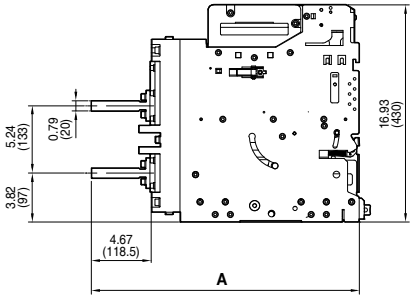
Bottom View



Back View



Side View

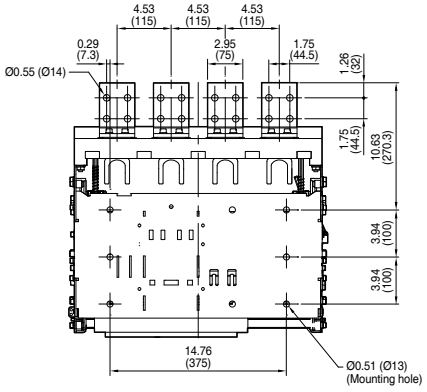


Dimension "A"		inch	mm
Horizontal (3P)	Without Metering CT	20.68	525.3
	With Metering CT	21.27	540.3

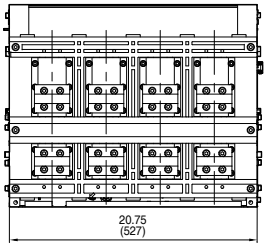
Horizontal type (4P)

[inch (mm)]

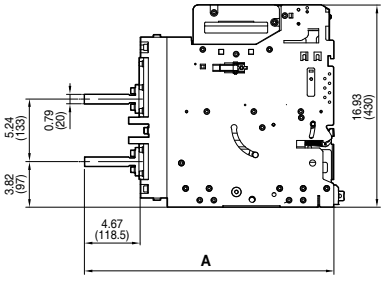
Bottom View



Back View



Side View



Dimension "A"		inch	mm
Horizontal (4P)	Without Metering CT	20.68	525.3
	With Metering CT	21.27	540.3

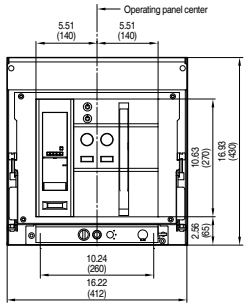
Susol UL ACB E-Frame

Dimensions

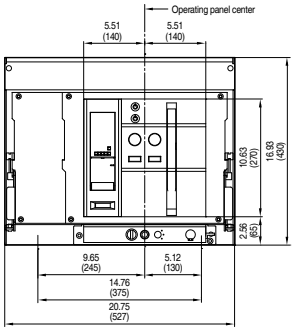
Draw-out type [UAH-32E]

Front view (3P, 4P)

[inch (mm)]

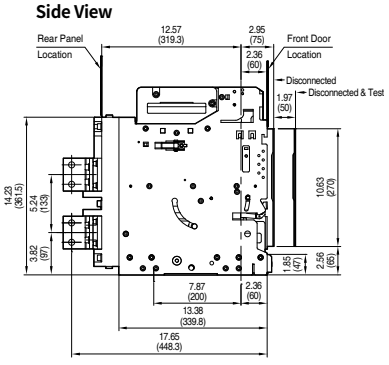


3P



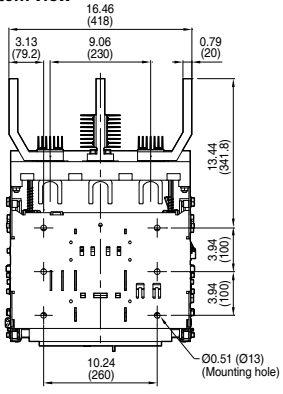
4P

Side View

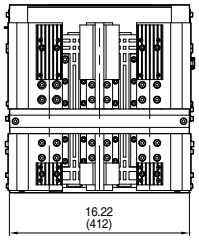


Vertical type (3P)

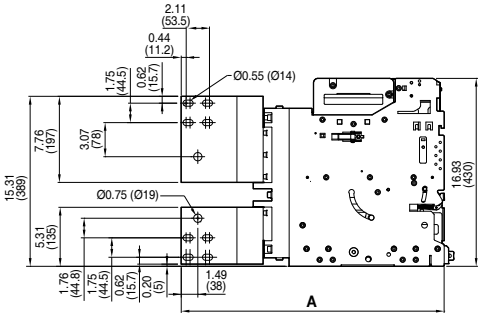
Bottom View



Back View



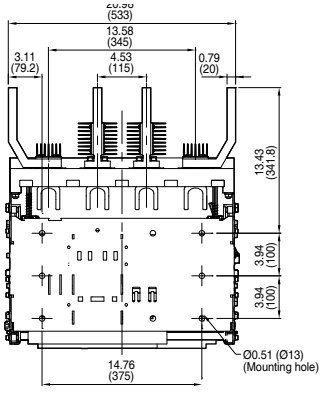
Side View



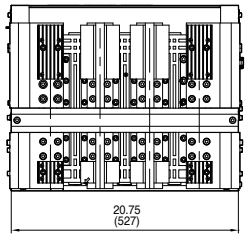
Dimension "A"		inch	mm
Vertical (3P)	Without Metering CT	23.49	596.8
	With Metering CT	24.08	611.8

Vertical type (4P)

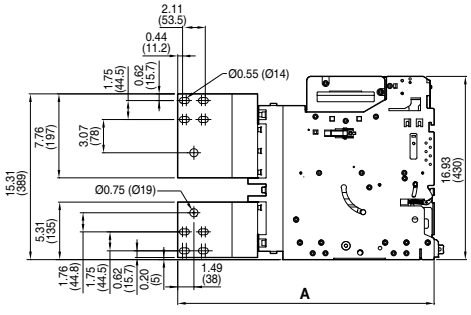
Bottom View



Back View



Side View



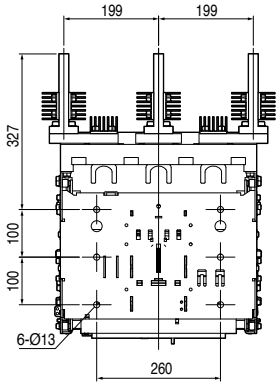
Dimension "A"		inch	mm
Vertical (4P)	Without Metering CT	23.49	596.8
	With Metering CT	24.08	611.8

Draw-out type [UAH-40E]

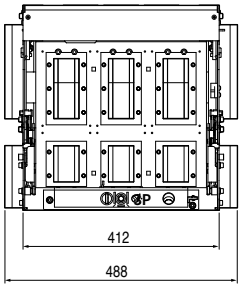
Vertical type (3P)

[inch (mm)]

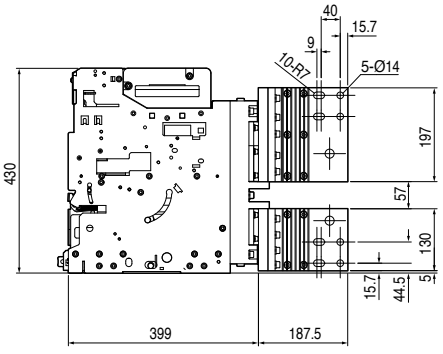
Bottom View



Back View

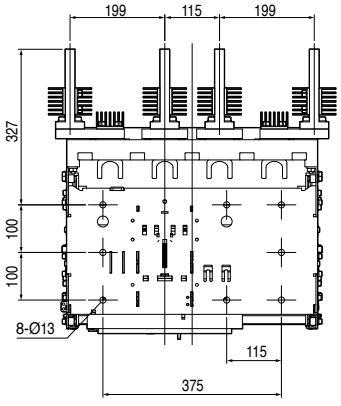


Side View

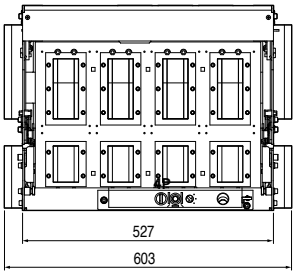


Vertical type (4P)

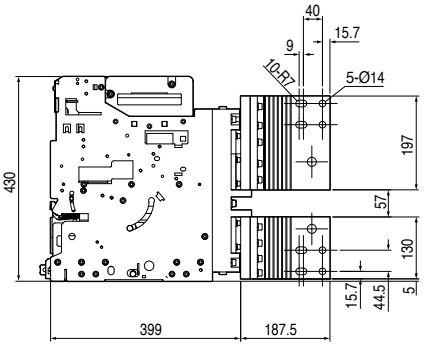
Bottom View



Back View



Side View



Memo

Beyond X™ Susol UL ACB G-Frame

Beyond X™ Susol ACB delivers high breaking capacity with minimal energy loss, making it ideal for reliable and sustainable power management in any application.

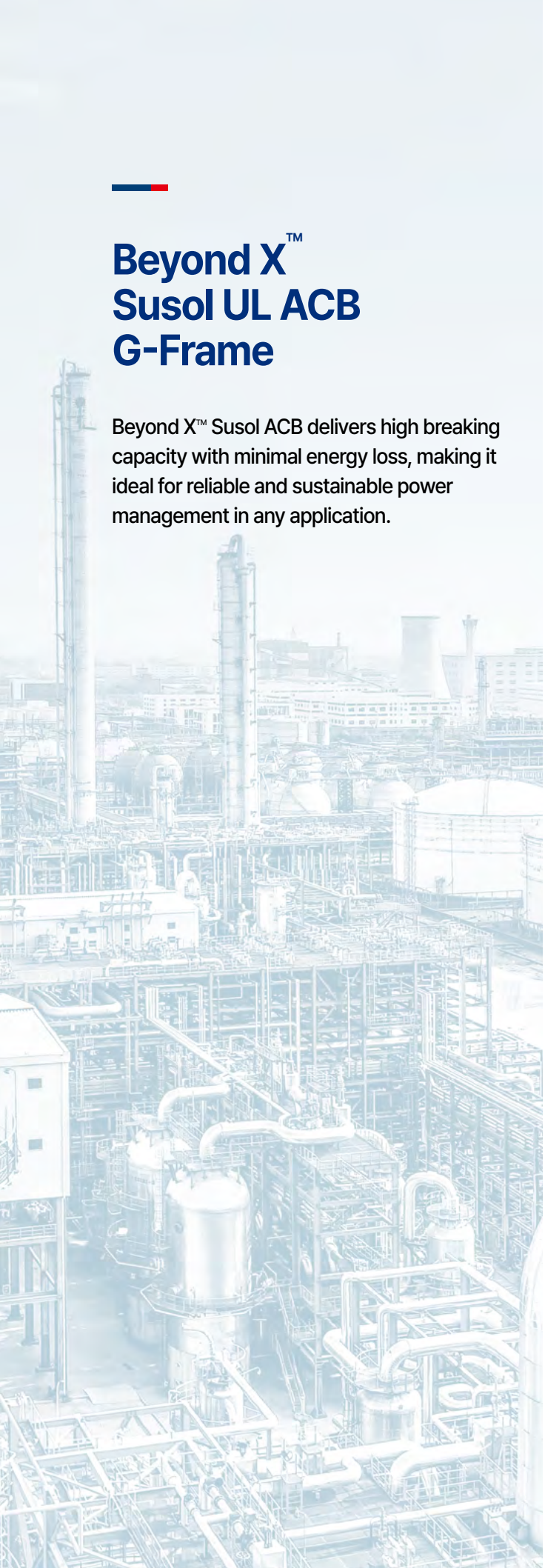


Table of Contents

Susol UL ACB G-Frame

Configuration

Main body

UAH — 60 — G — 3 — 60 — A

Air circuit breaker	
UAH	Up to 635Vac

Frame size	
32	3200AF
40	4000AF
50	5000AF
60	6000AF

Frame type and phase	
G	3P/4P Standard ABC(N)
Z	4P Reversed (N)ABC

Poles	
3	3 Poles
4	4 Poles

Rating current	
16	1600A
20	2000A
25	2500A
30	3000A
32	3200A
36	3600A
40	4000A
50	5000A
60	6000A

Mounting and terminal	
Draw-out type	
A	Draw-out
Fixed type	
H	Horizontal
V	Vertical
M	Upper - Horizontal Lower - Vertical
N	Upper - Vertical Lower - Horizontal

Switch	
UAA	Switch

Rating current	
00	None

Note 1: The applicable terminal type of UAA-60G (Z) is A (Draw-out) only.

Cradle

UAL — S60G — 3 — A — V — F — S

Type and ampere frame	
S50G	5000AF
S60G	6000AF

Poles	
3	3 Poles
4	4 Poles

Secondary connector type	
A	Connector type
B	Screw joint type
C	Spring type

Terminal configuration	
H	Horizontal
V	Vertical
M	Upper - Horizontal Lower - Vertical
N	Upper - Vertical Lower - Horizontal

Shutter	
E	Without safety shutter
F	With safety shutter

Other options	
N	Without arc cover
S	With arc cover
T [1]	With arc cover and Metering CT

Breaker				Corresponding cradle
UAH-40G	UAH-40Z	UAA-40G	UAA-40Z	S50G
UAH-50G	UAH-50Z	UAA-50G	UAA-50Z	
UAH-60G	UAH-60Z	UAA-60G	UAA-60Z	S60G

Note 1: Metering CT (T-Option) must be ordered separately.
The depth of Metering CT included cradle is longer than normal cradle. Please check Dimension page.

M1

Motor operator	
MA	None (Manual operated)
M1	AC/DC 100V~125V
M2	AC/DC 200V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M8	AC 48V

D1

Closing coil	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

D1

Shunt trip	
D0	None
D1	AC/DC 100V~125V
D2	AC/DC 200V~250V
D3	DC 125V
D4	DC 24V~30V
D5	DC 48V~60V
D7	AC 48V

HX

Charging/Auxiliary switch	
HX	High capacity OFF charge/5a5b
HC	High capacity ON charge/5a5b
GX	High capacity OFF charge/3a3b
GC	High capacity ON charge/3a3b
JC	Capacity ON charge/6a6b

NHO

Trip unit (Relay)
Please check page 84.

U1

UVT Coil	
U0	None
U1	AC/DC 100V~125V
U2	AC/DC 200V~250V
U3	DC 125V
U4	DC 24V~30V
U5	DC 48V~60V
U6	AC 380V~480V
U7	AC 48V

AL

Accessories
Please check below.

Accessory selection					
Package code					
N01	N02	N03	N04	N05	N06
	✓				
				✓	
					✓
✓			✓		
✓		✓	✓	✓	
✓			✓	✓	
	✓				
✓	✓		✓	✓	✓
		✓			
✓	✓	✓		✓	✓
		✓	✓	✓	✓
✓	✓				
	✓				

Self Selection	Accessory Codes	Description
	AL	AL1+MRB (Trip alarm contact 1+Manual reset button)
	A1	AL1+MRB+RES(AC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A2	AL1+AL2+MRB (Trip alarm contact 1&2+Manual reset button)
	A3	AL1+MRB+RES(DC110V~125V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A4	AL1+MRB+RES(AC200V~250V) (Trip alarm contact 1+Manual reset button+Remote reset switch)
	A5	AL1+MRB+Auto reset (Trip alarm contact 1+Manual reset button+Auto reset)
	A6	AL1+AL2+MRB+Auto reset (Trip alarm contact 1&2+Manual reset button+Auto reset)
	A7	AL1+MRB+RES(DC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A8	AL1+MRB+RES(AC200V~250V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	A9	AL1+MRB+RES(AC110V~125V)+Auto reset (Trip alarm contact 1+Manual reset button+Remote reset switch+Auto reset)
	Y2	AL1+AL2+MRB (2b contact)
	Y6	AL1+AL2+MRB (1a1b contact)
	Z2	AL1+AL2+MRB+Auto reset (2b contact)
	Z6	AL1+AL2+MRB+Auto reset (1a1b contact)
	S	Charge switch communication(CS2)
	B	Lockable On/Off button cover
	M	Mechanical Interlock
	D	Door interlock(DI) or MOC(Mechniasim operated cell switch
	(-V)	Without VDM module (External type VDM is required to order)
	K	Key lock
	K2	Key interlock set
	K3	Key interlock double
	K4	Key lock(Same key)
	K5	Profalux lock(CAMLOCK type)
	K6	Kirkkey lock(CAMLOCK type)
	K7	Kirkkey lock(CN-22 type)
	R	Ready to close switch
	T	Temperature monitoring
	E	Spring auto release
	H1	Double shunt coil(AC/DC100V~125V)
	H2	Double shunt coil(AC/DC200V~250V)
	H3	Double shunt coil(DC125V)
	H4	Double shunt coil(DC24V~30V)
	H5	Double shunt coil(DC48V~60V)
	H7	Double shunt coil(AC48V)

* The Counter option is automatically applied.

Susol UL ACB G-Frame

Configuration

Trip Unit

N — **H** — **0**

Trip Relay Type

N

000	Trip Relay N/A
N	Normal

Communication and protection

H

H	L, S, I, G

Control voltage and frequency

0

	Frequency used	Control power voltage	Comm.
0	60Hz	Self-Power Note 1	NFC
5	50Hz	Self-Power Note 1	NFC

A — **H** — **0**

A	Ammeter

H

H	L, S, I, G
D	L, S, I, G + Comm.
Y	L, S, I, Gext + Ground wire CT + Comm.
O **	L, S, I, G + Neutral CT + Comm.

* L, S, I: Long time delay trip, Short time delay trip, Instantaneous trip
* G: Ground fault (Residual earth fault protection)
* Ground fault system by vector sum
* Communication and output contacts DO NOT work under self-power condition
* Gext + Ground wire CT: Source return Type
* Customers must purchase their own Ground wire CT (Secondary output: 5A, accuracy 1%)
** AO provides the function to detect and protect the ground fault current by applying the NCT (Neutral CT) in the neutral wire when 3-pole circuit breaker is used in 3-phase 4-wire system.
* Customers must purchase their own Neutral CT (Primary output: same as ACB's Rated Current / Secondary output: 5A, accuracy 1%)

0

	Frequency used	Control power voltage	Comm.
0	60Hz	Self-Power	N/A
1	60Hz	AC/DC 100V~250V	N/A
2	60Hz	DC 24V~48V	N/A
5	50Hz	Self-Power	N/A
6	50Hz	AC/DC 100V~250V	N/A
7	50Hz	DC 24V~48V	N/A

Note 1: The Self-Power function is to receive power from the main circuit inside the circuit breaker without external power to the STU Communication. ZSI, Remote Reset and DO functions are not available and EVENT is not logged when using Self - Power only.

P — **S** — **1**

Trip unit type
P Power meter

S

Relay function / Commutation (MODBUS)
S L, S, I, G + PTA
Y L, S, I, Gext + Ground wire CT
O L, S, I, G + Neutral CT

1

	Frequency	Control power voltage	Communication
1	60Hz	AC/DC 100V~250V	N/A
2	60Hz	DC 24V~48V	N/A
3	60Hz	AC/DC 100V~250V	Bluetooth
4	60Hz	DC 24V~48V	Bluetooth
6	50Hz	AC/DC 100V~250V	N/A
7	50Hz	DC 24V~48V	N/A
8	50Hz	AC/DC 100V~250V	Bluetooth
9	50Hz	DC 24V~48V	Bluetooth

S — **S** — **1**

Trip unit type
S Supreme meter

S

Relay function / Commutation (MODBUS)
S L, S, I, G + PTA
Y L, S, I, Gext + Ground wire CT
O L, S, I, G + Neutral CT

1

	Frequency	Control power voltage	Communication
1	60Hz	AC/DC 100V~250V	Bluetooth, NFC
2	60Hz	DC 24V~48V	Bluetooth, NFC
6	50Hz	AC/DC 100V~250V	Bluetooth, NFC
7	50Hz	DC 24V~48V	Bluetooth, NFC

* Self-power is automatic power supply to the Trip Unit without additional control power
* L, S, I: Long time delay trip, Short time delay trip, Instantaneous trip
* G: Ground fault (Residual earth fault protection)
* Gext + Ground wire CT: Source return type
* PTA: Pre-trip alarm function
* Customers must purchase their own Ground wire CT (Secondary output: 5A, accuracy 1%)
* Customers must purchase their own Neutral CT (Primary output: same as ACB's Rated Current / Secondary output: 5A, accuracy 1%)
* The STU acceptable voltage range is 100 to 250V
* If you want an external VDM, please insert '(-V)' at the end of the full order

Item	Description	Features	Notes
72313460708	TOTAL ASS'Y,VDM(Shield Cable), EXTERNAL, STU	Accessory	Separate purchase

* To apply external VDM separately, order the code above.

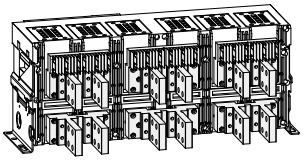
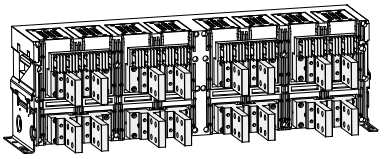
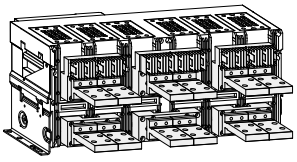
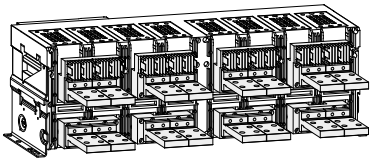
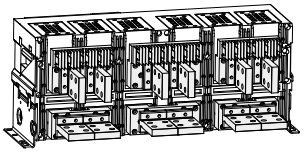
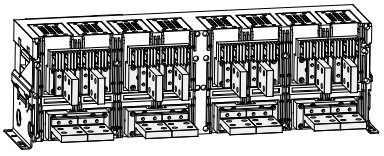
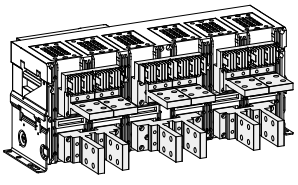
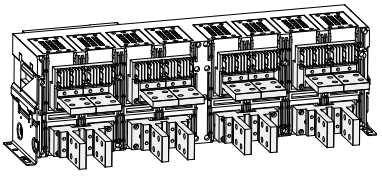
Rating

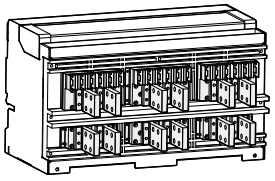
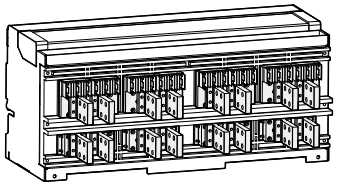
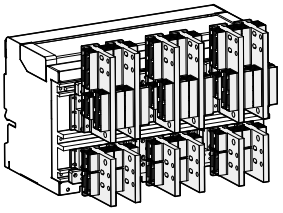
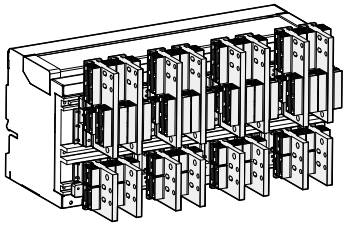
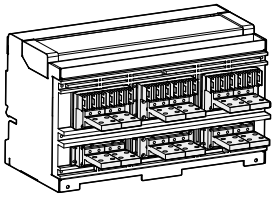
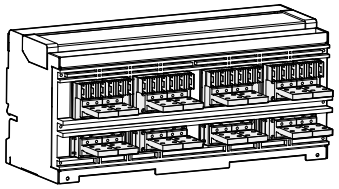
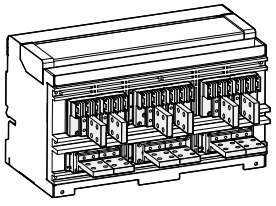
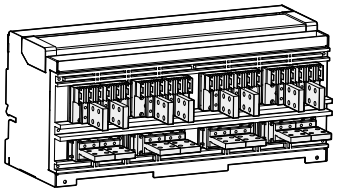
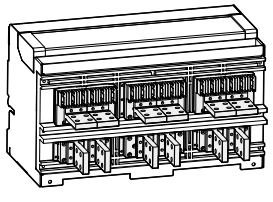
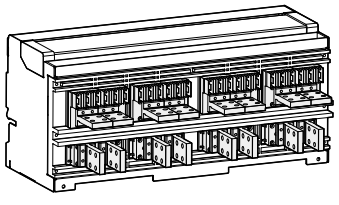
Type					Susol			
Ampere Frame (AF)					UAH-□□G / UAA-□□G			
Rated current (CT Ration)	(A)			at 40°C	32	40	50	60
Rated current (Available Rating plug)	(V)			at 40°C	3200	4000	5000	6000
					1600	2000	2500	3000
					2000	2500	3000	3200
					2500	3000	3200	3600
					3000	3200	3600	4000
					3200	3600	4000	5000
						4000	5000	6000
Rated maximum voltage	(V)				254/ 508/ 635			
Frequency	(Hz)				UAH: 50/60			
Number of poles	(P)				3/4			
Type of trip relay (Electronic trip device)					N, A, P, S (4 type)			
Rated short circuit current (Sym.) (Duty: O-15s-CO)	(kA)	With instantaneous	AC	847V(60Hz)	-			
				635V	100			
				508V	130			
				254V	130			
		Without instantaneous	AC	847V(60Hz)	-			
				635V	100			
				508V	100			
				254V	100			
Rated making current (X/R=more than 6.6)	(kA peak)	With instantaneous	AC	847V(60Hz)	-			
				635V	230			
				508V	299			
				254V	299			
		Without instantaneous	AC	847V(60Hz)	-			
				635V	230			
				508V	230			
				254V	230			
Rated short time current	(kA)		AC		100			
Operating time (t)	(ms)	Breaking time			Less than 30ms			
		Opening time			Less than 50ms			
		Closing time			Less than 90ms			
		Charging time			Less than 5 sec.			
Endurance Rating C/O Cycles) (Without maintenance)	(Cycles)	Mechanical (60 times per hour)			10,000			
		Electrical (30 times per hour)			1,000			
Weight (Includes charging motor)	lb (kg)	Drawout type	Main Body with Cradle	3P	489 (222)			
				4P	626 (284)			
			Only Cradle	3P	276 (125)			
				4P	355 (161)			
		Fixed type		3P	227 (127)			
				4P	287 (130)			
External dimensions	Draw-out type	inch (mm)	H×W×D	3P	18.11×30.91×16.02 (460×785×407)			
				4P	18.11×39.96×16.02 (460×1015×407)			
	Fixed type	inch (mm)	H×W×D	3P	11.81×29.57×11.61 (300×751×295)			
				4P	11.81×38.62×11.61 (300×981×295)			
Enclosure dimensions		inch (mm)	H×W×D	3P	31.50×32.48×13.39 (800×825×340)			
				4P	31.50×41.54×13.39 (800×1055×340)			
Operating Temperature					-4°F ~ +140°F (-20°C ~ +60°C)			
Standards					UL 1066 / ANSI C37.13			

Susol UL ACB G-Frame

Multiple connections

Fixed type

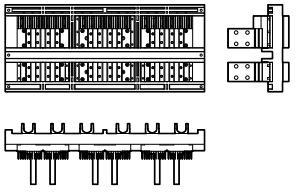
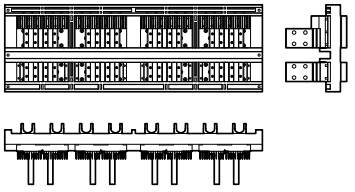
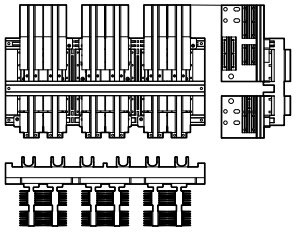
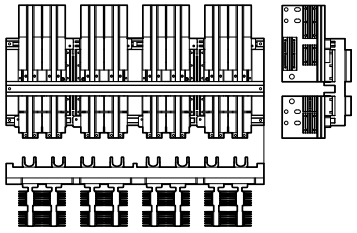
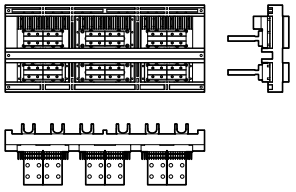
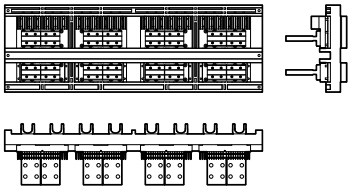
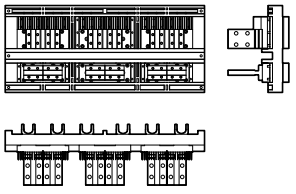
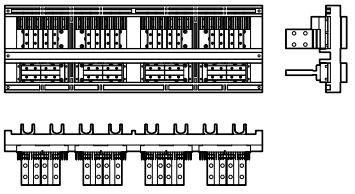
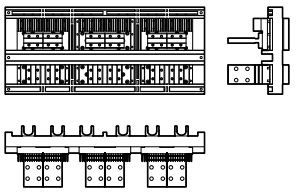
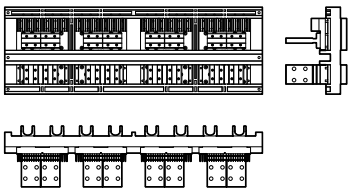
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
G	Vertical (V)	3200 to 5000A		
	Horizontal (H)			
	Vertical/ Horizontal (N)			
	Horizontal/ Vertical (M)			

Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
G	Vertical (V)	3200 to 5000A		
		6000A		
	Horizontal (H)	3200 to 5000A		
	Vertical/ Horizontal (N)			
	Horizontal/ Vertical (M)			

Susol UL ACB G-Frame

Multiple connections

Connector view

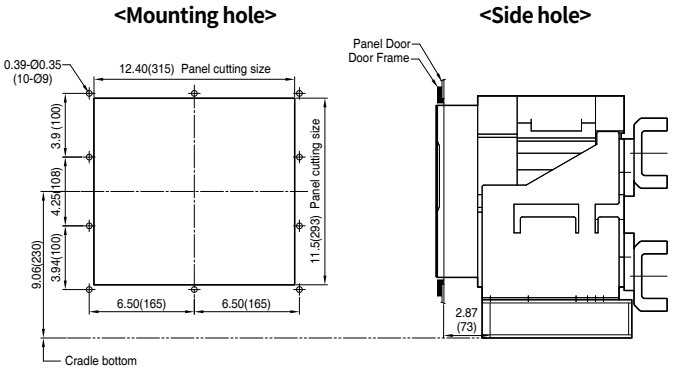
Frame	Connector Type	Ampere Rating	3P Layout	4P Layout
G	Vertical (V)	3200 to 5000A		
		6000A		
	Horizontal (H)	3200 to 5000A		
	Vertical/ Horizontal (N)			
	Horizontal/ Vertical (M)			

Enclosure Size

Number of Poles	ACB Rating		Enclosure Dimensions		Ventilation Area	
	Rated Current	Ampere Frame	(W×H×D)		Top	
			inch	mm	inch²	mm²
3P	6000A and below, UL 1066 (ANSI C37.50)	G	32.48×31.42×13.98	825×798×355	60.48	39018
4P	6000A and below, UL 1066 (ANSI C37.50)	G	41.54×31.42×13.98	1055×798×355	80.35	51839

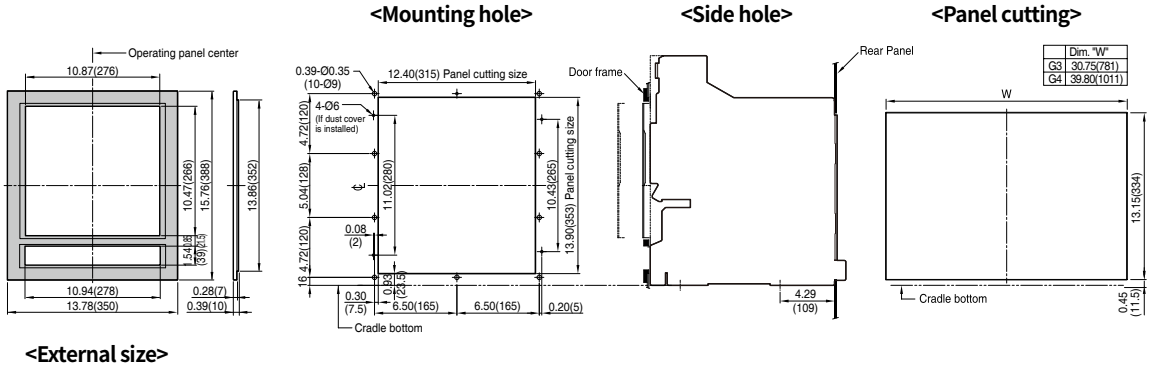
Door Frame (Fixed type)

[inch (mm)]



Door Frame (Draw-out type)

[inch (mm)]



<External size>

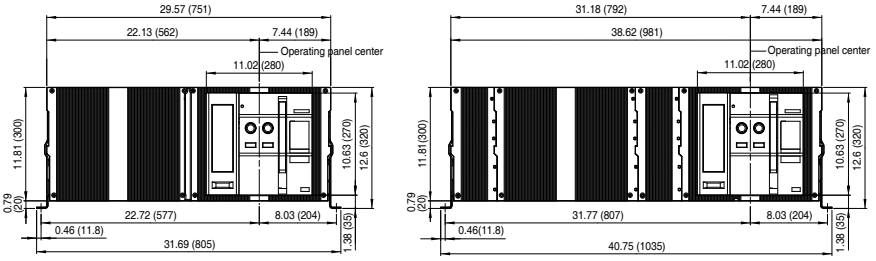
Susol UL ACB G-Frame

Dimensions

Fixed type [UAH-32/40/50G]

Front view

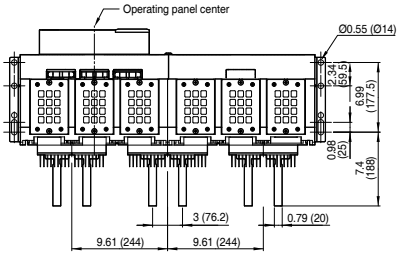
[inch (mm)]



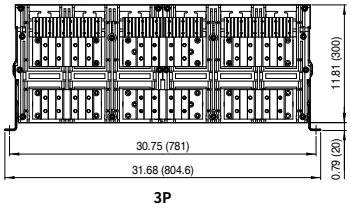
Vertical type (3P)

[inch (mm)]

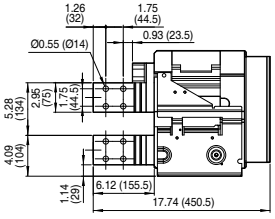
Top View



Back View



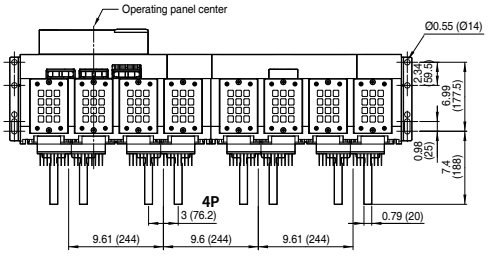
Side View



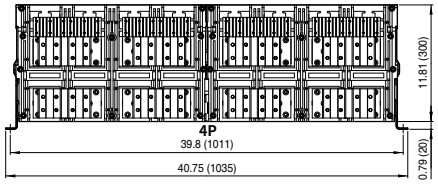
Vertical type (4P)

[inch (mm)]

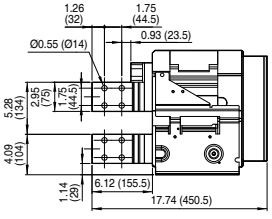
Top View



Back View



Side View

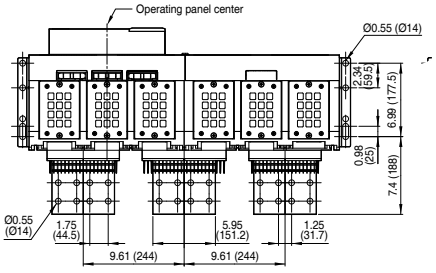


Fixed type [UAH-32/40/50G]

Horizontal type (3P)

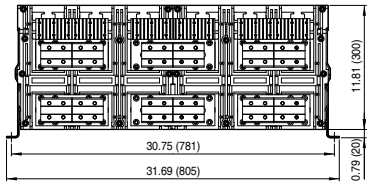
[inch (mm)]

Top View



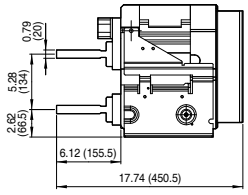
3P

Back View



3P

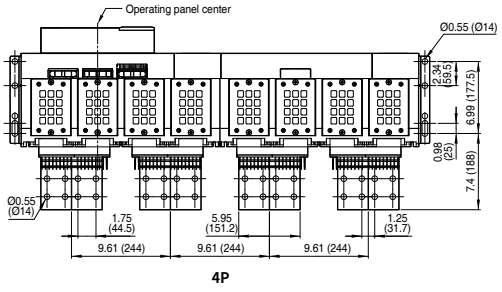
Side View



Horizontal type (4P)

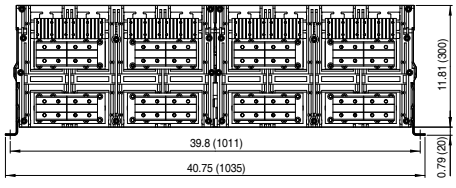
[inch (mm)]

Top View



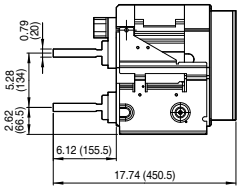
4P

Back View



4P

Side View



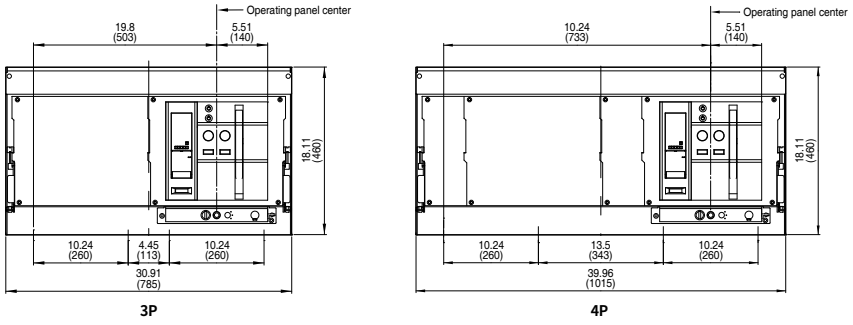
Susol UL ACB G-Frame

Dimensions

Draw-out type [UAH-32/40/50G]

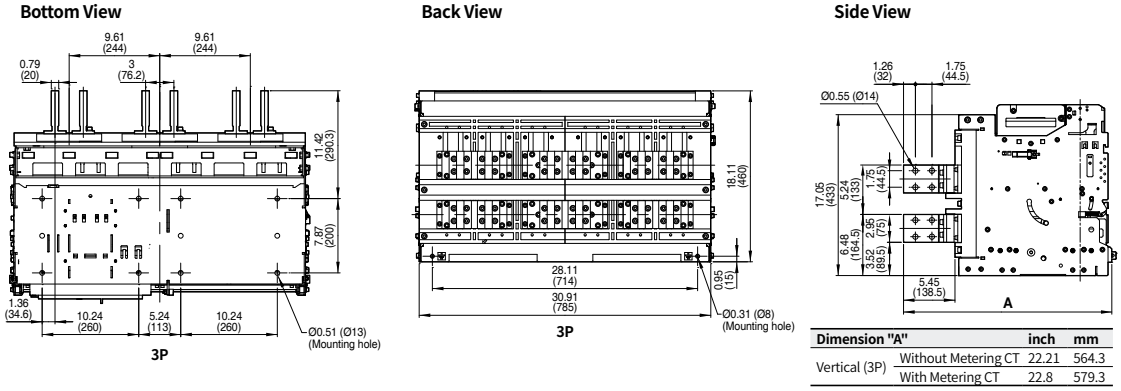
Front view

[inch (mm)]



Vertical type (3P)

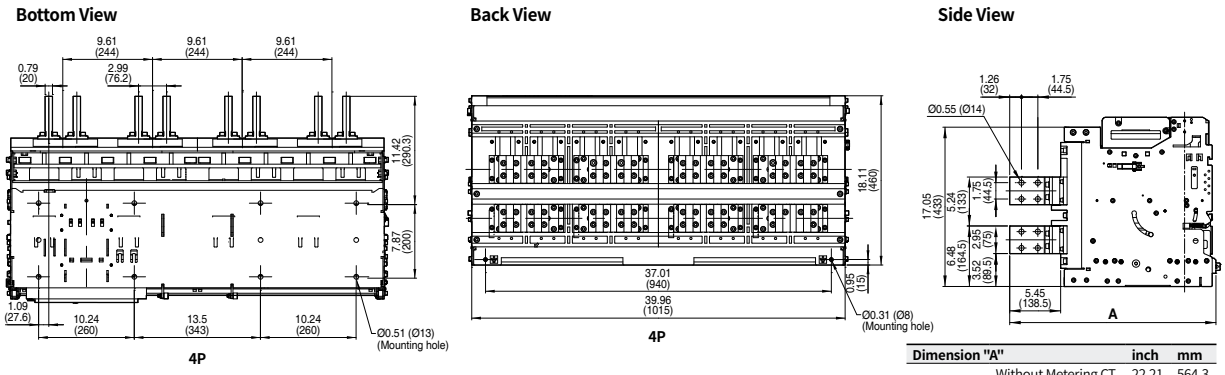
[inch (mm)]



Dimension "A"		inch	mm
Vertical (3P)	Without Metering CT	22.21	564.3
	With Metering CT	22.8	579.3

Vertical type (4P)

[inch (mm)]



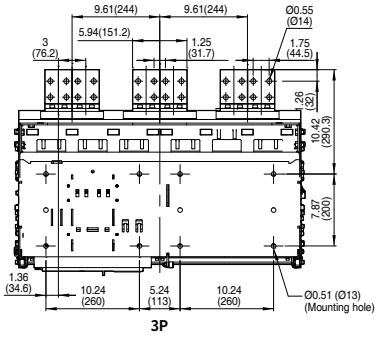
Dimension "A"		inch	mm
Vertical (4P)	Without Metering CT	22.21	564.3
	With Metering CT	22.8	579.3

Draw-out type [UAH-32/40/50G]

Horizontal type (3P)

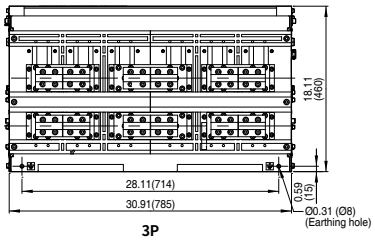
[inch (mm)]

Bottom View



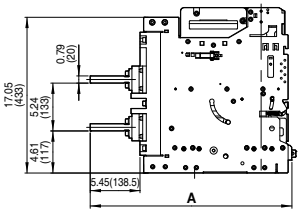
3P

Back View



3P

Side View

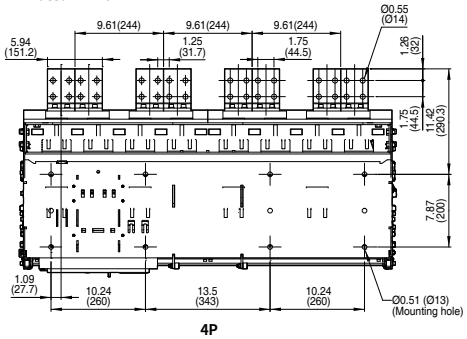


Dimension "A"		inch	mm
Horizontal (3P)	Without Metering CT	22.21	564.3
	With Metering CT	22.8	579.3

Horizontal type (4P)

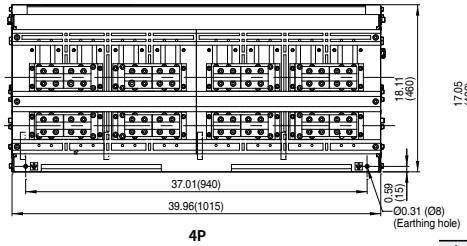
[inch (mm)]

Bottom View



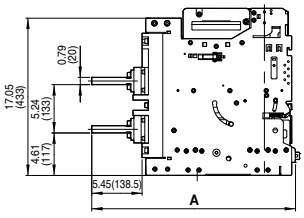
4P

Back View



4P

Side View



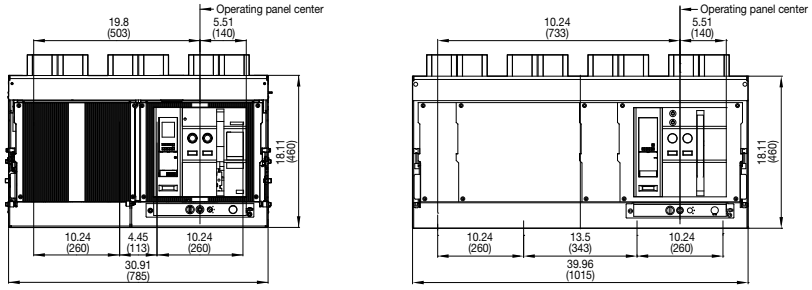
Dimension "A"		inch	mm
Horizontal (4P)	Without Metering CT	22.21	564.3
	With Metering CT	22.8	579.3

Dimensions

Draw-out type [UAH-60G]

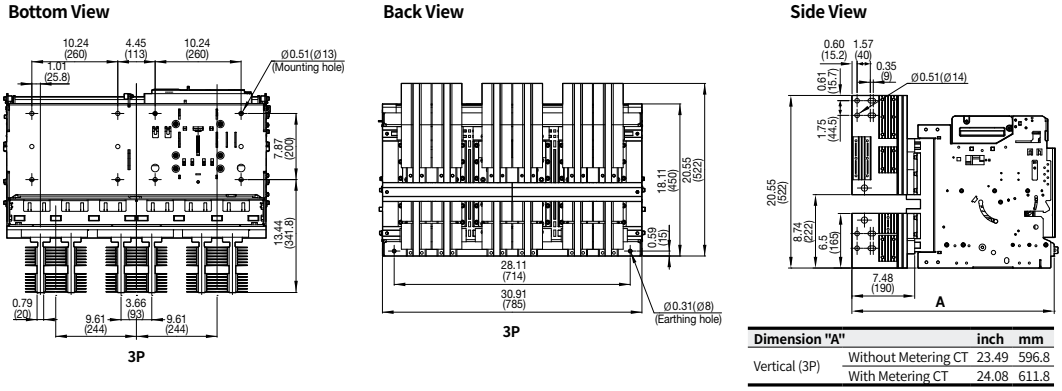
Front view

[inch (mm)]



Vertical type (3P)

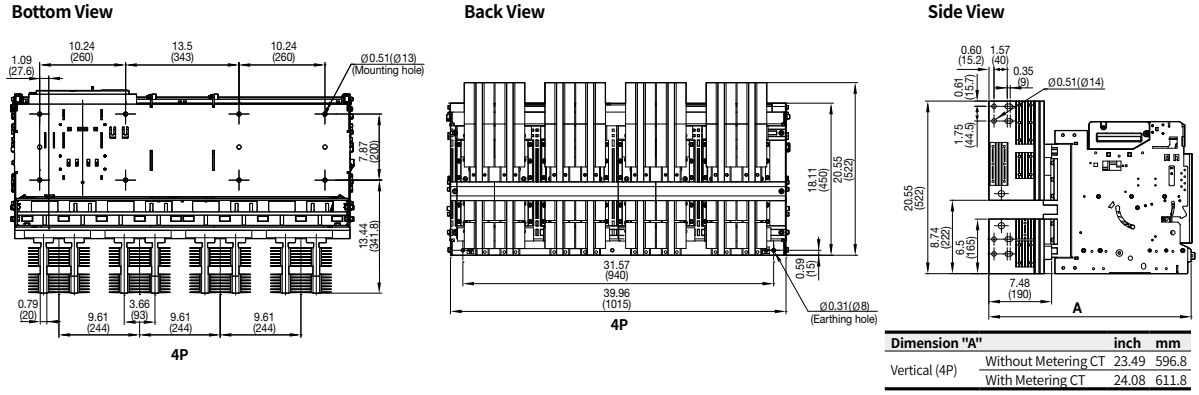
[inch (mm)]



Dimension "A"		inch	mm
Vertical (3P)	Without Metering CT	23.49	596.8
	With Metering CT	24.08	611.8

Vertical type (4P)

[inch (mm)]



Dimension "A"		inch	mm
Vertical (4P)	Without Metering CT	23.49	596.8
	With Metering CT	24.08	611.8

Smart trip unit

Designed with advanced electronic trip units, it offers precise, intelligent monitoring and seamless integration with modern energy management systems

Table of Contents

Smart trip unit

Introduction

The Smart Trip Unit represents a leap forward in the management, protection, and monitoring of electrical systems. Designed to work with LS ELECTRIC Air Circuit Breakers (ACBs), the Smart Trip Unit ensures superior operation across a broad spectrum of applications. This innovative device combines advanced measurement capabilities equivalent to those of a power meter, achieving Energy Class 1 accuracy, thereby addressing the critical challenge of energy management for contemporary and future generations.

Key to the smart trip unit's appeal is its advanced diagnostic and maintenance support, which not only promotes uninterrupted service continuity but also prolongs equipment longevity. This is crucial for our customers who prioritize reliability and efficiency in their electrical installations. Protection enhancements are core components of the Smart Trip Unit, featuring dual settings and supplementary features that elevate low-voltage protection systems' performance and flexibility.

Communication lies at the heart of the Smart Trip Unit's functionality, integrating multiple channels including Ethernet, Modbus, and wireless options to ensure comprehensive access to information processed by the Protection Control Unit. This facilitates both local and remote operations for control, monitoring, energy efficiency, and asset management, underscoring the Smart Trip Unit's role in advancing smart energy solutions.

Moreover, the Smart Trip Unit introduces additional protection features, such as LSIGV protections with enhanced functionalities designed for challenging scenarios, including low short-circuit currents and the need to manage thermal constraints on equipment. This device measures all crucial electrical parameters, supports real-time waveform capture, and performs energy measurement per phase, ensuring thorough monitoring and management of electrical networks.

Through its embedded user interface and device connections, the Smart Trip Unit's comprehensive information is readily accessible, providing a user-friendly interface for efficient system management. Its design incorporates robust resistance to disturbances, and with the support of an extensive selection of accessories, the Smart Trip Unit enhances control and monitoring functions for high reliability.

Overview

All LS ELECTRIC ACBs equipped with the Smart Trip Unit demonstrate our commitment to innovation and excellence in electrical system management. With the Smart Trip Unit, entities can anticipate enhanced operational efficiency, reliability, and safety in their electrical infrastructure, marking a significant advancement in smart energy management technologies.

Core functions of the smart trip unit

- **Measurement:** Accurate capture of electrical parameters (such as current, voltage and power) and real-time waveform capture.
- **Protection:** Long-time overload protection, short-time short-circuit protection, instantaneous protection, and earth fault protection.
- **Maintenance and Diagnostics:** Features for predictive and preventive maintenance, diagnostics to facilitate quick power restoration, and alarms for operational alerts.
- **Communication:** Options for local and remote access, including Ethernet, Modbus, Bluetooth, and NFC as well as integration with a dedicated mobile app.

Advanced features and settings

- **Supplementary protection features:** Additional functionalities for enhanced system protection in complex scenarios, such as Zone Selective Interlocking (ZSI) and dual settings for flexibility.
- **User interface:** Accessibility of information through embedded interface, smartphones, and PCs; configuration and status checking capabilities.

Model variations and customization

Smart Trip Units by LS ELECTRIC are designed to address the diverse requirements of electrical system management. The products are available in a range of models: Types N, A, P, and S type, offering varying levels of protection and functionality. This selection enables the customization of electrical systems to specific needs, from basic protection to advanced system monitoring and diagnostics.

- **N type :** Offers basic protection features and is suitable for general applications where sophisticated functions and advanced communication protocols are not required. It includes:

  - Basic measurement and protection functionality.
  - NFC communication for checking the last fault waveform via an app.
  - Manual controls for setting adjustments and system resets.
  - LED status displays and an interface for physical connections to computers or other devices.

- **A type :** Steps up from Type N with additional capabilities, aimed at systems that need more than just the fundamental protection features, such as systems where coordination between different protective devices is crucial. It includes:

  - A button-operated LCD for system control and measurement.
  - External control power options for enhanced communication and output capabilities.
  - Storage for current measurements and fault events.
  - Additional functionalities like ZSI for selective interlocking and ERMS for enhanced restarting.

- **P type :** Brings enhanced functionality and control options for more demanding settings. It includes:

  - Real-time waveform measurements, which could be critical for analyzing system performance and troubleshooting.
  - Data verification via Bluetooth, allowing for wireless connectivity and app-based interaction.
  - A 3.5-inch touch LCD screen for advanced control and information display, indicating a user-friendly interface for complex operations.

- **S type :** The most comprehensive unit, equipped with full-scale system monitoring, diagnostics, and the widest array of protective features. This type is ideal for critical applications where maximum protection and detailed system analytics are necessary. It includes:

  - Support for two relay setting groups, facilitating flexibility in system configuration and response.
  - Both Bluetooth and NFC communications, offering multiple wireless connectivity options.

The Smart Trip Unit series comes in a variety of types, each tailored to meet specific operational needs, ensuring you can find the perfect fit for any set of conditions with ease.

Smart trip unit

Overview

Trip relay types

		N-Type	A-Type	P-Type	S-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	• P type Current relay • S(V)2
Voltage relay		-	-	• UV1, OV1, RV, VU	• P type Voltage relay • UV2, OV2
Frequency relay		-	-	• UF1, OF1, ROCOF	• P type Frequency relay • UF2, OF2
Power relay		-	-	• RP, RQ1, OP, OQ, UP	• P type Power relay • RP, RQ1, RQ2
Group control		-	-	-	• A,B (Control by DI and communication)
Relay fine tuning		-	-	• Possible (Adjust knob and freely set operating value current)	• Possible (Freely set operating value current)
ERMS		-	• Control by DI and Communication	• 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)	• 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	• 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)	• 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)	• Saves 127 incident events • Saves 6 incident waveforms (for Self Power operation, incident waveform is not saved)

		N-Type	A-Type	P-Type	S-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) • Vector Sum zero sequence Current • 3 phase voltage, line - to - line voltage • Frequency • External CT current • Voltage/Current phase (Based on the phase A) • Total/Each phase power (P, Q, S) • Total/Each phase power factor • Positive/Negative, Effective/ Reactive/Apparent energy • Vector sum zero sequence voltage • Vector sum zero sequence current • Positive, Negative sequence voltage • Positive, Negative sequence current • Voltage imbalance rate • Current imbalance rate • Previous current demand for each phase • Previous apparent, reactive and active power demand	• Current(A/B/C/N) • Vector Sum zero sequence Current • 3 phase voltage, line - to - line voltage • Frequency • External CT current • Voltage/Current phase (Based on the phase A) • Total/Each phase power (P, Q, S) • Total/Each phase power factor • Positive/Negative, Effective/ Reactive/Apparent energy • Vector sum zero sequence voltage • Vector sum zero sequence current • Positive, Negative sequence voltage • Positive, Negative sequence current • Voltage imbalance rate • Current imbalance rate • Previous current demand for each phase • Previous apparent, reactive and active power demand
Accuracy degree of measur-ement	Current	-	• 0.5%	• 0.5%	• 0.5%
	Voltage	-	-	• 0.5%	• 0.5%
	Power	-	-	• Class 1 (IEC 62053 - 21, 22)	• Class 1 (IEC 62053 - 21, 22)
	Frequency	• 50Hz or 60Hz	• 50Hz or 60Hz	• 0.1% (10 ~ 200Hz)	• 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	• 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	• 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	• Using USB/RS485 communication • Using LCD screen

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

Smart trip unit

Overview

Trip relay types

		N-Type	A-Type	P-Type	S-Type
Communication		• NFC (Near Field communication)	• USB (For site operator) • RS485/Modbus (Communication type Only))	• USB (For site operator) • RS485/Modbus • BLE (Bluetooth, Option)	• USB (For site operator) • RS485/Modbus • BLE(Bluetooth) • NFC (Near Field communication)
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	• 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)	• 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)	• RTC embedded (Back up with battery)
Other LED		• Run, Alarm, Self diagnosis	• Run, Alarm, Self diagnosis, Communication	• Run, Alarm, Self diagnosis, Communication	• Run, Alarm, Self diagnosis, Communication
Operating button		• Reset button	• Reset/Menu/Tap/Up, Down/ Enter	• Reset button • LCD Touch	• 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)	• RUN/AL LED blinking (Red ↔ Blue blinking)
	LCD	-	• Displays relevant Segment or error number at LCD	• Can check at self diagnosis screen on 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 degrees (N/A type) or 115 degrees (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			

Memo

Smart trip unit

N-type

Features

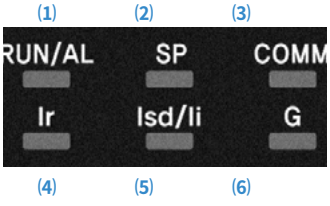
- Basic functionality with built-in measurement and protection capabilities.
- Does not include Modbus communication.
- Ideal for simple applications where basic protection and monitoring are required.
- It provides NFC communication functionality, allowing you to check the last fault waveform via a dedicated smartphone app.

Product appearance and structure

N-type Smart Trip Unit : general overview

❶	**NFC antenna**	Allows for wireless communication between the Smart Trip Unit and a nearby device, such as a smartphone or tablet.
❷	**LED status display**	Indicates the status of the Smart Trip Unit.
❸	**Reset button**	Clears any fault messages on the screen and resets the digital outputs of the Smart Trip Unit system to their default state.
❹	**Knob switches**	Allow manual adjustments to the Smart Trip Unit settings.
❺	**Rating plug**	Sets the rating current for the Smart Trip Unit.
❻	**USB interface (Mini B type)**	Provides a physical connection point for a computer or other devices using a Mini B USB cable.
❼	**Battery**	Powers the LED indicators and maintains the real-time clock (RTC).
❽	**DIP switches**	Used to set the override level.
❾	**Connection with tester**	Allows a testing device to be connected to the Smart Trip Unit.

LED status display overview



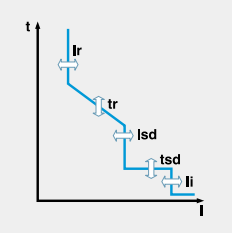
(1) RUN/AL
- RUN: Blue LED blinks during operation
- AL: LED stays on when overload reaches above 90%, and blinks if it exceeds 105%. For self diagnosis errors: LED blinks in blue and red.

(2) SP: Red LED indicates Override/MCR operation.
(3) COMM: Green LED shows active communication.
(4) Ir: Indicates long-time overcurrent relay has operated.
(5) Isd/Ii: Indicates short-time or instantaneous overcurrent relay has operated.
(6) G: Indicates ground fault relay has operated.

Protection

Long time											
Threshold (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.

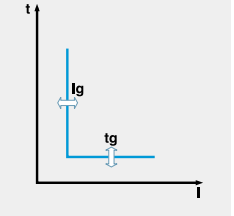


Short time										
Pick up (A) Accuracy: ±10%	Isd = Ir×...	1.5	2	3	4	5	6	8	10	Off
Time Delay (s) Tolerance ▪ I²t On: Pick largest value between ±15% (Is ≤ 6In), ±20% (Is > 6In), or ±40ms ▪ I²t Off: Pick largest value between ±10% or 40ms	tsd — I²t Off	0.05	0.1	0.2	0.3	0.4				
	tsd — I²t On@(10×Ir)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

Instantaneous										
Pick up (A) Accuracy: ±10%	Ii = In×...	2	3	4	6	8	10	12	15	Off
Trip time		50ms or less								

Ground fault										
Pick up (A) Accuracy: ±10%	Ig = In×...	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	Off
Time Delay (s) Tolerance ▪ I²t On: Pick largest value between ±15% or ±40ms ▪ I²t Off: Pick largest value between ±10% or 40ms	tg — I²t Off	0.05	0.1	0.2	0.3	0.4				
	tg — I²t On@(1×Ir)		0.1	0.2	0.3	0.4				
ZSI	ZSI Time (s)	0.04 ~ 0.2 (0.01s steps), OFF								

Note: Ig cannot be over 1200A.



Smart trip unit

A-type

Features

- Advanced protection features and enhanced diagnostic functions for more detailed system analysis.
- LCD and control buttons for measuring current and checking settings.
- External control power can be used, allowing for communication and digital output.
- Current measurement and fault event storage capability.
- ZSI (Zone Selective Interlocking) and ERMS(Energy Reduction Maintenance Setting) functions.

Product appearance and structure

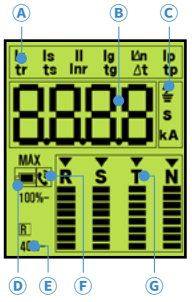
A-type smart trip unit : general overview

❶	**LCD display**	Shows data and system status.
❷	**LED status display**	Indicates the status of the Smart Trip Unit.
❸	**Reset button**	Clears any fault messages on the screen and resets the digital outputs of the Smart Trip Unit system to their default state
❹	**Manual buttons**	Used for manipulating the LCD menu.
❺	**Knob switches**	Allow manual adjustments to the Smart Trip Unit settings.
❻	**Rating plug**	Sets the rating current for the Smart Trip Unit.
❼	**USB interface (Mini B type)**	Provides a physical connection point for a computer or other devices using a Mini B USB cable.
❽	**Battery**	Powers the LED indicators and maintains the real-time clock (RTC).
❾	**DIP switches**	Used to set the override level.
❿	**Connection with tester**	Allows a testing device to be connected to the Smart Trip Unit.

Manual buttons overview

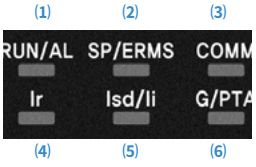
①	**Menu**	Moves between menus.
②	**Up/Down**	Navigates cursor up/down or adjust setting values.
③	**Tap**	Navigates through settings or fix screen.
④	**Enter**	Accesses secondary menus or confirm setting inputs.

LCD display overview



Ⓐ	**Relay element**	Indicates the settings for relay elements.
Ⓑ	**Measurement /setting value**	Displays real-time measurement data for electrical parameters and setting values.
Ⓒ	**Unit (delay time or current)**	Displays the appropriate units for the parameters shown in area 2.
Ⓓ	**Battery Status**	Shows the health of the battery.
Ⓔ	**Local / Remote**	Indicates whether the device is being operated remotely.
Ⓕ	**Communication set**	Indicates entry into communication related settings menu.
Ⓖ	**Load Rate by Phase**	Identifies the phase indicated by the reverse triangle and indicates the rated load percentage based on Ir current.

LED status display overview



(1) RUN/AL

- RUN: Blue LED blinks during operation
- AL: LED stays on when overload reaches above 90%, and blinks if it exceeds 105%. For self diagnosis errors: LED blinks in blue and red.

(2) SP/ERMS: SP: Red LED indicates Override/MCR operation; Blue LED signifies ERMS operation.

(3) COMM: Green LED shows active communication.

(4) Ir: Indicates long-time overcurrent relay has operated.

(5) Isd/Ii: Indicates short-time or instantaneous overcurrent relay has operated.

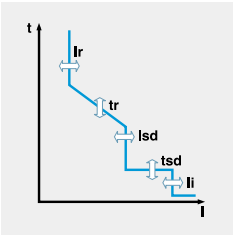
(6) G: Indicates ground fault relay has operated.

Protection

Long time

Threshold (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 the trip unit.

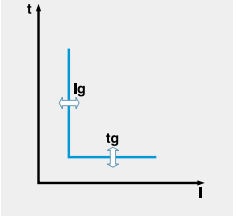


Short time

Pick up (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				
	tsd: 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)	Above 1.2 × Isd (10A steps)								
	Time delay (s)	0.1 ~ 30 (0.1s steps), OFF								

Instantaneous

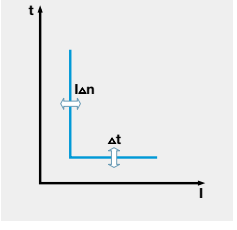
Pick up (A) Accuracy: ±10%	Ii = In × ...	2	3	4	6	8	10	12	15	Off
Trip time	Under 50ms									
Start up Tolerance: Pick largest value between ±10% or 40ms	Pick up (A)	(2.0 ~16) × In(10A steps)								
	Time delay (s)	0.1 ~ 30 (0.1s steps), OFF								



Ground fault

Pick up (A) Accuracy: ±10%	Ig = In × ...	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	Off
Time Delay (s) Tolerance ▪ I²t On: Pick largest value between ±15% or ±40ms ▪ I²t Off: Pick largest value between ±10% or 40ms	tg: I²t Off	0.05	0.1	0.2	0.3	0.4				
	tg: I²t On@(1 × 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)	(0.2 ~1.0) × In(10A steps)								
	Time delay (s)	0.1 ~ 30 (0.1s steps), OFF								

Note: Ig cannot be over 1200A.



Earth Leakage(Option)

Pick up (A) Accuracy: (0.8~1.0) × I△n)	I△n	0.5	1	2	3	5	10	20	30	Off
Time Delay(ms) Tolerance ▪ I²t On: ±25% ▪ I²t Off: Pick largest value - AJ type: ±10% (I△n ≥ 5A), ±20% (I△n < 5A) or 40ms - AY type: ±10% (I△n ≥ 2A), ±20% (I△n < 2A) or 40ms	t△t: Alarm Time (ms)	140	230	350	800	950				
	t△t: Trip Time (ms)	140	230	350	800					
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 (0.1A steps)								
	Time delay (s)	0.1 ~ 30 (0.1s steps), OFF								

Note: 1. It is not possible to use both ground fault and earth leakage at same time.
2. The CT accuracy depends on the applied CT. It can be changed by applied CT accuracy.

PTA(Pre Trip Alarm)

Pick up (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

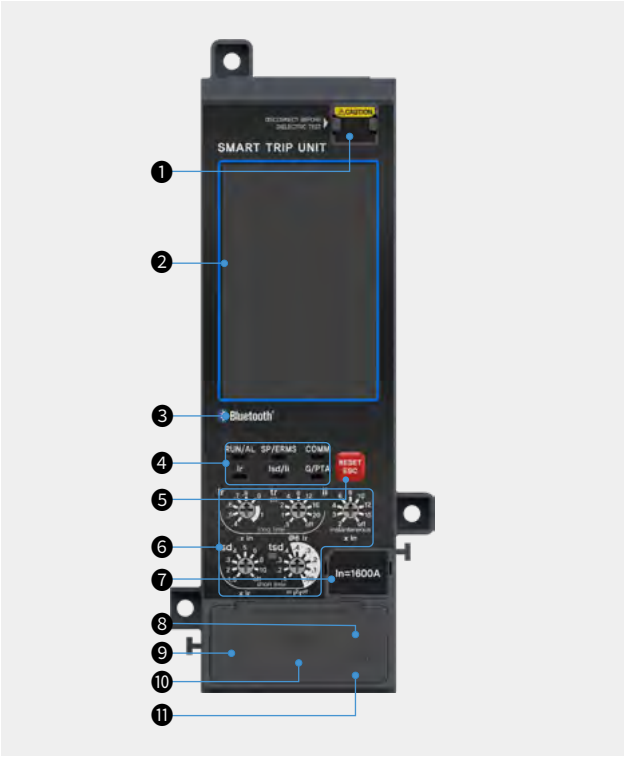
Smart trip unit

P-type

Features

- Advanced protection features and enhanced diagnostic functions for more detailed system analysis.
- Real-time waveform measurement feature.
- Data verification feature via Bluetooth.
- Advanced system control and effective information delivery with a 3.5-inch LCD touchscreen.

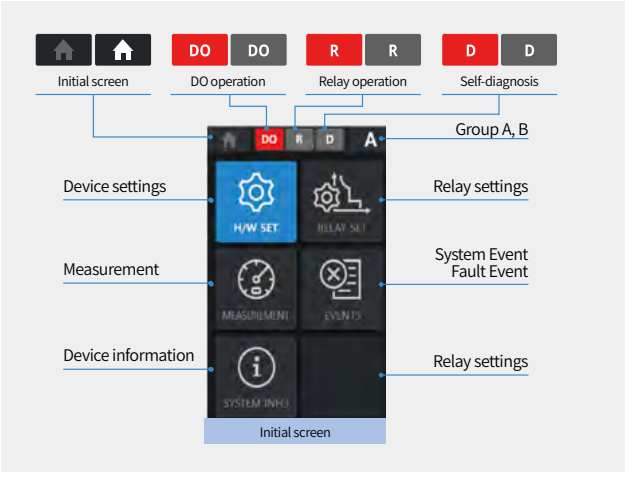
Product appearance and structure



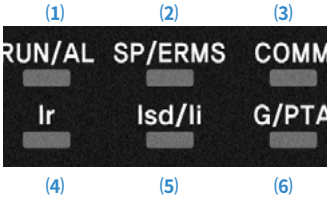
P-type smart trip unit : general overview

❶	**V plug**	Disconnects during insulation resistance and dielectric withstand voltage tests.
❷	**3.5” touch screen**	Shows data and system status.
❸	**Bluetooth function (option)**	Enables Bluetooth connection via a dedicated app on a smartphone.
❹	**LED status display**	Indicates the status of the Smart Trip Unit.
❺	**Reset button**	Clears any fault messages on the screen and resets the digital outputs of the Smart Trip Unit system to their default state.
❻	**Knob switches**	Allows manual adjustments to the Smart Trip Unit settings.
❼	**Rating plug**	Sets the rating current for the Smart Trip Unit.
❽	**USB interface (Mini B type)**	Provides a physical connection point for a computer or other devices using a Mini B USB cable.
❾	**Battery**	Powers the LED indicators and maintains the real-time clock (RTC).
❿	**DIP switches**	Used to set the override level.
⓫	**Connection with tester**	Allows a testing device to be connected to the Smart Trip Unit.

LCD touch screen overview



LED status display overview



(1) RUN/AL
- RUN: Blue LED blinks during operation
- AL: LED stays on when overload reaches above 90%, and blinks if it exceeds 105%. For self diagnosis errors: LED blinks in blue and red.

(2) SP/ERMS: SP: Red LED indicates Override/MCR operation; Blue LED signifies ERMS operation.

(3) COMM: Green LED shows active communication.

(4) Ir: Indicates long-time overcurrent relay has operated.

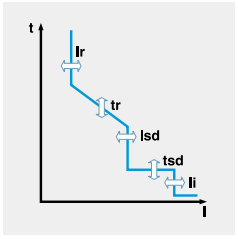
(5) Isd/Ii: Indicates short-time or instantaneous overcurrent relay has operated.

(6) G: Indicates ground fault relay has operated.

Protection

Long time	Tolerance	Setting								
Threshold (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 the trip unit.
3. Threshold(A) value can be adjusted in 1A by LCD touchscreen.



Short time	Tolerance	Setting									
Pick up (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								

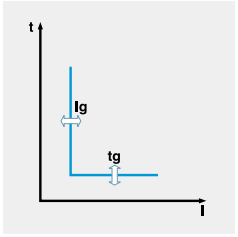
Note: Threshold(A) value can be adjusted in 1A by LCD touchscreen.

Instantaneous	Tolerance	Setting								
Pick up (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.

Ground fault	Tolerance	Setting	
Pick up (A) Accuracy: ±10%		Ig = In × ...	0.2 ~1.0 (1A steps), OFF
Time Delay (s) Tolerance ■ I²t On: Pick largest value between ±15% or ±40ms ■ I²t Off: Pick largest value between ±10% or 40ms	tg		I²t can choose On/Off 0.05 ~ 3.0 (0.01s steps)
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)	(0.2~1.0) × In(10A steps)
		Time delay (s)	0.1 ~ 30 (0.1s steps), OFF

Note: 1. Ig cannot adjust over 1200A. 2. Time tolerance should add +20ms for relaying if power does not supply the trip unit. 3. Ground fault should be adjusted byLCD touch screen.



Earth leakage(option)	Tolerance	Setting	
Pick up (A) Accuracy: (0.8~1.0) × I△n)		I△n	0.1 ~ 30 (1A steps), OFF
Time Delay(ms) Tolerance ■ I²t On: ±25% ■ I²t Off: Pick largest value - PJ type: ±10% (I△n ≥ 5A), ±20% (I△n < 5A) or 40ms - PY type: ±10% (I△n ≥ 2A), ±20% (I△n < 2A) or 40ms		△t	I²t can choose On/Off 0.1 ~ 3.0 (0.01s steps)
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 × (0.1A)(0.1A steps)
		Time delay (s)	0.1 ~ 30 (0.1s steps), OFF

Note: 1. It is not possible to use both ground fault and earth leakage at same time. 2. CT accuracy can be changed by applying CT. 3. Earth leakage should be adjusted by LCD touchscreen.

PTA(Pre Trip Alarm)	Tolerance	Setting	
Pick up (A) Accuracy: (0.8~1.0) × I△n)		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 LCD touchscreen.

Protection	Setting rage		Step	Accuracy	Setting range	Step	Tolerance
Under voltage	Y-connection	(0.5 ~ 0.98) × Vn/√3	0.1V	±5% (> 100V) ±10% (≤ 100V)	0.1 ~ 120s, OFF	0.01s	Choose target 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 target value: Operating value ±10% or abs of operating value ±2%	0.5 ~ 60s, 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 target value: ±20% or 300 mHz/s	0.5 ~ 10s, OFF		Choose target 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 ~ 100s, OFF		Choose target 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						

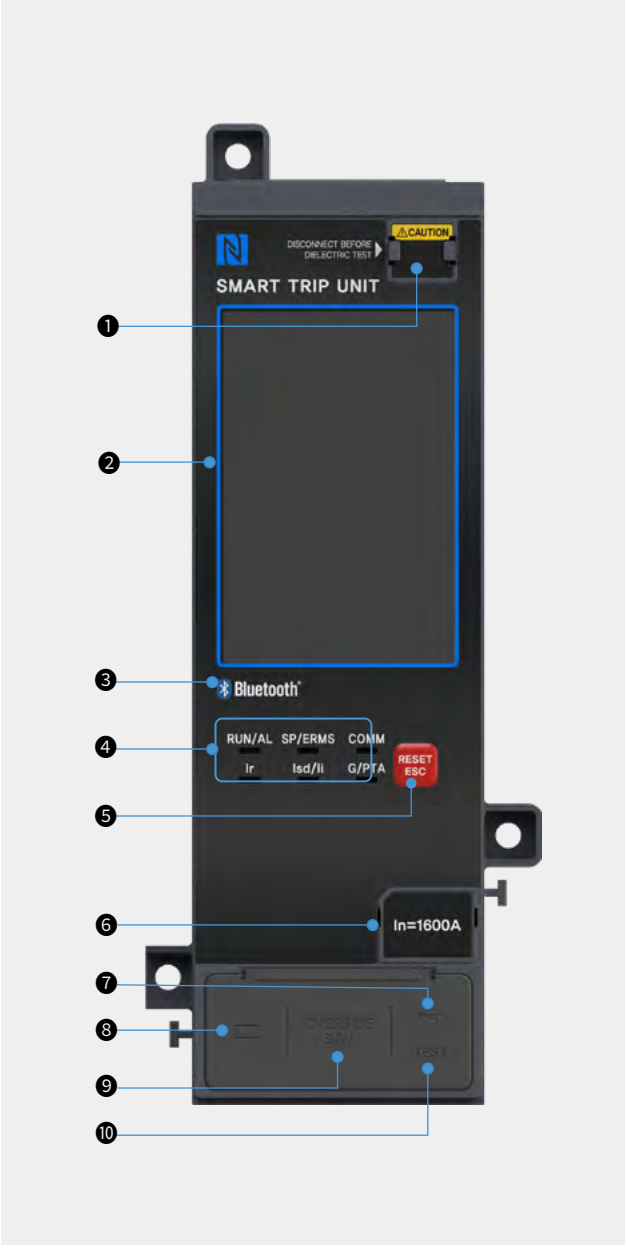
Smart trip unit

S-type

Features

- The most comprehensive unit with full integration of all measurement, protection, communication, and diagnostic functions.
- LCD touchscreen for advanced system control.
- Advanced system control and effective information delivery with a 3.5-inch LCD touchscreen
- Supports two relay setting groups, A and B, allowing for easy switching between relay setting groups depending on the situation.
- Supports both Bluetooth and NFC communication functionalities.

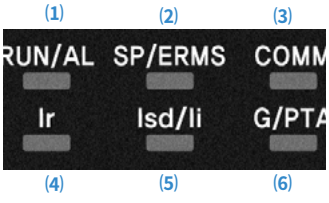
Product appearance and structure



S-type smart trip unit – general overview

❶	**V plug**	Disconnects during insulation resistance and dielectric withstand voltage tests.
❷	**3.5" touch screen**	Shows data and system status.
❸	**Bluetooth function**	Enables Bluetooth connection via a dedicated app on a smartphone.
❹	**LED status display**	Indicates the status of the Smart Trip Unit.
❺	**Reset button**	Clears any fault messages on the screen and resets the digital outputs of the Smart Trip Unit system to their default state.
❻	**Rating plug**	Sets the rating current for the Smart Trip Unit.
❼	**USB interface (Mini B type)**	Provides a physical connection point for a computer or other devices using a Mini B USB cable.
❽	**Battery**	Powers the LED indicators and maintains the real-time clock (RTC).
❾	**DIP switches**	Used to set the override level.
❿	**Connection with tester**	Allows a testing device to be connected to the Smart Trip Unit.

LED status display overview



(1) RUN/AL

- RUN: Blue LED blinks during operation
- AL: LED stays on when overload reaches above 90%, and blinks if it exceeds 105%. For self diagnosis errors: LED blinks in blue and red.

(2) SP/ERMS: SP: Red LED indicates Override/MCR operation; Blue LED signifies ERMS operation.

(3) COMM: Green LED shows active communication.

(4) Ir: Indicates long-time overcurrent relay has operated.

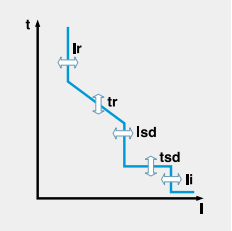
(5) Isd/Ii: Indicates short-time or instantaneous overcurrent relay has operated.

(6) G: Indicates ground fault relay has operated.

Protection

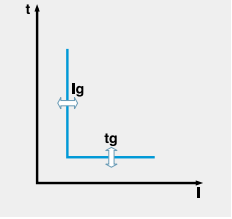
Long time	Setting	
Threshold (A) between 1.05 and 1.15 Ir	Ir = In×...	0.4 ~ 1.0 (1A steps), OFF
Time Delay (s) Tolerance Pick largest value between ±10% (Ir < 6In), ±20% (Ir ≥ 6In), or ±40ms	tr@(6.0×Ir)	0.5~24 (0.01s steps), OFF

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 the trip unit.
3. S-Type should be adjusted by LCD touchscreen.



Short time	Tolerance	Setting		
Pick up (A) Accuracy: ±10%		Isd = Ir×...		1.5 ~ 10 (1A steps), 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 Selectable On/Off)	I²t Off I²t On@ (10×Ir)	0.05~0.8(0.1s steps), OFF
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
Instantaneous	Tolerance	Setting		
Pick up (A) Accuracy: ±10%		Ii = In×...		2 ~ 16 (10A steps), 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
Ground fault	Tolerance	Setting		
Pick up (A) Accuracy: ±10%		Ig = In×...		0.2 ~1.0 (1A steps), OFF
Time Delay (s) Tolerance ■ I²t On: Pick largest value between ±15% or ±40ms ■ I²t Off: Pick largest value between ±10% or 40ms		tg		I²t can choose On/Off 0.05 ~ 3.0 (0.01s steps)
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)		(0.2~1.0)×In(10A steps)
		Time delay (s)		0.1~ 30 (0.1s steps), OFF

Note) 1. Ig cannot adjust over 1200A 2. Time tolerance should add +20ms for relaying if power does not supply the trip unit. 3. Ground fault should be adjusted by LCD touchscreen.



Earth leakage(option)	Tolerance	Setting	
Pick up (A) Accuracy: ±10%		I△n	0.1 ~ 30 (1A steps), OFF
Time Delay(ms) Tolerance ■ I²t On: ±25% ■ I²t Off: Pick largest value - SJ type: ±10% (I△n ≥ 5A), ±20% (I△n < 5A) or 40ms - SY type: ±10% (I△n ≥ 2A), ±20% (I△n < 2A) or 40ms		t△n	I²t can choose On/Off 0.1 ~ 1.0 (0.01s steps)
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×(0.1A)(0.1A steps)
		Time delay (s)	0.1~ 30 (0.1s steps), OFF

Note: 1. It is not possible to use both ground fault and earth leakage at same time. 2. CT accuracy can be changed by applying CT. 3. Earth leakage should be adjusted by LCD touchscreen.

PTA(Pre Trip Alarm)	Tolerance	Setting	
Pick up (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 LCD touchscreen.

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 ~ 120s, OFF	0.01s	Choose target 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 target value: Operating value ±10% or abs of operating value ±2%	0.5 ~ 60s, 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 target value: ±20% or 300 mHz/s	0.5 ~ 10s, OFF		Choose target 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 ~ 100s, OFF		Choose target 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						

Smart trip unit

Relay element

Relay element

No.	Relay element	N	A	P	S	
		Group A	Group A	Group A	Group A	Group B
1	L	○	○	○	○	○
2	S1	○	○	○	○	○
3	S2				○	○
4	I	○	○	○	○	○
5	LN	○	○	○	○	○
6	G	○	○	○	○	○
7	Gext (I△n)		○	○	○	○
8	PTA	○	○	○	○	○
9	UV1			○	○	○
10	UV2				○	○
11	OV1			○	○	○
12	OV2				○	○
13	RV			○	○	○
14	D			○	○	○
15	S(V)1			○	○	○
16	S(V)2				○	○
17	IU			○	○	○
18	VU			○	○	○
19	UF1			○	○	○
20	UF2				○	○
21	OF1			○	○	○
22	OF2				○	○
23	ROCOF			○	○	○
24	RP			○	○	○
25	RQ1			○	○	○
26	RQ2				○	○
27	OP			○	○	○
28	OQ			○	○	○
29	UP			○	○	○

Relay element list

Symbol	ANSI code	Description
L	49RMS, 51	LONG - TIME OVER CURRENT RELAY
S1	51	SHORT - TIME OVER CURRENT RELAY (Stage 1)
S2	51	SHORT - TIME OVER CURRENT RELAY (Stage 2)
I	50	INSTANTANEOUS OVER CURRENT RELAY
LN	49NRMS	LONG - TIME NEUTRAL LINE OVER CURRENT RELAY
G	50G/51G	GROUND - FAULT PROTECTION RELAY (Vector Sum)
Gext (I△n)	50G/51G	EXTERNAL GROUND - FAULT PROTECTION (EXTERNAL CT)
PTA		PTA(Pre Trip Alarm)
UV1	27	UNDER VOLTAGE RELAY (Stage 1)
UV2	27	UNDER VOLTAGE RELAY (Stage 2)
OV1	59	OVER VOLTAGE RELAY (Stage 1)
OV2	59	OVER VOLTAGE RELA (Stage 2)
RV	64	OVER VOLTAGE GROUND RELAY (Vector Sum)
D	67D	DIRECTIONAL OVER CURRENT RELAY
S(V)1	51V	VOLTAGE CONTROLLED & RESTRAINED OVER CURRENT RELAY (Stage 1)
S(V)2	51V	VOLTAGE CONTROLLED & RESTRAINED OVER CURRENT RELAY (Stage 2)
IU	46	CURRENT UNBALANCE PROTECTION RELAY
VU	47	VOLTAGE UNBALANCE PROTECTION RELAY
UF1	81U	UNDER FREQUENCY RELAY (Stage 1)
UF2	81U	UNDER FREQUENCY RELAY (Stage 2)
OF1	81O	OVER FREQUENCY RELAY (Stage 1)
OF2	81O	OVER FREQUENCY RELAY (Stage 2)
ROCOF	81R	RATE OF CHANGE OF FREUENGY
RP	32RP	REVERSE ACTIVE POWER RELAY
RQ1	40 or 32RQ	REVERSE REACTIVE POWER RELAY (Stage 1)
RQ2	40 or 32RQ	REVERSE REACTIVE POWER RELAY (Stage 2)
OP	32OF	ACTIVE OVER POWER
OQ	32OF	REACTIVE OVER POWER
UP	32LF	ACTIVE UNDER POWER

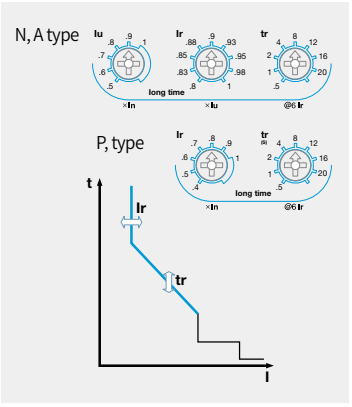
Smart trip unit

Relay element

Operation characteristics

Long-time delay (L)

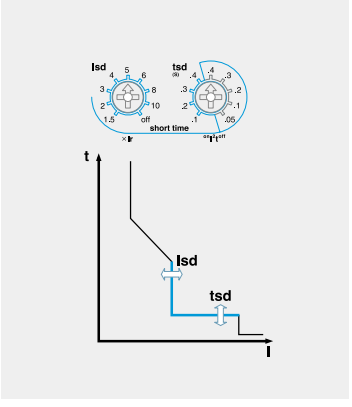
The long-time delay function for overload protection has a time delay characteristic with inverse ratio to fault current.



1. Standard current setting knob: Ir *The S type STU is set on HMI (no knob).
   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 *The S type STU is set on HMI (no knob).
   – Standard operating time is based on the time of 6×Ir
   – Setting range: 0.5-1-2-4-8-12-16-20-Off sec (9 modes)
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 phase.
5. LN (Long Time Delay Protection): Off or adjustable from 0.4 to 2.0×Ir
   (default setting: 1.0×Ir)
   – Enabled only for 4P, and the operation time is the same as the tnr setting

Short-time delay (S)

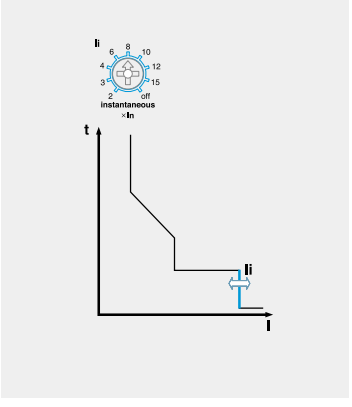
The short-time delay function for fault current (over current) protection has a definite time characteristic and time delay with inverse ratio to fault current.



1. Standard current setting knob: Isd *The S type STU is set on HMI (no knob).
   – Setting range: (1.5-2-3-4-5-6-8-10-Off)×Ir
2. Time delay setting knob: tsd *The S type STU is set on HMI (no knob).
   – 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 phase.
4. When ZSI function is set, the protection operation will take place instantaneously when there is no ZSI input signal by downstream devices. Disabling the ZSI function on the last downstream device is advised.

Instantaneous (I)

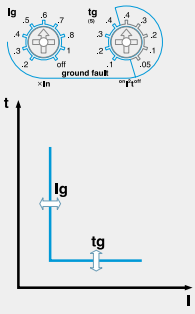
The instantaneous function is for breaking fault current above the setting value within the shortest time to protect the circuit from short circuit.



1. Standard current setting knob: Ii *The S type STU is set on HMI (no knob).
   – 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 phase.
3. Total breaking time is below 50ms.

Ground Fault (G)

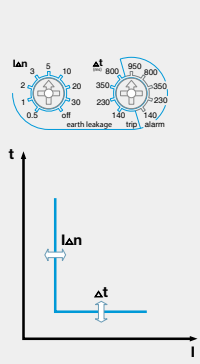
The ground fault function is for breaking ground fault current above setting value after time delay to protect the circuit from ground fault.



1. Standard setting current knob: Ig *The P/S type is set on HMI (no knob).
   – Setting range: (0.2–0.3–0.4–0.5–0.6–0.7–0.8–1.0–Off)×In
2. Time delay setting knob: tg *The P/S type is set on HMI (no knob).
   – 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
   – P/S type setting range: 0.05 ~ 3.0 sec
3. The fault current is the value detected by Vector sum of the current input as the R, S, T phase (3P) or the R, S, T, N (4P).
4. When ZSI function is set, the protection operation will take place instantaneously when there is no ZSI input signal by downstream devices. Disabling the ZSI function on the last downstream device is advised.

Earth Leakage (G) - Option

The earth leakage function is for breaking earth leakage current above setting value after time delay to protect the circuit from earth leakage. (A, P, S type)



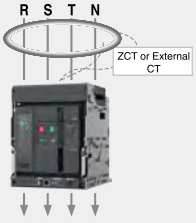
1. Standard setting current knob: IΔn *The P/S type is set on HMI (no knob).
   – A type setting range: 0.5-1-2-3-5-10-20-30-Off (A)
   – P/S type setting range: 0.1 ~ 30 (A)
2. Time delay setting knob: Δt *The P/S type is set on HMI (no knob).
   A type setting range
   – Trip time: 140–230–350–800 ms – Alarm time: 140–230–350–800–950 ms
   P/S type setting range (Same as Trip/Alarm)
   – Long-time: 0.1 ~ 3.0 sec – Short-time: (0.1 ~ 3.0 sec)@30A
3. Setting values within the alarm range will not trip the breaker but will activate its alarm.
4. This function is enabled and can be used only with private external CT(secondary output 5A)selected by customers.
5. When ZSI function is set, the protection operation will take place instantaneously when there is no ZSI input signal by downstream devices. Disabling the ZSI function on the last downstream device is advised.

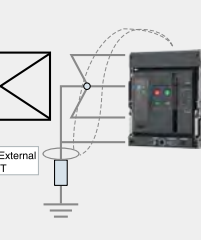
*** Caution for earth-leakage current settings**

- When using ZCT provided by customers, the setting range should be from 0.5 to 5A based on its secondary current.(Secondary output rating: 5A)
  Hence, under 100: 5A CT, if trip relay is set to 0.5A, earth-leakage exceeding 10A will activate its operation (0.5A×20 = 10A)

※ External CT usage guidelines

- Earth-leakage protection characteristics using the standard CT installed inside of ACB can protect current from 20 to 100% range of its rated current.
- As rated current applied to ACB increases, current that is covered by its standard CT increases as well. This cannot protect against small leakage currents.
  ex) 400A ACB Min. Earth-leakage current 400A×20% =80A
  4000A ACB Min. Earth-leakage current 4000A×20% =800A
- Therefore, customers are advised to install an external CT in accordance with its rated current within its systems. Choose trip relay (E, X type) which is required with external CT usage to provide earth-leakage functions.





Smart trip unit

Protection functions

The Smart Trip Unit offers a range of protection functions that operate independently of auxiliary power sources, powered solely by the currents flowing through the circuit breaker. These functions include:

Long-time Overload Protection (ANSI 49RMS)

ANSI 49RMS represents the thermal overload protection relay, which detects excessive heating in electrical equipment, signaling an overload condition, and acts as a safety device for the system. It typically measures the temperature of the equipment and operates when it exceeds predefined threshold values, preventing damage to electrical equipment. It is commonly used in devices such as motors, transformers, and generators.

The ANSI 51 denotes the time overcurrent relay, which detects overcurrent abnormalities in the network and safeguards the system. When a steady current flows for a certain period, this relay operates to either trip the circuit or take appropriate measures to protect the equipment. It is used in situations where rapid response is needed, such as detecting overcurrent conditions and maintaining system stability by interrupting circuits.
These relays are utilized to maintain the safety and stability of power systems.

They protect and shut down the system in cases of overload, short circuits, fault clearing, and other abnormal situations, minimizing equipment damage, system failures, and human risks. Additionally, it's important to note that both ANSI 49RMS and ANSI 51 relays exhibit a characteristic where the operating time is inversely proportional to the magnitude of the current. This means that as the current increases, the operating time of the relay decreases, allowing for faster response to protect the system against overcurrent conditions.

Short-time Short-Circuit Protection (ANSI 50TD/51)

A short-time short circuit refers to a situation where a circuit experiences a fault, causing it to remain in a shortcircuited state for a certain period. Such faults typically arise due to equipment failures or faults, resulting from overloads, tripping, or electrical issues.

The protective function against short circuits is equipped with the I^2t characteristic. When I^2t is set to OFF, it operates after a set delay time when the fault current exceeds the threshold. If I^2t is set to ON, the current and time are inversely proportional, meaning that as the fault current increases, the operating time decreases. This characteristic does not apply indefinitely to all currents; for currents exceeding ten times the threshold, it maintains the same time characteristic.

Short-time short circuits can typically persist for several seconds to minutes.
During this period, a large amount of electrical energy flows through the circuit, rapidly heating it and potentially causing damage to electrical equipment.
Therefore, it is essential to promptly resolve such short-circuited conditions to minimize equipment damage and ensure the safety of the power system.

In power systems, various protective devices and electrical equipment are used to detect and respond to short-time short circuits. These protective devices swiftly detect the fault location and trip the circuit, safeguarding electrical equipment. This helps minimize equipment damage and system disruptions caused by short circuits.

Instantaneous Short-Circuit Protection (ANSI 50)

ANSI 50 denotes the "Instantaneous Overcurrent Relay."
This relay is one of the protective mechanisms utilized in power systems to detect immediate excessive surges in current and protect the system.

When the current exceeds a specified threshold, the relay immediately springs into action. This is crucial for safeguarding the system against sudden spikes in current without any delay. Additionally, ANSI 50 relays posses the characteristic of i2t, where the operating time is inversely proportional to the current magnitude when it's in the on state. Even when the fault current exceeds ten times the threshold value, ANSI 50 relays operate for the same duration. It swiftly detects overcurrent situations and responds promptly to ensure system safety.

It's employed in scenarios where sudden overcurrent situations, such as short circuits resulting from explosive increases in current, occur.
In such instances, it aids in rapidly responding to protect equipment and maintain system stability. For instance, if a short circuit occurs in a power line, ANSI 50 relays promptly activate to cut off the circuit and prevent equipment damage.

ANSI 50 relays are applicable across various sections of power systems, primarily in equipment like power lines, generators, transformers, and electric motors.
It primarily detects overcurrent situations in power networks, swiftly responding to maintain system safety.

ANSI 50 relays promptly acts to cut off circuits or initiate protective measures when the current exceeds the threshold, safeguarding equipment.
It's designed to respond to sudden overcurrent situations without any delay.

Earth Fault Protection (ANSI 50N[G]/51N[G])

Designed to address faults due to earth leakage, ensuring the safety and integrity of the electrical installation.

Smart trip unit

Measurement

The ACB's-embedded CT and calibrated SMART TRIP UNIT comply with class 0.5 for voltage and current, and class 1 for active power and energy measurements.

For each measurement, the accuracy is certified within the temperature range of -25°C to 60°C and compensates for individual errors in the components contained in the measurement chain.
Based on the measurement of line currents, neutral current, phase-to-phase voltages, and phase-to-neutral voltages, the SMART TRIP UNIT comprehensively monitors and displays all parameters necessary for the assessment of any AC electrical power system, covering aspects of power quality, power management, and energy efficiency.

The calculated and displayed electrical parameters include:

- RMS values of currents and voltages
- Active, reactive and apparent powers
- Active (reverse) and reactive (reverse) energies
- Power factor
- Frequency
- Phase sequence
- Voltage and current unbalances
- Current and total power demands
- Total Harmonic Distortion (THD) of voltages
- THD of currents

This comprehensive set of measured and calculated parameters empowers users to effectively monitor and manage their AC electrical power systems, to ensure optimal performance, efficiency, and power quality.

The current demand is calculated using the thermal method, measured in adjustable intervals between 1 and 60 minutes, in steps of 1 minute.
The power demand is calculated using arithmetical integration of power RMS values during a period of time divided by the length of the set interval; adjustable between 1 and 60 minutes, in steps of 1 minute.

Note:
- A demand is the average value of a quantity over a specified period of time.
- Thermal current demand calculates the demand based on a thermal response, which mimics the analog-type thermal demand meters.
- Power demands are calculated using integration of power values during a period of time divided by the length of the period. The result is equivalent to the energy accumulated during the period of time. The period of calculation can be fixed or adjusted based on customer preference.

The electrical values calculated by the SMART TRIP UNIT can be displayed on the built-in HMI, smartphones via Bluetooth, PCs running LV software, and 1:N display units. They are updated every two seconds. The display of the built-in HMI is accessed through a context menu that can be easily navigated through the electrical values. Alternatively, key defaults can be displayed through the UDD option.

The SMART TRIP UNIT logs and timestamps minimum and maximum values, last reset, and all relevant measurements (current, voltage, frequency, active power, responsiveness, Power, apparent power, THDI and THDV). For a complete list of measurements and minimums, see the SMART TRIP UNIT User's Guide. Maximum and minimums can be reset on the built-in display, smartphone via Bluetooth, or PC.

External power must be supplied to the SMART TRIP UNIT to process and display measurements including energy counters for currents less than 50% of the single phase reference rated current.

Measurement function

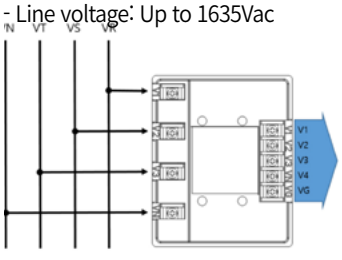
Type			Class	Measurement element	Detailed element	Unit	Display range
S type	P type	A type	Current	Line current	Ia, Ib, Ic	A	0.02In~1.2In
				Normal current	I_1		
				Reverse current	I_2		
			Voltage	Line voltage	Vab, Vbc, Vca	V	1200V
				Phase voltage	Va, Vb, Vc	V	600V
				Normal voltage	V_1	V	3V~690V
				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	1st~63th harmonics of Va(ab),Vb(bc),Vc(ca)	V	4~690V
				Current harmonics	1st~63th harmonics of Ia,Ib,Ic	A	95%(3, 5, 7) / 65%(etc)
				THD, TDD	-	%	0.0 ~ 100.0
				K–Factor	-	-	1.0 ~

Shield cradle

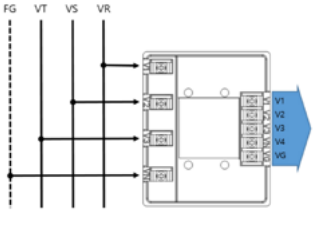
For P/S type trip relay, it is necessary to use voltage trip module for measuring the voltage at the load side of ACB.

Voltage input range

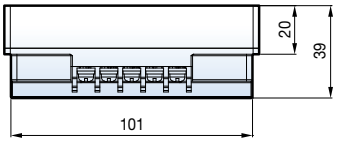
- Phase voltage: Up to 973Vac
- Line voltage: Up to 1635Vac

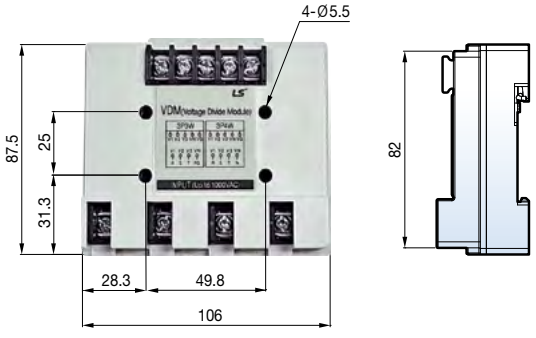


3P4W wiring



3P3W wiring





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

Smart trip unit

Interface and user interaction

The Smart Trip Unit is designed with a user-centric approach to ensure ease of interaction and seamless access to vital information. The user interface offers intuitive navigation through system statuses, settings, and diagnostics. Alarm messages and system health indicators are swiftly identified on this interface, enhancing user response time to potential issues.

For remote interaction, the Smart Trip Unit includes wireless connectivity options. It pairs with smartphones using Bluetooth, allowing for mobile access to system details and facilitating maintenance tasks remotely.

The Smart Trip Unit's interface extends to personal computers as well, with a USB interface that provides a direct link for system checks and diagnostics. This interface also serves as a conduit for updating the Smart Trip Unit's software, ensuring the system remains up-to-date with the latest features and security patches.

Modbus-RTU connectivity is integrated into the Smart Trip Unit design. It is possible to connect to building management systems or industrial control networks by Modbus-RTU networking. This connectivity ensures that the Smart Trip Unit can be a part of a comprehensive monitoring solution, leveraging existing network infrastructure for control and communication tasks. Smart Trip Unit can connect to Ethernet using the RSTP module and perform the same communication tasks as Modbus-RTU.

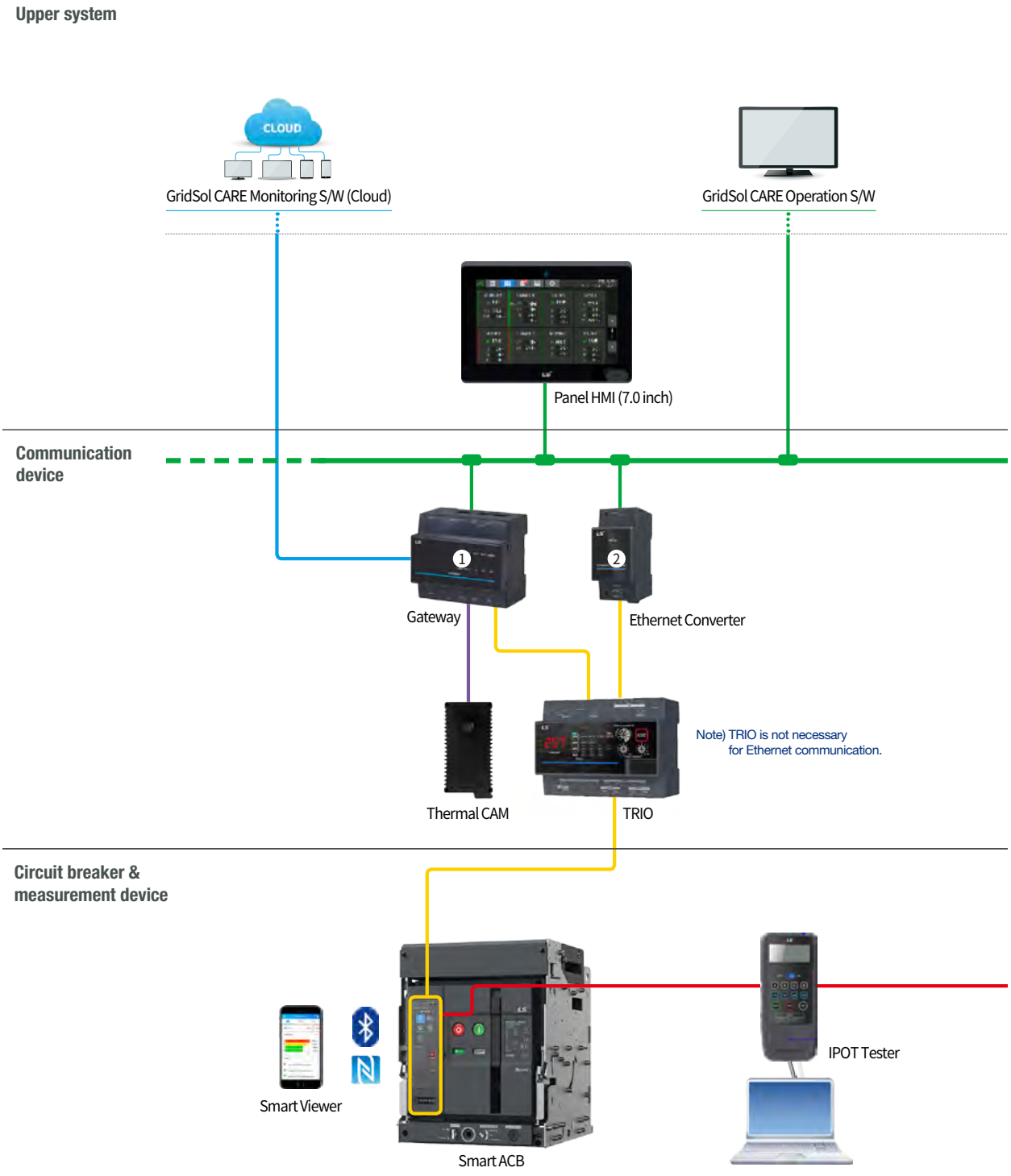
An extensive catalog enhances the Smart Trip Unit's capabilities. Each accessory in the catalog is designed to tailor control and monitoring functions to specific needs.
These accessories range from additional sensors to supplementary interface modules, providing a versatile toolkit for customization according to the varied demands of modern electrical distribution systems.

Compliance and Standards

Smart Trip Units are manufactured and tested in accordance with the following standards:

Standard/Norm	Related Function
ANSI 49RMS/51	Long-time Overload Protection
ANSI 50TD/51	Short-time Short-circuit Protection
ANSI 50	Instantaneous Short-circuit Protection
ANSI 27/59	Under/Over Voltage Protection
ANSI 81	Under/Over Frequency Protection
ANSI 32P	Reverse Active Power Protection
ANSI 51	IDMTL Overcurrent Protection
ANSI 51N/51G	Ground-fault Alarm
IEC 61557-12	Measurement Accuracy

Panel configuration



Smart trip unit

Settings and indicators

Smart trip unit protection settings can be configured and managed through several interfaces, offering versatility and security. LED indicators provide a quick reference for system status and alerts.

Dual settings (Smart trip unit type S)

Smart trip units (STU) are versatile devices, coming in various types to cater to the unique requirements of different electrical systems. The smart trip unit type S provides distinct sets of settings for its protective functions, known as LSIG, minus the earth leakage. This dual-setting system offers flexibility, allowing users to adapt to various operational scenarios with ease.

One of the key applications for this functionality is the ability to fine-tune the shortcircuit protection for systems that draw power from dual sources, such as a grid and a generator set. These sources often have differing short-circuit current levels, and the ability to switch settings helps maintain protection integrity under varying conditions.

Adjusting these settings can be achieved via several methods for user convenience and system integrity:

- **Digital input selection:** Users can change settings through a digital input, either using the Smart Trip Unit DI option or via the TRIO module, enabling a fast and straightforward approach to system configuration.
- **Communication interface:** The communication interface allows for remote adjustments through standard protocols; however, it does not support the transfer of settings between Group A and Group B.
- **User Interface:** For direct, hands-on configuration, settings can be altered using the onboard user interface. This method allows users to interact with the smart trip unit in real-time, offering immediate feedback and control over the adjustments being made.

With these user-friendly interfaces, smart trip units ensure that adapting protection settings to match specific needs is not only possible but also practical, securing electrical systems against a wide range of irregularities and conditions.

Overcurrent and trip cause indications

The smart trip unit features six LEDs for different functions, signaling operational status, alarms, communication status, and specific protection activations. These include bi-color LEDs for run/alarm status, short and instantaneous short protection, and ground/earth fault indication:

- **RUN/AL LED:** Indicates smart trip unit operation (blue) and alarms (red).
- **SP/ERMS LED:** Shows status for Override/MCR (red) and ERMS operations (blue).
- **COMM LED:** Green light indicates active communication.
- **Ir LED:** Signifies long-time overload protection activation (red).
- **Isd/Ii LED:** Illuminates for short-time (red) and instantaneous (blinking red) protection activation.
- **G/PTA LED:** Indicates ground fault and ground leak protection (red).

Configuration and monitoring of protection settings

The smart trip unit offers diverse interfaces for configuration and control, ensuring that protection settings are both accessible and adjustable to suit varying needs. These include:

- **Embedded display:** Directly modify settings on the smart trip unit.
- **Smartphone connectivity:** Use bluetooth, NFC for wireless adjustments.
- **PC interface:** Run LV software for comprehensive configuration.
- **Network communication:** Ethernet and modbus for remote adjustments.

LV software capabilities

The dedicated software enhances smart trip unit functionality, allowing users to:

- Configure and verify protection settings.
- Download existing configurations and upload new ones.
- Monitor operational status.
- Access measurements, alarms, and diagnostics data.

For advanced types like P and S, the smart trip unit also features a test menu on the LCD for verifying trip operations.

Traceability of setting changes

Changes made to P and S types are meticulously logged, including:

- Time and date stamps of adjustments.
- Comparative records of old and new settings.

Locking configuration changes

The smart trip unit allows for control over setting modifications:

- Enable or disable changes via the embedded display.
- Restrict or permit adjustments from external devices like smartphones or PCs, and through communication protocols.

Zone selective interlocking (ZSI)

Zone selective interlocking (ZSI) is an advanced system designed to protect electrical distribution equipment from the stresses caused by short-circuit or earth fault conditions. It functions in harmony with existing protection systems to curtail fault tripping times while retaining system selectivity.

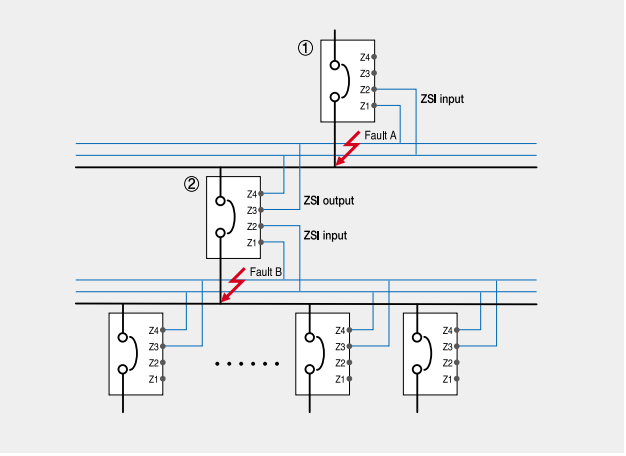
ZSI is primarily linked with short-time short-circuit and ground fault protection mechanisms. When a fault is identified by the control unit, ZSI springs into action with two critical steps:

- **Upstream communication:** An immediate signal is transmitted upstream to alert the system of the fault.
- **Downstream signal verification:** Concurrently, the system verifies whether a signal has been received from downstream circuits.

The response of the ZSI system is contingent upon the presence or absence of a downstream signal:

- **Presence of downstream signal:** If a signal is detected from downstream, the circuit breaker is programmed to stay closed for the set tripping delay period, maintaining circuit integrity.
- **Absence of downstream signal:** Should there be no signal from downstream, the circuit breaker executes a trip command instantly, overriding any preset tripping delays.

This intelligent response protocol can be utilized in A, P, and S type Smart Trip Units when external control power is supplied. This capability guarantees a synchronized and refined response to fault conditions, thus bolstering the reliability and operational efficiency of the overall electrical distribution network.



Consider, for instance, a scenario (Fault 1)—where only circuit breaker A identifies the fault. Without a restraining signal from downstream, it trips instantaneously, ignoring any preset delay, which, in this case, is 0.3 seconds. In another scenario (Fault 2), if both circuit breakers A and B detect the fault, circuit breaker A, upon receiving a restraining signal from circuit breaker B, does not trip, honoring its full tripping delay of 0.3 seconds. Conversely, circuit breaker B, not receiving a downstream signal, trips immediately, notwithstanding its programmed delay of 0.2 seconds.

These examples delineate ZSI's operational strategy, underscoring the critical influence of downstream signaling on the trip decision-making process of interconnected circuit breakers and demonstrating ZSI's crucial role in system protection dynamics.

Smart trip unit

ERMS and digital I/O (A, P, S type)

ERMS (Energy Reduction Maintenance Setting) is a function to reduce arc energy to ensure worker's safety. When using the ERMS function, the instantaneous setting value is minimized (2*n). A, P, and S type trip relays are able to perform the ERMS by digital input and have 3 do (digital output).

Description

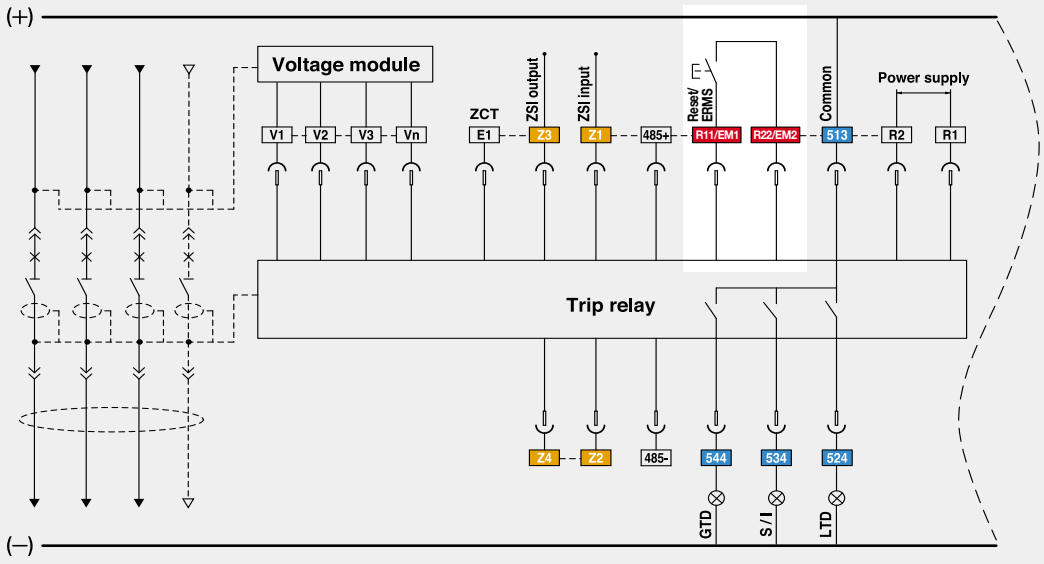
The ERMS function is used to reduce the LSIG protection settings in order to trip faster when an internal arc fault occurs. It is a recognized solution to improve the protection of workers against internal arc-fault caused by faulty electrical equipment, abnormal environmental conditions, lack of maintenance, or pest disturbance. It complies with recommendations issued by regulatory organizations dealing with this concern. As soon as the ERMS digital module is installed on the smart trip unit control unit, the ERMS function is enabled, but not engaged. Additional steps are then required to set the appropriate ERMS LSIG settings and to engage the ERMS function. ERMS settings is an additional LSIG tripping curve to dual settings and can be customized on site by means of a smartphone via Bluetooth, or with Power Commission software running on a PC. Customization of ERMS settings with power commission software or a smartphone is passwordprotected. As soon as ERMS is engaged, the ERMS LSIG factory settings are automatically replaced by the ERMS LSIG customized settings. This is engaged/disengaged through the power device app (there is a digital lock between power device app app and smart trip unit) or through an external contact with the additional dedicated ESM hardware module (ERMS switch module). ESM hardware module requires the smart trip unit to be supplied by an external 24V DC power supply.

When ERMS is engaged, the corresponding information is made available as follows:

- On the smart trip unit front face with the ERMS blue LED on
- The smart trip unit embedded display with the blue backlight on
- An external light with the additional dedicated ESM hardware module on a PC with power commission software through the customer communications network (ethernet or modbus SL) ESM hardware module on a PC with power commission software through the customer communications network (ethernet or modbus SL)

1. To use the ERMS function, jump between two ends of ERMS terminal.
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
3. All DI are dry contacts with 3.3V recognition voltage. When inputting close by SSR (Solid State Relay) or opencollector, connect collector (Drain) to EM1.
4. 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.

ERMS wiring diagram



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, S type	DO1(524)	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Program-mable	○
	DO2(534)	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○
	DO3(544)	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○
A type	DO1(524)	●	×	×	×	Not available																
	DO2(534)	×	●	●	×																	
	DO3(544)	×	×	×	●																	

Smart trip unit

Precision measurements

Accurate system analysis

Embedded CTs and calibrated smart trip units provide precise measurements, including:

- RMS values of currents and voltages.
- Power quality indicators like active, reactive, and apparent powers.
- Energy efficiency metrics like power factor and frequency.
- Load balance assessments through phase sequence and unbalance detection.

Demand calculation

Demand values are computed through thermal or arithmetic methods, ensuring an accurate representation of power usage and system demands.

Maintenance and diagnostics

Advanced diagnostics and user support

The smart trip unit is equipped with advanced diagnostic tools that provide realtime assessments for ACBs. These units are adept at generating and recording crucial alarms and messages, which support users in maintenance procedures and aid in the swift restoration of power.

The smart trip unit's diagnostics align with essential user needs:

- **Rapid restart:** It enables quick system resets post-trip to reduce operational downtime.
- **Efficient repairs:** Offers health insights for the circuit breaker, facilitating timely repairs to maintain or restore peak performance.
- **Maintenance reporting:** Generates detailed reports that track equipment status, offering a thorough health and performance overview.

Proactive maintenance strategy

Maintenance alerts

Implementing a preventive maintenance plan and being informed about the circuit breaker's condition are critical to avoiding power outages. The smart trip unit's proactive diagnostics encourage an efficient management approach to the electrical system.

Health indicators

By default, the smart trip unit features a "RUN/AL" LED indicator which signals the circuit breaker's condition:

- Blue LED indicates normal operation.
- Red LED signifies operation above alarm threshold, signaling various potential issues.

These alarms are displayed on the embedded HMI, with different smart trip unit types indicating specific issues which can be investigated further upon interaction.

Information is also accessible remotely via bluetooth or LV software on a PC, and even through LV software if the smart trip unit is not powered.

Power supply

The smart trip unit can generate its own power to perform basic protection functions if the load current exceeds 20% of the rated current, even without an external control power source. However, an external power source is required to perform all specified functions. These functions include:

- The smart trip unit's human-machine interface (HMI), display screen(P/S),
- Maintenance and diagnostic operations.
- Network communications via Modbus low energy technology.
- Digital output/input

Customization and optional protection

The smart trip unit can be customized with additional protections like undervoltage, overvoltage, frequency variations, and more. These protections are especially useful in abnormal or critical situations, providing enhanced safeguarding for electrical installations.

Optional protection

The smart trip unit can be customized with additional protections, such as undervoltage, overvoltage, underfrequency, over frequency, and reverse active power protections. These can be added anytime to improve monitoring and operational safety of electrical networks.

ANSI protection relay elements

Under / Over voltage (ANSI 27/59)

This function ensures voltage levels remain within acceptable limits, triggering alarms or trips to restore optimal conditions.

Electrical installation voltages need to stay within approved operating ranges to protect motor loads, delicate electronics, and ensure all loads function correctly. Typically, the acceptable voltage range is within ±10%. The ANSI 27/59 digital module for Under/Over voltage protection keeps a constant watch on system voltage.

If a voltage strays outside normal limits, this module provides data to kickstart corrective measures, ensuring optimal operating conditions are resumed.

The ANSI 27/59 function output DO or initiates a trip. It monitors either three phase-to-phase voltages (V12, V23, V31) or phase-to-neutral voltages (V1N, V2N, V3N) for under and overvoltage. The module includes three independent protections: 27-1, 27-2, 59-1, Protections 27-1 and 59-1 act when any one voltage hits its threshold.

Protections 27-2 responds when all monitored voltages reach their respective limits. Each has an adjustable time delay, activating as soon as it detects a problem, detailed on page C-4. Voltage measurement for undervoltage tripping must be done on the power source side for the circuit breaker to close properly. The smart trip unit receives external voltage input through the VDM module.

Tripping occurs when the voltage surpasses the preset limit and the timer runs out.

Smart trip unit

Customization and optional protection

Under / Over frequency (ANSI 81U/81O)

This function continuously monitors frequency, with provisions for both alarm and trip functionalities to maintain system stability.

Maintaining the frequency within established operating parameters is critical in electrical systems to protect motor loads, sensitive electronics, and ensure all components perform optimally. The standard permissible frequency variation is within ±10%. The ANSI 81 Under/Over frequency protection function constantly monitors frequency levels.

When the frequency deviates from its designated range, this module provides data that can be employed to implement corrective measures and reestablish proper operating conditions.

The ANSI 81 function offers two autonomous protections: underfrequency (ANSI 81U) and overfrequency (ANSI 81O), activated when the frequency exceeds or drops below set thresholds.

Both protections operate with a definite time characteristic and have an associated adjustable time-delay that commences upon detection of a frequency anomaly. For underfrequency trip conditions, voltage measurement should occur on the power source side for effective circuit breaker closure. A trip occurs when the frequency surpasses the set value, and the timed delay elapses.

Reverse active power (ANSI 32RP)

Reverse active power is a phenomenon typically observed during generator operation when the prime mover of the generator, whether it be a steam, gas, or diesel turbine, suddenly fails. In such instances, the generator may attempt to operate in reverse, essentially behaving like a motor and potentially causing mechanical damage. This phenomenon primarily occurs in synchronous generators and can result in damage to the generator. The ANSI 32RP- reverse active power protection detects these conditions and interrupts the operation of the generator to prevent damage.

The ANSI 32RP function triggers an alarm or trip when it detects reverse power flow, using RMS values for voltage and current to measure active power. A time delay, which begins with the detection of an issue, is tied to this protection.

The direction of active power flow determines the operational mode of the generator. By default, the current direction of the smart trip unit can be adjusted based on the configuration requirements. If the power supply is connected at the bottom, the current sign can be altered using smart trip unit HMI, software and modbus command.

IDMTL overcurrent (ANSI 51)

The IDMTL (Inverse Definite Minimum Time Lag) function of ANSI 51 utilizes the IDMTL function to incorporate time-current characteristics.

This function operates along specific time-current characteristic curves when current varies over time, detecting overcurrents and protecting the system.

Specifically, IDMTL introduces a time delay when current exceeds a certain threshold, and the operating time decreases proportionally with current magnitude. This aids in rapidly responding to severe overcurrent situations to protect the system.

The reasons for using the IDMTL function include:

- **Comprehensive protection:** IDMTL considers time-current characteristics to comprehensively protect the system in various overcurrent situations, enhancing the safety of power systems.
- **Fault and anomaly detection:** Abnormal increases in current can indicate equipment faults or system anomalies. IDMTL promptly detects such situations to maintain system safety.
- **System flexibility:** IDMTL allows for adjustment of operating time based on current and time, enabling adaptation to various system configurations and operating conditions.

Additionally, it's beneficial to understand the settings of the IDMTL function. Settings can be adjusted according to system characteristics and requirements to ensure an appropriate level of protection. Furthermore, the IDMTL function can be customized to specific system components for optimal performance.

IDMTL comes in various types, with the three main types being:

- Standard Inverse (SIT):
  - Standard Inverse is one of the most commonly used IDMTL functions.
  - The operating time decreases rapidly as the current increases.
  - It has high time delay at low currents and low time delay at high currents.
- Very Inverse (VIT):
  - Very Inverse is designed to react more quickly to overcurrent situations.
  - The operating time decreases even more rapidly as the current increases.
  - It has higher time delay at low currents and lower time delay at high currents.

- Extremely Inverse (EIT):
  - Extremely Inverse is used when rapid response is needed in extremely severe overcurrent situations.
  - It has very short time delay even at very high currents.
  - This helps in quickly tripping the circuit to protect the system in extremely severe overcurrent situations.

These types of IDMTL operate differently based on current and time, allowing them to adapt to various situations. The required type may vary depending on the characteristics and operational requirements of the system.

Ground-fault (ANSI 50N/51N,51G)

Smart Trip Unit models A, P, and S are compatible with the selection of 50N/51N and 51G relay elements.
The 50N/51N element measures the magnitude of the ground fault current by calculating the vector sum of the current inputs from the R, S, T phases (3P) or R, S, T, N phases (4P). Meanwhile, the 51G element is designed to detect the magnitude of ground fault currents by utilizing an externally installed setup. It measures leakage currents through current inputs from either a Zero Sequence Current Transformer (ZCT) or a Ground Line Current Transformer (CT).

ANSI 50N (Instantaneous Neutral Overcurrent Relay)

ANSI 50N is used to detect instantaneous overcurrent in the neutral line of a power system.
The neutral line serves as the center for current flow in an electrical circuit, typically maintaining a voltage of 0V. When unexpected current surges occur in the neutral line, the circuit is immediately tripped to protect the system.

ANSI 51N (Time-Delayed Neutral Overcurrent Relay)

ANSI 51N detects overcurrent in the neutral line and operates only if the overcurrent persists for a specified duration.
In other words, the relay functions by tripping the circuit when the duration of the overcurrent exceeds a predefined threshold. This feature allows for a more cautious evaluation and response to overcurrent situations.

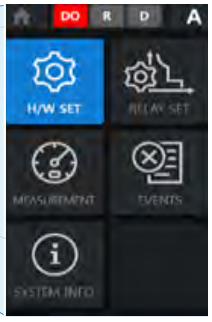
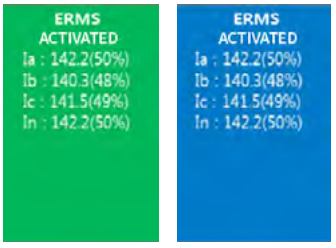
ANSI 51G (Time-Delayed Ground Overcurrent Relay)

ANSI 51G detects overcurrent in the ground and operates only if the overcurrent persists for a specified duration. It monitors overcurrent situations in grounded equipment and trips the circuit if the overcurrent continues for a predetermined period.

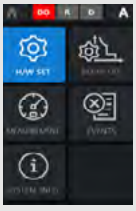
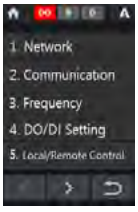
This is crucial for protecting equipment from ground-related issues and maintaining system safety. In summary, while ANSI 50N provides instantaneous detection and tripping for neutral line overcurrents, ANSI 51N and 51G operate with time-delayed tripping mechanisms, triggering only when overcurrent conditions persist beyond a set duration.

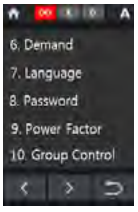
Smart trip unit

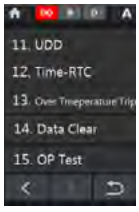
Protection element setting (P & S type)

Main menu	Button Functions	ERMS display
	Screen transition Return Cancel Enter	 • The screen during ERMS ON

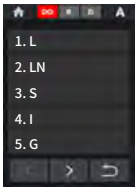
H/W SET display

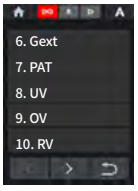



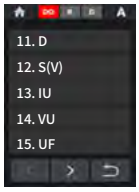


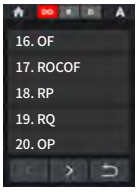


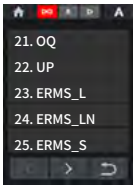
Relay SET display

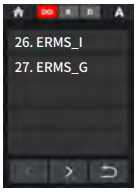





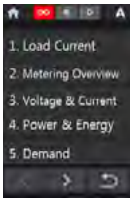


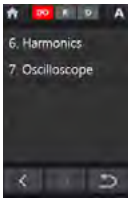




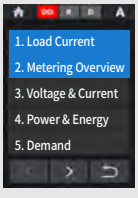


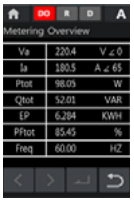
Measurement display

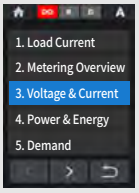
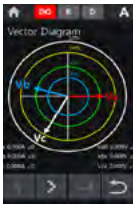
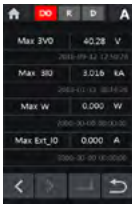
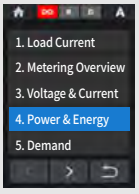
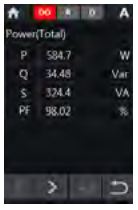
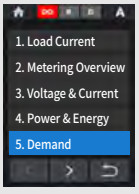
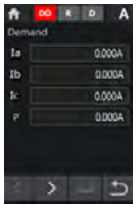
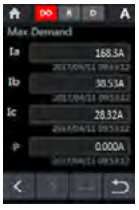
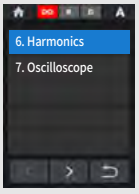
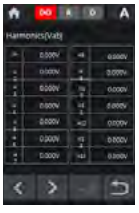
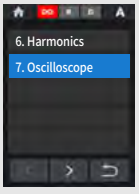
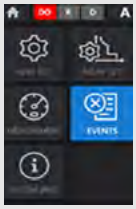
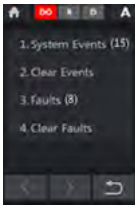
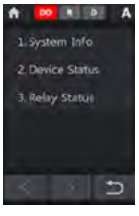





Load current / Metering overview



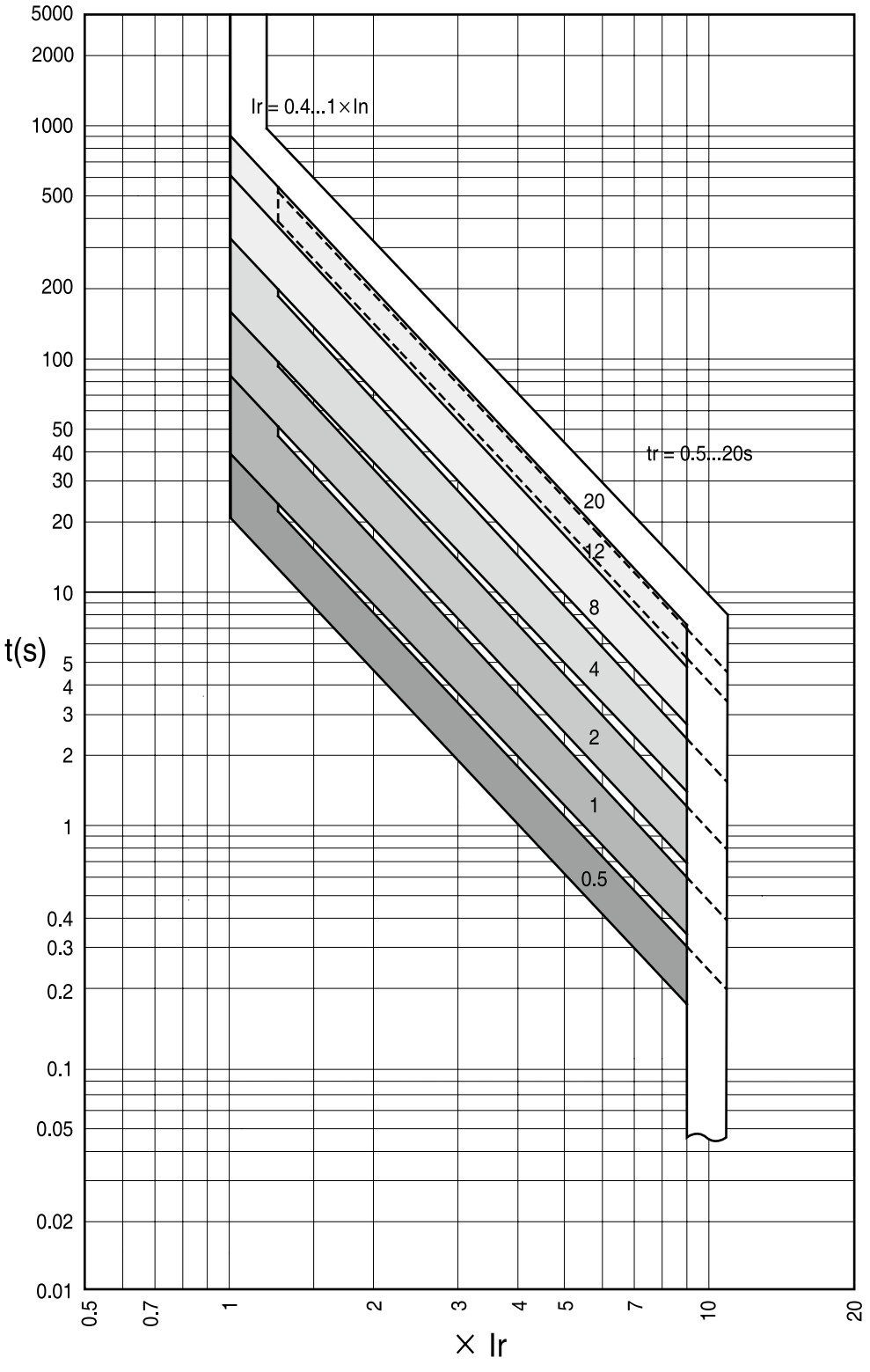


Voltage and current				
Power and energy				
Demand				
Harmonics				
Oscilloscope				
EVENT display				
System info display				

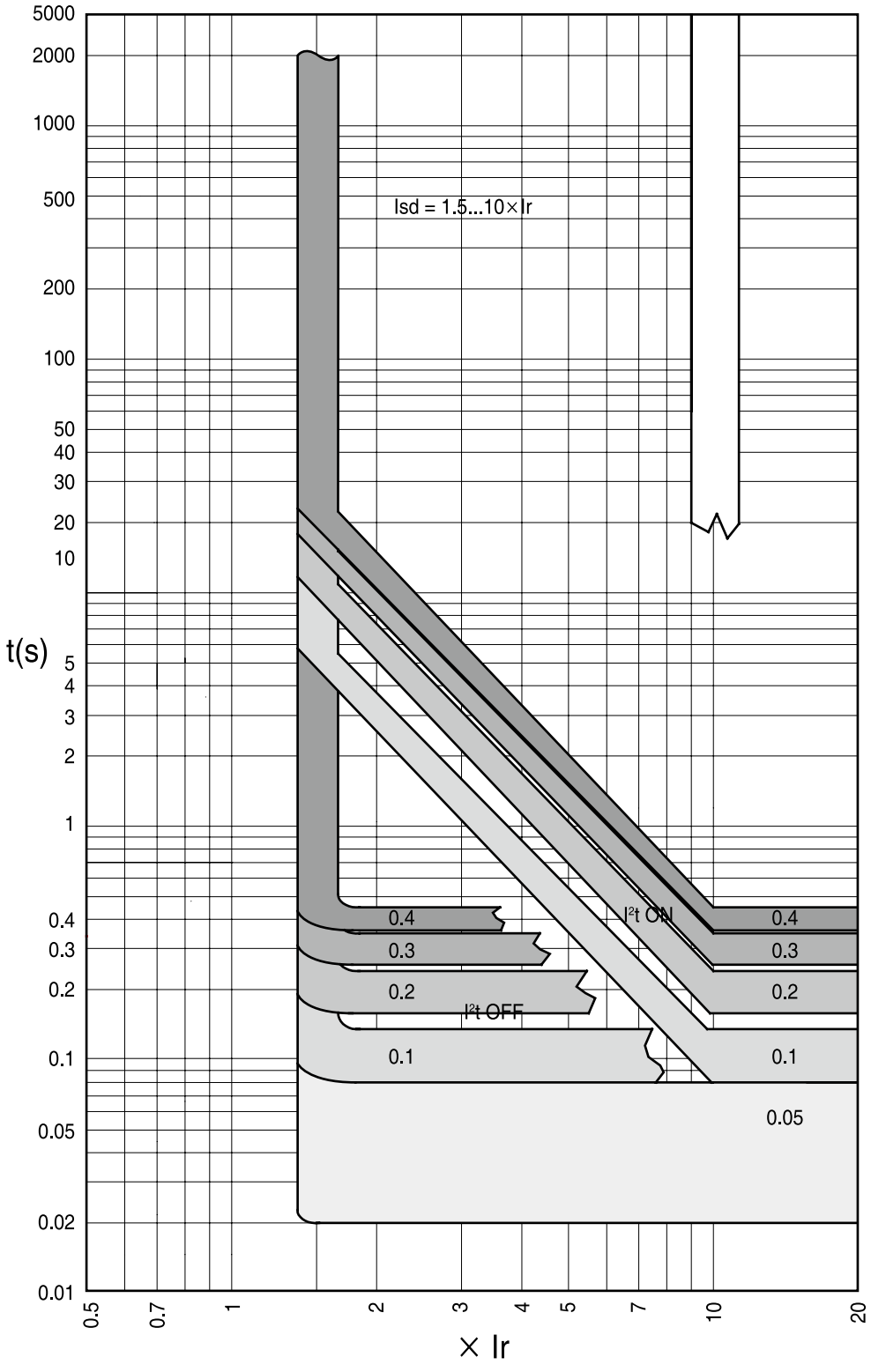
Smart trip unit

Characteristic curves

Long-time delay (L)



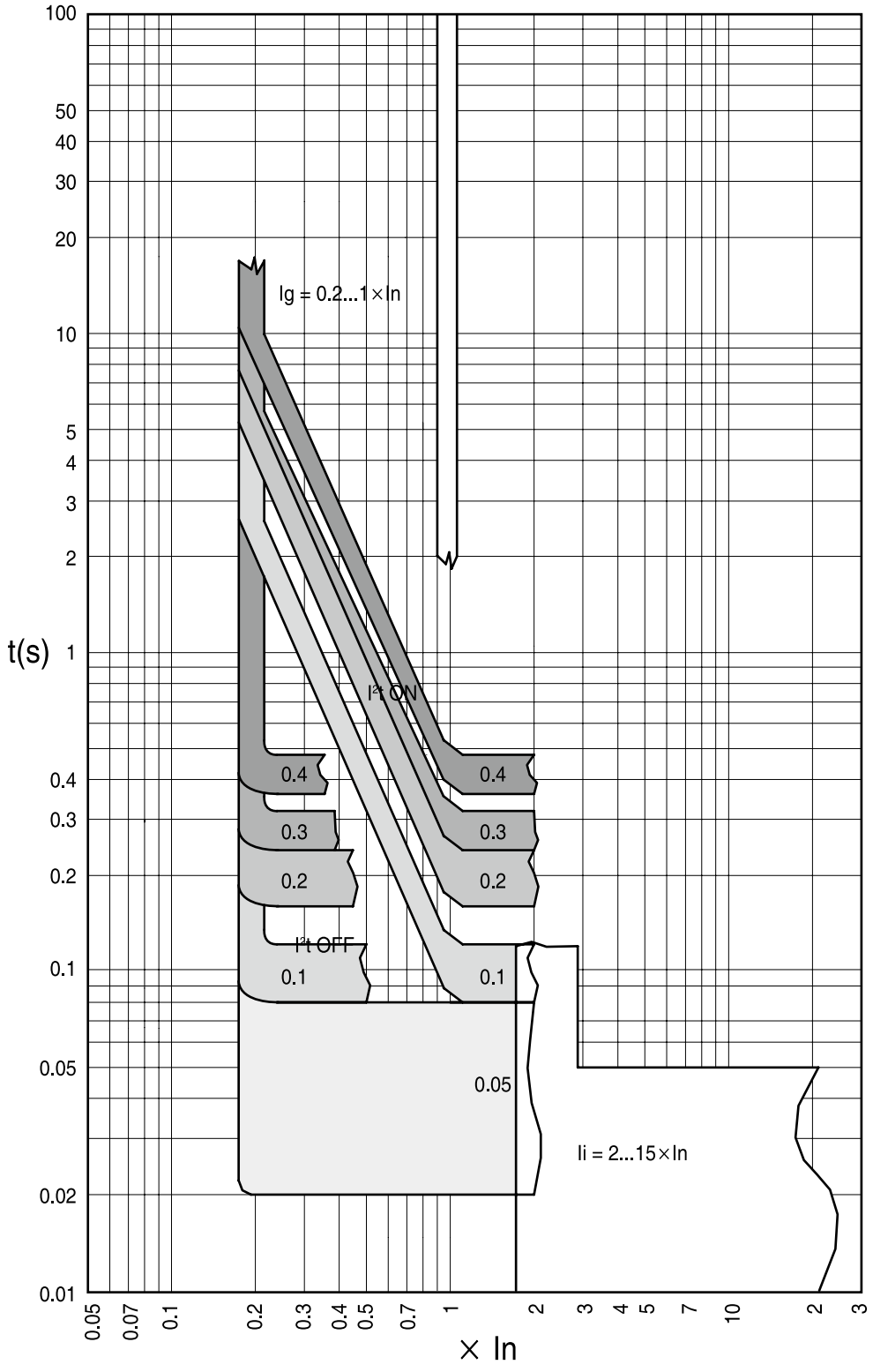
Short-time delay (S)



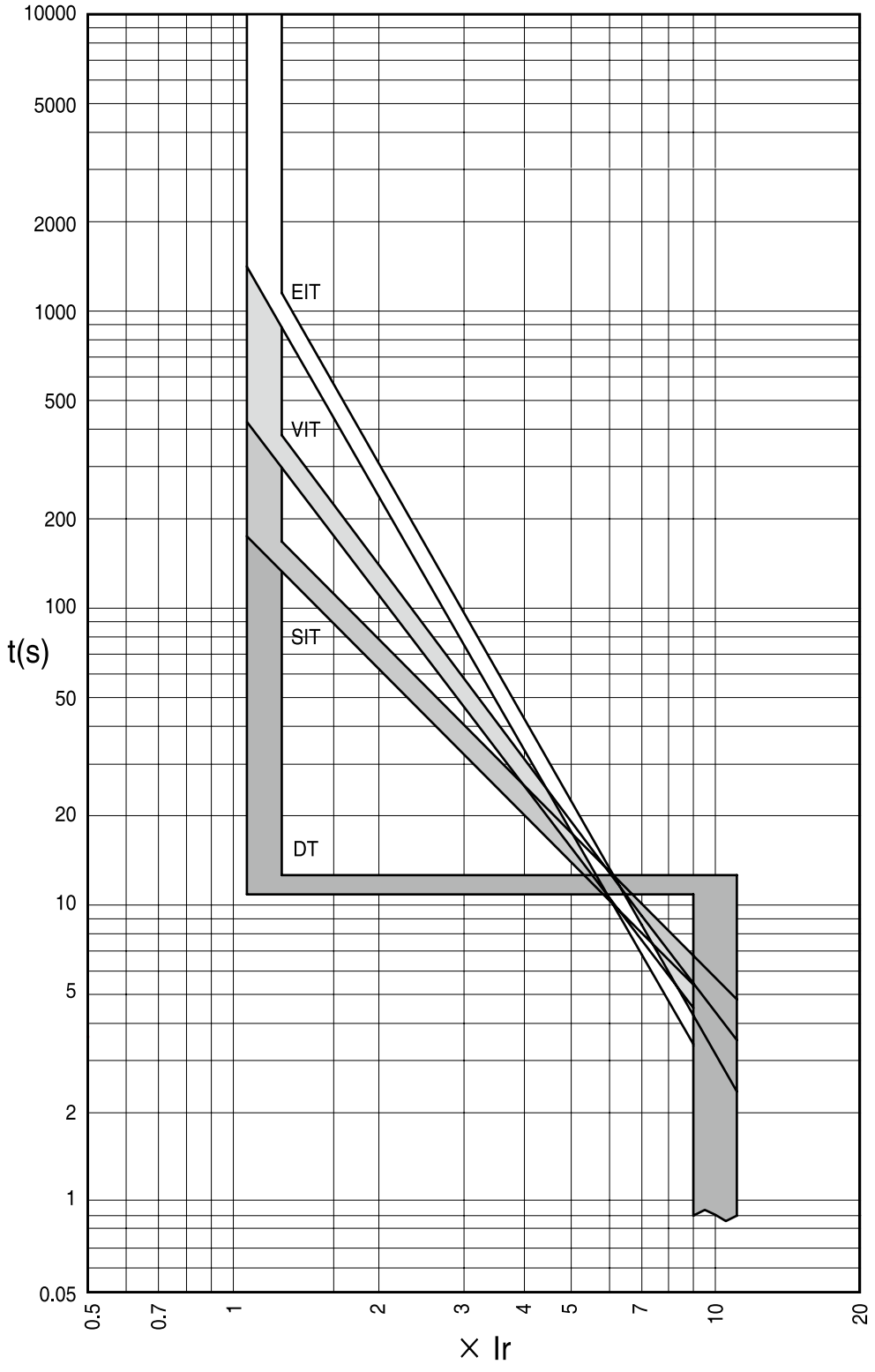
Smart trip unit

Characteristic curves

Instantaneous (I)
Ground fault (G)



IDMTL


10000
5000
2000
1000
500
200
100
50
20
10
5
2
1
0.05
t(s)
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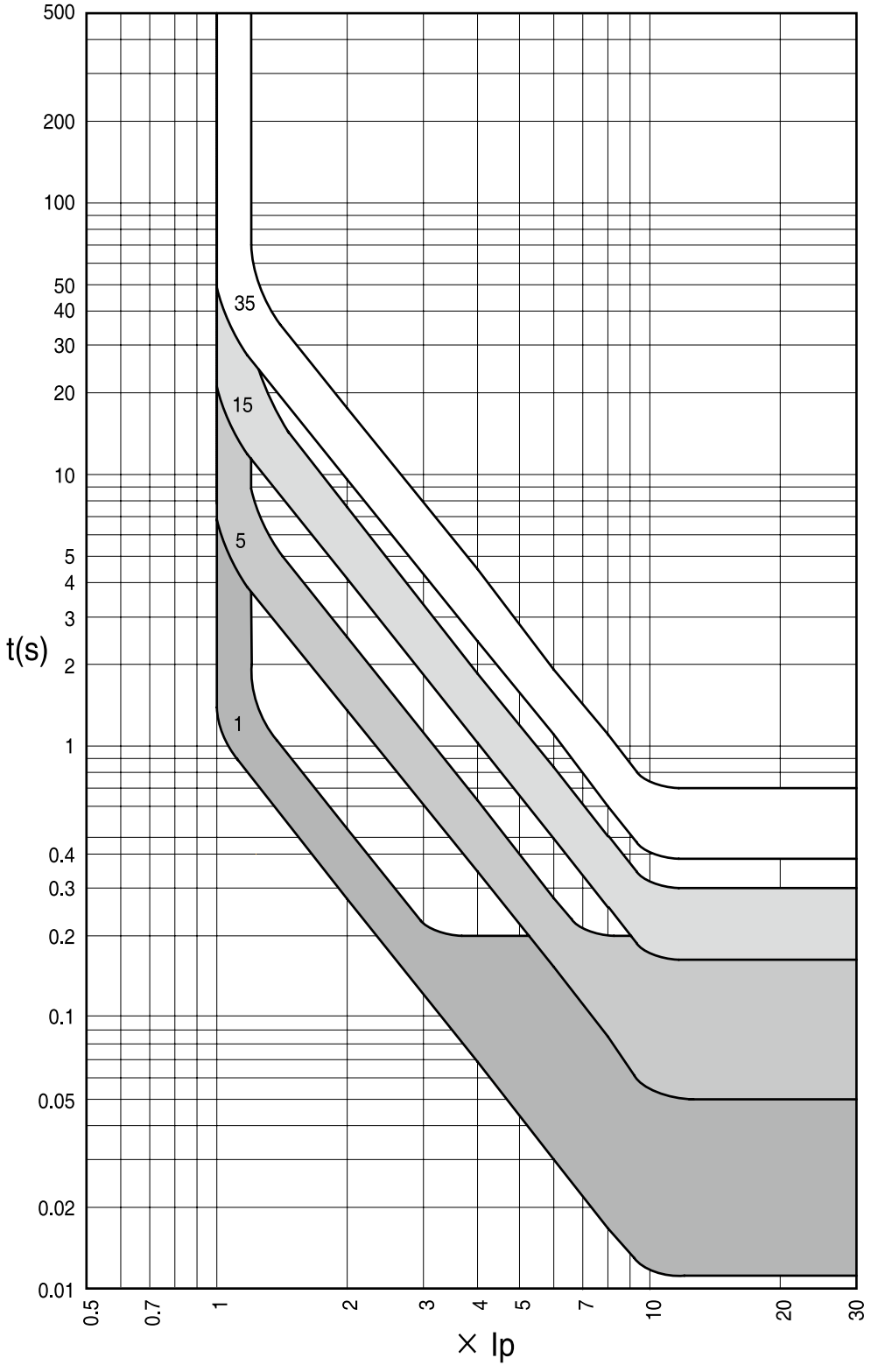
VIT
SIT
DT
0.5
0.7
1
2
3
4
5
7
10
20
× Ir

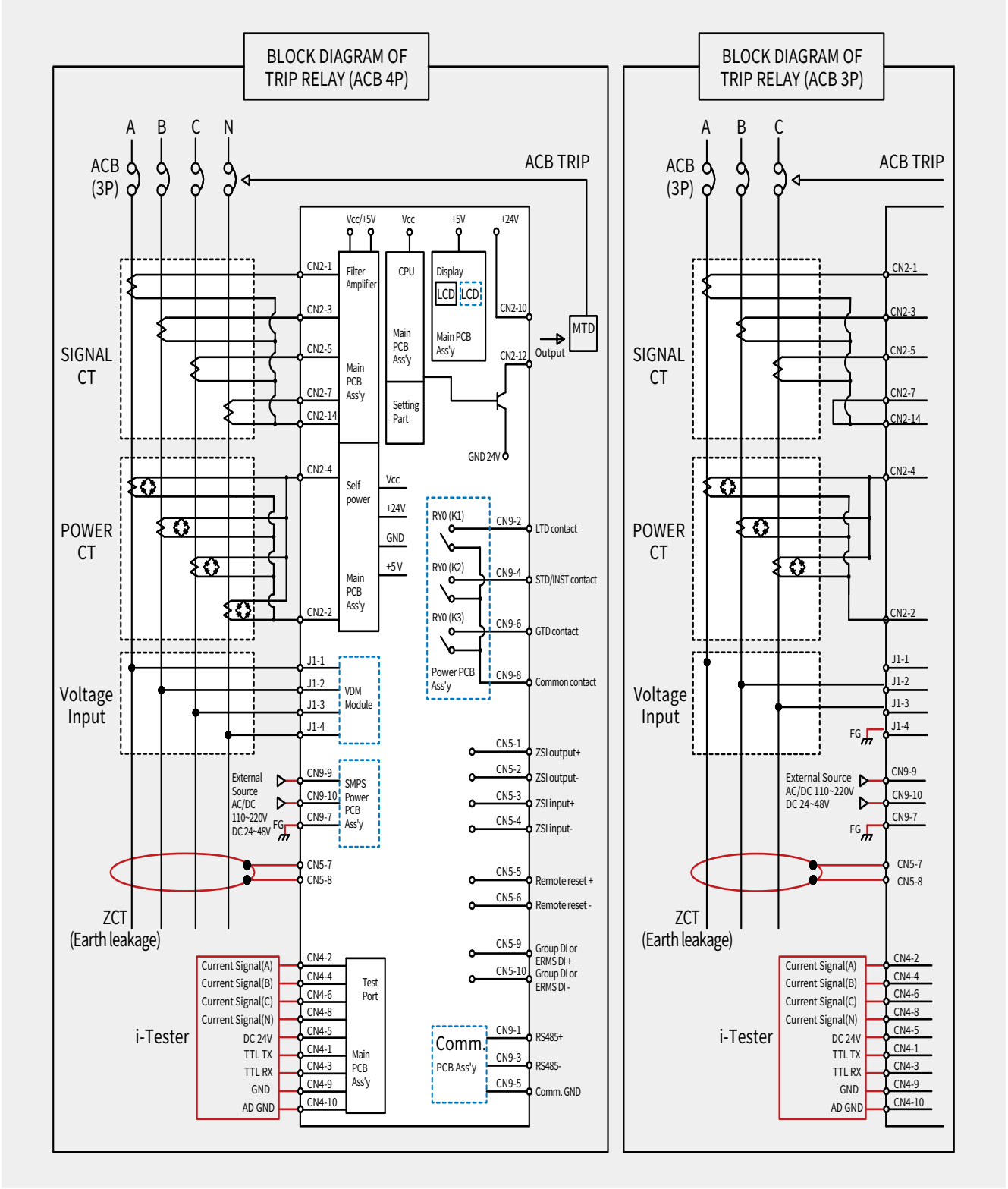
Smart trip unit

Characteristic curves

Pre Trip Alarm



System block diagram



Accessories

Beyond X™ Susol ACB's innovative modular design ensures simple installation and maintenance.

Table of Contents

Accessories

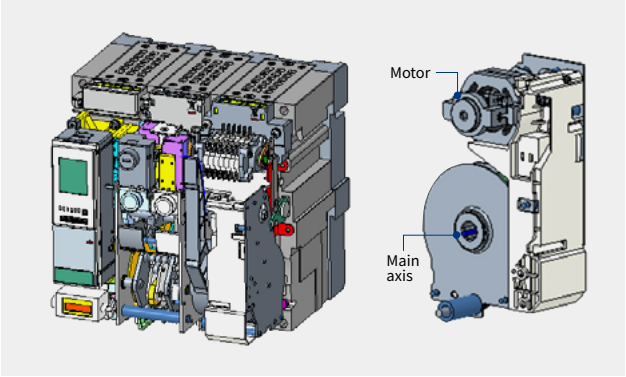
Motor [M]

Main Body

Motor(M) uses external power to automatically charge the breaker's closing spring. There are two types of spring charging methods for ACB: off-charge (commonly used) and on-charge. This is a method in which the motor is driven to charge the closing spring whenever the breaker is turned off or tripped.

The electrical circuit of the motor is separated from the ON/OFF operation circuit. When the closing spring is charged, the indicator on the mechanism shows "CHARGED" through the window on the front cover. This means that the breaker is ready to close by the on circuit or the manual "ON" button. If there is no control power supply, the manual spring charge handle can be used as a backup.

On the other hand, if the on-charge method is selected, the motor is driven to charge the closing spring automatically when the ACB is closed. This method can be used for high-speed reclosing duty. (O-CO-CO operation)



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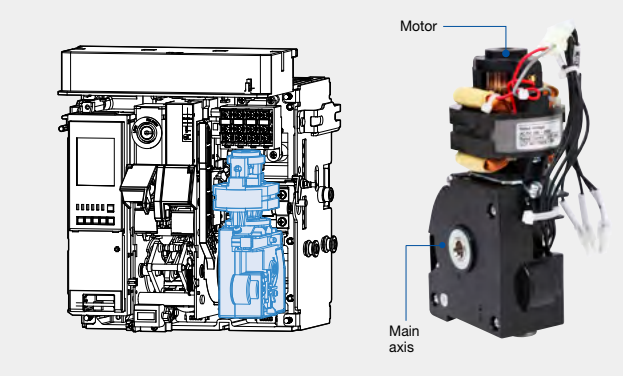

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Input voltade (V)	DC 24~30V	AC/DC 48~60V	AC/DC 100~130V	AC/DC 200~250V*	AC 380V**	AC 440~480V**
Load current (max.)	5A	3A	1A	0.5A	0.3A	0.3A
Starting current (max.)	5 times of load current					
Load rpm (motor)	15,000~19,000 rpm					
Charge time	Less than 5sec.					
Dielectric strength	2kV/min					
Using temperature range	-20°~60°					
Using humidity range	Max. RH 80% (No dew condensation)					
Endurance	15,000 cycle (Load connection, 2 times/mon)					
Charge switch	10A at 250Vac					

* 305Vac control power is also available for AC/DC 200~250V motors.
** Non UL Listed

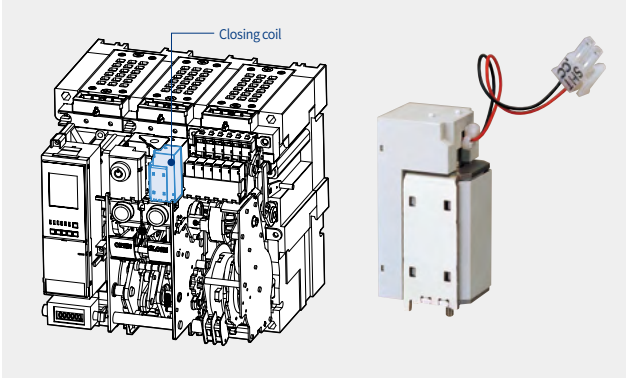
Closing Coil [CC]

Main Body

Closing Coil (CC) is a device that closes the main contact by electrically controlling the breaker remotely or on-site. The procedure for closing the breaker is done by energizing coil when applying the rated voltage to both ends of the CC coil continuously, or when the power is supplied instantaneously (200 ms or more).

This means that the closing spring energy which is charged by the motor or manual handle triggers the mechanism, and the closing operation of the main circuit contact is completed.

The closing coil circuit of the ACB is single-pulse type and is designed to operate normally even when the control voltage is applied continuously. Therefore, a separate burning prevention circuit is not required. The total closing time of the breaker is from the time the closing coil is energized to the time the main contacts are completely closed.



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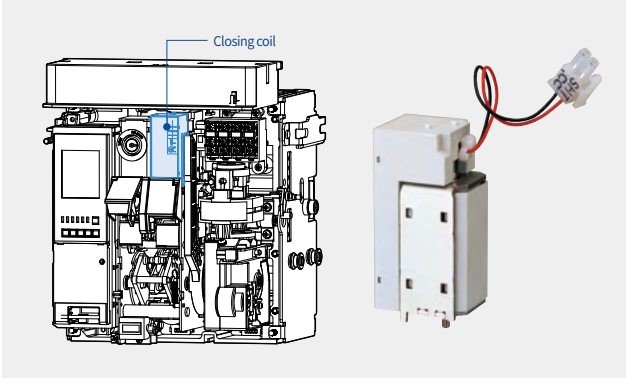
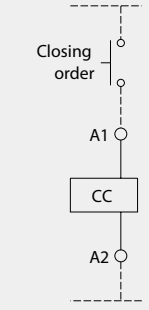


<C-Frame>

Rated voltage and characteristics of closing coil

Rated voltage (Vn)		Operating voltage range (V)	Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)		Inrush	Steady-state	
24~30	–	14 ~ 33	200	5	Less than 80ms/90ms * under
48~60	48	28 ~ 66			
100~125	100~125	70 ~ 140			
200~250	200~250	140 ~ 280			
–	380~480**	266 ~ 528			

Note: The minimum operating voltage is calculated with reference to the minimum rated voltage (Vn), while the maximum operating voltage is calculated with reference to the maximum rated voltage (Vn)
* Close time of G frame (3200~5000A) is less than 95ms.
** C-Frame cannot apply to 380~480V
** Non UL Listed



* Dotted lines are for customer connections

Wiring Diagram

Wire specifications

• Refer to the below table for wiring length and specifications when using trip coil with DC 24~30V or DC / AC 48~60V rated voltage.

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

Accessories

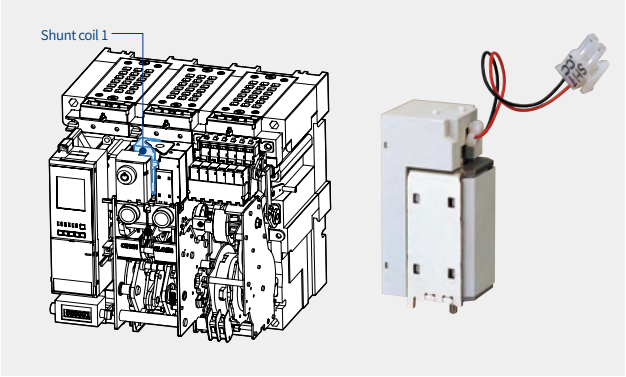
Shunt Coil [SHT1]

Main Body

The shunt coil (SHT) is an essential component of the breaker. It is a device that opens the grid by remote control or trips the ACB instantaneously by trip relay in case of fault current. The SHT consists of electronics and a solenoid coil. The SHT generates a magnetic field when power is continuously applied to both ends of the coil, or when voltage is applied instantaneously (200 ms or more).

This magnetic field interacts with the breaker's internal mechanism to immediately turn the breaker off. The SHT has the ability to open the line by remote control or trip relay, and with an additional double shunt coil (SHT2), it can be connected to an emergency stop system.

The SHT can also be used to implement an electrical interlock function in ACB with continuous rating.



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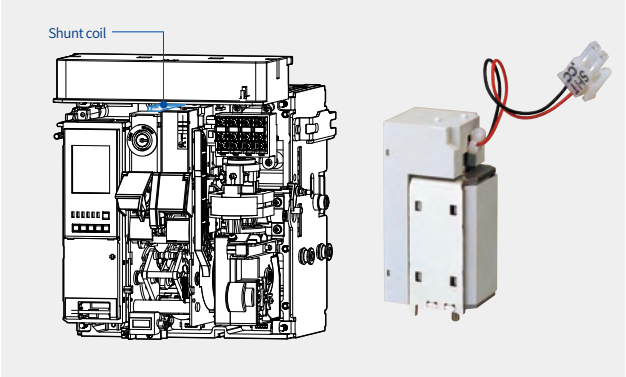
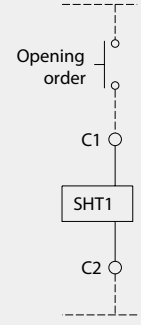


<C-Frame>

Rated voltage and characteristics of closing coil

Rated voltage (Vn)		Operating voltage range (V)	Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)		Inrush	Steady-state	
24~30	–	14 ~ 33	200	5	Less than 40ms under
48~60	48	28 ~ 66			
100~125	100~125	70 ~ 140			
200~250	200~250	140 ~ 280			
–	380~480*	266 ~ 528			

Note: The minimum operating voltage is calculated with reference to the minimum rated voltage (Vn), while the maximum operating voltage is calculated with reference to the maximum rated voltage (Vn)
* C-Frame cannot apply to 380~480V
* Non UL Listed



* Dotted lines are for customer connections

Wiring diagram

Wire specifications

• Refer to the below table for wiring length and specifications when using trip coil with DC 24~30V or DC / AC 48~60V rated voltage.

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

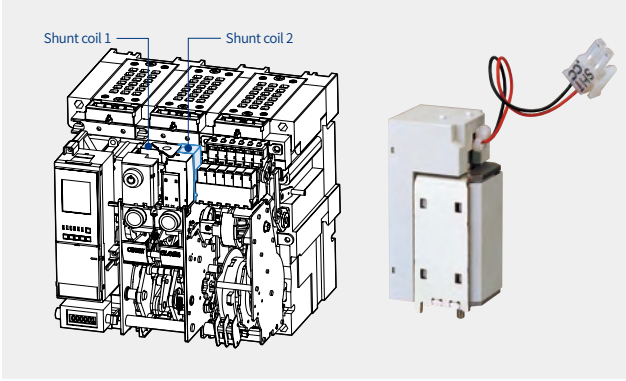
Double Shunt Coil [SHT2]

Main Body

Double shunt coil (SHT2) is a control device that plays an important role in maintaining the reliability and safety of circuit breakers. SHT is a device that opens the circuit breaker when an external protection relay operates in response to overcurrent or reverse power. SHT2 serves as a safety mechanism that remotely trips the breaker if the primary shunt coil (SHT1) does not operate normally.
SHT2 can also be connected to emergency stop systems.

When a fire or emergency occurs, it is necessary to immediately turn off the power to various equipment connected to the grid circuit. Pressing the emergency stop button on site or remotely will activate SHT2 and the system power is immediately cut off. However, SHT2 and UVT cannot be mounted on the same ACB.

- Shunt coil 1: Install at existing location.
- Shunt coil 2: Install on the right side of the shunt coil 1



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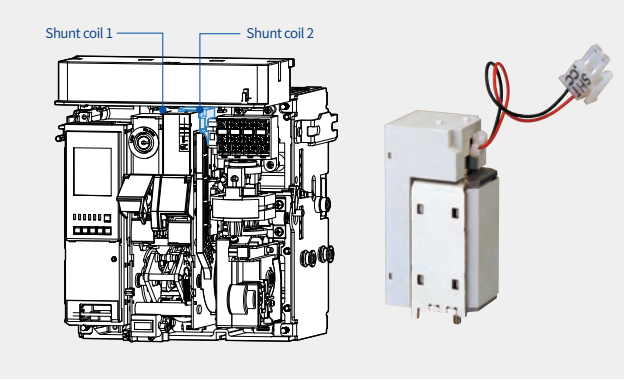
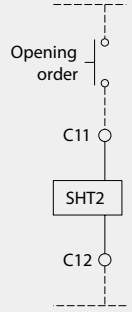


<C-Frame>

Rated voltage and characteristics of closing coil

Rated voltage (Vn)		Operating voltage range (V)	Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)		Inrush	Steady-state	
24~30	–	14 ~ 33	200	5	Less than 40ms
48~60	48	28 ~ 66			
100~125	100~125	70 ~ 140			
200~250	200~250	140 ~ 280			
–	380~480*	266 ~ 528			

Note: The minimum operating voltage is calculated with reference to the minimum rated voltage (Vn), while the maximum operating voltage is calculated with reference to the maximum rated voltage (Vn)
* C-Frame cannot apply to 380~480V
* Non UL Listed



* Dotted lines are for customer connections

Wiring diagram

Wire specifications

- Refer to the below table for wiring length and specifications when using trip coil with 24~30V or DC / AC 48~60V rated voltage.

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

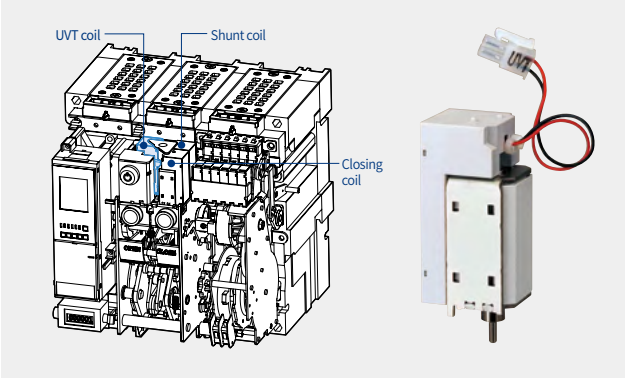
Accessories

Under Voltage Trip Device [UVT]

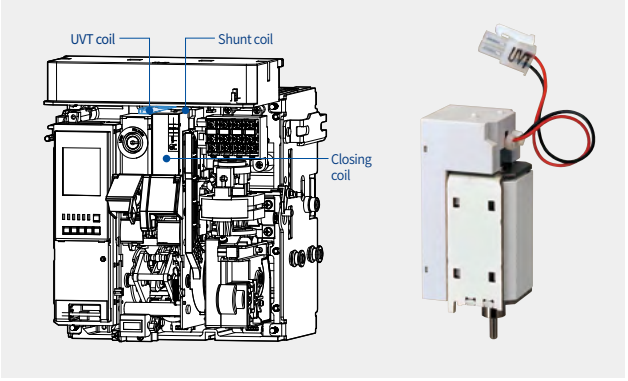
Main Body

Under Voltage Trip device (UVT) is used to monitor the voltage level of the control power supply and protect the power equipment from low voltage conditions. This is a function that automatically trips the breaker when the voltage drops below a certain threshold or when a power failure occurs, triggering the UVT. In an unstable situation where a large voltage drop occurs, the UVT trips the ACB to isolate the electrical line, preventing further damage or dangerous operation of the load side equipment.

The UVT is an optional feature, and the breaker cannot be electrically/mechanically closed when the UVT is not supplied with control power. Once power is restored to 65-85% of the rated voltage after a power outage, the ACB is ready for operation. UVT selection should be decided after reviewing and evaluating the power system situation and the required functions of the facility. Also, when selecting the UVT option, it is not possible to use the double shunt coil (SHT2) function on the same breaker.



D/E/G-Frame

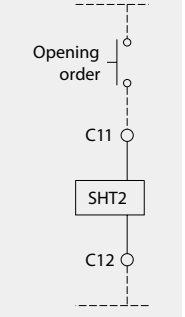


C-Frame

Rated voltage and characteristics of closing coil

Rated voltage (Vn)		Operating voltage range (V)		Power consumption (VA or W)		Trip time (ms)
DC (V)	AC (V)	Pick up	Drop out	Inrush	Steady-state	
24~30	–	0.85~1.1 Vn	0.35~0.7 Vn	200	5	Less than 50ms
48~60	48					
100~130	100~130					
200~250	200~250					
–	380~480*					

Note: The minimum operating voltage is calculated with reference to the minimum rated voltage (Vn), while the maximum operating voltage is calculated with reference to the maximum rated voltage (Vn)
* C-Frame cannot apply to 380~480V
* Non UL Listed



Wiring Diagram

Wire specifications

• Refer to the below table for wiring length and specifications when using trip coil with 24~30V or DC / AC 48~60V 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: The shunt coil is in a different location when using the UVT coil.

Auxiliary Switch [AX]

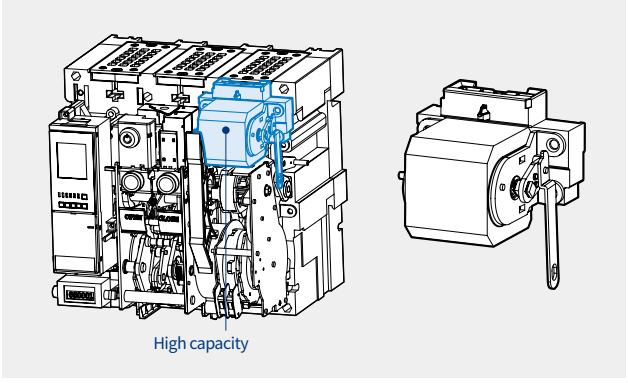
Main Body

The Auxiliary Switch (AX) is a switch mounted on the main shaft of the breaker and actuated by the rotation of the shaft. Its main function is to indicate to the distant operator whether the ACB main circuit is closed or open.

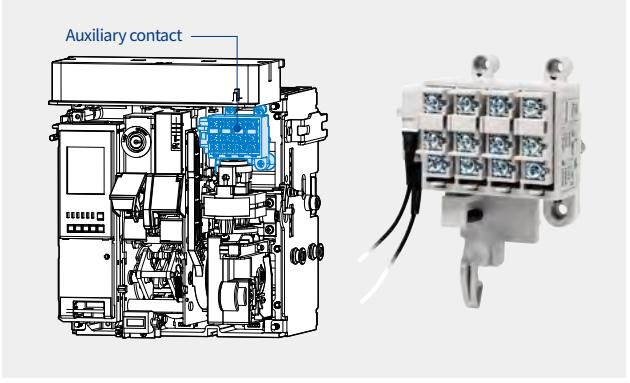
AX consists of two contacts, NO normally open contact "a" and NC normally closed contact "b" in one (1) set of up to six (6NO, 6NC) contacts.

When a breaker is switched on or off, AX reacts simultaneously and provides an electrical signal to an external monitoring system or control device. This allows individuals to check the breaker energization information provided and to open or close the circuit when necessary.

The AX is a micro-load capable switch, while the auxiliary switches of the withdrawable CB and DS operate only in the connected and test positions.
(Contact capacity of AX: 4 Vdc 1 mA)



D/E/G-Frame



C-Frame

Classification – D/E/G-Frame

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

Classification – C-Frame

Switch classification		Resistive load	
		Maximum	Minimum
Standard	FC, FX, LC	AC250V 3A AC125V 5A	DC5V 160mA
Micro load	PC, PX IOder No. 83011176209)	AC120V 0.1A DC30V 0.1A	DC5V 1mA

Accessories

Trip Alarm Contact [AL]

Main Body

Trip Alarm contact (AL) operates only when a circuit defect is detected, and the protective coordination function of the trip relay is activated to block the fault current. Trip alarm notifies the external device that the circuit breaker has tripped when electrical contact 1a is closed.

During AL operation, the LED lamps on the front of the trip relay, such as Ir, Isd/Ii, and G/PTA, repeatedly blink individually, and the red manual reset button (MRB) located on the top of the circuit breaker front cover also protrudes. The LED lamp and MRB linked to AL are not triggered by pressing the mechanical off button of the breaker or the electrical operation of the SHT but are triggered only by the breaker trip operation by the trip relay.

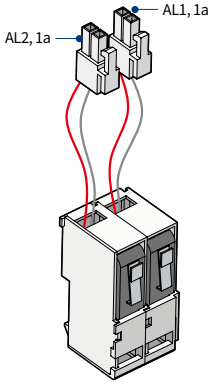
An AL-operated circuit breaker can only be turned on electrically and mechanically if it is returned by pressing the MRB. There are two types of MRB reset. It can be restored manually after on-site inspection or by ordering the optional automatic reset type RES (Remote Reset Switch).

When specifying an option during ordering, it will be attached and shipped.

In the case of RES (automatic reset type) circuit breakers, the interlock is automatically released after the circuit breaker trips, allowing re-input. When R11 and R12 terminals (dry contact) are common, the LED lamp on the front of the trip relay and the cause of the accident display relay contacts 524 (LTD), 534(STD/Inst), 544(GTD) terminals are reset remotely.

(STD/Inst), 544(GTD) terminals are reset remotely. Additionally, the LED lamp blinking, which operates by blocking fault current, can be restored to its original state by pressing the Reset button on the trip relay.

One (AL1, 1a) or two (AL1, AL2, 1a) trip alarm switches (AL) are provided depending on the order specifications. However, AL2 and RES cannot be used at the same time, and only one option can be selected between AL1 and RES or a combination of AL1 and AL2.

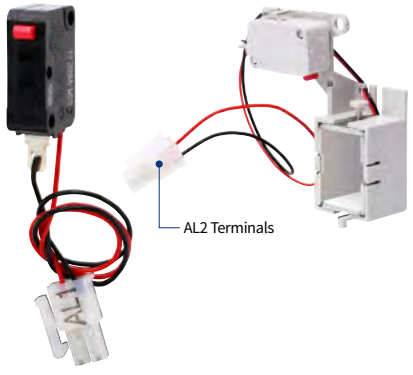


Characteristic – D/E/G-Frame

Classification	Standard		Notes
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	

Characteristic – C-Frame

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]

Main Body

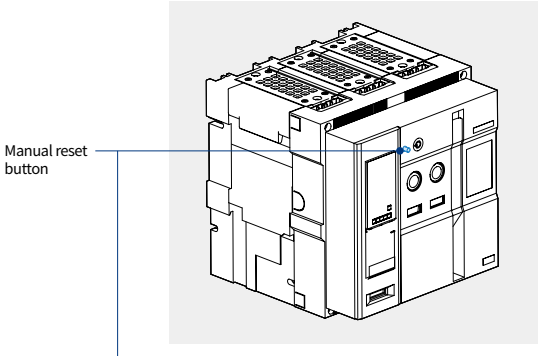
The Manual Reset Button (MRB) is a device that mechanically prevents re-opening of the fault circuit by activating the interlock function when the circuit breaker trips by the trip relay. A red indicator device protrudes from the front main cover so that accident trips can be visually recognized.

This interlock device button prevents re-energization until the breaker or utility fault is corrected. This is equivalent to giving the operator an opportunity to solve the problem through the process of first inspection or repair of the power equipment and grid circuit system at the site where abnormal overcurrent, ground fault, or short circuit occurred.

The next step is to reset the protection coordination of the trip relay or reset the breaker by pressing the MRB. With the return of the MRB, CB input is enabled, and at the same time, the alarm switch is reset.

For circuit breakers with the optional auto reset function, the mechanism can be turned on normally even when tripped by the trip relay, and only the alarm S/W is reset when the MRB is pressed.

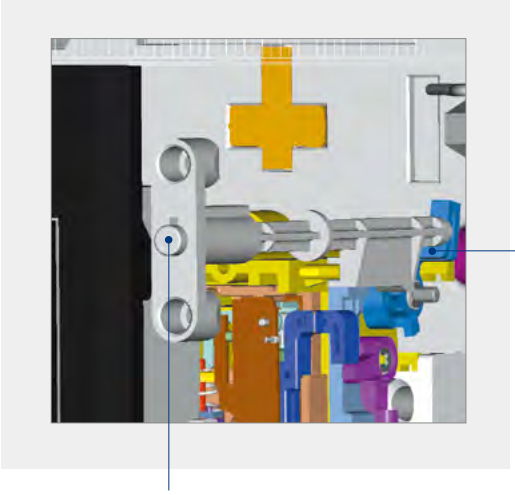
The MRB does not operate during general SHT and UVT operations or the circuit breaker trip process by pressing the manual OFF button, and protrudes from the front cover only when triggered by a trip signal from the relay.



Note: The manual reset button protrudes in the event of trip.

<D/E/G-Frame>

<C-Frame>



Accessories

Remote Reset Switch [RES]

Main Body

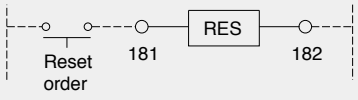
Remote Reset Switch (RES) is a function that changes a breaker tripped by fault current to a state where it can be re-closed remotely. This option is useful in environments where ACB needs to be reset, controlled and monitored from a distance without directly accessing the panel itself, making it convenient and providing safety in situations where access may be difficult or dangerous.

The standard ACB cannot be remotely reset when the current is cut off by the Trip Relay command. This is due to safety reasons such as facility inspection and restoration, and since RES is not attached to general products, reset is possible by pressing the MRB. At this time, if the trip unit's LED is on, press the red Reset button to turn off the blinking LED lamp.

RES operation is performed in the order that when the push button switch is operated from a distance, the breaker is reset by the micro switch installed inside the breaker and then automatically blocks the current supplied to the coil.

Recommended specifications for pushbutton switches

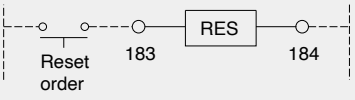
AC125V 10A, AC250V 6A, DC110V 2.2A, DC220V 1.1A resistive load AL2 and RES cannot be used at the same time, and only one option can be selected.



* Dotted lines are for customer connections

Wiring Diagram

<D/E/G-Frame>



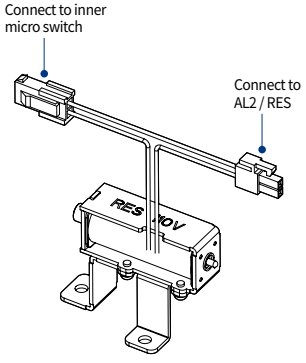
* Dotted lines are for customer connections

Wiring Diagram

<C-Frame>

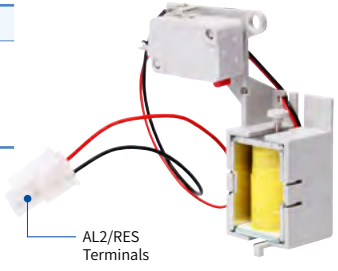
Characteristic – D/E/G-Frame

Rated voltage	Operating current(Max.)		Operating time	Wire specification
AC/DC 100~130V	AC	6A	Less 40ms	#14 AWG (2.08 mm²)
	DC	5A		
AC/DC 200~250V	AC	3A		#16 AWG (1.31 mm²)
	DC	2.5A		



Characteristic – C-Frame

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



Charge Switch [CS1] / Charge Switch Communication [CS2]

Main Body

Charge Switch (CS1) and Charge Switch Communication (CS2) refer to the mechanism that controls the completion of charging of the closing spring. This is a function to check whether the main circuit is ready to be closed when the breaker is operated remotely. ACB implements this function by being equipped with a 2a contact that outputs a signal to the outside when motor charging is completed. The signal output of contact point configuration 2a is divided into 1a contact point for communication and 1a contact point for spring charge completion and plays an important role in ensuring that the circuit breaker operates effectively.
The 1a contact point for communication can be used with a separate communication module (Remote I/O) to check the contact status through communication. The charge switch capacity applied to ACB is 10 A at 250 Vac.

Classification	Standard	
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

Accessories

Lockable On / Off Button Cover [B, B1]

Main Body

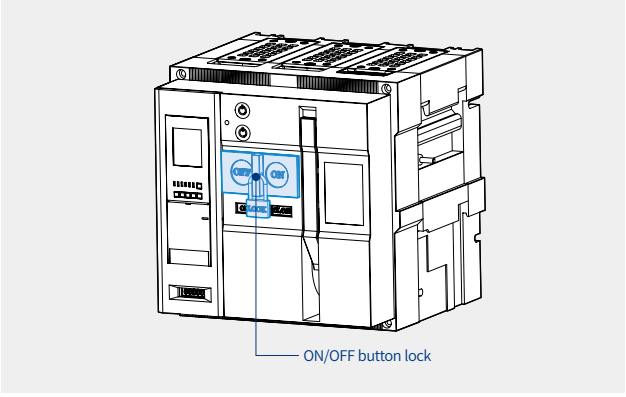
Button cover (B) protects the ON or OFF button of the breaker from inadvertent or unauthorized manual operation in the field. The button cover (B) can be locked with a padlock or cable tie (also known as zip ties or tie wraps).

This padlock ensures that the ACB remains in a secure condition and is protected from accidental button operation, unplanned energization or power outages. This is very important for accident prevention activities in facility operation and maintenance situation. When the button cover is locked with a padlock, manual on/off operation of the breaker is not possible, but it is possible to electrically operate the motor remotely to charge the closing spring and open/close the circuit.

There are 3 types of button covers, and when placing an order without selecting an item, it will be shipped as 56773460012. Item 56773460004 has a metal button cover material, and item 56773460016 has a flap door type that allows for simultaneous locking of the On/Off button or selective padlocking of either the On or Off button.

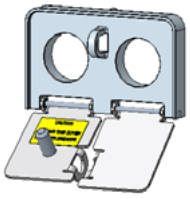
Please refer to the picture for the size of the suitable padlock.

The padlock / lockout kit is not included.
(The suggested diameter of shackle is ¼ inch or 5~8mm)



<D/E/G-Frame>

<C-Frame>

Button cover types			
Frame	**56773471612**		
C			
Frame	**56773460012**	**56773460004**	**56773460016**
D/E/G			

<Button cover types>

Mechanical Interlock [MI]

Main Body | Cradle

A Mechanical Interlock (MI) can be installed between two or three breakers and a switch-disconnector, either horizontally or vertically, using flexible cable. MIs are supplied separately as a kit for customer assembly and are installed on the right side of each breaker.

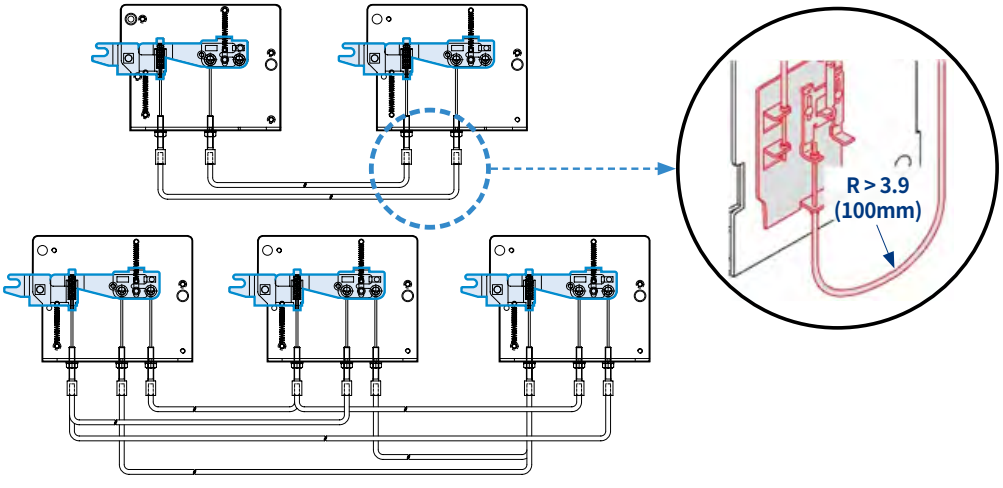
The MI Kit is an interlock system that allows the ACB to interrupt overcurrent or quickly switch to a spare line in the event of a grid fault or emergency. It is a mechanical interlock system to prevent the simultaneous operation of two breakers connected by a flexible cable. Its main function is to allow electricity to flow through only one breaker circuit at a time, preventing dangerous situations such as short circuits or overloads.

The ACB withdrawable MI interlocks only in the "CONNECTED" position and does not operate in any other position. For MI to operate normally, the breaker must be equipped with the necessary electrical and mechanical accessories for remote and field control. (Motor, CC, SHT)

To order mechanical interlocking, add "M" to the ACB body description code and separately select 2-Way or 3-Way from the "MI Kit" code in the table below. The MI kit is shipped separately, and field installation requires compliance with the recommended bending radius of the flexible cable. If the bending radius is small, the interlock may not operate completely. (Bending radius: R≥100mm, 3.9")

<D/E/G-Frame>

<C-Frame>



Frame	Specification	Item code	Description
C	2way, 2m	56123460502	INTERLOCK ASS'Y, MECHANICAL, WIRE-2WAY
C	3way, 3m	56123460503	INTERLOCK ASS'Y, MECHANICAL, WIRE-3WAY
D/E/G	2way, 2m	72313460791	TOTAL ASS'Y M/I KIT, WIRE_2WAY, AN, AS, AH-D, E, F, G, A/S
D/E/G	2way, 2.6m	72313460792	TOTAL ASS'Y M/I KIT, WIRE_2WAY, 2.6m, AN, AS, AH-D, E, F, G, A/S
D/E/G	3way, 3m	72313460793	TOTAL ASS'Y M/I KIT, WIRE_3WAY, AN, AS, AH-D, E, F, G, A/S

Accessories

Door Interlock [DI]

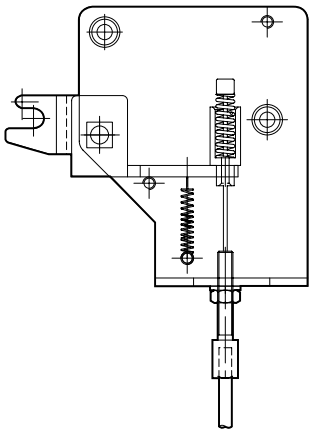
Main Body | Cradle

Door Interlock (DI) is an interlock device that prevents the front door of the switchgear from opening when the ACB is in the "ON" state. DI is a very important optional function for safety that prevents accidental contact with live parts of the load line when maintenance or facility inspection is required.

There are two types of DI: Normal type and Catch type. The normal type is interlocked to prevent the switchboard door from opening when the breaker is in the "ON" state. When using DI, MOC (Mechanical Operated Cell-switch) cannot be selected at the same time.

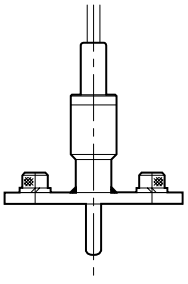
Catch type DI is installed on the cradle and is a device that opens the switchboard door in the breaker "Disconnected" position regardless of the ACB "ON" or "OFF" status. However, it is a special type in which the door does not open in the "Connected" and "Test" positions, just like the normal type. Catch type DI can be selected as left or right depending on the installation direction of the switchboard door. Please refer to the guide below for installation method and switchboard configuration.

Normal type

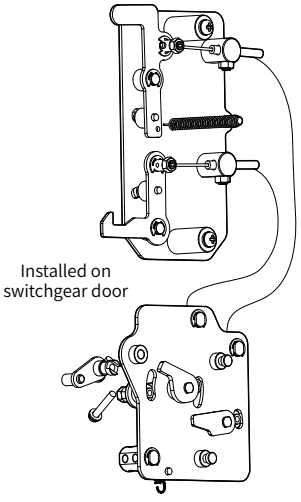


Install on the side plate of ACB cradle

<D/E/G-Frame>

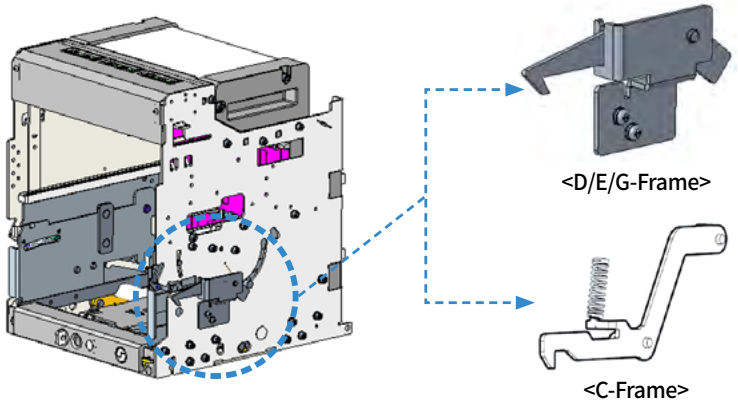


Install on the door of panel



<C-Frame>

Catch type



<D/E/G-Frame>

<C-Frame>

Mechanical Operate Cell switch [MOC]

Main Body | Cradle

Mechanical Operated Cell-switch (MOC) is typically used when additional auxiliary contacts (Aux Switches) are required beyond the number that can be configured on the breaker. MOC is an accessory that indicates whether the main circuit contact point inside the ACB body is open or closed, so it can be used instead of an auxiliary switch.

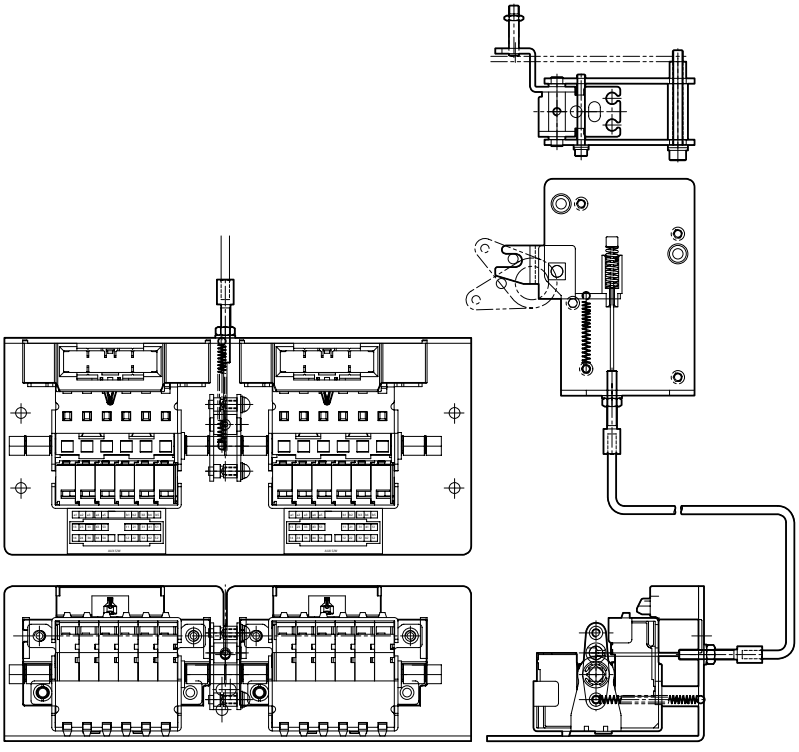
ACB MOC operates mechanically only when the main body is in the "Connected" position, and is composed of 10 high-capacity rotary switch auxiliary contact points so that the breaker status can be checked from the outside.

The auxiliary switch (AX) installed inside the circuit breaker is a switch that indicates the ON/OFF status in all "Connected", "Test", and "Disconnected" positions.

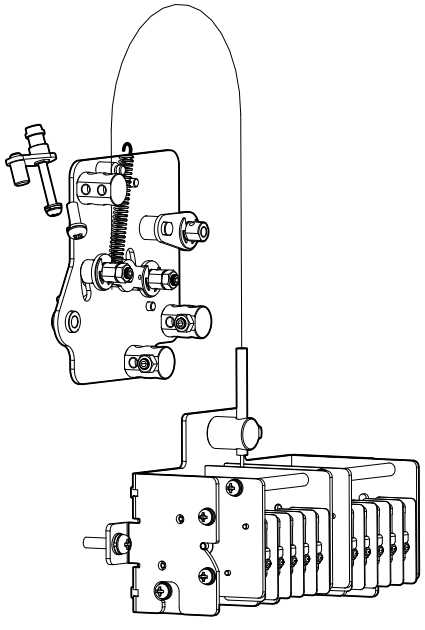
The links that make up the MOC can be installed on the cradle, and the rotary switch contacts can be installed in the space inside the panel.
MOC operation is performed through the PIN connected to the main shaft of the ACB body. Therefore, Door Interlock (DI) and MOC, which operate with the same PIN, cannot be used at the same time.

The auxiliary contact capacity of MOC is shown in the table below.

Classification			Resistive load (A)	Inductive load (A)
Minimum current			5 Vdc, 1 mA	
Contact capacity (V)	AC	125	10.0	10.0
		250	10.0	10.0
		490	5.0	2.5
	DC	30	10.0	10.0
		125	10.0	6.0
		250	3.0	1.5



<MOC for D/E/G-Frame>



<MOC for C-Frame>

Accessories

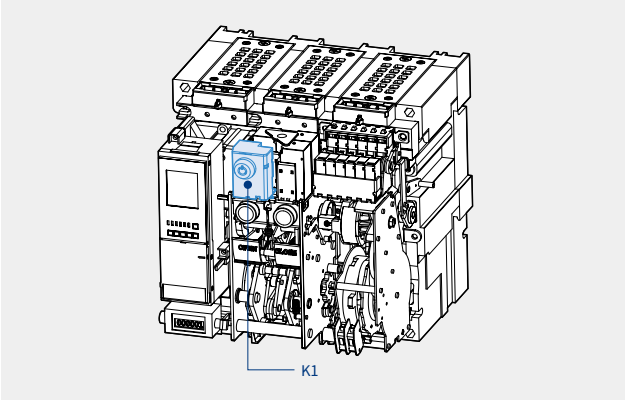
Key Lock (Single) [K, K1, K5, K6, K7]

Main Body

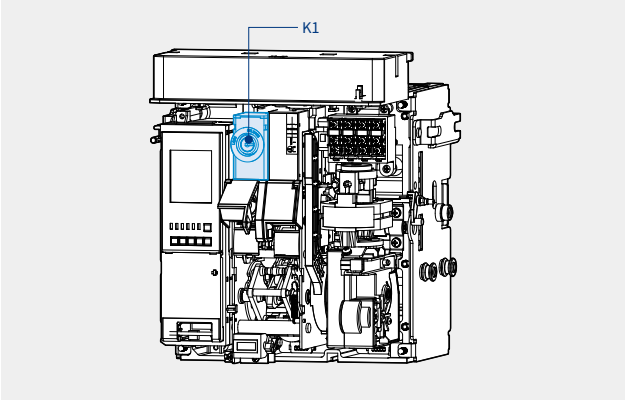
ACB Key Lock (K) is a mechanism used to prevent unauthorized people from accessing and controlling circuit breakers and prevent unauthorized on/off operation without ignoring manager permission or complying with operating procedures. Key lock is a locking device used to prevent arbitrary operation of a specific circuit breaker when using not only one ACB but also two or multiple ACBs.

All ACB key-locks are optional products, and the basic type K1 has a function that prevents the on operation of each individual breaker. For the K1 lock, press the breaker's Off button and turn the key counterclockwise. When the operation of the key lock device is completed, the circuit breaker is not turned on mechanically or electrically.
Other key lock types and functions are shown in the table, and K cannot be selected repeatedly.

K4 is an option that provides multiple keys with the same serial number. All ACB products with "K4" in the product name are provided with the same key.



<D/E/G-Frame>



<C-Frame>

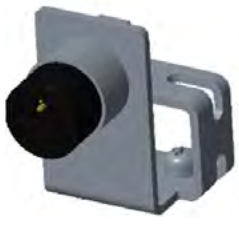
Key lock for factory installed

Code	Description	Installed	Applicable Frame
K	Key lock (Normal)	Factory	C
K1	Key lock (Normal)	Factory	D/E/G
K5	PROFALUX lock (CAMLOCK type)	Factory	D/E/G
K6	Kirk key lock (CAMLOCK type)	Factory	D/E/G
K7	Kirk key lock (CN-22 type)	Factory	D/E/G

Key lock modules for field installed (Key lock does not included)

Key lock Type	Description	Code	Applicable Frame	Key lock part number
CAMLOCK	PROFALUX lock, Single	54623460001	D/E/G	-
CAMLOCK	Kirk key lock, Single	54623460001	D/E/G	KCAM00010
CN-22	Kirk key lock, Single	72313460864	D/E/G	KC40-10

<K1>



<K5>

<K6>

<K7>

Key Interlock Set [K2]

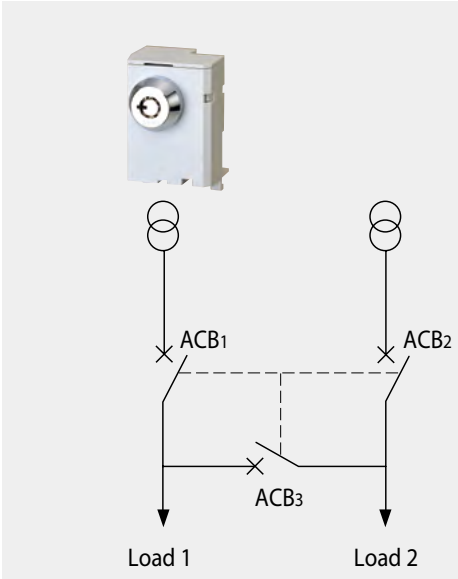
Main Body

Key Interlock Set (K2) consists of a system with three circuit breakers to supply stable power.
K2 is a lock (key bundle) function built into each circuit breaker and can configure the interlock to operate in an appropriate order and procedure to prevent multiple main or reserve powers from being turned on at the same time.
This is an interlock mechanism that prevents simultaneous input of multiple ACB power supplies and prevents accidental load transfer or unauthorized switching.

To order K2, three circuit breakers must be ordered as a set, and the K2 model name must be added to each circuit breaker. All K2 Option circuit breakers are equipped with the same lock, and only two keys are provided per three circuit breakers at the time of shipment. A keyless breaker cannot be turned on, but other breakers can be turned on, so in the case of a main1-tie-main2 system, power can be supplied to Load 1 and Load 2 simultaneously by turning on two breakers at once or turning on one main breaker.

ACB1	ACB2	ACB3	Status	
			Load 1	Load 2
●	●	●	OFF	OFF
●	○	○	ON	ON
○	●	○	ON	ON
○	○	●	ON	ON
●	●	○	OFF	OFF
●	○	●	OFF	ON
○	●	●	ON	OFF

○: Release ●: Lock



Key lock for factory installed

Code	Description	Installed	Applicable Frame
K2	Key lock(Normal, Interlock set)	Factory	C/D/E/G

Accessories

Key Lock (Double) [K3]

Circuit breakers equipped with double key lock (K3) can be opened and closed only when the mechanical interlock is simultaneously released using two keys.

Using K3 is the same as K1, and it is possible to use a padlock to lock the circuit breaker in the off position. This function prevents the circuit breaker from turning on. It uses the ACB to implement essential safety and control functions that ensure the utility operates as intended by utility managers.

※ D/E/G-Frame Only

Main Body

<D/E/G-Frame>

Key lock for factory installed

Code	Description	Installed	Applicable Frame
K3	Key lock(Normal, Double)	Factory	D/E/G

Key lock modules for field installed (key lock does not included)

Key lock Type	Description	Code	Applicable Frame	Key lock part number
CAMLOCK	Kirk key lock, Double	72313460902	D/E/G	KCAM00010

Key Lock [K4]

Key Lock (K4) is an option that provides multiple keys with the same serial number. All ACB products with "K4" in the product name are provided with the same key.

※ D/E/G-Frame Only

Main Body

Key lock for factory installed

Code	Description	Installed	Applicable Frame
K4	Key lock(Normal, Single, Same key)	Factory	C/D/E/G

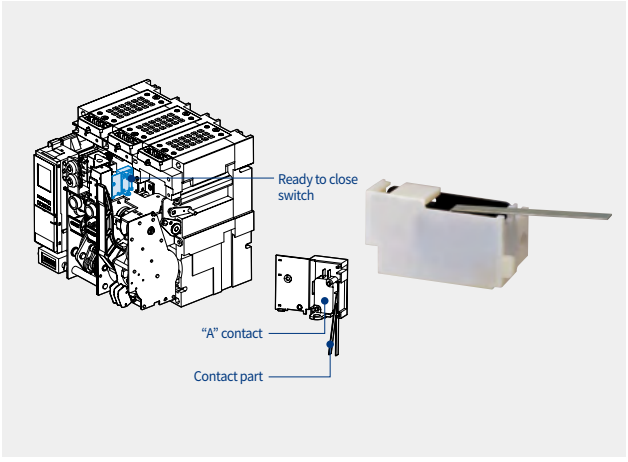
Ready to Close Switch [RCS]

The Ready-to-Close Switch (RCS) is an important component that is linked to the breaker mechanism and ensures that the remote system is ready to pressurize the electric line safely and stably.
When ACB is off and the closing spring is charged, an "On" state electrical signal is provided to the micro switch contact point.

This is a valid option for preventing accidental closing with a visual indication device that ensures that circuit breakers operated by a spring energy mechanism can safely close the circuit when certain conditions are met.

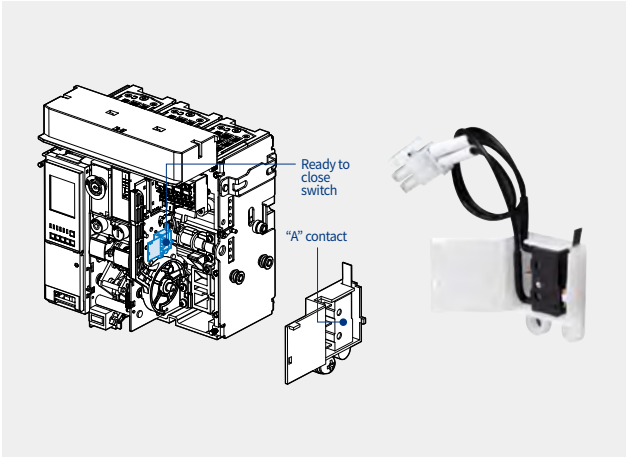
The electrical capacity of this signal contact point is as shown in the table below.

Main Body



<D/E/G-Frame>

Main Body



<C-Frame>

Characteristic of RCS for D/E/G-Frame

Classification	Standard	
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

Characteristic of RCS for C-Frame

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

Accessories

Temperature Remote Input Output [TRIO]

Main Body

TRIO (Temperature Remote Input Output) module is a device installed in a low-voltage panel or distribution board to measure ACB temperature, monitor On/Off status, and control remote opening/closing operations. TRIO can be expanded with DI/DO through communication linkage with Trip Unit (STU). ACB can be turned on and off using communication protocol Modbus RS485 communication.

There are two types of temperature sensors for temperature measurement and monitoring using the TRIO module. There is a non-contact type that is shipped attached to the inside of the ACB and a contact type that is attached to the busbar when the customer installs the circuit breaker on the panel. To check the temperature, the temperature value of 0 ~ 150°C for each channel (Phase) is displayed on the LCD in 1°C increments.

The temperature displayed on the TRIO module is the maximum of the input temperatures. Data is transmitted through real-time communication and a temperature alarm is set. When the temperature rises above the set value, the warning LED blinks every second and DO is output. There are four alarm temperatures that can be set: 55, 65, 70, and 80°C.

Exterior

Specification

Item	Description	Notes
Rating voltage	110 ~ 220V AC/DC	50/60Hz
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	-
Dimensions (W×H×D)	108(W)×81(H)×65.6(D), unit : mm	-
Ambient air temperaturefor operation	-25 °C ~ +60 °C	-
Ambient air temperature for Storage	-30 °C ~ +70 °C	-
Humidity	Under 85% (Dew will not form)	-

Example

Accessories

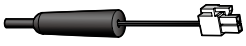
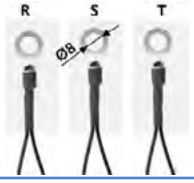
Temperature Monitoring

Main Body

TRIO unit is a device that can detect and display the temperature input through a temperature sensor. Up to two non-contact sensors can be installed inside the ACB, and the output of the sensors is connected to the ACB's control terminal block.

The contact temperature sensor is provided in the form of a 5/16 Inch (M8) Insulated Cramp Ring Terminal so that it can be attached to the ACB external panel or terminal busbar. The provided sensor cable insulation strength is 600 V, and it consists of a total of 4 wires with a length of 3 m that can be installed on each phase. The temperature measured by each temperature sensor is displayed for 2 seconds.

TRIO's rating voltage is DC 24 V. If the switchboard control power is not DC 24 V, a separate SMPS (Switching Mode Power Supply) is required. LS supplies power modules for AC/DC 240 V power.

Temperature sensor	**Non-contact type**	**Contact type**
Part No.	DD103JC	DS103HF
Installation	Inside ACB	Terminal Busbar
Center-Temp / R-Value	25°C / 10000 Ω	25°C / 10000 Ω
R-Tolerance of Center Temp.	5 %	3 %
Test Condition	Zero Power	Zero Power
B-Condition	(25/85)°C	(25/85)°C
B-Tolerance	3720.1 K	3970.0 K
Item Code	-	7231 3460 280
Product reference		

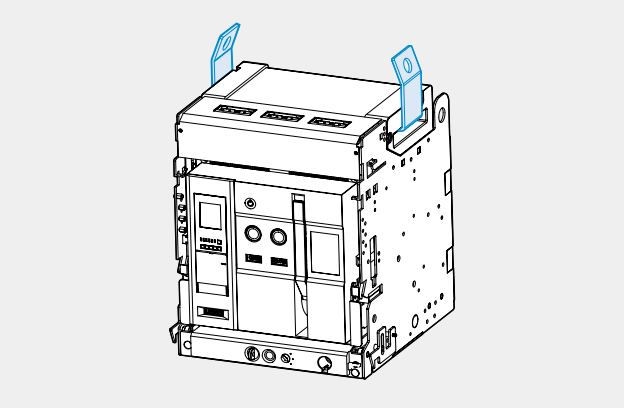
Lifting Hook [LH]

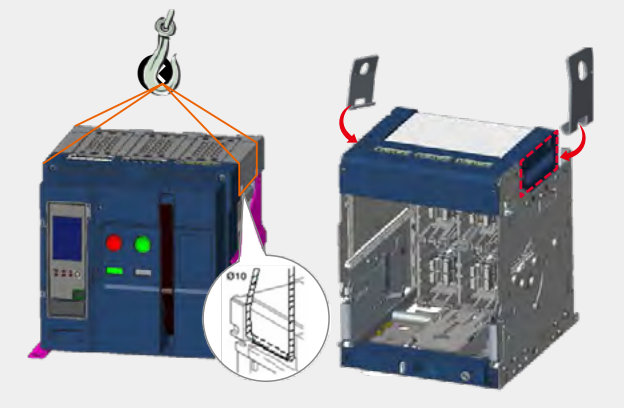
Main Body | Cradle

The Lifting Hook (LH) is an accessory for lifting the ACB body or cradle or safe installation in a switchgear. The LH hangs on both handles of the cradle's arc cover.

LH can be used on both small, medium and large frames (C/D/E/G Frame), and for large frame products, simultaneous use of lifting hook and lifting crossbar is recommended. The winch rope, which can be used when LH cannot be used depending on the site situation, should have a thickness of 3/8 Inch (Ø10) or more. Before using the winch rope, make sure the chain hook is securely fixed and inspect the rope for twisting or damage.

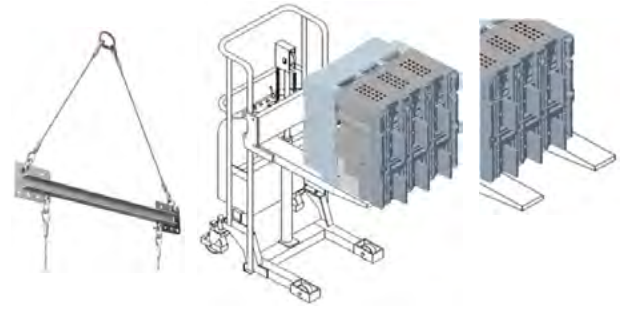
In special cases, special safety measures are required during the process of installing the ACB body to the cradle using a forkstacker (or platform lift). For these cases, the flange (fork) of the fork-stacker must not extend behind the breaker body. The lift's fork/flange must be set inside the base end of the ACB body and installed to fit the grooves of the left and right rails of the cradle. Failure to follow these instructions may result in damage to the breaker's insulation.

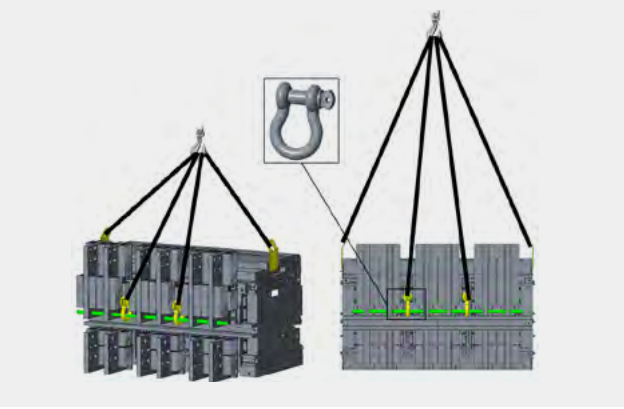




Example of lifting the ACB up to 3200AF

Lifting crossbar	Fork-stacker (Platform lift)





Example of lifting the ACB 6000AF

Accessories

Condenser Trip Device [CTD]

Pannel

The Condenser Trip Device (CTD) can block fault current in the system by combining with Trip Coil (SHT) to prevent further damage or risk to connected power facilities when a power outage or other critical system issue occurs. The use of CTD is necessary to ensure safety in the process of inspecting load equipment by preventing the ACB from remaining in the closed state during a power outage.

CTD operation refers to the method of rectifying the AC voltage and charging it in the condenser (capacitor), and when a fault occurs, the condenser is discharged by a relay trigger and the trip coil is excited to trip the circuit breaker. When the power supply is lost, the ACB Trip time is up to 2 or 3 minutes for each CTD type.

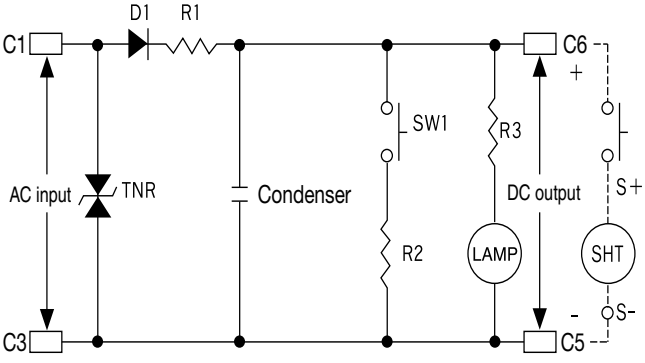
CTD can be used as a rectifier in a control circuit without DC power to rectify AC power and supply DC power to the circuit breaker.

※ The CTD is not UL certified

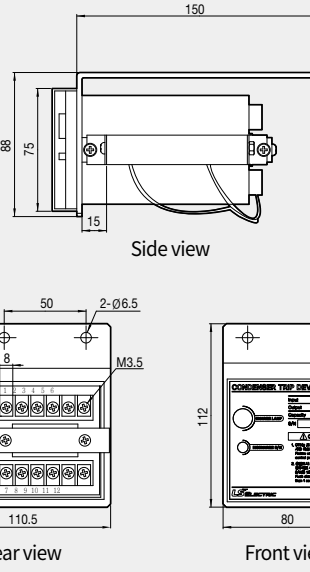
Specification

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	Less than 1 min	Less than 1 min
Range of Input voltage (%)	85~110	85~110
Condenser capacity	1000μF	560μF

Circuit diagram



Dimensions



Order code

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

Door Frame [DF]

Pannel

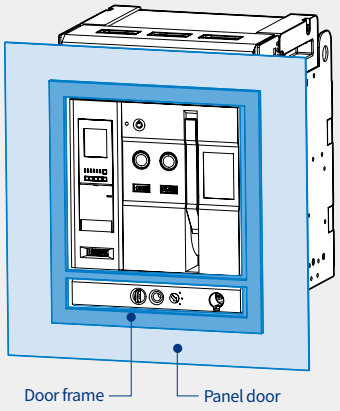
The Door Frame (DF) is an essential accessory used when designing an Embedded-type ACB panel. When attached to a panel door, it can obtain NEMA 1 rated protection.

Although DF is made of plastic and has an open structure, it provides a sealing function that complements the protective frame of the protruding front part of the ACB and the cut edge of the panel.

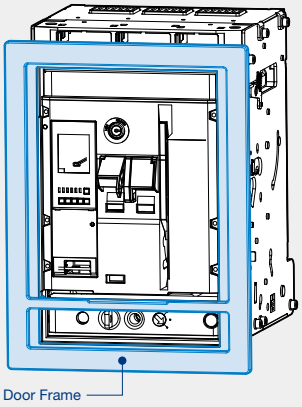
NEMA is rated to ensure safety and proper function of electrical equipment. A NEMA 1 rating provides basic protection against dust and accidental contact for indoor use.

NEMA: National Electrical Manufacturers Association standards.

Door Frame for D/E/G-Frame



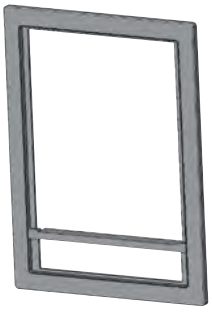
Door Frame for C-Frame



Fixed type

Draw-out type

Fixed type



Draw-out type

4

Accessories

Dust Cover [DC]

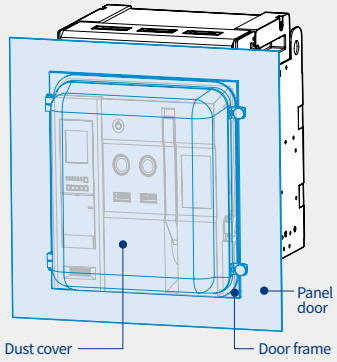
Pannel

The Dust Cover (DC) is an optional product that is attached to the Door Frame (DF) and protects the front of the ACB from environmental factors such as dust and moisture that may affect circuit breaker performance. If dust or solid foreign matter accumulates in the mechanism, it may lead to malfunction of the circuit breaker.

By adding a Dust Cover (DC) to the Door Frame (DF) as appropriate protection against contaminants, the NEMA rating increases up to NEMA 12. This is equivalent to improving the sealing level up to IEC standard IP54.

The DC type is attached to the front door of the panel, has a hinged dome-shaped cover structure, and is transparent, so the front of the ACB can be seen easily.
When used in a pull-out ACB, even if the switchboard door is closed and moved from the connected position to the test position, the dustproof and waterproof functions of IP54 are maintained and the door can be opened and closed.

NEMA 12 is commonly used in industrial environments, control panels, and electrical panels that require indoor protection against dust and dripping water.



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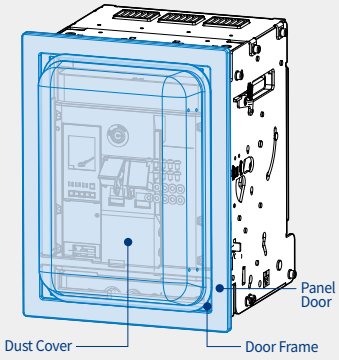


<C-Frame>

Type	Code	Description
With door frame	64623460502	COVER ASS'Y, DUST & DOOR FRAME, AN/AS/AH-DEFG
Without door frame	64623460501	COVER ASS'Y, DUST, AN, AH-D, E, F, G

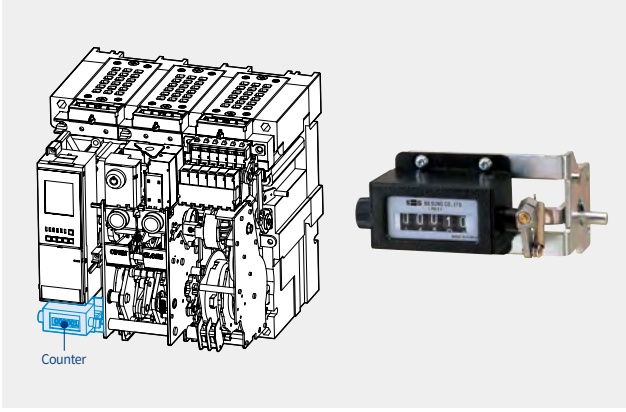
Counter [C]

Main Body

A Counter (C) is a mechanical device that tracks the number of times a breaker has been operated.
The counter is typically installed at the factory and displays the number of mechanical or electrical On and Off operations related to the life of the breaker for maintenance scheduling. The mechanical operation of the counter is counted once each time the closing spring is charged and does not return to the number of times before the operation.

The counter records the operation history, including both manual operation and electrical automatic opening and closing for factory testing, installation/commissioning, commercial operation, and maintenance, thus ensuring the reliability and safety of the circuit breaker.

※ When you select the D, E or G Frame (UAS-D, UAH-E/G), the Counter option will be automatically applied.



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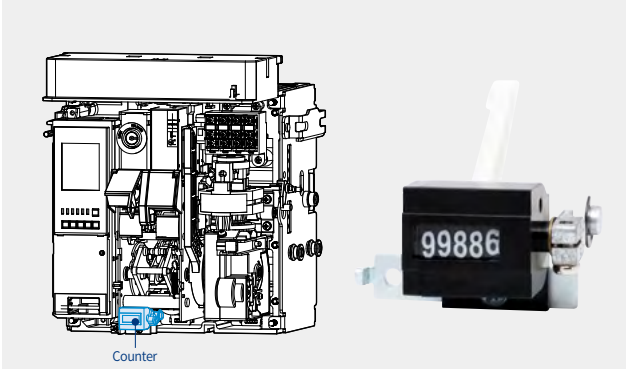


<C-Frame>

4

Accessories

Cell Switch [CEL]

Cradle

The Cell Switch (CEL) is designed for pull-out ACB and is a device that can check the position of the main body in the cradle. The location of the circuit breaker is divided into three locations: Connected, Test, and Disconnected.
CEL helps ensure safety during facility maintenance and operation by providing remote indication of circuit breaker location and interlock function. The operation is linked to the rotation of the crank manual handle when the ACB is drawn in or out, and the state of the switch is changed by contact with the actuator when the body enters or exits.

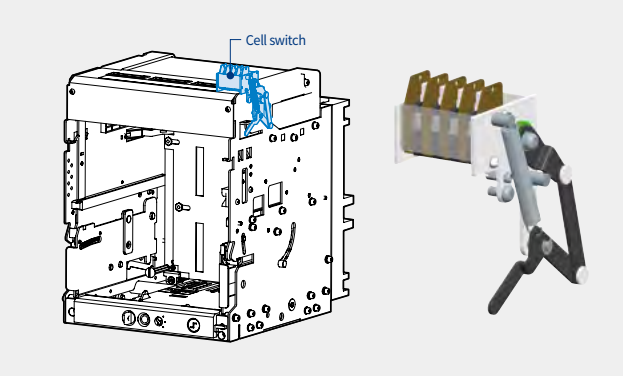
Among the states of each switch, the Connected position is the position where the main circuit power of the breaker is supplied.

In the Test position, the power supply is disconnected, but the control circuit remains connected.
In the control circuit, power is supplied to the breaker through Test and Connected, enabling electrical opening and closing operations remotely or on site. Disconnected is the position where the main circuit power and control circuit of the breaker are separated and the power supply is interrupted.

Contact configuration

4C: 1 Disconnected + 1 Test + 2 Connected

※ The contact configuration can be changed as needed. Always work in a power-off state and follow safety precautions on site when handling circuit breakers.



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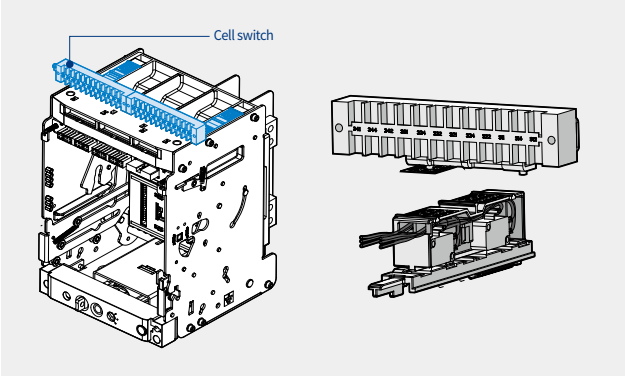


<C-Frame>

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	

Classification	Standard	
Contact capacity	250/125 Vac	10 A
	250 Vdc	0.3 A
	125 Vdc	0.6 A
	48 Vdc	3 A
	24 Vdc	5 A
Contact number	4C	

ACB position		DISCONNECTED		CONNECTED
Draw-in and draw-out position		DISCONNECTED	TEST	CONNECTED
Contact operation	CL–C (CONNECTED)	OFF		ON
	CL–T (TEST)	OFF	ON	
	CL–D (DISCONNECTED)	ON	OFF	

Contact capacity	Voltage (V)		Resistive load	Inductive load
	AC	460	5	2.5
		250	10	10
		125		
	DC	250	3	1.5
		125	10	10
		30	10	
Contact number	4C			

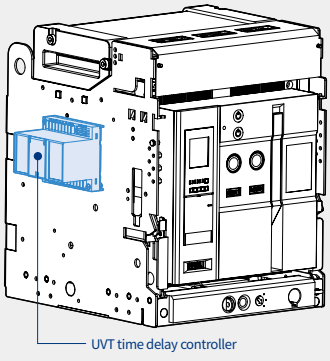
UVT Time Delay Controller [UDC]

Cradle | Pannel

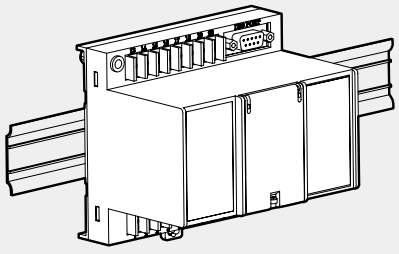
The UVT Time Delay Controller (UDC) is a device used to enhance facility safety by automatically tripping the ACB to prevent load side accidents due to low voltage or power failure. There are two types of UVT, the instantaneous type that uses only the UVT coil, and the time delay type that uses UDC connected to the UVT coil.

Applying the time delay type has the advantage of ensuring system protection and safety by minimizing the risk of sudden power outages due to temporary voltage drops.
In the time delay type, UDC prevents unnecessary circuit opening by adjusting the time delay setting before tripping the ACB, and ensures system stability even during temporary voltage fluctuations due to motor startup.

UDC can be installed on the DIN rail or cradle side.



< Attached to Cradle >



< Attached to DIN rail >

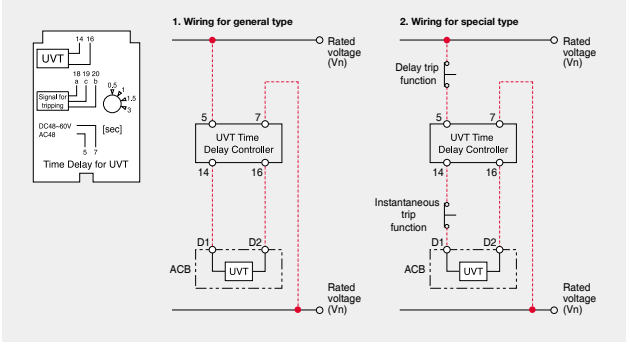
Rated voltage (Vn)		Operating voltage range (V)		Power consumption (VA or W)		Trip time (s)
DC (V)	AC (V)	Pick up	Drop out	Inrush	Steady-state	
48~6	48	0.65~0.85 Vn	0.4~0.6 Vn	200	5	0.5, 1, 1.5, 3
100~130	100~130					
200~250	200~250					
–	380~480					

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

Order codes

UVT	Code	Description
U5,U7	52773460271	DEVICE ASS'Y, UVT DELAY, DC48~60V, AC48V
U1,U3	52773460272	DEVICE ASS'Y, UVT DELAY, ADC100~130V
U2	52773460273	DEVICE ASS'Y, UVT DELAY, ADC200~250V
U6	52773460274	DEVICE ASS'Y, UVT DELAY, AC380~480V

Wiring



* Red wiring should be set by users.

Accessories

Safety Shutter [ST]

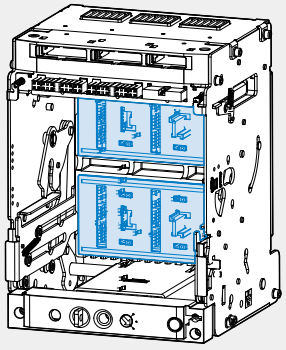
Cradle

The Safety Shutter (ST) physically blocks external contact to the charging part inside the circuit breaker by isolating the conductor of the main circuit from being exposed when the ACB is in the test position, disconnected position, or fully withdrawn state. This acts as a safety barrier to prevent accidental contact with live parts during maintenance or testing procedures or when the breaker is not in use.

When the ACB is moved to the Connected position, the Safety Shutter automatically opens, releases isolation, and safely connects to the charging part.

There are three types of Safety Shutters (classified as shown below).

The Safety shutter attached to the UL ACB Cradle of LS ELECTRIC is designed for easy assembly and disassembly to facilitate convenient maintenance and allow for the straightforward installation and removal of the metering CT.



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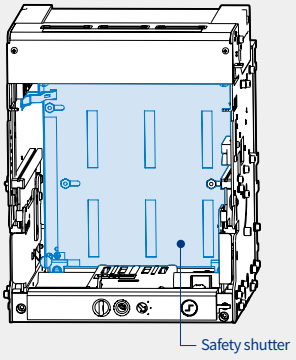


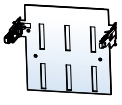
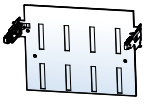
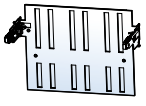
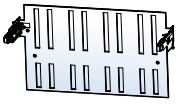
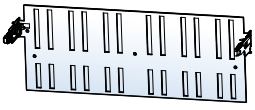
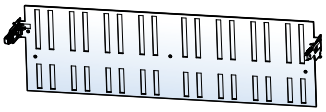
<D/E/G-Frame>

Safety shutter plate types

3P

4P


Safety shutter plate types

1600AF, 3P	1600AF, 4P
	
3200AF, 3P	3200AF, 4P
	
6000AF, 3P	6000AF, 4P
	

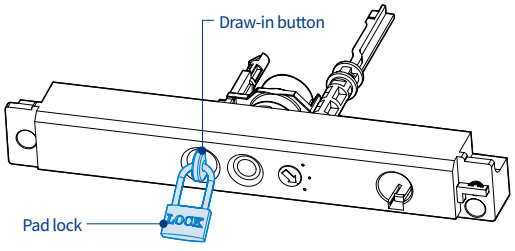
Lockable Position Lock [PL]

Cradle

The Lockable Position Lock (PL) is a cradle 3-position lock used in pull-out circuit breakers. During the ACB insertion or withdrawal process, the PL protrudes from the Connected, Test, and Disconnected positions, and the crank manual handle rotates idle to prevent the circuit breaker body from entering or exiting.
The protruding PL is the mechanism used to secure the ACB position if a lock is used.
In the locked state as shown in the picture below, the ACB body cannot enter or exit the cradle. The customer must purchase a lock to limit the breaker location. (Ø5 ~ Ø6)

For information on how to release the fixed (restricted) PL and perform a retraction or withdrawal operation, refer to the picture and follow the steps below. First,
1. press the off-button and
2. simultaneously insert the crank manual handle into the coupling of the cradle bottom-cover. The next step is to
3. press the protruding button to unlock and
4. rotate the handle to withdraw (CCW) or retract (CW) the breaker.

※ Padlock is not included



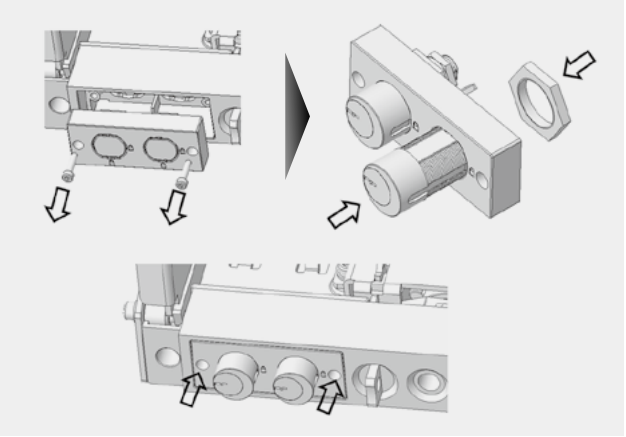
Cradle Mount Key Lock

Cradle

This key lock device is installed in the cradle to prevent the circuit breaker from turning on and racking in/out.

Using the KIRK key option, cradle locking and interlocking are possible and can be used with the padlock that is installed as standard on the cradle.

KIRK key interlock can be used on UL/ANSI breakers. Up to two can be used together. Key lock options are provided as parts, and KIRK key locks are designed to be purchased and assembled by customers.



Installation of KIRK key lock to cradle

Accessories

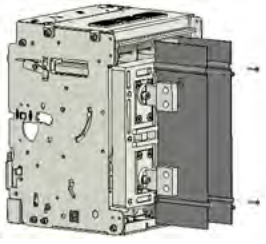
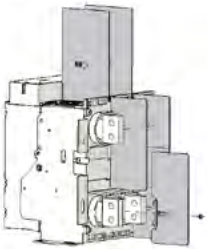
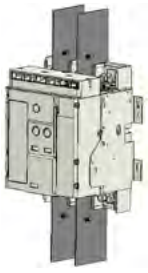
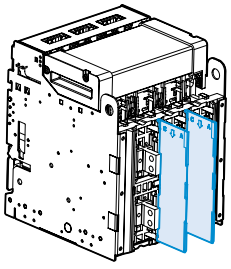
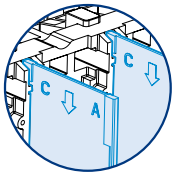
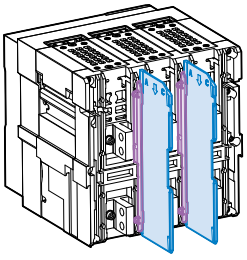
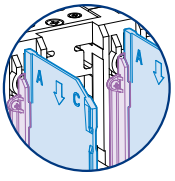
Interphase Barrier [IB]

Main Body | Cradle

The Interphase Barrier (IB) prevents electrical contact between different phases of the main circuit terminal, improving insulation reliability of the panel. Additionally, using IB prevents accidents by preventing ground faults and short circuits by blocking arcs that occur between phases of the circuit breaker's main circuit.

IB, a flexible insulating rubber material, is used for both fixed and withdrawable types.
The location where IB is installed is between the terminal busbars on the back of the circuit breaker, and its use is recommended when the grid voltage is over 500 V. The direction in which IB is assembled is indicated by the letter "A" or "C".

The letter "A" stands for "ACB body" and when it is a fixed type, it is installed by inserting it in the "A" direction.
The letter "C" stands for "Cradle" and when it is a pull-out type, it is installed by inserting it in the "C" direction.

	Draw-out type	Fixed type	
		V, H, M, N	P
C-Frame			
D/E/G Frame	 	 	

i-Tester

Main Body

The i-Tester (Intelligent Tester) accessory can be used to test ACB/MCCB features. 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 selfcalibration 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.

Function overview

- **Calibration function**
  - The calibration function of IPOT is used to calibrate the error using the output value set in i-Tester and the measurement current data.
- **Device H/W setting function**
  - E nables setting system configuration, time of the device and language and time of the IPOT.
- **Relay setting function**
  - A llows checking the current relay element of the device and setting the relay.
- **Relay test**
  - As a part for testing the relay, it is composed of manual/ automatic/user tests allowing various relay tests to be conducted.
- **Control function**
  - Provides a function to clear or reset the device data and to control DO and CB.
- **System information**
  - Consists of the device information, relay status, and tester system information.
- **Test history**
  - Consists of test history stored in IPOT and enables deleting 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

Accessories

ERMS Switch Module [ESM]

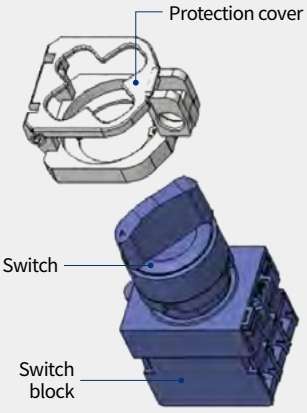
The ESM is used to manually activate/deactivate the ERMS protection functions.

- ESM does not need to connect to another digital module for support to activate ERMS protection.
  ESM should connect (wire) with the smart trip unit.
- For more details on installation information, please check the ESM installation manual.

Item codes

Standard	Item Code	Rated Voltage
UL	72313460651	24 V (AC/DC)
	72313460652	110 V (AC Only)
	72313460653	220 V (AC Only)

Pannel

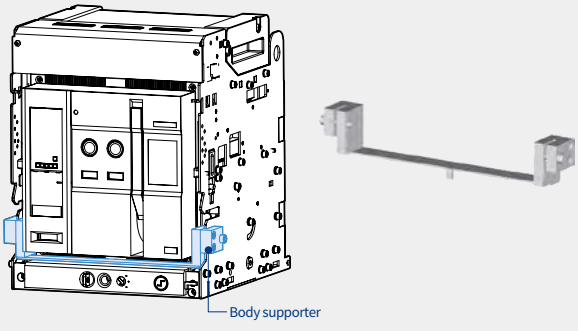


Body Supporter [BSP]

Interlocks the main body of the circuit breaker and the cradle mechanically to fix the breaker in connected position.
The BSP makes all draw-in/outs unavailable.

Pole	Frame	Code	Description
3	D	72313460373	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-D3
	E	72313463501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-E3
	F	72313465501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-F3
	G	72313465503	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-G3
4	D	72313462501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-D4
	E	72313464501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-E4
	F	72313465502	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-F4
	G	72313465504	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-G4

Cradle



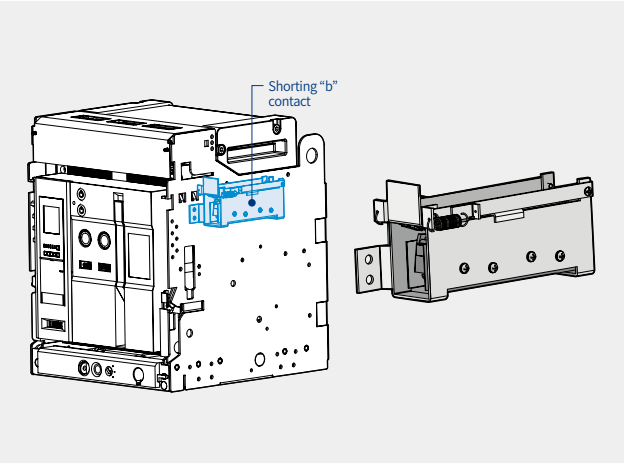
* Not UL Listed

Shorting "B" Contact [SBC]

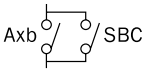
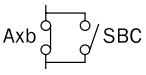
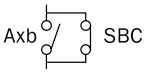
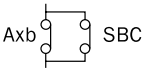
Cradle

This contact keeps the external control circuit normal by auxiliary 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).

Code	Description
62503460401	SWITCH ASS'Y, SHORT/B, CONTACT



Contact condition (Link between Axb and shorting "b" contact)

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

Adapter kit for front / mixed type ACB

Main Body

The front connection type is suitable for panels requiring narrow depth for installation.

- The connection can be modified between vertical type and horizontal type by rotating the terminals through 90 degrees for the breakers such as UAS-06~16D and UAH-06E~32E.
- Refer to the rating list, as installation method is based on rated current.

Note: AS-20D, AH-20D, AS-40E and AH-40E types are equipped with vertical-only terminals.

Accessories

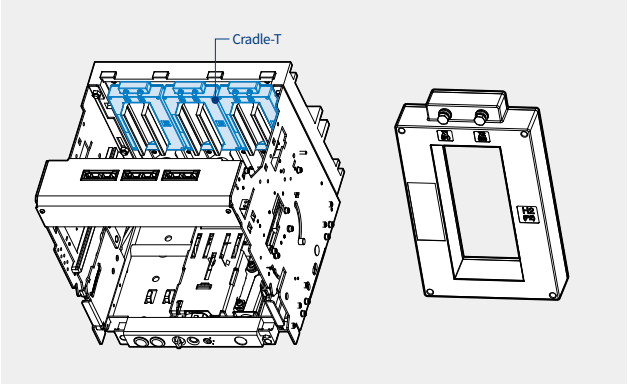
Metering Current Transformer (For Cradle)

The Metering Current Transformer allows maintenance on the front of the switchgear when the switchgear door is closed. These features bring convenience and safety to engineers.

This CT is developed for LS UL Type ACB and can be applied to D, E. and G Frame Refer to the specification rating table for moreinformation.or CT.

- Standards: UL1066/ANSI C37.13(ACB), ANSI C57.13(Metering Current Transformer)
- Applicable Frame : D/E/G -Frame

Cradle



D-Frame(for package)

Pole	Rating (A)	Item code	Description	Q'ty(Set)
3P	400	77123466201	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-D,3POLES	1
	600	77123466202	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-D,3POLES	1
	800	77123466203	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-D,3POLES	1
	1000	77123466204	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-D,3POLES	1
	1200	77123466205	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-D,3POLES	1
	1600	77123466206	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-D,3POLES	1
4P	400	77123466207	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-D,4POLES	1
	600	77123466208	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-D,4POLES	1
	800	77123466209	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-D,4POLES	1
	1000	77123466210	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-D,4POLES	1
	1200	77123466211	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-D,4POLES	1
	1600	77123466212	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-D,4POLES	1

E-Frame for package

Pole	Rating (A)	Item code	Description	Q'ty(Set)
3P	400	77123467201	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-E,3POLES	1
	600	77123467202	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-E,3POLES	1
	800	77123467203	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-E,3POLES	1
	1000	77123467204	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-E,3POLES	1
	1200	77123467205	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-E,3POLES	1
	1600	77123467206	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-E,3POLES	1
	2000	77123467207	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-E,3POLES	1
	2500	77123467208	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-E,3POLES	1
	3000	77123467209	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-E,3POLES	1
	3200	77123467210	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-E,3POLES	1
4P	400	77123467211	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-E,4POLES	1
	600	77123467212	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-E,4POLES	1
	800	77123467213	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-E,4POLES	1
	1000	77123467214	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-E,4POLES	1
	1200	77123467215	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-E,4POLES	1
	1600	77123467216	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-E,4POLES	1
	2000	77123467217	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-E,4POLES	1
	2500	77123467218	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-E,4POLES	1
	3000	77123467219	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-E,4POLES	1
	3200	77123467220	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-E,4POLES	1

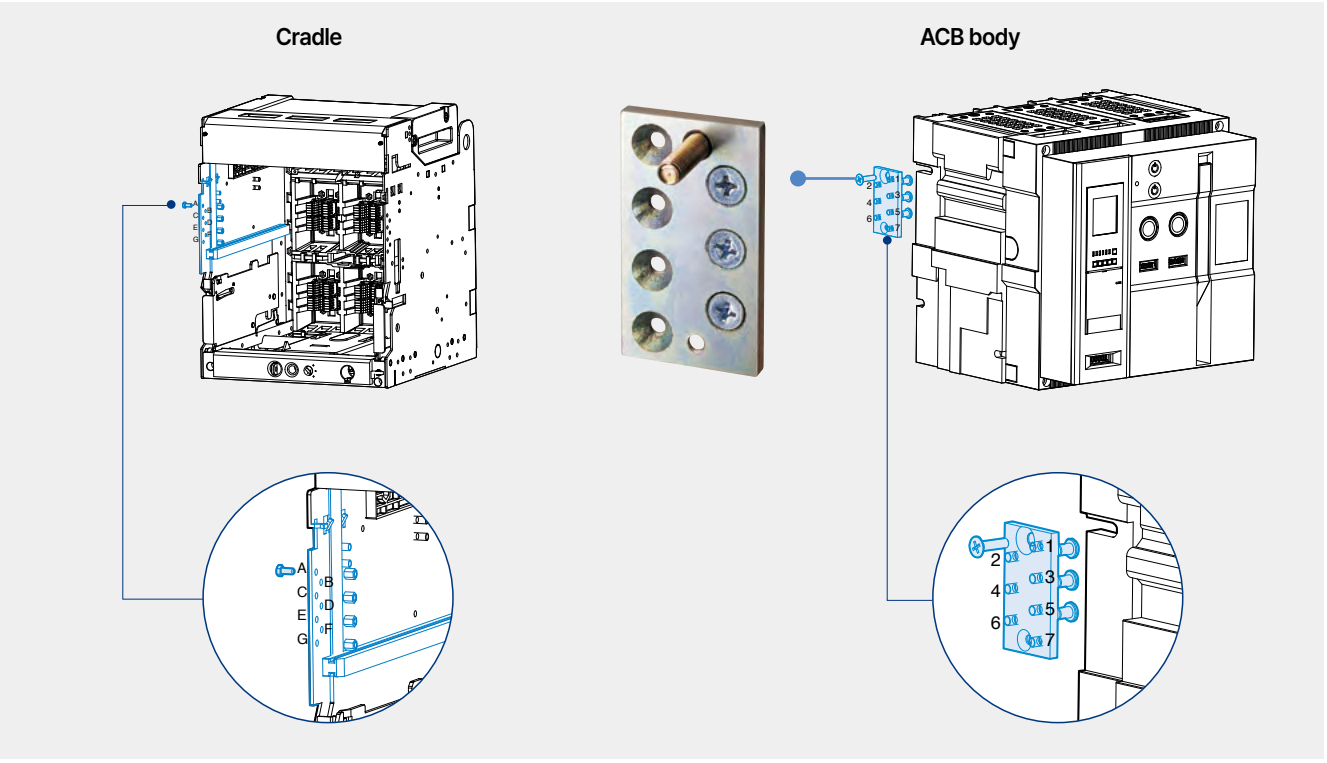
G-Frame for package

Pole	Rating (A)	Item code	Description	Q'ty(Set)
3P	2000	77123468201	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-G,3POLES	1
	2500	77123468202	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-G,3POLES	1
	3000	77123468203	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-G,3POLES	1
	3200	77123468204	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-G,3POLES	1
	4000	77123468205	COIL ASS'Y,BUILT-IN CRADLE,4000A,UL/ANSI-G,3POLES	1
	5000	77123468206	COIL ASS'Y,BUILT-IN CRADLE,5000A,UL/ANSI-G,3POLES	1
	6000	77123468207	COIL ASS'Y,BUILT-IN CRADLE,6000A,UL/ANSI-G,3POLES	1
4P	2000	77123468208	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-G,4POLES	1
	2500	77123468209	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-G,4POLES	1
	3000	77123468210	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-G,4POLES	1
	3200	77123468211	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-G,4POLES	1
	4000	77123468212	COIL ASS'Y,BUILT-IN CRADLE,4000A,UL/ANSI-G,4POLES	1
	5000	77123468213	COIL ASS'Y,BUILT-IN CRADLE,5000A,UL/ANSI-G,4POLES	1
	6000	77123468214	COIL ASS'Y,BUILT-IN CRADLE,6000A,UL/ANSI-G,4POLES	1

Accessories

Mis-Insertion Prevention Device [MIP]

Cradle



- Mechanically prevents the ACB from being inserted into the cradle if the rating of the ACB does not match the cradle.
- The installation method varies according to ratings.

Cradle	ACB
ABCD	567
ABCE	467
ABCF	457
ABCG	456
ABDE	367
ABDF	357
ABDG	356
ABEF	347

Cradle	ACB
ADEF	237
ADEG	236
ADFG	235
AEFG	234
BCDE	167
BCDF	157
BCDG	156
BCEF	147

Cradle	ACB
ABEG	346
ABFG	345
ACDE	267
ACDF	257
ACDG	256
ACEF	247
ACEG	246
ACFG	245

Cradle	ACB
BCEG	146
BDEF	137
BDEG	136
BDFG	135
CDEF	127
CDEG	126
CEFG	124
DEFG	123

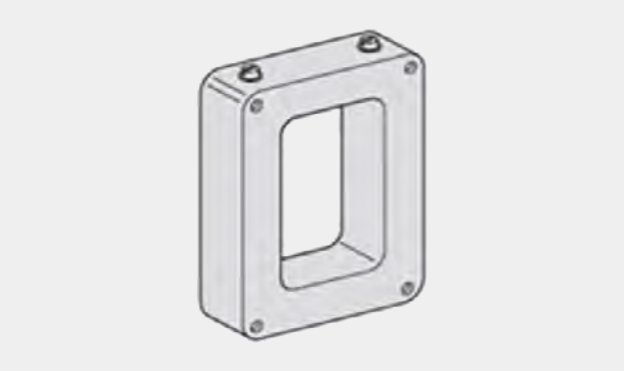
External Neutral Current Transformer [NCT]

Pannel

The NCT(Neutral CT) enables the use of protective 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 this accessory because the NCT is already included.



Application (STU type)

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

Application (Trip Relay type) :

See wiring diagram(page 42) before wiring. The ACB may malfunction when the NCT is not wired correctly.

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 (0.5mm^2 to 1.25mm^2)

Ordering codes

Standard	Item Code	CT specification			
		CT ratio	Burden	Frequency	Part size
UL	76313460018	400 / 5A	5VA	60Hz	S91
	76313460003	600 / 5A	5VA	60Hz	S61
	76313460004	630 / 5A	5VA	60Hz	S61
	76313460005	800 / 5A	5VA	60Hz	S61
	76313460006	1000 / 5A	5VA	60Hz	S61
	76313460007	1200 / 5A	5VA	60Hz	S61
	76313460008	1250 / 5A	5VA	60Hz	S61
	76313460009	1600 / 5A	5VA	60Hz	S61
	76313460010	2000 / 5A	5VA	60Hz	S91
	76313460011	2500 / 5A	5VA	60Hz	S91
	76313460012	3000 / 5A	5VA	60Hz	S10
	76313460013	3200 / 5A	5VA	60Hz	S10
	76313460014	3600 / 5A	5VA	60Hz	S10
	76313460015	4000 / 5A	5VA	60Hz	S10
	76313460016	5000 / 5A	5VA	60Hz	S10
	76313460017	6000 / 5A	5VA	60Hz	S10

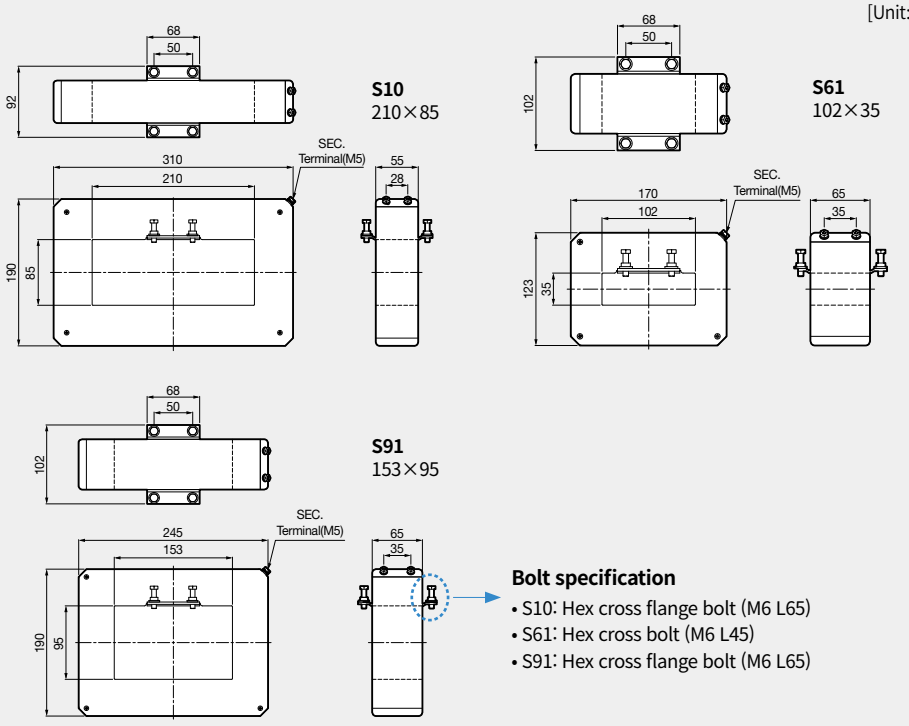
Accessories

External Neutral Current Transformer [NCT]

Pannel

Dimension

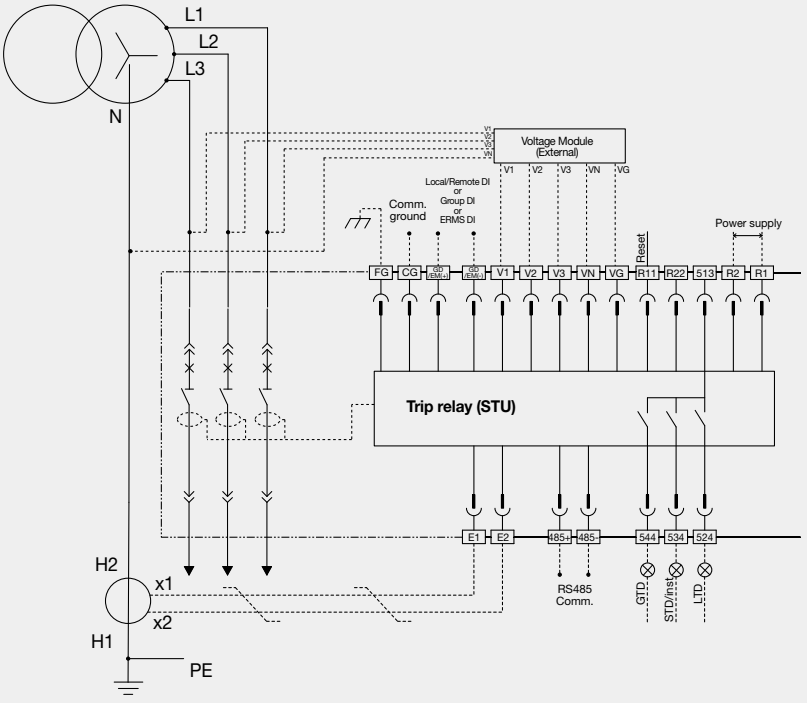
[Unit: mm]



Bolt specification

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

Installation schematic



Gateway

Pannel

Gateway is the communication device of Smart LV Solution. Gateway is responsible for transmitting data from the serial-connected device using RS485 protocol to the LAN(Local Area Network) using TCP/IP.

Gateway provides its own web page, which allows you access the setting and status monitoring services for connected devices.

Temperature monitoring

Type	Gateway Web Page
Settings screen	Device information can be checked and name and location information can be changed.
TThermal imaging monitoring	Provides thermal image monitoring device status, event, and trend information
RS485 (Channel1 & 2)	Displays the name and status of the device connected to the RS458 channel (provides detailed information when the device name is clicked)
Auto search	Provides RS485 automatic search function HMI connection function
General settings	Provides network, system and status information
Monitoring dashboard	Provides main status information of the connected devices (provides detailed information when the device name is clicked)

Specification

Item	Details	Remarks
Rated voltage	DC24V (DC20.4~28.8V)	IEC60038 standard
Power consumption	Max. 12W	
Communication network	2×Terminal Block : RS485 2Ch 1×RJ45 : 1000 Ethernet 1×RJ45 : 10/100 Ethernet 2×RJ45 : RSTP (10/100 Ethernet) 1×WiFi (including AP function)	
External interface	2×USB Type A port(Host) 1×USB Mini B port(Device) / For maintenance	
Memory	RAM : 1GB(DDR3) MRAM : 2MB Flash : 1GB	
Installation	DIN rail mounting	
Size (W×H×D)	108mm×80mm×66mm	6Pole
Button	• 1×Push Button • Hard Reset: Press the button for 5 seconds • Soft Reset: Press the button for 1 seconds	
Switch	1×Dip Switch RS-485 communication termination settings	
Battery	± 3°C or ±3% or Reading (+10 to 100°C @ 20°C ±10°C amb)	
Operating environment	• Operating temperature: -25°C ~ 70°C (WiFi module: 0 ~ 50 °C) • Storage temperature: -40°C ~ 85°C (WiFi module: -20 ~ 80 °C) • IP rating: IP2X • Operating humidity: Max. 95% RH (no condensation)	

Accessories

Gateway

Web service

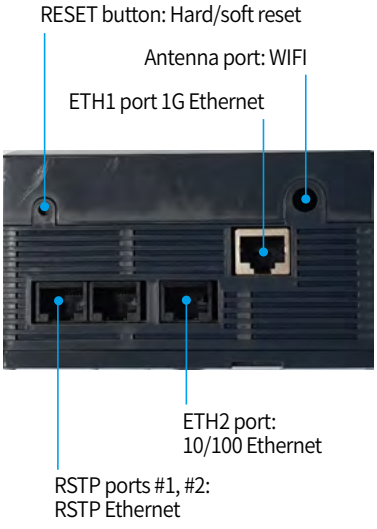
- Provides device registration and monitoring functions
- Provides remote firmware upgrade function

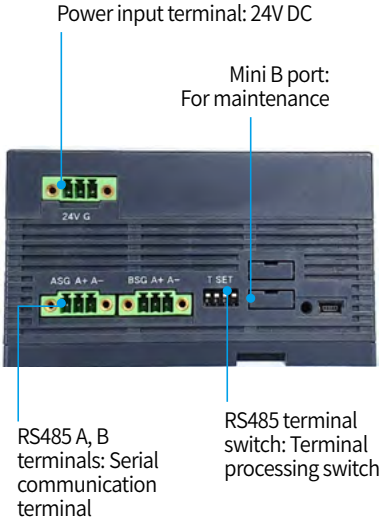
Pannel

ACB voltage, current waveform

Trip wave

Exterior description



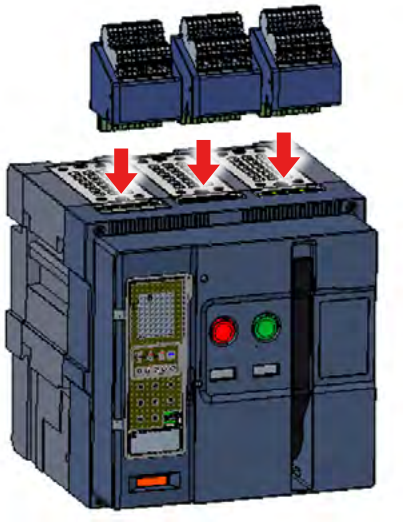


Target device

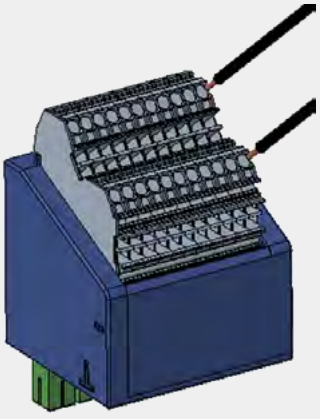
Circuit breaker	Susol ACB STU, Metasol ACB STU, Susol Smart MCCB
Measurement device	GIMAC1000, GIMAC-B, E TAG, MMP, DMPi, Energy Meter
Accessory device	M LINK, TRIO, Thermal CAM

Secondary connection

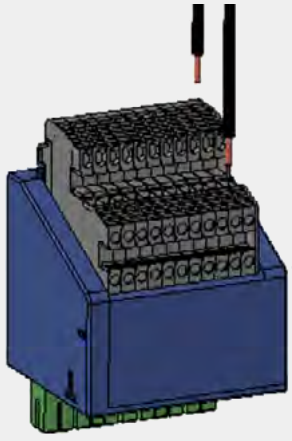
The push-in module consists of auxiliary terminal blocks designed for quick and reliable connection of control circuits, such as auxiliary contacts, alarm contacts, trip and close coils and monitoring sensors. The products enable fast and tool-free wiring, helping to reduce installation and maintenance time.



Main Body | Cradle



Push-in type module



Screw type module

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

Accessories

Accessories Item Code

Main body

Mechanical Interlock KIT [MI]

Item Code	Description	Wire length	Applicable Frame
56123471500	INTERLOCK ASS'Y,MI 2WAY,AN,AH,AR-C	6.5ft(2m)	C
56123471505	INTERLOCK ASS'Y,MI 3WAY,AN,AH,AR-C	9.8ft(3m)	C
72313460791	TOTAL ASS'Y, M/I KIT, WIRE_2WAY, AN, AS, AH-D, E, F, G, A/S	6.5ft(2m)	D/E/G
72313460792	TOTAL ASS'Y, M/I KIT, WIRE_2WAY, 2.6m, AN, AS, AH-D, E, F, G, A/S	8.5ft(2.6m)	D/E/G
72313460793	TOTAL ASS'Y, M/I KIT, WIRE_3WAY, AN, AS, AH-D, E, F, G, A/S	9.8ft(3m)	D/E/G

Keylock Module

Type	Item Code	Description	Applicable key part number	Applicable Frame
CAM LOCK Single	54623460001	FRAME ASS''Y, KEY LOCK, PROFALUX, KIRK(CAMLOCK), AN, AS, AH-D, E, F, G	- Profalux keylock - Kirkkey lock (KCAM00010)	D/E/G
	72313460864	TOTAL ASS''Y, FRAME, KIRKKEY(CN22), AN, AS, AH-D, E, F, G	- Kirkkey lock (CN-22(KC40-10))	D/E/G
CAM LOCK Double	72313460902	TOTAL ASS'Y, FRAME, DOUBLE KIRKKEY, AN, AS, AH-D, E, F, G	- Kirkkey lock (KCAM00010)	D/E/G

Lifting hook [LH]

Item Code	Description	Q'ty per item code	Applicable Frame
46513471500	HOOK,LIFT,AN,AH,AR-C	1 ea	C
46513451003	HOOK, LIFT, LBA-C 630~3200A	1 ea	D/E
46513460882	HOOK,LIFT,AN,AS,AH	1 ea	G

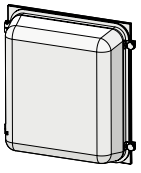
IPOT [Intelligent Potable OCR Tester]

Item Code	Description	Applicable Frame
72313460410	TOTAL ASS'Y, IPOT, Trip Relay Tester	C/D/E/G

Terminal KIT

Type	Item Code	Description	Q'ty per item code	Applicable Frame
Flat-Flat	62363471501	SUB ASS'Y,ADAPTER KIT ASS'Y_FRONT,AN,AH-C3	1 Set(Load&Line)	C, 3-Pole
	62363471502	SUB ASS'Y,ADAPTER KIT ASS'Y_FRONT,AN,AH-C4	1 Set(Load&Line)	C, 4-Pole
	62363461607	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, UL-D3	1 Set(Load&Line)	D, 3-Pole
	62363462610	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, UL-D4	1 Set(Load&Line)	D, 4-Pole
	62363463607	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, UL-E3	1 Set(Load&Line)	E, 3-Pole(Up to 2000A)
	62363464612	SUB ASS'Y, ADAPTER KIT ASS'Y_FRONT, UL-E4	1 Set(Load&Line)	E, 4-Pole(Up to 2000A)
Flat-Vertical or Flat-Horizontal	62363461508	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-D3	1 Set(Load&Line)	D, 3-Pole
	62363462511	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-D4	1 Set(Load&Line)	D, 4-Pole
	62363463506	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-E3	1 Set(Load&Line)	E, 3-Pole(Up to 2000A)
	62363464511	SUB ASS'Y, ADAPTER KIT ASS'Y_F&V/H, AN/AS/AH-E4	1 Set(Load&Line)	E, 4-Pole(Up to 2000A)
Spread-Spread	62363471515	SUB ASS'Y,ADAPTER KIT ASS'Y_SPREAD,AN,AH-C3	1 Set(Load&Line)	C, 3-Pole
	62363471516	SUB ASS'Y,ADAPTER KIT ASS'Y_SPREAD,AN.AH-C4	1 Set(Load&Line)	C, 4-Pole
Flat-S pread	62363471503	SUB ASS'Y,ADAPTER KIT ASS'Y_FRONT_SPREAD,AN,AH-C3	1 Set(Load&Line)	C, 3-Pole
	62363471504	SUB ASS'Y,ADAPTER KIT ASS'Y_FRONT_SPREAD,AN.AH-C4	1 Set(Load&Line)	C, 4-Pole
Spread-Vertical	62363471505	SUB ASS'Y,ADAPTER KIT ASS'Y_SPREAD/VER,AN,AH-C3	1 Set(Load&Line)	C, 3-Pole
	62363471506	SUB ASS'Y,ADAPTER KIT ASS'Y_SPREAD/VER,AN,AH-C4	1 Set(Load&Line)	C, 4-Pole

Dust cover [DC]



Type	Item Code	Description	Door Frame	Applicable Frame	Notes
Draw-out	64623471401	COVER ASS'Y,DUST&DOOR FRAME,AN,AH,AR-C	Included	C	
	64623471402	COVER ASS'Y,DUST,AN,AH,AR-C	Not included	C	
	64623460501	COVER ASS'Y, DUST, AN, AH-D, E, F, G	Not included	D/E/G	
	64623460502	COVER ASS'Y, DUST & DOOR FRAME, AN/AS/AH-DEFG	Included	D/E/G	
	64623460504	COVER ASS'Y, DUST & DOOR FRAME, AN, AH-D, E, F, G, IP54	Included	D/E/G	For IP54
Fixed	64623471401	COVER ASS'Y,DUST&DOOR FRAME,AN,AH,AR-C	Included	C	
	64623471402	COVER ASS'Y,DUST,AN,AH,AR-C	Not included	C	
	64623460507	COVER ASS'Y, DUST & DOOR FRAME, AN/AS/AH-DEFG, FIXED	Included	D/E/G	
	64623460508	COVER ASS'Y, DUST, AN, AH-D, E, F, G, FIXED	Not included	D/E/G	

Accessories

Accessories Item Code

Main body

Voltage module [VM]

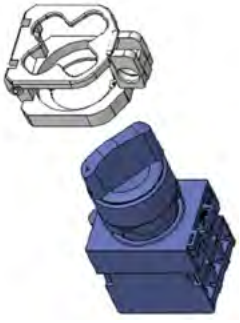
Item Code	Description	Classification	Applicable Frame
72313460374	TOTAL ASS''Y,VOLTAGE DIVIDE MODULE	VDM only	C
62363460151	SUB ASS'Y,BRACKET,COMPACT VDM	VDM Compatible Bracket	C
72313460708	TOTAL ASS'Y, VDM(with Cable), EXTERNAL, STU	Cable included	D/E/G
72313460709	TOTAL ASS'Y, VDM, EXTERNAL, STU	VDM only	D/E/G

ERMS Switch Module [ESM]

The ESM switch module engages/disables the ERMS function of the STU from the outside.

- The ESM consists of one input dedicated to the switch and one output that activates the LED lamp.
- It should be the same as the control power of the ACB.

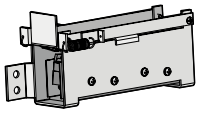
Item Code	Description	Applicable Frame	Classification
72313460651	TOTAL ASS'Y,ACB ERMS S/W,AC/DC 24V	D/E/G	AC/DC 24V
72313460652	TOTAL ASS'Y,ACB ERMS S/W,AC 110V	D/E/G	110Vac
72313460653	TOTAL ASS'Y,ACB ERMS S/W,AC 220V	D/E/G	220Vac



Cradle

Shorting "b" contact [SBC]

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



Safety shutter lock [STL]

Item Code	Description	Applicable Frame	Q'ty per item code
56763460411	LOCK, SHUTTER, AN, AS, AH-D, E, F, G, 2EA	D/E/G	2 ea

Door Frame [DF]

Type	Item Code	Description	Applicable Frame
Draw-out	64723471501	DOOR ASS;Y,FRAME DRAWOUT,AN,AH,AR-C	C
	64723460501	DOOR ASS'Y, FRAME Drawout	D/E/G
Fixed	64723471500	DOOR ASS'Y,FRAME FIXED,AN,AH,AR-C	C
	64723460502	DOOR ASS'Y, FRAME FIXED	D/E/G

고정형

인출형

Miss insertion prevent device [MIP]

Item Code	Description	Applicable Frame
84113471500	MIP ASS'Y,400~1600A,AN,AH,AR-C	C
84113460501	MIP ASS'Y, 630~6300A, AN, AS, AH-D, E, F, G	D/E/G

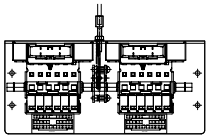
Accessories

Accessories Item Code

Cradle

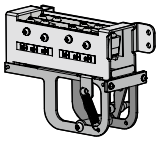
Mechanical operated cell switch [MOC]

Item Code	Description	Applicable Frame
72313471500	TOTAL ASS'Y,MOC,AN,AH,AR-C	C
72313460659	TOTAL ASS'Y, MOC, AN, AS, AH, 200~6300A, ROTARY	D/E/G



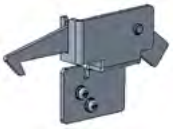
Cell Switch [CEL]

Item Code	Description	Position	Cover	Applicable Frame	Notes
72313471400	TOTAL ASS'Y, CELL S/W_2C,AN,AH,AR-C			C	2C
72313460501	TOTAL ASS'Y, CELL SWITCH, 4C_LEFT, 630~6300A, AN, AS, AH	Left	Not included	D/E/G	4C
72313460621	TOTAL ASS'Y, CELL SWITCH, 4C_LEFT_WITH COVER, AN, AS, AH	Left	Included	D/E/G	4C
72313460537	TOTAL ASS'Y, CELL SWITCH, 4C_RIGHT, 630~6300A, AN, AS, AH	Right	Not included	D/E/G	4C
72313460620	TOTAL ASS'Y,C ELL SWITCH, 8C_LEFT, 630~6300A, AN, AS, AH	Left	Not included	D/E/G	8C
72313460623	TOTAL ASS'Y, CELL SWITCH, 8C_LEFT_WITH COVER, AN, AS, AH	Left	Included	D/E/G	8C



Door Interlock [DI]

Type	Item Code	Description	Applicable Frame	Position
Wire	56123471502	INTERLOCK ASS'Y,DOOR CABLE,AN,AH,AR-C	C	
	56123460504	INTERLOCK ASS'Y, DOOR, AN, AS, AH-D, E, F, G	D/E/G	
Catch	56123471501	INTERLOCK ASS'Y,DOOR CATCH,AN,AH,AR-C	C	
	56123460512	INTERLOCK ASS'Y, DOOR CATCH, RIGHT, AN, AS, AH-D, E, F, G	D/E/G	Right
	56123460513	INTERLOCK ASS'Y, DOOR CATCH, LEFT, AN, AS, AH-D, E, F, G	D/E/G	Left



Body supporter [BSP]

Item Code	Description	Applicable Frame
72313461501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-D3	D, 3-Pole
72313462501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-D4	D, 4-Pole
72313463501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-E3	E, 3-Pole
72313464501	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-E4	E, 4-Pole
72313465503	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-G3	G, 3-Pole
72313465504	TOTAL ASS'Y, BODY SUPPORTER, AN/AS/AH-G4	G, 4-Pole

UVT Time Delay Controller [UDC]

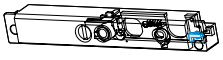
Item Code	Description	Applicable Frame	Classification
52773460272	DEVICE ASS'Y, UVT DELAY, ADC100~130V, AN, AS, AH-D, E, F, G	C/D/E/G	
52773460273	DEVICE ASS'Y, UVT DELAY, ADC200~250V, AN, AS, AH-D, E, F, G	C/D/E/G	
52773460280	DEVICE ASS'Y, UVT DELAY, ADC200~250V, 5S, AN, AS, AH-D, E, F, G	D/E/G	Delay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

Interphase barrier [IB]

Item Code	Description	Applicable Frame	Q'ty per item code	Classification
67213471500	BARRIER,INSULATION,AN,AH,AR-C	C	1 set(3ea)	
67213460011	BARRIER, INSULATION, LS-C, 630~6300A, 3EA	D/E/G	1 set(3ea)	100mm
67213460013	BARRIER, INSULATION, LS-C, 630~6300A, LONG, 3EA	D/E/G	1 set(3ea)	140mm

Racking Interlock [RI]

Item Code	Description	Applicable Frame	Classification
56123460501	INTERLOCK ASS'Y, RACKING	C/D/E/G	100mm
56123460521	INTERLOCK ASS'Y, RACKING	C/D/E/G	140mm



Draw In/Out Handle [Long-type]

Type	Item Code	Description	Applicable Frame
Normal	62363471402	SUB ASS'Y,DRAW HANDLE LOCK,AN,AH,AR-C	C
	62363460542	SUB ASS'Y,DRAW HANDLE ASS'Y,AL-DEFG,AS	D/E/G
Long	62363471401	SUB ASS'Y,DRAW HANDLE LOCK,LONG,AN,AH,AR-C	C
	55223460402	HANDLE ASS'Y,DRAW,LONG	D/E/G

Accessories

Accessories Item Code

Cradle

Secondary connection

Type	Item Code	Description	Applicable Frame
Push-in	72313460660	TOTAL ASS'Y, PUSH-IN MODULE, AMP	C/D/E/G
Screw	72313460661	TOTAL ASS'Y, SCREW MODULE, AMP	C/D/E/G


<Push-in type module>

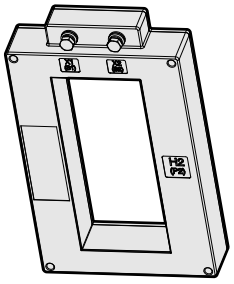

<Screw type module>

TRIO

Item Code	Description	Applicable Frame	Classification
72313460390	TOTAL ASS'Y,TRIO	C/D/E/G	TRIO
72313460280	TOTAL ASS'Y, CONTACT TEMPERATURE SENSOR, TRIO	C/D/E/G	Contact sensor

External Neutral Current Transformer [NCT]

Standard	Code	CT spec.				Q'ty(EA)
		CT ratio	Burden	Frequency	Part Size	
UL	76313460018	400/5A	5VA	60Hz	S91	1
	76313460003	600/5A	5VA	60Hz	S61	1
	76313460004	630/5A	5VA	60Hz	S61	1
	76313460005	800/5A	5VA	60Hz	S61	1
	76313460006	1000/5A	5VA	60Hz	S61	1
	76313460007	1200/5A	5VA	60Hz	S61	1
	76313460008	1250/5A	5VA	60Hz	S61	1
	76313460009	1600/5A	5VA	60Hz	S61	1
	76313460010	2000/5A	5VA	60Hz	S91	1
	76313460011	2500/5A	5VA	60Hz	S91	1
	76313460012	3000/5A	5VA	60Hz	S10	1
	76313460013	3200/5A	5VA	60Hz	S10	1
	76313460014	3600/5A	5VA	60Hz	S10	1
	76313460015	4000/5A	5VA	60Hz	S10	1
	76313460016	5000/5A	5VA	60Hz	S10	1
	76313460017	6000/5A	5VA	60Hz	S10	1



Metering Current Transformer (D-Frame)

D-Frame for package

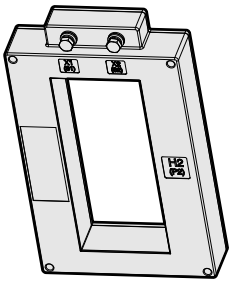
Pole	Rating (A)	Item Code	Description	Q'ty(Set)
3P	400	77123466201	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-D,3POLES	1
	600	77123466202	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-D,3POLES	1
	800	77123466203	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-D,3POLES	1
	1000	77123466204	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-D,3POLES	1
	1200	77123466205	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-D,3POLES	1
	1600	77123466206	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-D,3POLES	1
4P	400	77123466207	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-D,4POLES	1
	600	77123466208	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-D,4POLES	1
	800	77123466209	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-D,4POLES	1
	1000	77123466210	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-D,4POLES	1
	1200	77123466211	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-D,4POLES	1
	1600	77123466212	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-D,4POLES	1

For single item

Pole		Rating (A)	Item Code	Description	Q'ty(EA)
3P	4P				
●	●	400	77123466101	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-D	1
●	●	600	77123466102	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-D	1
●	●	800	77123466103	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-D	1
●	●	1000	77123466104	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-D	1
●	●	1200	77123466105	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-D	1
●	●	1600	77123466106	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-D	1

Accessories

Accessories Item Code



Cradle

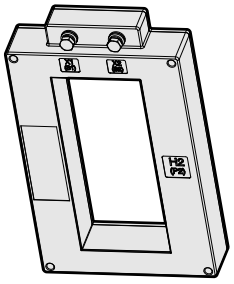
Metering Current Transformer (E-Frame)

E-Frame for package

Pole	Rating (A)	Item Code	Description	Q'ty(Set)
3P	400	77123467201	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-E,3POLES	1
	600	77123467202	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-E,3POLES	1
	800	77123467203	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-E,3POLES	1
	1000	77123467204	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-E,3POLES	1
	1200	77123467205	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-E,3POLES	1
	1600	77123467206	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-E,3POLES	1
	2000	77123467207	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-E,3POLES	1
	2500	77123467208	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-E,3POLES	1
	3000	77123467209	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-E,3POLES	1
	3200	77123467210	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-E,3POLES	1
4P	400	77123467211	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-E,4POLES	1
	600	77123467212	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-E,4POLES	1
	800	77123467213	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-E,4POLES	1
	1000	77123467214	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-E,4POLES	1
	1200	77123467215	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-E,4POLES	1
	1600	77123467216	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-E,4POLES	1
	2000	77123467217	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-E,4POLES	1
	2500	77123467218	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-E,4POLES	1
	3000	77123467219	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-E,4POLES	1
	3200	77123467220	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-E,4POLES	1

For single item

Pole		Rating (A)	Item Code	Description	Q'ty(EA)
3P	4P				
●	●	400	77123467101	COIL ASS'Y,BUILT-IN CRADLE,400A,UL/ANSI-E	1
●	●	600	77123467102	COIL ASS'Y,BUILT-IN CRADLE,600A,UL/ANSI-E	1
●	●	800	77123467103	COIL ASS'Y,BUILT-IN CRADLE,800A,UL/ANSI-E	1
●	●	1000	77123467104	COIL ASS'Y,BUILT-IN CRADLE,1000A,UL/ANSI-E	1
●	●	1200	77123467105	COIL ASS'Y,BUILT-IN CRADLE,1200A,UL/ANSI-E	1
●	●	1600	77123467106	COIL ASS'Y,BUILT-IN CRADLE,1600A,UL/ANSI-E	1
●	●	2000	77123467107	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-E	1
●	●	2500	77123467108	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-E	1
●	●	3000	77123467109	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-E	1
●	●	3200	77123467110	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-E	1



Metering Current Transformer (G-Frame)

G-Frame for package

Pole	Rating (A)	Item Code	Description	Q'ty(Set)
3P	2000	77123468201	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-G,3POLES	1
	2500	77123468202	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-G,3POLES	1
	3000	77123468203	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-G,3POLES	1
	3200	77123468204	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-G,3POLES	1
	4000	77123468205	COIL ASS'Y,BUILT-IN CRADLE,4000A,UL/ANSI-G,3POLES	1
	5000	77123468206	COIL ASS'Y,BUILT-IN CRADLE,5000A,UL/ANSI-G,3POLES	1
	6000	77123468207	COIL ASS'Y,BUILT-IN CRADLE,6000A,UL/ANSI-G,3POLES	1
4P	2000	77123468208	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-G,4POLES	1
	2500	77123468209	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-G,4POLES	1
	3000	77123468210	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-G,4POLES	1
	3200	77123468211	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-G,4POLES	1
	4000	77123468212	COIL ASS'Y,BUILT-IN CRADLE,4000A,UL/ANSI-G,4POLES	1
	5000	77123468213	COIL ASS'Y,BUILT-IN CRADLE,5000A,UL/ANSI-G,4POLES	1
	6000	77123468214	COIL ASS'Y,BUILT-IN CRADLE,6000A,UL/ANSI-G,4POLES	1

For single item

Pole		Rating (A)	Item Code	Description	Q'ty(EA)
3P	4P				
●	●	2000	77123468101	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-G,RT	1
●		2000	77123468102	COIL ASS'Y,BUILT-IN CRADLE,2000A,UL/ANSI-G,S	1
●	●	2500	77123468103	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-G,RT	1
●		2500	77123468104	COIL ASS'Y,BUILT-IN CRADLE,2500A,UL/ANSI-G,S	1
●	●	3000	77123468105	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-G,RT	1
●		3000	77123468106	COIL ASS'Y,BUILT-IN CRADLE,3000A,UL/ANSI-G,S	1
●	●	3200	77123468107	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-G,RT	1
●		3200	77123468108	COIL ASS'Y,BUILT-IN CRADLE,3200A,UL/ANSI-G,S	1
●	●	4000	77123468109	COIL ASS'Y,BUILT-IN CRADLE,4000A,UL/ANSI-G,RT	1
●		4000	77123468110	COIL ASS'Y,BUILT-IN CRADLE,4000A,UL/ANSI-G,S	1
●	●	5000	77123468111	COIL ASS'Y,BUILT-IN CRADLE,5000A,UL/ANSI-G,RT	1
●		5000	77123468112	COIL ASS'Y,BUILT-IN CRADLE,5000A,UL/ANSI-G,S	1
●	●	6000	77123468113	COIL ASS'Y,BUILT-IN CRADLE,6000A,UL/ANSI-G,RT	1
●		6000	77123468114	COIL ASS'Y,BUILT-IN CRADLE,6000A,UL/ANSI-G,S	1

Technical information

LS Electric's newest ACB products feature convenient access to device data through Modbus, BLE, NFC or direct USB connection; providing users with easy access and efficient control over their power distribution infrastructure.

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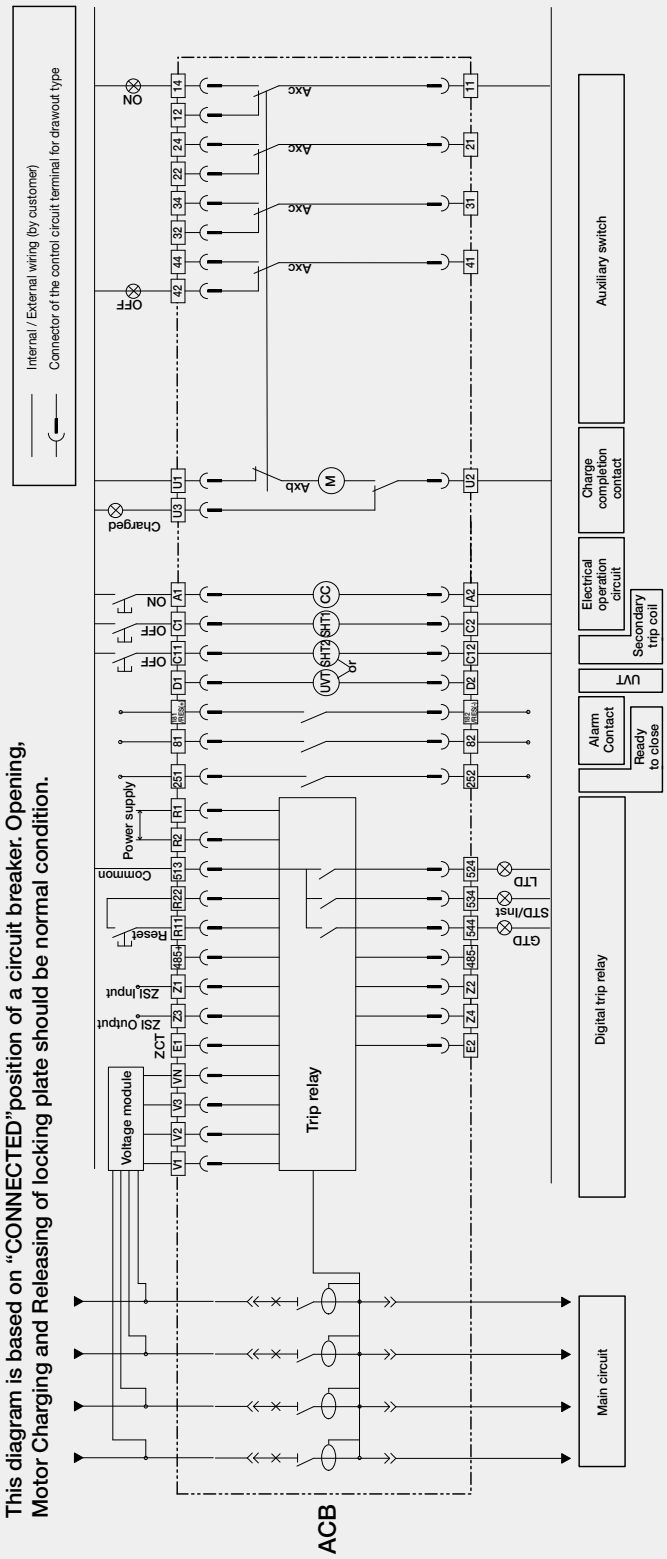
Technical Information

Electrical Diagram – ACB (C-Frame)



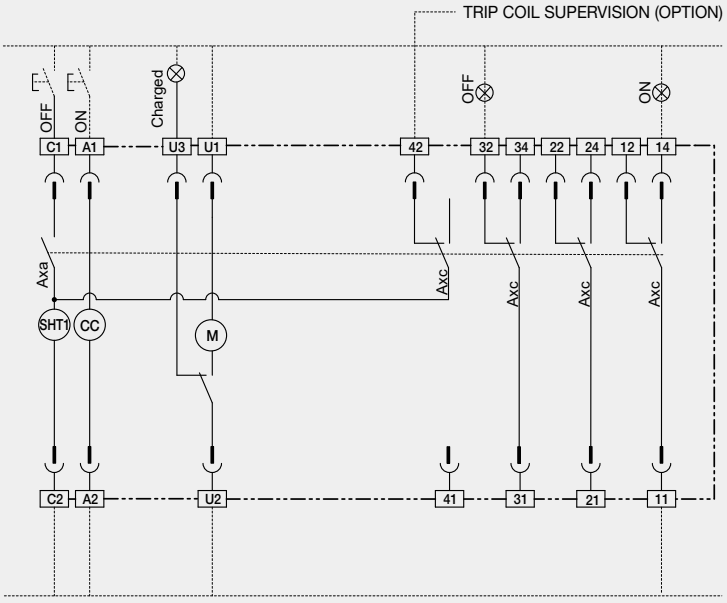
Terminal code description

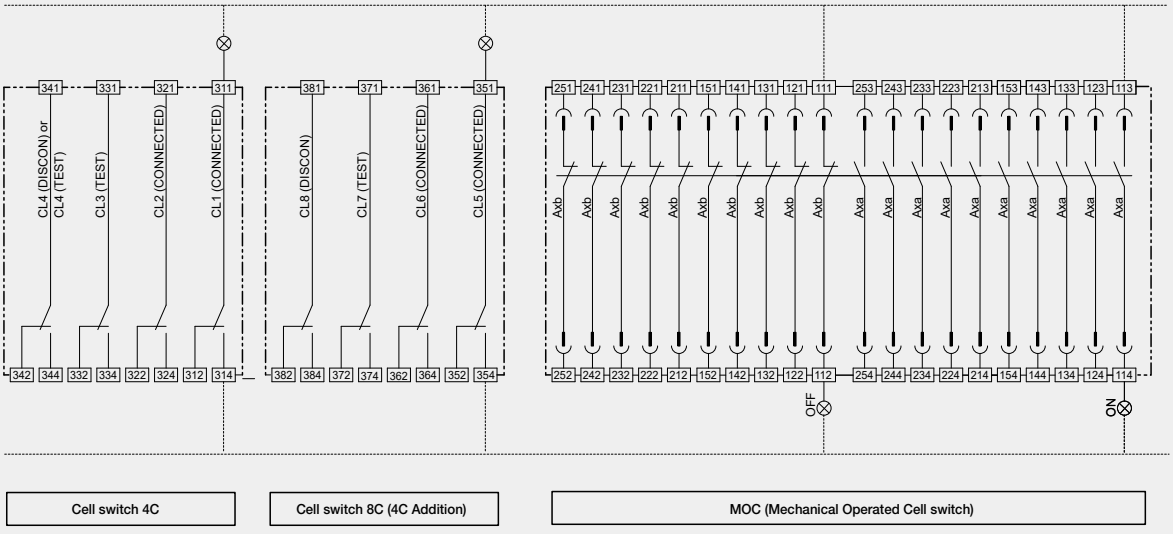
11	12 ~ 41	42	Auxiliary switch "b" contact	D1	D2	Voltage input terminal of UVT coil
11	14 ~ 41	44	Auxiliary switch "a" contact	81	82	Alarm1 "a" contact
U3	U2		Charge completion signal	181	182	Alarm2 "a" contact or RES Coil
U1	U2		Motor charging	251	252	Ready to close switch
A1	A2		Closing coil	R1	R2	Control power for trip unit
C1	C2		Shunt trip	513 ~	544	Fault cause indication contacts
C11	C12		2nd shunt trip	R11	R22	Alarm reset (Trip cause LEDs, contacts)
Z1	Z2		ZSI input			
Z3	Z4		ZSI output			
E1	E2		ZCT			
VN ~	V3		Voltage module			
485+ ~	485+		RS-485 Communication			
311 ~	344		Cell switch			

Accessory code description

Axc	Auxiliary switch
LTD	Long time delay trip indicator
STD/Inst	Short time delay/instantaneous
GTD	Ground fault trip indicator
CL1~CL4	Cell switch
(M)	Motor
(CC)	Closing coil
(Sht1)	1st Shunt coil
(Sht2)	2nd Shunt coil
(UVT)	UVT coil

Note: 1. The diagram is shown with circuit de-energized, all devices open and charged and relays in normal position
2. Relay is normal condition and charging type is "Off Charging"
3. Standard auxiliary contact is 4C
4. Options
- Ready to close contact, trip alarm contact, UVT coil, fully charged contact, and secondary trip coil
- Temperature module, voltage module, ZCT, and ZSI
5. Consult LS ELECTRIC when using ZSI (Zone Selective Interlocking)
6. For connecting RS-485 verify if the polarity is correct
7. Contact configuration for Cell Switch can be changeable if necessary



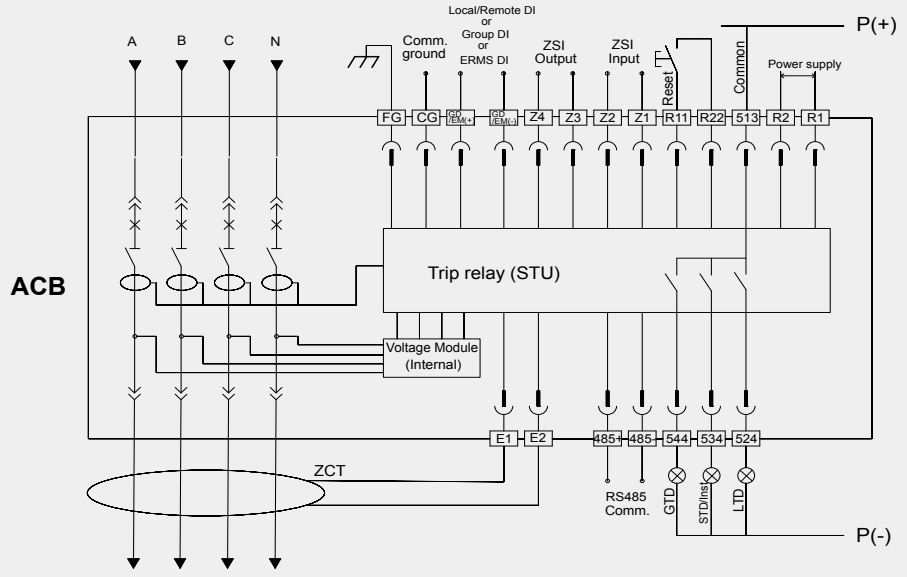


Terminal symbol

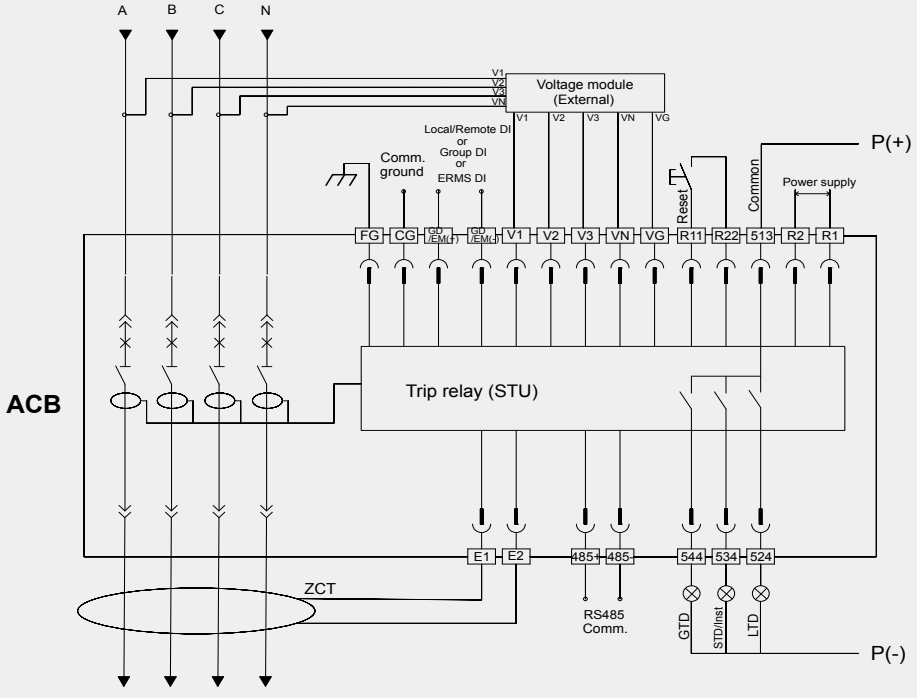
311 ~ 344	Cell switch
111 ~ 254	MOC

Electrical Diagram – ACB/STU (D/E/G-Frame)

STU Wire Diagram (with internal VDM)

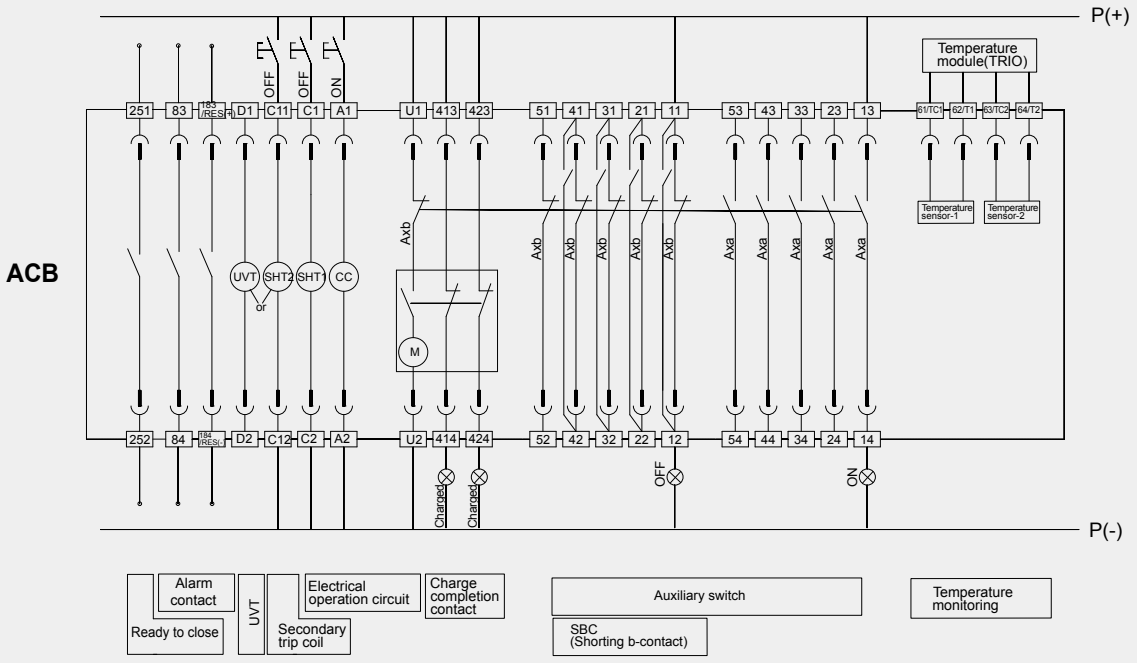


STU Wire Diagram (with external VDM)



Note: 1. For connecting RS-485 verify if the polarity is correct
2. Purchase TRIO module for using both Local/Remote and Group DI
3. Contact LS ELECTRIC for requirements of external voltage module

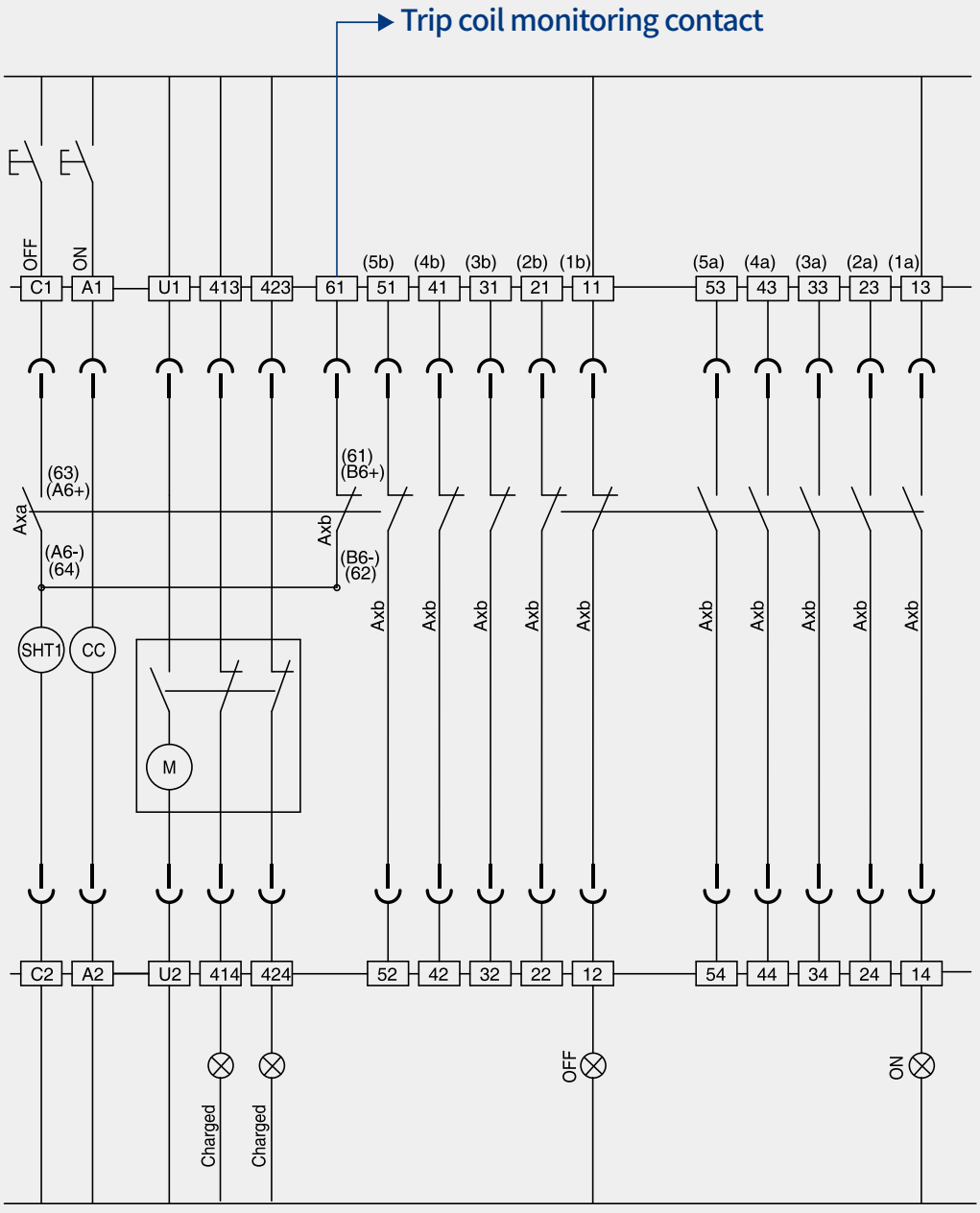
ACB Control Circuit Diagram



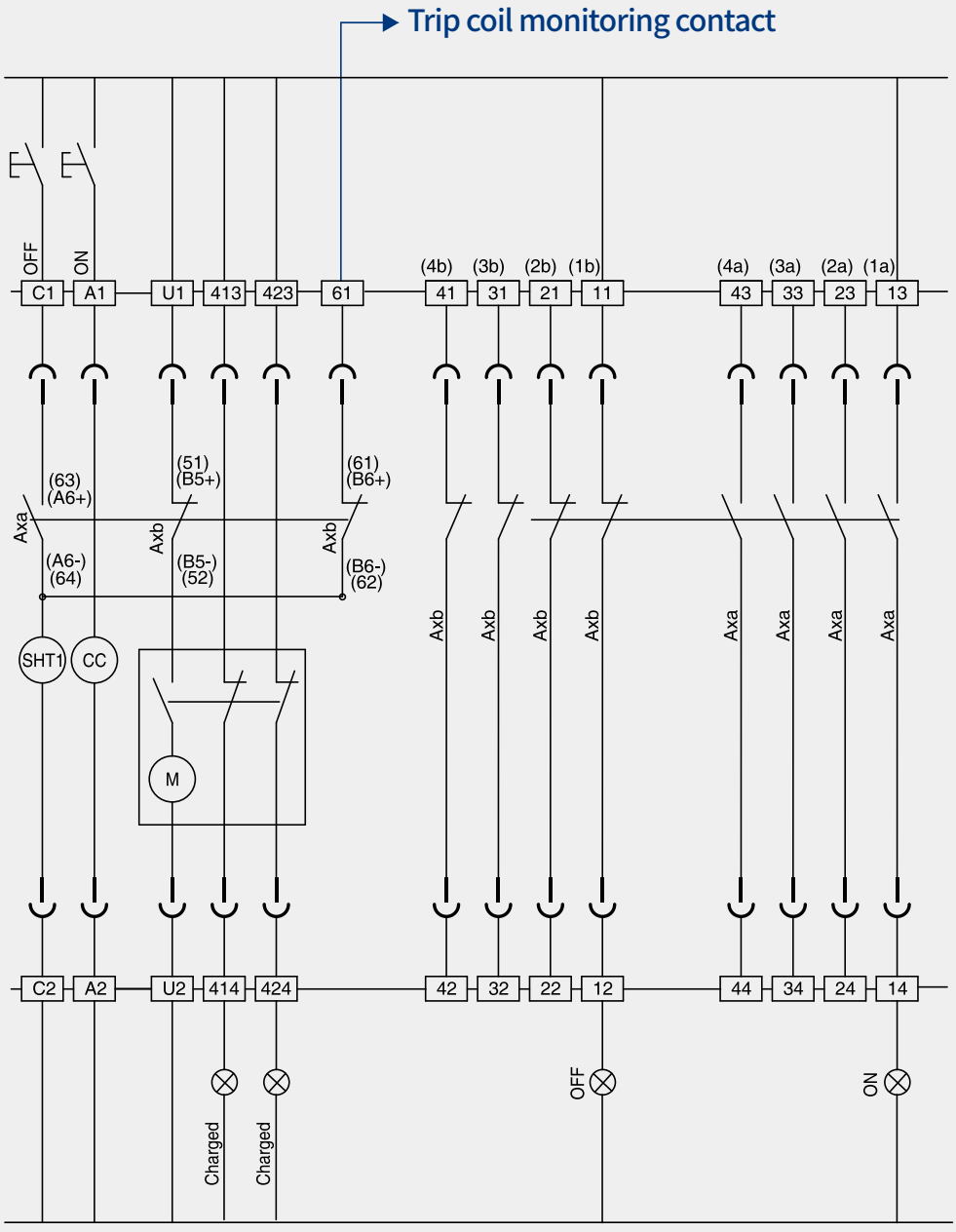
Note: 1. Charging type is "OFF Charging"
2. The auxiliary switch in above diagram is composed of 5a5b

Electrical Diagram – Trip coil monitoring contact

TC (TCS ON-charge) '5a5b'



TC (TCS ON-charge) '4a4b'



Technical Information

Altitude and isolation voltage

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

Max. using voltage by frame		Altitude			
		2000m	3000m	4000m	5000m
		6560ft	9842ft	13123ft	16404ft
C-Frame	UAS series	800Vac	720Vac	640Vac	552Vac
D-Frame	UAS series	635Vac	571Vac	508Vac	438Vac
E-Frame	UAH series	635Vac	571Vac	508Vac	438Vac
	UAW series	847Vac	762Vac	677Vac	584Vac
G-Frame	UAH series	635Vac	571Vac	508Vac	438Vac
Current compensation constant		1×In	0.99×In	0.96×In	0.94×In

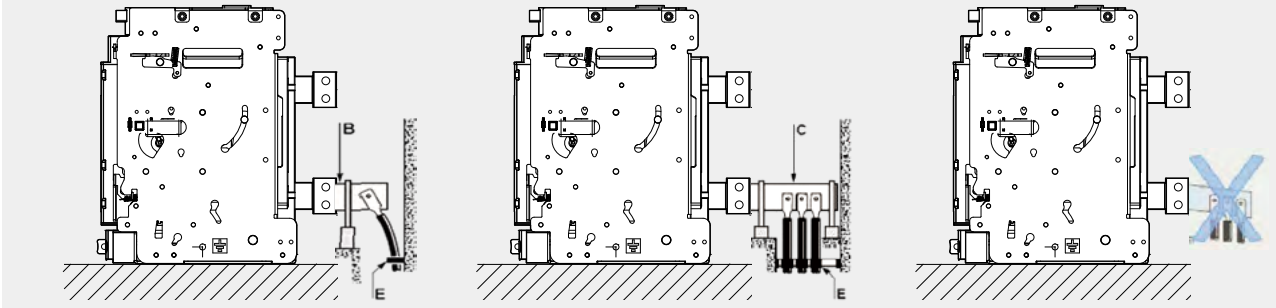
Internal resistance (per pole) and power consumption (3-phase)

Frame	Rated current (A)	Fixed type		Draw-out type	
		Inner resistance (μΩ)	Power consumption (W/3Phase)	Inner resistance (μΩ)	Power consumption (W/3Phase)
C	400	20	10	30	14
	600	20	22	30	32
	800	20	38	30	58
	1000	20	60	30	90
	1200	20	86	30	130
D	400	15	7	30	14
	600	15	16	30	32
	630	15	18	30	36
	800	15	29	30	58
	100	15	0	30	1
	1200	15	65	30	130
	1250	15	70	30	141
	1600	15	115	30	230
E	400	10	5	20	10
	600	10	11	20	22
	630	10	12	20	24
	800	10	19	20	38
	1000	10	30	20	60
	1200	10	43	20	86
	1250	10	47	20	94
	1600	10	77	20	154
	2000	10	120	20	240
	2500	10	188	20	375
	3000	10	270	20	540
	3200	10	307	20	614
G	1600	6	46	9	69
	2000	6	72	9	108
	2500	6	113	9	169
	3000	6	162	9	243
	3200	6	184	9	276
	3600	6	233	9	350
	4000	6	288	9	432
	5000	6	450	9	675
	6000	5	540	7	756

Installation recommendation

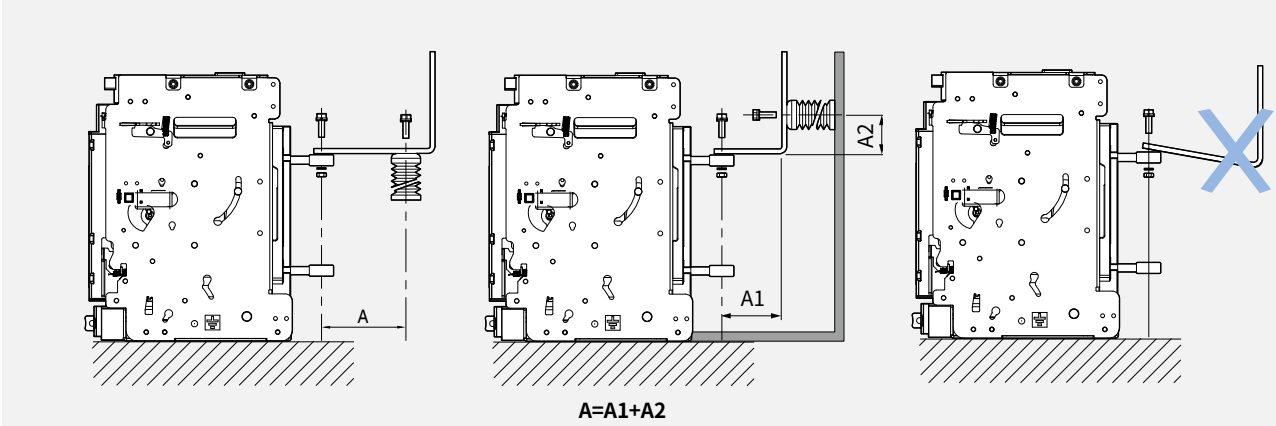
Cables connections

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



Bus bar connection

For bus bar connection, connect access parts with provided torque and fix parallel when installing the support to not apply excessive weight on the circuit breaker.
To prevent accidents, secure maximum safe distance A from the connection point. This ensures it can withstand the electric force generated in the event of a short circuit.
(Support strength: Insulator bending load 720kg or more, tensile strength 3000kg or more)



※ Damage caused by modifications is not covered by the warranty.

Safe distance

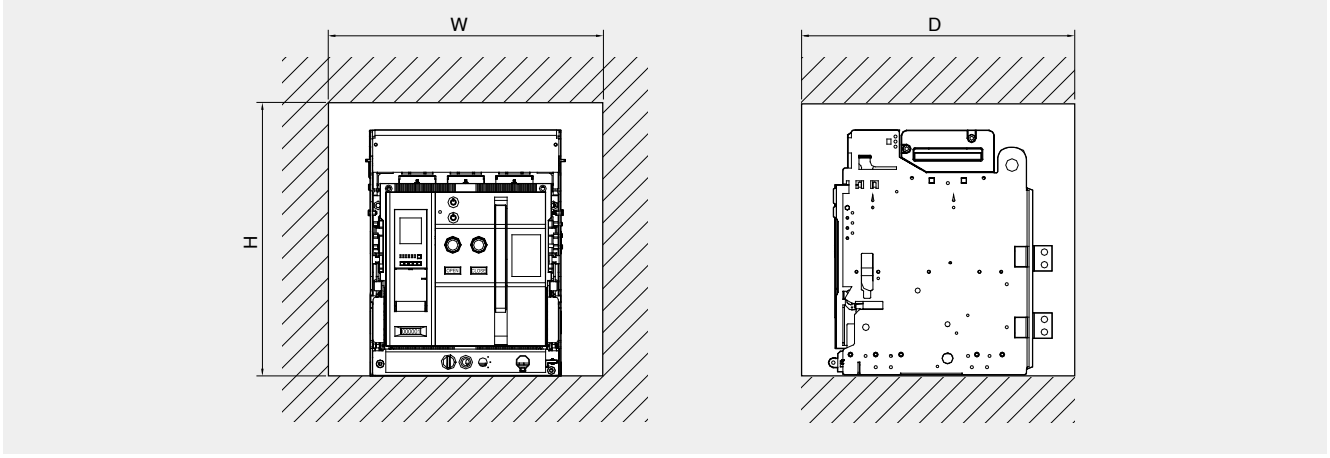
Short capacity(kA)	Maximum safe distance "A"					
	30	50	65	80	100	150
Length A (mm)	350	300	250	150	150	150

Technical Information

Installation recommendation

Insulation voltage

Refer to the below table for the proper isolation distance between ACB and panel.

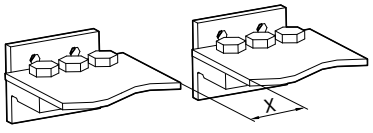


Enclosure Dimensions		C-Frame			D-Frame			E-Frame			G-Frame		
		H	W	D	H	W	D	H	W	D	H	W	D
3P	Inch	17.72	11.06	9.84 (Flat: 7.48)	19.69	15.75	13.39	19.69	19.69	13.39	31.5	32.48	13.39
	mm	450	281	250 (Flat: 190)	500	400	340	500	500	340	800	825	340
4P	Inch	17.72	13.78	9.84 (Flat: 7.48)	19.69	19.69	13.39	19.69	24.21	13.39	31.5	41.54	13.39
	mm	450	350	250 (Flat: 190)	500	500	340	500	615	340	800	1055	340

Note: 1. Enclosure dimensions are also in pages 24~25.
2. Enclosure dimensions adhere to UL/ANSI Standard.

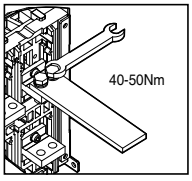
Minimum isolation distance

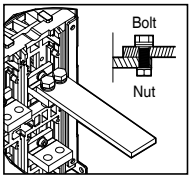
For safety, all electric charging part installations should adhere to the minimum isolation distance.

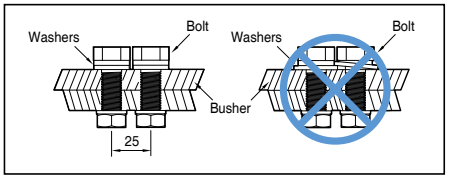


Insulating voltage	Minimum isolation distance
600V	8 mm
1000V	14 mm

Tightening torque







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

Product model	Rated current		Applicable busbar size (mm)	 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
UAS/UAN-08C	800A	mm	6.4T×50.8×2ea	800A	800A	800A	800A	800A	800A	800A							
			6.4T×76.2×1ea								800A	800A	800A	800A	800A	800A	800A
		inch	1/4×2×2ea	800A	800A	800A	800A	800A	800A	800A							
			1/4×3×1ea								800A	800A	800A	800A	800A	800A	800A
UAS/UAN-12C	1200A	mm	6.4T×50.8×4ea	1200A	1176A	1152A	1128A	1092A	1056A	1008A							
			6.4T×76.2×2ea								1200A	1176A	1152A	1128A	1092A	1056A	1008A
			10T×50×2ea	1200A	1176A	1152A	1128A	1092A	1056A	1008A							
		inch	1/4×2×4ea	1200A	1176A	1152A	1128A	1092A	1056A	1008A							
			1/4×3×2ea								1200A	1176A	1152A	1128A	1092A	1056A	1008A
UAS-08D	800A	mm	6.4T×76.2×1ea								800A	800A	800A	800A	800A	800A	800A
			5T×50×2ea	800A	800A	800A	800A	800A	800A	800A							
		inch	1/4×3×1ea								800A	800A	800A	800A	800A	800A	800A
UAS-16D	1600A	mm	6.4T×76.2×2ea								1600A	1600A	1600A	1600A	1600A	1600A	1600A
			10T×50×2ea	1600A	1600A	1600A	1600A	1600A	1600A	1600A							
		inch	1/4×3×2ea								1600A	1600A	1600A	1600A	1600A	1600A	1600A
UAH-20E	800A	mm	5T×100×1ea	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A
			6T×80×1ea														
			6.4T×76.2×1ea														
		inch	1/4×3×1ea														
	1600A	mm	6.4T×127×2ea	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A
			8T×100×2ea														
			5T×100×3ea														
		inch	10T×80×2ea														
	2000A	mm	5T×125×2ea								2000A	2000A	2000A	2000A	2000A	2000A	2000A
			8T×80×2ea	2000A	2000A	2000A	2000A	2000A	2000A	2000A							
			6.4T×101.6×2ea														
			10T×100×2ea	2000A	2000A	2000A	2000A	2000A	2000A	2000A							
		inch	1/4×4×2ea														
UAH-25E	2500A	mm	5T×100×3ea	2500A	2464A	2359A	2250A	2134A	2012A	1882A	2500A	2500A	2484A	2368A	2247A	2118A	1981A
			6.4T×127×2ea														
			8T×100×2ea	2500A	2464A	2359A	2250A	2134A	2012A	1882A							
			10T×80×2ea														
		inch	1/4×5×2ea														
UAH-32E	3200A	mm	6.4T×127×3ea	3200A	3067A	2936A	2800A	2656A	2504A	2342A	3200A	3200A	3091A	2947A	2796A	2636A	2466A
			8T×100×3ea														
			10T×80×3ea														
			10T×125×2ea														
		inch	1/4×5×3ea														
UAH-40E	4000A	mm	6.4T×127×4ea								4000A	4000A	4000A	3929A	3728A	3514A	3287A
			10T×150×2ea														
		inch	1/4×5×4ea														
UAH-40G	4000A	mm	6.4T×127×4ea	4000A	4000A	3915A	3733A	3541A	3339A	3123A	4000A	4000A	4000A	3929A	3728A	3514A	3287A
			10T×125×3ea														
			10T×150×2ea														
		inch	1/4×5×4ea														
UAH-50G	5000A	mm	6.4T×152×5ea	5000A	4929A	4719A	4499A	4268A	4024A	3764A	5000A	5000A	4967A	4736A	4493A	4236A	3962A
			6.4T×203×4ea														
			10T×125×4ea														
		inch	1/4×6×5ea														
			1/4×8×4ea														
UAH-60G	6000A	mm	6.4T×152×6ea								6000A	6000A	5795A	5525A	5242A	4942A	4623A
			6.4T×203×5ea														
			10T×100×6ea														
			10T×150×4ea														
		inch	1/4×6×6ea														
			1/4×8×5ea														

* If ambient temperature is greater than 60°C, consult LS ELECTRIC. * Total temperature limit is 105°C according to UL/ANSI standard.

Technical Information

Ordering sheet

C-Frame

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

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

ACB main body	Type of ACB	● UL Compact	☐ UAN	☐ UAS	☐ UAA		
	Frame size	☐ 800AF	☐ 1200AF				
	Rated current (rating plug)	A					
	Trip relay	☐ NO					
		☐ YES					

Type	Frequency		Control voltage			Comm.		Optional function	
	60Hz	50Hz	NO	AC/DC 110~250V	DC 24~60V	NO	YES	Earth leakage detection	External CT ground fault
Normal	☐ NGO	☐ NG5	●	-	-	●	-	-	-
Ammeter	☐ AGO	☐ AG5	●	-	-	●	-	-	-
	☐ AG1	☐ AG6	-	●	-	●	-	-	-
	☐ AG2	☐ AG7	-	-	●	●	-	-	-
	☐ AI0	☐ AI5	●	-	-	●	-	-	-
	☐ AI1	☐ AI6	-	●	-	●	-	-	-
	☐ AI2	☐ AI7	-	-	●	●	-	-	-
	☐ AE0	☐ AE5	●	-	-	●	-	-	-
	☐ AE1	☐ AE6	-	●	-	●	-	-	●
	☐ AE2	☐ AE7	-	-	●	●	-	-	●
	☐ AT0	☐ AT5	●	-	-	●	-	-	●
	☐ AT1	☐ AT6	-	●	-	●	-	-	●
	☐ AT2	☐ AT7	-	-	●	●	-	-	●
	☐ AC1	☐ AC6	-	●	-	-	●	-	-
	☐ AC2	☐ AC7	-	-	●	-	●	-	-
	☐ AQ1	☐ AQ6	-	●	-	-	●	-	-
	☐ AQ2	☐ AQ7	-	-	●	-	●	-	-
	☐ AX1	☐ AX6	-	●	-	-	●	-	●
	☐ AX2	☐ AX7	-	-	●	-	●	-	●
	☐ AR1	☐ AR6	-	●	-	-	●	-	●
	☐ AR2	☐ AR7	-	-	●	-	●	-	●

Type	Frequency		Control voltage			Comm.		Optional function	
	60Hz	50Hz	NO	AC/DC 110~250V	DC 24~60V	NO	YES	Earth leakage detection	External CT ground fault
Power meter	☐ PC1	☐ PC6	-	●	-	-	●	-	-
	☐ PC2	☐ PC7	-	-	●	-	●	-	-
	☐ PQ1	☐ PQ6	-	●	-	-	●	-	-
	☐ PQ2	☐ PQ7	-	-	●	-	●	-	-
	☐ PX1	☐ PX6	-	●	-	-	●	-	●
	☐ PX2	☐ PX7	-	-	●	-	●	-	●
	☐ PR1	☐ PR6	-	●	-	-	●	-	●
Supreme meter	☐ PR2	☐ PR7	-	-	●	-	●	-	●
	☐ SC1	☐ SC6	-	●	-	-	●	-	-
	☐ SC2	☐ SC7	-	-	●	-	●	-	-
	☐ SQ1	☐ SQ6	-	●	-	-	●	-	-
	☐ SQ2	☐ SQ7	-	-	●	-	●	-	-
	☐ SX1	☐ SX6	-	●	-	-	●	-	●
	☐ SX2	☐ SX7	-	-	●	-	●	-	●
	☐ SR1	☐ SR6	-	●	-	-	●	-	●
	☐ SR2	☐ SR7	-	-	●	-	●	-	●

Note: 1. Standard function: Ground fault detection
2. Communication function is unavailable when selecting NO control voltage
3. Power/Supreme Meter is also available for generator protection

	No.of poles	☐ 3-pole			☐ 4-pole		
	Installation type	☐ Draw-out type			☐ Fixed type		
	Phase arranging order	☐ Standard type (N, R, S, T)			☐ Reverse phase type (R, S, T, N)		
	Closing type	☐ Manual closing					
		☐ Electrical closing					
		• Charge method			☐ Standard type (OFF-Charging method)		
					☐ Rapid auto-reclosing type (ON-Charging method)		
		•Motor operating voltage	☐ AC/DC 100V~130V		☐ DC 125V	☐ 24V~30V	☐ DC 48V~60V
			☐ AC/DC 200V~250V		☐ AC 48V		
	Closing voltage	☐ AC/DC 100V~130V	☐ DC 125V	☐ AC/DC 200V~250V	☐ DC 24V~30V	☐ DC 48V~60V	☐ AC 48V
	Tripping voltage	☐ AC/DC 100V~130V	☐ DC 125V	☐ AC/DC 200V~250V	☐ DC 24V~30V	☐ DC 48V~60V	☐ AC 48V
Cradle	Cradle type	☐ Safety Shutter Attachment (F class)			☐ Automatic connection (Connector type)	☐ Automatic connection (Screw Joint type)	
Bus-bar connection	Bus-bar type	☐ Vertical	☐ Horizontal	☐ Plane	☐ Top: Horizontal, Bottom: Vertical	☐ Top: Vertical, Bottom: Horizontal	☐ Customer mounting

ACB accessory	Main body	Standard Accessory	• Aux. contact	☐ Standard type (4c, standard installation)		☐ Micro Load type (4C, installation)	
			• Key Lock			☐ Single Key (ON-Lock)	
			• Undervoltage trip device (UVT, Instantaneous type)	☐ AC/DC 100V~130V		☐ DC 125V	☐ AC/DC 200V~250V
				☐ DC 24V~30V		☐ DC 48V~60V	☐ AC 380V~480V
			• Mechanical operation contact (MOC), Door Interlock (DI)			☐ Non-attachment type	☐ Attachment type
			• Mechanical Interlock (MI)			☐ Non-attachment type	☐ Attachment type
			• Counter			☐ Default	
			• Miss insertion preventive device (MIP)			☐ Non-attachment type	☐ Attachment type
			• Double trip device (Same with Shunt voltage)			☐ Non-attachment type	
			• Ready-to-close contact			☐ Non-attachment type	☐ Attachment type
			• Key Interlock (K2, ON–Lock)			☐ ON/OFF Button Lock	
			☐ Spread Busbar (for Plan type)				
	Separate purchase	Cradle mounting	• Cell switch (CL)	☐ 4c	☐ 8c		
			• Door Interlock			☐ Wire type	☐ Catch type
			• Mechanical operation contact (MOC)			☐ Standard type (10a10b)	
			• Mechanical Interlock (MI)			☐ Wire type (2 terminals)	☐ Wire type (3 terminals)
			• Miss insertion preventive device (MIP)			☐ Non-attachment type	☐ Attachment type
			☐ Racking Interlock	☐ Insulation barrier - Default			
		External mounting	• UVT time delay controller	☐ AC/DC 100V~130V		☐ DC 125V	☐ AC/DC 200V~250V
				☐ DC 48V~60V		☐ AC 380V~480V	☐ AC 48V
			☐ Door Frame (DF)	☐ Condenser trip device (CTD)		☐ OCR Tester	
			☐ Dust Cover	☐ Profibus-DP Comm.		☐ Remote closing & trip	

D/E/G-Frame

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

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

ACB main body

ACB Type & Frame size

※D/W-Frame: 400~1600AF, E/X-Frame: 400~4000AF, G/Z-Frame: 1600~6000AF

☐ UAS-D (D-Frame, Standard RST(N), 3/4P) ☐ UAS-W (D-Frame, Reverse NRST, 4P)
☐ UAH-E (E-Frame, Standard RST(N), 3/4P) ☐ UAH-X (E-Frame, Reverse NRST, 4P)
☐ UAH-G (G-Frame, Standard RST(N), 3/4P) ☐ UAH-Z (G-Frame, Reverse NRST, 4P)
☐ UAW-E (E-Frame, High Voltage, Standard RST(N), 3/4P) ☐ UAW-E (E-Frame, High Voltage, Standard RST(N), 3/4P)

Ratings: AF | Rated current(Rating Plug): A

Trip relay: ☐ YES ☐ NO

Type		Frequency		Control voltage			Comm.		Optional function	
		60Hz	50Hz	No	AC/DC 100~250V	DC 24~48V	No	Yes	Earth leakage detection	External CT ground fault
N	Normal	☐ NHO	☐ NH5	●	-	-	●	-	-	-
A	Ammeter	☐ AH0	☐ AH5	●	-	-	●	-	-	-
		☐ AH1	☐ AH6	-	●	-	●	-	-	-
		☐ AH2	☐ AH7	-	-	●	●	-	-	-
		☐ AD1	☐ AD6	-	●	-	-	●	-	-
		☐ AD2	☐ AD7	-	-	●	-	●	-	-
		☐ AJ1	☐ AJ6	-	●	-	-	●	●	-
		☐ AJ2	☐ AJ7	-	-	-	-	●	●	-
		☐ AY1	☐ AY6	-	●	-	-	●	-	●
		☐ AY2	☐ AY7	-	-	●	-	●	-	●
		☐ AO1	☐ AO6	-	●	-	-	●	-	-
		☐ AO2	☐ AO7	-	-	●	-	●	-	-

Note: 1. Standard function: Ground fault detection.
2. Communication function is unavailable when selecting NO control voltage.
3. P (Power) and S (Supreme) types are also available for generator protection.
4. P and S types need the VDM accessory for voltage measurement.

Type		Frequency		Control voltage		Comm.	Optional function		
		60Hz	50Hz	AC/DC 100~250V	DC 24~48V		Earth leakage detection	External CT ground fault	Pre-Trip Alarm
P	Power Meter	☐ PS1	☐ PS6	●	-	●	-	-	●
		☐ PS2	☐ PS7	-	●	●	-	-	●
		☐ PJ1	☐ PJ6	●	-	●	●	-	●
		☐ PJ2	☐ PJ7	-	●	●	●	-	●
		☐ PY1	☐ PY6	●	-	●	-	●	●
		☐ PY2	☐ PY7	-	●	●	-	●	●
		☐ PO1	☐ PO6	●	-	●	-	-	●
		☐ PO2	☐ PO7	-	●	●	-	-	●
		☐ PS3	☐ PS8	●	-	●	-	-	●
		☐ PS4	☐ PS9	-	●	●	-	-	●
		☐ PJ3	☐ PJ8	●	-	●	●	-	●
		☐ PJ4	☐ PJ9	-	●	●	●	-	●
		☐ PY3	☐ PY8	●	-	●	-	●	●
		☐ PY4	☐ PY9	-	●	●	-	●	●
		☐ PO3	☐ PO8	●	-	●	-	-	●
		☐ PO4	☐ PO9	-	●	●	-	-	●
S	Ammeter	☐ SS1	☐ SS6	●	-	●	-	-	●
		☐ SS2	☐ SS7	-	●	●	-	-	●
		☐ SJ1	☐ SJ6	●	-	●	●	-	●
		☐ SJ2	☐ SJ7	-	●	●	●	-	●
		☐ SY1	☐ SY6	●	-	●	-	●	●
		☐ SY2	☐ SY7	-	●	●	-	●	●
		☐ SO1	☐ SO6	●	-	●	-	-	●
		☐ SO2	☐ SO7	-	●	●	-	-	●

Number of poles	☐ 3-pole		☐ 4-pole	
Installation type	☐ Fixed type		☐ Draw-out type	
Closing type	☐ Manual closing			
	☐ Electrical closing			
	• Charging method	☐ Standard type (OFF-Charge method)		
		☐ Rapid auto-reclosing type (ON-Charge method)		
	• Motor operating voltage	☐ Without motor	☐ A/DC 100V~125V	☐ A/DC 200V~250V ☐ DC 125V ☐ DC 24V~30V
		☐ DC 48V~60V	☐ AC 48V	
	• Charging switch	☐ None	☐ CS1(Charging Switch)	☐ CS2(Charging switch communication)
Closing voltage	☐ Without coil	☐ A/DC 100V~125V	☐ A/DC 200V~250V	☐ DC 125V ☐ DC 24V~30V ☐ DC 48V~60V ☐ AC 48V
Trippiong voltage	☐ Without coil	☐ A/DC 100V~125V	☐ A/DC 200V~250V	☐ DC 125V ☐ DC 24V~30V ☐ DC 48V~60V ☐ AC 48V

ACB cradle

Cradle type	☐ No safety shutter (E class)		☐ Safety shutter attachment (F class)	
Secondary Connector	☐ Manual connection	☐ Automatic connection (Connector type)	☐ Automatic connection (Screw Joint type)	

Connections: ☐ Vertical ☐ Horizontal ☐ Front connection ☐ Line: Horizontal Load: Vetical ☐ Line: Vetical Load: Horizontal ☐ Customer mounting

ACB accessory

ACB main body – Standard accessory

• Aux. contact(AX)							
☐ High capacity type (5a5b, OFF charge)	☐ High capacity type (5a5b, ON charge)	☐ High capacity type (6a6b, ON charge)					
☐ High capacity type (3a3b, OFF charge)	☐ High capacity type (3a3b, ON charge)						
• Undervoltage trip device (UVT, Instantaneous)							
☐ Without coil	☐ A/DC 100V~125V	☐ A/DC 200V~250V	☐ DC 125V	☐ DC 24V~30V	☐ DC 48V~60V	☐ AC 380V~480V	☐ AC 48V
• Double shunt coil(SHT2)	☐ Non-attachment type	☐ Attachment type					
• Trip alarm switch, Manual reset button(AL, MRB)	☐ Non-attachment type	☐ Attachment type					
• Remote Reset Switch	☐ Non-attachment type	☐ Attachment type					
• Ready-to-close switch(RCS)	☐ Non-attachment type	☐ Attachment type					
• Counter(C)	☐ Non-attachment type	☐ Attachment type					
• Key Lock(K)							
☐ K1 (Normal type)	☐ K2 (Interlock set)	☐ K3 (Double keylock)	☐ K4 (Same keylock)				
☐ K5 (Kirkkey lock type, Profalux type)	☐ K6 (Kirkkey lock type, CAMLOCK type)	☐ K7 (Kirkkey lock type, CN-22)					
• Lockable On/OFF Button Cover (B)	☐ Non-attachment type	☐ Attachment type					
• Mechanical operation contact (MOC)	☐ Non-attachment type	☐ Attachment type					

ACB cradle – Standard accessory

• Safety Shutter (ST)	☐ Non-attachment type	☐ Attachment type
• Cell Switch (CEL)	☐ Non-attachment type	☐ Attachment type
• Body Supporter (BSP)	☐ Non-attachment type	☐ Attachment type
• Lockable Position Lock (PL)	☐ Non-attachment type	☐ Attachment type
• Metering Current Transformer (T)	☐ Non-attachment type	☐ Attachment type

Separate purchase

Main body	☐ Interphase Barrier (IB)				
	☐ Slow closing lever (SL)				
Cradle mounting	☐ Door interlock (DI)				
	☐ Mechanical operation contact (MOC)				
	• 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)			
External mounting	• UVT time delay controller (UDC)				
	☐ A/DC 100V~125V	☐ A/DC 200V~250V	☐ DC 125V	☐ DC 24V~30V	☐ DC 48V~60V ☐ AC 380V~480V ☐ AC 48V
	☐ Door frame (DF)	☐ Dust cover (DC)		☐ Condenser trip device (CTD)	
	☐ Profibus-DP Comm. (PC)	☐ Temperature alarm (TM)		☐ Temperature Remote I/O (TRIO)	
ETC	☐ i-Tester (IT)	☐ Lifting Hook (LH)			

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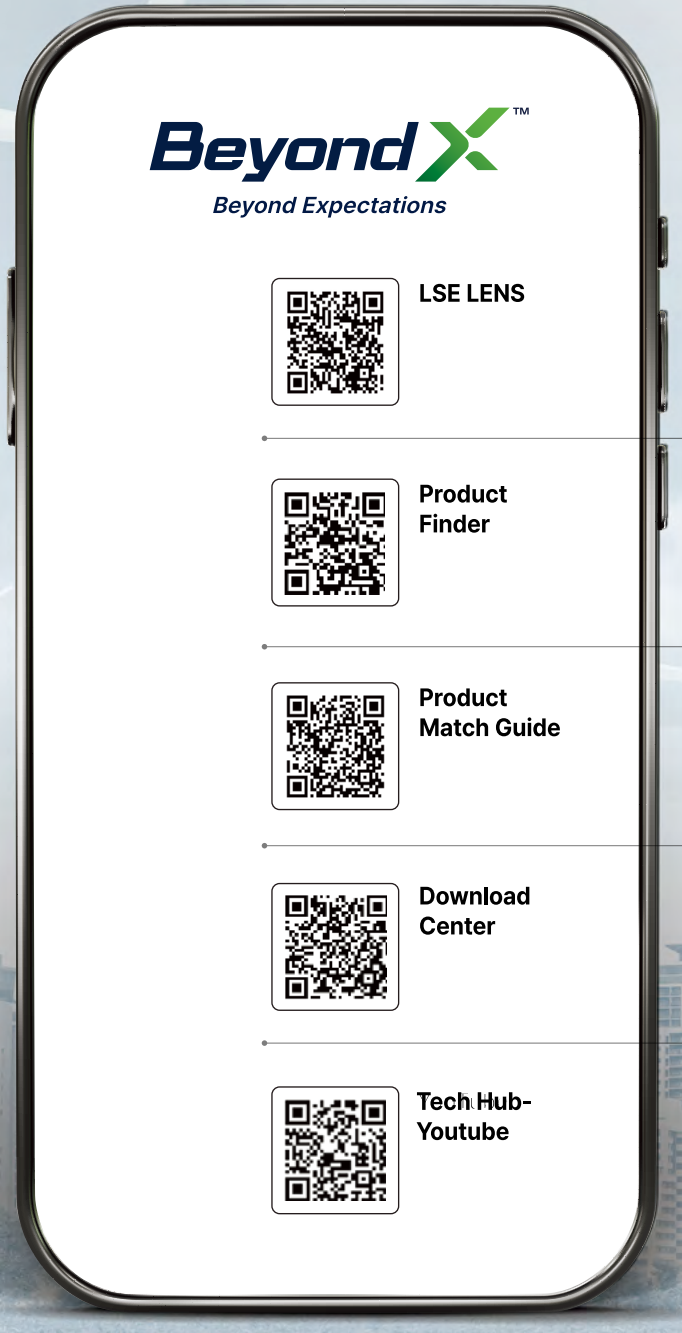

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