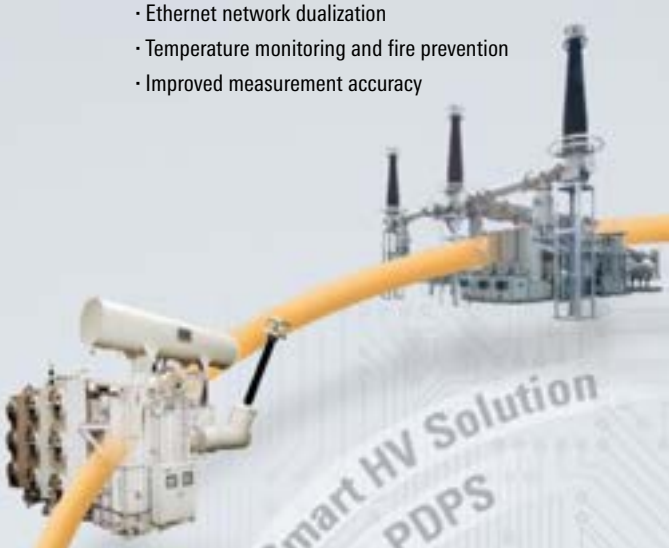
Beyond X™

Smart LV Solution

LS ELECTRIC

Reliability

- Power facility preventive and diagnostic services
- Ethernet network dualization
- Temperature monitoring and fire prevention
- Improved measurement accuracy



Reliability

Smart HV Solution
PDPS

Convenience

Beyond X™

Digital power facility integrated management service

Convenience

- Latest on-site management technology
- Real-time remote monitoring
- Real-time alarm service
- Integrated operation of existing systems

Smart LV

Beyond X™ Smart LV Solution is
LS ELECTRIC's digital power facility integrated management service
Provides energy management, facility operation efficiency,
and maintenance convenience through smart switchboard and separate operation software,
and also connects to SCADA and ultra high voltage diagnosis.
We provide customized integration services.

Efficiency

- Energy information visualization
- Energy demand trend analysis
- Energy consumption prediction
- Provides periodic energy reports

Contents

1. Introducing Smart LV Solution 02
2. Components and Benefits of Smart LV Solution 04
3. ACB / MCCB / MCB panel configuration 08
4. Specification introduction
   - Smart ACB 10
   - Smart MCCB 48
   - E TAG & MCB 72
   - Smart LV Solution accessory device 78
   - Smart LV Solution upper system 96
5. Major Achievements 108

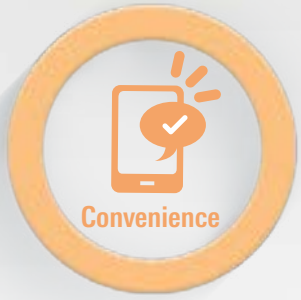
Beyond X™

Smart LV Solution

Smart LV Solution is LS ELECTRIC's unique smart switchboard solution that enhances measuring and monitoring by integrating IoT and digital technologies.

Reliability – Prevent accidents in power facilities and reduce losses

- Remote monitoring and control of all circuit breakers from ACB to MCB
- Provides enhanced self-diagnostics in devices.
  - Contact life, number of opening/closing, temperature status, relay operation, battery, wiring status, memory, time, etc.
- Provides diagnostic and forecast services for power facilities.
  - Operation time, circuit breaker operation time, electrical/mechanical operation number, trip number, etc.
- Fire can be prevented through temperature monitoring.
  - TRIO : Temperature monitoring function for high-risk points.
- Improved measurement accuracy of Smart circuit breaker (STU, ETU models) (Class 1.0)
- Improved network stability by implementing Rapid Spanning Tree Protocol (RSTP).



Convenience – Increased maintenance convenience and reduced commissioning time

- Auto discovery, Auto time sync
  - Provides automatic search and time synchronization for smart circuit breakers and instruments.
- Real-time monitoring of systems and devices
- On-site/remote monitoring of power facilities

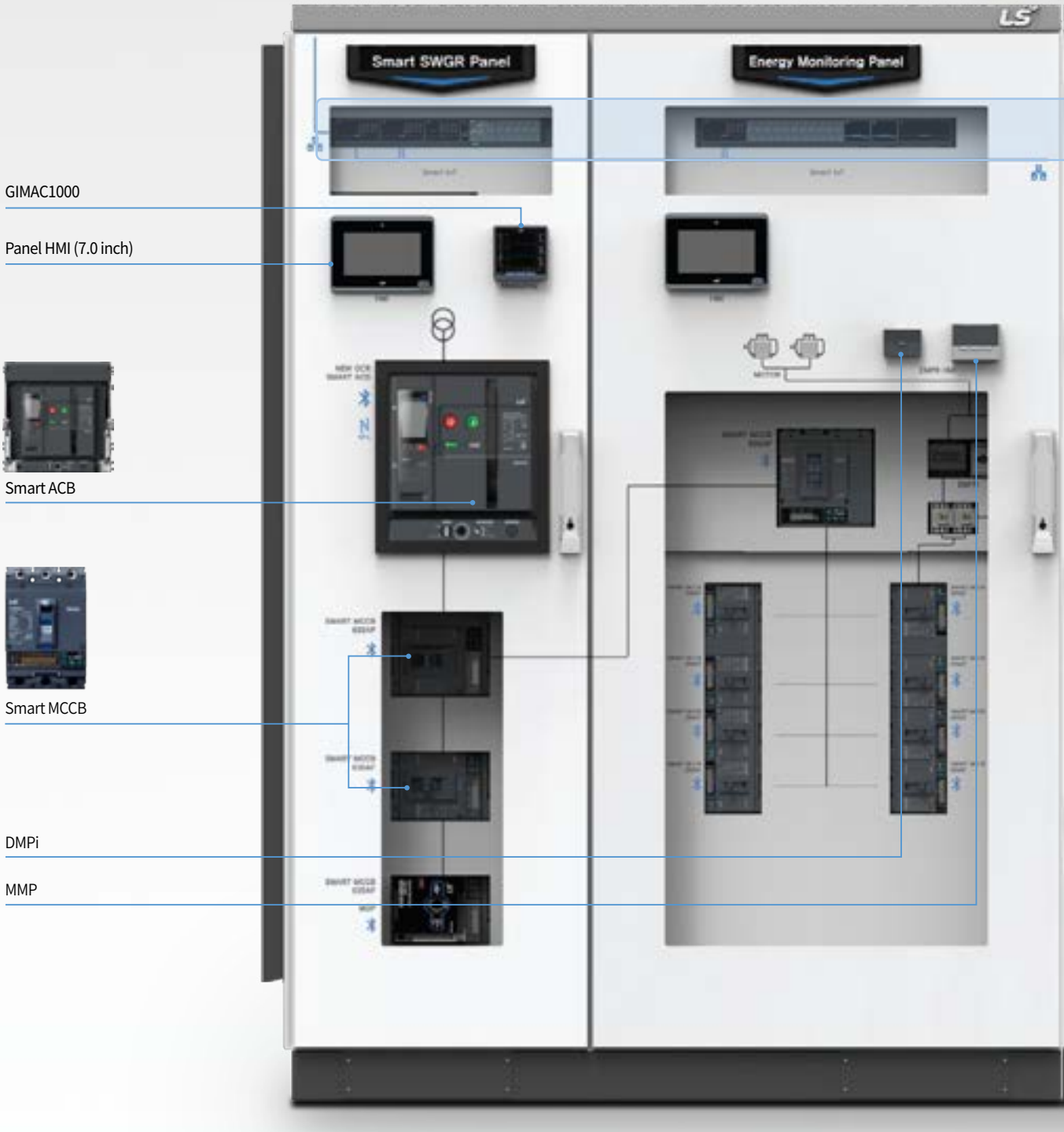
Upper system		Function	Remark
Beyond X™	Monitoring S/W (Cloud)	Cloud monitoring	Selection options
	Operation S/W	Remote monitoring and control	
	Maintenance S/W	Project management, testing	
Panel HMI (7.0 inch)		On-site monitoring and control	
Smart Viewer (Mobile App.)		BLE : On-site monitoring	
		NFC : Checks the state just before power failure	

- Convenient F/W update function
  - Smart ACB, Smart MCCB : F/W update available in live or no power
  - Communication device : Remote F/W update
- Provides real-time alarm service when problems occur in systems and devices.
  - SMS, E-mail
  - Provides information on event type, time of occurrence, and location of power facilities

Efficiency – Reduced energy consumption and cost

- Visualizes and provides data to intuitively understand energy information.
  - Graph (3D, bar, circle, strip, line, etc.), table
- Real-time information on energy can be checked by category.
  - Energy information : Power consumption, power demand, power quality, device information, peak, etc.
  - Category : Location, use, day, month, year, time zone, etc
- Provides real-time energy demand trend and analysis information.
- Provide regular reports for efficient energy management.
  - Project status, communication status, alarm/event, energy usage, system/device diagnostic information, etc.

	Line-up	Main functions
Upper system	Beyond X™ Monitoring S/W (Cloud)	• Provides LV panel monitoring function (anytime, anywhere) by managing data through the cloud server • Provides real-time energy information such as device status, power consumption, quality, demand, and peak • Provides E-mail, SMS functions (Events, reports)
	Beyond X™ Operation S/W	• Provides monitoring and control of LV panel by managing data through local server • Provides real-time energy information such as device status, power consumption, quality, demand, and peak
	Beyond X™ Maintenance S/W	• Provides project engineering, device setting and control functions • Relay setting and relay testing (Automatic generation of result reports)
	Panel HMI (7.0 inch)	• 7.0 inch TFT Color LCD • Provides detailed information such as device status, communication status, hierarchical information, control, and events
	Smart Viewer (Mobile App.)	• Smart circuit breaker on-site monitoring (BLE) and immediately before event check (NFC)
Communication device	Gateway	• Auto discovery, auto time sync • Provides Rapid Spanning Tree Protocol (RSTP) function • Provides infrared camera monitoring and web service support
	Ethernet Converter (RSTP)	• Provides E-mail • Provides RSTP (Rapid Spanning Tree Protocol) function
	E COLLECTOR	• Collects electricity measurement data of small sensing module (E TAG) by wireless communication • Fast registration and Web service support through auto discovery function
Accessory device	M LINK	• MCB/MCCB On/off/trip status monitoring and on/off control • Number of contacts: DI 6 points, DO 4 points, AI 1 point
	TRIO	• ACB temperature monitoring (7-Segment) • ACB On/off control and contact monitoring
	T Connection Module	• Provides RS-485 Multi-Drop connection convenience • Provides termination processing function
	DC Power Module	• DC 24V output • 5 types according to input and output specifications
	i-Tester	• Saves current relay test and test history results (Used for test result report)
	Portable Battery & Trip Module	• Supplies DC power to Smart MCCB • Checks Smart MCCB trip operation
Circuit breaker	Smart ACB	• Susol & Metasol ACB applied with Smart Trip Unit (STU) • Equipped with IoT function and upgraded measurement accuracy, measurement items, relay function
	Smart MCCB	• Susol MCCB applied with ETU (Electronic Trip Unit) • Equipped with IoT function and upgraded measurement accuracy, measurement items, relay function
	MCB	• BK63H Series
Measurement device	GIMAC1000	• Provides voltage, current, power and power measurement and Harmonics and THD, TDD functions for voltage, current • Provides Rapid Spanning Tree Protocol (RSTP) function
	E TAG	• Tag type small sensing module for measuring electricity (Voltage/current/power/power factor/frequency) • Supports wireless communication to simplify wiring within the panel (Interface with E COLLECTOR and wireless communication)
	DMPi	• Current measurement and protection • Provides various returns (Manual/auto/electrical return) functions
	MMP	• Measurement of current, voltage and power and protection of power factor • Applies various motor starting methods with one model


Smart SWGR Panel
Energy Monitoring Panel
GIMAC1000
Panel HMI (7.0 inch)
Smart ACB
Smart MCCB
DMPi
MMP

Beyond X™

Gateway

Ethernet Converter

TRIO

M LINK

DC Power Module

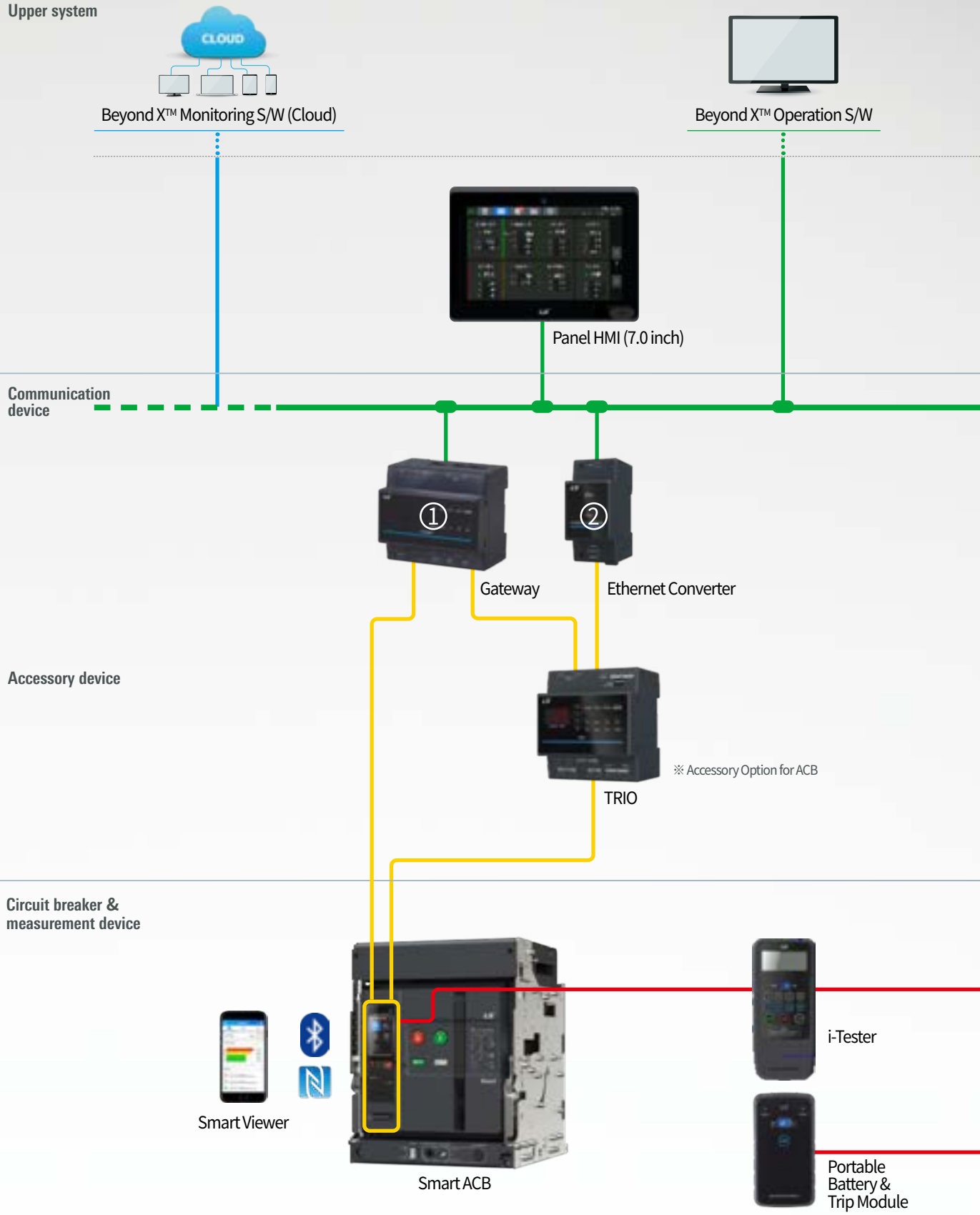
T Connection Module

E COLLECTOR

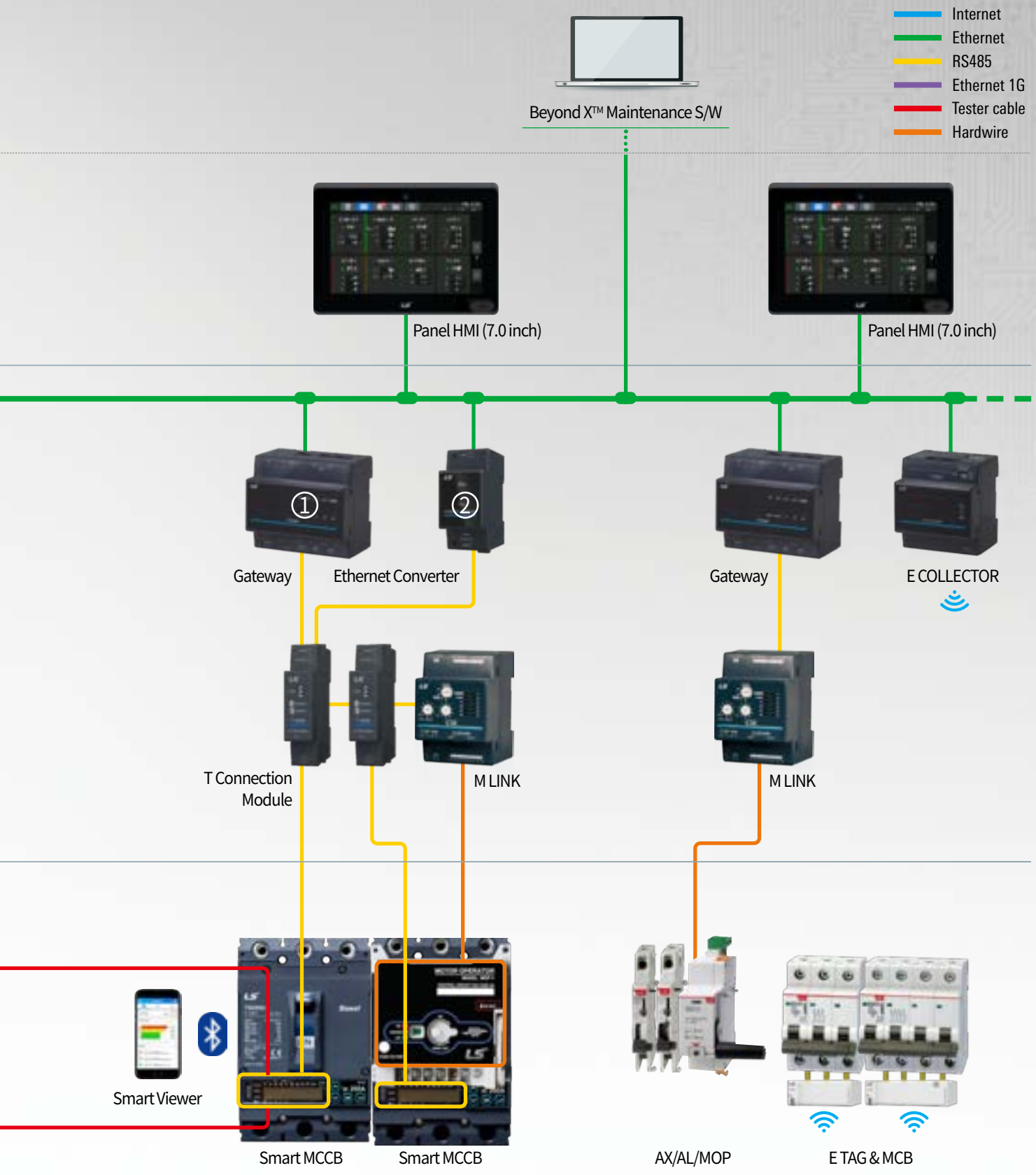
E TAG

MCB

ACB/MCCB/MCB panel configuration



※ Please use one of the communication devices ① (Gateway) or ② (Ethernet Converter). ※ Compatible devices : GIMAC1000, GIMAC-B, MMP, DMPi
※ RSTP (Rapid Spanning Tree Protocol) supported devices : Gateway, Ethernet Converter, E COLLECTOR



Smart Air Circuit Breakers

Smart ACB is a large-capacity breaking, multifunctional device. It is a Susol/Metasol ACB applied with a digital trip relay STU (Smart Trip Unit) with built-in IoT communication function for measurement, analysis, diagnosis and Smart LV implementation other than relay.

Smart ACB

1. Overview
- Susol ACB Overview ····· 12
- Metasol ACB Overview ····· 14
- STU (Smart Trip Unit) Overview ····· 16

2. Features
- ACB with STU (Smart Trip Unit) Features ····· 18

3. Model selecting guide
- Susol ACB model numbering (Product selection) ····· 22
- Metasol ACB model numbering (Product selection) ····· 24
- Susol UL ACB model numbering ····· 26
- Susol ACB Cradle model numbering (Product selection) ····· 28
- Metasol ACB Cradle model numbering (Product selection) ····· 28
- Susol UL ACB Cradle model numbering ····· 29
- Smart Trip Unit model numbering (Product selection) ····· 30

4. Rated specifications
- Susol ACB Rated specifications ····· 32
- Metasol ACB Rated specifications ····· 34
- Susol UL ACB Rated specifications ····· 36

5. Smart Trip Unit ····· 38

Susol ACB Overview

Family

As the world's best large-capacity breaking, multifunctional device, Susol ACB Series can apply digital trip relay STU (Smart Trip Unit) with built-in IoT communication function for measurement, analysis, diagnosis, and Smart LV implementation other than relay.
It is suitable for important facilities, since the Arc Cover for securing Arc Space Zero performance is installed.

85kA

AH-06~20D

06	630AF
08	800AF
10	1000AF
13	1250AF
16	1600AF
20	2000AF

Icu=Ics=85kA/500Vac
W=334(3p), 419(4p)mm

100kA

AH-06~40E

06	630AF
08	800AF
10	1000AF
13	1250AF
16	1600AF

20	2000AF
25	2500AF
32	3200AF
40	4000AF

Icu=Ics=100kA/500Vac
W=412(3p), 527(4p)mm

Full line-up & Compact

Up to 6300A, Susol ACB provides fully lined-up 3 frame.
For each frame, there is just one size, which is smaller and more compact.
It makes it possible for you to design the optimized volume panel.

150kA

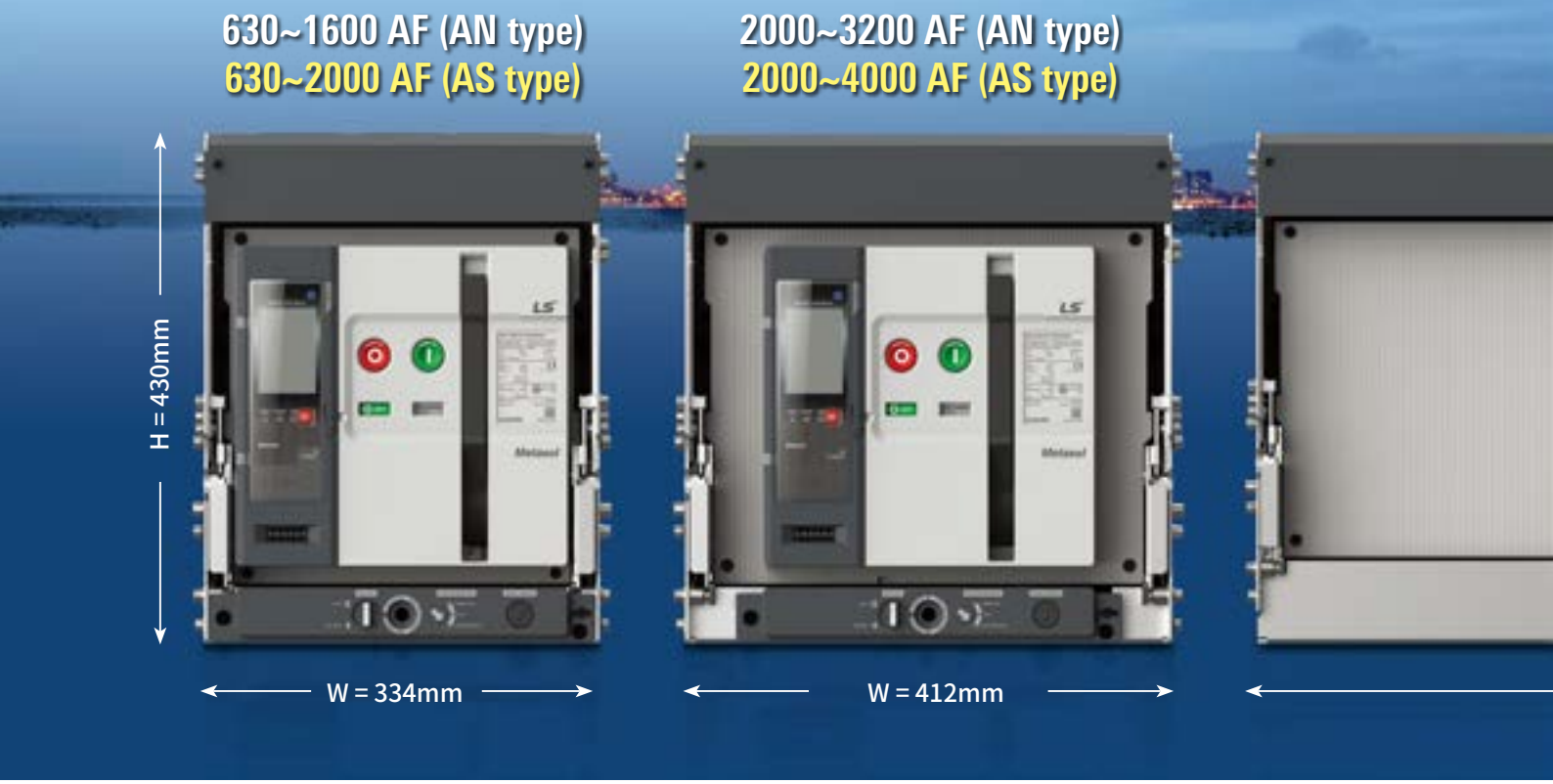
AH-40~63G

40	4000AF
50	5000AF
63	6300AF

Icu=Ics=150kA/500Vac
W=785(3p), 1015(4p)mm

- The highest breaking capacity: 150kA (6300AF at 500Vac)
- 3 ampere frame sizes: 2000/4000/6300AF
- N phase current conducting capacity: 100%

Metasol ACB Overview



Family

As a large-capacity breaking, multifunctional device, Metasol ACB Series is able to apply digital trip relay STU (Smart Trip Unit) with built-in IoT communication function for measurement, analysis, diagnosis, and Smart LV implementation other than relay. It is a highly customized device that maximizes the range of device selection by size and rating by diversifying small and medium capacity (less than 3200AF) models and various deployments of large capacity (more than 4000AF) models.

70kA (65kA)

AN-06~16D

06	630AF
08	800AF
10	1000AF
13	1250AF
16	1600AF

Icu=Ics=65kA/500Vac
W=334(3p), 419(4p)mm

AS-06~20D

06	630AF
08	800AF
10	1000AF
13	1250AF
16	1600AF
20	2000AF

Icu=Ics=70kA/500Vac
W=334(3p), 419(4p)mm

85kA (70kA)

AN-20~32E

20	2000AF
25	2500AF
32	3200AF

Icu=Ics=70kA/500Vac
W=412(3p), 527(4p)mm

AS-20~40E

20	2000AF
25	2500AF
32	3200AF
40	4000AF

Icu=Ics=85kA/500Vac
W=412(3p), 527(4p)mm

Full line-up & Compact

Up to 6300A, Metasol ACB provides fully lined-up 4 frame.
For each frame, there is just one size, which is smaller and more compact.
It makes it possible for you to design the optimized volume panel.

100kA 120kA

AS-50F

40	4000AF
50	5000AF

Icu=Ics=100kA/500Vac
W=629(3p), 799(4p)mm

AS-40~63G

40	4000AF
50	5000AF
63	6300AF

Icu=Ics=120kA/500Vac
W=785(3p), 1015(4p)mm

- The highest breaking capacity: 150kA (6300AF at 500Vac)
- 4 ampere frame sizes: 2000/4000/5000/6300AF
- N phase current conducting capacity: 100

Smart Trip Unit Overview

Smart Trip Unit (Trip Relay)

It is a smart trip unit that provides the world's highest level of measurement accuracy, relay function, and IoT communication function, and is a relay interlocked with the mechanism (low voltage circuit breaker body). It expands and improves the ACB's breaking performance (high-speed short-circuit breaking characteristic) and increases the ACB life (increasing marking capacity).

Smart Trip Unit

- Secures relay operation safety through the instrument-level measurement accuracy (current/voltage 0.5%, power class 1.0)
- Prevention of mis-trip through powerful self-diagnosis functions such as CT disconnection check, contact wear rate, internal temperature monitoring, and quick response through alarm
- Secures Smart Panel Solution through ICT convergence technology (Service is accessible anytime, anywhere)
- Speedily changes the relay setting value when changing from commercial power to power generation according to S type relay setting Group A/B (A↔B)
- Power supply for checking and setting internal data of STU (N/A/P/S) at a short distance through USB communication

Serializes STU's trip relay by function

The trip relay series for each use and function are maximized and the user's convenience is maximized by easy attachment and detachment.

N type

- Device operation through self-power
- Current relay function
- Supports USB communication
- Supports NFC communication (Standard)

P type

- Device operation through self-power
- Device operation via AC or DC
- Current/voltage/frequency/ power relay function
- 3.5″ Graphic Display
- DO output
- Supports USB communication
- Supports RS485 communication
- Supports BLE communication (Option)

A type

- Device operation through self-power
- Device operation via AC or DC
- Current relay function
- Segment LCD Display
- DO output
- Supports USB communication
- Supports RS485 communication

S type

- Device operation through self-power
- Device operation via AC or DC
- Current/voltage/frequency/ power relay function
- 3.5″ Graphic Display
- DO output
- Relay setting to group A/B
- Supports short-range USB communication
- Supports RS485 communication
- Supports NFC/BLE communication

Upgraded performance compared to existing OCR

Improved measurement accuracy

Type		Susol ACB OCR P/S	Smart Trip Unit (STU)			
			N	A	P	S
Measurement accuracy	Current	6%	0.5%		0.5%	
	Voltage	3%	—		0.5%	
	Power	10%	—		Class 1.0	
	Frequency	0.05 Hz (50, 60 Hz device classification)	50, 60 Hz device classification		0.1% (10~200Hz)	

- Measurement accuracy through calibration using voltage, current, and power reference (Current/Voltage : 0.5%, Power : Class 1.0) Satisfaction
- Improved resolution using 16bit ADC converter

Measurement items & relay function extension

1. Based on S type, equipped with a total of 29 types and 58 relay functions

2. Relay setting grouping and change function (Gtoup A/B)
: Relay group setting is changed quickly in parallel feeding situation where relay setting needs to be changed.
(Group A → B)

3. ERMS (Energy Reduction Management System) function
: As a function to sensitively change the relay setting for the safety of a field electrical engineer,
it is a safety related function required by the American market (L/S1/S2/IG//LN)

4. ZSI (Zone Select Interlock) function
: A function to operate the upstream circuit breaker closest to the accident point first by using ZSI Input DI
and ZSI Output DO

5. Start-up function
: Prevents malfunction of relay element by in-rush current generated when starting motor and Transformers

6. Stores 255 system events, 127 fault events and 6 accident waves
: Trip Wave saves 4 cycles before an accident + 4 cycles after an accident

Safe self-diagnosis function

Quick maintenance by adding powerful self-diagnosis function to prevent mis-trip and through alarm

		N type	A type	P type	S type
Self-diagnosis	LED	RUN/AL LED flashing (Red ↔ Blue flashing)			
	LCD		Displays the corresponding segment or error number	Can be checked on the self-diagnosis screen	
	List	• Contact Wear Alarm : Occurs when the contact wear rate is over 80% • Electrical Open Count Over Alarm : Occurs when the electrical open count exceeds 80% of the allowable electrical open count • Mechanical Open Count Over Alarm : Occurs when the mechanical open count exceeds 80% of the allowable mechanical open count • CT disconnection error : Occurs when CT disconnection occurs (monitoring for each phase), breaks relay function related to disconnection such as G, UP, IU, etc. • Over Heat Error : Occurs when CPU internal temperature N/A type exceeds 100°C and P/S type exceeds 115°C. • MTD Fail : Occurs when STU is not assembled with MTD or trip coil disconnection occurs (wiring check) • Battery Low Alarm : Occurs when the internal battery is not inserted or when the battery voltage is low • Rating Plug Unattached or Error : Occurs when rating plug is not assembled or when there is rating plug error • Ampere Frame Error : Occurs when the value of rating plug is not within 45%~100% of AF • Factory Cfg Error : Occurs when the factory mode setting is entered incorrectly • Device Type Error : Occurs when the rating plug information and CT information are different • RTC Error : Occurs when an error occurs in the internal RTC information • Memory Error : Occurs when corruption occurs in the redundant internal settings stored in the internal non-volatile memory			

Increased user convenience

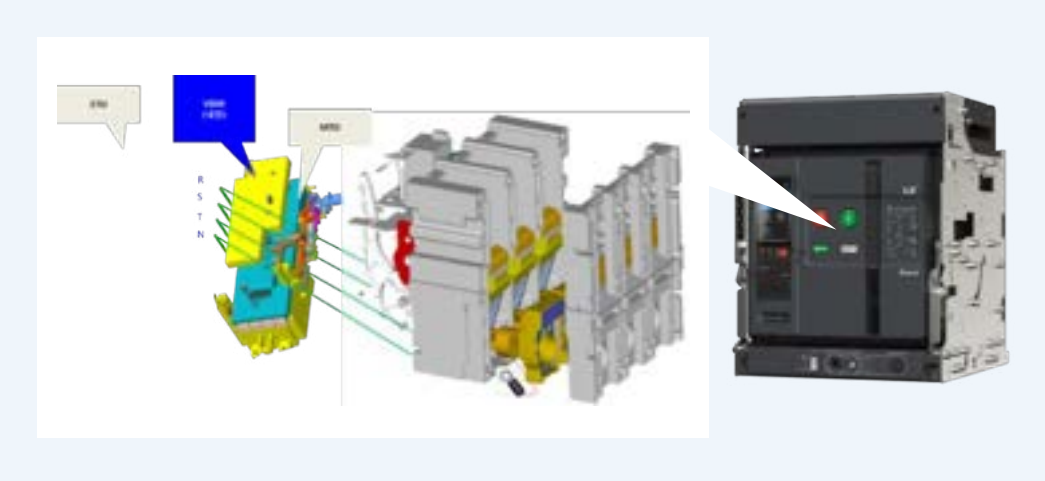
Uninterrupted device update & non-powered device setting

- By using USB interface, STU Program update is possible without a power outage in the live state, and STU can be set and updated even when the power is not supplied.

Uninterrupted device update & non-powered device setting

VDM and frequency tracking technology

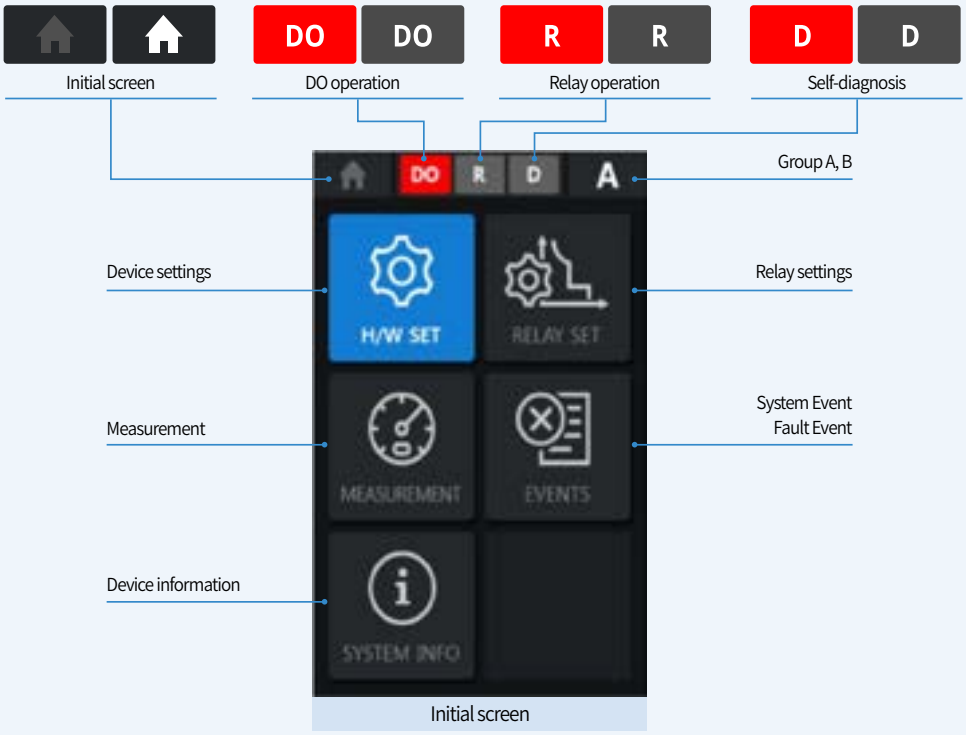
- With a built-in VDM for voltage measurement, it can save the installation space of the distribution panel. It is also equipped with frequency tracking technology that maintains measurement and relay accuracy even at variable frequencies from 10 Hz to 200 Hz (Able to respond to renewable energy markets such as wind power and waterpower).
- We have Internal and external type VDM, and the external type is used when the primary and secondary sides of the ACB are reversed and the location of the inspection of the VDM is differently in case of 2-Stage ACB.



Note1) Be sure to use a shielding wire for the secondary wiring of the Voltage module.
Note2) The maximum length of use is less than 3.5m.
Note3) If you want an external VDM, please insert '(-V)' at the end of the full ordering.

3.5" Touch Graphic LCD applied

• By applying Color Graphic LCD & Touch panel in P and S types, it improves the convenience and visibility of device use.



Initial screen

Load factor

Vector Diagram

Real-time waveform

System/accident event

Operation information

Built-in IoT function

• It is possible to check and share device information on a smartphone by interworking with a mobile App. through BLE and NFC communication.

Type	Specifications
NFC	(1) Collects STU last trip information through smart phone in non-powered state (2) Communication distance : 10mm or less
BLE	(1) All information of the device can be accessed through the smart phone while the power is supplied. (2) Communication distance : within 4m

Model selecting guide

Susol ACB model numbering (Product selection)

Body and accessories

AH — 10 D 3 — 10 A

Type	
Susol ACB	
DH	
Switch Disconnector	

Ampere Frame	
06	630AF
08	800AF
10	1000AF
13	1250AF
16	1600AF
20	2000AF

* 2000AF only offers with vertical type mounting terminals(Busbar).

Frame sizes & phase array	
D	630 ~ 2000AF 3P/4P Standard ABC (N)
W	630~2000AF 4P Inverse type (N) ABC

No. of pole	
3	3P(D)
4	4P(D, W)

Rated current (CT Spec.)	
00	Without STU & CT
02	200A
04	400A
06	630A
08	800A
10	1000A
13	1250A
16	1600A
20	2000A

Connections	
	Draw-out type
A	Automatic connection
	Fixed type
H	Horizontal type
V	Vertical type
M	Mixed type Horizontal Vertical
N	Mixed type Vertical Horizontal
P	Front type

06	630AF
08	800AF
10	1000AF
13	1250AF
16	1600AF
20	2000AF
25	2500AF
32	3200AF
40	4000AF

E	630 ~ 4000AF 3P/4P Standard ABC (N)
X	630 ~ 4000AF 4P Reverse phase type(N) ABC

3	3P(E)
4	4P(E, X)

00	No STU & CT
02	200A
04	400A
06	630A
08	800A
10	1000A
13	1250A
16	1600A
20	2000A
25	2500A
32	3200A
40	4000A

*4000AF only offers with vertical type mounting terminals(Busbar).

40	4000AF
50	5000AF
63	6300AF

G	4000/5000/6300AF 3P/4P Standard ABC (N)
Z	4000/5000/6300AF 4P Reverse phase type(N) ABC

3	3P(G)
4	4P(G, Z)

00	No STU & CT
40	4000A
50	5000A
63	6300A

Note 1) AH-20D, AH-40E types are equipped with vertical-only terminals.
In case of F/Y/G/Z Frame size, front type & mixed type connection is not available.
2) In case of DH type Switch Disconnector, the rated current (CT Spec.) will be applied 00
3) DN models are selectable up to 3200AF and DS models up to 4000AF.

M1 – Motor rated voltage

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

D1 – Closing coil rated voltage

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

D1 – Shunt coil rated voltage

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

AX – Aux.contact & charging types

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

SS1 – STU

Refer to page 27

U1 – UVT coil rated voltage

U0	Without UVT coil
U1	AC/DC 100V ~ 130V
U2	AC/DC 200V ~ 250V
U3	DC 125V
U4	DC 24V ~3 0V
U5	DC 48V ~ 60V
U6	AC 380V ~ 480V
U7	AC 48V

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

AL – Option

Option	Type name	Option description
AL	AL1 + MRB	
A1	AL1 + MRB + RES(AC110~130V) *AC only	
A2	AL1 + AL2 + MRB	
A3	AL1 + MRB + RES(AC/DC 110~125V) *DC only	
A4	AL1 + MRB + RES(AC/DC 200~250V) *AC only	
A5	AL1 + MRB + AUTO RESET	
A6	AL1 + AL2 + MRB + AUTO RESET	
A7	AL1 + MRB + RES(AC/DC 110~125V) + AUTO RESET *DC전용	
A8	AL1 + MRB + RES(AC/DC 200~250V) + AUTO RESET *AC전용	
A9	AL1 + MRB + RES(AC/DC 110~130V) + AUTO RESET *AC전용	
Y2	AL1 + AL2 + MRB(2b contact)	
Y6	AL1 + AL2 + MRB + AUTO RESET(2b contact)	
Z2	AL1 + AL2 + MRB(1a1b contact)	
Z6	AL1 + AL2 + MRB + AUTO RESET(1a1b contact)	
C	C	Counter
S	CS2	Charge switch communication
B	B	On/Off Button lock
M	MI	Mechanical interlock
D	DI or MOC	Door Interlock or MOC (Mechanism operated cell switch)
K	K1	Key Lock
K2	K2	Key Interlock Set
K3	K3	Key Lock Double
R	RCS	Ready to Close switch
T	TM	Temperature Monitoring
H1	SHT2	AC/DC 100~130V
H2	SHT2	AC/DC 200~250V
H3	SHT2	DC 125V
H4	SHT2	DC 24~30V
H5	SHT2	DC 48~60V
H6	SHT2	AC 380~480V
H7	SHT2	AC 48V

Note 1)

Note 1) It is a double shunt coil and not applicable when using UVT

Model selecting guide

Metasol ACB model numbering (Product selection)

Body and accessories

AS — 10 D 3 — 10 J

Type	
Metasol ACB	
AN	Standard type
AS	High breaking type
DN / DS	
Switch Disconnector	

Ampere * Frame	
06	630AF
08	800AF
10	1000AF
13	1250AF
16	1600AF
20	2000AF

Frame sizes & phase array	
D	630~2000AF 3P/4P Standard ABC (N)
W	630~2000AF 4P Inverse type (N) ABC

No. of pole	
3	3P(D)
4	4P(D, W)

Rated current ** (CT Spec.)	
00	Without OCR & CT
02	200A
04	400A
06	630A
08	800A
10	1000A
13	1250A
16	1600A
20	2000A

Connections	
	Draw-out type
J	Manual connection
A	Automatic connection
	Fixed type
H	Horizontal type
V	Vertical type
M	Mixed type Horizontal Vertical
N	Mixed type Vertical Horizontal
P	Front type

* 2000AF only offers with vertical type mounting terminals(Busbar).

Ampere * Frame	
20	2000AF
25	2500AF
32	3200AF
40	4000AF

Frame sizes & phase array	
E	2000 ~ 4000AF 3P/4P Standard ABC (N)
X	2000 ~ 4000AF 4P Inverse type (N) ABC

No. of pole	
3	3P (E)
4	4P (E, X)

Rated current ** (CT Spec.)	
00	Without OCR & CT
02	200A
04	400A
06	630A
08	800A
10	1000A
13	1250A
16	1600A
20	2000A
25	2500A
32	3200A
40	4000A

* 4000AF only offers with vertical type mounting terminals(Busbar).

Ampere * Frame	
40	4000AF
50	5000AF

Frame sizes & phase array	
F	4000/5000AF 3P/4P Standard ABC (N)
Y	4000/5000AF 4P Reverse phase type(N) ABC

No. of pole	
3	3P (F)
4	4P (F, Y)

Rated current ** (CT Spec.)	
00	Without OCR & CT
40	4000A
50	5000A

Ampere * Frame	
40	4000AF
50	5000AF
63	6300AF

Frame sizes & phase array	
G	4000/5000/6300AF 3P/4P Standard ABC (N)
Z	4000/5000/6300AF 4P Reverse phase type(N) ABC

No. of pole	
3	3P (G)
4	4P (G, Z)

Rated current ** (CT Spec.)	
00	Without OCR & CT
40	4000A
50	5000A
63	6300A

* AN type : 630 ~ 1600AF, 2000 ~ 3200AF
AS type : 630 ~ 2000AF, 2000 ~ 4000AF, 4000 ~ 5000AF, 4000 ~ 6300AF

** AN type is available up to rated current 1600A when 630~1600AF is selected and rated current is available up to 3200A when 2000 ~ 3200AF is selected.

Note 1) D Frame 2000AF and E Frame 4000AF are vertical type only. F and G Frames are not applicable to flat type and flat mix type.
2) For DN/DS models, only the rated current (CT Spec.) "00" is applied.
3) DN models can be selected up to 3200AF and DS models up to 4000AF.

M1 – Motor rated voltage

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

D1 – Closing coil rated voltage

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

D1 – Shunt coil rated voltage

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

AX – Aux.contact & charging types

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

SS1 – STU

Refer to page 27

U1 – UVT coil rated voltage

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

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

AL – Option

Symbol	Model	Option description
AL	AL1 + MRB	
A1	AL1 + MRB + RES(AC110~130V) *AC only	
A2	AL1 + AL2 + MRB	
A3	AL1 + MRB + RES(AC/DC 110~125V) *DC only	
A4	AL1 + MRB + RES(AC/DC 200~250V) *AC only	
A5	AL1 + MRB + AUTO RESET	
A6	AL1 + AL2 + MRB + AUTO RESET	
A7	AL1 + MRB + RES(AC/DC 110~125V) + AUTO RESET *DC only	
A8	AL1 + MRB + RES(AC/DC 200~250V) + AUTO RESET *AC only	
A9	AL1 + MRB + RES(AC/DC 110~130V) + AUTO RESET *AC only	
Y2	AL1 + AL2 + MRB(2b contact)	
Y6	AL1 + AL2 + MRB + AUTO RESET(2b contact)	
Z2	AL1 + AL2 + MRB(1a1b contact)	
Z6	AL1 + AL2 + MRB + AUTO RESET(1a1b contact)	
C	C	Counter
S Note1)	CS2	Charge switch communication
B	B	On/Off Button lock
M Note2)	MI	Mechanical interlock
D	DI or MOC	Door Interlock or MOC (Mechanism operated cell switch)
K	K1	Key Lock
K2	K2	Key Interlock Set
K3	K3	Key Lock Double
R	RCS	Ready to Close switch
T Note3)	TM	Temperature Monitoring
H1	SHT2	AC/DC 100 ~ 130V
H2	SHT2	AC/DC 200 ~ 250V
H3	SHT2	DC 125V
H4	SHT2	DC 24 ~ 30V
H5	SHT2	DC 48 ~ 60V
H6	SHT2	AC 380 ~ 480V
H7	SHT2	AC 48V

Note4)

Note 1), 2), 3) AN Type not applicable
4) Double shunt coil, not applicable when using UVT

Model selecting guide

Susol UL ACB model numbering

UAS — 16 D 3 — 16 A

Frame type

Frame type	
08	800AF
16	1600AF

1600AF	
D	3/4P standard RST(N)
W	4P reversed NRST

Poles	
3	3P
4	4P

Sensor rating	
04~08	400A~800A
08~16	800A~1600A

Sensor rating	
Mounting	
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

* 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).
* 6000AF is only available for drawout type

UAH — 32 E 3 — 32

Frame type

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

Phasing	
E	3/4P standard RST(N)
X	4P reversed NRST

Poles	
3	3P
4	4P

Sensor rating	
04~08	400A~800A
08~16	800A~1600A
10~20	1000A~2000A
12~25	1200A~2500A
16~32	1600A~3200A

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

Phasing	
G	3/4P standard RST(N)
Z	4P reversed NRST

Poles	
3	3P
4	4P

Sensor rating	
16~32	1600A~3200A
20~40	2000A~4000A
25~50	2500A~5000A
30~60	3000A~6000A

UAH — 16 D 3 — 00

Frame type

Frame type	
08	800AF
16	1600AF

Phasing	
D	3/4P standard RST(N)
W	4P reversed NRST

Poles	
3	3P
4	4P

Sensor rating
Not applied

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

Phasing	
E	3/4P standard RST(N)
X	4P reversed NRST

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

Phasing	
G	3/4P standard RST(N)
Z	4P reversed NRST

M1 D1 D1 HX NGO U1 AL

Motor operator	
MA	None (Manual operated)
M1	AC/DC 100V~125V
M2	AC/DC 200V~250V
M3	DC 125V
M4	DC 24V~30V
M5	1200A~2500A
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	1200A~2500A
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	
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

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	SHT2 Note 2)	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		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.

Model selecting guide

Susol ACB Cradle model numbering (Product selection)

Cradle

AL — H16D — 3 — A — H — E — S

Type

LS ACB Cradle

Rated current and frame

H06~16D	AH – 06 ~ 16D
H20D	AH – 20D
H06~32E	AH – 06 ~ 32E
H40E	AH – 40E
H40~50G	AH – 40 ~ 50G
H63G	AH – 63G

*D Frame 2000AF and E Frame 4000AF are vertical type only.

No. of pole

3	3P
4	4P

Terminal connections

A	Automatic connection
J	Manual connection

Connections

H	Horizontal type (H20D inapplicable)
V	Vertical type
M	Mixed type Line: Horizontal Load: Vertical (H20D inapplicable)
N	Mixed type Line: Vertical Load: Horizontal (H20D inapplicable)
P	Front type (20D, 40E, 50FG, 63G inapplicable)

Safety shutter

E	Without safety shutter
F	With safety shutter

Arc cover (Zero Arc Space) note)

S	With ARC Cover

Note) Susol ACB is supplied as an arc cover standard.

Metasol ACB Cradle model numbering (Product selection)

Cradle

AL — N16D — 3 — J — H — E — N

Type

Metasol ACB Cradle

Rated current and frame

N06~16D	AN – 06 ~ 16D
S06~16D	AS – 06 ~ 16D
S20D	AS – 20D
N20~25E	AN – 20 ~ 25E
N32E	AN – 32E
S20~25E	AS – 20 ~ 25E
S32E	AS – 32E
S40E	AS – 40E
S40~50F	AS – 40 ~ 50F
S40~50G	AS – 40 ~ 50G
S63G	AS – 63G

*D Frame 2000AF and E Frame 4000AF are vertical type only.

No. of pole

3	3P
4	4P

Terminal connections

J	Without manual access
A	With automatic connection

Connections

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

Safety shutter

E	Without safety shutter
F	With safety shutter

Arc cover (Zero Arc Space)

N	Without ARC Cover
S	With ARC Cover

Susol UL ACB Cradle model numbering

Cradle

UAL — S16D 3 A H E S

UAL — For UL ACB cradle type

S16D — Frame size note)

S16D	1600AF
S20E	2000AF
S25E	2500AF
S32E	3200AF
S50G	5000AF
S60G	6000AF

3 — Secondary connector type

A	Connector type
B	Screw joint type
C	Spring type

A

H — 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

E — Shutter

E	Without safety shutter
F	With safety shutter

S — Other options

S	Arc cover
T	Metering CT

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

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

Smart Trip Unit model numbering (Product selection)

N type

N	—	H	—	G
Trip unit type		Communication & Leakage Detection		Control Power & Frequency
0 N/A		0 N/A		0 N/A

N	—	H	—	G		
Trip unit type		Relay Function / Communtation Fuction(Default)			Frequency (Main Circuit)	Control Power Voltage
N Normal		H L,S,I,G + NFC TBD		0	60Hz	No Control Power
				5	50Hz	No Control Power

* NFC : Near Field Communication

* Self-power is Default
* No Output Contact (Accident indication can be confirmed only by LED)

A type

A	—	G	—	0		
Trip unit type		Relay Function / Communtation Fuction			Frequency (Main Circuit)	Control Power Voltage
A Ammeter		H L,S,I,G		0	60Hz	No Control Power
		D L,S,I,G / Communication		1	60Hz	AC/DC 100V~250V
		J L,S,I,Gext + ZCT / Communication		2	60Hz	DC 24V~48V TBD
		Y L,S,I,Gext + Ground wire CT / Communication		5	50Hz	No Control Power
		B L,S,I + PTA / Communication		6	50Hz	AC/DC 100V~250V
		O L,S,I,G + Neutral CT / Communication		7	50Hz	DC 24V~48V TBD
		V L,S,I + PTA (For Marine)				

* Self-power is Default
* Only AH Type can select "0, 5" (AH0, AH5)
* No Output Contact when choosing " 0 " (Accident indication can be confirmed only by LED)
* AV Type has no LCD Screen

P type

P	—	S	—	1			
Trip unit type		Relay Function / Communtation Fuction(Default)			Frequency (Main Circuit)	Control Power Voltage	Communication
P Power meter		S L,S,I,G + PTA		1	60Hz	AC/DC 100V~250V	N/A
		J L,S,I,Gext + ZCT		2	60Hz	DC 24V~48V	N/A TBD
		Y L,S,I,Gext + Ground wire CT		6	50Hz	AC/DC 100V~250V	N/A
		O L,S,I,G + Neutral CT		7	50Hz	DC 24V~48V	N/A TBD
				3	60Hz	AC/DC 100V~250V	Bluetooth
				4	60Hz	DC 24V~48V	Bluetooth TBD
				8	50Hz	AC/DC 100V~250V	Bluetooth
				9	50Hz	DC 24V~48V	Bluetooth TBD

S type

S	—	S	—	1			
Trip unit type		Relay Function / Communtation Fuction(Default)			Frequency (Main Circuit)	Control Power Voltage	Communication
S Supreme meter		S L,S,I,G + PTA		1	60Hz	AC/DC 100V~250V	Bluetooth/NFC
		J L,S,I,Gext + ZCT		2	60Hz	DC 24V~48V	Bluetooth/NFC TBD
		Y L,S,I,Gext + Ground wire CT		6	50Hz	AC/DC 100V~250V	Bluetooth/NFC
		O L,S,I,G + Neutral CT		7	50Hz	DC 24V~48V	Bluetooth/NFC TBD

* Self-power is Default (Automatic power supply to the Trip Unit without additional control power)
* L,S,I : Long time delay trip, Short time delay trip, Instanteneous trip * G : Ground fault (Residual earth fault protection)
* Gext + ZCT : Earth leakage protection (Earth Fault Current : 0.5A ~ 30A) - Onlu suitable for under 1600A products and cables
* Gext + Ground wire CT : Source return Type * PTA : Pre-trip alarm Function
* Customers purchase their own Ground wire CT (Secondary output : 5A, accuracy 1%)
* Customers purchase their own Neutral CT (Primary output : same as ACB's Rated Current / Secondary output : 5A, accuracy 1%) * The STU acceptable voltage range is 100 to 250V.

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

* If you want to apply external VDM separately, please order the code above.

Memo

Rated specifications

Susol ACB

Frame					AH - D					
Type					AH - 06D	AH - 08D	AH - 10D	AH - 13D	AH - 16D	AH - 20D
Ampere frame	(AF)				630	800	1000	1250	1600	2000
Rated current (In max)	(A)				200 400 630	400 630 800	630 800 1000	630 800 1000 1250	800 1000 1250 1600	1000 1250 1600 2000
Rated operational voltage (Ue)	(V)				690					
Rated insulation voltage (Ui)	(V)				1000					
Frequency	(Hz)				50/60					
Number of poles	(P)				3/4					
Setting current *	(A)	Control trip relay (…×In max)			0.4 ~ 1.0					
N pole rated current	(A)				630	800	1000	1250	1600	2000
Rated breaking current (Icu) (Sym)	(kA)	IEC 60947–2 KS C 4620	AC	690V / 600V / 550V ***	65					
				500V / 480V / 460V	85					
				415V / 380V / 230V / 220V	85					
Rated service breaking capacity (Ics)	(kA)			…%×Icu	100					
Rated input current (Icm) (peak)	(kA)	IEC 60947–2 KS C 4620	AC	690V / 600V / 550V ***	143					
				500V / 480V / 460V	187					
				415V / 380V / 230V / 220V	187					
Rated short-time current (Icw)	(kA)			1 second	65					
				2 seconds	60					
				3 seconds	50					
Rated impulse withstand voltage (Uimp)	(kV)				12					
Operating time (t)	(ms)			Total cut-off time, maximum	Less than 25ms under Icw / Less than 75ms over Icw					
				Input time	Less than 80					
Life cycle	ACB (time)	Mechanical			20000					
		Electrical			5000					
Weight (3P/4P)	(kg)	Draw-out type	Body + cradle	Electric charging method	63/74					70/85
				Manual charging method	61/72					68/83
			Cradle		29/32					33/40
		Fixed type		Electric charging method	34/44					38/47
				Manual charging method	32/42					36/45
Connections **		Fixed type/ Draw-out type		Horizontal type	●	●	●	●	●	–
				Vertical type	○	○	○	○	○	●
				Flat surface type	○	○	○	○	○	–
				Mix type	○	○	○	○	○	–
External dimensions	Withdrawal type (mm)	H : 430 (460), D : 375		W (3P/4P)	334/419					
	Stationary type (mm)	H : 300, D : 295		W (3P/4P)	300/385					
Certificate & Approval					KS / KEMA / KERI / GOST / CCC					
Certificate & Approval					LR, ABS, DNV, KR, BV, GL, RINA, NK					

*Refer to detailed STU rating **●: Standard ○: Option

***Acquired KSC 4620 rated voltage is 690/600V, and low rated use voltage is KS certified with 600V breaking capacity (Reason: Refer to the classification of KS C 4620 audit criteria certification)

※ Life time is the lifespan, not the warranty life, and is charged for maintenance. If an abnormality occurs in the accessory device during use, it can be replaced and used.
Quality Assurance : Based on IEC60947-2 number of opening and closing times within the warranty period

※ D Frame 2000AF and E Frame 4000AF are available in vertical type only.

	AH - E									AH - G		
	AH - 06E	AH - 08E	AH - 10E	AH - 13E	AH - 16E	AH - 20E	AH - 25E	AH - 32E	AH - 40E	AH - 40G	AH - 50G	AH - 63G
	630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
	200 400 630	400 630 800	630 800 1000	630 800 1000 1250	800 1000 1250 1600	1000 1250 1600 2000	1250 1600 2000 2500	1600 2000 2500 3200	2000 2500 3200 4000	2000 2500 3200 4000	2500 3200 4000 5000	3200 4000 5000 6300
	690									690		
	1000									1000		
	50/60									50/60		
	3/4									3/4		
	0.4 ~ 1.0									0.4 ~ 1.0		
	630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
	85									100		
	100									150		
	100									150		
	100									100		
	187									220		
	220									330		
	220									330		
	85									100		
	75									85		
	65									75		
	12									12		
	Less than 25ms under Icw / Less than 75ms over Icw									Less than 25ms under Icw / Less than 75ms over Icw		
	Less than 80									Less than 90		
	15000									10000		
	5000									2000		
	87/103							107/139		181/223		186/230
	85/101							102/145		179/221		184/228
	44/55							65/85		97/117		102/124
	44/55							61/81		98/123		103/130
	42/53							60/80		96/121		101/128
	●	●	●	●	●	●	●	●	–	○	○	○
	○	○	○	○	○	○	○	○	●	●	●	●
	○	○	○	○	○	○	○	○	–	–	–	–
	○	○	○	○	○	○	○	○	–	–	–	–
	412/527									785/1015		
	378/493									751/981		
	KS / KEMA / KERI / GOST / KEPIC / CCC									KS / KEMA / KERI / GOST / CCC		
	LR, ABS, DNV, KR, BV, GL, RINA, NK									LR, ABS, DNV, KR, BV, GL, RINA, NK		

※ Although reverse connection to the power supply and load side is possible, use it as a normal connection for maintenance, inspection, and safety.
※ The neutral pole of the 4-pole type is broke by pre-input.
※ Rated current brackets are rated for ACB for nuclear power plants.
1) Test specifications : KEPIC EED 1200/END 1100 / END 2000 2) Nuclear power plant electrical class : Class 1E, Quality class : Q 3) Rated : AC 508V, 100KA, 800/16 00/2000/3200A

Rated specifications

Metasol ACB

Frame					AN - D				
Type					AN - 06D	AN - 08D	AN - 10D	AN - 13D	AN - 16D
Ampere frame	(AF)				630	800	1000	1250	1600
Rated current (In max)	(A)				200 400 630	400 630 800	630 800 1000	630 800 1000 1250	800 1000 1250 1600
Rated operational voltage (Ue)	(V)				690				
Rated insulation voltage (Ui)	(V)				1000				
Frequency	(Hz)				50/60				
Number of poles	(P)				3/4				
Setting current *	(A)	Control trip relay (…×In max)			0.4 ~ 1.0				
N pole rated current	(A)				630	800	1000	1250	1600
Rated breaking current (Icu) (Sym)	(kA)	IEC 60947–2 KS C 4620	AC	690V / 600V / 550V ***	50				
				500V / 480V / 460V	65				
				415V / 380V / 230V / 220V	65				
Rated service breaking capacity (Ics)	(kA)			…%×Icu	100				
Rated input current (Icm) (peak)	(kA)	IEC 60947–2 KS C 4620	AC	690V / 600V / 550V ***	105				
				500V / 480V / 460V	143				
				415V / 380V / 230V / 220V	143				
Rated short-time current (Icw)	(kA)			1 second	50				
				2 seconds	42				
				3 seconds	36				
Rated impulse withstand voltage (Uimp)	(kV)				12				
Operating time (t)	(ms)			Total cut-off time, maximum	Less than 25ms under Icw / Less than 75ms over Icw				
				Input time	Less than 80				
Life cycle ACB	(time)	Mechanical			20000				
		Electrical			5000				
Weight (3P/4P)	(kg)	Draw-out type	Body + cradle	Electric charging method	63/74				
				Manual charging method	61/72				
			Cradle		29/32				
		Fixed type		Electric charging method	34/44				
				Manual charging method	32/42				
Connections **		Fixed type/ Draw-out type		Horizontal type	●	●	●	●	●
				Vertical type	○	○	○	○	○
				Flat surface type	○	○	○	○	○
				Mix type	○	○	○	○	○
External dimensions	Draw-out type (mm)	H : 430 (460), D : 375		W (3P/4P)	334/419				
	Fixed type (mm)	H : 300, D : 295		W (3P/4P)	300/385				
Certificate & Approval					KEMA / KERI / KS /GOST				
Marine clasiflcation					–				

*Refer to detailed STU rating **●: Standard ○: Option

***Acquired KSC 4620 rated voltage is 690/600V, and low rated use voltage is KS certified with 600V breaking capacity (Reason: Refer to the classification of KS C 4620 audit criteria certification)

※ Life time is the lifespan, not the warranty life, and is charged for maintenance. If an abnormality occurs in the accessory device during use, it can be replaced and used.
Quality Assurance : Based on IEC60947-2 number of opening and closing times within the warranty period

※ D Frame 2000AF and E Frame 4000AF are available in vertical type only.




	AS - D						AS - E				AS - F		AS - G		
	AS - 06D	AS - 08D	AS - 10D	AS - 13D	AS - 16D	AS - 20D	AS - 20E	AS - 25E	AS - 32E	AS - 40E	AS - 40F	AS - 50F	AS - 40G	AS - 50G	AS - 63G
	630	800	1000	1250	1600	2000	2000	2500	3200	4000	4000	5000	4000	5000	6300
	200 400 630	400 630 800	630 800 1000	630 800 1000 1250	800 1000 1250 1600	1000 1250 1600 2000	200, 400, 630, 800, 1000, 1250, 1600, 2000	1250 1600 2000 2500	1600 2000 2500 3200	2000 2500 3200 4000	2000 2500 3200 4000	2500 3200 4000 5000	2000 2500 3200 4000	2500 3200 4000 5000	3200 4000 5000 6300
	690						690				690		690		
	1000						1000				1000		1000		
	50/60						50/60				50/60		50/60		
	3/4						3/4				3/4		3/4		
	0.4 ~ 1.0						0.4 ~ 1.0				0.4 ~ 1.0		0.4 ~ 1.0		
	630	800	1000	1250	1600	2000	630, 800 , 1000, 1250 , 1600 , 2000	2500	3200	4000	4000	5000	4000	5000	6300
	65						85				85		100		
	70						85				100		120		
	70						85				100		120		
	100						100				100		100		
	143						187				187		220		
	154						187				220		264		
	154						187				220		264		
	65						85				85		100		
	50						75				75		85		
	42						65				65		75		
	12						12				12		12		
	Less than 25ms under Icw / Less than 75ms over Icw														
	Less than 80						Less than 80				Less than 90		Less than 90		
	20000						15000				10000		10000		
	5000						5000				2000		2000		
	63/74					70/85	87/103			107/139	145/173		181/223		186/230
	61/72					63/83	85/101			102/145	143/171		179/221		184/228
	29/32					33/40	44/50			65/85	78/90		97/117		102/124
	34/44					38/47	44/55			61/81	76/94		98/123		103/130
	32/42					36/45	42/53			60/80	74/92		96/121		101/128
	●	●	●	●	●	–	●	●	●	–	○	○	○	○	○
	○	○	○	○	○	●	○	○	○	●	●	●	●	●	○
	○	○	○	○	○	–	○	○	○	–	–	–	–	–	–
	○	○	○	○	○	–	○	○	○	–	–	–	–	–	–
	334/419						412/527				629/799		785/1015		
	300/385						378/493				597/767		751/981		
	KEMA / KERI / KS / GOST						KEMA / KERI / KS / GOST				KEMA / KERI / KS / GOST / KEPIC				
	LR, ABS, DNV, KR, BV, GL, RINA, NK						LR, ABS, DNV, KR, BV, GL, RINA, NK				LR, ABS, DNV, KR, BV, GL, RINA, NK				

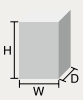
※ Although reverse connection to the power supply and load side is possible, use it as a normal connection for maintenance, inspection, and safety.

※ The neutral pole of the 4-pole type is broke by pre-input.

※ Rated current brackets are rated for ACB for nuclear power plants.
1) Test specifications : KEPIC EED 1200/END 1100 / END 2000 2) Nuclear power plant electrical class : Class 1E, Quality class : Q 3) Rated : AC 508V, 100KA, 3200/4000A

Rated specifications

Susol UL ACB

Type					Susol UAS-□□D	
AF					08	16
Rated current (In max)	(A)			at 40°C	800	1600
Rated current	(A)			at 40°C		800
					400	1000
					6000	1200
					630	1250
					800	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 635V (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			Less than 25ms under Icw / Less than 75ms over Icw	
		Maximum closing time			80ms under	
Life cycle ACB	(time)	Mechanical		Without maintenance	12,500	
				With maintenance	-	
		Electrical		Without maintenance	2,800	
				With maintenance	-	
Weight	lb (kg)	Drawout type		3P	154 (70)	
				4P	187 (85)	
				3P	71 (32)	
				4P	84 (38)	
		Fixed 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)	

Note: * shows the breaking capacity of the UAA type.

	Susol					Susol			
	UAS-□□E					UAS-□□G			
	08	16	20	25	32	32	40	50	60
	800	1600	2000	2500	3200	3200	4000	5000	6000
	400	800	1000	1200	1600	1600	2000	2500	3000
	600	1000	1200	1250	2000	2000	2500	3000	3200
	630	1200	1250	1600	2500	2500	3000	3200	3600
	800	1250	1600	2000	3000	3000	3200	3600	4000
		1600	2000	2500	3200	3200	3600	4000	5000
							4000	5000	6000
	254V / 508V / 635V					254V / 508V / 635V			
	50 / 60					50 / 60			
	3P / 4P					3P / 4P			
	N, A, P, S (4 type)					N, A, P, S (4 type)			
	85					100			
	100					130			
	100					130			
	85					100			
	85					100			
	85					100			
	85					100			
	Less than 25ms under Icw/Less than 75ms over Icw					Less than 25ms under Icw/Less than 75ms over Icw			
	80ms under					90ms under			
	12,500				12,500	10,000			
	-				-	-			
	2,800				1,000	1,000			
	-				-	-			
	214 (97)			245 (111)	326 (148)	489 (222)			709 (321)
	269 (122)			309 (140)	414 (188)	626 (284)			919 (417)
	99 (45)			123 (56)	205 (93)	276 (125)			482 (218)
	121 (55)			152 (69)	256 (116)	355 (161)			630 (286)
	101 (46)			110 (50)	196 (89)	227 (103)			433 (196)
	126 (57)			137 (62)	249 (113)	287 (130)			561 (255)
	16.93×16.22×16.02 (430×412×407)					18.11×30.91×16.02 (460×785×407)			
	16.93×20.75×16.02 (430×527×407)					18.11×39.96×16.02 (460×1015×407)			
	11.81×14.88×11.61 (300×378×295)					11.81×29.57×11.61 (300×751×295)			
	11.81×19.41×11.61 (300×493×295)					11.81×38.62×11.61 (300×981×295)			
	19.69×19.69×13.39 (500×500×340)					31.5×32.48×13.39 (800×825×340)			
	19.69×24.21×13.39 (500×615×340)					31.5×41.54×13.39 (800×1055×340)			

Smart Trip Unit

Advanced Trip Relay!

With the world's best measurement accuracy and increased relay elements, the relay operation stability is enhanced, and the abnormal self-diagnosis function prevents mis-trips and ensures the stability of abnormal conditions through alarms.
NFC and Bluetooth built-in and Smart add-on modules can be configured. Monitoring and monitoring is possible through service access anytime, anywhere by securing a Smart LV solution through ICT convergence technology.

STU function-specific series

N type

- Device operation through self-power
- Current relay function
- Supports USB communication

A type

- Device operation through self-power
- Device operation via AC or DC
- Current relay function
- Segment LCD Display
- DO output
- Supports USB communication
- Supports RS485 communication

P type

- Device operation through self-power
- Device operation via AC or DC
- Current/voltage/frequency/power relay function
- 3.5” Graphic Display
- DO output
- Supports USB communication
- Supports RS485 communication

S type

- Device operation through self-power
- Device operation via AC or DC
- Current/voltage/frequency/power relay function
- 3.5” Graphic Display
- DO output
- Relay setting group A/B available
- Supports USB communication
- Supports RS485 communication
- NFC/BLE communication support

Types of STU

	Type N	Type A	Type P	Type S
Exterior				
Current relay	• L (N), S, I, G, PTA	• L (N), S, I, G, PTA, Gext	• L (N), S, I, G, PTA, Gext • D, S (V), IU	• L (N), S1, S2, I, G, PTA, Gext • D, S (V) 1, S (V) 2
Voltage relay			• UV, OV, RV, VU	• UV1, UV2, OV1, OV2, RV, VU
Frequency relay			• UF, OF, ROCOF	• UF1, UF2, OF1, OF2, ROCOF
Power relay			• RP, RQ, OP, OQ, UP	• RP, RQ1, RQ2, OP, OQ, UP
Group control				• A, B (can be changed by communication)
Relay fine adjustment			• L, S, I Pickup current	
ERMS		• Control by DI and communication	• Control by DI and communication	• Control by DI and communication
IDMTL support	• Supports L relay element Thermal and DT, SIT, VIT, EIT, EIT50	• Supports L relay element Thermal and DT, SIT, VIT, EIT, EIT50	• Supports L relay element Thermal and DT, SIT, VIT, EIT, EIT50	• Supports L relay element Thermal and DT, SIT, VIT, EIT, EIT50
Trip information maintenance LED	• L, S, I, G/PTA, SP	• L, S, I, G/Gext/PTA, SP	• L, S, I, G/Gext/PTA, SP	• L, S, I, G/Gext/PTA, SP
Accident record – Screen		• 32 accident events indicated [Accident phase/current/time]	• 127 accident events indicated [Accident phase/current/time]	• 127 accident events indicated [Accident phase/current/time]
Accident record – Memory	• 127 accident events indicated [Accident phase/current/time]	• 127 accident events indicated • 6 accident events indicated [Does not support Self-power]	• 127 accident events indicated • 6 accident events indicated [Does not support Self-power]	• 127 accident events indicated • 6 accident events indicated [Does not support Self-power]

Smart Trip Unit

STU types and main functions

		Type N	Type A	Type P	Type S
Measurement function		• Current [R/S/T/N] • Current phase (A phase current standard) • Vector sum image current • Normal and reverse phase current • Current imbalance rate • Current demand before each phase	• Current [R/S/T/N] • External CT current • Current phase (Based on phase A current) • Vector sum image current • Normal and reverse phase current • Current imbalance rate • Current demand before each phase	• 3-phase phase voltage, line voltage • Current [R/S/T/N] • Frequency • External CT current • Voltage/current phase (Based on phase A voltage) • Total/each phase power [P, Q, S] • Total/each power factor • Positive/reverse, effective/ invalid/apparent energy • Vector Sum image voltage • Vector sum image current • Normal and reverse phase voltage • Normal and reverse phase current • Voltage unbalance rate • Current imbalance rate • Current demand before each phase • Demand on the last apparent, reactive, or active power	• 3-phase phase voltage, line voltage • Current [R/S/T/N] • Frequency • External CT current • Voltage/current phase (Based on phase A voltage) • Total/each phase power [P, Q, S] • Total/each power factor • Positive/reverse, effective/ invalid/apparent energy • Vector Sum image voltage • Vector sum image current • Normal and reverse phase voltage • Normal and reverse phase current • Voltage unbalance rate • Current imbalance rate • Current demand before each phase • Demand on the last apparent, reactive, or active power
Measurement accuracy	Current	0.5%	0.5%	0.5%	0.5%
	Voltage			0.5%	0.5%
	Power			class 1.0 (IEC 62053 - 21, 22)	class 1.0 (IEC 62053 - 21, 22)
	Frequency	50, 60 Hz device classification	50, 60 Hz device classification	0.1% (10 ~ 200Hz)	0.1% (10 ~ 200Hz)
PQ function		• 63rd harmonic current • Current THD, TDD, K - Factor	• 63rd harmonic current • Current THD, TDD, K - Factor	• 63rd harmonic current • Voltage THD • Current THD, TDD, K - Factor	• 63rd harmonic current • Voltage THD • Current THD, TDD, K - Factor
Measurement record		• Max Current demand • Max I_o • Max I_n • Max internal temperature	• Max Current demand • Max I_o • Max Ext I_o • Max I_n • Max internal temperature	• Max Current demand • Max active/reactive/apparent power • Demand • Max active power • Max V_o • Max I_o • Max Ext I_o • Max I_n • Max internal temperature	• Max Current demand • Max active/reactive/apparent power • Demand • Max active power • Max V_o • Max I_o • Max Ext I_o • Max I_n • Max internal temperature
Real - time waveform			• Can be checked by communication	• Can be checked by communication • Can be checked on the LCD screen	• Can be checked by communication • Can be checked on the LCD screen

		Type N	Type A	Type P	Type S
Communication		• USB [for on-site operator] (Communication type only)	• USB [for on-site operator] • RS485 / Modbus (Communication type only)	• USB [for on-site operator] • RS485 / Modbus	• USB [for on-site operator] • RS485 / Modbus • BLE • NFC
Power		• [Operation when 30% or more of rated current, based on single-phase load standard]	• [Operation when 30% or more of rated current, based on single-phase load standard] • AC/DC 88 ~ 264V • DC 24 ~ 48V(Future development)	• [Operation when 30% or more of rated current, based on single-phase load standard] • AC/DC 88 ~ 264V • DC 24 ~ 48V(Future development)	• [Operation when 30% or more of rated current, based on single-phase load standard] • AC/DC 88 ~ 264V • DC 2 4~ 48V(Future development)
Event record		• 255 device status changes [Details, status, date]	• 255 device status changes [Details, status, date]	• 255 device status changes [Details, status, date]	• 255 device status changes [Details, status, date]
Clock		• RTC built-in (Back up with battery)	• RTC built-in (Back up with battery)	• RTC built-in (Back up with battery)	• RTC built-in (Back up with battery)
Other LED		• Run, alarm, Self-diagnosis, comm.	• Run, alarm, Self-diagnosis, comm.	• Run, alarm, Self-diagnosis, comm.	• Run, alarm, Self-diagnosis, comm.
Operation button		• Reset button	• Reset/menu/tap/up/down/enter	• Reset button • LCD Touch	• Reset button • LCD Touch
Self-diagnosis	LED	• RUN/AL LED flashing (Red ↔ Blue flashing)	• RUN/AL LED flashing (Red ↔ Blue flashing)	• RUN/AL LED flashing (Red ↔ Blue flashing)	• RUN/AL LED flashing (Red ↔ Blue flashing)
	LCD		Displays the corresponding segment or error number on the LCD	Can be checked on the LCD self-diagnosis screen	Can be checked on the LCD self-diagnosis screen
	List	• Battery Low Alarm : Occurs when the internal battery is not inserted or when the battery voltage is low • Rating Plug Unattached or Error : Occurs when rating plug is not assembled or when there is rating plug error • Ampere Frame Error : Occurs when the value of rating plug is not within 45%~100% of AF • MTD Fail : Occurs when STU is not assembled with MTD or trip coil disconnection occurs • Factory Cfg Error : Occurs when the factory mode setting is entered incorrectly • Device Type Erro r: Occurs when the rating plug information and CT information are different • Over Heat Error : Occurs when CPU internal temperature N/A type exceeds 100 degrees and P/S type exceeds 115 degrees • Contact Wear Alarm : Occurs when CPU internal temperature N/A type exceeds 100 degrees and P/S type exceeds 115 degrees • Electrical Open Count Over Alarm : Occurs when the electrical open count exceeds 80% of the allowable electrical open count • Mechanical Open Count Over Alarm : Occurs when the mechanical open count exceeds 80% of the allowable mechanical open count • RTC Erro r: Occurs when an error occurs in the internal RTC information • Memory Error : Occurs when corruption occurs in the redundant internal settings stored in the internal non-volatile memory • CT disconnection error : Occurs when CT disconnection occurs (monitoring by each phase)			

TRIO

This device is installed on a low-pressure panel or distribution panel to monitor ACB status, remotely open and close operation control, and measure temperature.
DI/DO expansion is possible by linking with communication with STU.

Features

TRIO module can monitor temperature by attaching a separate temperature sensor, and it has built-in DI/DO expansion function, so it can monitor and control the circuit breaker. Compared to the existing TRIO, the number of DI/DO contacts has increased, and the temperature display has been improved to 7-Segment level.

Specifications

Type	Details	Remark
Model name	TRIO	
Rated voltage	DC24V (±10%)	21.6~26.4Vdc
Power consumption	6W or less	
Temperature sensor	4EA	Measurement range : 0~150 °C Error range : ± 3 °C for contact, 5 °C for non-contact Alarm temperature : 55 °C, 65 °C, 70 °C, 80 °C Digital output connection possible Temperature sensor sold separately
DI	General : 4EA CB : 2EA	Cradle status contact monitoring and spring charge status monitoring are possible
DO	General : 3EA CB : 2EA	LATCH, 500ms can be set (CB control possible)
LED	Power LED Comm. LED 3 CB LEDs 4 DI LEDs 3 DO LEDs 4 temperature sensor LEDs	Temperature display 7-Segment 99 °C or less : Display to 1 decimal place 100 °C or more : 1-digit display
Protocol	Modbus RTU	
Communication method	RS485	STU connection possible
Installation type	DIN-Rail, Screw	
Size	72 (W) × 81 (H) × 65 (D), unit : mm	
Use temperature	-25 °C ~ +60 °C	
Storage temperature	-30 °C ~ +70 °C	
Ambient humidity	Within 85% RH, no condensation	

Exterior description

Device usage example

Independent use example

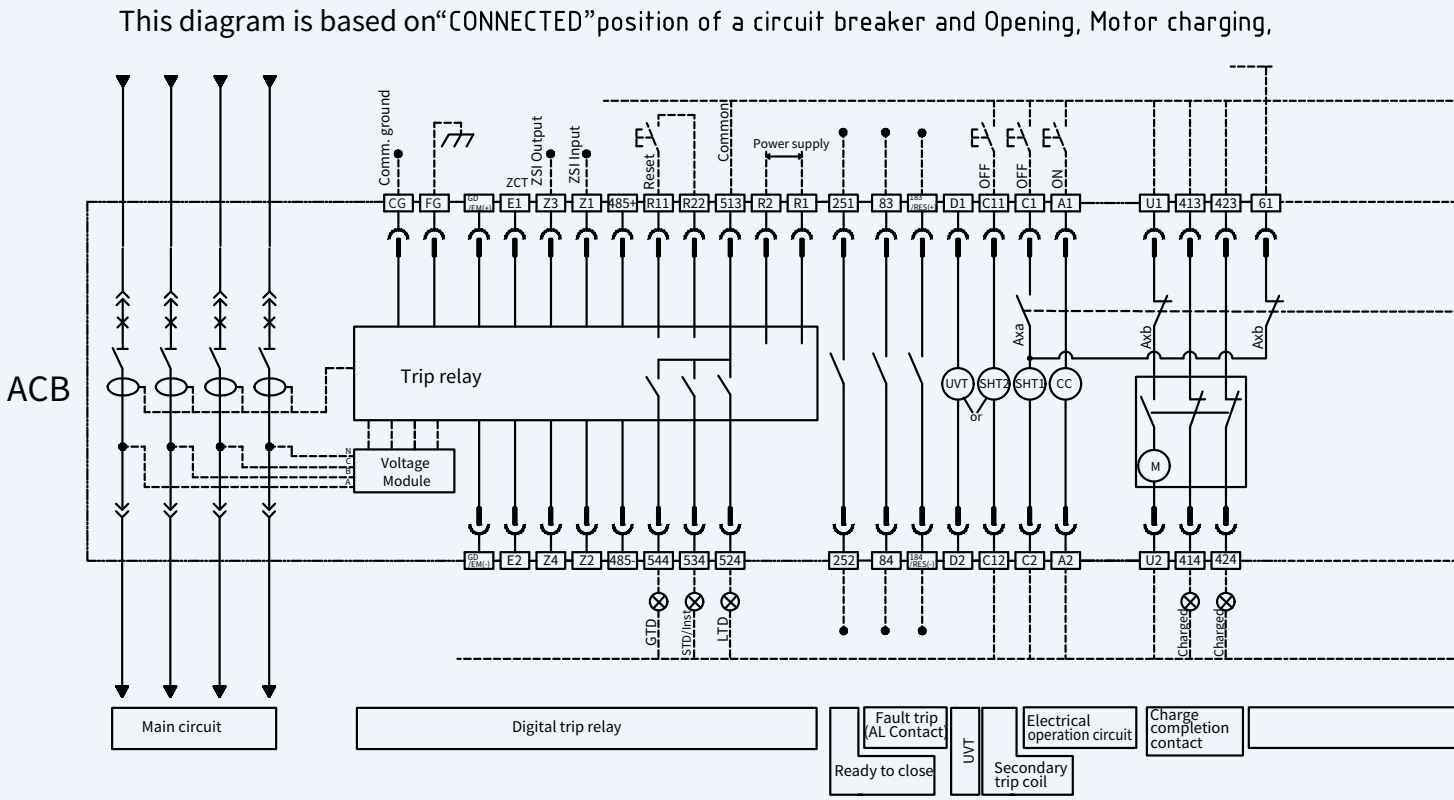
STU connection example

Target device

Circuit breaker	Susol ACB STU, Metasol ACB STU

※Can be used alone

Control circuit diagram



Terminal code description

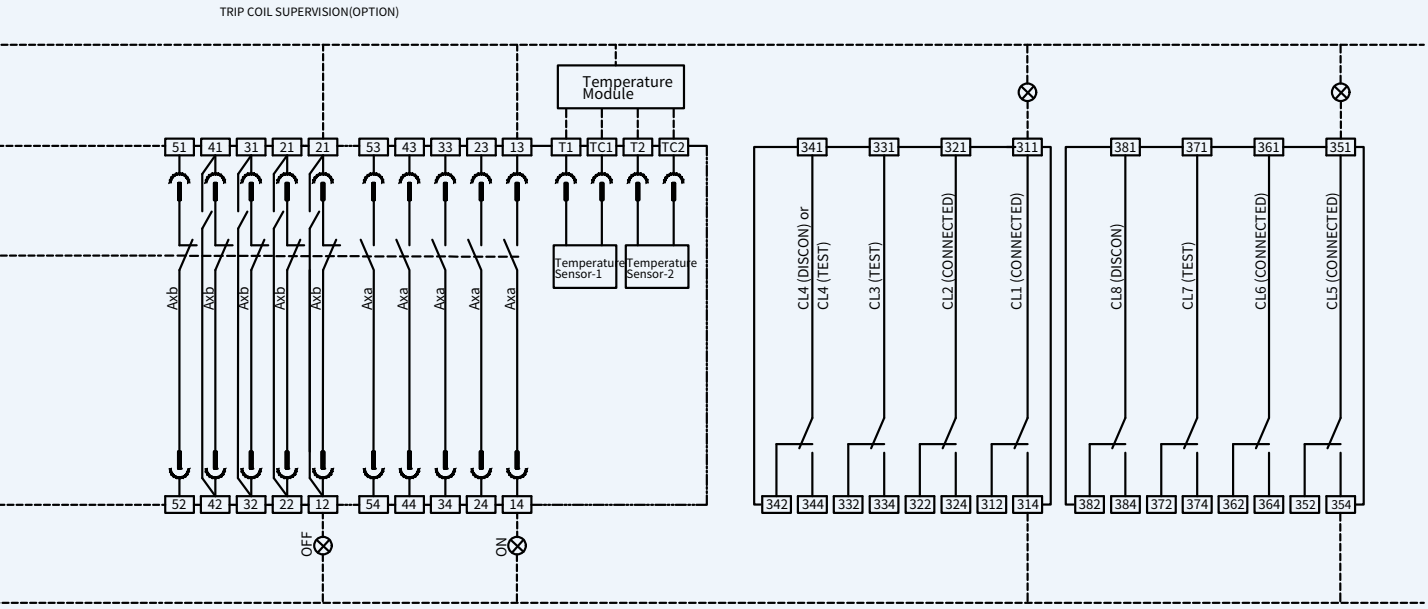
13 14 ~ 63 64	Auxiliary switch "NO"
11 12 ~ 61 62	Auxiliary switch "NC"
413 414	Charged signal
423 424	Charged signal communication
U1 U2	Motor charging
A1 A2	Closing coil
C1 C2	Shunt trip
C11 C12	2nd shunt trip

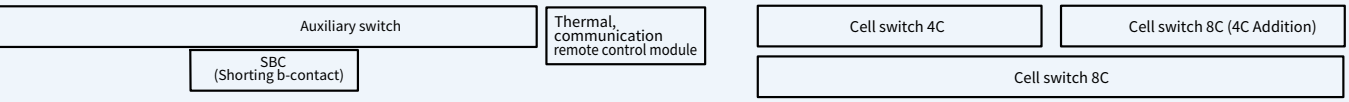
D1 D2	Voltage input terminal of UVT
83 84	Alarm1 "NO"
183 184	Alarm2 "NO"
251 252	Ready to close switch
R1 R2	Control Power
513 ~ 544	Alarm contact
R11 R22	Alarm reset (Trip cause LED, Alarm contact)
485+ 485-	RS-485 communication

Z1 Z2	ZSI input
Z3 Z4	ZSI output
E1 E2	ZCT
GD /EM(+) GD /EM(-)	Group DI or ERMS DI
FG	Frame ground
CG	Communication Ground
TC1 TC2 ~ T1 T2	Temperature module
311 ~ 344	Position switch
911 ~ 914	EARTHING TRUCK

Note) 1. The diagram is shown with circuit de-energized, all devices open, connected and charged and relays in normal position
2. Relay is normal condition and charging type is "OFF-Charging"
3. The standard of auxiliary contact is 3a3b. The auxiliary switch in above diagram is composed of 5a5b. See 48 page for more detail on auxiliary switches.
4. Option
- Ready to close contact, Trip alarm contact, UVT coil, Fully charged contact, secondary trip coil
- Cell switch, Temperature module, Voltage module, Remote close-open module, ZCT, ZSI
5. Please consult us for the use of ZSI (Zone selective Interlocking).
6. Refer to the page 33 for the connection of Trip relay and the page 43 for UVT.
7. For connecting RS-485 verify if the polarity is correct
8. Contact configuration for Cell Switch can be changeable if necessary

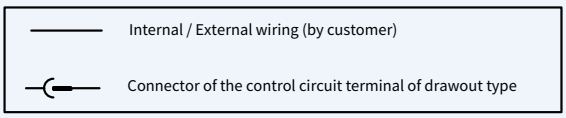
Releasing of locking plate should be normal condition.





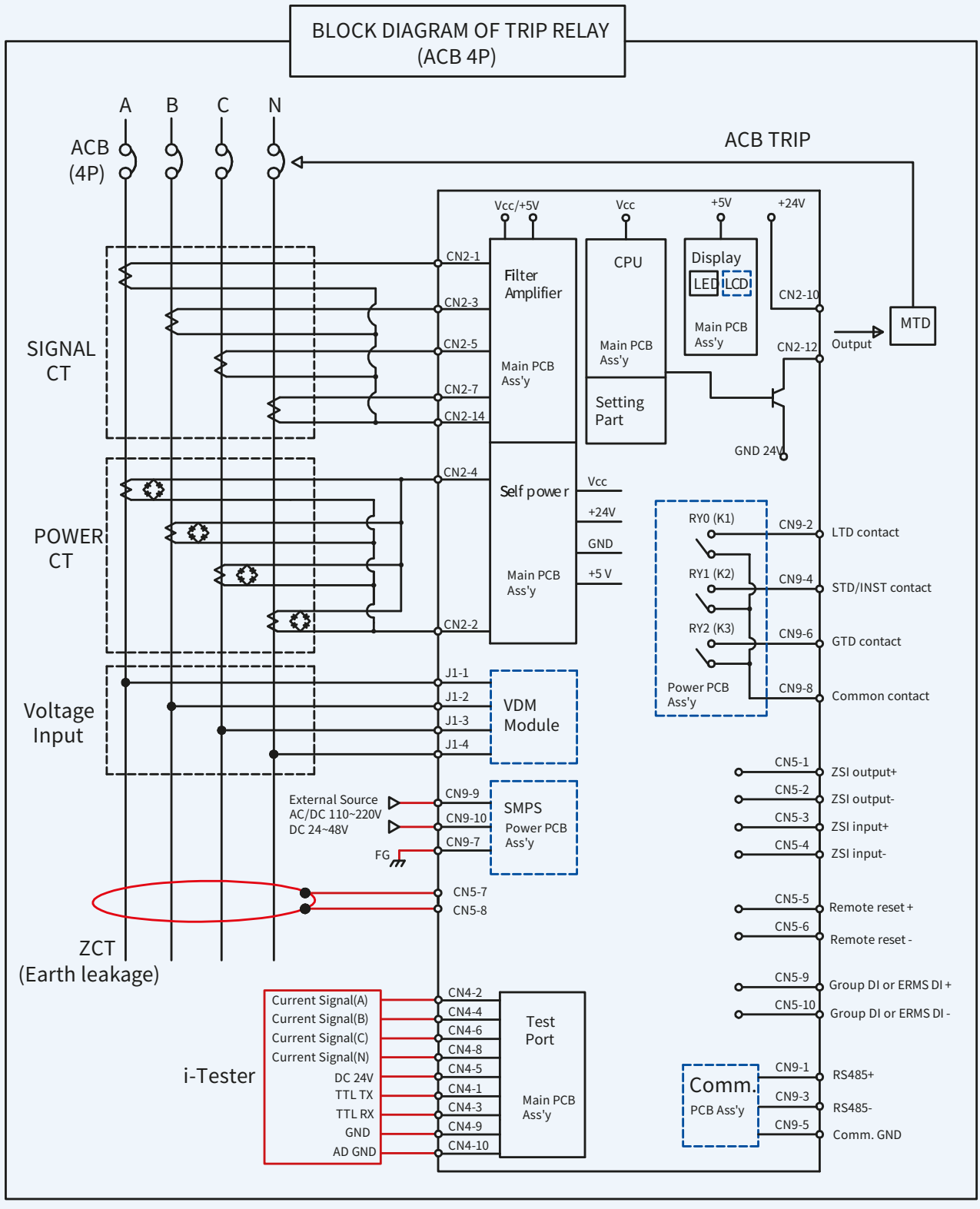
Accessory code description

Axa , Axb	Auxiliary switch
LTD	Long time delay trip indicator
STD/Inst	Short time delay/instantaneous
GTD	Ground fault trip indicator
CL1~CL4	Cell switch
M	Motor
CC	Closing coil
SHT1	Shunt tripping device 1
SHT2	Shunt tripping device 2
UVT	UVT coil

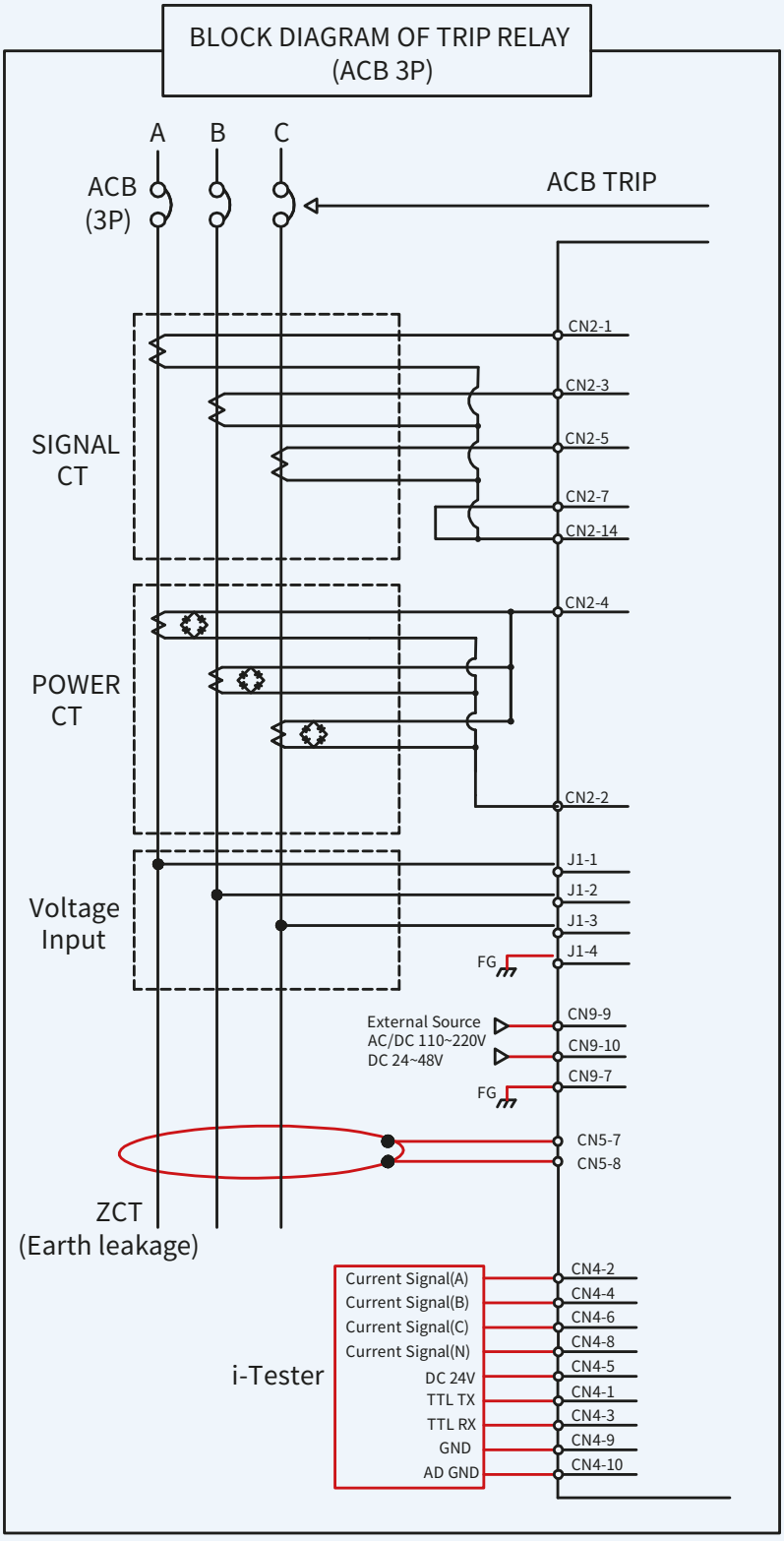


Smart Trip Unit

System diagram



Note: 1. The red display part is for the option order and the user must wire directly.
2. The blue display part must be ordered according to the required specifications when ordering a trip relay.



Susol

Smart Molded Case Circuit Breakers

Susol Smart MCCB is developed by combining digital technology with LS ELECTRIC's power device technology accumulated over 40 years. The relay and measurement functions for line protection has been upgraded. By using accessory devices for connectivity between low-voltage devices, it is possible to diagnose and maintain devices by collecting and analyzing data.

Susol Smart MCCB

1. Overview
- Susol MCCB Overview ····· 50

2. Features
- Susol MCCB features ····· 54

3. Model selecting guide
- Susol MCCB model numbering (Product selection) ····· 56

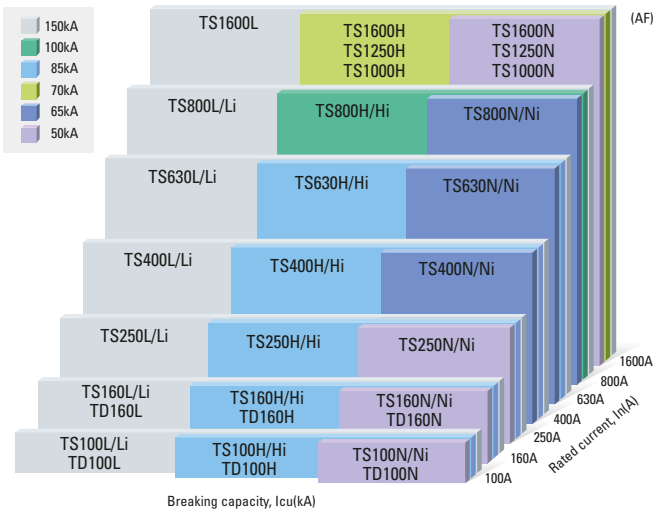
4. External structure and notation ····· 58

5. Rated specifications ····· 60

6. Smart Trip Unit ····· 64

Susol MCCB Overview

Ics=100% Icu : 50, 65, 85, 100, 150kA at 415Vac



TD100/160

Rated current : 16~160A
Icu : 50kA (N), 85kA (H), 150kA (L)
Ics = Icu
90 (W) × 140 (H) × 86mm (D)

TS100/160/250

Rated current : 40~250A
Icu : 50kA (N/Ni), 85kA (H/Hi), 150kA (L/Li)
Ics = Icu
105 (W) × 160 (H) × 86mm (D)

Super performance

The third breaking performance guarantees the original performance.

Icu 150kA
Ui 1000V
Uimp 8kV

5 Frames

TS400/630

Rated current : 300~630A
Icu : 65kA (N/Ni), 85kA (H/Hi), 150kA (L/Li)
Ics = Icu
140 (W) × 260 (H) × 110mm (D)

TS800

Rated current : 700, 800A
Icu : 65kA (N/Ni), 100kA (H/Hi), 150kA (L/Li)
Ics = Icu
210 (W) × 320 (H) × 135mm (D)

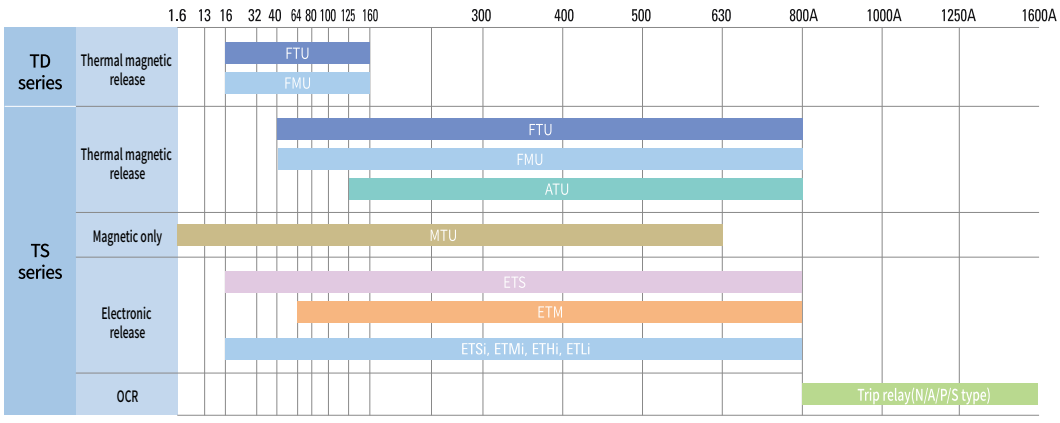
TS1600

Rated current : 1000, 1250, 1600A
Icu : 50kA (N), 70kA (H), 150kA (L)
Ics = Icu
210 (W) × 327 (H) × 152.5mm (D)

Susol
Smart MCCB

Susol circuit breaker's Brain-Trip unit

The trip unit has the core function of monitoring the system and sending an interruption (trip) signal when an error occurs. The Susol circuit breaker have optional adjustable devices for each item as well as simple fixed trip devices. It provides the optimal solution for selection according to the type of load and operation coordination between upper and lower circuit breakers.



Optimal Solution-Trip unit

Type		TD Seris	TS Series		
					
Rated current		16 ~ 160A	40 ~ 800A	40 ~ 800A	800 ~1600A
Trip unit	Thermal electronic type	FMU FTU	FMU FTU ATU	-	DSU
	Magnetic only	-	MTU Note 1)	-	-
	Electronic release	-	ETS ETM Note 2)	ETSi ETMi ETHi ETLi	-
	Switch	DSU	DSU	-	DSU
	OCR	-	-	-	N type A type P type S type

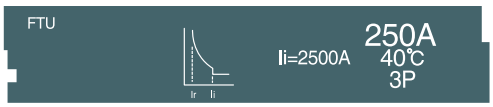
Note 1) 1.6~630A Note 2) 64~800A

100~800AF

For line and device protection

1. Thermal magnetic trip units

- FTU : Fixed thermal, fixed magnetic trip unit
- FMU : Adjustable thermal, fixed magnetic trip unit
- ATU : Adjustable thermal, adjustable magnetic trip unit

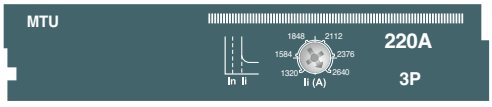


2. Electronic trip units

- ETS/ ETSi : Standard
- ETM/ ETMi : Multi-Function
- ETHi : High-Performance
- ETLi : Limited-Performance

For motor protection

MTU : Magnetic only trip unit



For switch disconnector

DSU : Disconnecting switch unit

1000~1600AF trip relay (OCR)

N type	A type	P type	S type
			
Regular type	Ammeter type	Power meter type	High performance meter type

Susol MCCB features

Susol Smart MCCB

Susol Smart MCCB was developed by integrating digital technology based on power device technology accumulated over 40 years.
Relay and measurement functions for line protection have been upgraded, and by using accessory devices for connectivity between low - voltage devices, data can be collected and analyzed to diagnose and maintain devices.
LS ELECTRIC takes the lead for a smart future with energy digitalization.

Applicable field

The movement for energy digitalization is taking place in various fields.
Susol Smart MCB can be applied to areas such as renewable energy, buildings, industry, and EV charging infrastructure linked to low pressure, in order to safely protect the line with LSIG relay function.

Renewable energy generation | Infrastructure | Residential/ Commercial | Industrial | EV charging infrastructure

Susol MCCB and Susol Smart MCCB device specifications

Common specifications

- Breaking capacity and exterior size
- Insulation voltage upgrade : 750V → 1000V
- Compatible with existing accessories

Susol Smart MCCB features

- Fine relay function that can be finely adjusted : LSIG (Long time protection against overload, Short circuit protection, Instantaneous protection, Earth fault protection)
- Upgraded measurement accuracy : Current Class 1, Voltage ± 0.5%, Power and Power Class 2
- Device diagnosis and maintenance
- Dark gray exterior color with new PI

[Susol MCCB - ETM]

[Susol Smart MCCB - ETLi]

Electronic trip device specification comparison

Type		Susol MCCB		Susol Smart MCCB			
		ETS	ETM	ETSi	ETMi	ETHi	ETLi
Frame size		250/ 630/ 800AF	630/ 800AF	250/ 630/ 800AF			
Line protection	Long time, short circuit, instantaneous	■	■	■	■	■	■
	Ground fault		Option	■	■	■	■
Measurement information	Current	-	■	■	■	■	■
	Voltage, frequency, power factor, power quantity, power quality, etc.	-	-	-	-	■	■
Device operation	System event, fault event (Up to 50)	-	One	-	■	■	■
	Operating time, mechanical frequency, electrical frequency, trip frequency, load usage rate	-	-	-	■	■	■
	Contact wear rate	-	-	-	-	■	■
Communication	RS485	-	■	-	■	■	■
	Mobile communication	-	-	-	-	-	■

• ETS/ ETSi : Standard • ETM/ ETMi : Multi - Function • ETHi : High - Performance • ETLi : Limited - Performance

Smart MCCB (Trip unit : ETSi, ETMi, ETHi, ETLi)
Model numbering (Product selection)

TS 250	Ni	ETHi	630A	3P	-	AX
Basic format/ Ampere frame	Type		Rated current	Number of poles	Plug-in	

TS	100
	160
	250
	400
	630
	800

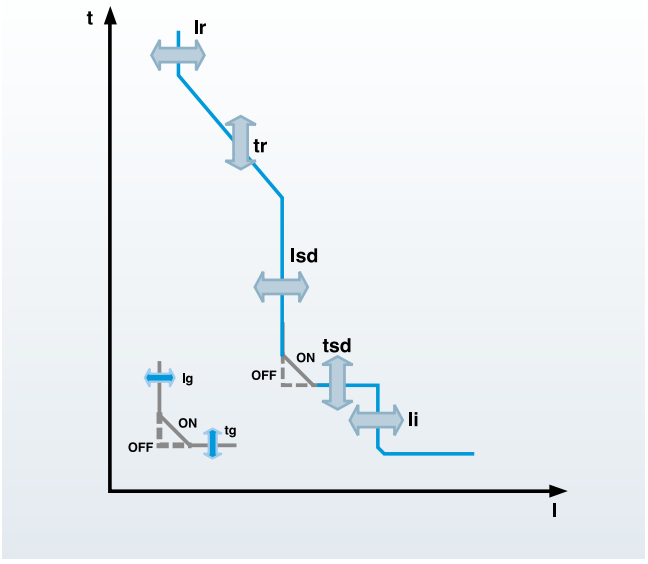
Ni	Normal
Hi	High
Li	Limited

3P	3-pole
4P L	4-pole N-A-B-C (N-R-S-T)
4P R	4-pole A-B-C-N (R-S-T-N)

-	Standard
P	Plug-in

-	Standard
AX	Accessories

Trip Unit (ETU)	
ETSi	Standard
ETMi	Multi-Function
ETHi	High-performance
ETLi	Limited-performance



ETSi, ETMi, ETHi, ETLi

New standard for low voltage circuit breakers

Susol Smart MCCB

Susol Smart MCCB is developed by combining digital technology with
LS ELECTRIC's power device technology accumulated over 40 years.
The relay and measurement functions for line protection has been upgraded.
By using accessory devices for connectivity between low-voltage devices,
it is possible to diagnose and maintain devices by collecting and analyzing data.

External structure and notation

Rated frequency

Utilization category

Symbol indicating suitability for isolation as defined by IEC60947-2

Standard

Certification mark

Alarm Indication LED

Test terminal

Overcurrent indication LED

Unlock Key

Circuit breaker model (Type/Model)

- TS: TS series
- 250 : Frame size
- Ni : Normal (Standard)
- Hi : High
- Li : Limited

Circuit breaker performance

- Ui : Rated insulation voltage
- Uimp : Impulse withstand voltage
- Ue : Rated operational voltage
- Icu : Ultimate breaking capacity
- Ics : Service breaking capacity

	250AF	630AF	800AF
Ni	TS100Ni TS160Ni TS250Ni	TS400Ni TS630Ni -	TS800Ni - -
Hi	TS100Hi TS160Hi TS250Hi	TS400Hi TS630Hi -	TS800Hi - -
Li	TS100Li TS160Li TS250Li	TS400Li TS630Li -	TS800Li - -
Ni	50kA	65kA	65kA
Hi	85kA	85kA	100kA
Li	150kA	150kA	150kA

CB Test certificate by UL

· Ref.Certificate No. : DK-85164-UL
· Standard No. IEC60947-2

Company logo
Upstream connections
Attachment Hole
Indication of closed (I/ON) position
Indication of closed (I/ON) position
Operation handle
Indication of open (O/OFF) position
Trip test button
Trip device type
Rating of trip unit
Trip unit operation button
Attachment hole
Downstream connections

Rated specifications

Susol Smart MCCB

When selecting a device, Susol Smart MCCB selects the type and rating of the main body and trip device, respectively.

Frame

Optional
- Model numbering (Example : TS100)
- Number of poles (Example : 3 poles)
- Breaking capacity (Example: Ni 50kA/460V)

Electronic trip unit

Trip Unit

L : Long time protection against overload
S : Short circuit protection
I : Instantaneous protection
G : Earth fault protection

Optional
- Trip Unit type (Example : ETSi)
- Rated current (Example : 100A)

ETSi (basic type)
LSIG relay, current measurement

ETMi (Multi - function)
LSIG relay, current measurement, communication function

ETHi (High - Performance)
LSIG relay, current/voltage/ power measurement,

LSIG relay, current/voltage/ power measurement, communication function, mobile

Frame

Model			TS100			TS160		
Frame size		[AF]	100			160		
Number of poles			3, 4			3, 4		
[Pole]	Type	Type	Ni	Hi	Li	Ni	Hi	Li
Rated breaking current, Icu	220/240V	[kA]	100	120	200	100	120	200
	380/415V	[kA]	50	85	150	50	85	150
	440/460V	[kA]	50	70	130	50	70	130
	480/500V	[kA]	42	65	85	42	65	85
	525V	[kA]	22	35	50	22	35	50
	660/690V	[kA]	10	10	10	10	10	10

Trip Unit

Rated current	In	40, 100	40, 100, 160
Overload protection setting current (Long time)	Ir	0.4 × In ~ 1.0 × In (1A unit)	
Tripping time (Long time)	tr	0.5, 1 2, 4, 8, 16 (second)	
Short circuit protection setting current	Isd	1.5 ~ 10 × Ir (0.5 unit)	
Tripping time (Short circuit)	tsd	I²t Off : 0, 0.1, 0.2, 0.3, 0.4 (second) I²t On : 0.1, 0.2, 0.3, 0.4 (second)	
Instantaneous protection setting current	Ii	40~160A : 1.5 ~ 15 × In (0.5 unit) 250~400A : 1.5 ~ 12 × In (0.5 unit) 630~800A : 1.5 ~ 11 × In (0.5 unit)	
Earth fault protection setting current	Ig	40A : 0.45 ~ 1.0 × In (0.05 unit) 100A : 0.35 ~ 1.0 × In (0.05 unit) 160A : 0.25 ~ 1.0 × In (0.05 unit) In > 160A : 0.2 ~ 1.0 × In (0.05 unit)	
Tripping time (Earth fault)	tg	I²t Off : 0, 0.1, 0.2, 0.3, 0.4 (second)) I²t On : 0.1, 0.2, 0.3, 0.4 (second)	
Additional functions		Selective protection (ZSI)	




	TS250			TS400			TS630			TS800		
	250			400			630			800		
	3, 4			3, 4			3, 4			3, 4		
	Ni	Hi	Li	Ni	Hi	Li	Ni	Hi	Li	Ni	Hi	Li
	100	120	200	100	120	200	100	120	200	100	120	200
	50	85	150	65	85	150	65	85	150	65	100	150
	50	70	130	65	85	130	65	85	130	65	100	130
	42	65	85	42	65	85	42	65	85	42	85	100
	22	35	50	22	35	50	22	35	50	22	35	50
	10	10	10	10	20	35	10	20	35	10	20	35

	40, 100, 160, 250	250, 400	250, 400, 630	630, 800
	0.4 × In ~ 1.0 × In (1A unit)			
	0.5, 1 2, 4, 8, 16 (second)			
	1.5 ~ 10 × Ir (0.5 unit)			
	I^2t Off : 0, 0.1, 0.2, 0.3, 0.4 (second) I^2t On : 0.1, 0.2, 0.3, 0.4 (second)			
	40~160A : 1.5 ~ 15 × In (0.5 unit) 250~400A : 1.5 ~ 12 × In (0.5 unit) 630~800A : 1.5 ~ 11 × In (0.5 unit)			
	40A : 0.45 ~ 1.0 × In (0.05 unit) 100A : 0.35 ~ 1.0 × In (0.05 unit) 160A : 0.25 ~ 1.0 × In (0.05 unit) In > 160A : 0.2 ~ 1.0 × In (0.05 unit)			
	I^2t Off : 0, 0.1, 0.2, 0.3, 0.4 (second) I^2t On : 0.1, 0.2, 0.3, 0.4 (second)			
	Selective protection (ZSI)			

Rated specifications

Susol Smart MCCB

Type				TS100			TS160		
Fame size			[AF]	100			160		
Rated current, In			[A]	40, 100			40, 100, 160		
No. of poles				3, 4			3, 4		
Rated operational voltage, Ue [AC]			[V]	690			690		
Rated impulse withstand voltage, Uimp			[kV]	8			8		
Rated insulation voltage, Ui			[V]	1000			1000		
				Ni	Hi	Li	Ni	Hi	Li
Rated ultimate short-ciucuit breaking capacity, Icu	AC 50/60Hz	220/240V	[kA]	100	120	200	100	120	200
		380/415V	[kA]	50	85	150	50	85	150
		440/460V	[kA]	50	70	130	50	70	130
		480/500V	[kA]	42	65	85	42	65	85
		525V	[kA]	22	35	50	22	35	50
		660/690V	[kA]	10	10	10	10	10	10
Rated service breaking capacity, Ics	AC 50/60Hz	220/240V	[kA]	100	120	200	100	120	200
		380/415V	[kA]	50	85	150	50	85	150
		440/460V	[kA]	50	70	130	50	70	130
		480/500V	[kA]	42	65	85	42	65	85
		525V	[kA]	22	35	50	22	35	50
		660/690V	[kA]	5	5	5	5	5	5
Rated short-circuit making capacity, Icm	AC 50/60Hz	220/240V	[kA]	220	265	440	220	264	440
		380/415V	[kA]	105	187	330	105	187	330
		440/460V	[kA]	105	154	286	105	154	286
		480/500V	[kA]	88	143	187	88	143	187
		525V	[kA]	46	74	105	46	74	105
		660/690V	[kA]	17	17	17	17	17	17
Category fo utilization				A			A		
Isolation behavior				■			■		
Trip unit(release) : Electronics		ETSi		■			■		
		ETMi		■			■		
		ETHi		■			■		
		ETLi		■			■		
Connection	fixed	front-connection		■			■		
		rear-connection		■			■		
	plug-in	front-connection		■			■		
		rear-connection		■			■		
Basic dimensions, W × H× D		3-pole	[mm]	105 × 160× 86			105 × 160× 86		
(front-connection)		4-pole	[mm]	140 × 160× 86			140 × 160× 86		




	TS250			TS400			TS630			TS800		
	250			400			630			800		
	40, 100, 160, 250			250, 400			250, 400, 630			630, 800		
	3, 4			3, 4			3, 4			3, 4		
	690			690			690			690		
	8			8			8			8		
	1000			1000			1000			1000		
	Ni	Hi	Li	Ni	Hi	Li	Ni	Hi	Li	Ni	Hi	Li
	100	120	200	100	120	200	100	120	200	100	120	200
	50	85	150	65	85	150	65	85	150	65	100	150
	50	70	130	65	85	130	65	85	130	65	100	130
	42	65	85	42	65	85	42	65	85	42	85	100
	22	35	50	22	35	50	22	35	50	22	35	50
	10	20	35	10	20	35	10	20	35	10	20	35
	100	120	200	100	120	200	100	120	200	100	120	200
	50	85	150	65	85	150	65	85	150	65	100	150
	50	70	130	65	85	130	65	85	130	65	100	130
	42	65	85	42	65	85	42	65	85	42	85	100
	22	35	50	22	35	50	22	35	50	22	35	50
	5	5	5	10	12	12	10	12	12	10	20	20
	220	264	440	220	264	440	220	264	440	220	264	440
	105	187	330	143	187	330	143	187	330	143	220	330
	105	154	286	143	187	286	143	187	286	143	220	286
	88	143	187	88	143	187	88	143	187	88	187	220
	46	74	105	46	74	105	46	74	105	46	74	105
	17	17	17	17	40	74	17	40	74	17	40	74
	A			A			A			A		
	■			■			■			■		
	■			■			■			■		
	■			■			■			■		
	■			■			■			■		
	■			■			■			■		
	■			■			■			■		
	■			■			■			■		
	■			■			■			■		
	■			■			■			■		
	105 × 160× 86			140 × 260 × 110			140 × 260 × 110			210 × 320 × 135		
	140 × 160× 86			186.5 × 260 × 110			186.5 × 260 × 110			280 × 320 × 135		

Smart Trip Unit - ETSi, ETMi, ETHi, ETLi (Electronic)

Trip Unit exterior

Trip Unit type

ETU of Susol Smart MCCB is equipped with basic type (ETSi) that performs current measurement for each AF and rated current, and advanced type (ETMi) trip unit with communication function, a high-end (ETHi) trip unit that performs voltage measurement in communication functions, and various electronic trip units capable of mobile (BLE) communication (ETLi).

ETSi (Standard)

ETMi (Multi-Function)

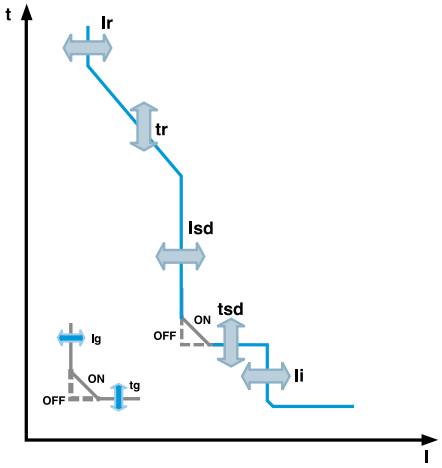
ETHi (High-Performance)

ETLi (Limited)

Trip Unit Rated current

AF	Rated current250
100AF	40A, 100A
160AF	40A, 100A, 160A
250AF	40A, 100A, 160A, 250A
400AF	250A, 400A
630AF	250A, 400A, 630A
800AF	630A, 800A

Trip Unit features

ETU		ETSi	ETMi	ETHi	ETLi
Relay (setting)					Long time Short circuit Instantaneous Ground fault
Button		●	●	●	●
LCD		●	●	●	●
Status LED		●	●	●	●
Test Port		●	●	●	●
Measurement	Current	●	●	●	●
	Power	-	-	●	●
Communication	RS485	-	●	●	●
	BLE	-	-	-	●

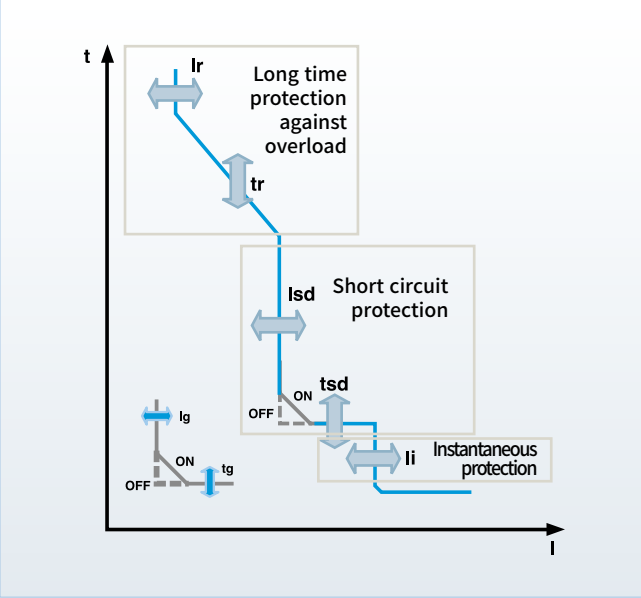
Smart Trip Unit - ETSi, ETMi, ETHi, ETLi (Electronic)

Overcurrent protection relay

Smart MCCB's ETU basically performs relay operation function for long time, short time, instantaneous and ground fault, and provides an alarm indicating LED related to overcurrent display.
Relay item setting for relay operation can be set by using the button on the front of ETU.
To change the relay action setting, press the 'unlock' button, change the setting in the 'unlock' state ( ),
and after completing the setting, press the 'unlock' button to switch to the 'lock' state ( ).
During the setting change, if there is no button input for more than 1 minute, the device automatically switches to the 'lock' state ( ).

Type		ETSi	ETMi	ETHi	ETLi
Relay setting	Ir, tr, Isd, tsd, Ii, Ig, tg	●	●	●	●

Characteristic curve



1) Long time overcurrent relay (Long time protection) : Performs caloric relay and the operating current (Ir) and operating time (tr) can be set.
2) Short time overcurrent relay (Short time protection) : The operating current (Isd) and operating time (tsd) can be set.
3) Instantaneous overcurrent relay : The operating current (Ii) can be set.
4) Ground fault relay (Ground fault protection) : You can set whether to use ground fault relay, operating current (Ig) and operating time (tg).
5) N - phase protection relay : N-phase protection relay can be set for a 4-wire type instrument.
- Off : No protection
- 100% : N-phase protection for 100% × Ir
- 50% : Perform N-phase protection for 50% × Ir
- ON : Performs N-phase protection for 160% × Ir when Ir setting is set to '<0.63xIn'
(Used for load usage conditions that contain a lot of harmonics)
6) ZSI (Zone Selective Interlocking : Breaks the protected area selectively.

*It is necessary to set the relay so that the circuit breaker does not malfunction due to inrush current.
(In case of motor or capacitor load, inrush current of several times the rated current may occur.)

Relay specification table

Protection	Item	Setting range								Remark
Long time (overload)	Operating current (Ir)	Rated current		Min (0.4 × In)			Max (1.0 × In)			1A unit adjustment
		40A		16A			40A			
		100A		40A			100A			
		160A		64A			160A			
		250A		100A			250A			
		400A		160A			400A			
		630A		252A			630A			
		800A		320A			800A			
	Operating time (tr) error range : ±20%	Setting		0.5	1	2	4	8	16	Unit : seconds
		Operation time	1.5 × Ir	11	22	45	90	180	360	
			6 × Ir	0.5	1	2	4	8	16	
			7.2 × Ir	0.35	0.7	1.4	2.8	5.5	11	
Short circuit	Operating current (Isd) error range : ±10%	1.5 × Ir ~ 10 × Ir (18 steps)								0.5 times unit adjustment
	Operating time (tr) error range : ±20%	Setting	I²tOff	0	0.1	0.2	0.3	0.4		Unit : seconds
			I²tOn	-	0.1	0.2	0.3	0.4		
		I²tOff Operation time	Non - operation	0.02	0.08	0.14	0.24	0.35		
			Maximum operation	0.08	0.14	0.24	0.35	0.50		
Instan-taneous	Operating current (Isd) error range : ±15%	Setting	Rated current	Range						0.5 times unit adjustment
			40A ~ 160A	1.5 × In ~ 15 × In (28 steps)						
			250A ~ 400A	1.5 × In ~ 12 × In (22 steps)						
			630A ~ 800A	1.5 × In ~ 11 × In (20 steps)						
		Non - operation time : 10ms, Maximum operating time : 60ms								
Earth fault	Operating current (Isd) error range : ±10%	Setting	Rated current	Range						0.05 times unit adjustment
			40A	0.45 × In ~ 1.0 × In (12 steps)						
			100A	0.35 × In ~ 1.0 × In (14 steps)						
			160A	0.25 × In ~ 1.0 × In (16 steps)						
			In > 160A	0.2 × In ~ 1.0 × In (17 steps)						
	Operating time (tr) error range : ±25%	Setting	I²tOff	0	0.1	0.2	0.3	0.4		Unit : seconds
			I²tOn	-	0.1	0.2	0.3	0.4		
		I²tOff Operation time	Non - operation	0.02	0.08	0.14	0.24	0.35		
			Maximum operation	0.08	0.14	0.24	0.35	0.50		

Smart Trip Unit - ETSi, ETMi, ETHi, ETLi (Electronic)

Measurement specification table

Type		ETU Type				Display	
		ETSi	ETMi	ETHi	ETLi	ETU	3.5" HMI
Current	Each phase current (Ia, Ib, Ic, In)	●	●	●	●	●	●
	Maximum current (Imax of Ia, Ib, Ic, In)	●	●	●	●	●	
	Ground fault current (Ig)	●	●	●	●	●	
	Maximum ground fault current (Imax of Ig)	●	●	●	●	●	
	Average current : Iavg = (Ia + Ib +I c)/3	●	●	●	●		
	Unbalance rate : Iunbal(%) = (Imax – Iavg)/Iavg	●	●	●	●		
Voltage	Phase voltage (Va, Vb, Vc)/Line voltage (Vab, Vbc, Vca)			●	●	●	●
	Average voltage : Vavg = (Va(Vab) + Vb(Vbc) + Vc(Vca))/3			●	●		
	Unbalance rate : Vunbal(%) = (Vmax – Vavg)/Vavg			●	●		
Frequency	Hz			●	●		●
Power	Active, Reactive, Apparent Power (total, for each phase)			●	●	▲ (Total)	▲ (Total)
Power factor	Power Factor (total, each phase)			●	●		▲ (Total)
Power quantity	Forward/reverse valid and invalid, apparent power quantity			●	●	▲ (Forward Yes/No, Apparent)	●
Demand (Previous, Max)	Current (Ia, Ib, Ic)		●	●	●		▲ (Max)
	Electric power (effective, invalid, apparent)			●	●		▲ (Max)
Power Quality	THDV : Total Harmonic Distortion V			●	●		●
	THDI : Total Harmonic Distortion I		●	●	●		●

Measurement accuracy

- Reference standards : IEC 61557-12
- Current : Three phase equilibrium (0.2 ~ 0.4In : ± 1.5%, 0.4 ~ 1.2In : ± 1.0%), single phase (0.2 ~ 1.2In : ± 2.0%)
- Voltag : ±0.5%
- Power and power quantity : Class 2

Type		Error range	Error
Power/Electricity	PF 1.0	0.2~0.4In	±2.5%
		0.4~1.2In	±2.0%
	PF 0.5 PF 0.8	0.4~0.8In	±2.5%
		0.8~1.2In	±2.0%

*Note : Refer to the current measurement value of the LCD, etc. for poor internal current conduction (defect).

ZSI function

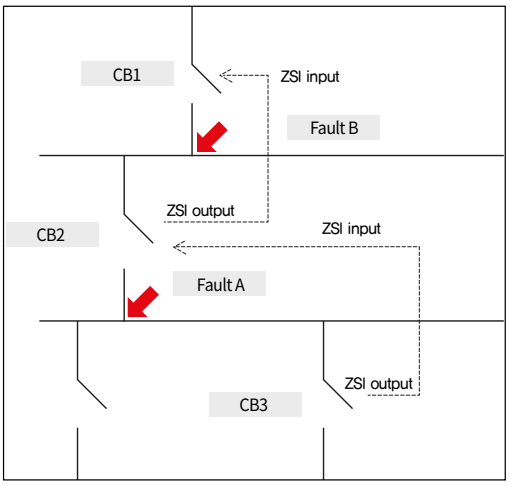
The ZSI function is used to minimize the impact that MCCB and other electrical devices receive under accident conditions by reducing the delay time that the device eliminates the failure.

1) While a short time or ground fault occurs in a system where ZSI is set, the device at the point of failure generates a ZSI signal output to suppress the operation of the host device.

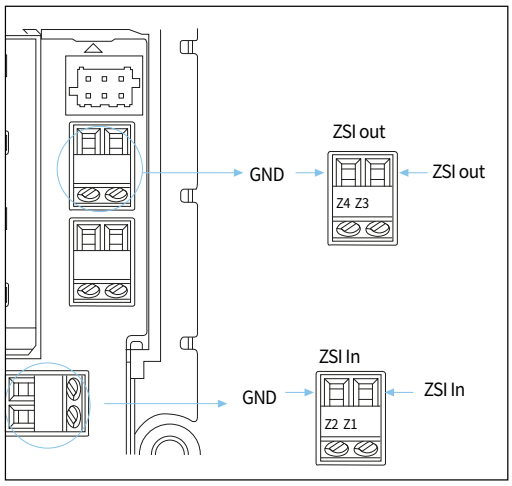
2) The MCCB at the point of failure is performed immediately and with minimum operating time without time delay to eliminate the fault.

3) The upper circuit breaker that receives the ZSI input signal operates according to the short time or ground operation delay time set for protection coordination on the system, but the upper circuit breaker that does not receive the ZSI input signal from the lower circuit breaker performs immediately without time delay in minimal operating time.

For normal ZSI operation, the operation time must be set properly for protection coordination so that the lower unit operates before the upper unit in case of short time relay/ground fault.



[ZSI operation]



[External I / O Board]

※Whether or not to use the ZSI function can be set in the ZSI PIN connection status and relay setting mode.
(ZSI used: ZSI pin removed, ZSI not used : ZSI pin fastened)
-When ZSI is set to enable, ZSI function operates.
-ZSI input signal is input to External I/O Board input terminal.

Smart Trip Unit - ETSi, ETMi, ETHi, ETLi (Electronic)

Diagnosis and maintenance

Smart MCCB's ETU can save various operation contents such as device operation and setting change.
It can also check its contents through communication and HMI.

Record

1) System events
- Possible up to 50 records including the event type and time
- If the number exceeds
- 50, the oldest event is deleted sequentially (Roll-Over)

2) Fault event
- When an accident occurs due to relay operation, up to 50 records including the type and time of occurrence is possible
- If the number exceeds ・50, the oldest event is deleted sequentially (Roll-Over)
- Accident waveform record: Records up to 2 accident waveforms (current and voltage waveform, 8 cycles)

3) Max. Demand and Max. Power value
- Records occurrence value and occurrence time

4) Device operation
- Operation/circuit breaker on (input) hour
- Circuit breaker/trip operation count
- Contact wear rate (%) : Wear rate according to the number of electrical openings and closings of the main body
- Load Profile : Hours of use according to the load used (hour)
  Classified into 4 levels (0~49% In, 50~79% In, 80~89% In,> 90% In)

Device management

ETU with communication function can obtain device information using communication.
- Communication related items (Communication address, speed etc.)
- Manufacturer
- Serial number
- Firmware version
- Model name, etc.

Characteristic

Type			ETU Type				Display	
			ETSi	ETMi	ETHi	ETLi	ETU	3.5" HMI
Event record	System	Status change, setting change, system control, etc. Generated when an event occurs (up to 50) -Occurrence event type and occurrence time	–	●	●	●	–	●
	Fault	Accident (long time relay/short time relay/instantaneous/ground fault) Generated on occurrence (up to 50) -Accident type, accident value and occurrence time	–	●	●	●	–	●
Maximum value record	Demand (Occurrence value and time)	Ia, Ib, Ic	–	●	●	●	–	●
		Active/reactive/apparent power	–	–	●	●	–	●
	Power (Occurrence value and time)	Active/reactive/apparent power	–	–	●	●	▲ (Occurrence value)	–
Device operation	Operating time (hour)		–	●	●	●	–	●
	Circuit breaker on time (hour)		–	●	●	●	–	●
	Circuit breaker mechanical and electrical operation frequency (number of times)		–	●	●	●	–	●
	Circuit breaker electrical operation frequency (number of times)		–	●	●	●	–	●
	Trip count (number of times)		–	●	●	●	–	●
	Contact wear rate (%)		–	–	●	●	–	●
	Load profile		–	●	●	●	–	–

Communication

RS485 communication

1) Communication method : Modbus RTU
2) Communication speed : 9,600, 19,200, 38,400 bps
3) Communication distance : up to 5m (between devices), maximum number of connections is 16
4) DC 24V power supplied from outside
5) Slave address : 1 ~ 247
6) Transmission information : device status and measured values, setting information, record data, etc.
※Communication is possible only when there is an external power supply (DC 24).

Tester Port communication

1) External power supply (DC 12V) input
2) Connected devices : i-Tester, IPBM
: Relay test current signal input

BLE Communications

1) Distance possible for communication : 4m (Open space standard)
2) Transmission information : Device status and measured values, setting information, record data, etc.
※Communication is possible only when there is an external power supply (DC 24).

*When power is supplied to the device again, the device time is reset to 1 : 01 : 01 on January 1, 2018.

E TAG for MCB/Metasol MCCB

It provides a management solution for electricity measurement,
wireless communication on low-voltage customer.

E TAG for MCB/Metasol MCCB

1. E TAG / E COLLECTOR ····· 74

2. Miniature Circuit Breakers – Ultra-small breaker (BK63H) ····· 76

E COLLECTOR

E TAG 32A/63A (for MCB)

E TAG 100A (for MCB/Metasol MCCB)

E TAG / E COLLECTOR

It is a device that performs power monitoring in a low voltage panel.
E TAG (Small sensing module) wirelessly transmits the measured power information to the E COLLECTOR.
E COLLECTOR provides power information to customers.

Features

- **Power monitoring at the extreme end load**
  : Measurement of voltage/current/power, power quantity
- **Miniaturization design (suitable for panel)**
  : E TAG - tag structure (Installable form in MCB)
  : E COLLECTOR - Din Rail mounting structure
- **Wireless communication**
  : Minimizes installation space and provides installation convenience
- **Easy to collect power information**
  : One-gate information collection and operation in Smart LV panel

Specification (E COLLECTOR)

Type	Details
Model name	IWM - ET - F24
Rated voltage	AC 110/220V, 50/60Hz
Number of connections for E TAG	20 or less recommended (up to 40)
LED	3 (Status, RF, Communication)
Protocol	Modbus RTU, Modbus TCP
Communication method	RS485, Ethernet, Wireless communication
Convergence time	Within 10 seconds
Mounting method	DIN-Rail
Size	72 (W) × 81 (H) × 65 (D), unit : mm
Weight	Approximately 200 g
Power Consumption	5W or less
Use temperature	-25 ~ +60 °C
Storage temperature	-40 ~ +80 °C

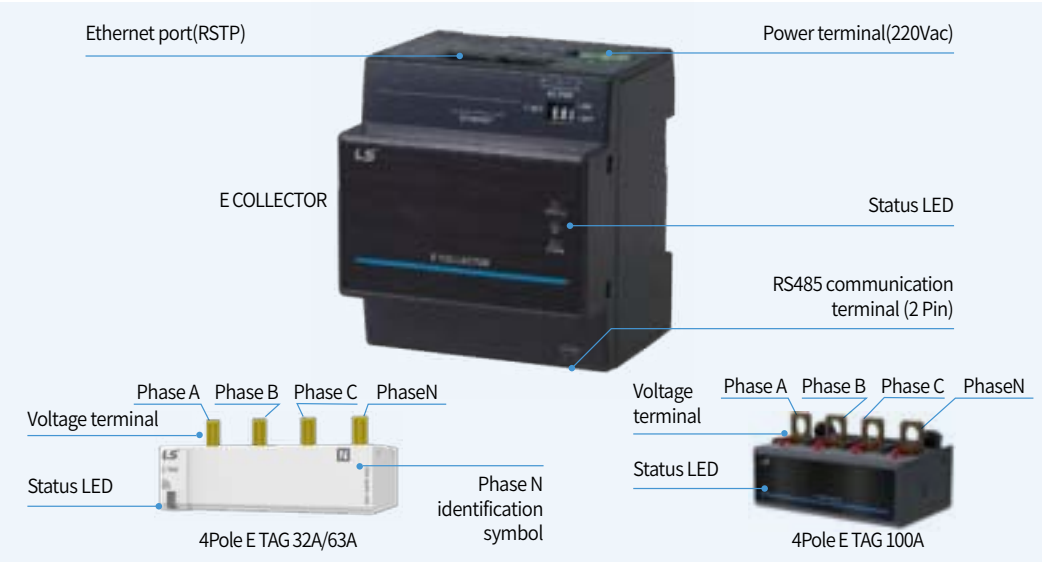
Wireless communication specifications

Type	Details	Remark
Wireless standard	IEEE 802.15.4	
Wireless output	0 dBm or less	
Frequency band	2.405MHz ~ 20480MHz	
Maximum number of sensors	40ea	Wireless communication cycle -20 or less : 5 seconds -21 or more : 10 seconds

Specification (E TAG)

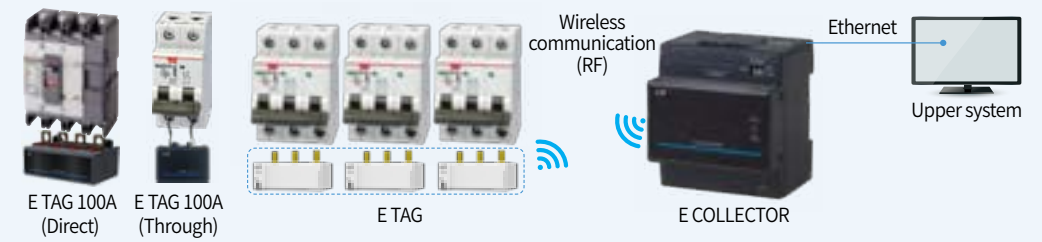
Type		1Pole	2Pole	3Pole	4Pole
Model name	32A	ISM - 11PB - 32A	ISM - 12PB - 32A	ISM - 33PB - 32A	ISM - 34PB - 32A
	63A	ISM - 11PB - 63A	ISM - 12PB - 63A	ISM - 33PB - 63A	ISM - 34PB - 63A
	100A(Direct)		ISM-21PB-100A-S	ISM-31PB-100A-S	ISM-41PB-100A-S
	100A(Through)		ISM-22PB-100A-T	ISM-32PB-100A-T	ISM-42PB-100A-T
Number of poles		1P + N	1P + N	3P	3P + N
Rated voltage		220V	220V	380V	220V/380V
Rated current		32/ 64A			
Rated frequency		60Hz			
Measurement factor	Current	●	●	●	●
	Voltage	● Phase voltage	● Phase voltage	● Line voltage	● Phase/line voltage
	Power(quantity), power factor	●	●	●	●
	Internal temperature(100A only)	-	Range : 0°C ~ 60°C @±1°C		
	Leakage current(100A only)	-	Range : 0~60mA (Accuracy : ±3mA (Avg.))		
Communication method		Wireless communication, 2.4GHz			
Combination method		Bottom attach			
Power consumption		2W or less			
Use temperature		-25 ~ +60 °C (Standard operating temperature : +23 °C)			
Storage temperature		-40 ~ +80 °C			
Humidity		Within 85% RH, no condensation			

Exterior description



Example of device usage

It is installed on the load side of the circuit breaker (MCB) to measure load power and provides power information wirelessly to the E COLLECTOR. E COLLECTOR provides the collected power information to customers through wired communication (RS485, Ethernet).



Ultra-small circuit breaker (BK63H)

- Number of poles : 1P, 2P, 3P, 4P
- Rated current : 1 ~ 63A
- Rated breaking capacity : 10kA
- Instantaneous trip characteristics : B, C, D
- Protection function : Overload and short circuit current
- Status display and dual terminal application
- Accessories : AX, AL, SHT, UVT, OVT

Specification

On/Off status display

Type			BK63H	
Frame size			63AF	
Number of poles			1P, 2P, 3P, 4P	
Rated current, In			1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A	
Rated breaking current	Applicable standards	Voltage	1P	2P, 3P, 4P
	IEC 60947-2, Icu	AC 415V	-	10kA
		AC 240V	10kA	-
		Ics (=%Icu)	75%	75%
	IEC 60898	AC 240/415V	10kA	10kA
Rated voltage		AC	240V	240/415V
		DC	60V	125V
Rated insulation voltage (Ui)			AC 500V	
Rated impulse voltage (Uimp)			AC 6kV	
Rated frequency			50/60 Hz	
Instantaneous trip characteristics			B (4In), C (7.5In), D (12In)	
Protection function			Overload, short circuit current	
Endurance life		Electrical	10,000 times	
		Mechanical	20,000 times	
Protection grade			IP20	
Wire dimension and torque			18-4 AWG (0.75 ⋯ 25mm²) 20 Kgf.cm	
Installation method			Using 35mm DiN rail	
Terminal structure			Lug/Screw dual structure	
Over current trip method			Thermal - Magnetic	
Ambient temperature			-25 ~ +55 °C (use)	
Certification status			CE, Safety certification (KC), SEMKO CB Classification : ABS, BV, DNV, GL, KR, LR, RINA	

Memo

Smart LV Solution accessory device

The accessories of Smart LV Solution consist of devices with the latest IoT technology.
Each device performs functions of measurement, diagnosis, communication, control, monitoring and test to change the distribution panel and switchboard smartly.

Smart LV Solution Accessory device

1. Gateway 80
2. Ethernet Converter 82
3. M LINK 84
4. T Connection Module 86
5. Communication / power connection cable 87
6. i-Tester 88
7. Portable Battery & Trip Module 90
8. DC Power Module 91
9. Smart accessories 93
10. Sample composition 94

Gateway

Gateway is the communication device of Smart LV Solution.
Gateway is responsible for transmitting data from the serial-connected device using RS485 protocol to the LAN(Local Area Network) using TCP/IP.
Gateway provides its own web page, which allows you access the setting and status monitoring services for connected devices.

Features

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

Specification

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

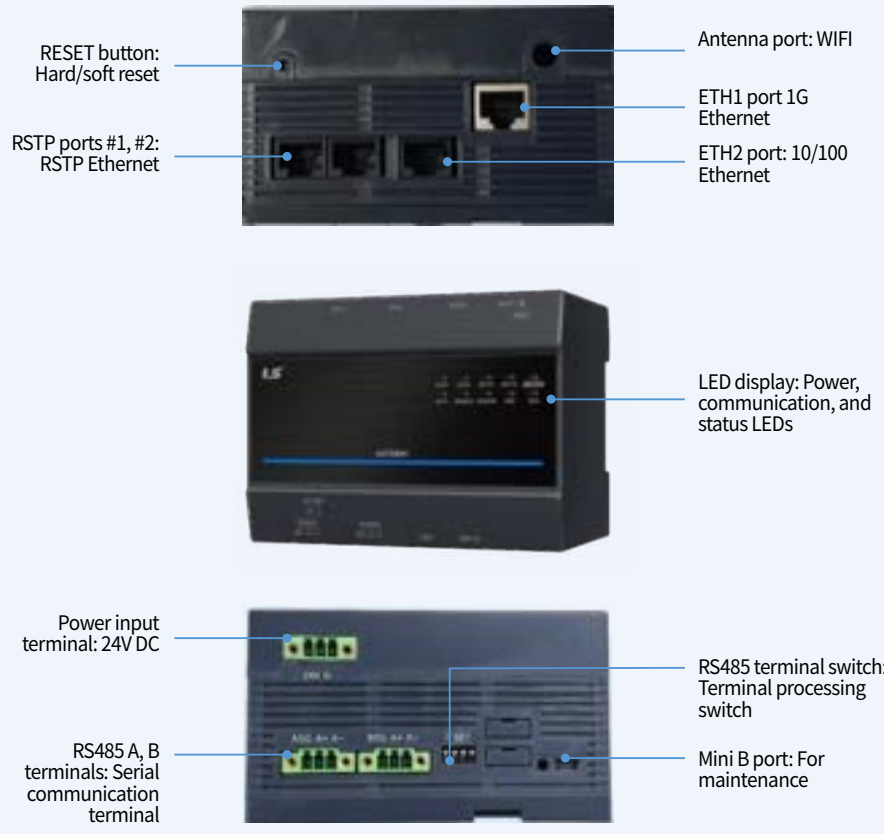
Web service

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

ACB voltage, current waveform

Trip wave

Exterior description



Target device

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

Ethernet Converter

This device is installed on a low-voltage panel or distribution panel to collect data from serially connected RS485 communication devices and transmit it to a local area network (LAN) communication using TCP/IP.
Control/status data and measurement values can be acquired by connecting to smart devices.

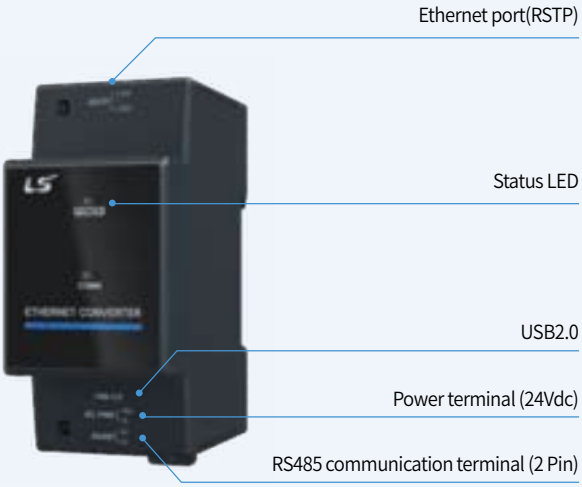
Features

This module converts RS485 communication to Ethernet. By supporting a Ring network, it improves the reliability of communication. In case of an accident, it has functions of event push alarm(Mobile App.) and e-mail transmission to 5 registered users.

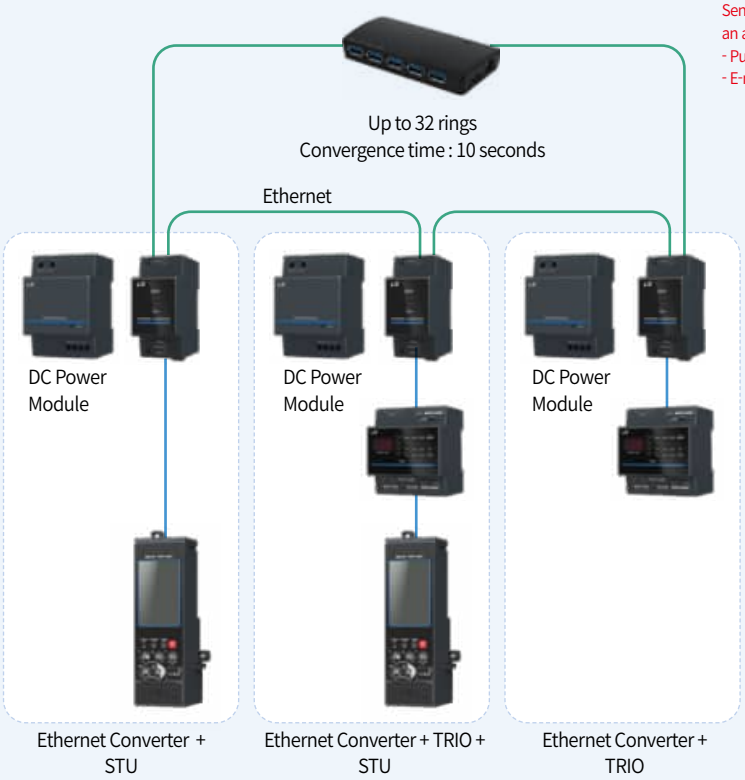
Specification

Type	Details
Model name	Ethernet Converter
Rated voltage	DC24V (±10%)
Power consumption	1W or less
Function	• 1 PORT RS-485 (Modbus/RTU) communication support • 2 PORT Ethernet (Modbus/TCP) communication support • RSTP support • Up to 8 Modbus Masters can be connected simultaneously • Push alarm and E-mail transmission when an event occurs
LED	Power LED Comm. LED
Protocol	Modbus RTU, Modbus TCP
Communication method	RS485 to Ethernet
Port specification	RJ45, 2Port
Ethernet communication speed	10/100Mbps
Ethernet communication distance	Etherne t: up to 100m (single line), up to 50m (stranded line)
Type of dualization	RSTP (Rapid Spanning Tree Protocol)
Size	36 (W) × 81 (H) × 65 (D), unit : mm
Use temperature	-25 °C ~ +60 °C
Storage temperature	-30 °C ~ +70 °C
Ambient humidity	Within 85% RH, no condensation

Exterior description



Device usage example



Target device

Circuit breaker	Susol ACB STU, Metasol ACB STU, Susol Smart MCCB
Accessory device	M LINK, TRIO

M LINK

It is a digital input/output and communication module for monitoring the status of on-site contacts, remote control of on-site contacts, and measuring on-site analog values on the low-voltage panel monitoring and control system.

Features

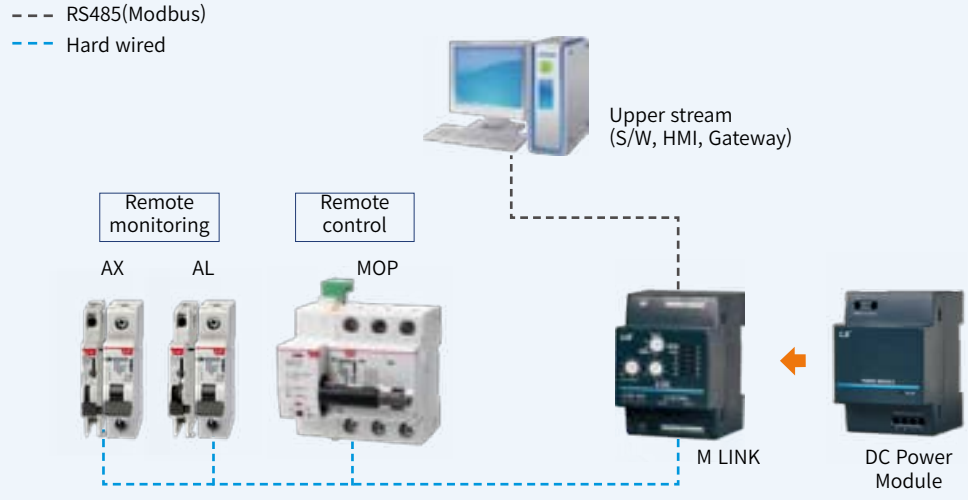
Type			Details
Model name			ILM - DC24V - DI6/DO4
Rated voltage			DC24V (±10%)
Power consumption			1.3W or less
Function			Monitoring function : DI contact monitoring
			Control function : DO contact control
			Analog input value measurement : AI contact input value measurement
			Communication function : RS485 (Modbus)
Input/output contacts	DI	Number of contacts	6 (6 DI, COM.4)
			Note] COM contacts are the same in electrical circuit
		Connection method	Hardwired, pluggable
		Contact method	Dry contact
	DO	Number of contacts	4 (4 DO, 2 Com.)
		Connection method	Hardwired, pluggable
		Rated voltage/current	250Vac/3A, 30Vdc/3A
		Contact method	Non-Latch, A contact (Normal Open)
	AI	Number of contacts	1 (AI +, AI-)
		Connection method	Hardwired, pluggable
		Input range	DC 4-20mA
Protocol			Modbus RTU
Communication method			RS485
Size			54 (W) × 81 (H) × 65 (D), uni t: mm
Use temperature			-25 ~ +60 °C
Storage temperature			-40 ~ +80 °C
Ambient humidity			Within 85% RH, no condensation

Exterior description

Device usage example

It can be used a digital input/output (DI/DO) communication module for on/off/trip status monitoring and on/off control of the Circuit breaker (MCB/MCCB). It also provides DI/DO operation function according to the operation mode (M1~M4, DO LOCK) for user convenience.

Operation mode	Function and usage
M1	General DI/DO operation
M2	Remote circuit breaker control
M3	Remote/on-site circuit breaker control
M4	On-site load control (DI/DO linkage control)
DO Lock	General DI operation (DO cannot be controlled)



Target device

Common device

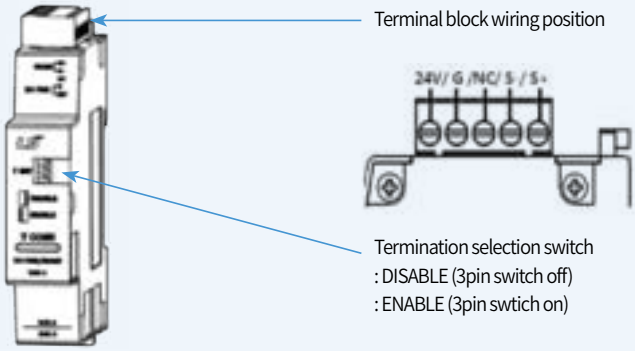
T Connection Module

T Connection Module is a branch module that can provide convenience when connecting multiple RS485 communication devices through multi-drop communication. It also provides termination processing when the device is located at the end.

Specification

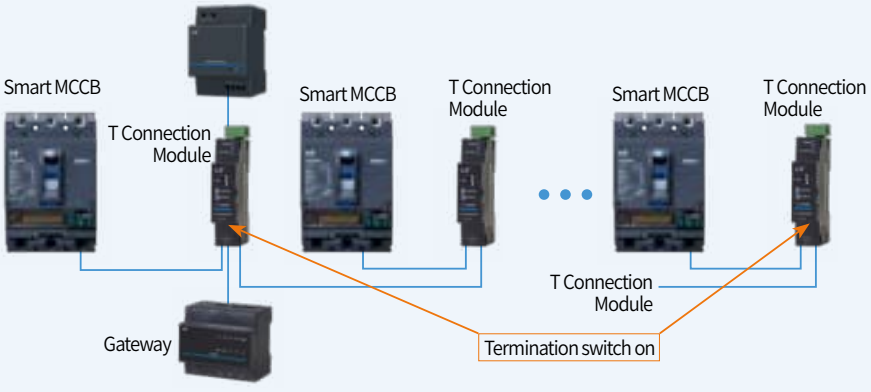
Type	Details
Model name	ITCM
Rated voltage	DC24V (±10%)
Basic function	Multi-drop connection
	Termination Selection
Mounting method	DIN-Rail, Screw (Screw not supplied)
Size	17.8 (W) × 81 (H) × 65.6 (D), unit : mm

Exterior description



Device usage example

When you wish to connect n number of devices excluding the upper system, you can conveniently configure them using n number of ITCM. Stable RS485 multi-drop is possible by deadening.



Target device

Common device

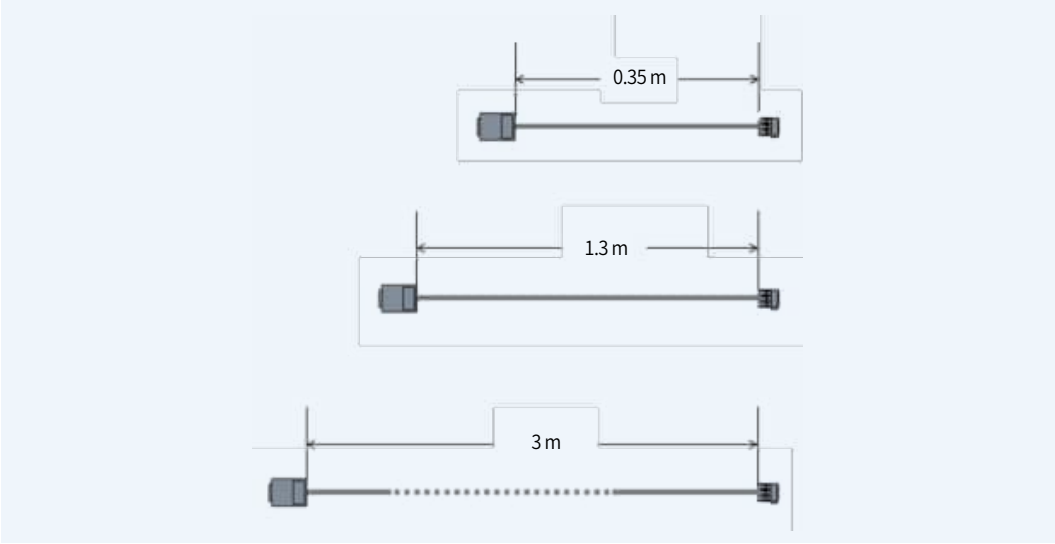
Communication / power connection cable

This is a communication / power connection cable used to connect Smart MCCB and T Connection Module, etc.
There are three types : 0.35m, 1.3m, and 3m in length.

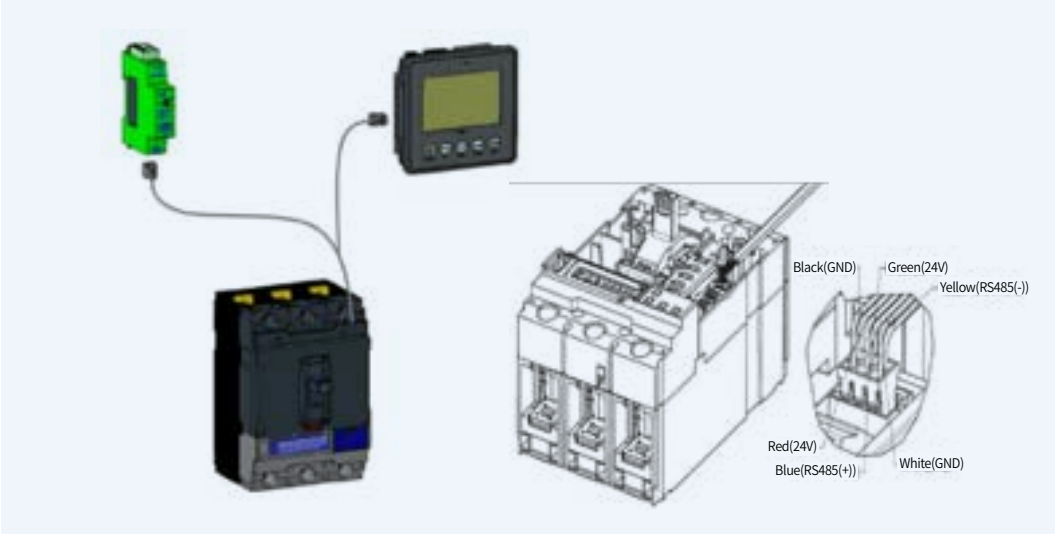
Specification

Type	0.35m	1.3m	3m
Model name	EXIO L350	EXIO L1300	EXIO L3000
Basic function	Communication / power connection		

Exterior description



Device usage example



Target device

Exclusive cable for Smart MCCB

Smart LV Solution Accessory device

i-Tester

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

Features

▪ **Calibration function**
: The calibration function of i-Tester is used to calibrates the error using the output value set in i-Tester and the measurement current data.

▪ **Device H/W setting function**
: It consists of the part to set the system configuration and time of the device and the part to set the language and time of the i-Tester itself.

▪ **Relay setting function**
: It consists of the part to check the current relay element of the device and the part to set the relay.

▪ **Relay test**
: As a part for testing the relay, it is composed of manual/automatic/user tests so that various relay tests can be conducted.

▪ **Control function**
: It provides a function to clear or reset the device data and to control DO and CB.

▪ **System information**
: It consists of the device information, relay status, and tester system information.

▪ **Test history**
: It consists of a part to check the test history stored in i-Tester and a part to delete the saved history information.

Specification

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

Exterior description

Type	Details
① Power switch	Power On/Off function
② LCD	256 × 128 graphic LCD
③ KEY PAD	Menu navigation, setting and operation buttons
④ Adapter terminal	DC24V power input terminal
⑤ USB terminal	USB communication connection terminal (USB2.0)
⑥ Signal port	Signal terminals for device testing
⑦ Battery	Equipped with 9V alkaline batteries (× 3ea)

Device usage example

Target device

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

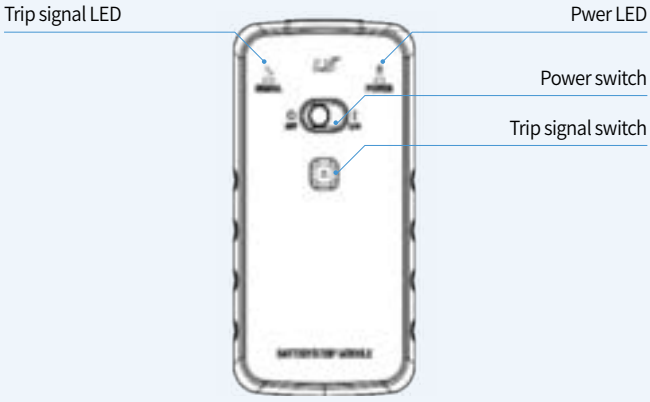
Portable Battery & Trip Module

It is a portable battery module that can power the Smart MCCB and test the trip function.
The user can change and check the settings by applying power to the Smart MCCB while carrying this device, and easily check the trip function, which is the most important function.

Specification

Type		Details
Model name		IPBM
Target device		Smart MCCB
Input power		AA size serial battery 2EA (battery specification : DC1.5V)
Output	Power supply	DC 12V (±5%)
	Trip signal	AC 0.9V, 60Hz (±15%)
Device operating time (battery replacement time)		More than 8 hours of continuous use ※The usage time can be changed depending on the battery capacity
Switch	Power supply	Slide switch, power supply On/Off
	Trip signal	Tact switch, Trip signal On/Off
LED	Power supply	Orange, DC 12V output status display
	Trip signal	Green, AC 0.9V Trip signal output status display
Size		72 (W) × 135 (H) × 34.5 (D), unit : mm

Exterior description



Operation method

1) Check the power switch off status of the portable battery module.
※If the battery is connected while the power switch is on, an error may occur in the device.
2) Open the battery cover on the back and install 2EA of AA size batteries.
3) Close the battery cover and connect the tester cable.
4) Open the glass cover of Smart MCCB and connect the Tester cable to the TEST port.
※ If the direction of the tester cable does not match, an error may occur in the device.
※ If the Tester cable is connected while the power switch is on, an error may occur in the device.
5) Operate the power switch of the portable battery module to On.
- Check that the power is turned on to the Smart MCCB,
and check and operate the Smart MCCB settings using the Smart MCCB key.
- The Trip test of Smart MCCB can be performed using the Trip button of the portable battery module.
6) After using the portable battery module, operate the power switch to the Off status.

DC Power Module

The DC Power Module is a power supply device that supplies DC24V.
It is composed of 5 types according to the rated voltage of the input.

Specification

Type	Specification				
Model name	IPM3P - AC240V /DC24V12W	IPM6P - DC30V /DC24V24W	IPM6P - DC125V /DC24V24W	IPM6P-AC415V /DC24V24W	IPM6P-ACDC240V /DC24V36W
Rated voltage	100 ~ 240Vac	24 ~ 30Vdc	48 ~ 125Vdc	380~415Vac	AC/DC100~240V
Input range	85 ~2 64Vac	20 ~3 3Vdc	40 ~ 138Vdc	323~457Vac	AC/DC95~264V
Frequency	50/60Hz	-		50/60Hz (45~65Hz)	DC or 50/60Hz(45~65Hz)
Output voltage	24Vdc (±5%)				
Output current	0.5A	1A			1.5A
Size (mm)	54 × 81 × 65	108 × 81 × 65			
Use temperature	-25 ~ +60 °C				
Storage temperature	-40 ~ +80 °C	-40 ~ +85 °C			
Mounting method	DIN-Rail, Screw (screws not included)				

Exterior description

Device combination

It can be used for the device that uses DC 24V as an input power supply and can be combined with Smart LV panel components. It can be combined with 12~36W DC Power Module.


ACB STU
A type -3W, P/S type – 5W


Smart MCCB – 1W


M LINK – 1.3W


TRIO – 5W


Ethernet Converter – 1W


Gateway – 11W

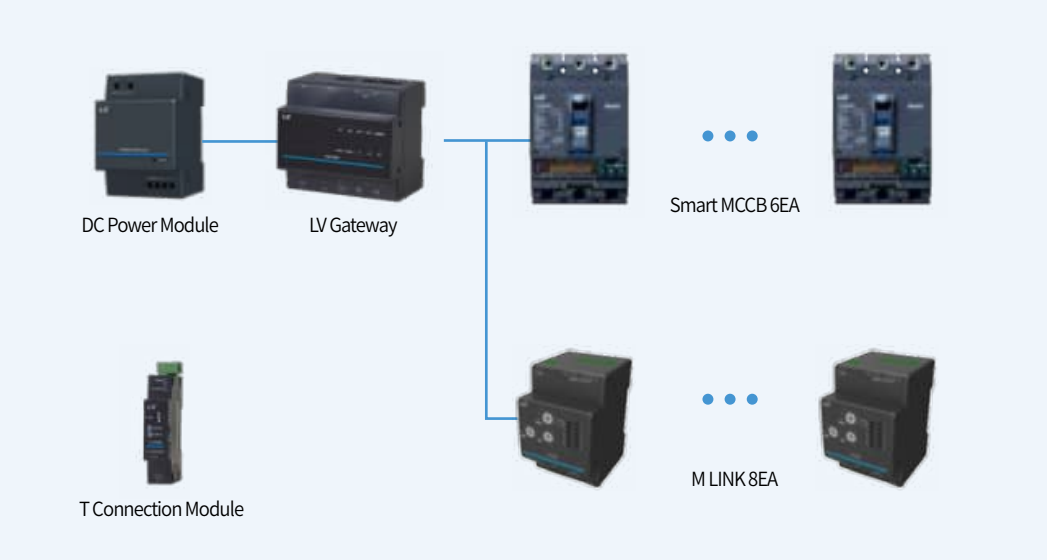

Panel HMI (7.0 inch) – 23W

DC Power Module

Device usage example

1) Composition of Smart MCCB + M LINK panel

・If Smart MCCB 6EA and M LINK 8EA are connected to 36W DC Power Module [11W+(6 x 1W)+(8x1.3W)=27.4W], it can be used stably.



2) Composition of ACB+Smart MCCB+M LINK panel

・If ACB 1EA, Smart MCCB 3EA, and M LINK 4EA are connected to 24W DC Power Module [11W+(3 x 1W)+(4x1.3W)=19.2W], it can be used stably.

Target device

Common device

Composition of Smart accessory device

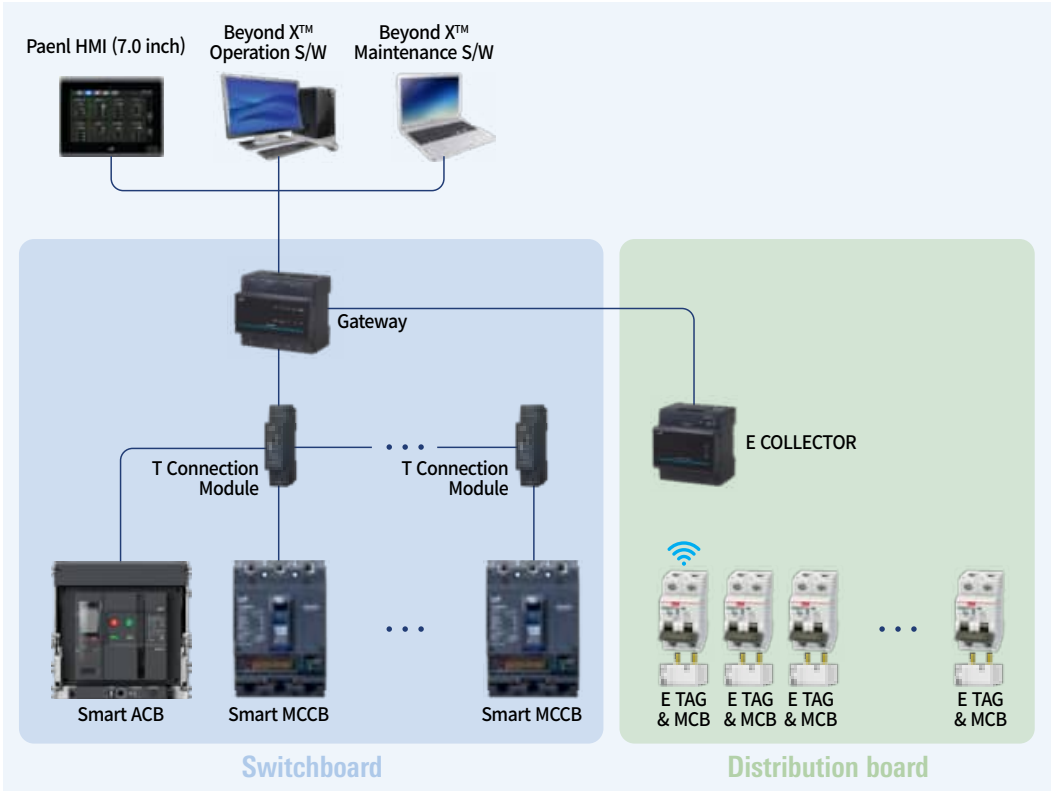
Device composition by application

Function / Accessory device	Switchboard				Distribution board			
	Energy monitoring	Circuit breaker monitoring	Circuit breaker remote control	Power facility preventive diagnosis	Energy monitoring	Circuit breaker monitoring	Circuit breaker remote control	Power facility preventive diagnosis
Gateway / Ethernet Converter Note1)	O Note3)	O Note3)	O Note3)	O Note3)		O Note3)	O Note3)	O Note3)
TRIO				O Note4)				
M LINK		O Note5)	O Note5)			O	O	
T Connection Module	O Note6)	O Note6)	O Note6)	O Note6)				
E TAG					O			
E COLLECTOR					O			
i-Tester / Portable Battery&Trip Module Note2)				O				
DC Power Module	O	O	O	O		O	O	O

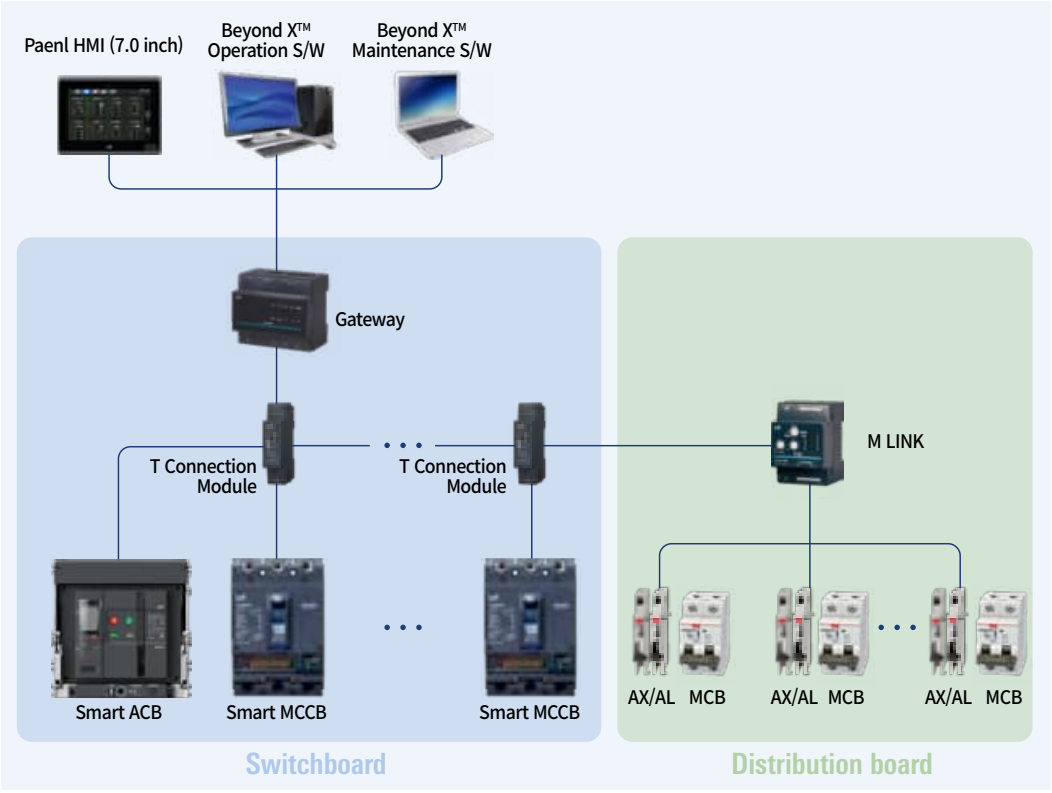
Note 1) Choose 1 from Gateway/Ethernet Converter
Note 2) Choose 1 from i-Tester/Portable Battery & Trip Module
Note 3) Gateway/Ethernet Converter is excluded from required installation devices when Beyond X™ host system is not used.
Note 4) TRIO is used with Smart ACB.
Note 5) M LINK is used with Smart MCCB.
Note 6) This accessory is used when communication expansion is required.

Sample composition

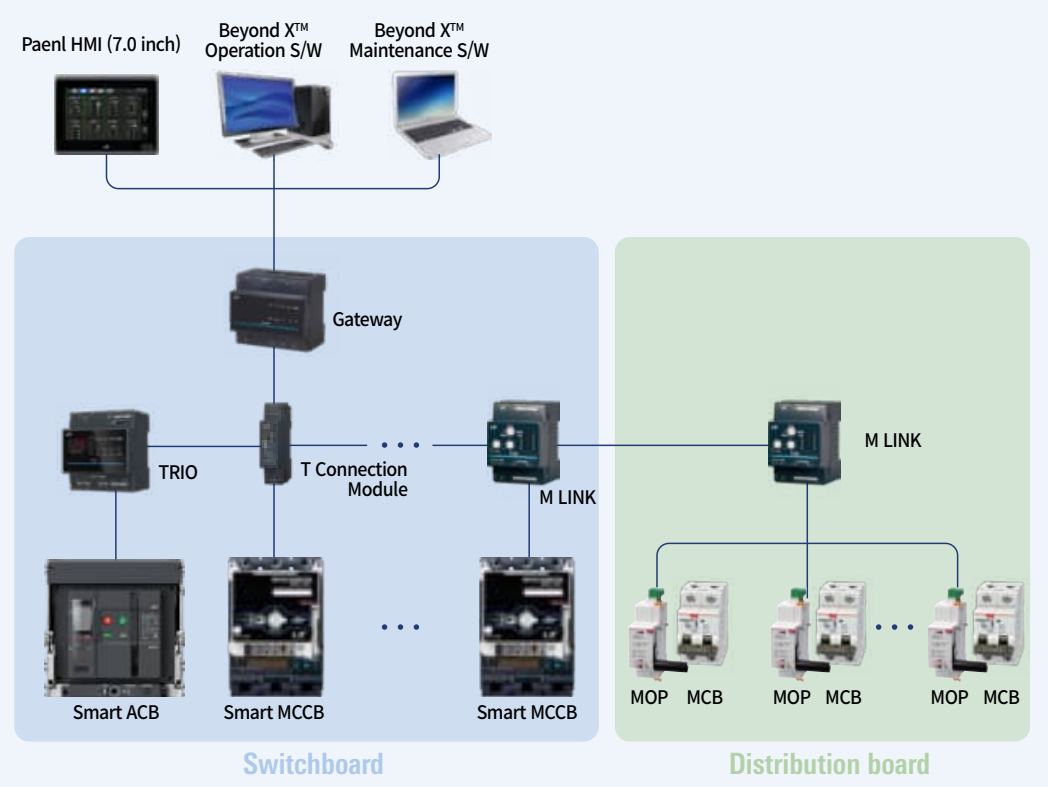
Sample 1
: Energy monitoring



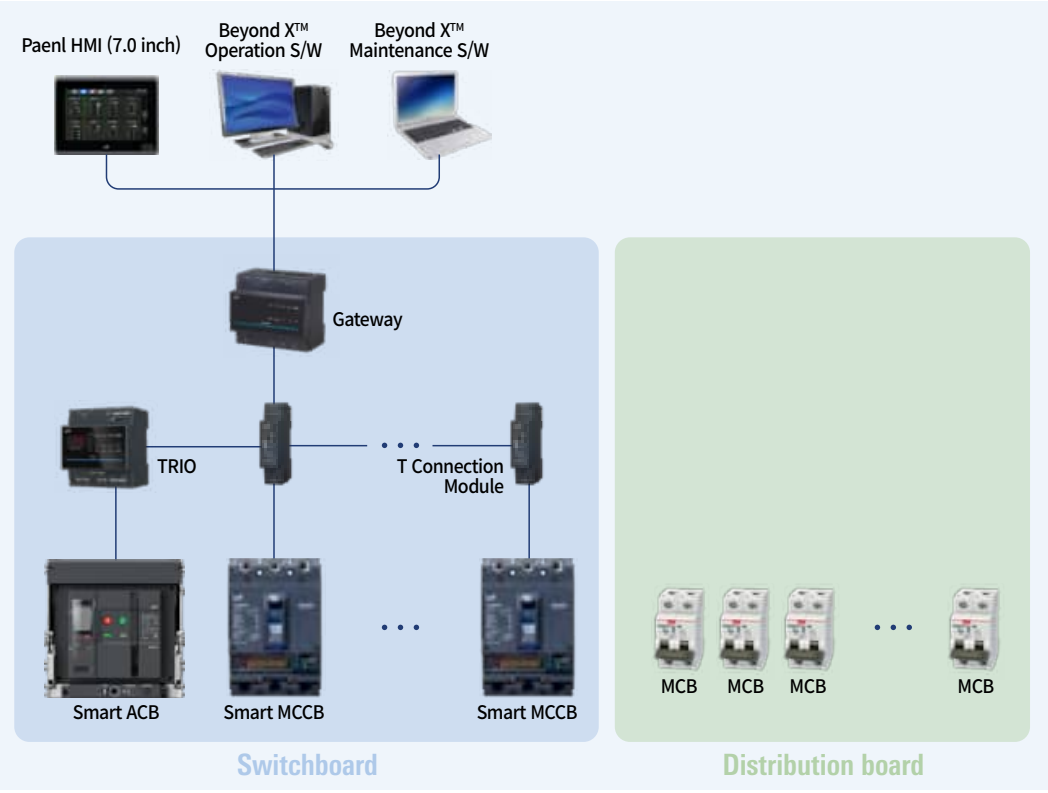
Sample 2
: Circuit breaker status monitoring



Sample 3
: Circuit breaker remote control



Sample 4
: Prevention and diagnosis of power facilities



Smart LV Solution upper system

Smart LV Solution upper system provides a variety of solutions for customers to conveniently manage their devices, systems, and energy information anytime, anywhere.
For convenience of on-site management, Panel HMI and Mobile App. are provided, and various S/W for remote monitoring/control is provided.

Smart LV Solution
Upper system

1. Beyond X™ Monitoring S/W (Cloud) ····· 98
2. Beyond X™ Operation S/W ····· 100
3.Beyond X™ Maintenance S/W ····· 102
4. Smart Viewer (Mobile App.) ····· 103
5. Panel HMI (7.0 inch) ····· 104

Beyond X™ Monitoring S/W (Cloud)

Beyond X™ Monitoring SW provides real-time remote monitoring function to safely manage power facilities anytime, anywhere, and to operate them efficiently. It also provides event notifications and monthly reports through e-mail and SMS services.

Features

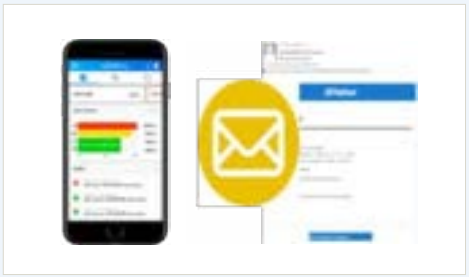
- **Energy consumption monitoring by project and category (place, usage, day, time, etc.)**
  : Voltage, current, power, power demand, etc.
- **Power quality information monitoring by project and category (place, panel, device, etc.)**
  : Voltage, frequency, power factor, harmonics, etc.
- **Device self-diagnosis function**
  : Memory, Setting time, contact life, number of opening/closing, temperature overheating, Wiring status, battery, relay operation, etc.
- **Device lifespan prediction function**
  : Operating time, breaker On time, electrical/mechanical operation number, trip number, etc.
- **Temperature monitoring function**
  : Real-time monitoring of a specific point is possible through TRIO
- **When an event occurs, event recording and fault waveform data are provide**
  : Point information, phase angle analysis, harmonic analysis, effective value chart, etc.
  : E-mail, SMS transmission function support
- **Provide regular reports**
  : Energy consumption, power demand, power quality, diagnosis, alarm/event, etc..
  : E-mail transmission support for monthly reports

Screen composition

- **Dashboard**
  : Energy consumption, estimated price, power quality, instantaneous power, weather information, project status are analyzed by category (location, use, time, day, week, month)
- **Monitoring & Control**
  : System/device monitoring, Hierarchy data
- **Diagnostics**
  : Energy diagnosis (total usage trend/comparison, usage/hourly usage)
  : Power quality diagnosis (voltage, frequency, power factor, THD/TDD)
- **Event**
  : Alarm, Event, Trip Wave
- **Customer support**
  : Customer center, Download center
- **Report**
  : Location, usage, usage by period, event, etc.
- **Common setting**
  : Theme setting (White, Dark), Language setting (Korean, English, Chinese), Personal information (Personal information, Electric charges)

Power quality diagnosis

Monthly report



Send event alarm

Target device

Communication device	Gateway, Ethernet Converter, E COLLECTOR
Accessory device	M LINK, TRIO
Circuit breaker	Susol ACB STU, Metasol ACB STU, Susol Smart MCCB
Measurement device	GIMAC1000, GIMAC-B, E TAG, MMP, DMPi, Energy Meter

Beyond X™ Operation S/W

Beyond X™ Operation SW provides real-time remote monitoring and control functions to safely manage and efficiently operate power facilities connected to the same network

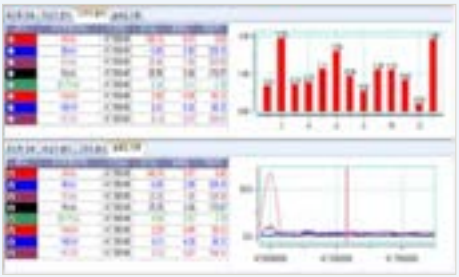
Features

- **Monitoring energy usage by category (place, use, day of the week, time, etc.)**
  : Voltage, current, power quantity, power demand, etc.
- **Monitoring power quality information by category (place, panel, device, etc.)**
  : Voltage, frequency, power factor, harmonics, etc.
- **Device self-diagnosis function**
  : Memory, Setting time, contact life, number of opening/closing, temperature overheating, Wiring status, battery, relay operation, etc.
- **Device lifespan prediction function**
  : Operating time, breaker On time, electrical/mechanical operation number, trip number, etc.
- **Temperature monitoring function**
  : Real-time monitoring of a specific point is possible through TRIO
- **When an event occurs, event recording and fault waveform data are provided**
  : Event occurrence point information, phase angle analysis, harmonic analysis, effective value chart, etc.
- **Provides regular reports**
  : Energy consumption, power demand, power quality, diagnosis, alarm/event, etc.

Screen composition

- **Dashboard**
  : Power consumption, power demand information, power device information, energy diagnosis information, energy prediction information, alarm/event, etc.
- **Monitoring & Control**
  : System and device monitoring and control, Hierarchy data
- **Diagnostic management**
  : Voltage PQ analysis, frequency PQ analysis, power factor PQ analysis, THD/TDD PQ analysis, total usage trend/comparison, demand diagnosis, etc.
- **History Management**
  : Alarm, Event, Trip Wave
- **Report**
  : Project, communication status, alarm/event, thermal image monitoring, statistics, diagnosis, system/device information, etc.
- **Common setting**
  : Theme setting (White, Dark), Language setting (Korean, English, Chinese)

Power factor trend information



Failure waveform analysis information

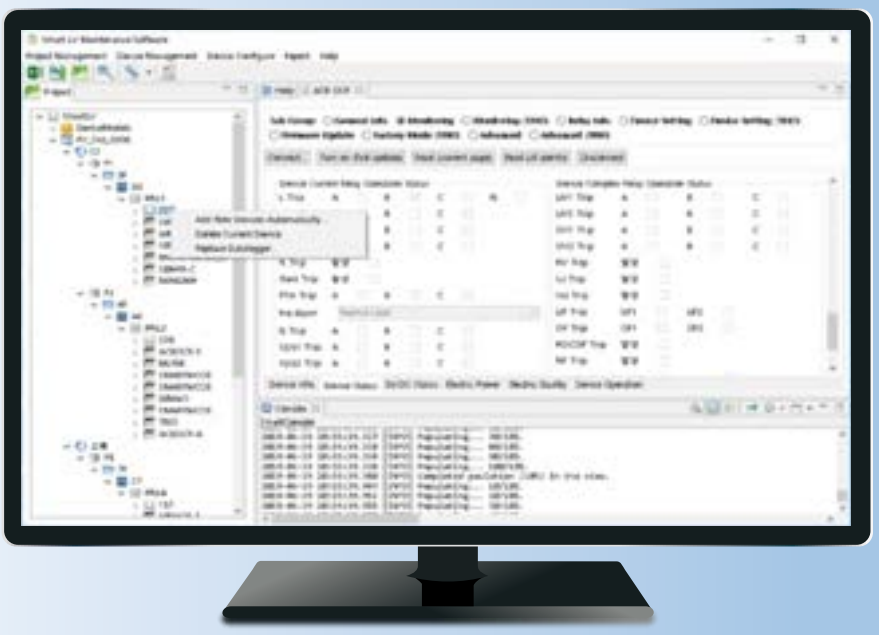
Regular report

Target device

Communication device	Gateway, Ethernet Converter, E COLLECTOR
Accessory device	M LINK, TRIO
Circuit breaker	Susol ACB STU, Metasol ACB STU, Susol Smart MCCB
Measurement device	GIMAC1000, GIMAC-B, E TAG, MMP, DMPi, Energy Meter

Beyond X™ Maintenance S/W

Beyond X™ Maintenance SW provides project and device management, remote monitoring and control functions, and testing functions for relay elements for each device.



Features

- **Project engineering function**
  : Project creation, open, close, save, modify, remove, duplicate, user management, etc.
  : Device information modeling and device data processing, replication, standard management by project

- **Device management, monitoring and control functions**
  : Device search, device addition/deletion, representative device setting, purpose setting, etc.
  : Data acquisition, firmware update, device setting, relay setting, control, etc.

- **Testing function for relay elements for each device**
  : Available when using i-Tester
  : Calibration, default test, manual test, scenario test

- **Report provided**
  : Test result, project, communication status, data acquisition status, etc.

Target device

Communication device	Gateway, Ethernet Converter, E COLLECTOR
Accessory device	M LINK, TRIO
Circuit breaker	Susol ACB STU, Metasol ACB STU, Susol Smart MCCB
Measurement device	GIMAC1000, GIMAC-B, E TAG, MMP, DMPi, Energy Meter

Smart Viewer (Mobile App.)

Smart Viewer (Mobile App.) provides monitoring function of devices installed on the panel through short-range wireless communication function.

Smart Viewer　　Smart MCCB　　Smart ACB

Features

▪ **Device and energy monitoring, failure analysis service**
· Communication method : BLE (Bluetooth Low Energy)
· Communication distance : Up to 4m

▪ **Event information of the device can be checked in the non-powered state.**
· Communication method : NFC (Near Field Communication)
· Communication distance : Up to 20mm

▪ **You can check the trip wave waveform stored in the device where the trip occurred.**

▪ **You can check the current and voltage waveforms of ACB.**
: STU S-type only.

Target device

BLE	Susol ACB STU (S-type), Metasol ACB STU (S-type), Susol Smart MCCB ETU (ETLi)
NFC	Susol ACB STU (S-type), Metasol ACB STU (S-type)

Panel HMI (7.0 inch)

Specification

Model name	Rated voltage	Power consumption	Temperature range	
IHM32	DC24V (±20%)	23.0W or less	Operation	0 ~ +50 °C
			Storage	-20 ~ +60 °C

- **Color TFT LCD (7.0" or more) + LED Backlight**
- **User operation** : Touch pad
- **Indication of device communication status**
- **Supports two languages (English and Chinese)**
- **Support upgrade function through USB port**
- **Sub-device connection through Ethernet communication**

: Up to 32 sub-devices (up to 40 devices can be connected for E TAG)
: Up to 16 sub-devices can be selected and displayed (screen output)

Display screen

- **Dashboard**

・Full information display : Displays communication status with Gateway, Panel name, and system date/time
・Quick View : Displays representative information of the device selected for monitoring in the form of icons
・Alarm : Displays the alarm information of the device selected for monitoring in the form of a list
・Event : Displays the event information of the device selected for monitoring in the form of a list
・Setting : Gateway IP for communication linkage, device selection for monitoring, user password, etc.

- **Device Details**

・Monitoring : Displays device status, communication status, measurement data, operation time, DI/DO status
・Control : Performs device On/Off control
・Management : Display and reset history and count data information
・Event : Displays incident event, device operation and abnormal event
・View setting : Displays device setting value and relay element setting value
・Device information display : Displays device-specific information such as device ID and device name

Target device

Communication device	Gateway, Ethernet Converter, E COLLECTOR
Accessory device	M LINK, TRIO
Circuit breaker	Susol ACB STU, Metasol ACB STU, Susol Smart MCCB
Measurement device	GIMAC1000, GIMAC-B, E TAG, MMP, DMPi, Energy Meter

Screen description

Quick View, View All

Display form	Description
ACB STU	Displays device communication status, device name, and device status
TRIO	Displays device communication status, device name, and analog input point (AI #1) value
MCCB	Displays device communication status, device name, and device status
M LINK	Displays device communication status, device name, DI/DO status
MMP	Displays device communication status, device name, and device status
DMPi	Displays device communication status, device name, and measurement value

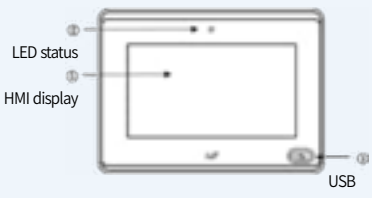
Quick View, View divided

Display form	Description
ACB STU	Displays device communication status, device name, device status, value of Vab, Tot P
TRIO	Displays device communication status, device name, and analog input point (AI # 1) value
MCCB	Displays device communication status, device name, device status, and values of Ia, Ib, and Ic
M LINK	Displays device communication status, device name, DI, DO, Mode status, control mode value
MMP	Displays device communication status, device name, device status, and values of Ia, Ib, and Ic
DMPi	Displays device communication status, device name, and values of Ia, Ib, and Ic

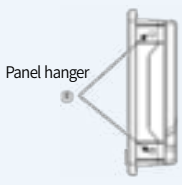
Detailed screen of device

Display form	Description
Monitoring	Displays selected device monitoring data(Device status, communication status, measurement data, operation time, DI/DO status)
Control	Control command (device On/Off)
Management	Display and reset history and count data
Event	Event and alarm list display
Settings	Displays set value information, relay element set value
Device information	Displays device-specific information such as device ID and device name
Group	The category name of the individual information item
Label	Name of individual information item

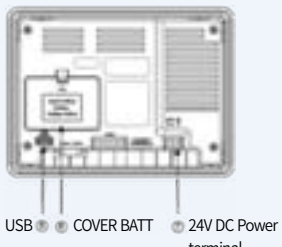
Exterior description



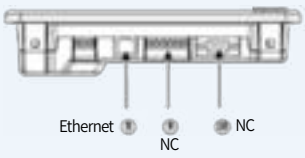
Front



side



back



bottom

Panel HMI (3.5 inch)

Specification

Model name	Rated voltage	Power consumption	Temperature range	
IHM8	DC24V (±20%)	3.0W or less	Operate	-20 ~ +60 °C
			Store	-30 ~ +80 °C

- **Color TFT LCD (3.5” or more) + LED Backlight**
- **User operation** : cancel, move (up), move (down), confirm, set
- **Displays communication status LED**
- **Supports languages (English)**
- **Supports upgrade function through USB port (PC Manager connection)**
- **Upper communication connection through RS-485**
- **Sub-device connection through RS-485 communication**
  : Connects up to 8 sub-devices
  : 9,600, 19,200, 38,400bps support
- **Fail safe and termination selection switch applied**

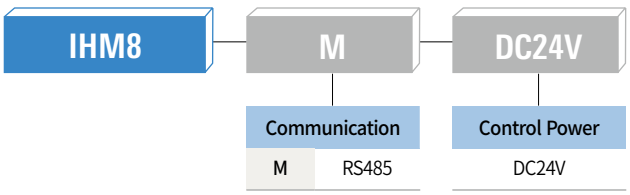
Display screen

- **Basic information of circuit breaker**
  - Number of poles, rated voltage, rated current, communication address, communication speed, control method
  - Manufacturer, model name, H/W version, S/W version, communication version, serial number
- **Current/Time of circuit breaker relay**
  - Long time delay, short time delay, instantaneous, ground fault
- **Measurement data of circuit breaker**
  - Voltage, current, active/reactive/apparent power for each phase
  - Energy : EP, EQ, rEP, rEQ, ES display
  - PQ (Power Quality) : Freq, PF, THD, TDD
  - Max Demand : Current value for each phase, active/reactive/apparent power
- **Breaker operation history**
  - Operating time, circuit breaker close time
  - Number of electrical operations, number of mechanical+electrical operations, number of trip operations
  - Contact consumption rate (0~100%)
- **Circuit breaker DI/DO status information and control**
- **History of events that occurred in the circuit breaker (save 20)**
- **Fault history of circuit breaker (save 20)**

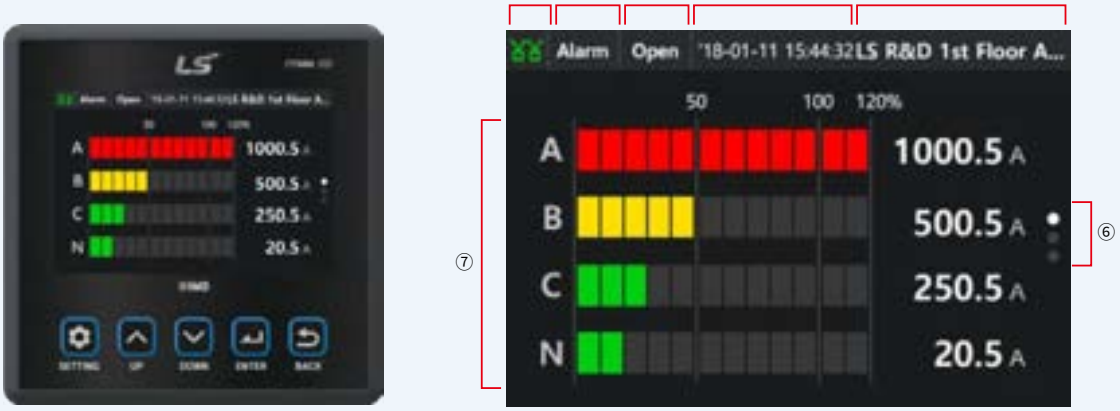
Target device

Type	Model name
Smart MCCB	Susol Smart MCCB
Smart ACB	Susol ACB STU, Metasol ACB STU
MCB	MCB Connected with M LINK

IHM8 numbering system



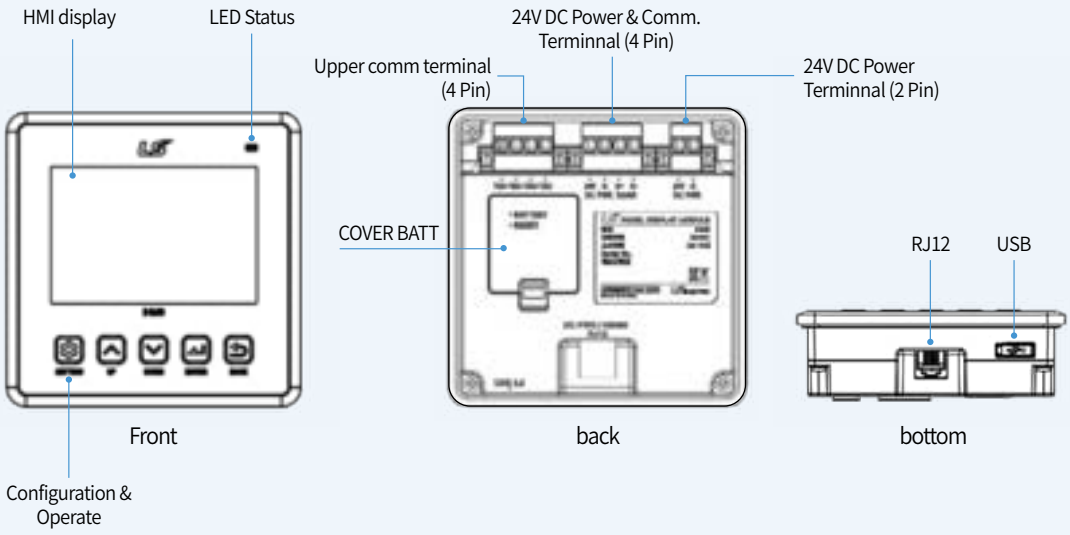
Screen description



1) **Communication connection status display** - 'Communication connected' or 'Communication not connected' is indicated by the RS485 communication icon.
2) **Alarm display** - If there is no alarm, it is shaded. When a new alarm is generated, 'Alarm' is displayed.
3) **Contact status display** - Displays the breaker's contact status ('Close', 'Open', 'Trip').
4) **Time display** - Displays the time (year-month-day hour : minute : second) of the connected device.
5) **Name display** - Displays the name of the connected device.
6) **Page display** - Displays the number of connected devices and brightly displays the order of the currently displayed screen.
7) **Load current display**
   - It is displayed as 'A/B/C' or 'A/B/C/N' depending on the load connection.
   - The size and color of the graph change depending on the load factor.
   - Displays the load current value.

*The screen configuration of ACB and M LINK is different from that of MCCB, so please refer to the user manual.

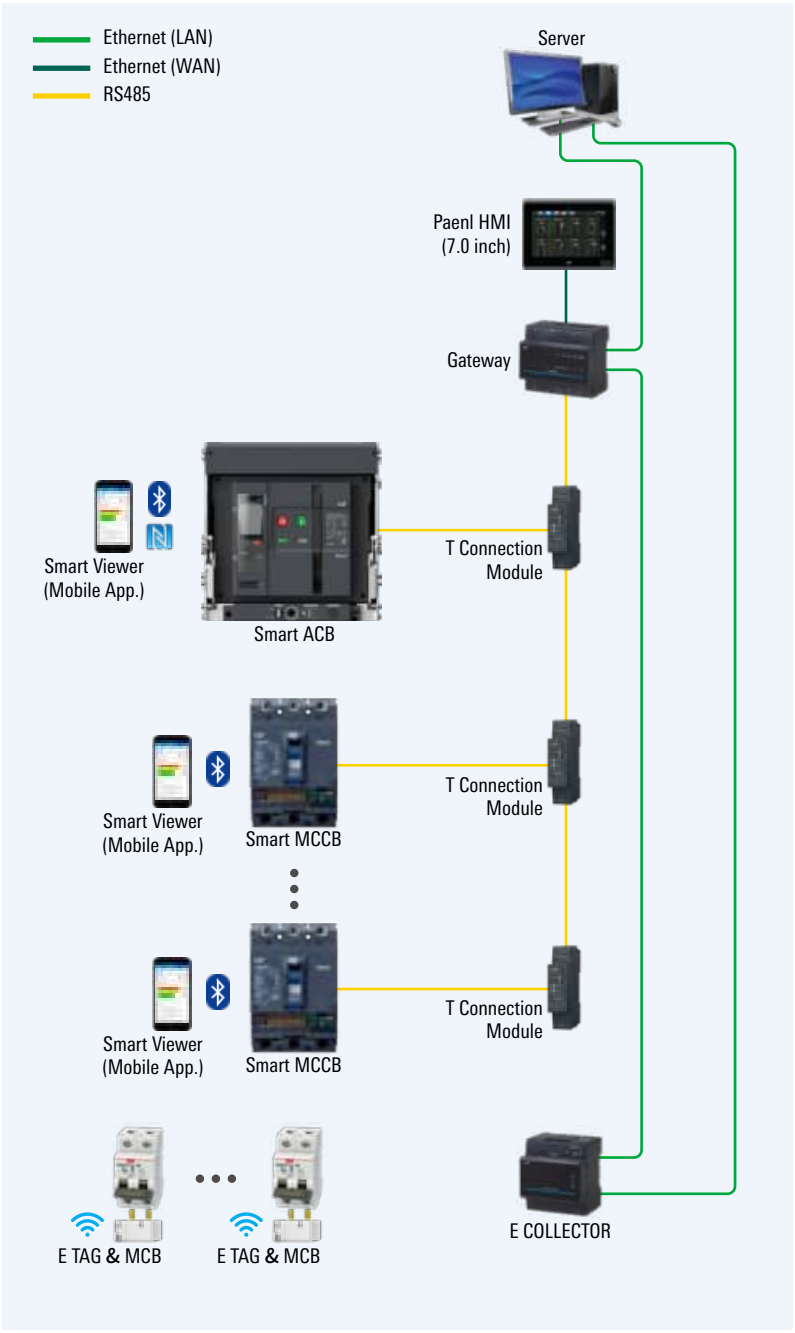
Exterior description



Seoul National University, College of Engineering, Building 135 (Sep. 2019)

▪ **Installed Beyond X™ Smart LV panel in Building 135, College of Engineering in Seoul National University on September 2019.**

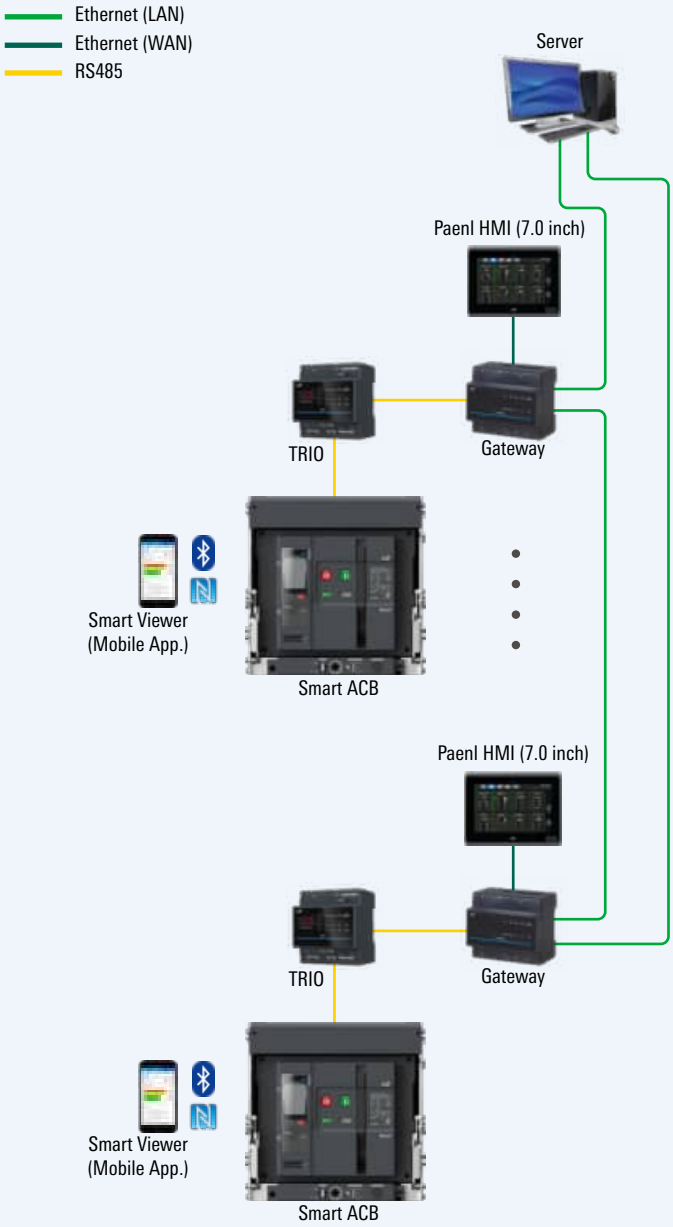
· **Upper system :** Beyond X™ Operation S/W, Panel HMI (7.0 inch), Smart Viewer (Mobile App.)
· **Circuit breaker :** Smart ACB, Metasol MCCB
· **Measurement device :** GIMAC-II Plus
· **Communication device :** Gateway, E COLLECTOR
· **Accessory device :** TRIO, DC Power Module, T Connection Module



KT Yongsan IDC Center Project (Nov. 2019)

▪ Applied in IDC Center of KT Yongsan on November 2019
With the addition of STU S Type's improved measurement accuracy (voltage/current : 0.5%) and the change function of A/B Group, TRIO and Panel HMI (7.0 inch) were used to configure the system without installing separate digital protection relay.

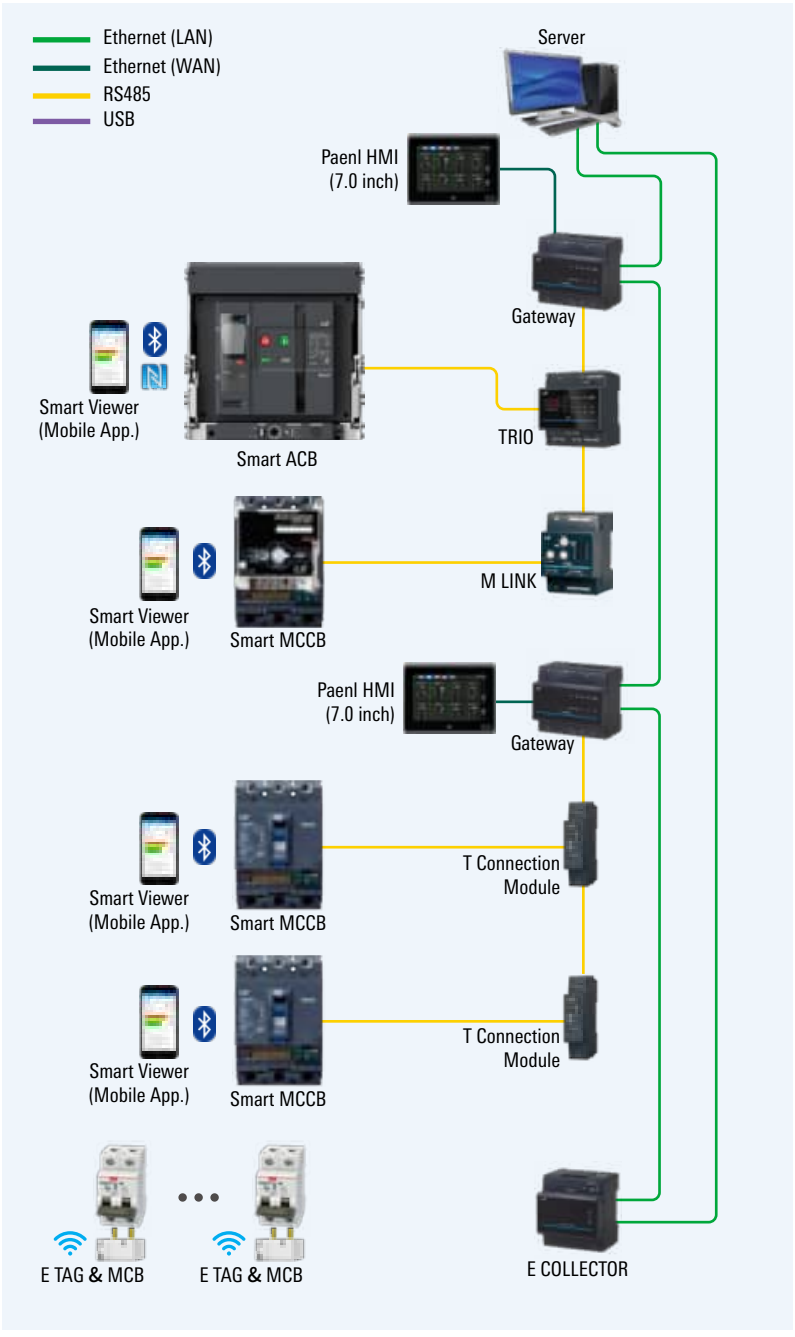
· **Upper system** : Server, Panel HMI (7.0 inch), Smart Viewer (Mobile App.)
· **Circuit breaker** : Smart ACB
· **Communication device** : Gateway
· **Accessory device** : TRIO, DC Power Module



LS ELECTRIC Cheongju 1 Work Site FEMS Station (Apr. 2020)

▪ **Installed 7 Beyond X™ Smart LV Solution switchboards on FEMS Station of LS ELECTRIC Cheongju Work Site 1 on April 2020.**

· **Upper system :** Beyond X™ Operation S/W, Panel HMI (7.0 inch), Smart Viewer (Mobile App.)
· **Circuit breaker :** Smart ACB, Smart MCCB
· **Relay/Measurement device :** XGIPAM, E TAG
· **Communication device :** Gateway, E COLLECTOR
· **Accessory device :** TRIO, M LINK, DC Power Module, T Connection Module



Headquarter
127 LS-ro (Hogye-dong) Dongan-gu, Anyang-si, Gyeonggi-Do, 14119, Korea

Seoul Office
LS Yongsan Tower, 92, Hangang-daero, Yongsan-gu, Seoul, 04386, Korea
TEL: 82-2-2034-4916, 4684, 4429

China

LS ELECTRIC (Dalian) Co., Ltd.
+86-411-8730-5872
china.dalian@lselectric.com.cn

LS ELECTRIC (Wuxi) Co., Ltd.
+86-510-6851-6666
china.wuxi@lselectric.com.cn

LS ELECTRIC (Lishui) Co., Ltd.
+86-578-6866-780
china.lishui@lselectric.com.cn

Shanghai Office
+86-21-5237-9977
china@lselectric.com.cn

Beijing Office
+86-10-5095-1631
china@lselectric.com.cn

Guangzhou Office
+86-20-3818-2883
china@lselectric.com.cn

Qingdao Office
+86-532-8501-2065
china@lselectric.com.cn

Chengdu Office
+86-28-8670-3201
china@lselectric.com.cn

Nanjing Office
+86-25-84 67-0005
china@lselectric.com.cn

India

India Office
+91-80-6142-9108
Info_india@ls-electric.com

Indonesia

PT. LS ELECTRIC INDONESIA
+62-21-2933-7614
indonesia@ls-electric.com

Italy

Italy office
+39-030-8081-833
italia@ls-electric.com

Japan

LS ELECTRIC Japan Co., Ltd.
+81-3-6268-8241
japan@ls-electric.com

Tokyo Office
+81-3-6268-8241
tokyo@ls-electric.com

Netherlands

LS ELECTRIC Europe B.V.
+31-20-654-1424
europartner@ls-electric.com

Russia

Moscow Office
+7-499-682-6130
info@lselectric-ru.com

Singapore

Singapore Office
+65-6958-8162
singapore@ls-electric.com

Spain

LS ELECTRIC IBERIA S.L.U.
+34-910-28-02-74
iberia@ls-electric.com

Thailand

Bangkok Office
+66-2-128-0295
thailand@ls-electric.com

Türkiye

LS ELECTRIC Türkiye Co., Ltd.
+90-212-806-1252
turkiye@ls-electric.com

U.A.E

LS ELECTRIC Middle East FZE (Dubai)
+971-4-886-5360
middleeast@ls-electric.com

USA

LS ELECTRIC America Inc.
+1-800-891-2941
sales.us@lselectricamerica.com

LS ENERGY SOLUTIONS LLC
+1-704-587-4051
cmfeldman@ls-es.com

MCM Engineering II
+1-435-865-0125
sales.us@lselectricamerica.com

America Western Office
+1-949-333-3140
america@ls-electric.com

America Bastrop Campus
+1-800-891-2941 EXT 2 power_support.
us@lselectricamerica.com

Vietnam

LS ELECTRIC Vietnam Co., Ltd.
+84-222-2221-110
vietnam@ls-electric.com

Hanoi Sales Office
+84-24-6275-8054
vietnam@ls-electric.com

Ho Chi Minh Sales Office
+84-3823-7890
vietnam@ls-electric.com

www.ls-electric.com