Synergy Susol Switchboards

About:

*The UL891 Compliant High quality Engineering Products

We, at Spike Electric Controls, introduce our Synergy Susol Switchboards range, which is an engineering marvel. We aim to bring you power products that are engineered for safety, reliability, and quality. We are committed to providing our clients with innovative solutions and meeting complex technical requirements with ease.

Our Synergy Susol Switchboards range is compliant with the specifications of the UL891 quality control standard, which is one of the most common and most widely trusted standards for switchboards. The UL standards are essentially a set of safety regulations that have been certified by OSHA (Occupational Safety and Health Administration) in the U.S. These standards have been approved by the U.S. federal government for the safety of workers.

The specifications of the UL891 quality control standard apply to the switchboards rated for 600V or less in accordance with the National Electric Code (NEC) and ANSI/ NFPA 70. This standard also covers the switchboards which are used in circuits with available short circuit currents up to 2,000A or less.

Our Synergy switchboards are tested after being subject to a 2,000A fault current. This certifies that our product can survive the extreme physical stress of such an event.

This gives you an assurance that our Synergy Susol Switchboards range will hold up even in the most extreme circumstances.

The UL standards for switchboards focus on all aspects of safety w.r.t the switchboard systems. As per the requirements of the UL certification, our Syne gy Susol Switchboards range is periodically sampled and tested to ensure compliance. So, there is a constant testing and thus, our task does not end with getting certified once onl .

The badge of the UL certification conveys trust between the manufacturers, governing bodies, and consumers.

Installation and Maintenance:

Synergy Switchboards – Easy Installation and Maintenance

Our Synergy Susol Switchboards range is built to last and features design innovations that facilitate easy installation and maintenance. These switchboards are easily available to meet the needs of contractors, consultants and end-users.

The Synergy Susol Switchboards range adheres to the highest standards in terms of quality. We offer custom or standard switchboards that are easy to install, we are available 24/7 to assist any installation questions. Spike Electric will provide you with a sales engineers contact information before shipping that you can call directly for any questions 24/7.

Our Synergy Susol Switchboards range designs entail the most frequently requested ratings and options, with faster delivery.

Features for the Custom Option:

Synergy Susol Switchboards Features for the Custom option

- Circuit breaker and fusible switch mains and feeders
- NEMA Type 1, 12, 4, 4x or Type 3R available
- NEC 2017 Arc Energy Reduction available or also called arc-flas mitigation system available for main breaker
- 6000 Amp Max on Switch Boards
- 65 kAIC standard bus bracing. Optional 100 or 200 kAIC
- Voltages – up to 600 Vac or 250 Vdc
- Sequence utility metering – hot or cold
- Internally mounted surge protection devices
- Customer metering
- Main Tie Main
- Dual Generator Input
- Emergency Generator Input Parraell Switchboard
- Automatic Transfer Switch Intergraded into Switchboard
- Manuel Transfer Switch Intergraded into Switchboard
- Distribution Transformers Intergraded into Switchboard
- Mini Power Zone Intergraded into Switchboard
- Long-Time Delay · Short-Time Pickup · Short-Time Delay · Instantaneous Pickup · Ground Fault Pickup. available on all circuit breakers
- Custom Busway and transformer connections available
- PLC or relay based main automatic transfer schemes
- Microprocessor-based metering and monitoring equipment
- Utility metering provisions

Features for the Standard Option:

Synergy Susol Switchboards Features for the Standard option

- Voltages to 600 Vac or 250 Vdc
- NEMA enclosure types – indoor and outdoor
- Ratings - up to 6000 A, 100 kA SCCR
- Bussing options – aluminium or copper with tin plating or copper with silver plating option
- Internally mounted surge protection devices

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Commercial Multi-Metering:

We offer an opportunity for providing revenue metering for multiple tenants in a cost-effective manner. Our aim is to reduce footprint requirements as well as installation time for projects that require top exit of load side cables. This proves to be an ideal option for shopping centers or for shopping malls.

Features of Commercial Multi-Metering:

- Commercial multi-metering is a hot sequence metering.
- It is available with Lever By-pass or Non-Lever-By-pass construction.
- Switchboard ratings – through 6000 A, 100 kA.
- Contains options to add future tenants and future sections.
- Factory installed devices are wired from the meter socket to disconnect.
- NEMA Type 1, 12, 4, 4x or Type 3R available.
- Alignment options include front and rear.
- Meter sections are available in three or six socket section configurations
- 60-200 A without lever by-pass contains inbuilt meter sockets, 5 or 7 jaw, ring type, test block.
- 60-200 A lever by-pass contains inbuilt meter sockets, 7 jaw, ringless.
- 400-1200A have current transformer rated meter compartments.

Synergy Low Voltage Switchboards:

Synergy low voltage switchboards offer an economical way of distributing electricity. These switchboards are customized and may be used as a service entrance equipment or as distribution centers in commercial, institutional, and industrial applications. Synergy low voltage switchboards are enclosed and free-standing structures, which contain circuit breaker for services rated up to 6000A with a maximum voltage of 600 VAC.

In addition, there is an auxiliary section that facilitates cable or bus transition. It also provides additional space for connecting the service conductors to the line side of the main.

The Synergy low voltage switchboard frame mounts various components in the switchboard, which include transfer switches, special metering systems, and throwover systems.

Features of Synergy Low Voltage Switchboards:

- Switchboard ampacity to 400A to 6000A
- Voltage: Up to 600Vac, or 250Vdc
- Suitable for service entrance or distribution
- NEMA enclosures – Type 1, 12, 4, 4x or Type 3R
- Testing of short circuit rating of 3 cycles (.05 seconds); or immediate trip of tested OCPD; or braced to UL configuration standa ds
- Accessibility: front or rear
- Assembling in factory
- Sequence utility metering for hot or cold
- Customer metering
- Availability of protective device accessories
- Fully rated copper bus systems – 1000 A per sq in.
- Fully rated aluminium bus systems – 750 A per sq in.
- A large array of integrated components available – SPD, distribution transformers, automation, automatic transfer switches, etc.

Stainless Steel Switchboards & Stainless Steel Nema 4x Switchboards:

Out Door Stainless steel switchboards are common in highly corrosive environments that a painted steel enclosure may corrode over time. The longevity of the switch board is significantly inc eased when utilizing a stainless-steel switch board in those types of environments. When ordering a Nema 4x Switchboard there is allot of room for error due to some companies not understanding the heat loss calculations that need to be done on a Nema 4X Rated switch board. Nema 4x Switch Board should be rated for windblown dust and rain, splashing water, and hose directed water; undamaged by ice which forms on the enclosure. Circuit Breakers, switches, transfer switches and other devices generate allot of heat. The heat needs to escape through a Nema 4x ventilated or AC cooled system or the enclosure needs to be sized properly in order to withstand the internal heat. Nem 4x Switchboards can have issues like nuisance tripping of circuit breakers, over heating of components, which in turn defeats the purpose of the 4x enclosure of increasing the longevity of the internal electrical components. Let Spike Electric Design and build your custom Nema 4x switch board. Our team of electrical engineers will ensure the heat calculations are done properly and working with their counterpart mechanical engineers will design the enclosure to fit the custom application.

Quick Ship Switchboards:

2-3 Week Lead Time

Synergy switchboards are quick ship switchboards which are suitable for use as service entrance equipment on ac systems.

Optional Seismic Compliance of Synergy Switchboards

Our Synergy Switchboards adhere to the requirements of the International Building Code (IBC), California Building Code (CBC), Office of Statewide Health Planning and Development (OSHPD), and ASCE/SEI 7 based on triaxial shake table testing; for equipment operation after a seismic activity.

A shake table testing was conducted by an independent test facility and compliance was verified to Ip = 1.5. The post test equipment functionality was verified as per the ASCE 7 requirements, which are a part of the seismic designated systems.

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Safe Reliable Energy Solutions

SPIKE ELECTRIC CONTROLS

Range – Benefits and Applications:

Our Synergy Susol Switchboards range provides various benefits, which include –

- custom or standard installation options
- quick installation time and mounting facility
- offer short lead times and an expedited delivery

Quality Management System ISO 9001 Manufacturing:

Learn more about our Quality Control Management system

The Synergy Susol Switchboards range has applications in various industries , which include –

- Manufacturing
- Water wastewater
- Commercial buildings
- Healthcare facilities
- Data Centres
- Textile
- Industrial buildings
- Commercial office building
- Pharmaceuticals
- Offshore Designs Available
- Oil & Gas

Contact Us for availing our products. We are happy to help and walk you through the installation process.

Catalog Number System

SWBLS 4X 480V SC L 600 50 MB400 T 15-1200 ISOG

Catalog Prefix

Synergy Susol Switchboards

NEMA Rating

Nema 1	1
Nema 3R	3
Nema 4 Painted	4
Nema 4x Stainless	4x

Voltage

3-Phase 4-Wire	480
3-Phase 3-Wire	400V
3-Phase 3-Wire	600V

Bus Material

Aluminum	A
Copper	C
Silver Plated Copper	SC

Cable Incoming

Left	L
Right	R

Bus Amps

400
600
800
1200
1600
2000
2500
3000
4000
5000
6000

Bus Rating

42ka	42
50kA	50
65kA	65
85kA	85
100kA	100
200kA	200

Main Breaker

400A	MB400
600A	MB600
800A	MB800
1200A	MB1200
1600A	MB1600
2000A	MB2000
2500A	MB25000
3000A	MB3000
4000A	MB4000
5000A	MB5000
6000A	MB6000
Main Lugs	MLO___

Power Entry

Top Feed	T
Bottom Feed	B

Branch Breakers

Poles	
1	15-1200
2	15-1201
3	15-1202

Enclosure Modifications & Accessories

Isolated Ground	ISOG
Austomatic Transfer Switch Section	ATS
Manuel Transfer Switch Section	MTS
Cam Lok Panel for Generator Feed	CL
Main Tie Main	MTM
Dual Genrator Input	DGI
Mini Power Zone Section 45KVA Transformer & Lighting Panel	MPZ
Power Meter W/CT's	PM
Surge Protection Device must specify required kA 100kA-400Ka	SPD_____
LSIG	LSIG
ARMS	AER
Service Enterance Rated	SER
Utility Structure	US

*Custom frame sizes available, we will custom build your switchboard to the size you need.

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UL489 MCCB

Susol Super Solution

UL891 Switchboard Solution

Contents

Overview

The Susol UL891 switchboard solution meets UL67/UL891 certification standards for bus straps and interiors utilizing UL489 MCCBs.
There are five types of interiors, three types of bus straps, and a wide range of MCCBs available which allow flexibility during the development and selection stage for new panels.
It is a cost effective and allows for safe installation and interchangeability.

UL489 MCCB

LS's supply scope

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SYNERGY SWITCHBOARD SOLUTIONS
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UL891 Switchboard Solution

SPIKE ELECTRIC CONTROLS

Panel builder

UL891 Switchboard

UL67 Switchboard

LS's supply scope

* Exclude frames

Features

- UL67/UL891 Panelboards
- UL489 Molded case circuit breakers
- Main bus, 1200/2000/2400/4000/6000A copper
- Branch-bus direct connection
- Up to 1200A breaker mounted as a branch device
- Double branched 150, 250 and 400AF breakers
- The interior maximum short circuit interrupting rating 100kA at 480Vac
- Individual breaker Protection cover plates

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Structure

1 Blank filler plate

Used to cover blank space on chassis

2 Circuit breaker cover

Used to protect breakers and bus straps

- single mounting type
- double mounting type

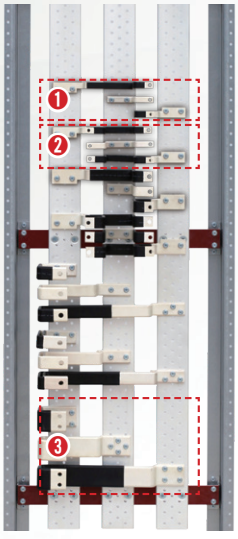
3 Filler plate

Filler plates are used to fill and protect unused spaces in the circuit breaker cover

4 Bus strap

- single mounting type
- double mounting type
- Installation case

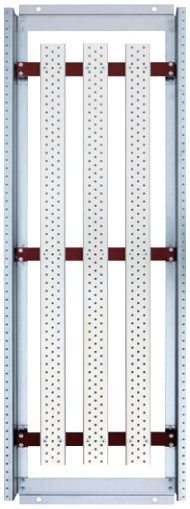
❶ 150AF of single bus strap
❷ 150AF of double bus strap
❸ 800AF of single bus strap



Note : Exclude steel frames of outer angle

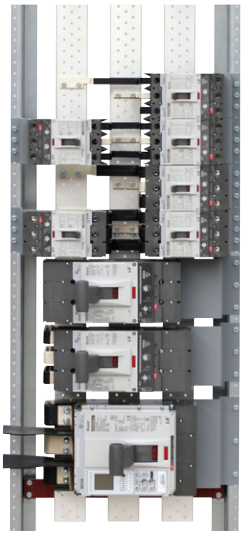
5 Interior

- 1200A(single chassis bus)
- 2000A(double chassis bus)
- 2400/4000/6000A



6 UL489 MCCB

- Ampere rating: 40~1200A
- Poles : 2, 3
- Various trip units:
  FTU, FMU, ATU, ETS, ETM, OCR, MCP, MCS
- Standards: UL489, IEC60947-2



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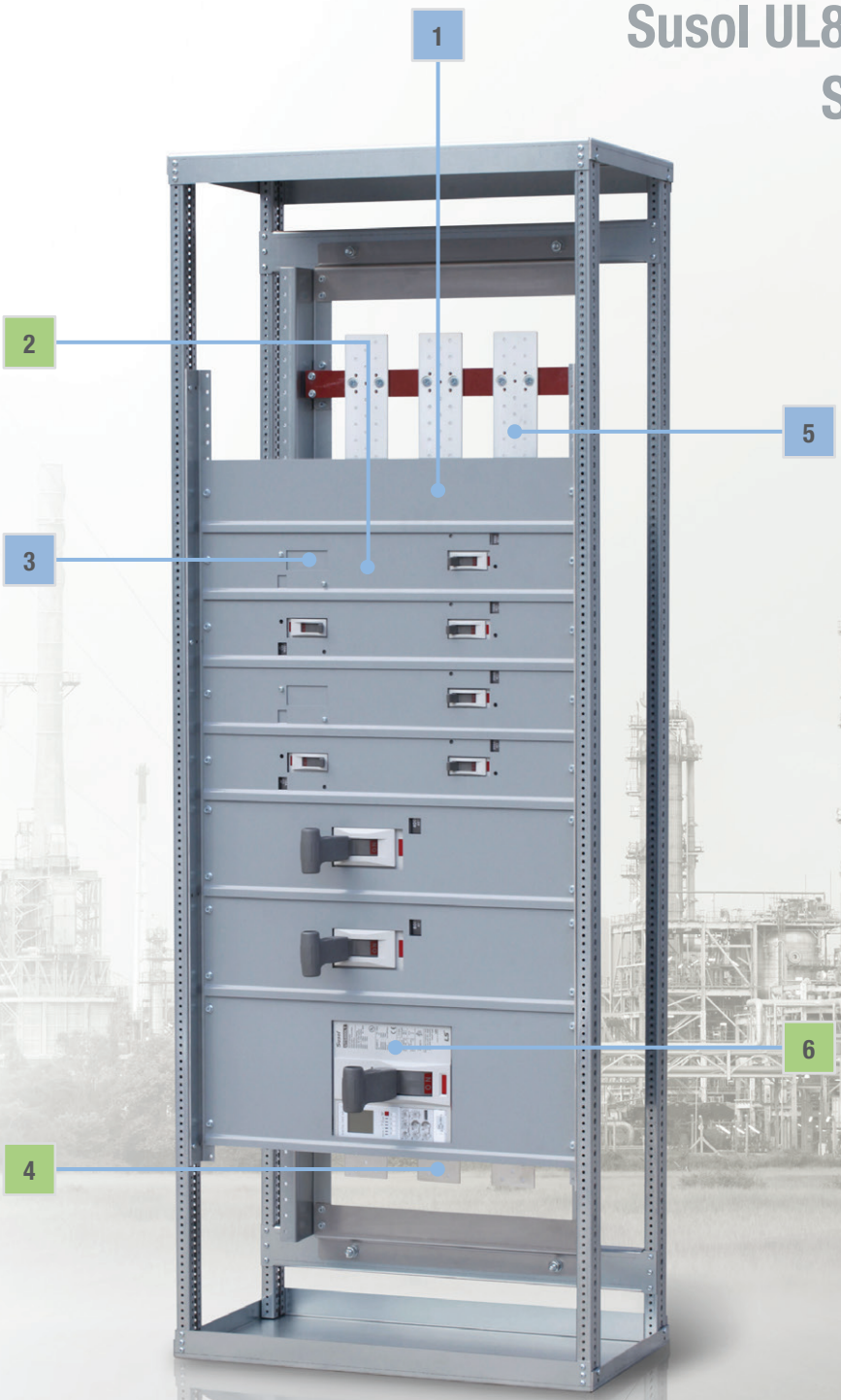
Susol UL891 Switchboard Solution



* Frames are installed for photography and are not included in the supply range.

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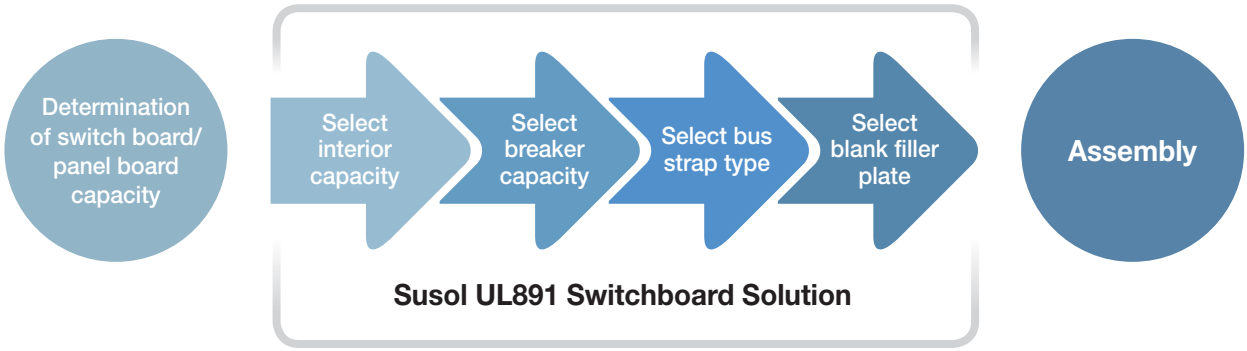
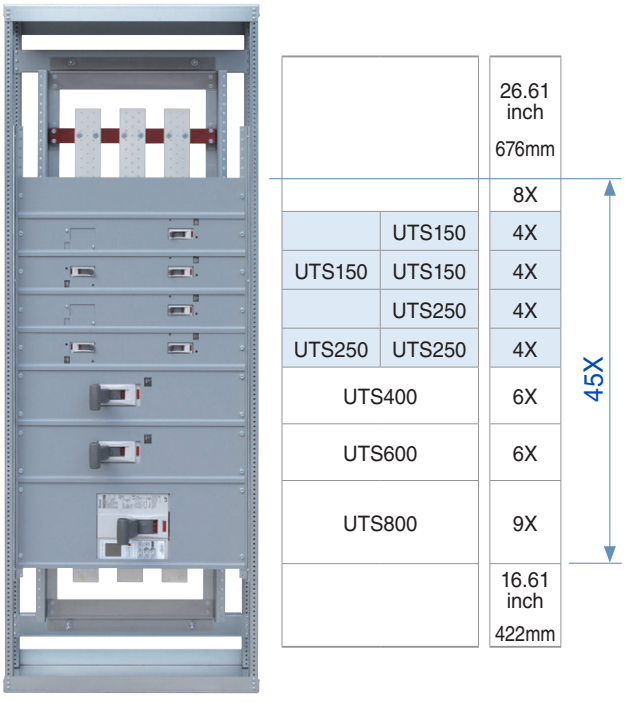
Features

Product selection sequence

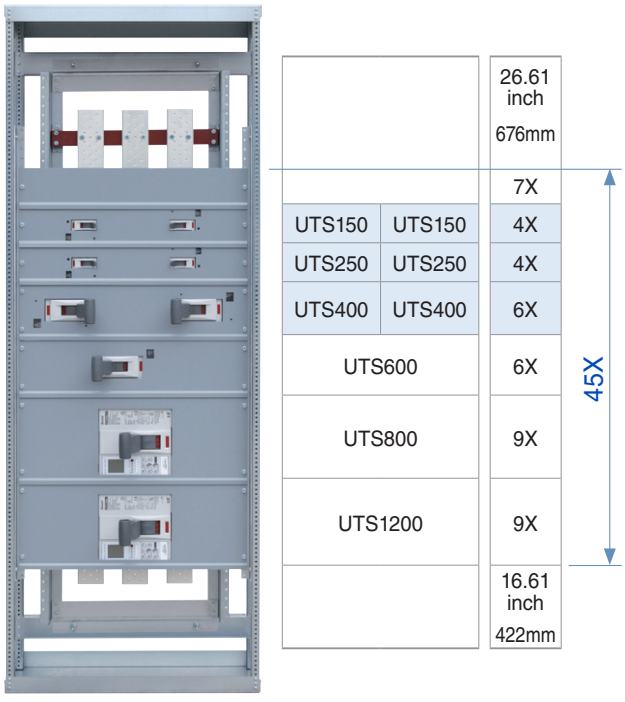


Chassis layout

1200AF chassis can be utilized for MCCBs UTS 150AF to UTS 800AF. 2000/2400/4000/6000A chassis can be utilized for MCCBs UTS 150AF to UTS 1200AF.
There are dedicated covers for each capacity of the breaker, which are 4X, 6X, and 9X high. Considering the height of circuit breaker cover, the breaker can be installed within 45X heights for the 1200/2000A interior. For 2400/4000/6000A interiors, there are three types of 36/46/66X.
Breakers are installed in order of lowest at the top to highest capacity at the bottom. Install the breakers, and insert the blank filler plate of various heights to fill the remaining space and complete the panel. The top and bottom spaces can be used for ventilation and wire connections.

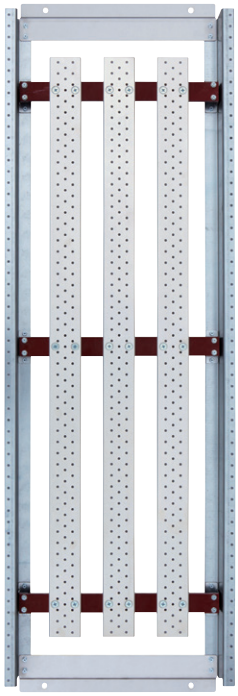


1200A



2000A

Interior



Description		Interior-1200	Interior-2000
Rated current		1200A	2000A
Rated short-circuit breaking capacity		100kA @480Vac	
Applicable MCCB		UTS150, UTS250, UTS400, UTS600, UTS800	UTS150, UTS250, UTS400, UTS600, UTS800, UTS1200
Minimum enclosure size (W×H×D)	mm	914.4 × 2,286 × 406.4	1,168.4 × 2,286 × 508.2
	inch	36” × 90” × 16”	46” × 90” × 20”
Standard		UL67	

Description			Interior-2400			Interior-4000			Interior-6000		
Rated current			2400A			4000A			6000A		
Rated Short-circuit breaking capacity			100kA @480Vac								
Applicable MCCB			UTS150, UTS250, UTS400, UTS600, UTS800, UTS1200								
Frame size			36X	46X	66X	36X	46X	66X	36X	46X	66X
	mm	W	542			542			562		
		H	1256.6	1520.6	1995.8	1256.6	1520.6	1995.8	1256.6	1520.6	1995.8
		D	92			92			127.3		
	inch	W	21.34			21.34			22.13		
		H	49.47	59.87	78.57	49.47	59.87	78.57	49.47	59.87	78.57
		D	3.62			3.62			5.01		
Standard			UL891								

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Applicable circuit breakers

Susol UL MCCB

Susol UL489 MCCBs are designed to protect low voltage electrical systems from damage caused by overloads and short circuits.

UTS150 UTS250 UTS400 UTS600 UTS800 UTS1200

Breaker type	Ampere frame	Ampere rating	Performance			Pole	Trip units							
			80% rating	100%[1] Rating	kA @480 Vac		FTU	FMU	ATU	ETS	ETM	OCR	MCP	MCS
UTS150	150	40/50/60/70/80/90/100/125/150A	N	NT	35	2,3	●	●	●	●	-	-	●	●
			H	HT	65									
			L	LT	100									
UTS250	250	150/160/175/200/225/250A	N	NT	35	2,3	●	●	●	●	-	-	●	●
			H	HT	65									
			L	LT	100									
UTS400	400	250/300/350/400A	N	NT	35	2,3	●	●	●	●	●	-	●	●
			H	HT	65									
			L	LT	100									
UTS600	600	500/600A	N	-	35	2,3	●	●	●	●	●	-	●	●
			H	-	65									
			L	-	100									
UTS800	800	400/600/630/800A	N	NT	35	3	-	-	-	-	-	●	●	●
			H	HT	65									
			L	LT	100									
UTS1200	1200	800/1000/1200A	N	-	35	3	-	-	-	-	-	●	●	●
			H	-	65									
			P	-	50									
			L	-	100									

Note1) The 100% rated MCCB is available with 90°C wire.

Circuit breaker terminals

UTS150 to UTS1200 frame circuit breakers can be ordered with line side and load side lugs.
The standard lugs can be removed for the installation of bus connections. All lugs are UL/cUL Listed Certified for their proper application and marked for use with aluminum and copper (Al/Cu) or copper only (Cu) conductors. Lugs suitable for copper and aluminum conductors are made of tin-plated aluminum. Mechanical lugs are sold either factory installed or as field installable kits.

Breaker type	Lug type	Ampere rating	Applicable wire (Copper)	TORQUEN N•m (lb-in)
UTS150	AL150TS	1.6~15A	14 AWG	4.1 (36.2)
		20~30A	12~10 AWG	5.4 (47.8)
		40~175A	8~2/0 AWG	15.1 (133.6)
UTS250	AL250TS	150~175A	1/0~2/0 AWG	32 (283.2)
		200~225A	3/0~4/0 AWG	
		250A	250~350 kcmil	44 (389.4)
UTS400	AL400TS	250, 300A	1/0 AWG~300 kcmil	40.5 (358.5)
		350, 400A	350~600 kcmil	54 (478)
UTS600	AL600TS	500, 600A	2/0 AWG~350 kcmil	40.5 (358.5)
UTS800	AL800TS	400, 600, 630, 800A	3/0 AWG~300 kcmil	45 (398.3)
UTS1200	AL1200TS	800, 1000, 1200A	3/0 AWG~350 kcmil	45 (398.3)

Note1) For the UTS150, barriers are required when connecting the breaker to the bus.

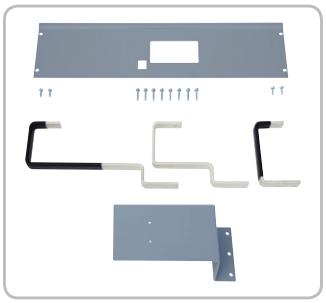
[UTS150 + barrier]

[Barrier for UST150]

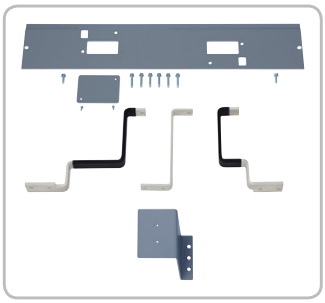
Bus strap kits

Each kit includes copper connectors, mounting brackets, cover, hardware and instructions.

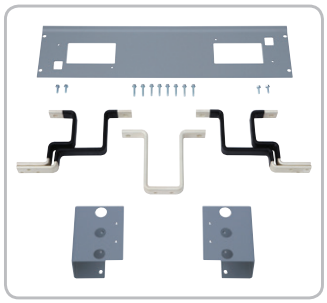
Bus strap kits composition



Single center



Single



Double

Installed appearance

Breaker type	Pole	Space required		Mounting type					
				1200A			2000A		
		Inch. (mm)	"X"	Single center	Single	Double	Single center	Single	Double
UTS150	2, 3	4.16 (105.6)	4X	-	●	●	-	●	●
UTS250	2, 3	4.16 (105.6)	4X	-	●	●	-	●	●
UTS400	2, 3	6.24 (158.4)	6X	●	-	-	●	●	●
UTS600	2, 3	6.24 (158.4)	6X	●	-	-	●	-	-
UTS800	3	9.36 (237.6)	9X	●	-	-	●	-	-
UTS1200	3	9.36 (237.6)	9X	-	-	-	●	-	-

Note) 1. X=1.04 Inches (26.4mm)
2. Single center: There is one open space.
3. Single: A filler plate is provided that covers one of the two spaces.
4. Circuit breaker is not included.
5. The single center types have L type (line side to the left) and R type (line side to the right) depending on the position of the breaker.

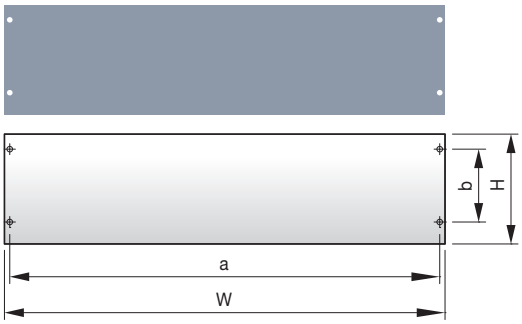
Type of protective cover

Blank filler plate

Used to cover blank space on chassis. All plate heights are measured in “X” units.
1X equals 1.04 inches (26.4 mm)
The blank filler plate heights are from 2X to 9X.

2X~4X

5X~9X



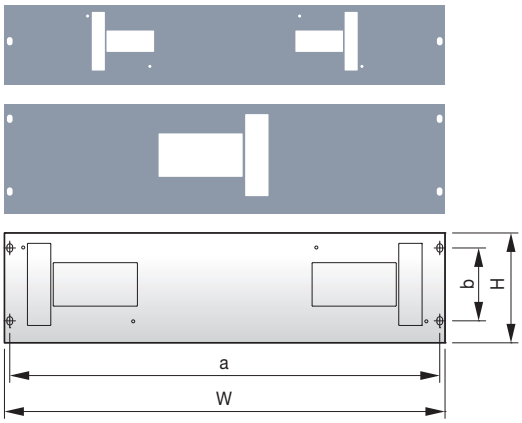
Dimensions

Blank	Frame		Hole spacing		
	W	H	a	b	
	inch. (mm)	inch. (mm)	inch. (mm)	inch. (mm)	X
2X	24.53 (623)	2.08 (52.8)	23.94 (608)	-	-
3X		3.12 (79.2)		-	-
4X		4.16 (105.6)		-	-
5X		5.20 (132.0)		3.12 (79.2)	3X
6X		6.24 (158.4)		4.16 (105.6)	4X
7X		7.28 (184.8)		5.20 (132.0)	5X
8X		8.32 (211.2)		6.24 (158.4)	6X
9X		9.36 (237.6)		7.28 (184.8)	7X

Note) 1. hole size: Ø8×12
2. A box contains 5EA(7X~9X) or 10EA(2X~6X) blank filler plates and is sold on a box-by-box basis.

Circuit breaker cover

All bus strap kits include a circuit breaker cover.



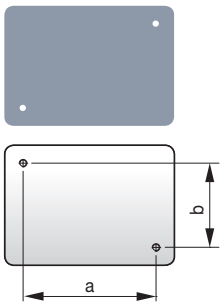
Dimensions

Circuit breaker	Frame		Hole spacing		
	W	H	a	b	
	inch. (mm)	inch. (mm)	inch. (mm)	inch. (mm)	X
UTS150/250	24.53 (623)	4.16 (105.6)	23.94 (608)	-	-
UTS400/600		6.24 (158.4)		4.16 (105.6)	4X
UTS800/1200		9.36 (237.6)		7.28 (184.8)	7X

Note) hole size: Ø8×12

Filler plate

The filler plates are used for single mounting in the double mounting type of the UTS150/250 and UTS400. The filler plates are required in addition to circuit breaker cover whenever a branch circuit breaker is specified.



Dimensions

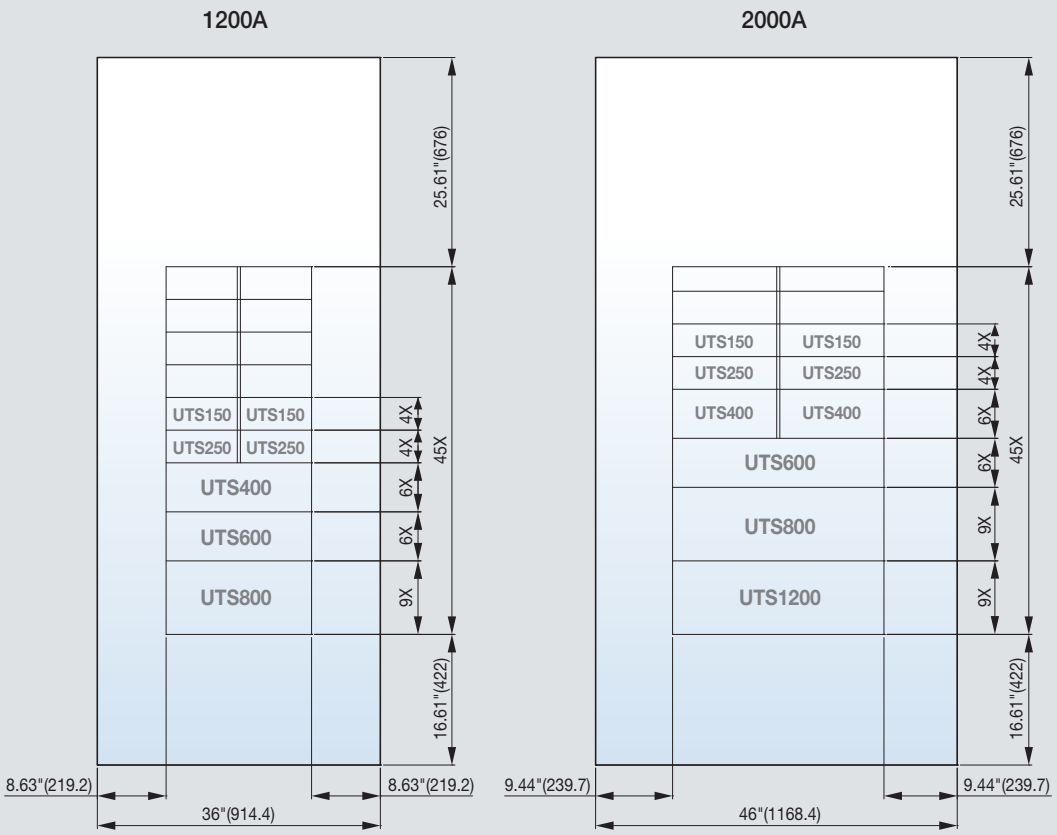
Circuit breaker	Hole spacing		Hole size
	a	b	
	inch. (mm)	inch. (mm)	
UTS150/250	3.47 (88.1)	2.87 (73)	NO. 8-32 UNC
UTS400/600	6.12 (155.5)	4.21 (107)	

Note) A box contains 30EA filler plates and is sold on a box-by-box basis.

Dimensions

Chassis layout

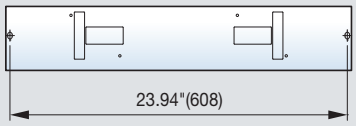
Dimension: inch[mm]



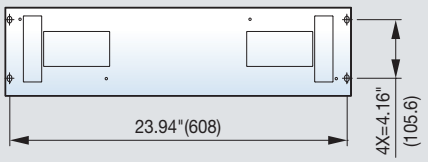
Circuit breaker cover

Dimension: inch[mm]

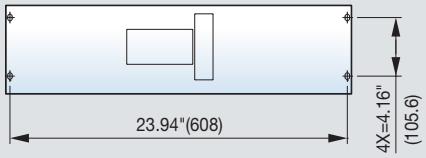
UTS150/250 Double



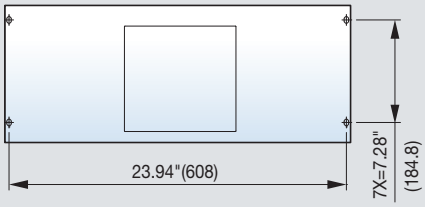
UTS400 Double



UTS400/600 Single



UTS800/1200 Single



Part numbering

Circuit breakers

Trip unit: FTU, ATU, FMU, ETS, ETM, MCP, MCS

UTS – 250 N FTU 250A 3P LO UL

Model

UL type TS

Ampere frame

150
250
400
600

Type

N	Normal, 80% rating
H	High, 80% rating
L	Current limit, 80% rating
NT	N type 100% rating
HT	H type 100% rating
LT	L type 100% rating

Trip unit

FTU	Fixed trip unit
FMU	Fixed magnetic trip unit
ATU	Adjustable trip unit
ETS	Electronic trip unit standard
ETM	Electronic trip unit multi function
MCP	Motor circuit protector
MCS	Molded case switch

Rated current

Poles

2P	2Pole
3P	3Pole

Terminals

LO	Lugs load side
-	Bolt-on

Suffix

UL	UL

Trip unit: OCR

UTS – 1200 N A G O 1600A 3P LO UL

Model

UL type TS

Ampere frame

800
1200

Type

N	Normal, 80% rating
H	High, 80% rating
P	Premium, 80% rating
L	Current limit, 80% rating
NT	N type 100% rating
HT	H type 100% rating
PT	P type 100% rating
LT	L type 100% rating

OCR-I

N	Normal
A	Ammeter
P	Power meter
S	Super meter
MCP	Motor circuit protector
MCS	Molded case switch

OCR-II

G	Communication(X)
E	Com.(X) + Outer CT (G/F)
C	Communication(O)
X	Com.(O) + Outer CT (G/F)

OCR-III

0	Power(X), 60Hz
1	AC/DC 100~250V, 60Hz
2	DC 24~60V, 60Hz
5	Power(X), 50Hz
6	AC/DC 100~250V, 50Hz
7	DC 24~60V, 50Hz

Rated current

Poles

2P	2Pole
3P	3Pole

Terminals

LO	Lugs load side
-	Bolt-on

Suffix

UL	UL

Bus strap kits

BSK — S - 3P — UTS150 — UL

Model
Bus strap kits

Code	Bus strap type	Pole	Line side
S - 2P	Single	2P	-
S - 2P	Single	3P	-
SC - 2PL	Single center	2P	Left
SC - 3PL	Single center	3P	Left
SC - 2PR	Single center	2P	Right
SC - 3PR	Single center	3P	Right
D - 2P	Double	2P	-
D - 3P	Double	3P	-

Ampere frame of circuit breaker	
UTS150	(1200A BKS-S, D) (2000A BKS-S, D)
UTS250	(1200A BKS-S, D) (2000A BKS-S, D)
UTS400	(1200A BKS-SC) (2000A BKS-S, SC, D)
UTS600	(1200A BKS-SC) (2000A BKS-SC)
UTS800	(1200A BKS-SC) (2000A BKS-SC)
UTS1200	(2000A BKS-SC)

Blank filler plate

BFP — 5X — UL

Model
Blank filler plate

Protection cover size	
2X~6X	2X~6X (Set of 10)
7X~9X	7X~9X (Set of 5)

Note) A box contains 5 or 10 protector cover blanks and is sold on a box-by-box basis.

Filler plate

FP — UTS150/250 — UL

Model
Filler plate

Applicable MCCB
UTS150/250 (Set of 30)
UTS400/600 (Set of 30)

Note) A box contains 30 protector cover fillers and is sold on a box-by-box basis.

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Super Solution for Protection

The new Susol series with thermal-magnetic circuit breakers are designed to protect low voltage electrical systems from damage caused by overloads and short circuits.

FOR POWER DISTRIBUTION

High breaking capacity
Optimum coordination technique
Powerful engineering tools
Reverse feeding

FOR PROTECTION OF MOTORS AND THEIR CONTROL DEVICES

Optimal overload protection
Guaranteed Short Circuit Current Ratings

FOR CONTROLLING AND DISCONNECTING CIRCUITS

FOR EXTENSIVE APPLICATIONS

Wide range of optimized auxiliaries and accessories

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SUSOL MCCBS AT A GLANCE.

1 FOR POWER DISTRIBUTION

- High breaking capacity
- Optimum coordination technique
- Powerful engineering tools
- Reverse feeding

2 FOR PROTECTION OF MOTORS AND THEIR CONTROL DEVICES

- Optimal overload protection
- Guaranteed Short Circuit Current Ratings

3 FOR EXTENSIVE APPLICATIONS

- Wide range of optimized auxiliaries and accessories

4 FOR CONTROLLING AND DISCONNECTING CIRCUITS

UTE100

UTS150

UTS250

UTS400

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SYNERGY SWITCHBOARD SOLUTIONS
★★★Made in the USA★★★

UL Feeder Circuit Breakers

SPIKE ELECTRIC CONTROLS

SIMPLIFIED PRODUCT RANGE

- **AF**: 100AF, 150AF, 250AF, 400AF, 600AF, 800AF, 1200AF
- **Ampere Range**: 15A ~ 1200A
- **Pole**: 2P, 3P

VARIABLE ACCESSORIES

- Electrical auxiliaries[AX, AL, UVT, SHT]
- Extended and direct mount rotary handle
- Flange handle with flexible cable and linkage
- Variable depth mechanism
- Locking devices
- LUG for CU/AL cable with UL486

HIGH PERFORMANCE

- Ultimate breaking capacity (kA rms)
- Max 100kA @480VAC and 50kA @600V

STANDARDS

- **World class with UL489**
  - UL489
  - CSA
- **IEC60947-2**
- **Class 1E for Nuclear power plant**
  - EQ : Environment Qualification
  - SQ : Seismic Qualification

VARIOUS TRIP UNITS

- **ATU**: Adjustable thermal & magnetic unit
- **FMU**: Adjustable thermal, fixed magnetic unit
- **FTU**: Fixed thermal & magnetic unit
- **ETS**: Electronic trip unit (LI, LSI)
- **ETM**: Electronic trip unit (LSIG, Multi-function unit)
- **OCR**: Electronic trip unit

MCP CHARACTERISTIC

- Simplified product range
  - **AF**: 150AF, 250AF, 400AF, 600AF, 800AF, 1200AF
  - **Ampere Range**: 1.6A ~ 1200A Only 3 Pole use
- **Standards**
  - Instantaneous circuit breaker with UL489
  - Motor protector with MC and Relay with UL508
- **IEC60947-2**

MCS CHARACTERISTIC

- Simplified product range
  - **AF**: 100AF, 150AF, 250AF, 400AF, 600AF, 800AF, 1200AF
  - **Ampere Range**: 100A ~ 1200A
  - **Pole**: 2P, 3P
- **Standards**
  - World class with UL489
- **IEC60947-2**

UTS600

UTS800

UTS1200

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Engineered for Optimal Protection

SUSOL SERIES OFFER VARIOUS TRIP UNITS :

- **ATU** (Adjustable thermal & magnetic unit)
- **FMU** (Adjustable thermal, fixed magnetic unit)
- **FTU** (Fixed thermal & magnetic unit)
- **ETS** (Electronic trip unit for UTS150…UTS600)
- **ETM** (Electronic trip unit for UTS400, UTS600)
- **OCR** (Electronic trip unit for UTS800, UTS1200)

THERMAL MAGNETIC TRIP UNITS

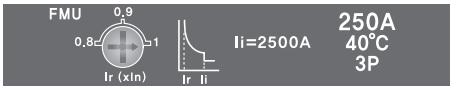
- UTE100...UTS600 frame
- 15-600 amperes
- Factory-installed
- Several versions by rated current and function

FTU

- Fixed Thermal. 15A~600A
- Fixed Magnetic. 400A~6000A

FMU

- Adjustable Thermal. 25A~600A(0.8~1 x In)
- Fixed Magnetic. 400A~6000A



ATU

- Adjustable Thermal. 100A~600A(0.8~1 x In)
- Adjustable Magnetic. 500A~6000A(5~10 x In)

MCP

- Adjustable Magnetic. 10A~6000A

MCS

- Fixed Magnetic. 1000A~6000A

ELECTRONIC TRIP UNITS

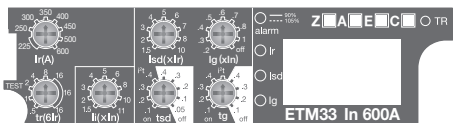
- UTS150…UTS600 frame
- 15~600 amperes
- Factory-installed
- Several versions by rated current and function

ETS

- Electronic trip unit for UTS150…UTS600

ETM

- Electronic trip unit for UTS400, UTS600



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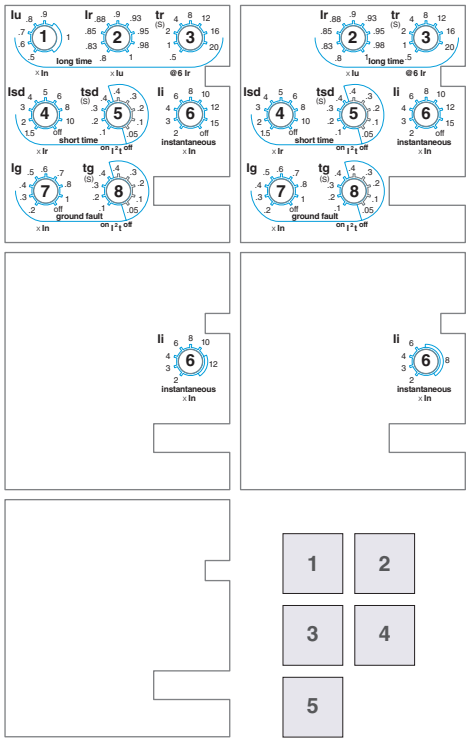
ELECTRONIC TRIP UNITS

- UTS800, UTS1200 Frame
- 400-1200 Amperes
- Factory-installed internal trip units.
- Several versions by rated current and function



1. N, A type Knob information
2. P, S type Knob information
3. MCP800 type Knob information
4. MCP1200 type Knob information
5. MCS800/1200 type Knob information

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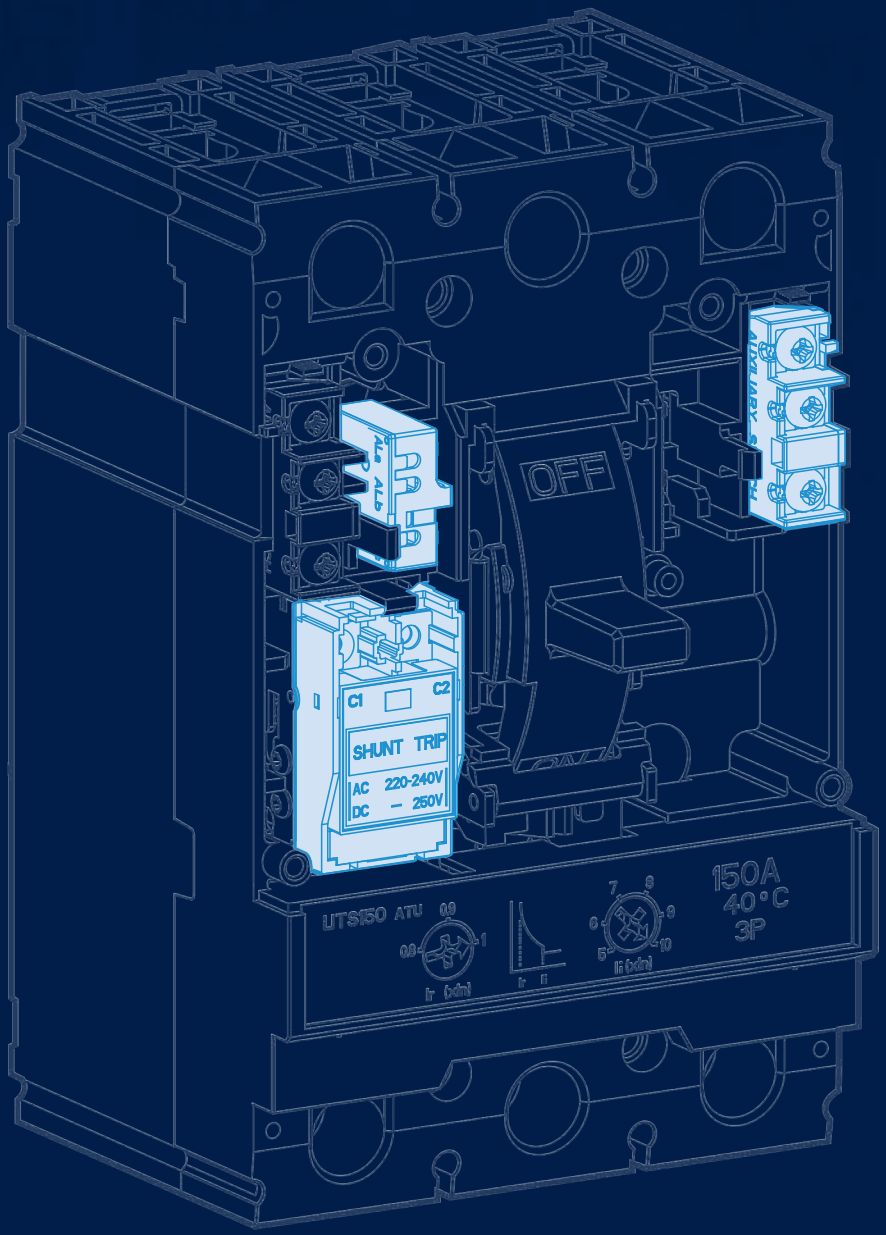
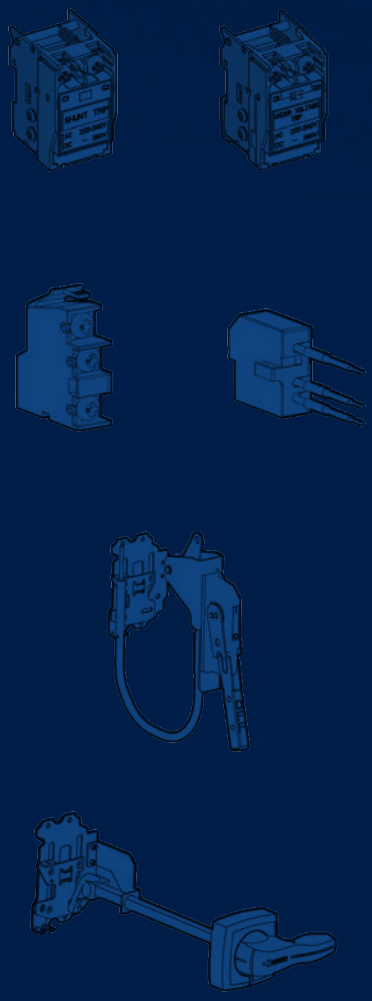
FUTURING SMART ENERGY

FOR EXTENSIVE APPLICATIONS

Wide range of optimized auxiliaries and accessories





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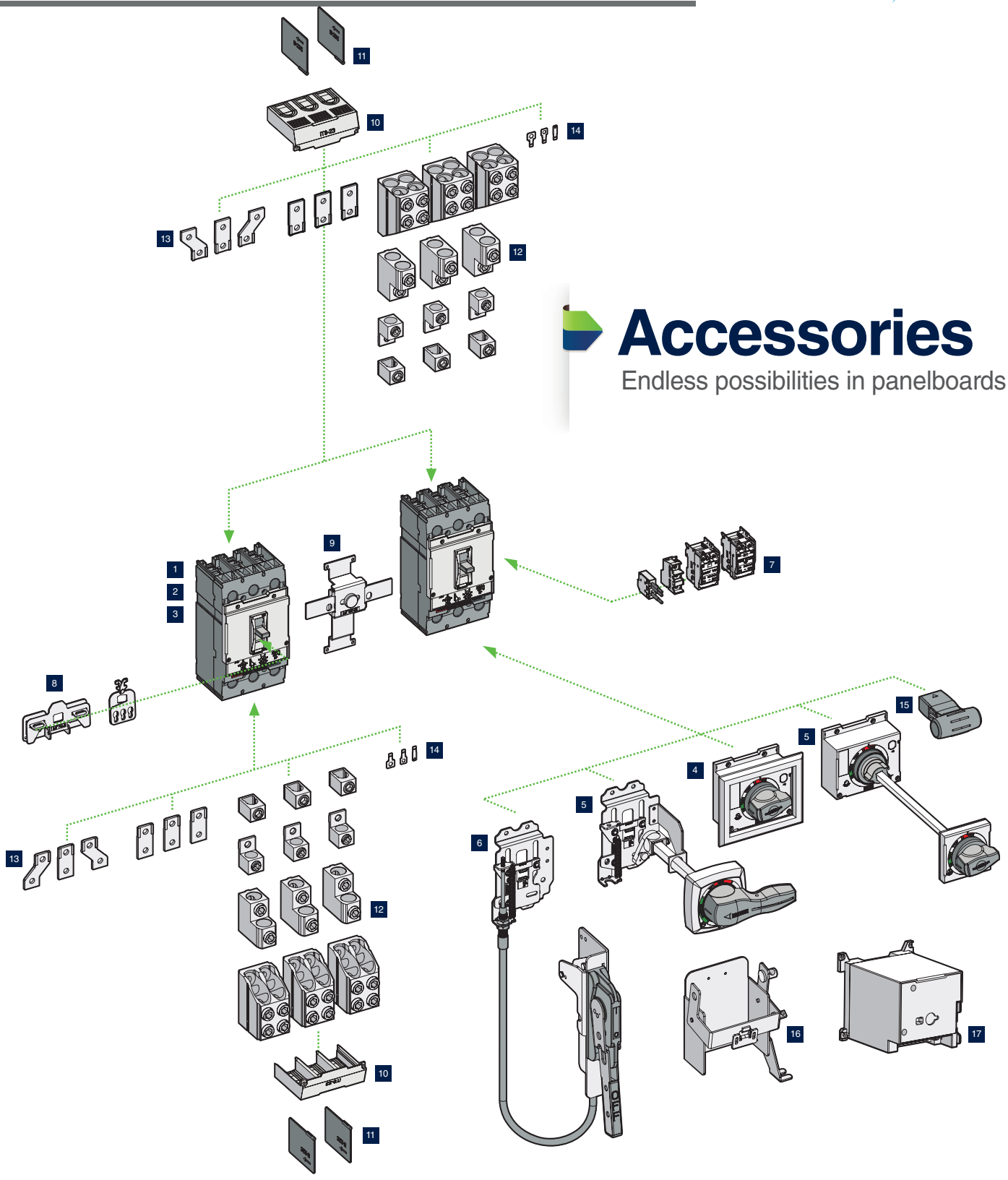

Accessories

Endless possibilities in panelboards

1. Molded Case Circuit Breaker
2. Motor Circuit Protector
3. Molded Case Switch
4. Direct Rotary Handle
5. Extended Handle
6. Flange Cable Handle
7. Inner Accessories (AL, AX, UVT, SHT)
8. Locking Device (Handle)
9. Mechanical Interlock
10. Terminal Shield
11. Interphase Barriers
12. Mechanical Lugs
13. Busbar Connectors
14. Control wire Terminal
15. Aux. Handle
16. Operating Mechanism (VDM/COM)
17. Motor operator (MOP)

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Series Overview

Frame		UTE100			UTE100			UTS150			UTS250		
Maximum rated current		100A		30A	100A		30A	150A			250A		
Number of poles		2			3			2, 3			2, 3		
Breaker type		E	N	H	E	N	H	N	H	L	N	H	L
UL489/CSA C22.2		UTE100			UTE100			UTS150			UTS250		
Interrupting capacity (kA rms) AC(50/60HZ) UL, CSA	120/240V	50	65	100	50	65	100	-	-	-	-	-	-
	240V ac	50	65	100	50	65	100	65	100	150	65	100	150
	480V ac	25	35	65	25	35	65	35	65	100	35	65	100
	600V ac		-			-		18	35	50	18	35	50
	600Y/347V ac	14	18	35	14	18	35	-	-	-	-	-	-
UL489 DC		UTE100			UTE100			UTS 150			UTS 250		
Interrupting capacity (kA) DC UL, CSA	250V dc-2P	16	25	-	16	25	-	35	50	65	35	50	65
	500V dc-3P		-		25	35	-	-	-	-	-	-	-
	600V dc-3P		-			-		35	50	65	35	50	65
IEC 60947-2		UTE100			UTE100			UTS150			UTS250		
Ultimate breaking capacity, (kA rms) AC 50/60Hz, Icu	220/240V	50	65	65	50	65	65	65	100	150	65	100	150
	380/415V	25	35	35	25	35	35	35	65	100	35	65	100
	480/500V		-			-		18	35	50	18	35	50
Service breaking capacity, Ics (%Icu)		100%			100%			100%			100%		
Insulation voltage, Ui		750 Vac			750 Vac			750 Vac			750 Vac		
Impulse withstand voltage, Uimp		8 kVac			8 kVac			8 kVac			8 kVac		
Rated short-time withstand current (Icw)		-			-			-			-		
Utilization category		A			A			A			A		
TRIP UNITS F : Fixed A : Adjustable T : Thermal M : Magnetic E : Electronics	Amperes	15~100A		15~30A	15~100A		15~30A	40~150A			150~250A		
	ATU	-			-			●			●		
	FMU	-			●			●			●		
	FTU	●			●			●			●		
	ETS	-			-			● (60,100,150A)			● (150, 250A)		
	ETM	-			-			-			-		
	OCR	-			-			-			-		
MCP	Amperes	-			-			1.6~60A 100~150A			220A		
	MCP	-			-			●			●		
MCS	Amperes	100A		-	100A		-	150A			250A		
	MCS	●		-	●		-	●			●		
Unit mounted		●			●			●			●		
Mechanical lugs		●			●			●			●		
Busbar connectors		●			●			●			●		
Control wire terminal kit		-			-			●			●		
Terminal shields		-			-			-			-		
Interphase barriers		●			●			●			●		
Shunt trip		●			●			●			●		
Undervoltage trip		●			●			●			●		
Auxiliary switch		●			●			●			●		
Alarm switch		●			●			●			●		
Fault alarm switch		-			-			●			●		
Flange cable handle		●			●			●			●		
Flange variable-depth mechanism		●			●			●			●		
Directly-mounted rotary operating handle		-			●			●			●		
NEMA-Door-mounted operating mechanisms		●			●			●			●		
IEC-Door-mounted operating mechanisms		●			●			●			●		
Mechanical interlocks		-			●			●			●		
Handle padlock attachment		●			●			●			●		
Motor operator		-			-			●			●		
Weight(approximate) lbs.(kg)	2-Pole	1.64(0.74)			-			3.44(1.56)			3.88(1.76)		
	3-Pole	-			2.33(1.06)			3.95(1.79)			4.49(2.04)		
Dimensions Inches(mm)	W x H x D	W	H	D	W	H	D	W	H	D	W	H	D
	2-Pole	2.01(51)	5.12(130)	3.44(87.5)	-	-	-	4.13(105)	6.50(165)	3.44(87.5)	4.13(105)	7.48(190)	3.44(87.5)
	3-Pole	-	-	-	2.99(76)	5.12(130)	3.44(87.5)	4.13(105)	6.50(165)	3.44(87.5)	4.13(105)	7.48(190)	3.44(87.5)

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	UTS400			UTS600			UTS800			UTS1200		
	400A			600A			800A			1200A		
	2, 3			2, 3			3			3		
N	H	L	N	H	L	N	H	L	N	H	P	L
	UTS400			UTS600			UTS800			UTS1200		
-	-	-	-	-	-	-	-	-	-	-	-	-
65	100	150	65	100	150	65	100	150	50	100	65	150
35	65	100	35	65	100	35	65	100	35	65	50	100
18	35	50	18	35	50	18	35	50	18	25	50	35
-	-	-	-	-	-	-	-	-	-	-	-	-
	UTS400			UTS600			UTS800			UTS1200		
35	50	65	35	50	65		-			-		
-	-	-	-	-	-		-			-		
35	50	65	35	50	65		-			-		
	UTS400			UTS600			UTS800			UTS1200		
65	100	150	65	100	150	65	100	150	50	100	65	150
35	65	100	35	65	100	35	65	100	35	65	50	100
18	35	50	18	35	50	18	35	50	18	25	50	35
	100%			100%			100%			100%		
	750 Vac			750 Vac			1000 Vac			1000 Vac		
	8 kVac			8 kVac			8 kVac			8 kVac		
	-			-		18kA	-	-	25kA	-	25kA	-
	A			A		B	A	A	B	A	B	A
	250/300/350/400A			500/600A			400/600/630/800A			800/1000/1200A		
	●			●			-			-		
	●			●			-			-		
	●			●			-			-		
	●(250, 400A)			●(400, 600A)			-			-		
	●(250, 400A)			●(400, 600A)			-			-		
	-			-			●			●		
	320A			500A			800A			1200A		
	●			●			●			●		
	400A			600A			800A			1200A		
	●			●			●			●		
	●			●			●			●		
	●			●			●			●		
	●			●			●			●		
	-			-			●			-		
	●			●			●			●		
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	●			●			●			●		
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	●			●			●			●		
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	●			●			-			-		
	●			●			●			●		
	●			●			●			●		
	●			●			●			●		
	●			●			●			●		
	●			●			●			●		
	●			●			●			●		
	●			●			●			●		
	●			●			-			-		
	12.02(5.45)			13.45(6.10)			-			-		
	13.89(6.30)			15.79(7.16)			31.35(14.22)			40.28(18.27)		
W	H	D	W	H	D	W	H	D	W	H	D	
5.51(140)	11.42(290)	4.33(110)	5.51(140)	13.39(340)	4.33(110)	-	-	-	-	-	-	
5.51(140)	11.42(290)	4.33(110)	5.51(140)	13.39(340)	4.33(110)	8.27(210)	12.88(327.2)	6(152.5)	8.27(210)	16.26(413)	6(152.5)	

Derwent Top 100 Global Innovator 2020

Susol Super Solution

Air Circuit Breakers

c UL US

LS ELECTRIC

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Codes and standards

UA Series are manufactured and tested in accordance with the following standards Low-Voltage Power Circuit Breaker

- ANSI C37.13
- ANSI C37.16
- ANSI C37.17
- ANSI C37.50
- UL 1066 (cULus Listed)
- CSA C22.2 No.31-10

Note) Throughout this document, the phrase "ANSI Certified" means the product meets the requirements of UL 1066 and ANSI C37

Contents

SYNERGY SWITCHBOARD SOLUTIONS
★★★Made in the USA★★★

Air Circuit Breakers

SPIKE ELECTRIC CONTROLS

Premium Susol ACB meets your demands for high breaking capacity with full line-up up to 6000A, all in optimized frame sizes for panel design.
Various accessories and connection methods realize user-friendly handling.

Susol ACB provides the total solution with an advanced trip relay for measurement, diagnosis, analysis, and communication as well as protective functions for absolute protective coordination and electric power monitoring system.

Susol
Super Solution

c UL us

UL listed/ANSI certified
Low-Voltage Power Circuit Breaker UA series

5914 E. Sam Houston Pkwy S. Houston TX 77034 | Toll Free 1.844.279.8295 | Local Factory Support 832.243.5372 | Fax 832.569.5645
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LS SuperSolution series

- **Modular design**
- **High (130kA) breaking capacity full line-up to 6000A**
- **Satisfy the needs for compact sized panels**
- **N-Phase conducting capacity 100%**
- **Interchangeable trip unit and rating plug**

Safety

Monitor temperatures for safety (Optional)

- Careful selection of materials
- Zero arc space
- Perform discriminations between upstream and downstream levels

User convenience

Various connection types for main circuit terminals

- Easy installation of accessories
- Interchangeable Trip unit and Rating plug

Intelligent trip relay

Various advanced functions for protection, measurement, diagnosis, analysis, communication

Susol Manual Motor Starters

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UL 1066
ANSI C37

Susol Air Circuit Breakers

Susol Molded Circuit Breakers

Susol Magnetic Contactors & Overload Relays

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Full line-up & Compact

Up to 6000A, Susol ACB provides a full line-up of 3 compact frame sizes.
Enables users to design panels of optimal volume.

85kA

UAS-08/16D

08	800AF
16	1600AF

85kA at 508Vac
W=13.15" (334mm) 3p,
16.50" (419mm) 4p

100kA

UAH-08~32E

08	800AF
16	1600AF
20	2000AF
25	2500AF
32	3200AF

100kA at 508Vac
W=16.22" (412mm) 3p,
20.75" (527mm) 4p

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130kA

- **High breaking capacity: 85/100/130kA (at 508Vac)**
- **3 ampere frame sizes: 1600/3200/6000AF**
- **N phase current conducting capacity: 100%**

UAH- 32~60G

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

130kA at 508Vac
W=30.91" (785mm) 3p,
39.96" (1015mm) 4p

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Trip Relay (OCR)

Trip relays are classified according to function.

Trip relays are classified according to their uses and functions to maximize customers' satisfaction. Classified trip relays and easy installation.

- Protection: overload, short current, ground fault, earth leakage, under voltage, over voltage, under frequency, over frequency, reverse power, unbalance, etc
- Measurement: voltage, ampere, power, energy, frequency, power factor, harmonics, etc.
- Event & fault recording: Max. 256 events & faults
- Communication: Modbus/RS-485, Profibus-DP

Susol ACB trip relay, which can be interlocked with the breaker mechanism, provides the world's best protection. It improves the breaking capacity, enhances the ACB's life, and provides advanced functions - measurement, diagnosis, analysis, and communication.

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Susol ACB Trip relay

N type

- L/S/I/G/Thermal

- Self Power
- RTC Timer mounted
- Fault information (LED)

A type

- L/S/I/G/Thermal
- ZSI
- ERMS
- Modbus/RS-485
- Profibus-DP

- Self Power
- AC/DC 100~250V
- DC 15~60V
- RTC timer mounted
- Fault recording (10EA)

P/S type

- L/S/ I/G/Thermal(Continuous)
- UV/OV/OF/UF/rP/Vun/Iun
- Measurement: V/A/W/Wh/F/PF
- Harmonics (63th), Waveform (S Type)
- ZSI
- ERMS
- Modbus/RS-485
- Profibus-DP

- AC/DC 100~250V
- DC 15~60V
- RTC timer mounted
- Event recording (256EA)
- Fault recording (256EA)
- Fault wave (S Type)

Trip relays series

N type (Normal)
- Self-power + Current protection

A type (Ammeter)
- Current meter + Current protection + DO control + Communication

P type (Power meter)
- A type + Power meter + Voltage / Frequency / Unbalance protection

S type (Supreme)
- P type + Harmonics analysis (63 th) + Fault wave recording

Rating Plug

Rating Plug for selection of rated current and frequency

Rating Plug enables the changing rated current(In) without CT replacement
Frequency selection switch: set to 50Hz or 60Hz

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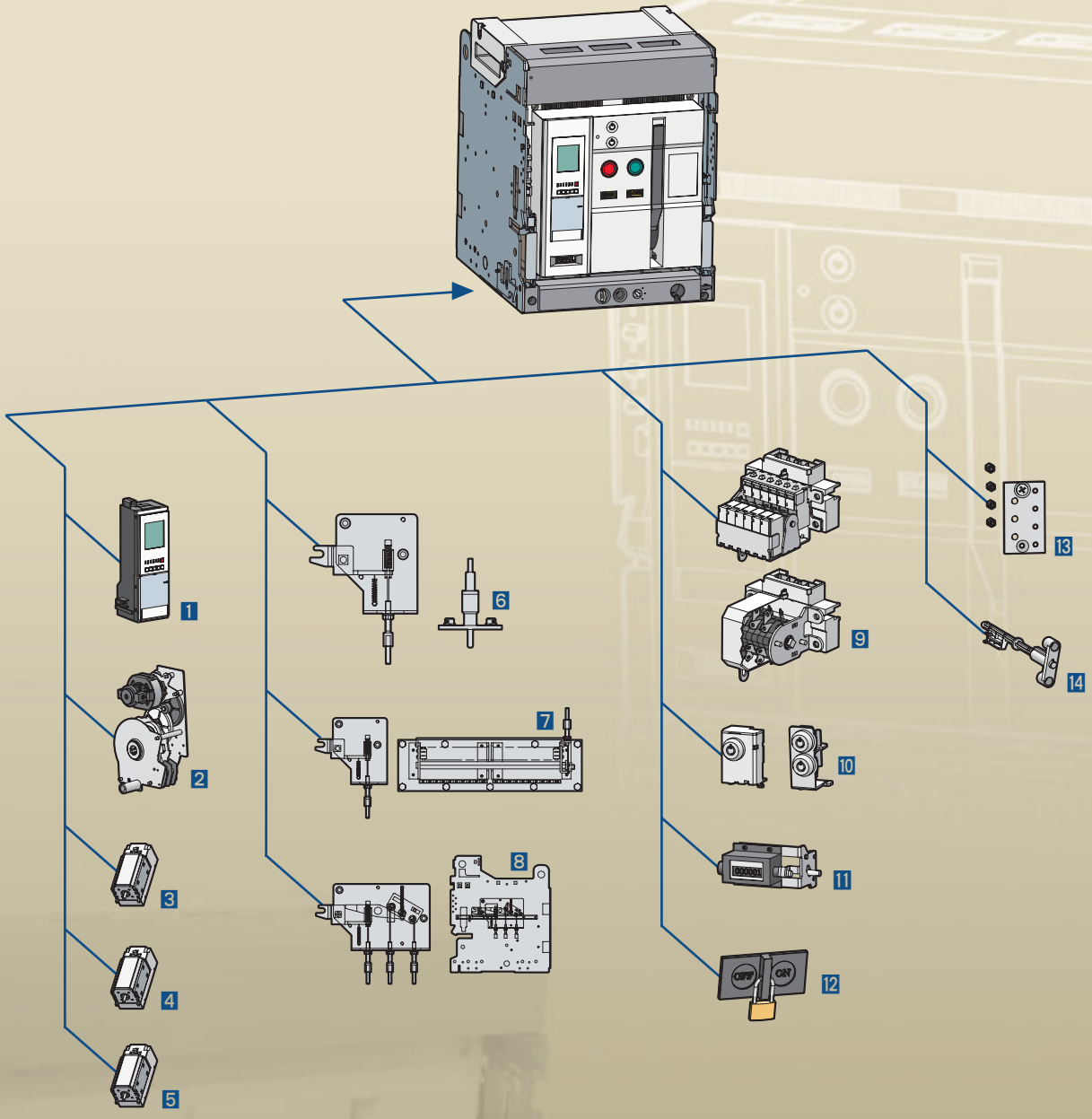
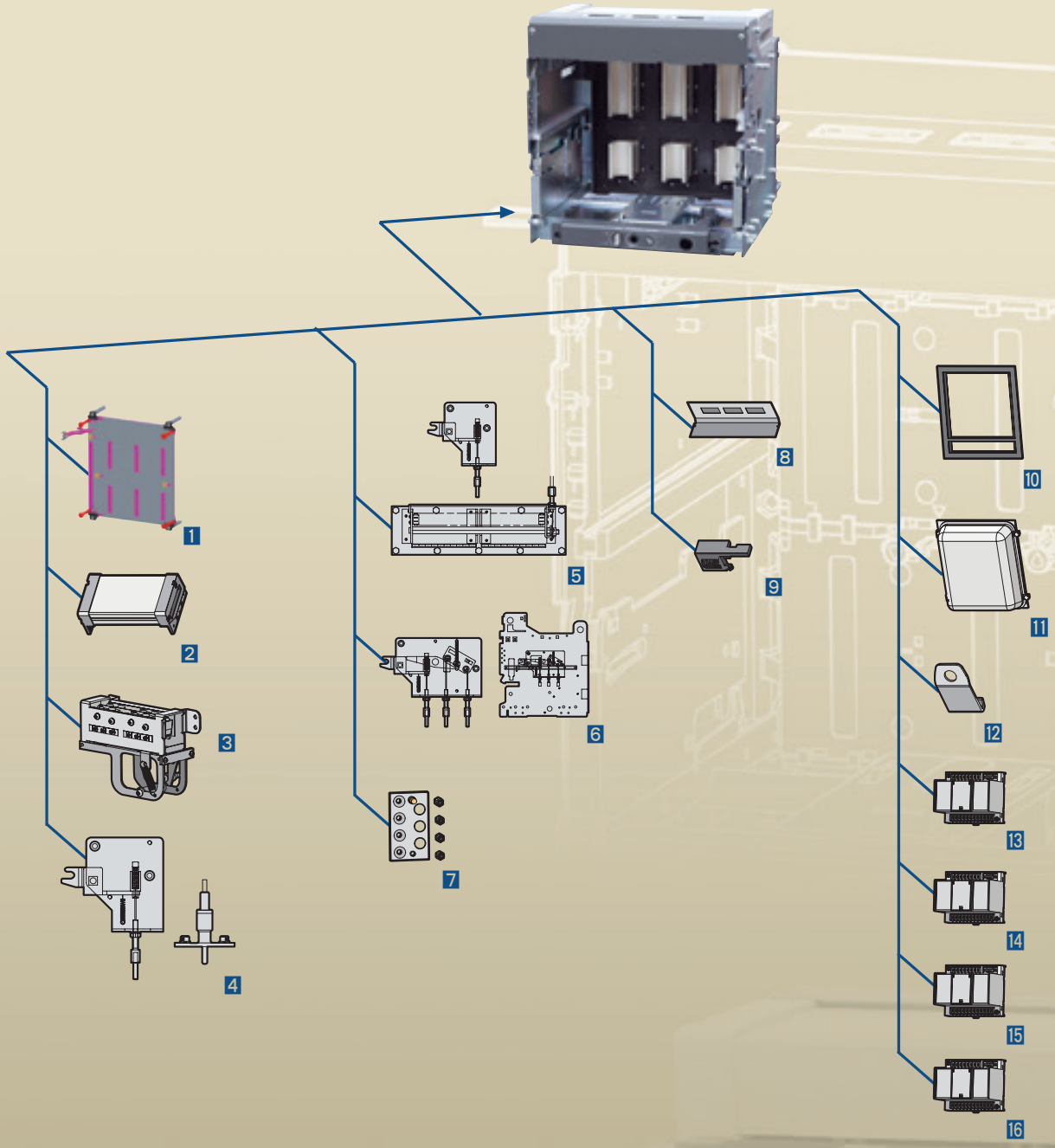
Accessories



ACB

1. Trip relay (OCR)
2. Motor (M)
3. Closing Coil (CC)
4. Shunt Coil (SHT)
5. Under Voltage Trip Device (UVT)
6. Door Interlock (DI)
7. MOC (Mechanically Operated Cell Switch)
8. Mechanical Interlock (MI)
9. Auxiliary Switch (AX)
10. Key Lock (K1), Double Key Lock (K3)
11. Counter (C)
12. Lockable On/Off Button Cover (B)
13. Mis-Insertion Prevention Device (MIP)
14. Manual Reset Button (MRB)



Cradle

1 Safety Shutter (ST)
2 Zero Arc Space (ZAS)
3 Cell Switch (CEL)
4 Door Interlock (DI)
5 MOC (Mechanical Operated Cell Switch)
6 Mechanical Interlock (MI)
7 Mis-Insertion Prevention Device (MIP)
8 Safety Control Cover (SC)
9 Racking Interlock (RI)

Other

10 Door Frame (DF)
11 Dust Cover (DC)
12 Lifting Hook (LH)
13 UVT Time Delay Controller (UDC)
14 Profibus-DP Communication Module
15 Remote I/O
16 Temperature Alarm

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Connection and Installation

Diversified terminal connection methods of the ACB main circuit for users.

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Multiple connections

Various installation methods

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

- **Front connection type is available to be connected regardless of the depth of main circuit terminal and it is suited for panels with limited installation space.**
- **The vertical and horizontal type terminal are module type which can be adjusted by rotating the module 90 degrees.**

• Please refer to the rating lists (Page 22~25) because the installation method varies according to the rated current.

External Configuratio

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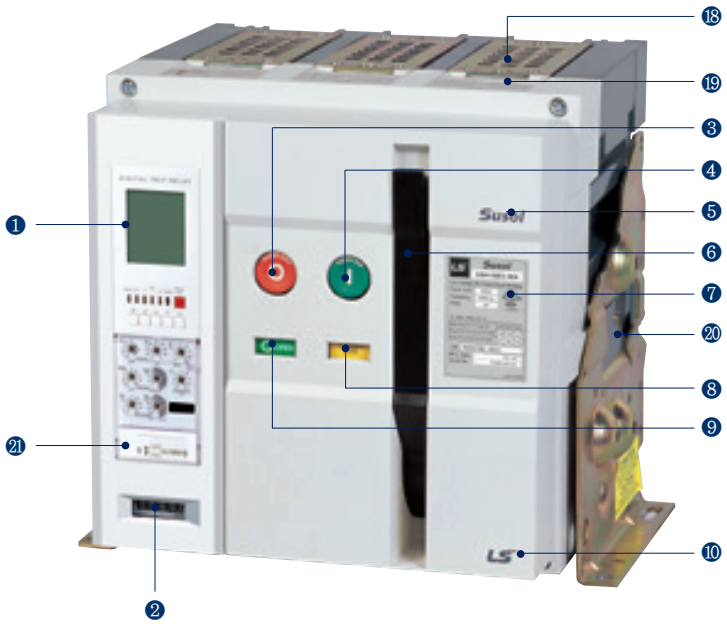
Fixed type ACB



Draw-out ACB (Cradle)

Terms

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

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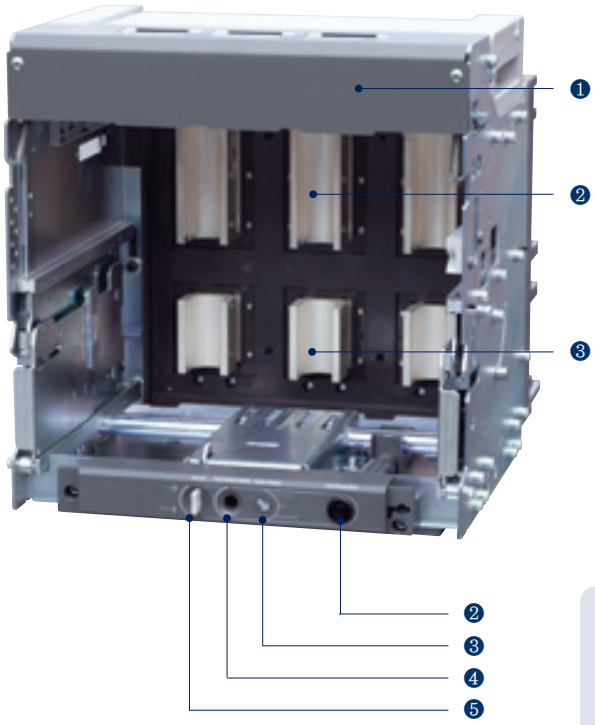
Cradle (Internal)



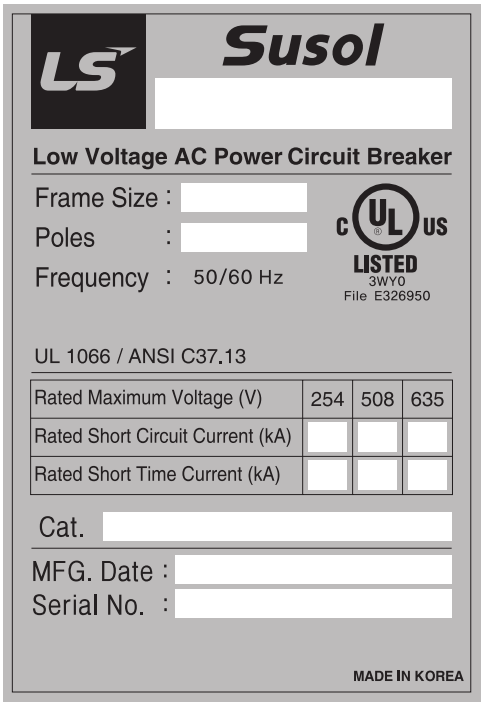
Cradle (Rear)

Terms

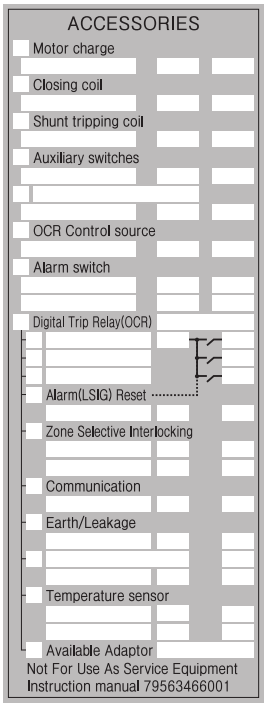
1. Safety control cover
2. Draw-out handle
3. Position indicator
4. Handle inserting hole
5. Pad lock button
6. Connecting conductor (Line side)
7. Connecting conductor (Load side)

Main nameplate

[Acronym explanation]



[Secondary nameplate]



Explanation of terminologies

- Motor charge
- Closing coil
- Shunt tripping coil

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

Internal Configuratio

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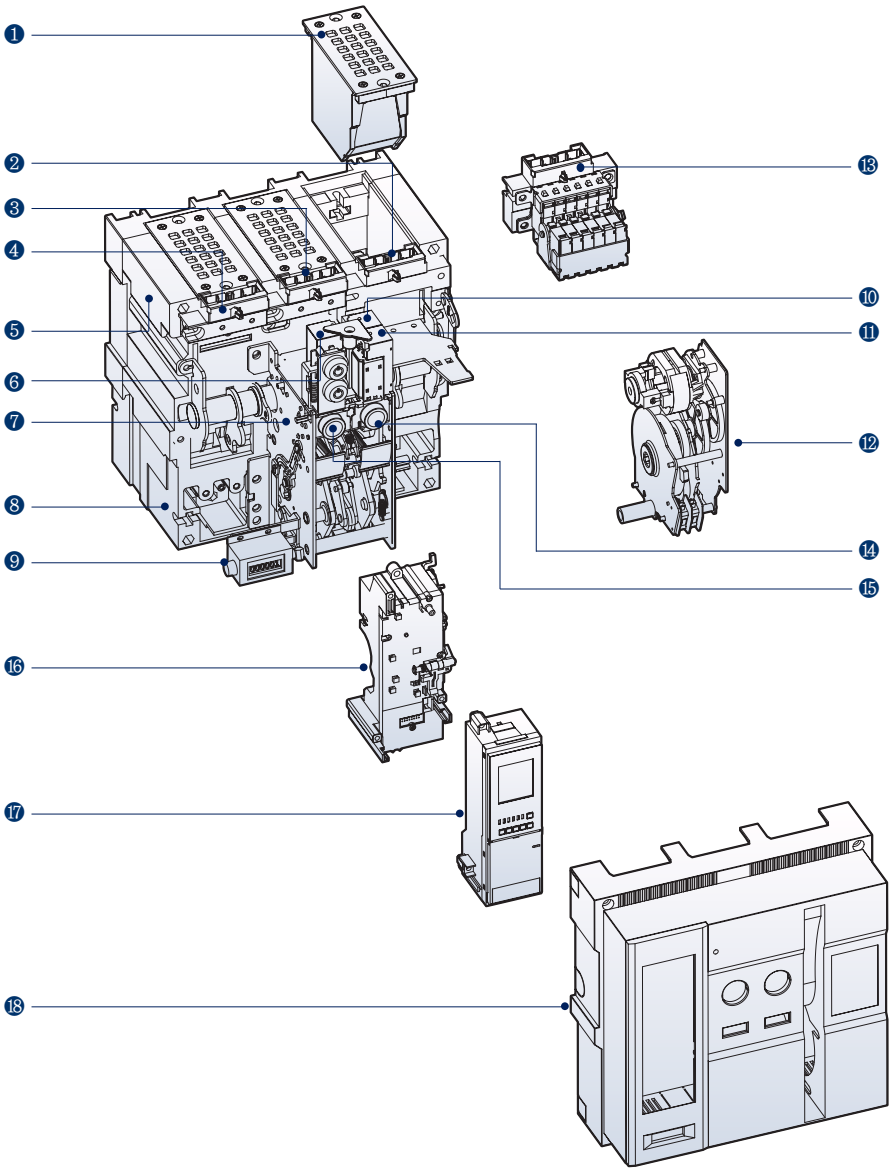

Terms

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

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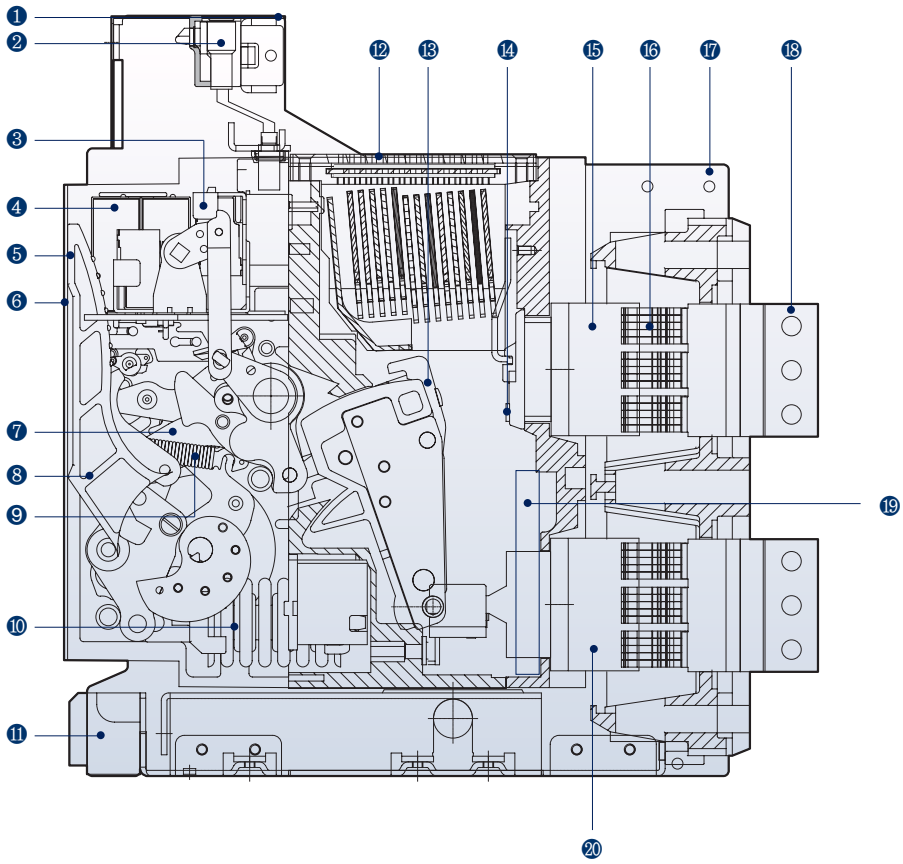
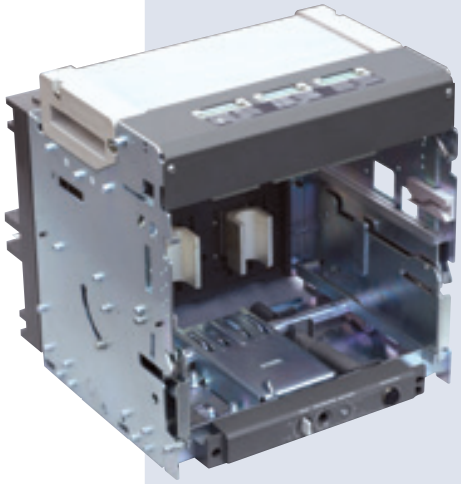


Terms

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



Ordering

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Breaker and accessories

UAS — 16 D 3 — 16 A

Frame type	Frame size		Phasing		Poles		Sensor rating		Mounting and terminal	
	08	800AF	D	3/4P standard RST(N)	3	3P	04~08	400A~800A	Mounting	
	16	1600AF	W	4P reversed NRST	4	4P	08~16	800A~1600A	A	Drawout
									Fixed	
									H	Horizontal terminals
									V	Vertical terminals
									M	Horizontal for line
										Vertical for load
									N	Vertical for line
										Horizontal for load
									P	Front terminal
									G	Horizontal-con type
									W	Vertical-con type

UAH — 32 E 3 — 32

Frame type	Frame size		Phasing		Poles		Sensor rating	
	08	800AF	E	3/4P standard RST(N)	3	3P	04~08	400A~800A
	16	1600AF	X	4P reversed NRST	4	4P	08~16	800A~1600A
	20	2000AF					10~20	1000A~2000A
	25	2500AF					12~25	1200A~2500A
	32	3200AF					16~32	1600A~3200A
	32	3200AF	G	3/4P standard RST(N)	3	3P	16~32	1600A~3200A
	40	4000AF	Z	4P reversed NRST	4	4P	20~40	2000A~4000A
	50	5000AF					25~50	2500A~5000A
	60	6000AF					30~60	3000A~6000A

* Terminals for P type must be ordered separately
* G and W types can be applicable to D-Frame only
* Front terminal is only available for 800~2000A
* 3200AF(E, X), 6000AF(G,Z) offers only vertical type terminals (Busbar).

UAA — 16 D 3 — 00

Frame type	Frame size		Phasing		Poles		Sensor rating
	08	800AF	D	3/4P standard RST(N)	3	3P	Not applied
	16	1600AF	W	4Preversed NRST	4	4P	
	08	800AF	E	3/4P standard RST(N)			
	16	1600AF	X	4P reversed NRST			
	20	2000AF					
	25	2500AF					
	32	3200AF					
	32	3200AF	G	3/4P standard RST(N)			
	40	4000AF	Z	4P reversed NRST			
	50	5000AF					
	60	6000AF					

Internal Configuratio

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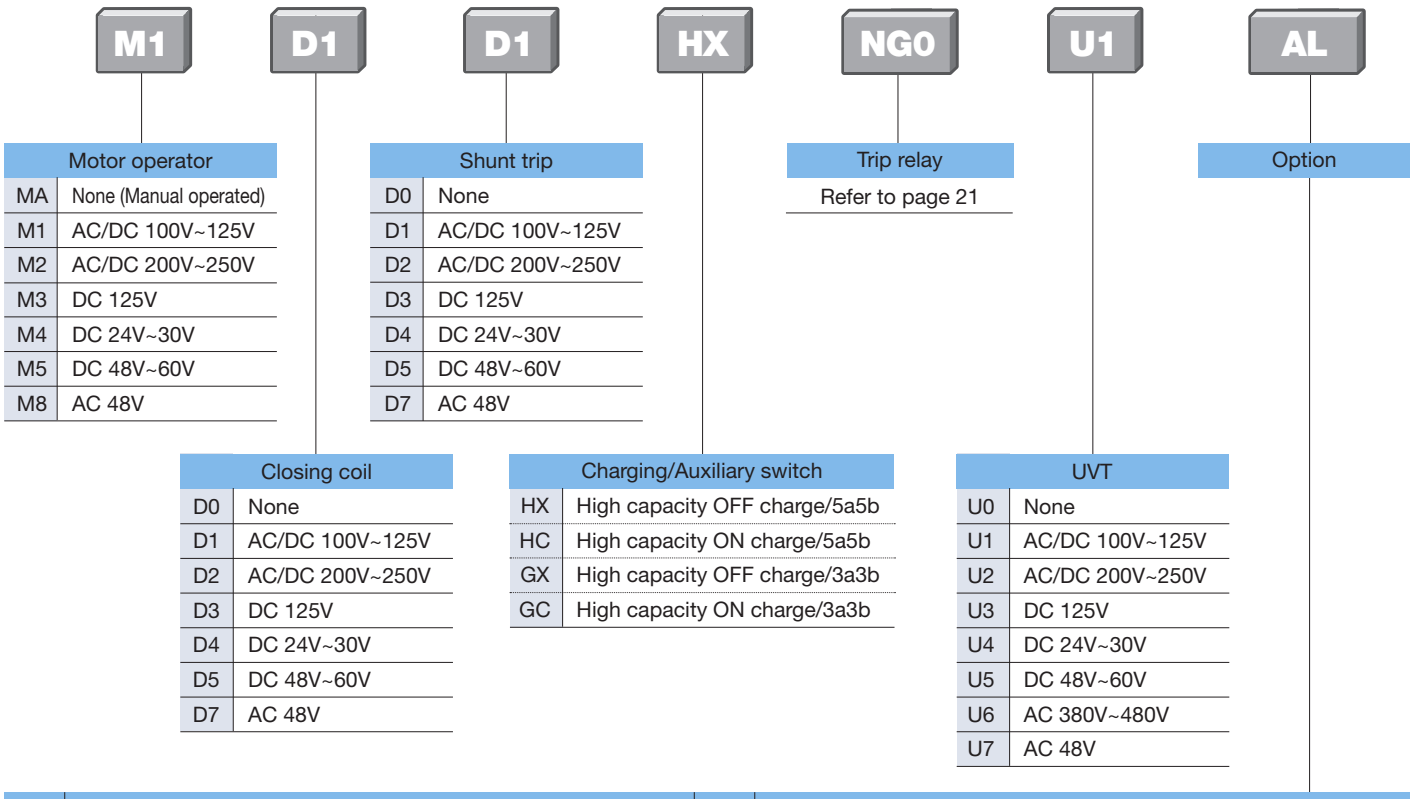


Motor operator	
MA	None (Manual operated)
M1	AC/DC 100V~125V
M2	AC/DC 200V~250V
M3	DC 125V
M4	DC 24V~30V
M5	DC 48V~60V
M8	AC 48V

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 relay
Refer to page 21

Option

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

UVT	
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

Code	Description		Code	Description	
AL	AL1+MRB		K	K1	Key lock
A1	AL1+MRB +RES (AC110~130V) *AC only		K2	K2	Key Interlock set
A2	AL1+AL2 +MRB		K3	K3	Key Interlock double
A3	AL1+MRB +RES (DC110~125V) *DC only		K5	K5	Profalux lock (CAMLOCK type)
A4	AL1+MRB +RES (AC200~250V) *AC only		K6	K6	Kirkkey lock (CAMLOCK type)
A5	AL1+MRB +Auto reset		K7	K7	Kirkkey lock (CN22 type)
A6	AL1+AL2 +MRB +Auto reset		R	RCS	Ready to close switch
A7	AL1+MRB +RES (DC110~125V) +Auto reset *DC only		T	TM	Temperature monitoring
A8	AL1+MRB +RES (AC200~250V) +Auto reset *AC only		H1		AC/DC 100V ~125V, Double shunt coil
A9	AL1+MRB +RES (AC110~130V) +Auto reset *AC only		H2		AC/DC 200V ~250V, Double shunt coil
S	CS2	Charge switch communication	H3	SHT2 Note 2)	DC 125V, Double shunt coil
B	B	Lockable On/Off button cover	H4		DC 24V ~30V, Double shunt coil
M	MI	Mechanical interlock	H5		DC 48V ~60V, Double shunt coil
D	DI or MOC	Door interlock or MOC (Mechanism operated cell switch)	H7		AC 48V, Double shunt coil

N01	A4 (AL1+MRB +RES(AC200~250V))+B(Lockable On/Off button cover)+K(Key lock)+R(Ready to close switch)+M(Mechanic interlock)+ E(Spring auto release)
N02	AL (AL1+MRB)+K(Key lock(OFF lock))+R(Ready to close switch)+D(Door interlock or MOC)+H1(AC/DC 100V ~ 130V, Double shunt coil)+E(Spring auto release)
N03	B(Lockable On/Off button cover)+K2(Key interlock set)+R(Ready to close switch)+T(Temperature monitoring)
N04	A4(AL1+MRB+RES(AC200~250V))+B(Lockable On/Off button cover)+K(Key lock(OFF lock))+M(Mechanical interlock)+T(Temperature monitoring)
N05	A1(AL1+MRB+RES110~130V)+B(Lockable On/Off button cover)+K(Key lock(OFF lock))+R(Ready to close switch)+ M(Mechanical interlock)+T(Temperature monitoring)
N06	A2(AL1+AL2+MRB)+K(Key lock(OFF lock))+R(Ready to close switch)+T(Temperature monitoring)

Note) 1. * Codes for over 5 optional accessories are composed separately 2. UVT and SHT2 can not be selected together. Select one of two.
3. C(counter) is provided as standard.

Ordering

Susol

Adapter (Cradle)

UAL — **S16D** **3** — **A** **H** **E** **S**

For UL ACB cradle type

Frame size Note)	
S16D	1600AF
S20E	2000AF
S25E	2500AF
S32E	3200AF
S50G	5000AF
S60G	6000AF

Number of poles	
3	3P
4	4P

Secondary connector type	
A	Connector type
B	Screw joint type

Terminal configuration	
H	Horizontal type
V	Vertical type
M	Line: Horizontal Load: Vertical
N	Line: Vertical Load: Horizontal
P	Front type
G	Horizontal-con type
W	Vertical-con type

Shutter	
E	Without safety shutter
F	With safety shutter

Other options	
S	Arc cover

* Terminals for P type must be ordered separately
* G and W types can be applicable to S16D (1600AF) only.

Note) The corresponding Breaker Adapter

Breaker		Adapter
UAS-08D	UAS-08W	S16D
UAS-16D	UAS-16W	
UAH-08E	UAH-08X	S20E
UAH-16E	UAH-16X	
UAH-20E	UAH-20X	
UAH-25E	UAH-25X	S25E
UAH-32E	UAH-32X	S32E
UAH-32G	UAH-32Z	S50G
UAH-40G	UAH-40Z	
UAH-50G	UAH-50Z	
UAH-60G	UAH-60Z	S60G

Rating plug

Rating plug classfication				ACB ampere frame							
	For none NCT type	For NCT type	Rating	800A	1600A	2000A	2500A	3200A	4000A	5000A	6000A
Rating plug code	73263466352	73263466372	400A	400A~ 800A							
	73263466353	73263466373	600A								
	73263466354	73263466374	630A								
	73263466355	73263466375	800A		800A~ 1600A						
	73263466356	73263466376	1000A			1000A~ 2000A					
	73263466357	73263466377	1200A				1200A~ 2500A				
	73263466358	73263466378	1250A								
	73263466359	73263466379	1600A					1600A~ 3200A			
	73263466360	73263466380	2000A						2000A~ 4000A		
	73263466361	73263466381	2500A							2500A~ 5000A	
	73263466362	73263466382	3000A								3000A~ 6000A
	73263466363	73263466383	3200A								
	73263466364	73263466384	3600A								
	73263466365	73263466385	4000A								
	73263466366	73263466386	5000A								
	73263466367	73263466387	6000A								

* A rating plug ranging from 50 to 100% of the ACB ampere frame should be used.

* The minimum value of the OCR self-power supply is based on the CT rating, not the rating plug rating.

Susol

Trip relay

N	G	0
Trip relay type	Communication & protection	Control voltage & frequency

N

000	Without trip relay
N	Normal

G

G	Ground fault

* L/S/I/G configuration as standard
  - with LED indicators - without output contacts
* Ground fault detection by vector sum

0

0	Self-power only Note1)	60Hz
5	Self-power only Note1)	50Hz

A

A	Ammeter

G

G	Ground fault
I	Ground fault + ERMS
E	Earth leakage(External CT, Earth leakage over 30A)
T	Earth leakage(External CT, Earth leakage over 30A) + ERMS
C	Ground fault + Comm.
Q	Ground fault + Comm. + ERMS
X	Earth leakage(External CT, Earth leakage over 30A) + Comm.
R	Earth leakage(External CT, Earth leakage over 30A) + Comm. + ERMS
N **	Ground fault (External NCT) + Comm.
M **	Ground fault (External NCT) + Comm. + ERMS

0

0	Self-power only	60Hz
1	AC/DC 100V~250V	60Hz
2	DC 15V~60V	60Hz
5	Self-power only	50Hz
6	AC/DC 100V~250V	50Hz
7	DC 15V~60V	50Hz

* L/S/I/G(or Earth leakage) configuration as standard (Unable to select ground fault and earth leakage simultaneously)
* Ground fault detection by vector sum(G,C)
* Earth leakage system
  - E,X: External CT - Private ZCT applied(faullt current >30A)
* Comm. and output contacts DO NOT work under self-power condition. (LED indicators will still function)

P

P	Power meter

C

C	Ground fault + Comm.
Q	Ground fault + Comm. + ERMS
X	Earth leakage(External CT, Earth leakage over 30A) + Comm.
R	Earth leakage(External CT, Earth leakage over 30A) + Comm. + ERMS
N **	Ground fault (External NCT) + Comm.
M **	Ground fault (External NCT) + Comm. + ERMS

1

1	AC/DC 100V~250V	60Hz
2	DC 15V~60V	60Hz
6	AC/DC 100V~250V	50Hz
7	DC 15V~60V	50Hz

* L/S/I/G(or Earth leakage) configuration as standard (Unable to select ground fault and earth leakage simultaneously)
* Ground fault detection by vector sum
* Earth leakage system
  - X: External CT - Private ZCT applied(faullt current >30A)
* Applicable to generator protection purpose
* Comm. and output contacts DO NOT work under self-power condition. (LED indicators will still function)

S

S	Supreme meter

C

C	Ground fault + Comm.
Q	Ground fault + Comm. + ERMS
X	Earth leakage(External CT, Earth leakage over 30A) + Comm.
R	Earth leakage(External CT, Earth leakage over 30A) + Comm. + ERMS
N **	Ground fault (External NCT) + Comm.
M **	Ground fault (External NCT) + Comm. + ERMS

1

1	AC/DC 100V~250V	60Hz
2	DC 15V~60V	60Hz
6	AC/DC 100V~250V	50Hz
7	DC 15V~60V	50Hz

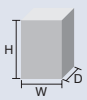
* L/S/I/G(or Earth leakage) configuration as standard (Unable to select ground fault and earth leakage simultaneously)
* Ground fault detection by vector sum
* Earth leakage system
  - X: External CT - Private ZCT applied(faullt current >30A)
* Applicable to generator protection purpose
* Comm. and output contacts DO NOT work under self-power condition. (LED indicators will still function)

** AN, PN, SN, AM, PM, SM provide the function to detect and protect the ground fault current by applying the NCT (Neutral CT) in the neutral wire when 3pole circuit breaker is used in 3-phase 4-wire system.
Please use NCT with the secondary output of 5A rating. (NCT is not provided)

Note) 1. L/S/I/G(or Earth leakage) configuration as standard (Unable to select ground fault and earth leakage simultaneously)
2. Ground fault, earth leakage and pre-trip alarm functions are mutually exclusive.
3. Functions like Metering, Communication, ZSI, Remote reset and Digital output are NOT available only under Self-power condition.
4. P and S types require voltage module to be purchased separately.

Ratings for UL Listing/ANSI Certified Susol UA Ci cuit Breakers

Susol

					Susol	
Type					UAS-□□D	
AF					08	16
Rated current (In max)	(A)			at 40°C	800	1600
Rated current	(A)			at 40°C	400 600 630 800	800 1000 1200 1250 1600
Rated maximum voltage	(V)				254V / 508V / 635V	
Frequency	(Hz)				50 / 60	
Number of poles	(P)				3P / 4P	
Type of trip relay (Electronic trip device)					N, A, P, S (4 type)	
Rated short circuit current (Sym.) UL 1066 ANSI C37.13	(kA)	With instantaneous	AC	635V	65	
				508V	**85**	
				254V	85	
		Without instantaneous	AC	635V	65	
				508V	**65**	
				254V	65	
Rated short time current	(kA)				65	
Operating time (t)	(ms)	Maximum total breaking time			50ms	
		Maximum closing time			80ms	
Life cycle ACB	(time)	Mechanical	Without maintenance		12,500	
			With maintenance		-	
		Electrical	Without maintenance		2,800	
			With maintenance		-	
Weight	lb (kg)	Drawout type	Main Body with Cradle	3P	154 (70)	
				4P	187 (85)	
			Only Cradle	3P	71 (32)	
				4P	84 (38)	
		Fixed type	Motor charging type	3P	77 (35)	
				4P	99 (45)	
External dimension 	Draw-out type	in (mm)	H×W×D	3P	16.93×13.15×16.02 (430×334×407)	
				4P	16.93×16.5×16.02 (430×419×407)	
	Fixed type	in (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 dimension		in (mm)	H×W×D	3P	19.69×15.75×13.39 (500×400×340)	
				4P	19.69×19.69×13.39 (500×500×340)	

Susol

Susol				
UAH-□□E				
08	16	20	25	32
800	1600	2000	2500	3200
400	800	1000	1200	1600
600	1000	1200	1250	2000
630	1200	1250	1600	2500
800	1250	1600	2000	3000
	1600	2000	2500	3200
254V/508V/635V				
50/60				
3P/4P				
N, A, P, S (4 type)				
85				
100				
100				
85				
85				
85				
85				
50ms				
80ms				
12,500				12,500
-				-
2,800				1,000
-				-
214 (97)			245 (111)	326 (148)
269 (122)			309 (140)	414 (188)
99 (45)			123 (56)	205 (93)
121 (55)			152 (69)	256 (116)
101 (46)			110 (50)	196 (89)
126 (57)			137 (62)	249 (113)
16.93×16.22×16.02 (430×412×407)				
16.93×20.75×16.02 (430×527×407)				
11.81×14.88×11.61 (300×378×295)				
11.81×19.41×11.61 (300×493×295)				
19.69×19.69×13.39 (500×500×340)				
19.69×24.21×13.39 (500×615×340)				

Susol			
UAH-□□G			
32	40	50	60
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
254V/508V/635V			
50/60			
3P/4P			
N, A, P, S (4 type)			
100			
130			
130			
100			
100			
100			
100			
50ms			
90ms			
10,000			
-			
1,000			
-			
489 (222)			709 (321)
626 (284)			919 (417)
276 (125)			482 (218)
355 (161)			630 (286)
227 (103)			433 (196)
287 (130)			561 (255)
18.11×30.91×16.02 (460×785×407)			
18.11×39.96×16.02 (460×1015×407)			
11.81×29.57×11.61 (300×751×295)			
11.81×38.62×11.61 (300×981×295)			
31.5×32.48×13.39 (800×825×340)			
31.5×41.54×13.39 (800×1055×340)			

Trip relay(OCR)

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

Contents

Trip Relays

Susol

Trip relay types

Classification	N type	A type	P type	S type
Externals				
Current protection	• L / S / I / G	• L / S / I / G(or Earth leakage) • Thermal • ZSI(Protective coordination) • ERMS	• L / S / I / G(or Earth leakage) • Thermal(Continuous) • ZSI(Protective coordination) • ERMS	• L / S / I / G(or Earth leakage) • Thermal(Continuous) • ZSI(Protective coordination) • ERMS
Other protection	-	• Earth leakage (Option)	• Earth leakage(Option) • Over/Under voltage • Over/Under frequency • Unbalance(Voltage/Current) • Reverse power	• Earth leakage(Option) • Over/Under voltage • Over/Under frequency • Unbalance(Voltage/Current) • Reverse power
Measurement function	-	• Current (R / S / T / N)	• 3 Phase Voltage/Current RMS/Vector • Power(P, Q, S), PF(3-Phase) • Energy(Positive/Negative) • Frequency, Demand	• 3 Phase Voltage/Current RMS/Vector • Power(P, Q, S), PF(3-Phase) • Energy(Positive/Negative) • Frequency, Demand • Voltage/Current harmonics (1st~63th) • 3 Phase Waveforms • THD, TDD, K-Factor
Fine adjustment	-	-	• Fine adjustment for long/short time delay/instantaneous/ ground	• Fine adjustment for long/short time delay/instantaneous/ ground
Pre Trip Alarm	-	-	• Overload protection relays : DO (Alarm) (Ground fault is not available when using Pre trip alarm)	• Overload protection relays : DO (Alarm) (Ground fault is not available when using Pre trip alarm)
Digital Output	-	• 3DO (Fixed) • L, S/I, G Alarm	• 3DO (Programmable) • Trip, Alarm, General	• 3DO (Programmable) • Trip, Alarm, General
IDMTL setting	-	-	• Compliance with IEC60255-3 SIT, VIT, EIT, DT	• Compliance with IEC60255-3 SIT, VIT, EIT, DT
Communication	-	• Modbus/RS–485 • Profibus–DP	• Modbus / RS-485 • Profibus-DP	• Modbus / RS-485 • Profibus-DP
Power supply	• Self Power - Power source works over 20% of load current.	• Self Power - Power source works over 20% of load current. - External power source are required for comm. • AC/DC 100~250V • DC 15~60V	• AC/DC 100~250V • DC 15~60V Basic protection function(L / S / I / G) is still under normal operation without control power.	• AC/DC 100~250V • DC 15~60V
RTC timer	-	• Available	• Available	• Available
LED for trip info.	• Long time delay • Short time delay/Instantaneous • Ground fault	• Long time delay • Short time delay/Instantaneous • Ground fault	• Long time delay • Short time delay/Instantaneous • Ground fault	• Long time delay • Short time delay/Instantaneous • Ground fault
Fault recording	-	• 10 records (Fault/Current/Date and Time)	• 256 records (Fault/Current/Date and Time)	• 256 records • Last fault wave recording (voltage, current are recorded in 3-phase, and can be read only by communication)
Event recording	-	-	• 256 records(Content, Status, Date)	• 256 records(Content, Status, Date)
Operating button	• Reset button	• Reset, Menu Up/Down, Tap, Enter	• Reset, Menu Up/Down, Tap, Enter	• Reset, Menu Up/Down, Tap, Enter

Each OCR type has Battery in itself.

1. Battery lifespan
   1) When turned off: 14~28years
   2) When using 1 LED consecutively or turned off: 7~14days

2. The display minimum range of OCR current
   1) A type: When more 15% than rated current (In)
   2) P/S type: When more 12% than rated current (In)

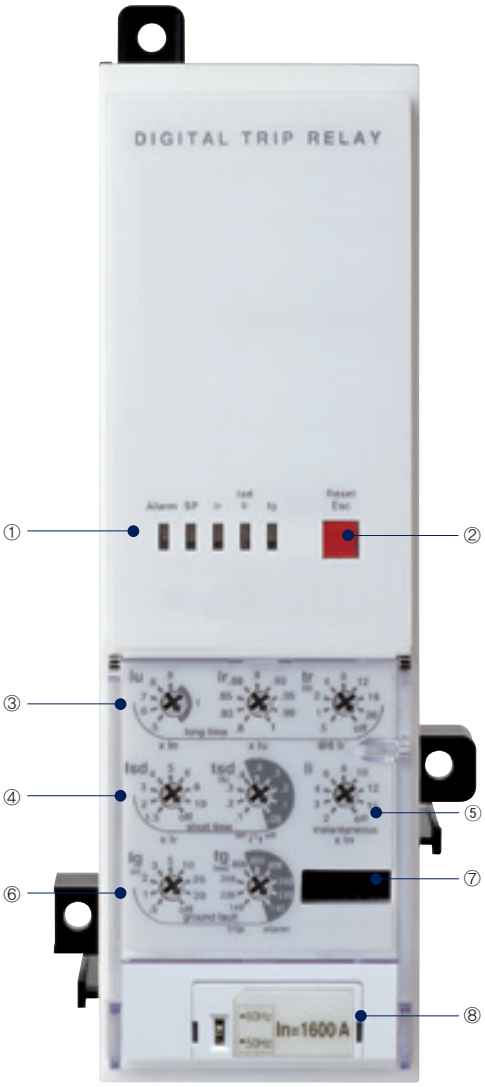
* L/S/I/G(or Earth leakage) configuration as standard
Unable to select ground fault and earth leakage simultaneously

Trip Relays

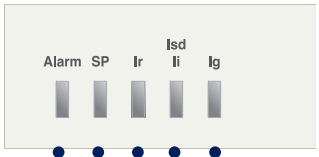
Susol

N type: 「Normal」 type

- Optimized protection function
- Overload protection
  - Long-time delay
  - Thermal
- Short-circuit protection
  - Short-time delay / Instantaneous
  - I^2t On / Off optional (for short-time delay)
- Ground fault protection
  - I^2t On / Off optional
- Self-Power



① LED: Indication of trip info. and overload state



Ig: LED indicating ground-fault
Isd / Ii: LED indicating short-time or instantaneous tripping
Ir: LED indicating long-time delay
SP: Self-protection and battery test LED
Alarm: LED indicating an overload
(Turn on above 90%, Blink above 105%)

② Reset Key: Fault reset or battery check

③ Iu, Ir: Long-time current setting, tr: Long-time tripping delay setting

④ Isd: Short-time current setting, tsd: Short-time tripping delay setting

⑤ Ii: Instantaneous current setting

⑥ Ig: Ground fault current setting, tg: Ground fault tripping delay setting

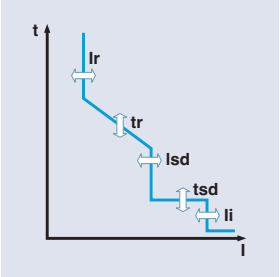
⑦ Test terminal: OCR test terminal (Connected with OCR tester)

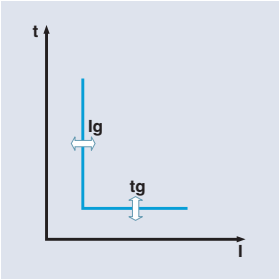
⑧ Rating plug
- **Rated current setting (45~100% of the AF)**
- **Frequency selectable(60Hz/50Hz)**

Trip Relays
Susol

Protection

Long time											
Current setting (A)	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)	tr@(1.5×Ir)		12.5	25	50	100	200	300	400	500	Off
Accuracy: ±15% or	tr@(6.0×Ir)		0.5	1	2	4	8	12	16	20	Off
below 100ms	tr@(7.2×Ir)		0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	Off
Short time											
Current setting (A)	Isd = Ir×...		1.5	2	3	4	5	6	8	10	Off
Time delay (s)	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4				
Accuracy: ±10% or		I^2t On @(10×Ir)		0.1	0.2	0.3	0.4				
below 50ms	(I^2t Off)	Min. Trip Time(ms)	20	80	160	260	360				
		Max. Trip Time(ms)	80	140	240	340	440				
Instantaneous											
Current setting (A)	Ii = In×...		2	3	4	6	8	10	12	15	Off
Tripping time			below 50ms								
Ground fault											
Pick-up (A)	Ig = In×...		0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	Off
Time delay (s)	tg	I^2t Off	0.05	0.1	0.2	0.3	0.4				
Accuracy: ±10%(Ig≥0.4In)		I^2t On @(1×In)		0.1	0.2	0.3	0.4				
±20%(Ig<0.4In)	(I^2t Off)	Min. Trip Time(ms)	20	80	160	260	360				
or below 50ms		Max. Trip Time(ms)	80	140	240	340	440				

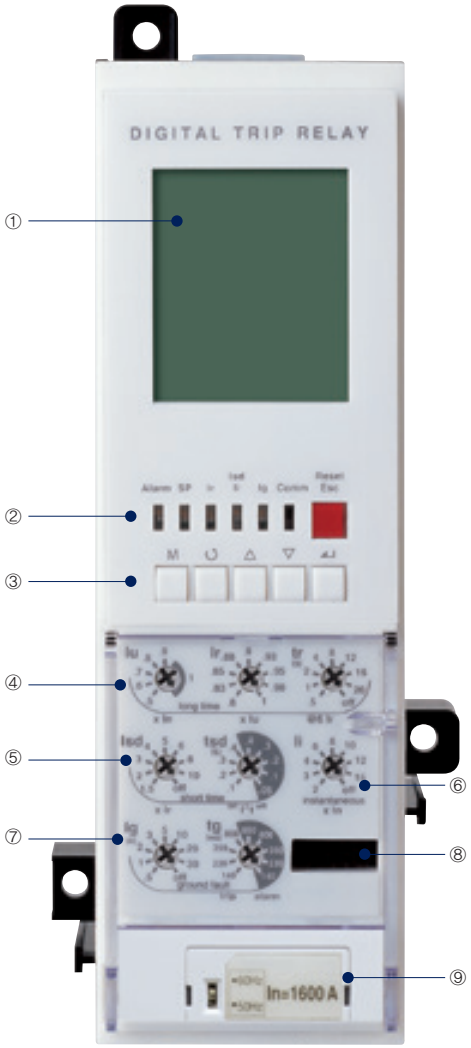




Trip Relays
Susol

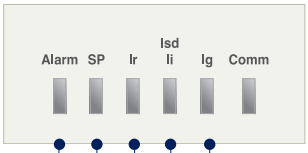
A type: 「Ammeter」 type

- Overload protection
  - Long-time delay
  - Thermal
- Short-circuit protection
  - Short-time delay / Instantaneous
  - I^2t On / Off optional (for short-time delay)
- Ground fault protection
  - I^2t On / Off optional
  - Trip / Alarm selectable (need external power)
  - Blocking Time (0~60s)
    Does not detect ground fault during Blocking time.
- Realization of protective coordination by ZSI
  (Zone Selective Interlocking)
  - Disable / Enable Selectable
- High-performance and high-speed MCU built-in
  - Accurate measurement with tolerance of 1.0%
- Measurement and Display Function
  - High detailed measurement for current
  - character LCD type
- Fault recording
  - Records Max. up to 10 fault information about fault type, fault phase, fault data, occurrence time of fault
- SBO (Select Before Operation)
  - High reliability for control and setting change method
- 3 DO(Digital Output)
  - Fixed
- Communication
  - Modbus / RS485
  - Profibus-DP
- ERMS
  - Arc Flash Reduction
  - Instantaneous setting value is minimized. (2*In)



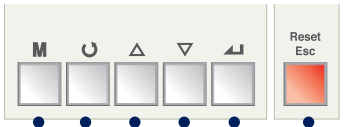
① LCD: Indication of measurement and information

② LED: Indication of trip info. and overload state



Ig: LED indicating ground-fault
Isd / Ii: LED indicating short-time or instantaneous tripping
Ir: LED indicating long-time delay
SP: Self-protection and battery test LED
Alarm: LED indicating an overload
(Turn on above 90%, blinks above 105%)

③ Key: Move to menu or reset



Reset / ESC: Fault reset or ESC from menu
Enter: Enter into secondary menu or setting input
Up/Down: Move the cursor up / down on screen or increase/decrease a setting value
Right/Left: Move the cursor or setting right/left on screen (Rotation)
Menu: Menu display ↔ Measurement display

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

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

⑥ Ii: Instantaneous current setting

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

⑧ Test terminal: OCR test terminal (Connected with OCR tester)

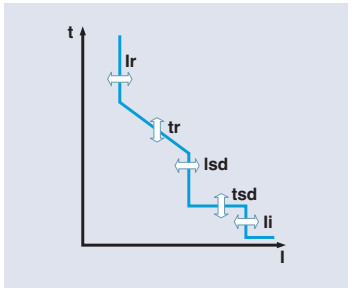
⑨ Rating plug
- **Rated current setting (45~100% of the AF)**
- **Frequency selectable(60Hz/50Hz)**

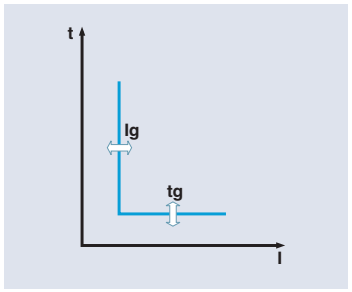
Trip Relays

Susol

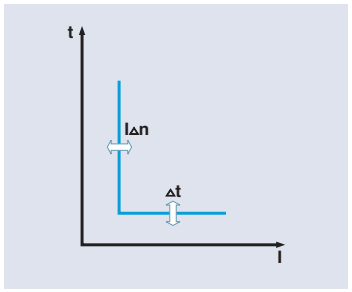
Protection

Long time											
Current setting (A)	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)	tr@(1.5×Ir)		12.5	25	50	100	200	300	400	500	Off
Accuracy: ±15% or	tr@(6.0×Ir)		0.5	1	2	4	8	12	16	20	Off
below 100ms	tr@(7.2×Ir)		0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	Off
Short time											
Current setting (A)	Isd = Ir×...		1.5	2	3	4	5	6	8	10	Of
Time delay (s)	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4				
Accuracy: ±10% or		I^2t On @(10×Ir)		0.1	0.2	0.3	0.4				
below 50ms	(I^2t Off)	Min. Trip Time(ms)	20	80	160	260	360				
		Max. Trip Time(ms)	80	140	240	340	440				
Instantaneous											
Current setting (A)	Ii = In×...		2	3	4	6	8	10	12	15	Off
Tripping time			below 50ms								
Ground fault											
Pick–up (A)	Ig = In×...		0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	Off
Time delay (s)	tg	I^2t Off	0.05	0.1	0.2	0.3	0.4				
Accuracy: ±10%(Ig≥0.4In)		I^2t On @(1×In)		0.1	0.2	0.3	0.4				
±20%(Ig<0.4In)	(I^2t Off)	Min. Trip Time(ms)	20	80	160	260	360				
or below 50ms		Max. Trip Time(ms)	80	140	240	340	440				





Earth leakage (Option)										
Current setting (A)	I△n		0.5	1	2	3	5	10	20	30	Off
Time delay (ms)	△t	Alarm Time(ms)	140	230	350	800	950				
Accuracy: ±15%		Trip Time(ms)	140	230	350	800					

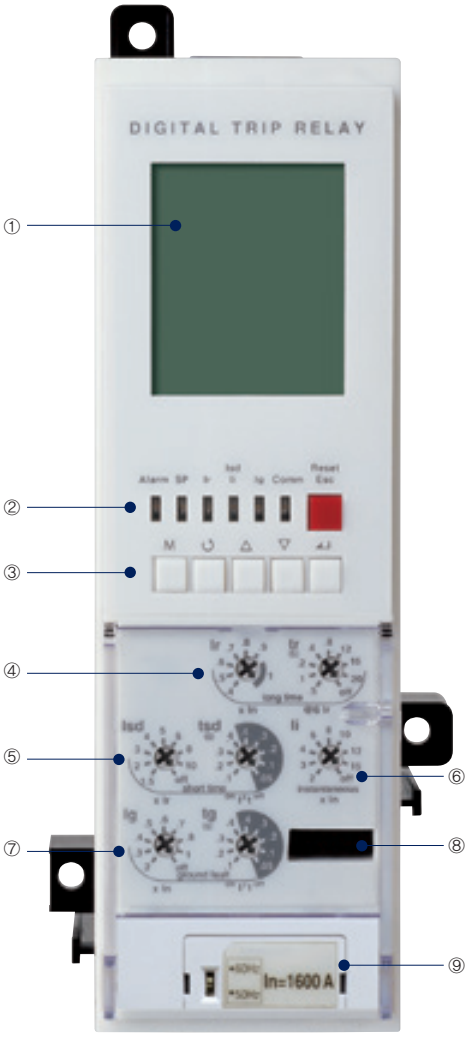


Note) Current setting values are secondary current of the external CT.
Recommended not to use current setting values more than 5A.

Trip Relays
Susol

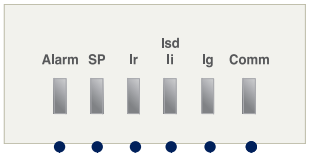
P type: 「Power meter」 type

- Overload protection
  - Long-time delay
  - Thermal
- Short-circuit protection
  - Short-time delay / Instantaneous
  - I^2t On / Off optional (for short-time delay)
- Ground fault protection
  - I^2t On / Off optional
  - Trip / Alarm selectable (need external power)
  - Blocking Time (0~60s)
    Do not ground fault detect during Blocking time
- Protection for Over voltage / Under voltage / Over frequency / Under frequency / Unbalance / Reverse power
- Realization of protective coordination by ZSI (Zone Selective Interlocking)
  - Disable / Enable Selectable
- Fine-adjustable setting by knob and key
- ERMS
  - Arc Flash Reduction
  - Instantaneous setting value is minimized. (2*In)
- IDMTL setting (SIT, VIT, EIT, DT curve)
  - Basic setting : “None”. Thermal curve.
- Measurement and Display Function
  - High detailed measurement for 3 phase current / Voltage / Power / Energy / Phase angle / Frequency / PF / Demand
  - 128 x 128 Graphic LCD
  - Indicates current / voltage Vector Diagram and Waveform
- Fault recording
  - Records Max. up to 256 fault information about fault type, fault phase, fault value, occurrence time of fault
- Event recording
  - Records events of device related to setting change, operation and state change. (Max. up to 256)
- SBO (Select Before Operation)
  - High reliability for control and setting change method
- 3 DO(Digital output)
  - Programmable for alarm, trip and general DO
- Communication
  - Modbus / RS485
  - Profibus-DP



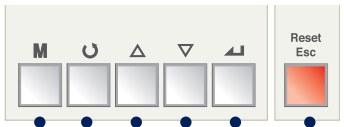
① Graphic LCD: Indication of measurement and information

② LED: Indication of trip info. and overload state



Comm: LED indicating comm. state (Blinks when running)
Ig: LED indicating ground-fault
Isd / Ii: LED indicating short-time or instantaneous tripping
Ir: LED indicating long-time delay
SP: Self-protection and battery test LED
Alarm: LED indicating an overload
(Turns on above 90%, blinks above 105%)

③ Key: Move to menu or reset



Reset / ESC: Fault reset or ESC from menu
Enter: Enter into secondary menu or setting input
Up / Down: Move the cursor up / down on screen or increase / decrease a setting value
Right/Left: Move the cursor or setting right / left on screen (Rotation)
Menu: Menu display ↔ Measurement display

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

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

⑥ Ii: Instantaneous current setting

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

⑧ Test terminal: OCR test terminal (Connected with OCR tester)

⑨ Rating plug
- **Rated current setting (45~100% of the AF)**
- **Frequency selectable(60Hz/50Hz)**

Trip Relays
Susol

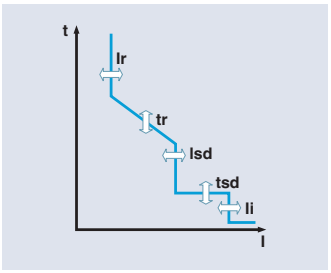
Protection

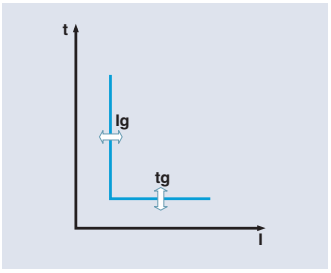
Long time										
Current setting (A)	Ir = In×...	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
Time delay (s)	tr@(1.5×Ir)	12.5	25	50	100	200	300	400	500	Off
Accuracy: ±15% or	tr@(6.0×Ir)	0.5	1	2	4	8	12	16	20	Off
below 100ms	tr@(7.2×Ir)	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	Off

Short time										
Current setting (A)	Isd = Ir×...	1.5	2	3	4	5	6	8	10	Off
Time delay (s)	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4			
Accuracy: ±10% or		I^2t On @(10×Ir)		0.1	0.2	0.3	0.4			
below 50ms	(I^2t Off)	Min. Trip Time(ms)	20	80	160	260	360			
		Max. Trip Time(ms)	80	140	240	340	440			

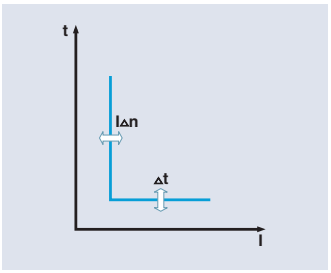
Instantaneous									
Current setting (A)	Ii = In×...	2	3	4	6	8	10	12	15	Off
Tripping time		below 50ms								

Ground fault										
Pick–up (A)	Ig = In×...	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	Off
Time delay (s)	tg	I^2t Off	0.05	0.1	0.2	0.3	0.4			
Accuracy: ±10%(Ig≥0.4In)		I^2t On @(1×In)		0.1	0.2	0.3	0.4			
±20%(Ig<0.4In)	(I^2t Off)	Min. Trip Time(ms)	20	80	160	260	360			
or below 50ms		Max. Trip Time(ms)	80	140	240	340	440			





Earth leakage (Option)										
Current setting (A)	I△n	0.5	1	2	3	5	10	20	30	Off
Time delay (ms)	△t	Alarm Time(ms)	140	230	350	800	950			
Accuracy: ±15%		Trip Time(ms)	140	230	350	800				



Note) Current setting values are secondary current of the external CT.
Recommended not to use current setting values more than 5A.

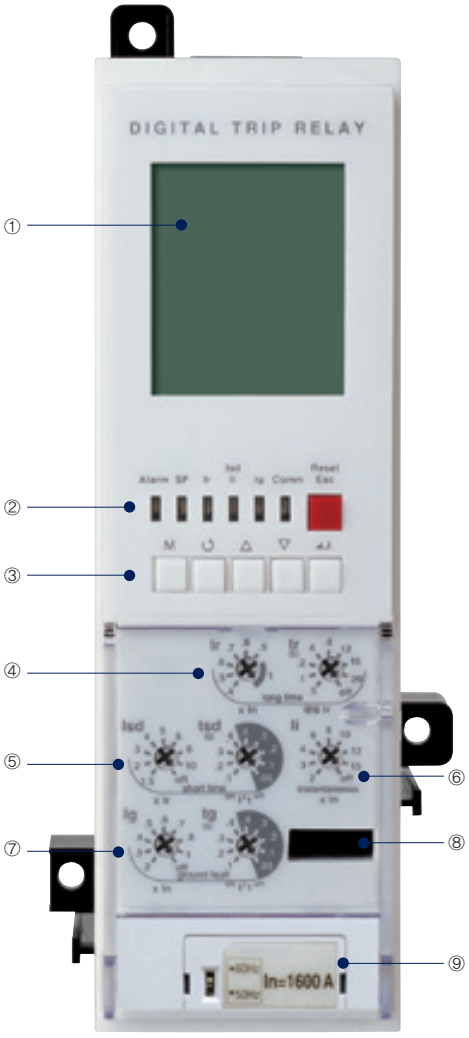
PTA(Pre Trip Alarm)										
Current setting (A)	Ip = Ir x ···	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
Time delay (s)	tp@(1.2×Ip)	1	5	10	15	20	25	30	35	Off
Accuracy: ±15%										

Other protection		Pick-up			Time delay(s)		
		Setting range	Step	Accuracy	Setting range	Step	Accuracy
Under voltage		80V ~ 0V_Pick-up	1V	±5%	1.2~40sec	0.1sec	±0.1sec
Over voltage		UV_Pick-up ~ 980V	1V	±5%			
Voltage unbalance		6% ~ 99%	1%	±2.5% or (*±10%)			
Reverse power		10~500 kW	1kW	±10%	0.2~40sec		
Over power		500~5000 kW	1kW	±10%			
Current unbalance		6% ~ 99%	1%	±2.5% or (*±10%)	1.2~40sec		
Over frequency	60Hz	UF_Pick-up ~ 65	1Hz	±0.1Hz			
	50Hz	UF_Pick-up ~ 55	1Hz	±0.1Hz			
Under frequency	60Hz	55Hz ~ OF_Pick-up	1Hz	±0.1Hz			
	50Hz	45Hz ~ OF_Pick-up	1Hz	±0.1Hz			

Trip Relays
Susol

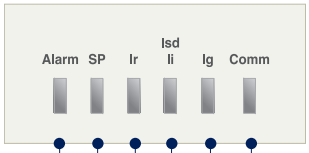
S type: 「Supreme meter」 type

- Overload protection
  - Long-time delay
  - Thermal
- Short-circuit protection
  - Short-time delay / Instantaneous
  - I^2t On / Off optional (for short-time delay)
- Ground fault protection
  - I^2t On / Off optional
  - Trip / Alarm selectable (need external power)
  - Blocking Time (0~60s)
    Do not ground fault detect during Blocking time
- Protection for Over voltage / Under voltage / Over frequency / Under frequency/Unbalance/Reverse power
- Realization of protective coordination by ZSI (Zone Selective Interlocking)
  - Disable / Enable
- Fine-adjustable setting by knob and Key
- IDMTL setting (SIT, VIT, EIT, DT curve)
  - Basic setting : “None”. Thermal curve.
- ERMS
  - Arc Flash Reduction
  - Instantaneous setting value is minimized. (2*In)
- Measurement and Display Function
  - High detailed measurement for 3 phase current / Voltage / Power / Energy / Phase angle / Frequency / PF / Demand
  - 128 x 128 Graphic LCD
  - Indicates current / voltage Vector Diagram and Waveform
- Fault recording
  - Records Max. up to 256 fault information about fault type, fault phase, fault value, occurrence time of fault
  - Fault wave recording: records the latest fault wave
- Event recording
  - Records events of device related to setting change, operation and state change. (Max. up to 256)
- SBO (Select Before Operation)
  - High reliability for control and setting change method
- Power quality analysis
  - Measurement for 1st~63th harmonics
  - THD, TDD, k-Factor
  - Voltage / current waveform capture
- 3 DO(Digital output)
  - Programmable for alarm, trip and general DO
- Communication
  - Modbus / RS485
  - Profibus-DP



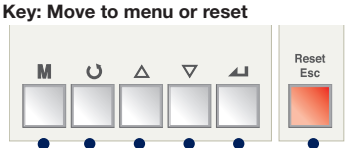
① Graphic LCD: Indication of measurement and information

② LED: Indication of trip info. and overload state



Comm: LED indicating comm. state (Blinks when running)
Ig: LED indicating ground-fault
Isd / Ii: LED indicating short-time or instantaneous tripping
Ir: LED indicating long-time delay
SP: Self-protection LED and battery test LED
Alarm: LED indicating an overload
(Turns on above 90%, blinks above 105%)

③ Key: Move to menu or reset



Reset / ESC: Fault reset or ESC from menu
Enter: Enter into secondary menu or setting input
Up / Down: Move the cursor up / down on screen or increase / decrease a setting value
Right/Left: Move the cursor or setting right / left on screen (Rotation)
Menu: Menu display ↔ Measurement display

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

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

⑥ Ii: Instantaneous current setting

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

⑧ Test terminal: OCR test terminal (Connected with OCR tester)

⑨ Rating plug
- **Rated current setting (45~100% of the AF)**
- **Frequency selectable(60Hz/50Hz)**

Trip Relays
Susol

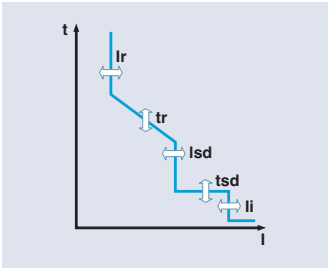
Protection

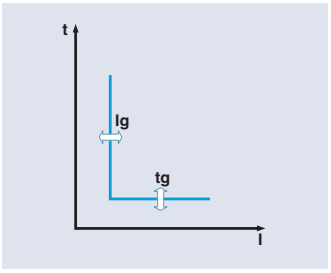
Long time										
Current setting (A)	Ir = In×...	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
Time delay (s)	tr@(1.5×Ir)	12.5	25	50	100	200	300	400	500	Off
Accuracy: ±15% or	tr@(6.0×Ir)	0.5	1	2	4	8	12	16	20	Off
below 100ms	tr@(7.2×Ir)	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	Off

Short time										
Current setting (A)	Isd = Ir×...	1.5	2	3	4	5	6	8	10	Off
Time delay (s)	tsd	I²t Off	0.05	0.1	0.2	0.3	0.4			
Accuracy: ±10% or		I²t On @(10×Ir)		0.1	0.2	0.3	0.4			
below 50ms	(I²t Off)	Min. Trip Time(ms)	20	80	160	260	360			
		Max. Trip Time(ms)	80	140	240	340	440			

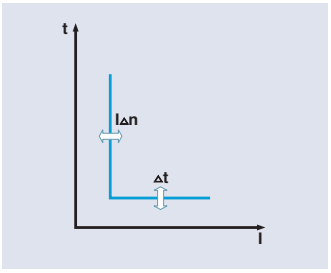
Instantaneous									
Current setting (A)	Ii = In×...	2	3	4	6	8	10	12	15	Off
Tripping time		below 50ms								

Ground fault										
Pick–up (A)	Ig = In×...	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	Off
Time delay (s)	tg	I²t Off	0.05	0.1	0.2	0.3	0.4			
Accuracy: ±10%(Ig≥0.4In)		I²t On @(1×In)		0.1	0.2	0.3	0.4			
±20%(Ig<0.4In)	(I²t Off)	Min. Trip Time(ms)	20	80	160	260	360			
or below 50ms		Max. Trip Time(ms)	80	140	240	340	440			





Earth leakage (Option)										
Current setting (A)	I△n	0.5	1	2	3	5	10	20	30	Off
Time delay (ms)	△t	Alarm Time(ms)	140	230	350	800	950			
Accuracy: ±15%		Trip Time(ms)	140	230	350	800				



Note) Current setting values are secondary current of the external CT.
Recommended not to use current setting values more than 5A.

PTA(Pre Trip Alarm)										
Current setting (A)	Ip = Ir x ···	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
Time delay (s)	tp@(1.2×Ip)	1	5	10	15	20	25	30	35	Off
Accuracy: ±15%										

Other protection		Pick-up			Time delay(s)		
		Setting range	Step	Accuracy	Setting range	Step	Accuracy
Under voltage		80V ~ 0V_Pick-up	1V	±5%	1.2~40sec	0.1sec	±0.1sec
Over voltage		UV_Pick-up ~ 980V	1V	±5%			
Voltage unbalance		6% ~ 99%	1%	±2.5% or (*±10%)			
Reverse power		10~500 kW	1kW	±10%	0.2~40sec		
Over power		500~5000 kW	1kW	±10%			
Current unbalance		6% ~ 99%	1%	±2.5% or (*±10%)	1.2~40sec		
Over frequency	60Hz	UF_Pick-up ~ 65	1Hz	±0.1Hz			
	50Hz	UF_Pick-up ~ 55	1Hz	±0.1Hz			
Under frequency	60Hz	55Hz ~ OF_Pick-up	1Hz	±0.1Hz			
	50Hz	45Hz ~ OF_Pick-up	1Hz	±0.1Hz			

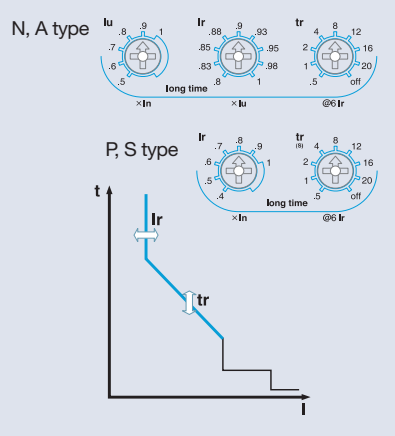
Trip Relays
Susol

Operation characteristics

Long-time delay (L)

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

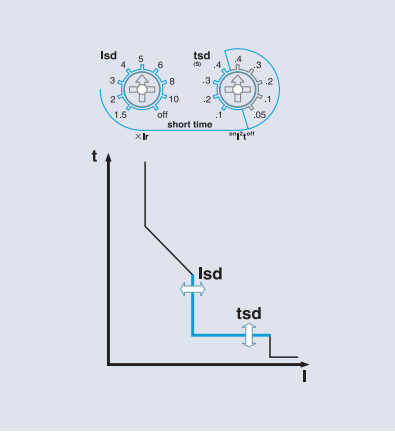
1. Standard current setting knob: Ir
   1) Setting range in P type and S type: (0.4-0.5-0.6-0.7-0.8-0.9-1.0)×In
   2) Setting range in N type and A type: (0.4 ~1.0)×In
      - Iu: (0.5-0.6-0.7-0.8-0.9-1.0)×In
      - Ir: (0.8-0.83-0.85-0.88-0.9-0.93-0.95-0.98-1.0)×Iu
2. Time delay setting knob: tr
   - Standard operating time is based on the time of 6×Ir
   - Setting range: 0.5-1-2-4-8-12-16-20-Off sec (9 modes)
3. Relay pick-up current
   - When current over (1.15)×Ir flows in, relay is picked up.
4. Relay operates basing on the largest load current among R/S/T/N phase.



Short-time delay (S)

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

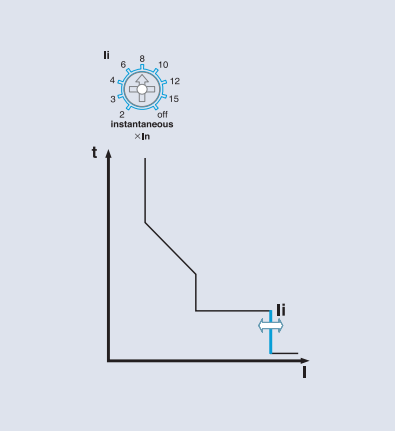
1. Standard current setting knob: Isd
   - Setting range: (1.5-2-3-4-5-6-8-10-Off)×Ir
2. Time delay setting knob: tsd
   - Standard operating time is based on the time of 10×Ir.
   - Inverse time (I^2t On): 0.1-0.2-0.3-0.4 sec
   - Definite time (I^2t Off): 0.05-0.1-0.2-0.3-0.4 sec
3. Relay operates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



Instantaneous (I)

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

1. Standard current setting knob: Ii
   - Setting range: (2-3-4-6-8-10-12-15-Off)×In
2. Relay operates basing on the largest load current among R/S/T/N phase.
3. Total breaking time is below 50ms.
4. When using the ERMS function, Instantaneous setting value is applied as 2*In (N type OCR does not apply)



Trip Relays
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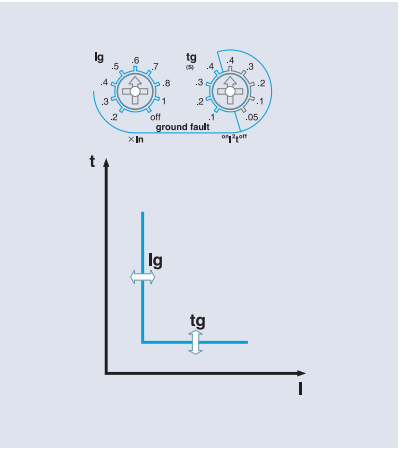
Ground Fault (G)

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

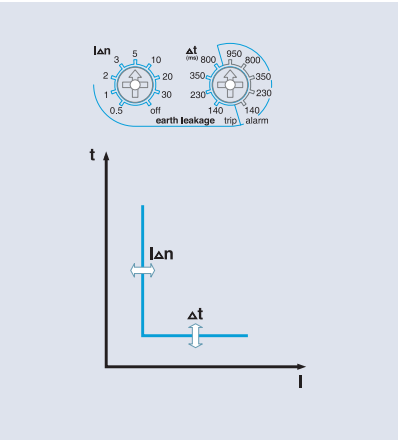
1. Standard setting current knob: Ig
   - Setting range: (0.2-0.3-0.4-0.5-0.6-0.7-0.8-1.0-Off)×In
2. Time delay setting knob: tg
   - Inverse time (I^2t On): 0.1-0.2-0.3-0.4 sec
   - Definite time (I^2t Off): 0.05-0.1-0.2-0.3-0.4 sec
3. Ground fault current is vector sum of each phase current. Therefore, 3Pole products may operate under its phase-unbalance including ground fault situations.(R+S+T+(N) Phase)
4. When ZSI function is set, the protection operation will take place instantaneously with input absence by downstream devices. It is advised to disable its ZSI function on the last downstream device.
5. Ground-fault functions are basically provided with products equipped with a trip relay through its internal CT that is embedded in each phase.(But, it can't be used with earth-leakage protection function at the same time)



Earth Leakage (G) - Option

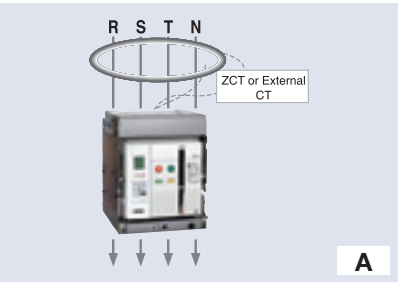
The function for breaking earth leakage current above setting value after time delay to protect the circuit from earth leakage. (A, P, S type)

1. Standard setting current knob: I△n
   - Setting range: 0.5-1-2-3-5-10-20-30-Off (A)
2. Time delay setting knob: △t
   - Trip time: 140-230-350-800 ms
   - Alarm time: 140-230-350-800-950 ms
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 with input absence by downstream devices. It is advised to disable its ZSI function on the last downstream device.



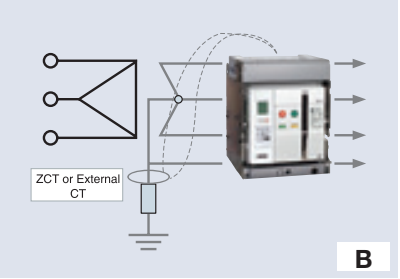
※ Use cautions with earth-leakage current settings

- 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)



※ Guideline for external CT usage

- Earth-leakage protection characteristics using the standard CT that is installed inside the ACB can protect currents from 20 to 100% range on its rated current.
- As rated currents on ACB increases, current that is covered by its standard CT increase as well. This can not 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 currents within its systems. And choose trip relay(E, X type) which is required with external CT usage in order to provide earth-leakage functions.



Trip Relays

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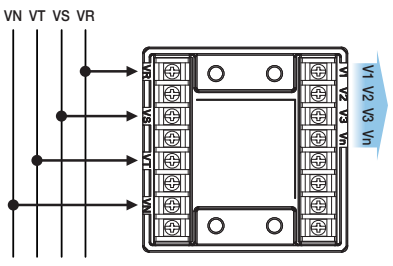
Measurement function

Class.	Measurement element	Detailed element	Unit	Display range	Accuracy
Current	Line current	Ia,Ib,Ic	A	A type: 0.15In~17In P/S type: 0.12In~1.6In	±3%
	Normal current	I_1			
	Reverse current	I_2			
Voltage	Line voltage	Vab,Vbc,Vca	V	60~690V	±1%
	Phase voltage	Va,Vb,Vc			±1%
	Normal voltage	V_1			
	Reverse voltage	V_2			
Angle	Line-to-line Line-to-current	∠VabIa, ∠VabIb, ∠VabIc, ∠VabVbc, ∠VabVca	°	0~360°	±1°
	Phase-to-phase	∠VaVb,∠VaVc			±1°
	Phase-to-current	∠VaIa, ∠VbIb, ∠VcIc			±1°
Power	Active power	Pa(ab), Pb(bc), Pc(ca), P	kW	1kW~99,999kW	±3%
	Reactive power	Qa(ab), Qb(bc), Qc(ca), Q	kVar	1kVar~99,999kVar	±3%
	Apparent power	Sa(ab), Sb(bc), Sc(ca), S	kVA	1kVA~99,999kVA	±3%
Energy	Active energy	WHa(ab), WHb(bc), WHc(ca), WH	kWh MWh	1kWh~9999.99MWh	±3%
	Reactive energy	VARHa(ab), VARHb(bc), VARHc(ca), VARH	kVarh Mvarh	1kVarh~9999.99MVarh	±3%
	Reverse active energy	rWHa(ab), rWHb(bc), rWHc(ca), rWH	kWh MWh	1kWh ~9999.99MWh	±3%
Freq.	Frequency	F	Hz	45~65Hz	
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	1kW~99999kW	
	Current demand	Peak demand	A	80A~65,535A	
Harmonics	Voltage harmonics	1st~63th harmonics of Va(ab),Vb(bc),Vc(ca)	V	60~690V	
	Current harmonics	1st~63th harmonics of Ia,Ib,Ic	A	80A~65,535A	
	THD, TDD		%	0.0~100.0	
	K-Factor		-	0.0~100.0	

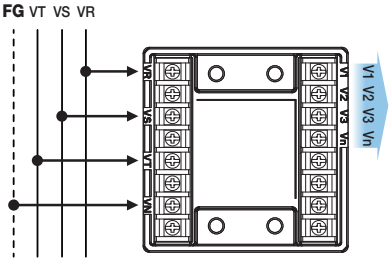
Voltage module

For P and S type trip relays, a separate voltage module is necessary to measure other elements beside the current. (Separate purchase necessary)

- Voltage input range: AC 60~690V
- Input/Output Ratio → 220V: 200mV



3P4W wiring



3P3W wiring

Trip Relays

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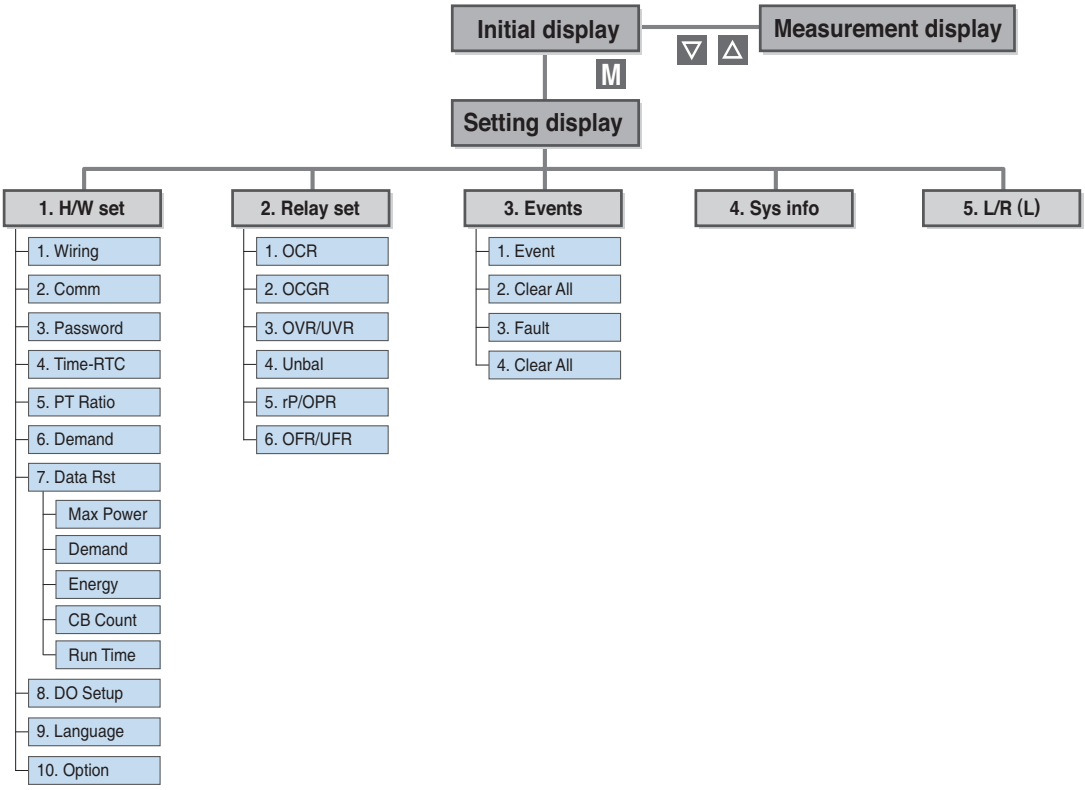
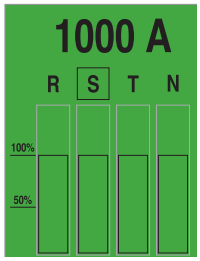
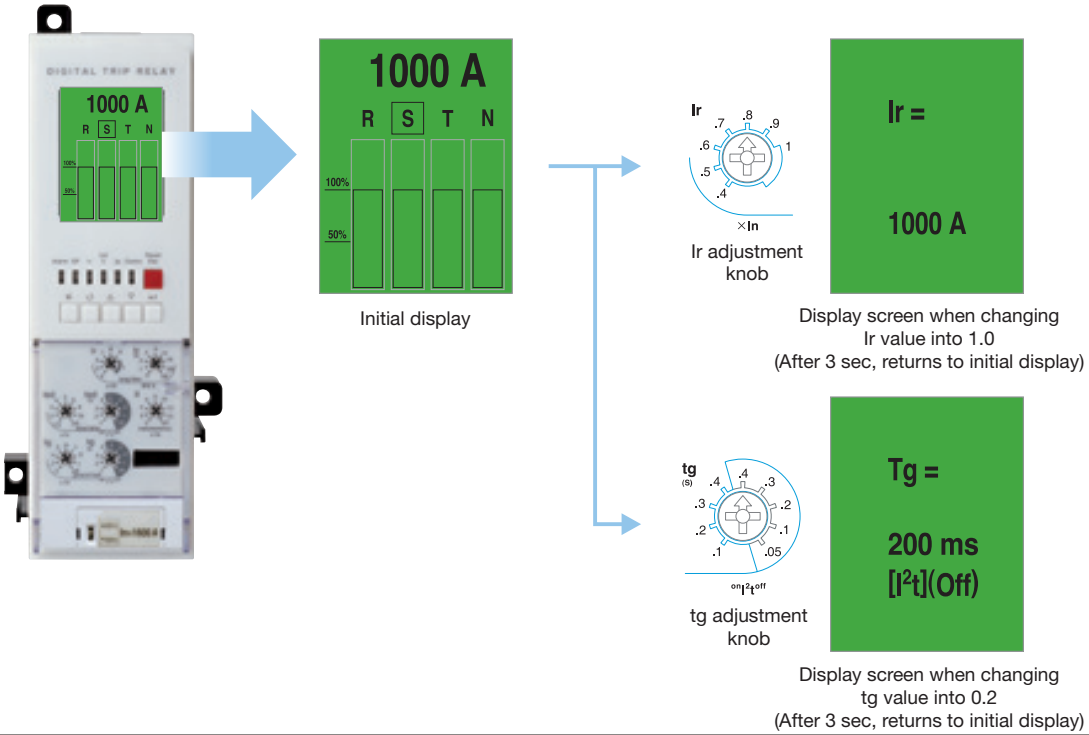
Man machine interface





Initial display

An example of graphic LCD display



Trip Relays

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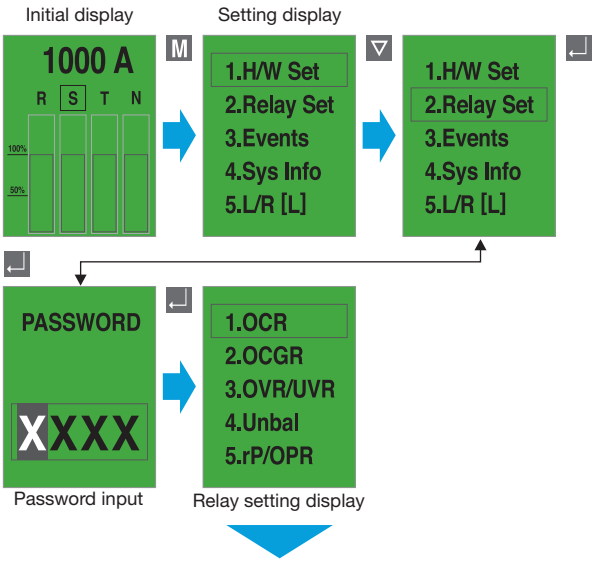
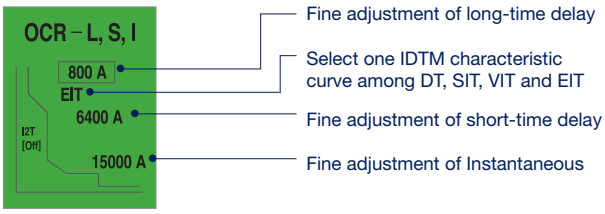
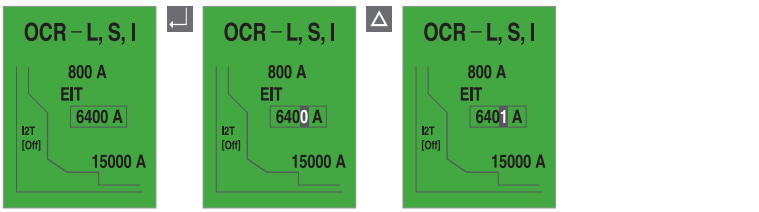
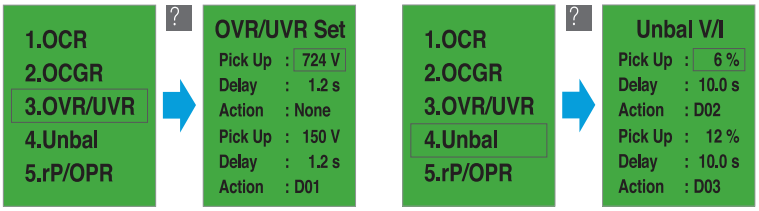
Protection element setting

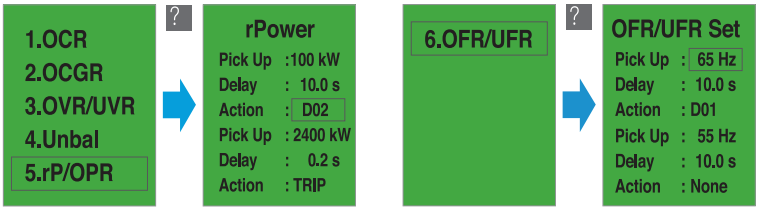


Fine adjustment of protection setting current









- OCR and OCGR's current setting is basically controlled by knob's setting values.
- The fine current that cannot be controlled by knob is adjustable by using ▽, △ key.
- Fine adjustment is only adjustable in the present knob and next knob's setting range, when moving knob, the adjusted data becomes reset state.

- The setting method of OCGR is same with OCR's, fine adjustment is available.

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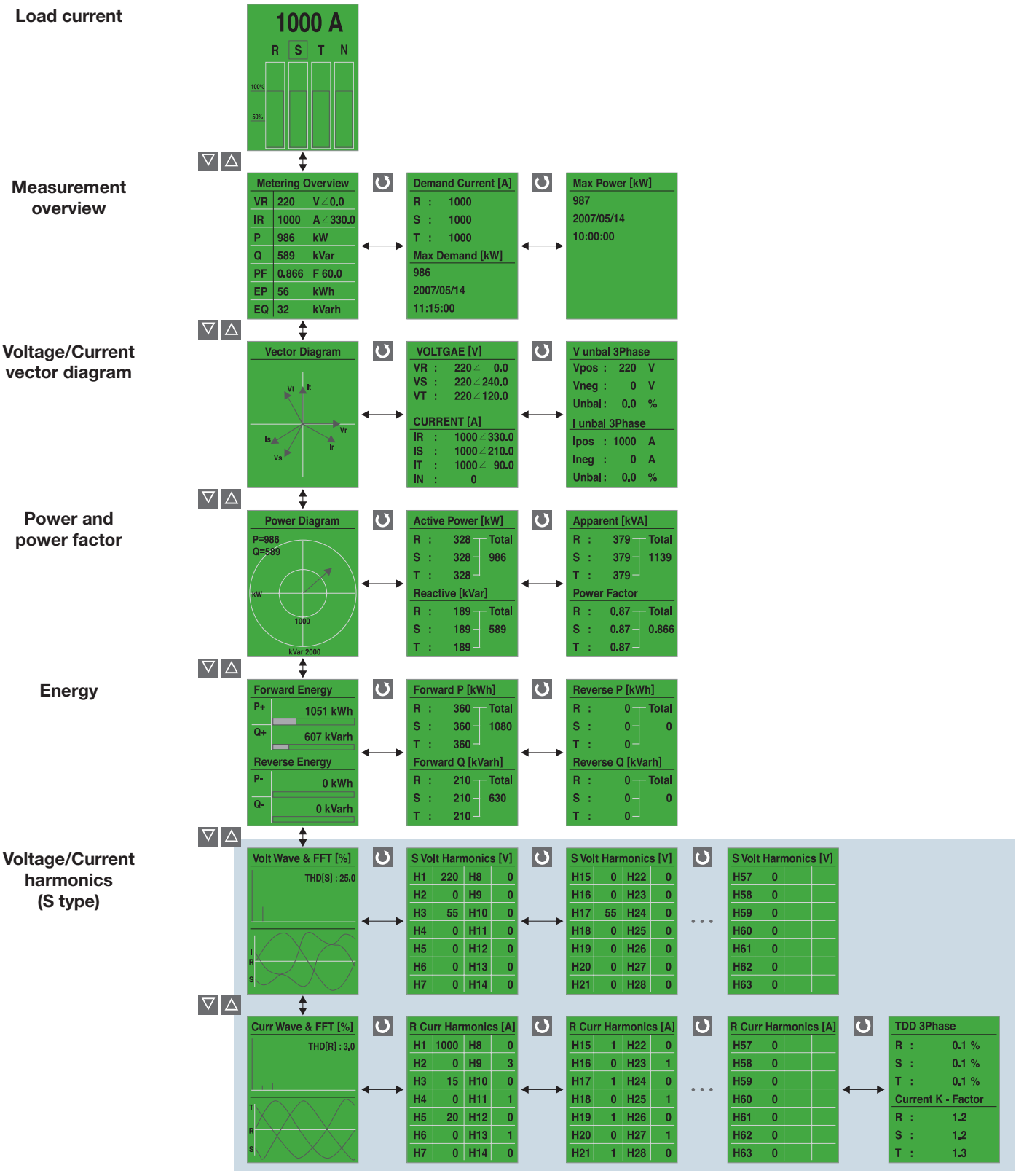
Measurement element display



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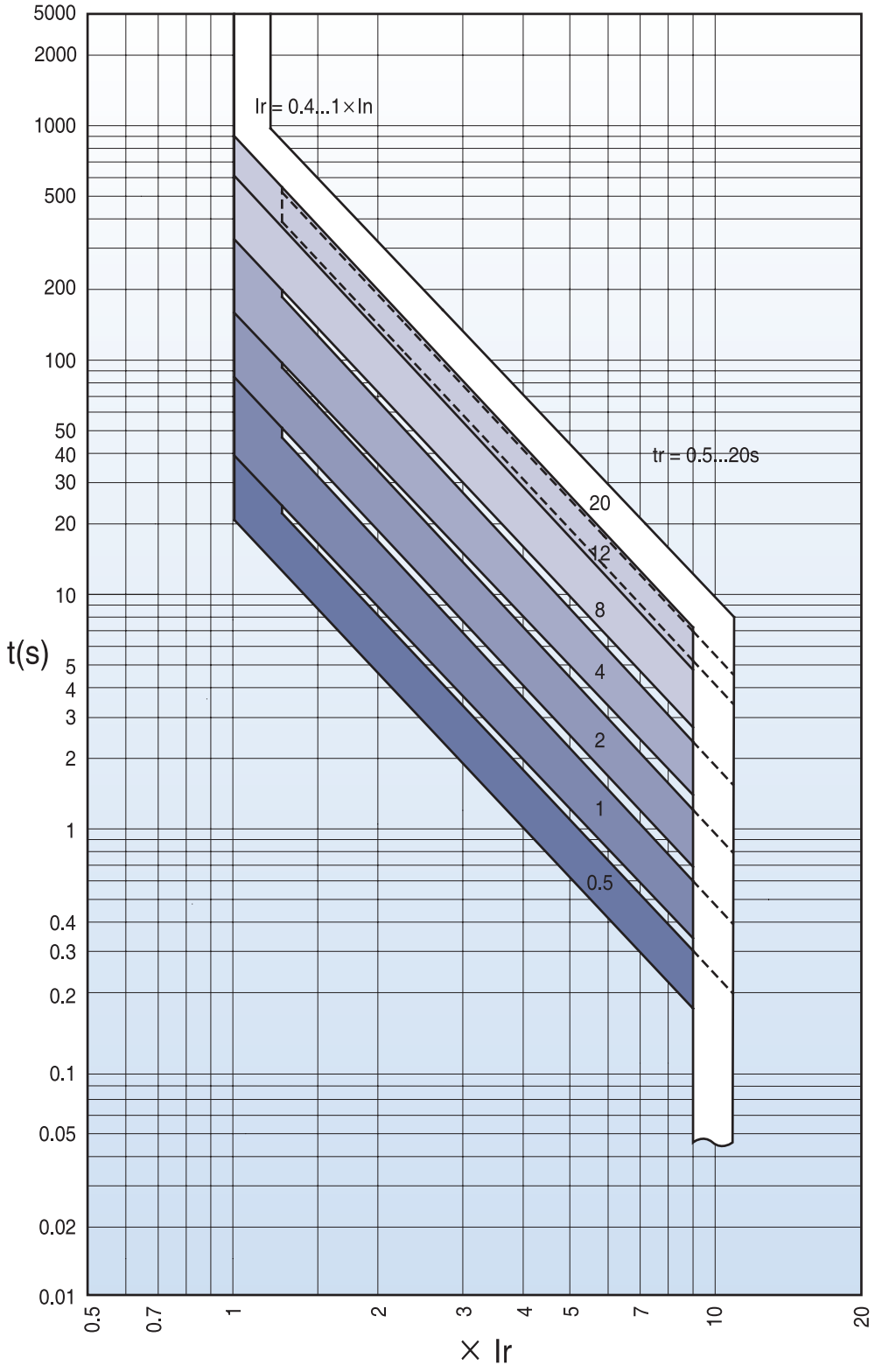
Characteristics curves

Long-time delay (L)



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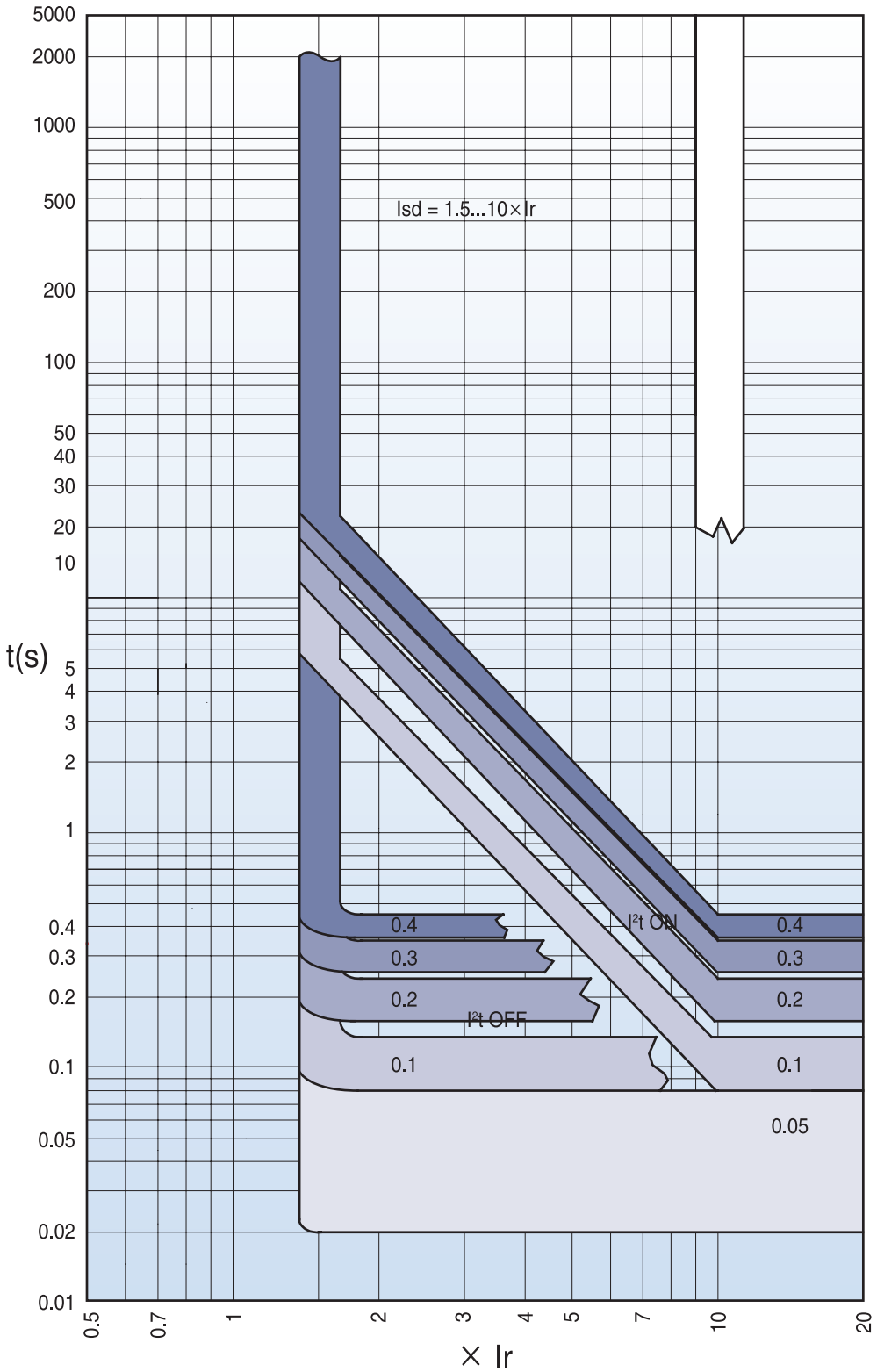
Short-time delay (S)



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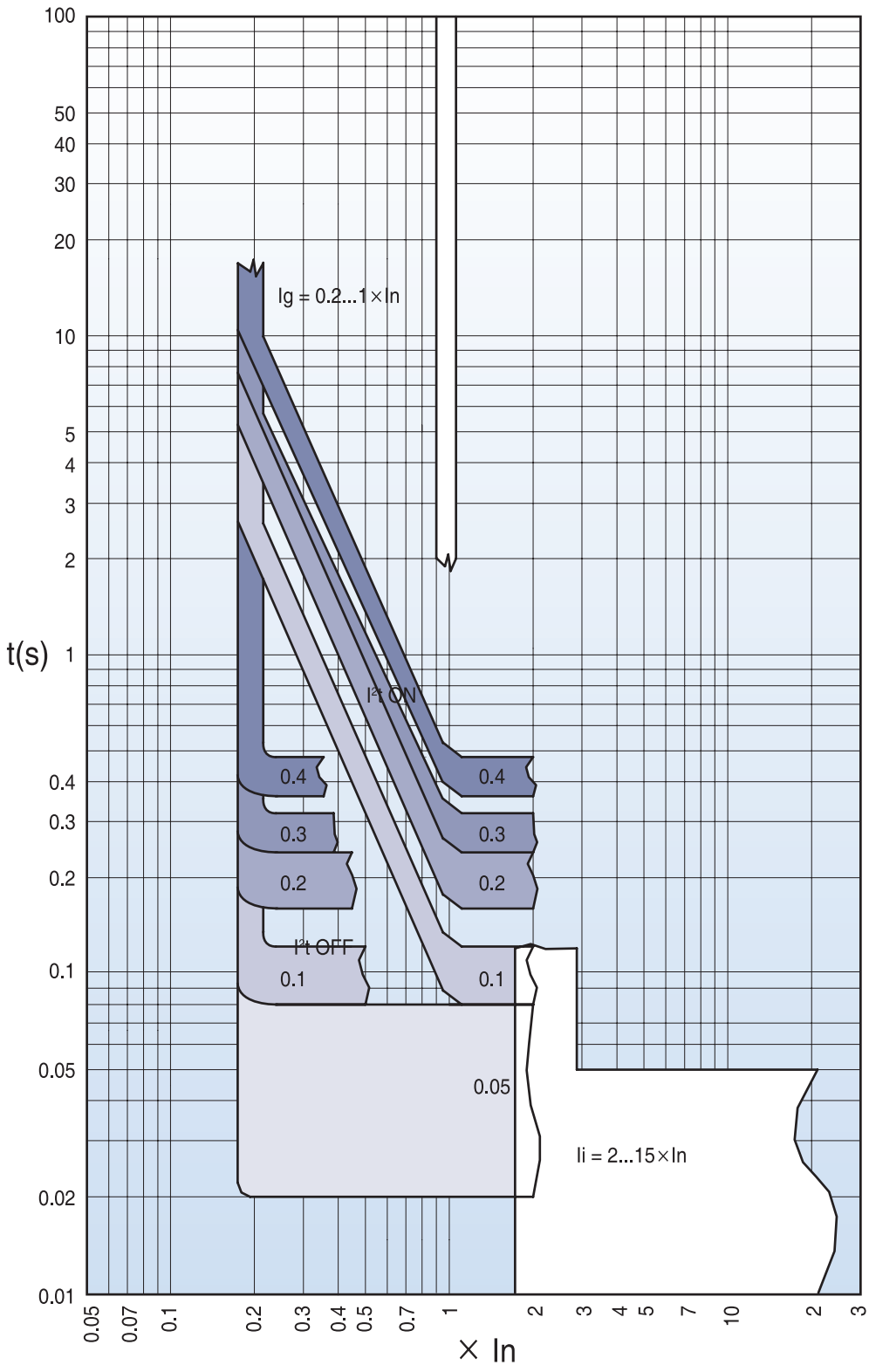
Characteristics curves

Instantaneous (I)
Ground fault (G)



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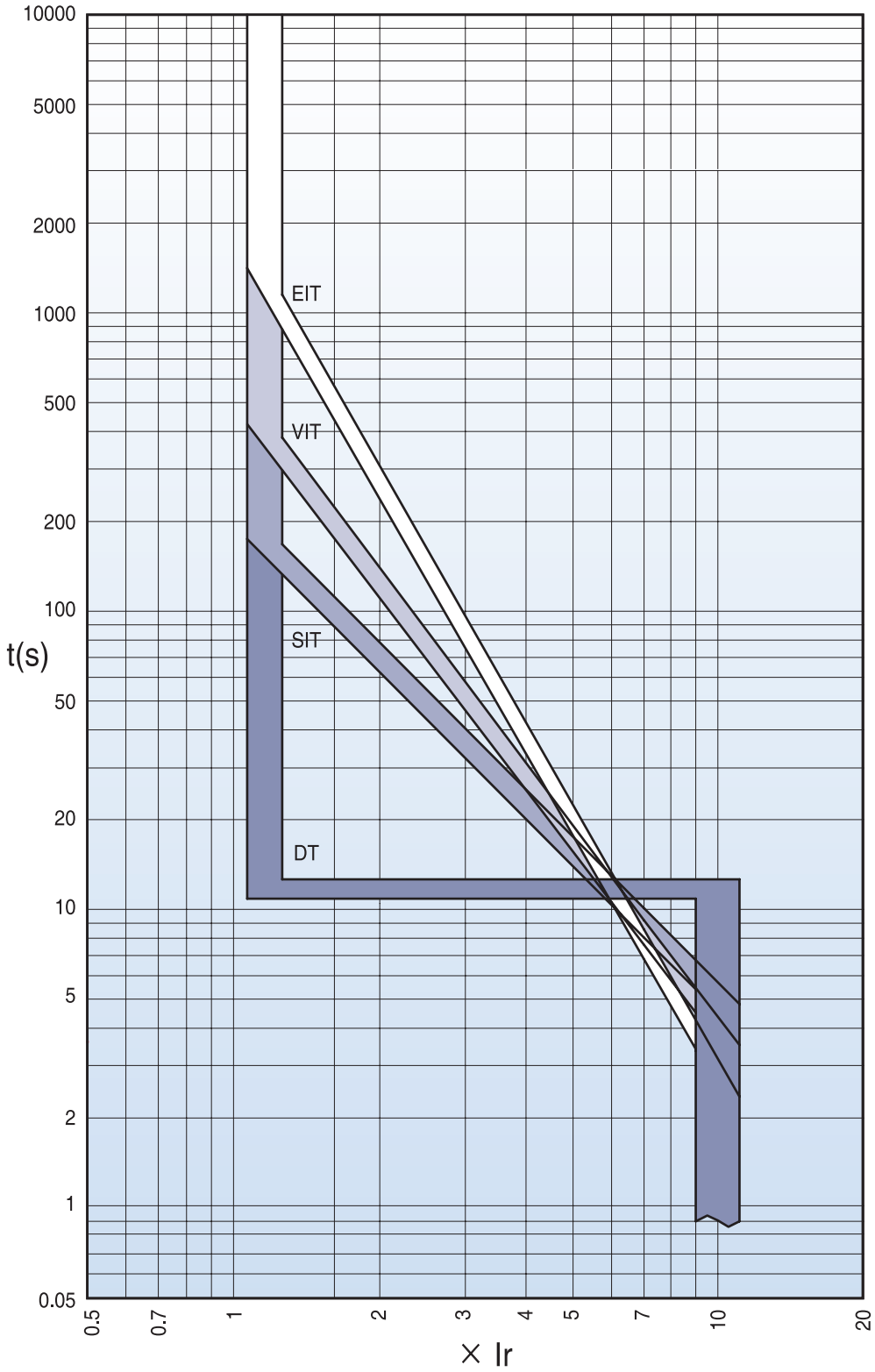
IDMTL



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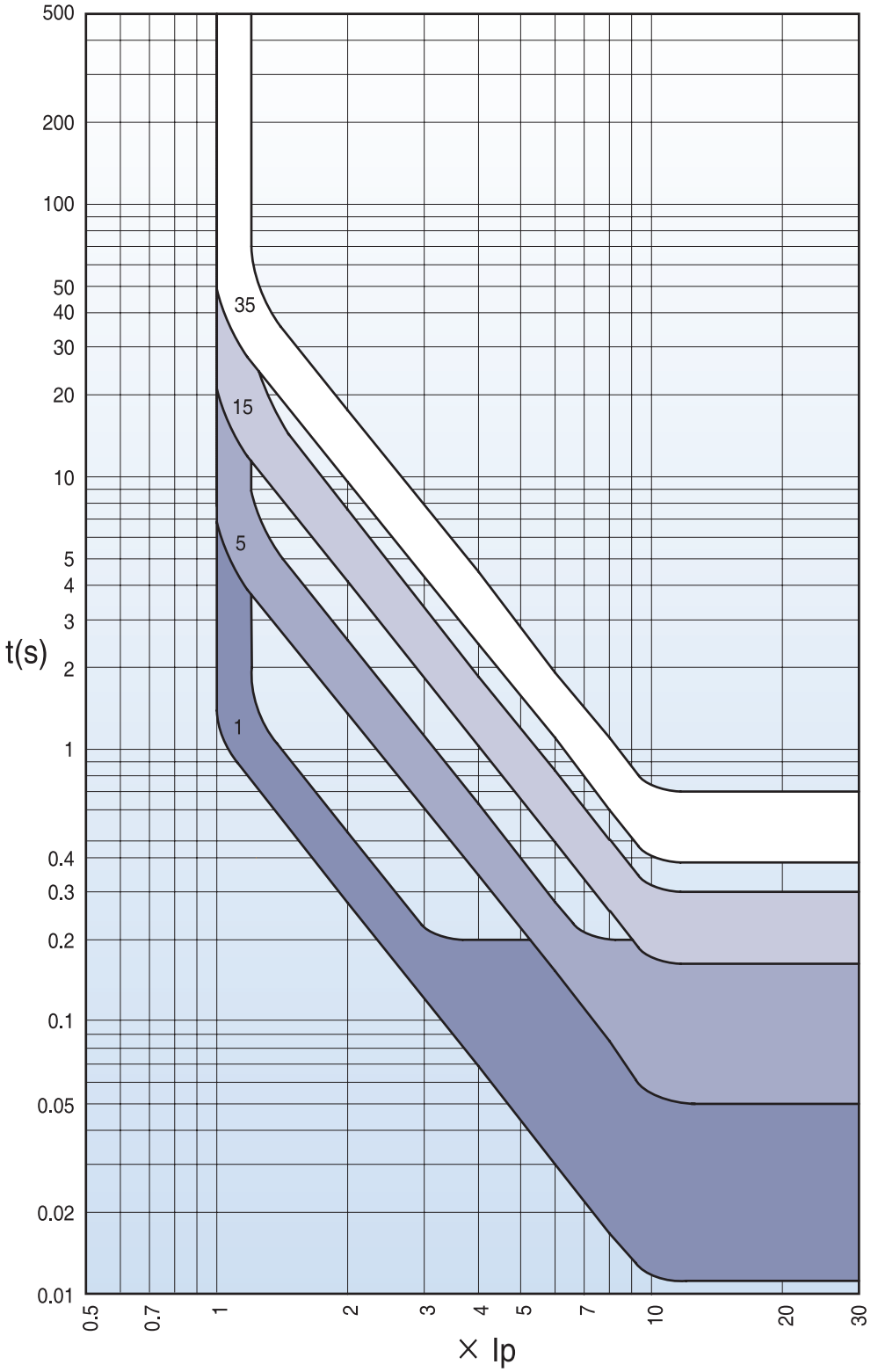
Characteristics curves

Pre Trip Alarm



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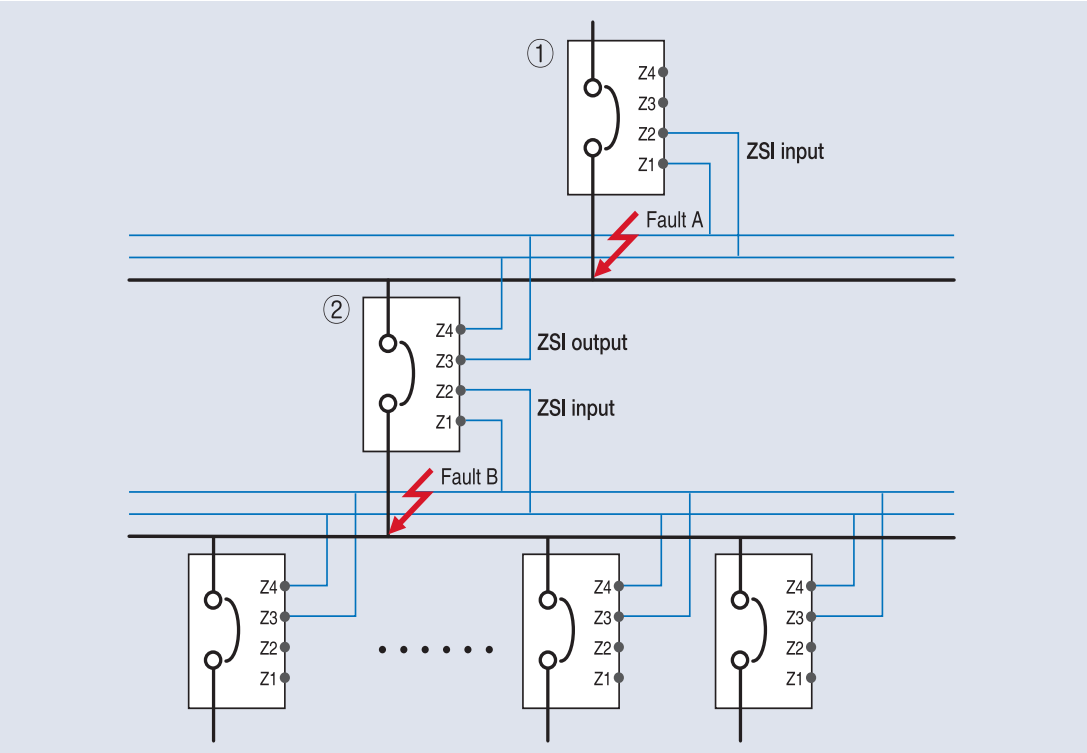
ZSI - Zone Selective Interlocking (A, P, S type)

Zone-selective interlocking drops the delay time for breakers to eliminate faults. It minimizes the shock that all kinds of electric machineries get under fault conditions.

1. In the case that a short time-delay or a ground fault accident occurs in a ZSI built-in system, the breaker at the accident site sends a ZSI signal to halt the upstream breaker's operation.
2. To prevent a breakdown, the trip relay of the ACB at the accident site activates trip operation with no time delay.
3. The upstream breaker that receives the ZSI signal adheres to a pre-set short time-delay or ground fault time-delay for protective coordination in the system.
   However, the upstream breaker that does not receive the signal will trip instantaneously.
4. For normal ZSI operation, operation time should be arranged accordingly so that downstream circuit breakers will react before upstream breakers under overcurrent/short time delay/ground fault situations.
5. ZSI connecting line needs to be Max. 3m.



1) Occurrence of fault A
   - Only breaker ① performs instantaneous trip operation.
2) Occurrence of fault B
   - Breaker ② performs instantaneous trip operation,
     breaker ① performs trip operation after prearranged delay time
   - But if breaker ② did not break the fault normally,
     breaker ① performs instantaneous trip operation to protect system.

Trip Relays

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

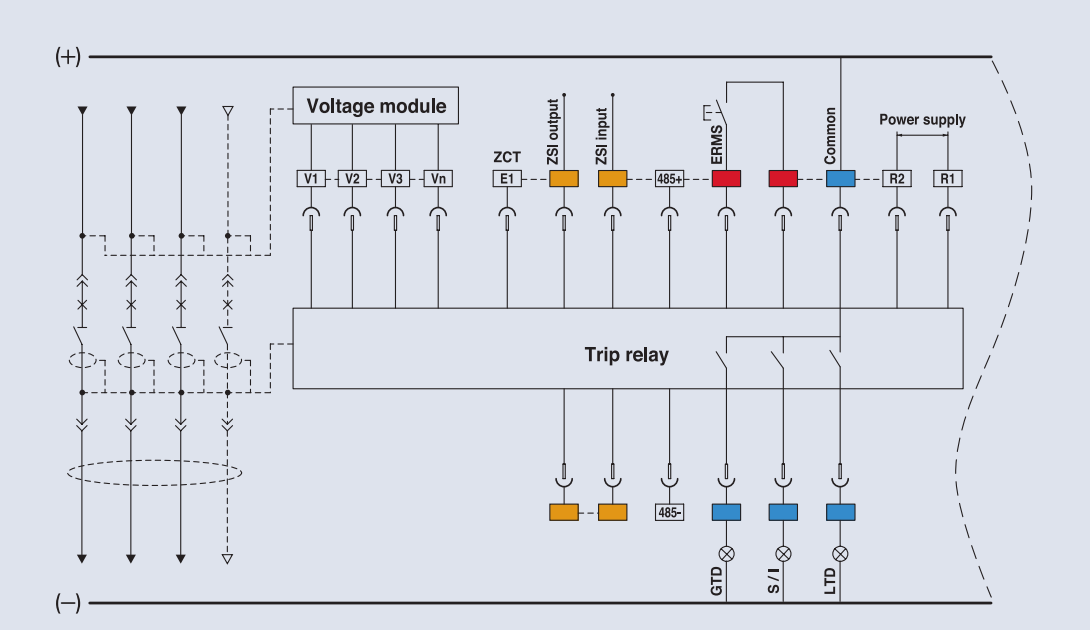
ERMS(Energy Reduction Maintenance Setting) is a function to reduce the arc energy to ensure workers' safety. When using the ERMS function, the instantaneous setting value is minimized(2*In). A, P, and S type trip relays are able to perform the ERMS by digital input and have 3 DO (digital output).

1. To use the ERMS function, short both ends of ERMS terminal

2. Digital input
   - [EM1-EM2] input: ERMS
   - [Z1-Z2] Input: ZSI input
   - [E1-E2] Input: ZCT for earth leakage detection or external CT input

※ All DI are dry contact that has 3.3V of recognition voltage. When inputting close by SSR(Solid State Relay) or open-collector, connect collector (Drain) to EM1.

3. Digital output 3a (524, 534, 544-513)
   - Fault output: Long/Short time delay, Instantaneous, Ground fault, UVR, OVR, UFR, OFR, rPower, Vunbal, Iunbal
     (Maintains state as Latch form until user pushes reset.)
   - General DO: when setting L/R as remote, it is available to control close/open remotely by using communication.



Trip Relay	Digital Output	Long time	Short time	Instantaneous	Ground	Overload Alarm	OVR	UVR	rPower	Vunbal	Iunbal	OFR	UFR	OPR	Note
P, S type	DO1(524)	●	○	○	○	○	○	○	○	○	○	○	○	○	Programmable
	DO2(534)	○	●	●	○	○	○	○	○	○	○	○	○	○	
	DO3(544)	○	○	○	●	○	○	○	○	○	○	○	○	○	
A type	DO1(524)	●	×	×	×	Not available									Fixed
	DO2(534)	×	●	●	×										
	DO3(544)	×	×	×	●										

Trip Relays
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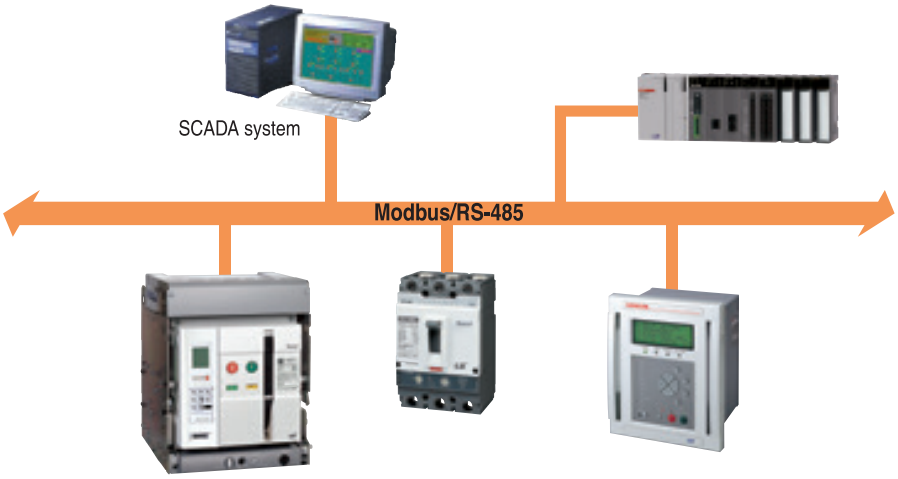
Communication

Modbus/RS-485

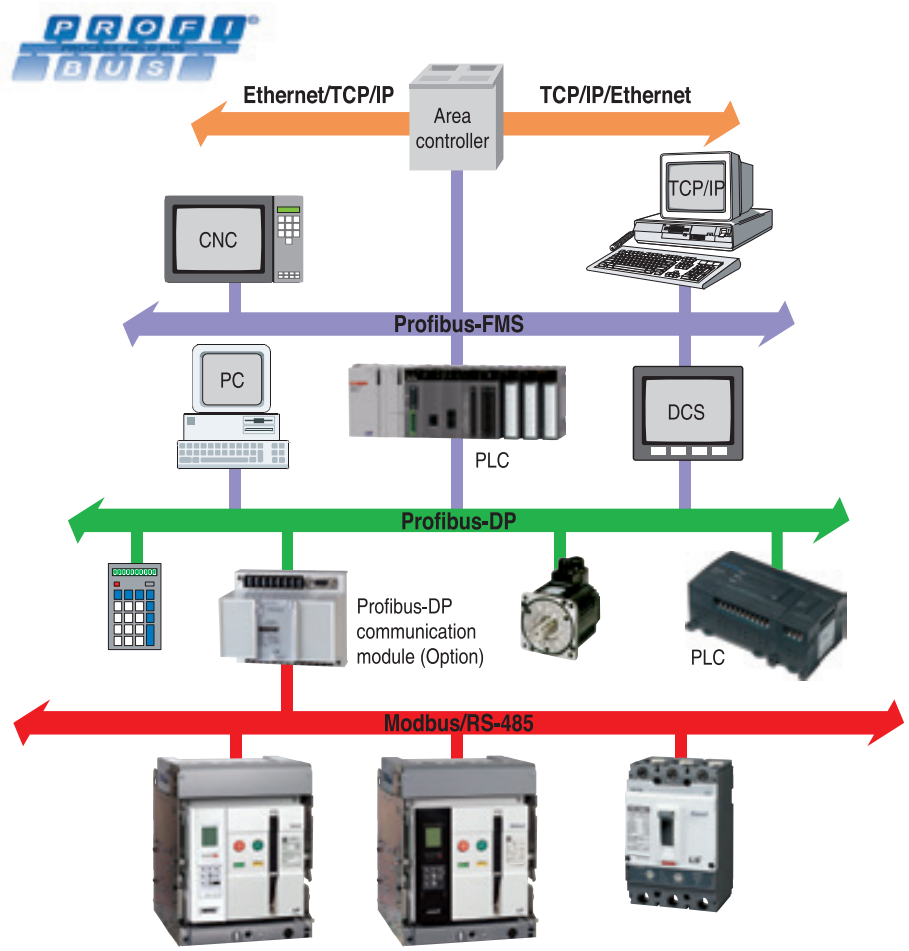
- Operation mode: Differential
- Distance: Max. 1.2km
- Cable :
  General RS-485 shielded twist 2-pair cable
- Baud rate :
  9600bps, 19200bps, 38400bps
- Transmission method: Half-Duplex
- Termination: 100Ω



Profibus-DP

- Profibus-DP module is installed separately (Option)
- Operation mode: Differential
- Distance: Max. 1.2km
- Cable :
  Profibus-DP shielded twist 2-pair cable
- Baud rate: 9600bps~12Mbps
- Transmission method: Half-Duplex
- Termination resistor: 100Ω
- Standard: EN 50170/DIN 19245

Profibus-DP communication module (Option)



Trip Relays
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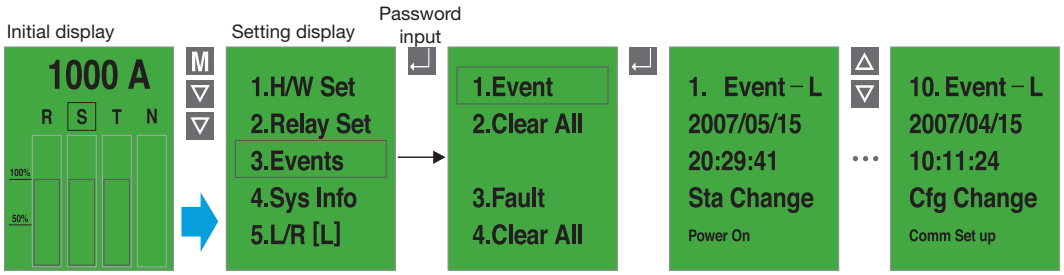
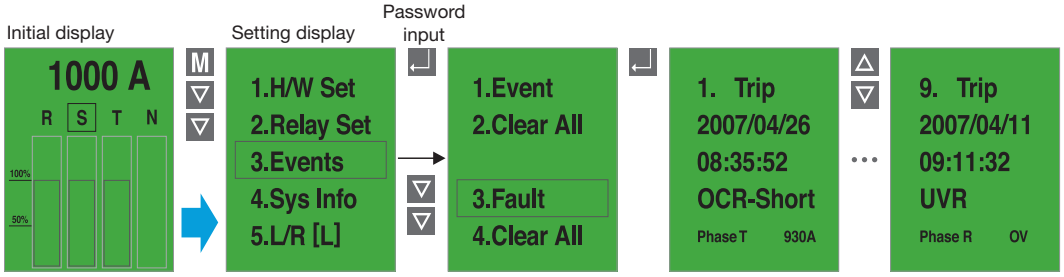
Event & fault recording (P, S type)

When events such as setting change, information change, self-diagnosis error, and status change occur, the P and S types can record up to 256 events in accordance with time(ms). In addition, they can record up to 526 (up to 10 for A type) faults, including information such as fault cause, fault phase, fault value, and so on, in accordance with time(ms).

Event information display



Fault information display

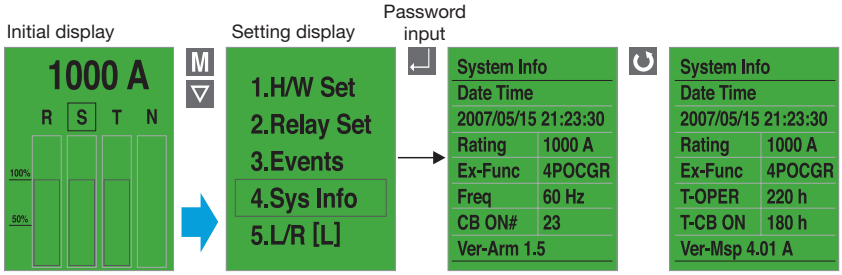


* Fault information is recorded only when there is external control power

System information

P and S type can display the ACB's information as following.
- Present time: year/month/date/hour/minute/ms
- ACB current ratings
- N-phase current ratings: 100%
- Frequency information: 60Hz / 50Hz
- Closing numbers of breaker: CB ON numbers
- Trip relay operating time: OCR ON time
- ON time of breaker: CB ON time
- F/W ver. information

System information display



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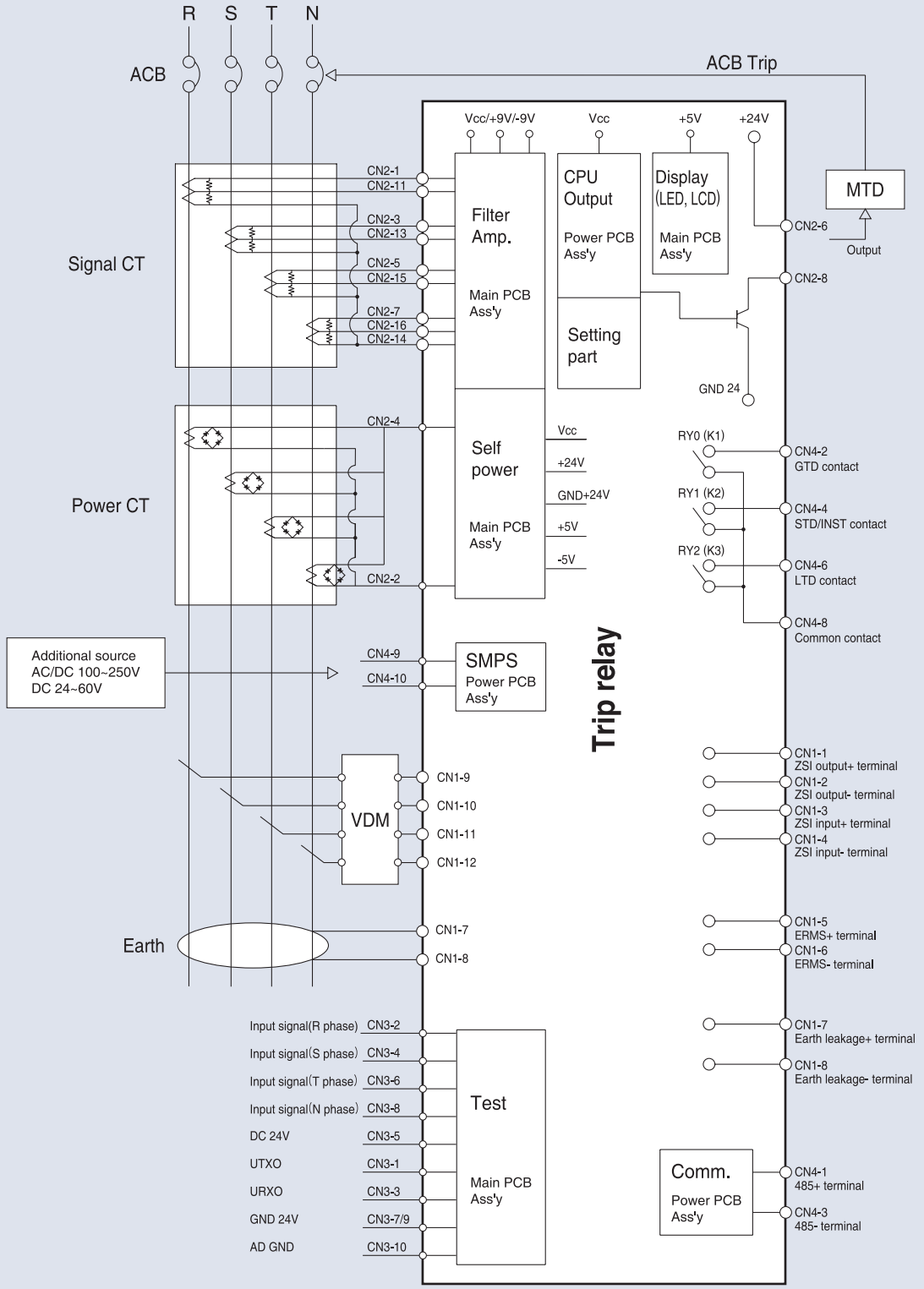
System block diagram



Accessories

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Mounting	Accessories		AH		Page
			Standard	Option	
Internal	SHT1	Shunt Coil		○	52
	SHT2	Double Shunt Coil		○	53
	CC	Closing Coil		○	54
	M	Motor		○	55
	CS1	Charge Switch		○	55
	CS2	Charge Switch Communication **		○	55
	UVT	Under Voltage Trip Device		○	56
	AL	Trip Alarm Contact **		○	57
	MRB	Manual Reset Button **		○	57
	RES	Remote Reset Switch		○	58
	RCS	Ready to Close Switch		○	58
	C	Counter	●		65
	AX	Auxiliary Switch		○	59
	TM	Temperature Alarm **		○	74
External	K1	Key Lock		○	60
	K2	Key Interlock Set		○	60
	K3	Double Key Lock		○	61
	K5	Profalux Lock (CAMLOCK Type)		○	60
	K6	Kirkkey Lock (CAMLOCK Type)		○	60
	K7	Kirkkey Lock (CN22 Type)		○	60
	B	Lockable ON/OFF Button Cover		○	61
	LH	Lifting Hook		○	62
	CTD	Condenser Trip Device *		○	62
	ATS	Automatic Transfer Switch Controller *		○	63
	DC	Dust Cover		○	65
	DF	Door Frame		○	68
	OT	OCR Tester *		○	64

FUTURING SMART ENERGY

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