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.
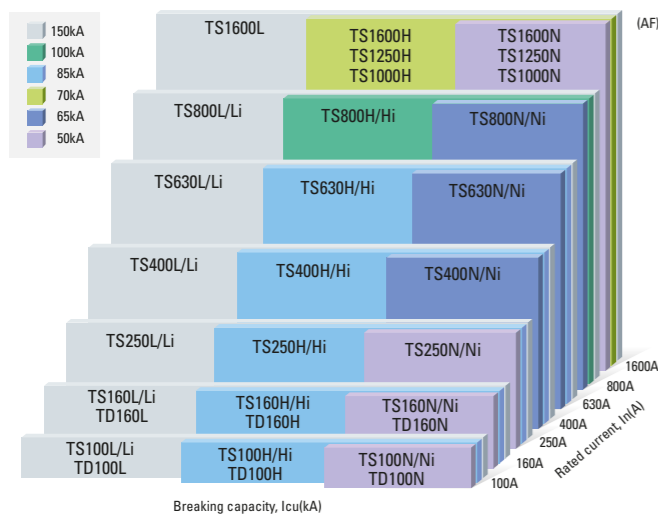
Susol Smart MCCB

Super performance

The third breaking performance guarantees
the original performance.

Icu 150kA
Ui 1000V
Uimp 8kV

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

5 Frames

TS1600

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

TS800

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

TS400/630

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

TD100/160

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

150kA		
100kA		
85kA		
70kA		
65kA		
50kA		

TS1600L
TS1600H / TS1250H / TS1000H
TS1600N / TS1250N / TS1000N (AF)

TS800L/Li
TS800H/Hi
TS800N/Ni

TS630L/Li
TS630H/Hi
TS630N/Ni

TS400L/Li
TS400H/Hi
TS400N/Ni

TS250L/Li
TS250H/Hi
TS250N/Ni

TS160L/Li / TD160L
TS160H/Hi / TD160H
TS160N/Ni / TD160N

TS100L/Li / TD100L
TS100H/Hi / TD100H
TS100N/Ni / TD100N

Breaking capacity, Icu(kA)

Rated current, In(A)
100A 160A 250A 400A 630A 800A 1600A

Susol Smart MCCB

Susol
Smart MCCB

LS

TS250Li
UI 1000V   Uimp 8kV
Ue(V)
220/240 ~
380/415 ~   Icu/Ics(kA)
440/460 ~   200
525 ~   150
660/690 ~   85
                       50
Ics = 100% Icu   10/5
50/60Hz
Cat.A

MADE IN KOREA
IEC 60947-2

Susol

ON   In 250A ETHi

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.
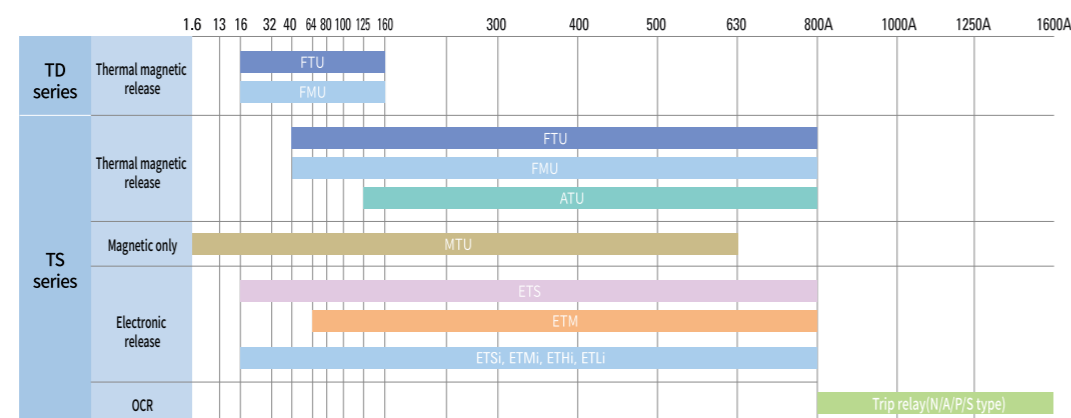
Optimal Solution-Trip unit

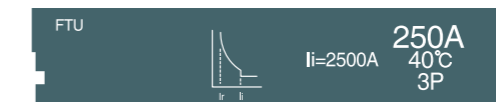|		TD Seris	TS Series		
Type					
Rated current		16 ~ 160A	40 ~ 800A	40 ~ 800A	800 ~1600A
Trip unit	Thermal electronic type	FMU FTU	FMU FTU ATU	-	DSU
	Magnetic only	-	MTU Note 1)	-	-
	Electronic release	-	ETS ETM Note 2)	ETSi ETMi ETHi ETLi	-
	Switch	DSU	DSU	-	DSU
	OCR	-	-	-	N type A type P type S type

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

FTU   Ii=2500A   250A 40℃ 3P

ACTIVE ... Ir tr tr ts ts Ii Ig tg hz EP com   ETLi In 250A
Max 1038 kVA
N A B C G

For motor protection

MTU : Magnetic only trip unit

MTU   220A 3P

For switch disconnector

DSU : Disconnecting switch unit

DSU   250A 3P

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.

Susol Circuit Breaker + Digital Technology

Susol Smart MCCB

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

630AF   800AF   250AF   630AF   800AF

[Susol MCCB - ETM]   [Susol Smart MCCB - ETLi]

Electronic trip device specification comparison

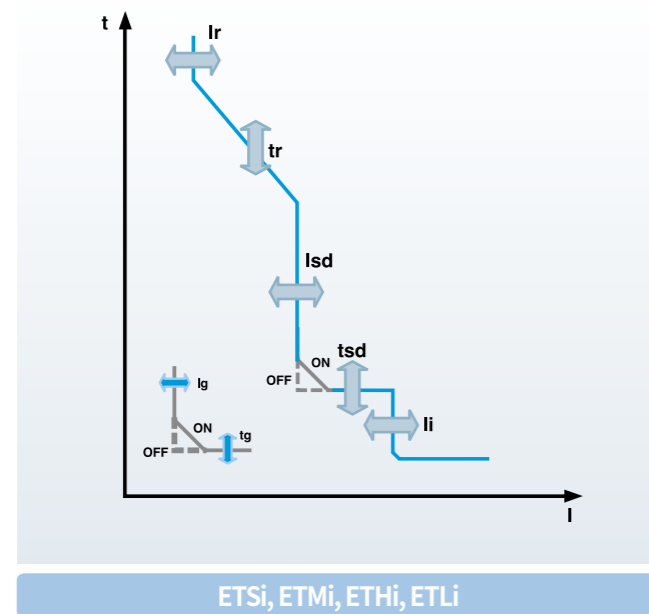| Type		Susol MCCB		Susol Smart MCCB			
		ETS	ETM	ETSi	ETMi	ETHi	ETLi
Frame size		250/630/800AF	630/800AF	250/630/800AF			
Line protection	Long time, short circuit, instantaneous	■	■	■	■	■	■
	Ground fault		Option	■	■	■	■
Measurement information	Current	-	■	■	■	■	■
	Voltage, frequency, power factor, power 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		-	Standard
	100	Ni	Normal		3P	3-pole	-	Standard	AX	Accessories
	160	Hi	High		4P L	4-pole N-A-B-C (N-R-S-T)	P	Plug-in		
TS	250	Li	Limited		4P R	4-pole A-B-C-N (R-S-T-N)				
	400									
	630									
	800									

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

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

Rated frequency

Utilization category

Symbol indicating suitability for isolation as defined by IEC60947-2

Standard

Certification mark

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

Alarm Indication LED

Test terminal

Overcurrent indication LED

Unlock Key

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.
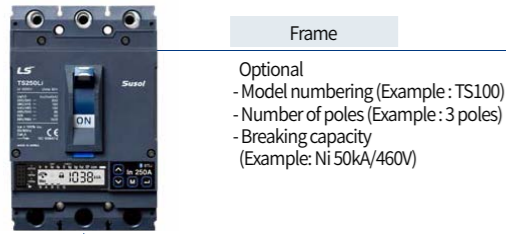
Frame

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,
communication function

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

Frame

Model		TS100			TS160				TS250			TS400			TS630			TS800		
Frame size	[AF]	100			160				250			400			630			800		
Number of poles		3, 4			3, 4				3, 4			3, 4			3, 4			3, 4		
[Pole]	Type	Ni	Hi	Li	Ni	Hi	Li		Ni	Hi	Li	Ni	Hi	Li	Ni	Hi	Li	Ni	Hi	Li
Rated breaking current, Icu	220/240V [kA]	100	120	200	100	120	200		100	120	200	100	120	200	100	120	200	100	120	200
	380/415V [kA]	50	85	150	50	85	150		50	85	150	65	85	150	65	85	150	65	100	150
	440/460V [kA]	50	70	130	50	70	130		50	70	130	65	85	130	65	85	130	65	100	130
	480/500V [kA]	42	65	85	42	65	85		42	65	85	42	65	85	42	65	85	42	85	100
	525V [kA]	22	35	50	22	35	50		22	35	50	22	35	50	22	35	50	22	35	50
	660/690V [kA]	10	10	10	10	10	10		10	10	10	10	20	35	10	20	35	10	20	35

Trip Unit

		TS100	TS160	TS250	TS400	TS630	TS800
Rated current	In	40, 100	40, 100, 160	40, 100, 160, 250	250, 400	250, 400, 630	630, 800
Overload protection setting current (Long time)	Ir	$0.4 \times$ In ~ $1.0 \times$ In (1A unit)		$0.4 \times$ In ~ $1.0 \times$ In (1A unit)			
Tripping time (Long time)	tr	0.5, 1 2, 4, 8, 16 (second)		0.5, 1 2, 4, 8, 16 (second)			
Short circuit protection setting current	Isd	$1.5 \sim 10 \times$ Ir (0.5 unit)		$1.5 \sim 10 \times$ Ir (0.5 unit)			
Tripping time (Short circuit)	tsd	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)		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)			
Instantaneous protection setting current	Ii	40~160A : $1.5 \sim 15 \times$ In (0.5 unit) 250~400A : $1.5 \sim 12 \times$ In (0.5 unit) 630~800A : $1.5 \sim 11 \times$ In (0.5 unit)		40~160A : $1.5 \sim 15 \times$ In (0.5 unit) 250~400A : $1.5 \sim 12 \times$ In (0.5 unit) 630~800A : $1.5 \sim 11 \times$ In (0.5 unit)			
Earth fault protection setting current	Ig	40A : $0.45 \sim 1.0 \times$ In (0.05 unit) 100A : $0.35 \sim 1.0 \times$ In (0.05 unit) 160A : $0.25 \sim 1.0 \times$ In (0.05 unit) In > 160A : $0.2 \sim 1.0 \times$ In (0.05 unit)		40A : $0.45 \sim 1.0 \times$ In (0.05 unit) 100A : $0.35 \sim 1.0 \times$ In (0.05 unit) 160A : $0.25 \sim 1.0 \times$ In (0.05 unit) In > 160A : $0.2 \sim 1.0 \times$ In (0.05 unit)			
Tripping time (Earth fault)	tg	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)		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)			
Additional functions		Selective protection (ZSI)		Selective protection (ZSI)			

Rated specifications

Susol Smart MCCB

| Type		TS100			TS160				TS250			TS400			TS630			TS800		
Fame size	[AF]	100			160				250			400			630			800		
Rated current, In	[A]	40, 100			40, 100, 160				40, 100, 160, 250			250, 400			250, 400, 630			630, 800		
No. of poles		3, 4			3, 4				3, 4			3, 4			3, 4			3, 4		
Rated operational voltage, Ue [AC]	[V]	690			690				690			690			690			690		
Rated impulse withstand voltage, Uimp	[kV]	8			8				8			8			8			8		
Rated insulation voltage, Ui	[V]	1000			1000				1000			1000			1000			1000		
		Ni	Hi	Li	Ni	Hi	Li		Ni	Hi	Li	Ni	Hi	Li	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		100	120	200	100	120	200	100	120	200	100	120	200
380/415V	[kA]	50	85	150	50	85	150		50	85	150	65	85	150	65	85	150	65	100	150
440/460V	[kA]	50	70	130	50	70	130		50	70	130	65	85	130	65	85	130	65	100	130
480/500V	[kA]	42	65	85	42	65	85		42	65	85	42	65	85	42	65	85	42	85	100
525V	[kA]	22	35	50	22	35	50		22	35	50	22	35	50	22	35	50	22	35	50
660/690V	[kA]	10	10	10	10	10	10		10	20	35	10	20	35	10	20	35	10	20	35
Rated service breaking capacity, Ics — AC 50/60Hz — 220/240V	[kA]	100	120	200	100	120	200		100	120	200	100	120	200	100	120	200	100	120	200
380/415V	[kA]	50	85	150	50	85	150		50	85	150	65	85	150	65	85	150	65	100	150
440/460V	[kA]	50	70	130	50	70	130		50	70	130	65	85	130	65	85	130	65	100	130
480/500V	[kA]	42	65	85	42	65	85		42	65	85	42	65	85	42	65	85	42	85	100
525V	[kA]	22	35	50	22	35	50		22	35	50	22	35	50	22	35	50	22	35	50
660/690V	[kA]	5	5	5	5	5	5		5	5	5	10	12	12	10	12	12	10	20	20
Rated short-circuit making capacity, Icm — AC 50/60Hz — 220/240V	[kA]	220	265	440	220	264	440		220	264	440	220	264	440	220	264	440	220	264	440
380/415V	[kA]	105	187	330	105	187	330		105	187	330	143	187	330	143	187	330	143	220	330
440/460V	[kA]	105	154	286	105	154	286		105	154	286	143	187	286	143	187	286	143	220	286
480/500V	[kA]	88	143	187	88	143	187		88	143	187	88	143	187	88	143	187	88	187	220
525V	[kA]	46	74	105	46	74	105		46	74	105	46	74	105	46	74	105	46	74	105
660/690V	[kA]	17	17	17	17	17	17		17	17	17	17	40	74	17	40	74	17	40	74
Category fo utilization		A			A				A			A			A			A		
Isolation behavior		■			■				■			■			■			■		
Trip unit(release) : Electronics — ETSi		■			■				■			■			■			■		
ETMi		■			■				■			■			■			■		
ETHi		■			■				■			■			■			■		
ETLi		■			■				■			■			■			■		
Connection — fixed — front-connection		■			■				■			■			■			■		
fixed — rear-connection		■			■				■			■			■			■		
plug-in — front-connection		■			■				■			■			■			■		
plug-in — rear-connection		■			■				■			■			■			■		
Basic dimensions, W × H × D (front-connection) — 3-pole	[mm]	105 × 160× 86			105 × 160× 86				105 × 160× 86			140 × 260 × 110			140 × 260 × 110			210× 320× 135		
4-pole	[mm]	140 × 160× 86			140 × 160× 86				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 model numbering

Rated current

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)
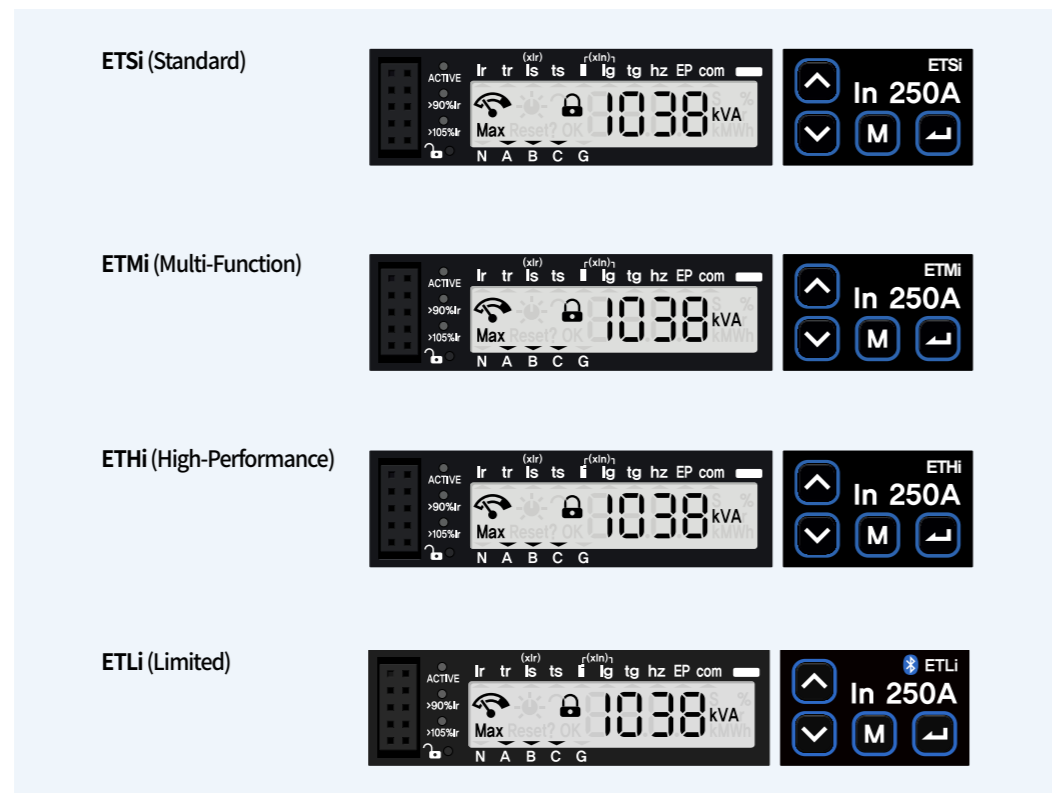
Trip Unit Rated current

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

| ETU		ETSi	ETMi	ETHi	ETLi
Button		●	●	●	●
LCD		●	●	●	●
Status LED		●	●	●	●
Test Port		●	●	●	●
Measurement	Current	●	●	●	●
	Power	-	-	●	●
Communication	RS485	-	●	●	●
	BLE	-	-	-	●

Smart Trip Unit

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
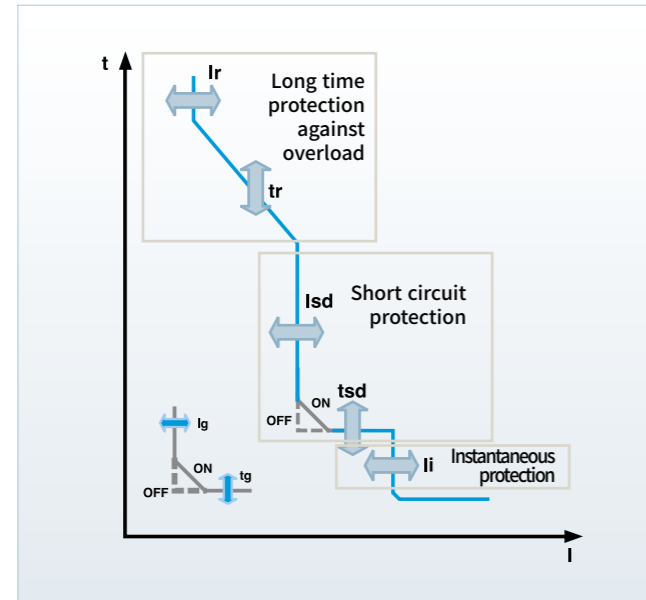
1) Long time overcurrent relay (Long time protection) : Performs caloric relay and the operating current (Ir) and operating time (tr) can be set.

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

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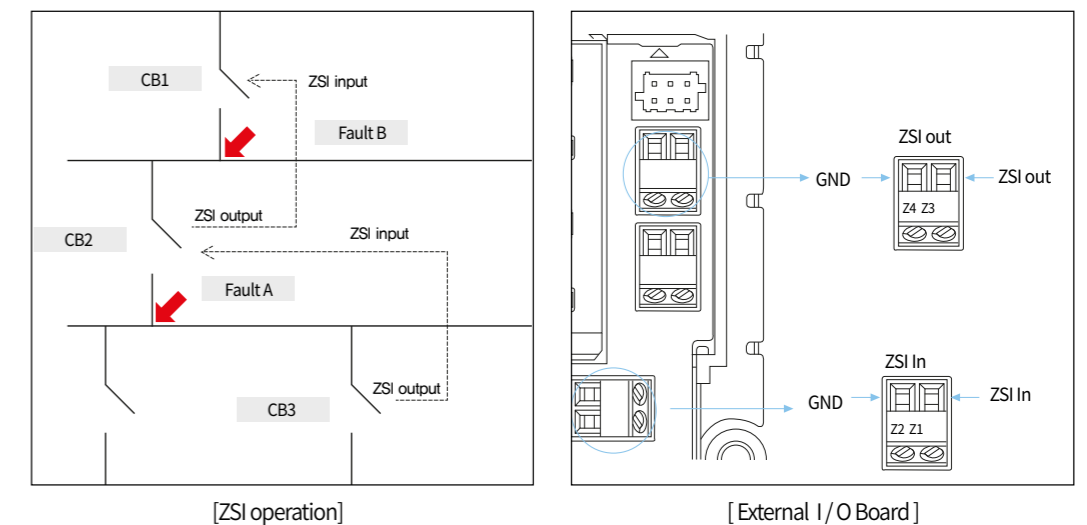
※Whether or not to use the ZSI function can be set in the ZSI PIN connection status and relay setting mode.
  (ZSI used: ZSI pin removed, ZSI not used : ZSI pin fastened)
  -When ZSI is set to enable, ZSI function operates.
  -ZSI input signal is input to External I/O Board input terminal.

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.